

**MEETING OF THE WATER RESOURCES COMMITTEE
OF THE BOARD OF DIRECTORS
WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA
4040 PARAMOUNT BOULEVARD, LAKEWOOD, CALIFORNIA 90712
12:00 P.M., WEDNESDAY, OCTOBER 1, 2008**

AGENDA

EACH ITEM ON THE AGENDA, NO MATTER HOW DESCRIBED, SHALL BE DEEMED TO INCLUDE ANY APPROPRIATE MOTION, WHETHER TO ADOPT A MINUTE MOTION, RESOLUTION, PAYMNET OF ANY BILL, APPROVAL OF ANY MATTER OR ACTION, OR ANY OTHER ACTION. ITEMS LISTED AS "FOR INFORMATION" MAY ALSO BE THE SUBJECT OF ANY "ACTION" TAKEN BY THE BOARD OR A COMMITTEE AT THE SAME MEETING.

- 1. DETERMINATION OF A QUORUM**
- 2. PUBLIC COMMENT**
- 3. APPROVAL OF THE MINUTES OF SEPTEMBER 3, 2008**
Staff Recommendation: Approve the minutes as submitted.
- 4. BASIN UPDATE**
Staff Recommendation: For information.
- 5. PORTUGUESE BEND, MALAGA COVE – METROPOLITAN WATER DISTRICT'S LOCAL PROJECTS PROGRAM**
Staff Recommendation: For information.
- 6. WATEREUSE FOUNDATION MEMBRANE RESEARCH PROJECT**
Staff Recommendation:
(1) Approve the co-funding agreement with Watereuse Foundation to contribute \$125,000 to the proposed Phase 1 membrane research project. (Actual WRD expense Is \$75,000 after cost sharing with USGVMWD and LACSD.)
(2) Approve a cash contribution of \$75,000 to share the costs with USGVMWD and LACSD to conduct the Phase 2 membrane research at SJCWRP.
- 7. USE OF RECYCLED WATER BY BP TO REDUCE GROUNDWATER DEMANDS**
Staff Recommendation: For information.
- 8. CONTRACT TERM EXTENSION FOR CARROLLO ENGINEERS**
Staff Recommendation: Extend the term of the contract with Carollo Engineers to December 31, 2009 with no additional cost to the District.
- 9. DIRECTORS REPORTS, INQUIRIES, REVIEW OF DIRECTIONS TO STAFF**
- 10. ADJOURNMENT**

Posted by Abigail C. Andom, Deputy Secretary, September 26, 2008.

In compliance with the Americans with Disabilities Act (ADA), if special assistance is needed to participate in the Board meeting, please contact Deputy Secretary Abigail Andom at (562) 921-5521 for assistance to enable the District to make reasonable accommodations.

All public records relating to an agenda item on this agenda are available for public inspection at the time the record is distributed to all, or a majority of all, members of the Board. Such records shall be available at the District office located at 4040 Paramount Boulevard, Lakewood, California 90712.

Agendas and minutes are available at the District's website, www.wrd.org.

UNAPPROVED
MINUTES

UNAPPROVED
MINUTES

**MINUTES OF SEPTEMBER 3, 2008
MEETING OF THE WATER RESOURCES COMMITTEE
OF THE BOARD OF DIRECTORS
WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA**

A meeting of the Water Resources Committee of the Board of Directors of the Water Replenishment District of Southern California was held on Wednesday, September 3, 2008, 12:15 p.m., at the District Office, 4040 Paramount Boulevard, Lakewood, California. Director Rob Katherman called the meeting to order and presided thereafter. Deputy Secretary Abigail C. Andom recorded the minutes.

1. DETERMINATION OF A QUORUM

Attendees at the meeting were as follows:

Committee: Directors Robert Katherman and Willard H. Murray, Jr.

Staff: Robb Whitaker, Bob Siemak, Ted Johnson,

2. PUBLIC COMMENT

None.

3. APPROVAL OF THE MINUTES OF JULY 9, 2008

The minutes were approved as amended.

4. ALAMITOS BARRIER TIER 1 IMPORTED WATER STORAGE AGREEMENT

General Manager Robb Whitaker stated that the proposed agreement is between WRD and Long Beach Water Department (LBWD) whereby the District would pre-purchase and store up to 2,000 acre-feet of Tier 1 imported water in 2008 for use in the Alamitos Barrier beginning in 2009. Mr. Whitaker explained that the agreement will result in savings of up to \$132,000 in Alamitos Barrier imported water purchases and will mitigate the effect of Metropolitan Water District's (MWD) 14% rate increase that goes into effect in January 2009.

The Committee recommended the Board authorize the General Manager to enter into an agreement with Long Beach Water Department to purchase and store up to 2,000 acre-feet of Tier 1 imported water in 2008.

5. WATER SUPPLY RELIABILITY VALUATION STUDY

General Manager Whitaker stated that water agencies traditionally conduct an economic analysis for water supply projects that compare the benefits derived from the project to the life-cycle costs of the project (capital and operation & maintenance costs). He explained that the analysis would help to determine the economic feasibility of a project. Mr. Whitaker noted that one significant benefit that has not been included in the economic analysis is the value of water reliability. He explained that placing an accurate value of that reliability will allow WRD to make water supply decisions that represent the most reliable water supply solutions.

Mr. Whitaker stated that WRD was approached by the National Water Resource Institute (NWRI) to jointly fund a study that would determine the value of reliability for WRD's ongoing and future water supply projects. He noted that study costs, estimated at \$150,000, would be shared equally by WRD, West Basin MWD and NWRI. The District's share is \$50,000 and is included in the current fiscal year budget.

The Committee recommended the Board authorize the General Manager to enter into a Memorandum of Understanding with the National Water Research Institute for the Water Supply Reliability Valuation Study.

6. MEMORANDUM OF UNDERSTANDING WITH UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT AND LOS ANGELES COUNTY SANITATION DISTRICTS ON AN ADVANCED WATER TREATMENT PLANT IN THE MONTEBELLO FOREBAY

General Manager Whitaker stated that, for the first time in its 50-year history, the District has no available imported water for groundwater recharge at any price for an entire year. He explained that WRD is looking at creating a locally sustainable groundwater supply that would eliminate dependence on imported water for groundwater replenishment.

Mr. Whitaker stated that historically WRD has purchased both imported water and recycled water for replenishment in the Montebello Forebay spreading grounds. He explained that WRD would purchase additional recycled water from the Los Angeles County Sanitation Districts (LACSD), which would otherwise flow into the ocean, for replenishment in the Montebello Forebay. He noted that it is the District's intention to use the available reliable, high quality, and cost-effective recycled water to ultimately replace the 21,000 acre-feet of imported replenishment water.

Mr. Whitaker stated that a similar imported water shortage is facing the Upper San Gabriel Valley Municipal Water District (USGVMWD). He informed everyone that WRD and USGVMWD have discussed development of a joint project, construction of an advanced water treatment plant, which would increase the use of recycled water for replenishment and also achieve economics of scale. He noted that a joint project would also have a regional water supply benefit which would enhance the potential of receiving Proposition 84 funds and other state and federal funding.

Mr. Whitaker stated that USGVMWD authorized a contract with Montgomery Watson Harza (MWH) to prepare a preliminary design report for a project that would satisfy their ultimate groundwater replenishment requirement of 25,000 acre-feet per year. He stated that WRD and LACSD requested that USGVMWD expand the scope of work to include the joint project with an ultimate capacity of 46,000 acre-feet per year. USGVMWD agreed and will continue to be the contracting agency for the

study with WRD and LACSD reimbursing USGVMWD for their share of the efforts.

Mr. Whitaker stated that the three agencies propose to work together and execute a Memorandum of Understanding (MOU) to jointly fund a Preliminary Development Plan for the joint project. The scope of the plan is to define the project, including treatment requirements, site selection and development, phasing and cost estimates.

Discussion followed. The Committee recommended that Board authorize the General Manager to sign the Memorandum of Understanding Concerning Development of an Advanced Water Treatment Plant in the Montebello Forebay between Upper San Gabriel Valley Municipal Water District, Water Replenishment District of Southern California and Sanitation Districts of Los Angeles County.

- 7. TRAVEL REQUEST FOR AWWARF RESEARCH PROJECT - DENVER**
Chief Hydrogeologist Ted Johnson stated that he is on a four-member project advisory committee (PAC) peer review panel for an American Water Works Association Research Foundation (AWWARF) project on carbon sequestration. Mr. Johnson stated that the objective of the project is to assess potential impacts to groundwater if carbon dioxide is injected into the deep earth for disposal instead of being released to the atmosphere where it can contribute to green house gas problems. He noted that AWWARF has requested the PAC members to meet and will pay for his air fare, hotel accommodations, ground transportation, and meals. The meeting will be held October 14-15, 2008 in Denver, Colorado.

The Committee recommended the Board approve Mr. Johnson's out-of-state travel, at AWWARF's expense, to attend the AWWARF Project Advisory Committee (PAC) meeting to be held in Denver, Colorado on October 14-15, 2008.

- 8. UPDATE ON VANDER LANS ADVANCED WATER TREATMENT FACILITY**
Chief Engineer Bob Siemak provided an update on the Leo J. Vander Lans Water Treatment Facility. Mr. Siemak stated that the plant has recently experienced problems with its membranes causing a decrease in plant efficiency.
- 9. DIRECTORS REPORTS, INQUIRIES, REVIEW OF DIRECTIONS TO STAFF**
Director Katherman requested an update on the Portuguese Bend and Malaga Cove at next month's meeting. He also asked that an WRD/WBMWD Ad Hoc meeting be scheduled.

10 ADJOURNMENT

With no further business for the Committee, the meeting was adjourned at 2:10 p.m.

Chairperson

ATTEST:

Director



MEMORANDUM

ITEM NO. 4

Prepared by: Ted Johnson

Reviewed by: Ted Johnson

Approved by: Robb Whitaker

DATE: OCTOBER 1, 2008
TO: WATER RESOURCES COMMITTEE
FROM: ROBB WHITAKER, GENERAL MANAGER
SUBJECT: BASIN UPDATE

SUMMARY

Staff has worked with the Los Angeles County Department of Public Works (DPW) to receive storm water captured from last winter's precipitation behind Morris Dam in the San Gabriel Mountains. The intent was to release water from the dam and share it between the Main San Gabriel Basin (MSGB) and the Central Basin. However, for the water to reach Central Basin it has to travel approximately 20 miles down lined and unlined river channels, soaking in to the MSGB and evaporating along the way. Therefore, because this type of release has not been attempted in recent years, it was considered a test to determine how much reservoir water would reach Central Basin under various operating conditions. Information from the test will be used for future years as reservoir release water is available.

On July 7, 2008, Morris Dam began releasing 337 cubic feet of water per second (cfs, or 668 acre feet per day, afd) down the San Gabriel River. All of this water soaked into the unlined San Gabriel River in MSGB and none of it reached Central Basin. Therefore, on July 22 the DPW increased the flow to 460 cfs (912 afd) but only about 7% reached Central Basin (32 cfs or 63 afd) with the majority still infiltrating into the Main San Gabriel Basin. On July 29 the outflow from Morris Dam was increased to 550 cfs (1,091 afd) and continued until August 9. Much more water reached Central Basin via the San Gabriel River (about 30% of the 550 cfs released), for a total over the entire test estimated at 4,300 af.

Morris Reservoir was allowed to refill from upstream reservoirs between August 9 and September 8. Then on September 9 releases were initiated again. In an attempt to get more water to Central Basin, the DPW routed the water through Peck Pit and the mostly concrete-lined Rio Hondo instead of the unlined San Gabriel River which was used for the July/August test. Shut off is scheduled for September 28. It is estimated that approximately 6,700 af will be recharged in the Central Basin from the September releases, for a total replenishment of 11,000 af for the entire test. This is less than the 23,000 af originally anticipated, but still very beneficial as recharge water to the groundwater users of the Central Basin. And the test provided information as to the river bed infiltration rates in the MSGB which will lead to improvements in reservoir water release deliveries to Central Basin in the future.

In other developments, September 30, 2008 marks the end of the Water Year. Staff will be busy in October compiling the numbers for pumping, spreading, and injection which will be used to calculate basin conditions over the year. Reports will be made back to Committee.

FISCAL IMPACT

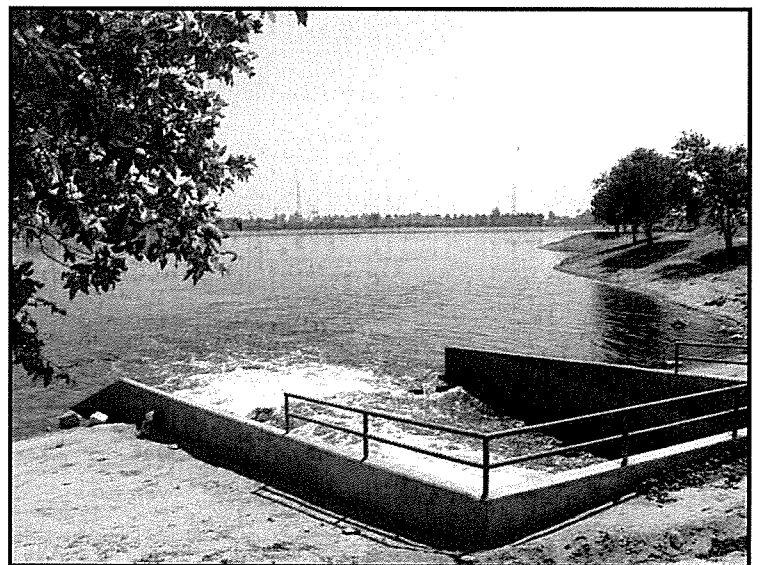
The estimated 11,000 af of reservoir release water was received at no cost to WRD. If this was purchased as imported water for replenishment through Metropolitan Water District, it would have cost nearly \$3,000,000.

STAFF RECOMMENDATION

For information.



Below Morris Dam - Start of Water Flow Journey



Rio Hondo Spreading Grounds - End of Journey



MEMORANDUM

ITEM NO. 5

Prepared by: Jason Weeks

Reviewed by: Ted Johnson

Approved by: Robb Whitaker

DATE: OCTOBER 1, 2008

TO: WATER RESOURCES COMMITTEE

FROM: ROBB WHITAKER, GENERAL MANAGER

SUBJECT: PORTUGUESE BEND, MALAGA COVE – METROPOLITAN WATER DISTRICT'S LOCAL PROJECTS PROGRAM

SUMMARY

The Abalone Cove Landslide Abatement District (ACLAD) is an organized homeowners association that installs and maintains dewatering wells to lower the water table in the portion of the PV Hills near the Portuguese Bend Landslide area (Abalone Cove Landslide to be specific) in an attempt to mitigate the threat of future landslides. There are about 20 dewatering wells which extract variable amounts of water based on precipitation. On average, these wells produce a total of about a half acre foot per day, or close to 200 acre-feet per year. This extracted water is piped across Palos Verdes Drive South and discharged to the ocean.

Although they do not have detailed water quality data, the extracted water quality appears poor. Electrical conductivity of the extracted water is between 4,000 to 8,000, uS/cm meaning that the TDS can be converted to about 3,000 ppm to 6,000 ppm.

In addition, a separate project known as Malaga Cove has nuisance water that may be able to put to beneficial use. District staff has been coordinating with WBWMD staff to determine if there is a method of conserving this water with funding assistance from MWD through its programs to develop local water supply projects.

A WBWMD staff member is anticipated to attend the Committee meeting to provide an update on the MWD process.

FISCAL IMPACT

None.

STAFF RECOMMENDATION

For information.

MEMORANDUM

ITEM NO. 6

Prepared by: Paul Fu

Reviewed by: Bob Siemak

Approved by: Robb Whitaker

DATE: OCTOBER 1, 2008

TO: WATER RESOURCES COMMITTEE

FROM: ROBB WHITAKER, GENERAL MANAGER

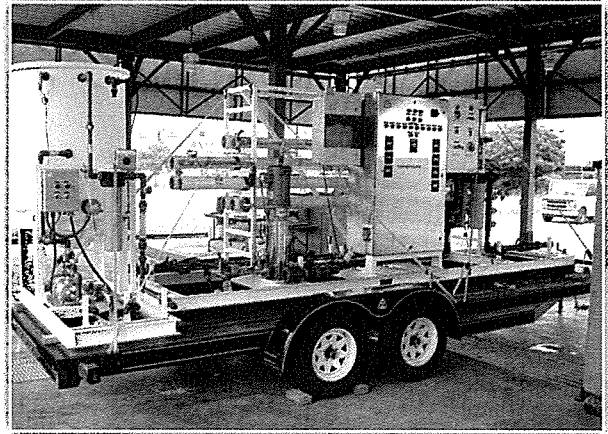
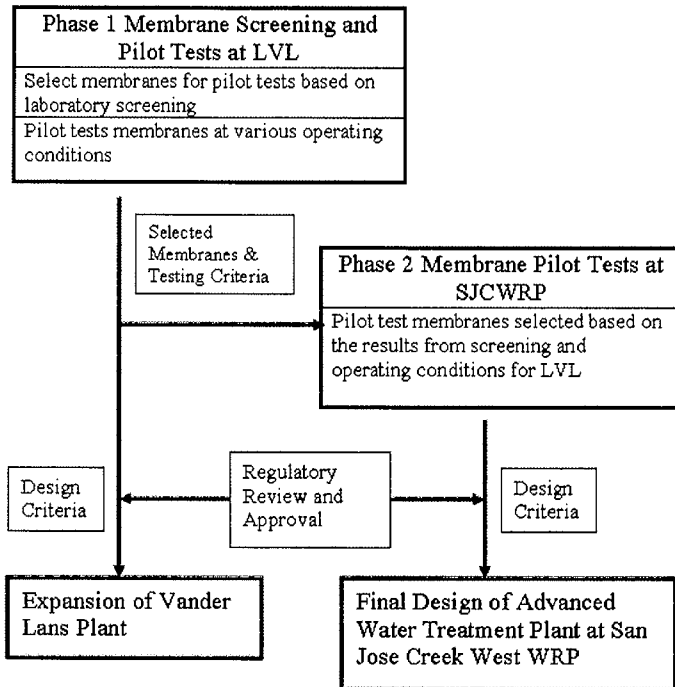
SUBJECT: WATEREUSE FOUNDATION MEMBRANE RESEARCH PROJECT

SUMMARY

The District has recently received funding of \$100,000 from the WaterReuse Foundation (WRF) to conduct a research pilot study at the Vander Lans Water Treatment Facility (LVL) using new-generation nanofiltration (NF) and low-pressure reverse osmosis (RO) technologies. The new-generation membranes, if installed at the LVL, may significantly improve the efficiency of the facility's operations. This study will provide critical data for acceptance of NF for recycled water treatment for groundwater recharge by the regulatory authorities. The key technology lead person from the California Department of Public Health (CDPH) has committed to serve as a member of the technical advisory committee for this project. Psomas and the Colorado School of Mines are contracted by WRF to conduct the research.

WRD, Upper San Gabriel Valley Municipal Water District (USGVMWD), and Los Angeles County Sanitation Districts (LACSD) are working collaboratively to increase the beneficial use of recycled water and are exploring the feasibility of a cooperative project that will increase the use of recycled water by nearly 50,000 acre-feet per year. The common goal is to maximize the use of recycled water. To this end, a collaborated effort from the three agencies to conduct a pilot study on new-generation membranes at both WRD's LVL Facility and LACSD's San Jose Creek Water Reclamation Plant (SJCWRP) is an important step toward achieving that goal. The study will help in selecting specialty membranes that would meet regulatory requirements while producing higher recovery (i.e., less waste) with lower energy and chemical costs than traditional RO membranes. With approval from regulatory authorities, the pilot tests will provide membrane design criteria for the future advanced water treatment plant at SJCWRP, the expansion of the LVL facility and future planned facilities by LACSD.

A project team represented by members of the three agencies has discussed the objectives and technical approaches for this study. The team has agreed that the previously selected and funded pilot study for LVL be expanded to include testing at the SJCWRP as a follow-up stage after the initial membrane screening test at LVL. A diagram delineating the sequence of testing is shown below.



The study is scheduled to start in October 2008 with membrane screening tests under the Phase 1 test program for LVL. The Phase 1 screening tests will select candidate membranes and testing criteria for the follow-up Phase 2 pilot tests at the SJCWRP facilities. The LACSD is currently constructing a membrane pilot unit and is expected to be used for the tests at SJCWRP starting in spring 2009. The overall project will last for approximately 16 months. More details about the joint research project are described in the attached study workplan.

The three agencies have agreed on the budget shown below to conduct this expanded study. The total cash contribution from USGVMWD is \$100,000. The LACSD is expected to contribute \$25,000 cash plus a Phase 2 in-kind contribution in the amount of \$91,000 for laboratory analyses and operations of the pilot unit at SJCWRP. WRD will provide a total of \$150,000 cash for the entire project.

Phase 1 Membrane Screening and Pilot Testing at LVL

WaterReuse Cash Funding	\$100,000
WRD Cash Contribution	\$75,000
USGVMWD Cash Contribution	\$25,000
LACSD Cash Contribution	\$25,000
<i>Total Cash Budget for LVL</i>	<i>\$225,000</i>

Phase 2 Pilot Testing at SJCWRP

WRD Cash Contribution	\$75,000
USGVMWD Cash Contribution	\$75,000
<i>Total Cash Budget</i>	<i>\$150,000</i>
LACSD In-kind Contribution	\$91,000
<i>Total Budget for SJCWRP</i>	<i>\$241,000</i>

WRF will administer the Phase 1 project. The attached draft co-funding agreement between WRD and WRF has been reviewed by the District's counsel. The agreement requires that WRF and WRD to share a cash budget of \$225,000, with WRF funding \$100,000 and WRD paying \$125,000. Of the WRD's share of \$125,000, USGVMWD and LACSD will each contribute \$25,000 to WRD.

LACSD will conduct the majority of the Phase 2 study with technical consultation and reviews by WRD and USGVMWD. The WRD is sending letters to USGVMWD and LACSD to obtain written confirmation for commitment to the joint project. Separately, the three agencies will seek additional funding from the WRF in FY 2009/10 for the expanded research study.

FISCAL IMPACT

WRD's share of the proposed membrane research project is \$150,000. The FY 08/09 budget has \$75,000 to cover the Phase 1 research. An additional \$75,000 will be budgeted in FY09/10 for the Phase 2 research.

STAFF RECOMMENDATION

- (1) Approve the co-funding agreement with WateReuse Foundation to contribute \$125,000 to the proposed Phase 1 membrane research project. (Actual WRD expense is \$75,000 after cost sharing with USGVMWD and LACSD.)
- (2) Approve a cash contribution of \$75,000 to share the costs with USGVMWD and LACSD to conduct the Phase 2 membrane research at SJCWRP.

Maximizing Recovery of Recycled Water for Groundwater Recharge Employing an Integrated Membrane System

An Add-on Opportunity to Participate in the
WateReuse Foundation 2008 Collaborative Research Program

Upper San Gabriel Valley Municipal Water District (USGVMWD)
County Sanitation Districts of Los Angeles County (LACSD)
Water Replenishment District of Southern California (WRD)

Governor Schwarzenegger issued a proclamation of a statewide drought on June 4th, 2008, and Metropolitan Water District of Southern California (MWD) followed up with adoption of a resolution by its board of directors on June 10th declaring a “Water Supply Alert” throughout its entire service area. The “Water Supply Alert” has been issued in response to record dry conditions in the state over the past two years, as well as court-ordered pumping restrictions from the Sacramento-San Joaquin Delta that have significantly reduced imported water deliveries from Northern California to Southern California. By issuing a call for Southern Californians to implement water conservation measures for the rest of 2008, and perhaps beyond, MWD seeks to lessen demand in order to preserve the region’s water supply reserves.

Groundwater provides 40% of the water supply in WRD’s service area and 90% of the supply in the Main San Gabriel Basin, highly urbanized areas that comprise nearly 15% of the state’s population. WRD and Main San Gabriel Watermaster typically use over 60,000 acre-feet of imported water annually for surface spreading to replenish the Central Basin and the Lower San Gabriel Basin. Replacing imported water used for spreading with recycled water will increase the reliability of these basins and decrease demand for water imported from the Colorado River and Northern California. The future availability of imported water is itself uncertain. For the first time in the history of the region, imported replenishment water has not been available for an entire year. It is also projected that MWD will only have replenishment water available approximately 2 years in every 10 years. Additional benefits of replacing imported water with recycled water include the reduction in volume of effluent to the ocean and a reduction in energy load. An acre-foot of recycled water produced locally is four to five times more energy efficient than a like amount imported from the Colorado River or Northern California.

To assure a reliable supply for spreading and replenishment, to reduce demand on imported water for that purpose, to reduce the energy burden on supply and to reduce the volume of effluent to the ocean, WRD, USGVMWD and LACSD are working collaboratively to increase the beneficial use of recycled water and are exploring the feasibility of a cooperative project that will increase the use of recycled water by nearly 50,000 acre-feet per year. Our common goal is to maximize the use of recycled water. To this end, a collaborated effort from the three agencies to conduct a pilot study on an integrated membrane treatment system at both WRD’s Leo J. Vander Lans Water Treatment Facility (LVL) and LACSD’s San Jose Creek Water Reclamation Plant (SJCWRP) is an important step toward achieving that goal. The study will help in selecting specialty membranes that would meet regulatory requirements while producing higher recovery (i.e., less waste) with lower energy and chemical costs than traditional RO membranes.

The WRD's Leo J. Vander Lans Water Treatment Facility (LVL) is a three-million-gallon per day (mgd) facility commissioned in 2005. It uses an integrated membrane system consisting of microfiltration (MF) followed by a conventional reverse osmosis (RO) membrane process for purification of the tertiary treated Title 22 effluent from LACSD's Long Beach Water Reclamation Plant (LBWRP). Treated water from LVL is transferred to the blend station of Alamitos Seawater Intrusion Barrier for aquifer injection to deter the flow of natural saline water into the groundwater basin. The LVL product water represents a significant part of the WRD's long-term plan to maximize beneficial use of the recycled water and is currently replacing up to 50% of the imported water purchased by the WRD from the MWD. It is WRD's goal to increase the yield of the LVL to expand the usage of recycled water for Barrier injection and further reduce its reliance on water purchased from the MWD. To reach that goal, the WRD is leading the effort to investigate alternative technologies to maximize water recovery of the membrane system while minimizing waste generation at LVL.

The WRD has also been recharging groundwater basins for several decades through spreading basins in the Montebello Forebay using Title 22 water from LACSD's SJCWRP. In order to meet WRD's long-term goal to maximize use of the recycled water, increased spreading at the Montebello Forebay is planned. In addition, USGVMWD's goal is to replace imported water that is used for groundwater recharge in the Main San Gabriel Basin with reclaimed water. To achieve this common goal, treatment of Title 22 water from the SJCWRP with an integrated membrane system would be required under the new regulations for groundwater recharge with reclaimed water proposed by the California Department of Public Health (CDPH).

WRD has recently received funding of \$100,000 from the Water Reuse Foundation (WRF) to conduct a research pilot study at the LVL using nanofiltration (NF) and low-pressure RO technologies. This study will provide critical data for acceptance of NF for recycled water treatment for groundwater recharge by the regulatory authorities. The key technology lead person from the CDPH has committed to serve as a member of the technical advisory committee for this project.

It is proposed that the previously selected and funded pilot study be expanded to include testing at the SJCWRP as a follow-up stage after the initial membrane screening test at LVL. A diagram delineating the sequence of testing is shown in Figure 1. The study is scheduled to start in October 2008 with membrane screening tests under the LVL test program. The screening tests will select candidate membranes and testing criteria for the follow-up pilot tests at the LVL and the SJCWRP facilities. The LACSD is currently constructing a membrane pilot unit and is expected to be used for the tests at SJCWRP starting in spring 2009. The overall project will last for approximately 16 months. With approval from regulatory authorities, the pilot tests will provide membrane design criteria for the future advanced water treatment plant at SJCWRP and the expansion of the LVL facility.

The budget to conduct this expanded study is shown below.

Membrane Screening and Pilot Testing at LVL

WRF Cash Funding	\$100,000
WRD Cash Contribution	\$75,000
USGVMWD Cash Contribution	\$25,000
<u>LACSD Cash Contribution</u>	<u>\$25,000</u>
<i>Total Cash Budget for LVL</i>	<i>\$225,000</i>

Pilot Testing at SJCWRP

WRD Cash Contribution	\$75,000
<u>USGVMWD Cash Contribution</u>	<u>\$75,000</u>
<i>Total Cash Budget</i>	<i>\$150,000</i>
<u>LACSD In-kind Contribution</u>	<u>\$91,000</u>
Total Budget for SJCWRP	\$241,000

A detailed description of the expanded study is provided in the paragraphs below.

Understanding of the Problem

Although very effective for the removal of most dissolved constituents present in wastewater, reverse osmosis (RO) and low-pressure RO membranes (LPRO) require relatively high operating pressures between 150 and 300 psi to achieve a permeate flux rate of 10 to 12 gfd while achieving a system recovery of 75 to 85 percent (Bartels et al., 2004; Lopez-Ramirez et al., 2006; Wilf and Alt, 2000). Nanofiltration (NF), and to a lesser extent, the new generation of LPRO membranes, may provide the opportunity to reduce feed pressures and operating costs associated with RO treatment while providing similar permeate water quality and increased permeate flux and recovery. Although NF has been implemented in various water purification applications, these applications have generally been limited to treating surface water and groundwater for the production of drinking water (Duranceau et al., 1992; Schäfer et al., 2005; Ventresque & Bablon, 1997; Ventresque et al., 2000). In a recent study funded by AwwaRF and WRF, numerous NF membranes were evaluated and tested for water recycling applications to replace conventional RO membranes while achieving similar product water qualities at lower operating pressures (Drewes et al. 2008). Findings of the study revealed that significant cost savings associated with lower feed pressure is limited to low fouling loose NF membranes. During the testing period, the NF-4040 (Dow/Filmtec) sustained pressures 3–4 times lower than the feed pressure of conventional RO membranes currently employed at full-scale facilities. These lower feed pressures would result in potential savings of \$0.03–0.08 per m³ (\$0.1–0.3 per kgal) as compared to current installations using conventional RO (Bellona and Drewes 2007). There is the potential to gain additional benefits from NF membranes by operating at higher permeate flux and higher overall system recoveries given the high permeability of many NF membranes.

One operational issue associated with the implementation of membrane technology for the reclamation of municipal wastewater is membrane fouling and subsequent flux decline (AWWA, 2005; Speth et al., 2000; Vrouwenvelder et al., 2002; Wilf and Alt, 2000). The worst-case scenario of implementing NF and LPRO would be the negation of cost saving benefits if they exhibited greater flux decline than conventional RO membranes. Although operational conditions can be optimized in order to minimize fouling, it appears from relevant literature that certain membranes foul faster and experience greater flux decline than others (Cho et al., 1999, Xu et al. 2005, Gwon et al., 2003, Vrijenhoek, et al. 2001). Identifying low-fouling NF and LPRO membranes is critical for energy savings, and a study previously conducted by Drewes et al. (2008) developed and utilized a novel membrane-fouling test to select membrane for pilot-scale testing. By conducting fouling tests, membranes that exhibited little flux decline could be identified and selected for pilot- and full-scale applications, minimizing the risk that candidate NF and LPRO membranes would foul considerably in a short time period.

The State of California Department of Public Health (CDPH) has proposed draft regulations for groundwater recharge with reclaimed water (CDPH, 2007). In addition to total nitrogen, CDPH has selected total organic carbon (TOC) as a parameter to be monitored in recycled water. Previous research has demonstrated that while NF and LPRO membranes can achieve a high removal of TOC, the rejection of inorganic monovalent ions such as ammonia and nitrate can be low depending on the membrane (Lee and Lupetow, 2001; Van der Bruggen et al., 2001; Bellona and Drewes, 2007). The rejection of inorganic ions has been shown to be strongly dependent upon membrane properties (e.g., pore size, surface charge), operating conditions (e.g., permeate flux), and feed water chemistry (e.g., pH, ionic strength) (Bowen, Lee and Lueptow, 2001). Recent studies investigating the viability of NF and RO membranes for potable water treatment technologies have reported the incomplete rejection of various endocrine disruptors (synthetic and natural hormones), pharmaceutically active compounds, disinfection by-products, and other organic compounds by RO, ULPRO and NF membranes (Kimura et al., 2003; Kimura et al., 2004; Ng & Elimelech, 2004; Nghiem et al., 2004; Schäfer et al., 2003). Most of these studies investigating trace contaminant rejection have been performed on bench-scale using flat-sheet membrane units or dead-end filtration cells and high feed water solute concentrations typically with rather short membrane operating times varying between a few hours to a couple of days. Many studies have also utilized deionized water spiked with target solutes as well as virgin membrane specimens neglecting water matrix effects and membrane property changes due to fouling commonly observed in full-scale membrane applications. Bench-scale membrane testing alone is also limited to properly investigate the effect of higher permeate flux on water quality and membrane fouling. In order to properly evaluate the rejection performance of NF and LPRO membranes under conditions representative of full-scale, a more thorough investigation of rejection on pilot-scale is required.

Task 1 — Selection of Candidate Membranes

Based upon previous studies funded by AwwaRF/WRF, three promising NF membranes and one LPRO membrane will be targeted in this phase of study, including NF-90, NF-4040 (Dow/Filmtec); TFC-S (Koch); and ESPA2 (Hydranautics) (Table 1). These membranes were pre-selected due to their high flux rates at low-pressure and low fouling propensity. The ESPA2 membrane will serve as the baseline membrane since it is currently employed at WRD's Vander Lans Water Treatment Facility (LVL) as well as other facilities utilizing integrated membrane systems for groundwater recharge (i.e., OCWD, WBMWD).

Table 1. Candidate Membrane Properties

Candidate Membrane	ESPA2	TFC-S	NF-90	NF-4040
Classification	RO/ULPRO	NF	NF	NF
Manufacturer	Hydranautics	Koch	Dow/Filmtec	Dow/Filmtec
Material	Polyamide	Polyamide	Polyamide	Polypiperazine amide
NaCl Rejection (%) [†]	99	80	90	40 – 60
Pure Water Specific Flux (gfd/psi) [‡]	0.2	0.23	0.3	0.37
MWCO (Daltons) [‡]	<100	~150	~100	~200

[†]From manufacturer. [‡]Computed during rejection experiments. gfd — permeate flow (gallons per day) per area (ft²)

Candidate Membrane Screening

A laboratory testing protocol previously developed at the Colorado School of Mines (CSM) (Drewes et al. 2008) will be implemented to screen commercially available membranes presented in Table 1 in regards to performance criteria considered important for treating wastewater effluents. These performance criteria include fouling propensity, operational performance and rejection performance.

Fouling Propensity: The fouling propensity of candidate membranes will be evaluated utilizing two bench-scale flat-sheet SEPA (GE/Osmonics) test cells run in parallel. Prior to fouling experiments, feed water from the LVL facility will be characterized in terms of water quality parameters relevant to membrane fouling including, but not limited to total organic carbon, size-exclusion chromatography with DOC detection as well as 3-D fluorescence spectroscopy to characterize the nature of dissolved organic carbon present in feed water, and major cations and anions. For fouling experiments, the wastewater effluent will be 0.2 μm filtered and pH adjusted to 6.3. Replicate candidate membranes will be fouled in parallel. One membrane will be operated at a target flux rate of 12 gfd, with the other operated at a higher flux of 16 gfd to understand the effect of permeate flux on fouling. Fouling experiments will be performed until flux decline stabilizes, generally after 40 to 100 hours of operation.

Operational Performance: The operational performance of candidate membranes will be evaluated utilizing a laboratory-scale membrane-testing unit consisting of two spiral-wound elements in series in 4040 configuration. The unit available at CSM, has a supervisory control and data acquisition (SCADA) system that downloads operational data including system flow rates and pressures. Candidate membrane operational performance treating wastewater effluent from the LVL facility or appropriate surrogate effluent will be assessed at CSM, including net driving pressure to achieve permeate flux set-points (10, 12, 14, 16, 18 gfd), specific flux, recovery (10 to 20 percent recovery per element) and initial flux decline due to fouling. One candidate membrane experiment will be performed over the course of 18 hours.

Rejection Performance: During operational performance experiments, the rejection performance of candidate membranes (Table 1) will be evaluated. Samples for water quality parameters relevant to the treatment of wastewater effluents will be monitored including total organic carbon, total nitrogen, ammonia and nitrate, major cations and anions, conductivity, UVA, and selected trace organic contaminants. A list of trace organic contaminants that will be analyzed by a GC/MS method (Reddersen and Heberer 2003) is presented in Table 2.

Table 2. List of Target Trace Organic Contaminants

Compound Category	Compounds
Pharmaceutically active compounds	Acetaminophen, caffeine, carbamazepine, clofibric acid, diclofenac, fenofibrate, gemfibrozil, ibuprofen, ketoprofen, naproxen, phenacetine, primidone
Plasticizer	Bisphenol-A
Pesticides	Dichloroprop, mecoprop
Chlorinated flame retardants	TCEP, TCPP, TDCPP

Compounds were selected to present a wide range of physicochemical properties of the contaminants, including hydrophobic non-ionic, hydrophilic non-ionic, and hydrophilic ionic.

Rejection experiments will be conducted with wastewater effluent as feed water. Where the wastewater effluent is non-nitrified, nitrate will be added to evaluate nitrate rejection. Trace organic contaminants will be spiked to achieve a nominal feed water concentration of 500 – 700 ng/L. Rejection experiments will be conducted at two flux rates of 12 and 18 gfd to evaluate the effect of permeate flux on rejection.

Evaluating Membrane Performance: The performance of candidate membranes as determined from bench-scale fouling experiments, and the 4040 configuration unit operation and rejection experiments will be used to select a membrane for pilot-scale testing at LVL and LACSD. A weighting and ranking procedure will be developed to evaluate the different performance parameters including flux decline due to fouling, virgin and fouled net driving pressure to achieve flux set-points, specific flux, and rejection of TOC, nitrogen, and trace organic contaminants. Candidate membrane performance results will be compared to the benchmark ESPA2 membrane to determine benefits of employing each candidate membrane.

Task 2 — Membrane Experiments at LVL

At LVL, a mobile 4-stage, 20 gpm, pilot-scale membrane skid, shown below in Exhibit 1, using 4040 spiral-wound membrane elements available at CSM will be used in a 2:2:1:1 pressure vessel array. The pilot is equipped with a customized SCADA system to monitor and log flux, pressure, and selected water quality parameters online (e.g., pH, temperature, conductance).

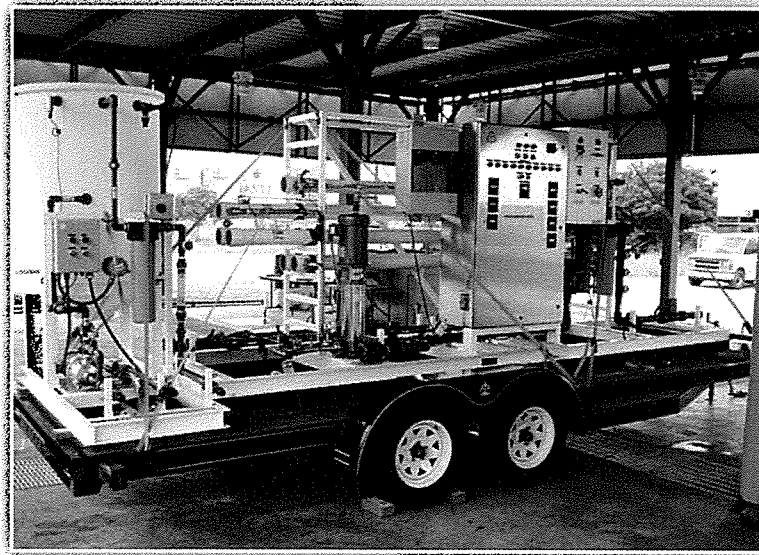


Exhibit 1. Proposed Four-Stage Mobile Pilot Scale Membrane Skid for Field Testing of Candidate Membranes

Microfiltration filtrate at the LVL will be diverted as the feed to the pilot-scale test unit. To demonstrate baseline performance, the pilot skid will be operated at a recovery of 82 percent and a permeate flux of 12 gfd for approximately 500 hours with pH adjustment to 6.3. This initial

testing phase is to validate whether comparable performance of the NF membrane to the ESPA2 membrane employed at full-scale, which will serve as control for the study, is reliably achievable. After a total initial run time of 500 hours, the recovery will be increased incrementally (every 500 hours) to 85 and 90 percent at permeate fluxes of approximately 14-15 gfd.

During these tests, weekly samples will be collected for TOC, ammonia, and nitrate, and additional samples will be collected for the selected trace organic compounds by CSM personnel during challenge tests (Table 2). Flow and feed as well as permeate water quality data (pH, conductivity) will be logged continuously through the SCADA system. Routine (i.e., weekly) water samples will be analyzed (for TOC, ammonia and nitrate) either by Long Beach Water Department (LBWD) laboratory or a certified commercial laboratory. An estimated five campaigns of samples for trace organic compounds will be collected and shipped via overnight courier to CSM. Selected endocrine-disrupting compounds (EDCs), pharmaceutical residues, and personal care products will also be analyzed in order to determine if the treatment configuration is sufficient to meet possible future regulations. Sampling and analysis will follow strict QA/QC protocols.

Task 3 — Membrane Experiments at LACSD SJCWRP

In order to validate the concept of using low-pressure NF/RO membranes at higher permeate flux, a new pilot-scale unit being built by LACSD will be deployed at the SJCWRP to test the effect of the tertiary effluent on operational performance. The pilot-scale unit will be operated by LACSD staff. The initial membrane screening tests performed for the LVL will provide NF membrane selection criteria and testing conditions for the pilot tests at SJCWRP. It is expected that two NF membranes and one LPRO membrane (ESPA2) will be tested at the SJCWRP for approximately 1,500 hours each (approximately 9 weeks). The ESPA2 membrane will serve as the baseline and will be operated at a recovery of 82% and permeate flux of 12 gfd with pH adjustment to 6.3.

A microfiltration pilot unit will be leased from a MF manufacturer to treat tertiary effluent at the SJCWRP. The MF filtrate will be diverted as the feed to the RO/NF pilot-scale test unit. To demonstrate baseline performance, each of the selected NF membranes will be operated at a baseline recovery of 82 percent and a permeate flux of 12 gfd for approximately 500 hours to observe the performance of the membranes. After the initial run, the recovery will be increased to an elevated value, between 85 and 90 percent, and at a permeate flux between 14 to 16 gfd for approximately 1,000 hours. The extended run should indicate whether the membranes are capable of performing without fouling.

During these tests, weekly samples will be collected and analyzed for primary constituents including TOC, TDS, UV₂₅₄, chloride, organic nitrogen, ammonia, nitrite, and nitrate. Samples for secondary constituents consisting of general minerals will be collected every other week. Samples for selected trace organic contaminants (Table 3), including pharmaceutical compounds and endocrine-disrupting compounds (EDCs), will be collected three times during testing of each membrane. Additional samples for SOCs, VOCs, radioactivity, and other chemicals of concern (as specified in the existing groundwater recharge permits for recycled water) will be taken once during testing of each membrane. Analyses for the primary constituents, secondary constituents, and most of the trace organic compounds will be conducted by the LACSD's laboratory. The

remaining constituents will be analyzed by MWH's laboratory. Sampling and analysis will follow strict QA/QC protocols. Flow, pressure, as well as permeate quality data (pH, conductivity, and temperature) will be logged continuously through the SCADA system on the pilot unit.

Table 3. List of Target Trace Organic Contaminants for the SJCWRP Study

Compound	Description	Compound	Description
NDMA	DBP, Industrial chemical	Naproxen	Analgesic
Trimethoprim	Antibiotic	Diclofenac	Arthritis Analgesic
Acetaminophen	Analgesic	Ibuprofen	Analgesic
Azithromycin	Antibiotic	Bisphenol A	Plasticizer
Primidone	Anti-anxiety	Gemfibrozil	Anti-cholesterol
Erythromycin	Antibiotic	Triclosan	Antimicrobial
Sulfamethoxazole	Antibiotic	Estrone	Hormone
Fluoxetine	Anti-depressant	17 β - Estradiol	Hormone
Carbamazepine	Anti-seizure, analgesic	17 α - Ethynylestradiol	Synthetic Hormone
Atorvastatin	Anti-cholesterol	Progesterone	Hormone
Iopromide	X-ray contrast media	4-Nonylphenol	Surfactant metabolite
Furosemide	Diuretic	4-Octylphenol	Surfactant metabolite
Caffeine	Stimulant	TDCPP	Flame retardant
DEET	Insect repellent	TBEP	Flame retardant
TCEP	Flame retardant		

Task 4 — NF Membranes for Waste Stream Minimization

Integrated membrane systems employed to treat recycled water can achieve recoveries of up to 85 percent, resulting in 15 percent of brine that requires disposal. Treating RO brine through additional treatment steps can result in further recovery of water. A potential hybrid system for concentrate minimization proposed in this study is an RO/NF membrane process, where the brine of a primary RO will be further treated by NF. While NF treatment may not achieve the same permeate quality (due to concentration polarization effects) as the primary RO, the treatment step can recover additional water that could be returned to the head of the IMS process to increase the overall system recovery. This concept will be explored at CSM through a desktop study and controlled laboratory-scale experiments. The desktop study will employ membrane design models and consider different degrees of salt rejections, applied permeate fluxes, efficiencies of partial and full-stream RO/NF brine treatment, as well as the impact of recirculating NF permeate elevated in TDS to the head of the plant. The second effort will identify limitations of the proposed RO/NF hybrid system through controlled experiments. RO brine provided by the LVL will be employed as feed water to a 2-stage NF testing skid as described above employing 4040 spiral wound elements. Several different NF membranes will be tested for feed pressure requirements, and viable recoveries and brine and permeate qualities will be determined.

Maximizing Recovery of Recycled Water for Groundwater Recharge Employing an Integrated Membrane System

WRF Project Number: WRF-08-10

COFUNDING AGREEMENT

Between

WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA
4040 Paramount Boulevard
Lakewood, CA 90712

and

THE WATEREUSE FOUNDATION
1199 N. Fairfax Street, Suite 410
Alexandria, VA 22314

October 1, 2008

This Agreement is entered into between the Water Replenishment District of Southern California (hereafter "WRD"), a California non-profit corporation whose principal place of business is 4040 Paramount Boulevard Lakewood, CA 90712 and the WateReuse Foundation (hereafter referred to as "WateReuse"), a California non-profit corporation whose principal place of business is 1199 N. Fairfax Street, Suite 410, in Alexandria, VA 22314.

Article 1: Responsibilities

WateReuse, on behalf of the parties, will enter into Project Funding Agreement WateReuse Project Number WRF-08-10 with the Contractor to conduct a Collaboration Project titled, *Maximizing Recovery of Recycled Water for Groundwater Recharge Employing an Integrated Membrane System*. This Cofunding Agreement between WateReuse and WRD defines the roles and responsibilities of the parties in accomplishing the tasks of the Collaboration Project described in the Project Description in the attached Exhibit 1, which by this reference is made an integral part of this Agreement.

- 1.1 The WRD Project Manager on this project is Paul Fu. The WateReuse Project Manager on this project is Caroline Sherony.
- 1.2 WRD shall provide cofunding for the Work in Accordance with the provisions of 2.1 below.

Article 2: Cofunding/Payment

- 2.1 WRD agrees to pay WateReuse an amount of \$125,000 in United States currency for costs associated with the Collaboration Project. WateReuse's share will be \$100,000 in cash funding towards this project. WateReuse will invoice WRD at the above address for \$42,000 in January 2009, \$42,000 in July 2009 and \$41,000 in December 2009. The invoices will be sent to the attention of Paul Fu, Project Manager, WRD, 4040 Paramount Boulevard Lakewood, CA 90712.
- 2.2 WateReuse will be solely responsible for payment to the Contractor on a cost reimbursement basis. In the event that the Collaboration Project is terminated or this Agreement is terminated in accordance with its terms, WateReuse shall return to WRD within a reasonable time, any payments or part of payments made to WateReuse by WRD that have not been paid to the Contractor or reasonably incurred by the Contractor up to the date of termination.
- 2.3 Payment to WateReuse should be made by check within 30 days of the invoice date and sent to: WateReuse Foundation, 1199 N. Fairfax Street, Suite 410, in Alexandria, VA 22314; phone (703) 548-0880. The project number 'WRF-08-10' should be indicated on the check.

Article 3: Project Management/Reports

- 3.1 The Work will be conducted under the direction of WateReuse in coordination with a Project Advisory Committee (PAC) defined as expert volunteers selected by WateReuse and WRD to provide technical review, assistance, and/or expertise to WateReuse regarding the project. WRD shall be entitled to appoint one representative to the PAC, which may include a staff member from WRD.
- 3.2 Copies of all Interim and Final Project Deliverables furnished to WateReuse by the Contractor shall timely be furnished to WRD by WateReuse.
- 3.3 WateReuse shall provide the Final Report to WRD in PDF format within five (5) days of receipt from the contractor and five (5) hard copies at no extra charge will be given to WRD upon publication. Additional hard copies shall be provided at cost upon request by WRD.

Article 4: Intellectual Property Rights

- 4.1 Parties intend that WateReuse shall own all U.S. and world-wide copyright in the Interim, Draft Final and Final Deliverables as defined in Exhibit 2. The Foundation hereby grants WRD a royalty-free, nonexclusive license to reproduce, distribute, and prepare Derivative Works based upon, and publicly display and perform the Foundation's Intellectual Property. In the event that WateReuse publishes these deliverables, no changes will be made to the reports, software, and deliverables including but not limited to the front cover, back cover, title pages, and the body and contents of the reports, software, and deliverables.

Article 5: Intent to Publish

- 5.1 WRD understands that the purpose of this project is to further knowledge in the area of research covered by this project. It is likely that information concerning WRD will result from the project and may be published in the project deliverables. WRD will have the right to review the project deliverables and provide the Contractor with the reasonable opportunity to correct, or if correction will take an unreasonably long time, to respond to, any problems or difficulties uncovered by the data, information, or test results, all of which must occur prior to the publication or use of such information.

Article 6: Indemnification

- 6.1 A copy of the indemnification provision is found in Exhibit 2. If the Contractor shall be unwilling to agree to such indemnity provisions, due to such circumstances as state law or self insurance, WateReuse agrees to so inform WRD promptly and to advise WRD of the provisions that the Contractor is willing to accept.
- 6.2 It is agreed that both parties shall defend, indemnify and hold harmless each others elected officials, officers, directors, employees, agents and representatives, from and against any and all liability, loss, expense, attorney's fees, or claims, for injury arising out of the performance of this agreement.

Article 7: Disclaimer

- 7.1 The title page of the Final Report shall contain an acknowledgement that WRD is a co-sponsor of the project.
- 7.2 The Disclaimer page of the Final Report shall contain a disclaimer to include reference to and disclaim the liability of WRD. WRD will provide the disclaimer language to WateReuse prior to the execution of this agreement.

Article 8: Termination

- 8.1 Any party may at any time by written notice terminate this Agreement or suspend its performance without liability for compensation or damages if one of the other Parties fails to comply with any of its obligations under this Agreement and such failure, if capable of being remedied, remains unremedied for 30 days after being brought to its attention by written notice from the party not in default.
- 8.2 In the event that the PAC concludes that the Collaboration Project is not progressing satisfactorily, WateReuse will consult and take into consideration the views and recommendations of the PAC in

considering whether to terminate the Collaboration Project.

Article 9: Insurance

9.1 WateReuse shall require the Contractor to provide the insurance coverage as set forth in Exhibit 2.

Article 10: Time Frame

10.1 This Agreement shall commence on *[date agreement is signed]* and end on the End Date of the agreement with the Contractor.

Article 11: Miscellaneous

11.1 This Agreement represents the entire agreement of the parties, and there are no promises or understandings other than those stated herein.

11.2 None of the provisions, terms, and conditions contained in this Agreement may be added to, modified, superseded or otherwise altered, except by written instrument executed by the parties hereto.

11.3 This Agreement shall be construed and interpreted in accordance with the laws of the Commonwealth of Virginia.

11.4 Any notice given pursuant to the terms of this Agreement shall be in writing and sent to:

For WRD: Paul Fu, 562-275-4251, pfu@wrdd.org.

For WateReuse: Caroline Sherony, 703-548-0880, csherony@watereuse.org.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives, effective as of the date of the last signature below.

WATEREUSE FOUNDATION

WATER REPLENISHMENT DISTRICT OF CALIFORNIA

By: G. Wade Miller
Title: Executive Director

By: Rob Katherman
Title: President, Board of Directors

Date: _____

By: Willard H. Murray, Jr.
Title: Secretary, Board of Directors

**Approved As To Form
MEYERS, NAVE, RIBACK,
SILVER & WILSON**

James M. Casso
Attorneys for the Water Replenishment
District of Southern California

Attachments:

Exhibit 1 – Project Description
Exhibit 2 – WateReuse-Contractor Agreement



MEMORANDUM

ITEM NO. 7

Prepared by: Jason Weeks

Reviewed by: Bob Siemak

Approved by: Robb Whitaker

DATE: OCTOBER 1, 2008

TO: WATER RESOURCES COMMITTEE

FROM: ROBB WHITAKER, GENERAL MANAGER

SUBJECT: USE OF RECYCLED WATER BY BP TO REDUCE GROUNDWATER DEMANDS

BACKGROUND

District staff has been working with basin stakeholders to evaluate methods to more efficiently operate the West Coast groundwater basin. Groundwater replenishment in the basin occurs through the two injection well seawater barriers systems (Barriers), Dominguez Gap and West Coast, located within the Basin. These Barriers require either costly non-interruptible imported water or highly treated recycled water. Groundwater extractions in the vicinity of these Barriers have a direct impact on the quantity of water that must be purchased to maintain protective elevations. Reductions in groundwater extractions in the vicinity of these Barriers will result in reduced injection demands and associated cost savings to the District.

Much of the groundwater extracted in the vicinity of the Barriers is by oil refineries for non-potable industrial purposes. One such refinery, British Petroleum (BP), uses groundwater, recycled water and imported water to meet its demands.

BP wishes to expand its recycled water use in the next few years which would decrease its demand on imported water and may also reduce its groundwater demand, which has averaged 3,700 acre-feet per year over the past three years. BP is interested in obtaining up to 12.7 million gallons per day (mgd) of single pass reverse osmosis and up to 3.2 mgd of nitrified reclaimed water for their refinery operations.

WBMWD and BP have agreed to proceed with a pre-engineering study of the potential project including establishing the requirements to facilitate an expansion of service. Within the agreement is an estimate of the cost of the study development (\$385,200) and a commitment from BP to reimburse WBMWD if the project is terminated. This agreement was approved by the WBMWD Board of Directors on July 17, 2008.

The District has proposed a partnership with WBMWD to share the up-front cost of the pre-engineering study, pending the decision by BP on whether to proceed with construction. As noted above, the District would realize a benefit through reduced barrier demands if the increased recycled use offsets BP's groundwater production. Additionally, BP has been active in the ongoing Refinery Working Group discussions and has signed a Memorandum of Understanding (MOU) with the District and other water agencies to *Work Cooperatively to*

Maximize the Use of Recycled Water and Minimize Groundwater Production and Imported Water Use in Oil Refinery Operations in the West Coast Basin.

WRD would consider providing funding for the engineering study if the District can verify that BP will reduce groundwater pumping by utilizing more recycled water.

FISCAL IMPACT

None at this time.

STAFF RECOMMENDATION

For information.



MEMORANDUM

ITEM NO. 8

Prepared by: Paul Fu

Reviewed by: Robert Siemak

Approved by: Robb Whitaker

DATE: OCTOBER 1, 2009

TO: WATER RESOURCES COMMITTEE

FROM: ROBB WHITAKER, GENERAL MANAGER

SUBJECT: CONTRACT TERM EXTENSION FOR CAROLLO ENGINEERS

BACKGROUND

The District has been using the engineering services of Carollo Engineers on the *Caltrans I-105 Freeway Dewatering Wells Beneficial Use Project*. The work by Carollo Engineers involves 1) a feasibility study and 2) environmental work pursuant to the California Environmental Quality Act (CEQA). The feasibility study was completed in 2006, and the District received conceptual approvals for the project's treatment and blending concept from the State's Public Health Department and the Regional Board. The CEQA work started in summer 2006 but has been progressing slowly due to uncertainties on the availability of the site owned by Caltrans.

The current contract with Carollo Engineers will expire on December 31, 2008. The contract has approximately \$100,000 remaining as unexpended, and work is still desired under this contract. Therefore, staff is recommending a simple term extension for the contract to December 31, 2009. The attached Amendment No. 4 for this term extension has been reviewed by District's counsel.

FISCAL IMPACT

This work was covered under the 08/09 budget. No additional funds are being sought for this contract.

STAFF RECOMMENDATION

Extend the term of the contract with Carollo Engineers to December 31, 2009 with no additional cost to the District.

AMENDMENT NO. 4

**TO CONTRACT NO. 371
AGREEMENT FOR PROFESSIONAL SERVICES
BETWEEN
WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA
AND
CAROLLO ENGINEERS P.C.**

This Amendment No. 4 is made and entered into this 1st day of January 2009 and between the Water Replenishment District of Southern California ("DISTRICT") and Carollo Engineers P.C. ("CONSULTANT"). The DISTRICT and CONSULTANT are collectively referred to as PARTIES.

RECITALS

A. On the 6th day of December 2004, a certain agreement, hereinafter referred to as Contract No. 371, was executed between DISTRICT and CONSULTANT for engineering services for the I-105 Freeway Dewatering Wells Beneficial Use of Groundwater Project.

B. On the 15th day of December 2005, Amendment No. 1 to Contract No. 371 was executed between DISTRICT and CONSULTANT for engineering services for the I-105 Freeway Dewatering Wells Beneficial Use of Groundwater Project.

C. On the 5th day of March 2007, Amendment No. 2 to Contract No. 371 was executed between DISTRICT and CONSULTANT for engineering services for the I-105 Freeway Dewatering Wells Beneficial Use of Groundwater Project.

D. On the 1th day of January 2008, Amendment No. 3 to Contract No. 371 was executed between DISTRICT and CONSULTANT for engineering services for the I-105 Freeway Dewatering Wells Beneficial Use of Groundwater Project.

D. DISTRICT and CONSULTANT desire to enter into Amendment No. 4, and have agreed to amend the Term of the Agreement provision of Contract No. 371, together with Amendments Nos. 1, 2 and 3 (collectively referred to as "AGREEMENT")

AMENDMENT

NOW, THEREFORE, in consideration of the mutual covenants, promises, and agreements set forth, it is agreed the aforesaid Contract No. 371, a copy of which is attached and incorporated

herein by reference, shall remain in full force and effect, except as otherwise hereinafter provided.

The PARTIES agree to amend the Agreement as follows:

1. Term of Agreement: The term of the Agreement shall be extended to December 31, 2009 (the "Expiration Date").
2. Remaining Portions of the Agreement: Except as otherwise expressly set forth in this Amendment No. 4, all other provisions of the Agreement remain in full force and effect between DISTRICT and CONSULTANT.

IN WITNESS WHEREOF, the PARTIES have caused this AMENDMENT No. 4 to the AGREEMENT to be executed the day and year first above written.

**WATER REPLENISHMENT DISTRICT OF
SOUTHERN CALIFORNIA**

Signature
Robert Katherman
President, Board of Directors

Signature
Willard H. Murray, Jr.
Secretary, Board of Directors

CAROLLO ENGINEERS, P.C. ("CONSULTANT")

Signature

Print Name

Title

Signature

Print Name

Title

Approved As To Form:
MEYERS, NAVE, RIBACK, SILVER & WILSON

James M. Casso, General Counsel
Water Replenishment District of Southern California