



● **Board of Directors**  
***Engineering and Operations Committee***

2/9/2010 Board Meeting

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**7-1**

**Subject**

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Appropriate \$1.2 million; and authorize four improvement projects at the Diemer plant (Approp. 15436)

**Description**

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This action authorizes four projects at the Robert B. Diemer Water Treatment Plant: (1) Preliminary design of upgrades to chemical feed equipment and systems; (2) Preliminary design of sample line and analyzer improvements; (3) Construction of a backup water supply for the solids handling facility; and (4) Procurement of fire water and potable water pumps.

**Timing and Urgency**

These four projects are needed to comply with drinking water and fire code requirements and to enhance plant reliability.

- The chemical feed pumps and flow meters for alum/ferric chloride, sodium hydroxide, liquid polymer, and dry polymer are over 20 years old and their repair kits and spare parts are no longer stocked by the manufacturers. The ammonia feed system has also deteriorated over time. Repeated age-related failures have occurred over the past 2 years, resulting in unscheduled shutdowns and costly maintenance. Upgrades are needed to improve system reliability and to protect treated water quality.
- Timely and accurate water quality monitoring results are required to properly control treatment processes, such as the chemical feed rates. Staff recommends proceeding with improvements to the sample lines and on-line analyzers to enable reliable and rapid response to changing water quality conditions.
- The Yorba Linder Feeder currently supplies service water to the Diemer Solids Handling Facility. With the recent discovery of quagga mussels in the Yorba Linda Feeder, staff recommends construction of a back-up or redundant water supply to sustain operation of the Solids Handling Facility when the Yorba Linda Feeder is taken out of service for cleaning.
- To meet the fire and potable water needs of the plant upon completion of the Diemer ozonation facilities, staff recommends procurement of new fire water and potable water pumps at this time due to the 6-to 9-month duration to fabricate and deliver the pumps.

These projects have been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria. The chemical feed system upgrades are categorized as an Infrastructure Refurbishment project; the sample line and analyzer improvements as a Water Quality project; and the alternate water supply for solids handling and the fire/potable water pumps procurement as Infrastructure Upgrade projects. All four projects are budgeted within Metropolitan's CIP for fiscal year 2009/10.

**Background**

The Diemer plant was placed into service in 1963 with an initial capacity of 200 million gallons per day (mgd). In 1969, the plant was expanded to a treatment capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River and the State Water Project to Orange County and parts of Metropolitan's Central Pool portion of the distribution system.

**Project No. 1: Chemical Feed Equipment and System Improvements – Preliminary Design Phase (\$345,000)**

Chemical feed equipment including pumps, motors and drives, control valves, and flow meters are used to add proper doses of chemicals to treat water. The equipment for feeding alum/ferric chloride, sodium hydroxide, liquid polymer and dry polymer at the Diemer plant has aged and its reliability has worsened over the years. Some of the feed equipment is 20 years old and has experienced various and repeated failures resulting in unscheduled shutdowns and costly maintenance. Failure of the feed equipment for water treatment chemicals could result in loss of chemical feed completely or inadequate feeding capacity, which would disrupt plant operations. Due to the age of the equipment, repair parts are no longer manufactured and are difficult to obtain. In addition, water quality requirements have changed since installation. As a result, some of the chemical feed equipment is unable to adjust chemical feed rates over the entire range of minimum and maximum doses that are now required.

Staff recommends replacing the aged chemical feed equipment at this time. The size, quantity, and configuration of the feed equipment will be optimized to meet current water quality and system reliability requirements. The existing motor drives for the pumps will be upgraded to increase set-point stability and to expand the controllable range of operations.

The existing ammonia feed system at the Diemer plant was commissioned in 1992. Ammonia is added to the plant outlet following chlorine addition in order to form chloramines, a residual disinfectant. While the ammonia storage tanks and large diameter piping are still in satisfactory condition, the reliability of small-diameter feed piping, pumps, valves and instrumentation has declined during the past year. The plant has experienced numerous incidents where ammonia feed has been lost for short periods of time. Such interruptions in ammonia feed have a potential to negatively impact treated water quality. The piping configuration for the existing system is also complicated and does not allow for easy access. The feed system needs to be redesigned to improve redundancy for system reliability.

Staff recommends replacement of the existing ammonia feed system. The new system will be installed within the existing tank farm, and will include redundant feed equipment to improve system reliability. The piping layout will be revised to reduce congestion and improve operability of the equipment.

This action appropriates \$345,000 and authorizes preliminary design phase activities for the chemical feed equipment and system improvements. These activities include engineering analyses, preparation of environmental documentation, an up-to-date code review, development of a construction cost estimate, and preparation of a preliminary design report. Preliminary design work will be performed by Metropolitan staff.

**Project No. 2: Sample Line and Analyzer Improvements – Preliminary Design Phase (\$134,000)**

Water quality monitoring data are used to control chemical feed rates and other treatment processes, such as the filtration process. This water quality data is critical to the real-time operation of the Diemer plant. Water samples (approximately 300 samples per day) are taken at various points at the Diemer plant and are analyzed by on-line analyzers located near the sampling point, or pumped to the plant's central laboratory. In some cases, samples are pumped to remote on-line analyzers located in the Diemer Administration Building's basement.

Recently, water with unexpectedly high chlorine residual entered the Diemer plant, which could have resulted in excessive chlorination of the treated water. The high chlorine residual was not observed at the plant inlet on-line chlorine analyzer until two hours after the residuals were detected by laboratory grab-sample analyses. Rapid adjustment of chlorine feed rates was necessary to prevent elevated residuals from entering the distribution system. Following this incident, staff evaluated the Diemer plant sampling system and found several deficiencies.

The detention time in sample lines was found to be too long (greater than one hour) for many of the sample points that are distant (over 1,000 feet) from the central laboratory, resulting in inconsistent readings between local on-line analyzers and the samples pumped to the laboratory. In addition, some of the remote on-line analyzers may be inaccurate due to solids deposition, temperature variation, or algae growth in the sample lines. Consequently, plant operators are frequently challenged in identifying appropriate operational adjustments.

Staff recommends upgrading the sample lines from polypropylene tubing to PVC pipes to allow the sample pumps to operate at higher pressure and flow settings in order to reduce the transport time in the sample lines. In addition, staff recommends replacing the remote on-line analyzers located in the Administration Building basement with new turbidimeters, pH analyzers and other on-line instruments at seven sampling locations to eliminate untimely analytical results. Because many of these locations do not have structures to house the on-line instruments, new power, communication lines, supervisory control and data acquisition (SCADA) set-up and weather-proof cabinetry may be required to complete the analyzer installations.

This action appropriates \$134,000 and authorizes preliminary design of improvements of the sample lines and installation of analyzers at the Diemer plant. These activities include engineering analyses, preparation of environmental documentation, an up-to-date code review, development of a construction cost estimate, and preparation of a preliminary design report. Preliminary design work will be performed by Metropolitan staff.

**Project No. 3: Backup Water Supply for Solids Handling Facility – Procurement and Installation (\$195,000)**

The Diemer plant uses raw water from the Yorba Linda Feeder for various operational processes that do not require the use of potable water, such as solids handling, basin maintenance, and chemical mixing. This practice allows beneficial use of the high pressure present on the incoming raw water feeder to supply water throughout the plant, without the added cost or equipment for pumping potable water. However, reliance on a single source of water for these processes does not support reliable operations. In October 2008, quagga mussels were discovered in the Yorba Linda Feeder at the Diemer plant. Growth of the quagga mussels will be controlled by the addition of sodium hypochlorite at the plant, and the Yorba Linda Feeder piping will regularly be taken out of service to check for mussel growth.

All three belt presses at the Diemer Solids Handling Facility operate only on raw water from the Yorba Linda Feeder at the present time. Any interruption to the raw water feeder renders the belt presses inoperable. When maintenance or repair work is required on the Yorba Linda Feeder system, the operation of the belt presses has to be interrupted. There have been numerous occasions recently when the presses were forced to shut down due to maintenance or work associated with the raw water system. Conversely, work on the raw water system has also been postponed to prevent impacts to the Solids Handling Facility. A back-up or redundant water supply is needed for the Solids Handling Facility to increase solids processing reliability and to reduce unnecessary down-time for the presses.

Staff recommends extending a pipe from the existing potable water system loop located adjacent to the Solids Handling Facility to provide the needed backup water supply inside the building.

This action appropriates \$195,000 and authorizes installation of a backup water supply for the Diemer plant's Solids Handling Facility. All work will be performed by Metropolitan forces. Completion of the alternate water supply using a contractor is not recommended because the work is to be performed inside an operating facility and flexibility is required to schedule the work to minimize impacts to the Solids Handling Facility. Requested funds include \$82,400 for Metropolitan force labor; \$38,200 for materials and supplies; \$37,500 for final design, procurement, and as-built preparation; \$14,900 for program management; and \$21,500 for remaining budget.

**Project No. 4: Fire and Potable Water Pump Station – Procurement (\$526,000)**

The Diemer plant has two washwater tanks that store water used to backwash the plant's filters. Potable and fire-protection water is also supplied from the two washwater tanks. When the Diemer ozonation facilities are completed in 2012, the filters will be allowed to become biologically active, which will enable more effective removal of disinfection byproduct precursors and other organic material that may impact water quality. To promote the biologically active filter operation, the backwash water stored in the washwater tanks will no longer be continuously chlorinated. Instead, occasional backwash chlorination will be used to control the filter biomass buildup and to prevent excessive filter head loss. Due to the lack of a disinfectant residual, the water stored in the two washwater tanks will no longer be used for the fire and potable water systems.

In September 2008, Metropolitan's Board authorized final design of the fire and potable water pump station, which will draw potable water from the plant's finished water reservoir. Final design is scheduled to be completed in May 2010. Staff recommends procurement of new fire water and potable water pumps at this time

due to the 6- to 9-month duration to fabricate and deliver the pumps. Due to the different characteristics of the fire water and potable water pumps, two procurement contracts will be prepared.

This action appropriates \$526,000 for procurement of the fire water pumps and potable water pumps. The procurement contracts are planned to be awarded under the General Manager's Administrative Code authority. Appropriated funds include \$400,000 for the procurement contracts; \$57,000 for procurement, technical support, and project management; and \$69,000 for remaining budget. All procurement activities will be performed by Metropolitan staff.

In mid-2010, staff will return to the Board to award the Diemer Fire and Potable Water Pump Station construction contract, which will include installation of the Metropolitan-furnished pumps.

### **Summary**

This action appropriate \$1.2 million, and authorizes preliminary design of improvements to the Diemer chemical feed equipment and systems, sample lines, and analyzers; construction of a backup water supply for the Diemer Solids Handling Facility; and procurement of fire water and potable water pumps. These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2009/10 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

These projects are consistent with Metropolitan's goals for sustainability by protecting water quality and improved worker safety at the Diemer plant, and to maintain reliable water deliveries in the future.

### **Project Milestones**

March 2010 – General Manager award of procurement contracts for the fire and potable water pumps

August 2010 – Completion of installation of backup water source for Solids Handling Facility

December 2010 – Completion of preliminary design of Chemical Feed Equipment and System Improvements, and Sample Line and Analyzer Improvements

### **Policy**

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Metropolitan Water District Administrative Code Section 5108: Appropriations

### **California Environmental Quality Act (CEQA)**

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CEQA determination for Options #1 and #2:

#### **Diemer Chemical Feed Equipment and System Improvements - Preliminary Design Phase; Sample Line and Analyzer Improvements - Preliminary Design Phase**

The proposed board action authorizes preliminary design work, which includes basic data collection and resource evaluation activities. As such, the proposed action is not subject to CEQA because it involves only feasibility or planning studies for possible future actions which the Board has not approved, adopted or funded (Section 15262 of the State CEQA Guidelines). In addition, the proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines because the proposed action involves basic data collection and research activities which do not result in a serious or major disturbance to an environmental resource. This may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. Accordingly, the proposed action qualifies as a Class 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that the proposed preliminary design work is not subject to CEQA pursuant to Section 15262 of the State CEQA Guidelines and also qualifies under a Categorical Exemption (Class 6, Section 15306 of the State CEQA Guidelines).

### **Backup Water Supply for the Diemer Solids Handling Facility - Construction**

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed project involves the funding and minor alterations of existing private or public facilities, along with the construction of minor appurtenant structures, with minor modifications in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees. These activities would result in negligible expansion of use and no possibility of significantly impacting the physical environment. Accordingly, the proposed action qualifies under Class 1, Class 3, and Class 4 Categorical Exemptions (Sections 15301, 15303, and 15304 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under three Categorical Exemptions (Class 1, Section 15301; Class 3, Section 15303; and Class 4, Section 15304 of the State CEQA Guidelines).

### **Fire and Potable Water Pumps - Procurement**

The environmental effects from the funding, design, procurement of equipment, construction and operation of the Diemer Oxidation Retrofit Program (Program) were evaluated in the Robert B. Diemer Treatment Plant Improvements Project Environmental Impact Report (EIR), Supplemental EIR, and Subsequent EIR, certified by the Board on February 13, 2001, August 20, 2002, and April 11, 2006 respectively. During these three board meetings, the Board also approved the Findings of Fact (findings), the Statement of Overriding Considerations (SOC), and the Mitigation Monitoring and Reporting Program (MMRP) for the Diemer Improvements Project EIR, Supplemental EIR, and Subsequent EIR. The current board action is to authorize procurement of fire water pumps and potable water pumps for the Diemer Fire and Potable Water Pump Station element of the Program, and does not propose any significant changes to the approved Program itself. Therefore, the previous environmental documentation acted on by the Board in conjunction with the proposed action fully complies with CEQA and the State CEQA Guidelines. Accordingly, no additional CEQA review or documentation is required.

The CEQA determination is: Determine that the potential environmental effects associated with procurement of fire water pumps and potable water pumps for the Diemer Fire and Potable Water Pump Station were addressed previously in the EIR, Supplemental EIR, and Subsequent EIR for the Diemer Improvements Program.

CEQA determination for Option #3:

None required

## **Board Options**

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### **Option #1**

Adopt the CEQA determinations and

- a. Appropriate \$1.2 million;
- b. Authorize preliminary design of the Diemer Chemical Feed Equipment and System Improvements;
- c. Authorize preliminary design of the Diemer Sample Line and Analyzer Improvements;
- d. Authorize construction of the Backup Water Supply for the Diemer Solids Handling Facility; and
- e. Authorize procurement of pumps for the Diemer Fire and Potable Water Pump Station.

**Fiscal Impact:** \$1.2 million in budgeted funds under Approp. 15436

**Business Analysis:** This option will improve the chemical feed equipment for alum/ferric chloride, sodium hydroxide, liquid polymer, dry polymer, and ammonia to meet current water quality and system reliability requirements. Improved sampling line and water quality monitoring equipment will enable the Diemer plant to respond to process upset conditions in a timely manner, thereby reducing the risk of water quality exceedances. A backup water supply for the Diemer Solids Handling Facility will minimize the belt press downtime and greatly enhance the treatment reliability. Early procurement of fire and potable water pumps in advance of award of the fire and potable water pump station construction contract will enable a timely switch to biological filtration, which is needed once ozonation commences at the Diemer plant.

**Option #2**

Adopt the CEQA determinations and

- a. Appropriate \$526,000;
- b. Authorize procurement of pumps for the Diemer Fire and Potable Water Pump Station; and
- c. Do not proceed with the preliminary design of the Chemical Feed Equipment and System Improvements; preliminary design of the Diemer Sample Line and Analyzer Improvements; or construction of the Backup Water Supply for the Diemer Solids Handling Facility.

**Fiscal Impact:** \$526,000 in budgeted funds under Approp. 15436

**Business Analysis:** Early procurement of fire and potable water pumps in advance of award of the fire and potable water pump station construction contract will enable a timely switch to biological filtration, which is required once ozonation commences at the Diemer plant. Under this option, improvements to the existing chemical feed equipment would not be made. As a result, plant staff would continue to operate and maintain the aged chemical feed equipment, and to use the less reliable ammonia feed system. The increasing failure rate for the chemical feed equipment and the ammonia feed system would result in increased maintenance cost and increased downtime, and may impact regulatory compliance. Without improved sampling and real-time water quality monitoring, plant staff would be able to make less timely adjustment of treatment processes. Maintaining a single source of water supply for the Diemer Solids Handling Facility would continue unavoidable process outages when the Yorba Linda Feeder is shut down.

**Option #3**

Do not proceed with the four Diemer improvement projects.

**Fiscal Impact:** None

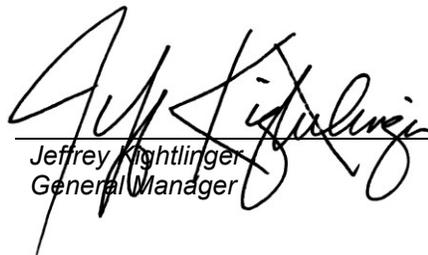
**Business Analysis:** Under this option, improvements to the existing chemical feed equipment would not be made. As a result, plant staff would continue to operate and maintain the aged chemical feed equipment, and to use the unreliable ammonia feed system. The increasing failure rate for the chemical feed equipment and the ammonia feed system would result in increased maintenance cost and increased downtime, and may impact regulatory compliance. Without improved sampling and real-time water quality monitoring, plant staff would be able to make less timely adjustment of treatment processes. Maintaining a single source of water supply for the Diemer Solids Handling Facility would continue unavoidable process outages when the Yorba Linda Feeder is shut down. This option would delay completion of the fire and potable water pump station, and the switchover to biological filtration when the ozonation facilities are completed.

**Staff Recommendation**

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Option #1

  
 \_\_\_\_\_ 1/28/2010  
 Roy L. Wolfe Date  
 Manager, Corporate Resources

  
 \_\_\_\_\_ 1/28/2010  
 Jeffrey Nightlinger Date  
 General Manager

**Attachment 1 – Financial Statement**

**Attachment 2 – Location Map**

Reference Number CR12602606

**Financial Statement for Diemer Improvements Program – Phase II**

A breakdown of Board Action No. 5 for Appropriation No. 15436 for four Diemer improvements projects\* is as follows:

	<b>Previous Total Appropriated Amount (Aug. 2009)</b>	<b>Current Board Action No. 5 (Feb. 2010)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies and Investigations	\$ 147,800	\$ 324,200	\$ 472,000
Final Design	1,733,700	31,400	1,765,100
Owner Costs (Program mgmt., permitting, bidding process)	999,138	207,200	1,206,338
Construction Inspection & Support	305,791	-	305,791
Metropolitan Force Construction	1,407,000	82,400	1,489,400
Materials and Supplies	253,058	438,200	691,258
Incidental Expenses	61,193	5,200	66,393
Professional/Technical Services	246,343	-	246,343
Equipment Use	23,155	-	23,155
Contracts	500,929	-	500,929
Remaining Budget	95,893 **	111,400	207,293
<b>Total</b>	<b>\$ 5,774,000</b>	<b>\$ 1,200,000</b>	<b>\$ 6,974,000</b>

**Funding Request**

<b>Program Name:</b>	Diemer Improvements Program – Phase II		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15436	<b>Board Action No.:</b>	5
<b>Requested Amount:</b>	\$ 1,200,000	<b>Capital Program No.:</b>	15436-I
<b>Total Appropriated Amount:</b>	\$ 6,974,000	<b>Capital Program Page No.:</b>	214
<b>Total Program Estimate:</b>	\$ 123,980,000	<b>Program Goal:</b>	I- Infrastructure Reliability

\* This action is the initial appropriation for the Chemical Feed Equipment and System Improvements project, Sample Line and Analyzer Improvements project, and Alternate Water Supply for the Diemer Solids Handling Facility project. The total amount expended to date on the Diemer Fire and Potable Water Pump Station project is approximately \$1,341,600.

\*\* Includes previous reallocation of \$182,475 from Remaining Budget to preliminary design of the Diemer filter valve replacement, and to construction of the hatch covers replacement.

# Robert B. Diemer Water Treatment Plant

