

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

February 11, 2003 Board Meeting

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8-1

### **Subject**

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Authorize funds for three Capital Investment Plan projects to increase efficiency and enhance the reliability of plant operations at the Diemer filtration plant (Approps. 15380 and 15363)

### **Description**

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Three projects are recommended at the Robert B. Diemer Filtration Plant to maintain compliance with drinking water quality and environmental regulations, increase the efficiency of plant operations, and enhance the safety and reliability of plant operations.

**Used Washwater Return Pumps Replacement (\$450,000):** The vertical turbine pumping units transfer used filter backwash water from filter sumps to the washwater reclamation plants for processing and recycling. The pumps were originally placed into service in the 1960s. Although the equipment has been routinely maintained during its service life, the equipment has significantly deteriorated during more than 30 years of operation. This deterioration has resulted in reduced reliability and increased maintenance costs. This action will authorize final design, equipment procurement and District force construction to replace these units.

**Chemical Storage Tank Farm Extension (\$470,000):** Over the past year, the Diemer plant has been treating a higher percentage of State project water than was typical in the past. Coincident with this change, the Diemer plant converted its primary coagulant from aluminum sulfate (alum) to ferric chloride. This has resulted in higher than expected ferric chloride dosages to comply with the Stage 1 Microbial/Disinfection By-Products Rule, which became effective January 1, 2002. To ensure on-site storage is adequate for plant treatment reliability, the purchase and installation of two additional ferric chloride compatible tanks and extension of the existing tank farm are recommended. This action will authorize preliminary and final design and all activities up to award of a construction contract.

**Solids Transfer and Dewatering Infrastructure (\$3,038,000):** The use of higher than expected ferric chloride dosages has also resulted in increased sludge production. This project will modify the sludge transfer system to improve sludge collection, removal and transfer to the thickening and dewatering processes. To allow planned grading of the Diemer plant's northwest hill to proceed, the existing belt press facility must be relocated. This action will authorize final design and construction by District forces.

All three projects were evaluated and recommended by the Capital Investment Plan Evaluation Team. Under the Diemer Filtration Plant Improvements Program (Approp. 15380), the Used Washwater Return Pumps Replacement project is included in the fiscal year 2002/03 CIP budget and the Chemical Storage Tank Farm Extension project is proposed for the fiscal year 2003/04 CIP budget. The Board has appropriated \$7.425 million for the Diemer Filtration Plant Solids Handling and Water Reclamation Program (Approp. 15363). It is recommended that the appropriation be increased by \$3.038 million to increase the solids handling capabilities and to support operation at higher coagulant levels. If the Board approves these recommendations, the fiscal year 2002/03 CIP expenditure plan will be adjusted. See [Attachment 1](#) for the detailed report and [Attachment 2](#) for the financial statement.

### **Policy**

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Metropolitan Water District Administrative Code § 5108: Capital Project Appropriation

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

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CEQA determination for Staff Recommendation:

### **Used Washwater Return Pumps Replacement Project**

The proposed project is categorically exempt under the provisions of CEQA. The overall activities involve the funding, final design, minor alterations and replacement of existing public facilities with no expansion of use and no possibility of significantly impacting the physical environment. As such, the proposed project qualifies under both Class 1 and Class 2 Categorical Exemptions (Sections 15301 and 15302 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under two Categorical Exemptions (Class 1, Section 15301 and Class 2, Section 15302 of the State CEQA Guidelines).

### **Chemical Storage Tank Farm Extension Project**

The proposed project is categorically exempt under the provisions of CEQA. The overall project activities involve the funding, final design, and installation of equipment within existing public facilities along with the construction of minor appurtenant structures with no expansion of use and no possibility of significantly impacting the physical environment. As such, the proposed project qualifies under both Class 1 and Class 3 Categorical Exemptions (Sections 15301 and 15303 of the State CEQA Guidelines).

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

### **Solids Transfer and Dewatering Infrastructure Project**

The proposed project is categorically exempt under the provisions of CEQA. The proposed action 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. As such, the proposed project 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).

**Staff Recommendation**

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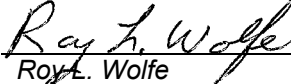
Adopt the CEQA determination for the projects described herein and

- a. Appropriate \$3,958,000 in budgeted and non-budgeted CIP funds,
- b. Authorize all work up to award of competitively bid contract for the Chemical Storage Tank Farm Extension, and
- c. Authorize all work for the Washwater Return Pumps Replacement project and the Solids Transfer and Dewatering Infrastructure project.

**Fiscal Impact:** \$3,958,000 of budgeted and non-budgeted CIP funds under the following appropriations:

Appropriation 15380 (Diemer Improvements Program): \$450,000 budgeted and \$470,000 non-budgeted

Appropriation 15363 (Diemer Solids Handling and Water Reclamation Program): \$3,038,000 non-budgeted

  
Roy L. Wolfe

Manager, Corporate Resources

1/13/2003

Date



Ronald R. Gastelum

Chief Executive Officer

1/20/2003

Date

**Attachment 1 – Detailed Report****Attachment 2 – Financial Statements for Diemer Filtration Plant Improvements Program and Diemer Filtration Plant Solids Handling and Water Reclamation Program**

## **Detailed Report**

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The Robert B. Diemer Filtration Plant was placed into service in 1963 with an initial capacity of 200 million gallons per day (mgd). The plant was expanded in 1969 and now has a design capacity of 520 mgd. The plant delivers treated, chloraminated water to Orange County and parts of Metropolitan's Central Pool portion of the distribution system.

The Diemer plant typically treats a blend of Colorado River water and State project water.

### ***Diemer Filtration Plant Improvements Program (Approp. 15380)***

The Diemer Filtration Plant Improvements Program was established to implement multiple projects necessary to ensure plant reliability. These projects address the following objectives: achieve and/or maintain compliance with federal and state drinking water quality regulations, increase the efficiency of plant operations, and enhance the safety and reliability of plant operations. Two projects are recommended under this program.

### **Used Washwater Return Pumps Replacement (\$450,000)**

#### ***Background/Purpose***

The used washwater return pumping stations transfer used filter backwash water from the east and west filter sumps to the washwater reclamation plants. Each pumping station contains multiple vertical turbine pumps. The pumps were originally installed in 1961 and 1966 and require frequent repairs. Recently, the output of one of the east used washwater pumps dropped to below 50 percent of design output. As flows fluctuate through the pumping station, the constant-speed pumps turn on/off over short periods of time. To maintain pumping reliability, staff recommends replacing one existing pump at each filter sump with a new unit equipped with variable speed. Conversion of the motor drives to variable-speed motor drives (VFDs) will increase water treatment efficiency. The use of VFDs will allow the pumps to operate at pumping rates to match inflows, reduce start/stop cycles, and prolong the life of each pump's electric motor. Through the use of VFDs, variable pumping rates from the station will dampen spikes of reclaimed washwater flows into the Diemer plant's reclamation plants. This improvement will permit the plant to even out chemical feed rates into the influent water and gain improved overall treatment efficiency and water quality.

#### ***Project Description***

The project includes purchase and installation of two 6,000-gpm, vertical turbine pumps, each equipped with high efficiency motor, and variable frequency drives. Pumping process controls will be modified to improve pump operations and flow control at the washwater reclamation plants.

#### ***Project Milestones***

- February 2003 – Board authorization for final design, equipment procurement, and District force construction
- June 2004 – Completion of construction

#### ***Cost Estimate***

Attachment 2 shows the breakdown of the total estimated cost for final design and all construction. Consistent with Metropolitan's approach of managing projects in the most cost-effective manner, staff will perform initial studies, investigations, project management, final design and equipment procurement and factory inspection. Construction will be by District forces.

**Chemical Storage Tank Farm Extension (\$470,000)*****Background/Purpose***

Primary coagulant tankage is typically sized to provide 14 days of storage capacity at extended duration dosage at design flowrate. This storage increases treatment reliability in the event of peak chemical usage, chemical shortages, or unexpected delivery problems.

In December 2001, the Diemer plant converted its primary coagulant from aluminum sulfate (alum) to ferric chloride to improve disinfection by-products precursor removal. This removal is required by the Stage 1 Microbial/Disinfection By-Products Rule, which became effective January 1, 2002. The precursors that form disinfection by-products differ widely in Metropolitan's two main sources of supply. SPW supplies contain higher concentrations of disinfection by-products precursors (e.g., total organic carbon and bromide) than CRW and form more disinfection by-products when chlorinated.

Over the last year, the Diemer plant has been treating a higher percentage of SPW than was typical in the past. This has necessitated the use of higher than expected ferric chloride dosages to remove total organic carbon. Average coagulant dosages have increased from 3 mg/L to 7.5 mg/L over the past year. Extended duration dosages have been higher. This trend is expected to continue. Until the Diemer Oxidation Retrofit Program is operational, the required extended duration dosage of ferric chloride is expected to range from 12.5 mg/L to 20 mg/L to treat higher volumes of SPW. Ozonation (or an alternative disinfection technology) is scheduled to be on-line at the Diemer plant by 2009.

With the addition of two 20,000-gallon tanks (per the November 2001 board action), the Diemer plant has 14 days of ferric chloride storage at 12.5 mg/L ferric chloride dosage at average plant flow (330 mgd), which is 190 mgd less than the plant's design flow rate of 520 mgd. Additional ferric chloride compatible tankage is needed to increase on-site storage.

***Project Description***

The project includes purchase and installation of two ferric chloride compatible tanks (20,000 gallons each) to provide 14 days of ferric chloride storage at the pre-ORP dosage of 12.5 mg/L at 520 mgd design flow. The abandoned storage shed north of the Administration Building will be demolished and the adjacent tank farm extended by providing tank foundations, platforms, piping, and accessories as needed to incorporate new tankage into the existing tank farm and chemical feed system.

***Project Milestones***

- February 2003 – Initial board authorization and funding for final design
- January 2004 – Board award of construction contract
- December 2004 – Completion of all installation and construction

***Cost Estimate***

Attachment 2 shows the breakdown of the estimated costs for this project through award of construction contract. Supplemental geotechnical preliminary design activities will be performed by a consultant obtained through a competitive selection process for professional agreements.

The design cost for the two projects recommended under the Diemer Filtration Plant Improvements Program is 15.4 percent of the estimated construction cost.

***Diemer Filtration Plant Solids Handling and Water Reclamation Program (Approp. 15363)***

The Diemer Filtration Plant Solids Handling and Water Reclamation Program was established to increase the Diemer plant's solids handling capabilities to support operation at elevated coagulation levels. The program includes:

**Solids Transfer and Dewatering Infrastructure (\$3,038,000)*****Background/Purpose***

Sludge captured within Diemer plant sedimentation basins is raked to collection sumps, removed and transferred to the sludge thickeners by pumps, and then dewatered at a belt press facility.

The use of higher coagulant dosages to treat higher volumes of SPW results in greater sludge capture in the sedimentation basins. The Diemer plant has eight sedimentation basins. Each basin has four sludge rakes (each with local torque indication) and four sludge removal pumps. The existing sludge rake torque indicators cannot be used for over-torque control or alarming in the event of heavy sludge loading or blockage by debris. The start/stop operation of the 140-gpm sludge removal pumps is controlled by sludge density meters. The aged density meters cannot be calibrated for use with ferric chloride sludge. The sludge removal pumps and piping systems to the sludge thickeners are undersized and cannot reliably transfer the sludge produced. Two replacement sludge density meters have already been purchased and successfully tested.

The belt press facility is located near the sludge thickeners and the northwest hill of the Diemer plant. Settled sludge from the nearby sludge thickeners is transferred by gravity to the facility for dewatering using a belt press. Dewatered sludge is discharged nearby for further air drying and then removal. The belt press facility has operated well and allowed the plant to use higher coagulant dosages while treating higher volumes of SPW.

Grading of the northwest hill for future residuals processing facilities is scheduled to start in July 2003. Before grading can commence, the belt press facility must be relocated. In addition, the belt press facility must be expanded to include two belt presses and an enlarged drying and staging area to handle the increased sludge produced by higher ferric chloride dosages.

***Project Description***

This project will provide 32 sludge rake on-line torque meters with control and alarm functions, replace 32 sludge removal pumps, provide six sludge density meters, and increase sludge transfer pipeline capacity. The project will also provide the infrastructure needed to expand and relocate the belt press facility to the southwest side of the plant and provide a dewatered sludge staging site on two pads on the southwest side of the plant. The relocation will include piping, pumps, belt presses' power supply, minor grading, concrete aprons for dewatered sludge handling, and paving.

***Project Milestones***

- February 2003 – Board authorization of all work
- June 2003 – Completion of dewatering belt press facility relocation
- December 2003 – Completion of sludge transfer improvements

***Cost Estimate***

Attachment 2 shows the breakdown of the total estimated costs for this project. District forces will procure equipment, materials, and supplies; install equipment; and construct the infrastructure. Southern California Edison will relocate the electrical power (pole) supply and a specialty contractor will provide asphalt paving. The design cost for the project recommended under this program is 15.6 percent of the estimated construction cost.

**Financial Statement for Diemer Filtration Plant Improvements Program**

A breakdown of Board Action No. 2 for Appropriation No. 15380 to replace two Used Washwater Return Pumps and for all activities up to award of construction contract for the Chemical Storage Tank Farm Extension is as follows:

	<b>Previous Board Action No. 1 (Nov. 2001)</b>	<b>Current Board Action No. 2 (Feb. 2003)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies and Investigations	95,000	113,000	208,000
Design and Specifications	75,000	193,000	268,000
Owner Costs (Program Management)	25,000	126,000	151,000
Construction Inspection and Support	25,000	5,000	30,000
Metropolitan Installation and Construction	140,000	56,000	196,000
Materials and Supplies	200,000	247,000	447,000
Incidental Expenses	25,000	6,000	31,000
Professional/Technical Services	0	30,000	30,000
Equipment Use	15,000	0	15,000
Contracts	300,000	0	300,000
Remaining Budget	135,000	144,000	279,000
<b>Total</b>	<b>\$ 1,035,000</b>	<b>\$ 920,000</b>	<b>\$1,955,000</b>

**Funding Request**

<b>Program Name:</b>	Diemer Filtration Plant – Improvements Program		
<b>Source of Funds:</b>	Construction Funds (General Obligation, Revenue Bonds, Pay-As-You-Go Fund)		
<b>Appropriation No.:</b>	15380	<b>Board Action No.:</b>	2
<b>Requested Amount:</b>	\$ 920,000	<b>Capital Program No.:</b>	15380-I
<b>Total Appropriated Amount:</b>	\$ 1,955,000	<b>Capital Program Page No.:</b>	E-28
<b>Total Program Estimate:</b>	\$ 17,670,000*	<b>Program Goal:</b>	I – Infrastructure Reliability

\* Total Program Estimate includes budget for the Chemical Storage Tank Farm Extension, which is added in this board action.

**Financial Statement for Diemer Filtration Plant Solids Handling and Water Reclamation Program**

A breakdown of Board Action No. 3 for Appropriation No. 15363 for the Diemer Filtration Plant Solids Handling and Water Reclamation Program described in this board action is as follows:

	<b>Previous Board Action No. 2 (Nov 2001)</b>	<b>Current Board Action No. 3 (Feb 2003)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies and Investigations	\$ 275,000	\$ 112,000	\$ 387,000
Design and Specifications	415,000	305,000	720,000
Owner Costs (Program Management)	195,000	174,000	369,000
Construction Inspection and Support	245,000	5,000	250,000
Metropolitan Installation and Construction	775,000	691,000	1,466,000
Materials and Supplies	725,000	1,146,000	1,871,000
Incidental Expenses	50,000	0	50,000
Equipment Use	125,000	50,000	175,000
Contracts	3,650,000	70,000	3,720,000
Remaining Budget	970,000	485,000	1,455,000
<b>Total</b>	<b>\$ 7,425,000</b>	<b>\$3,038,000</b>	<b>\$10,463,000</b>

**Funding Request**

<b>Program Name:</b>	Diemer Filtration Plant Solids Handling and Water Reclamation Program		
<b>Source of Funds:</b>	Construction Funds (General Obligation, Revenue Bonds, Pay-As-You-Go Fund)		
<b>Appropriation No.:</b>	15363	<b>Board Action No.:</b>	3
<b>Requested Amount:</b>	\$ 3,038,000	<b>Capital Program No.:</b>	15363-I
<b>Total Appropriated Amount:</b>	\$ 10,463,000	<b>Capital Program Page No.:</b>	E-30
<b>Program Estimate:</b>	\$ 10,463,000	<b>Program Goal:</b>	I-Infrastructure Reliability