



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

3/8/2011 Board Meeting

7-1

Subject

Appropriate \$850,000; and authorize two filter valve rehabilitation projects at the Jensen and Diemer plants (Approps. 15371 and 15436)

Description

This action authorizes the initial phase of final design for two projects to: (1) Replace or refurbish the 78 filter valves in the Module No. 1 filters at the Joseph Jensen Water Treatment Plant; and (2) Replace or refurbish the 244 filter valves at both modules of the Robert B. Diemer Water Treatment Plant. A total of 322 valves will be replaced or refurbished by the two rehabilitation projects. Based on operational requirements and expected treated water deliveries for the Jensen and Diemer plants, rehabilitation of the 322 filter valves will be staged in 80-valve increments, and will be completed within a five-year period.

The rehabilitation projects for the Jensen and Diemer plants will be completed in three phases. Phase 1 of the projects (which is the subject of this action) is focused on determining the most feasible and cost-effective approach to rehabilitating the 40 to 50-year-old filter valves at the Jensen and Diemer plants, and on preparing for the sequentially staged rehabilitation. A pilot program will be conducted to identify vendors capable of refurbishing this number and type of filter valves. Refurbishment of the filter valves is being investigated as a potential cost-saving alternative instead of replacing the worn-out valves with new valves. On average, it is estimated that a valve can be refurbished at half the cost of procuring a new one, potentially resulting in approximately \$13 million in cost savings to Metropolitan for these two projects if refurbishment proves viable. Phase 1 also involves the preparation of procurement documents to purchase 80 new filter valves in order to proceed with the staged refurbishment. As the 80 existing valves are removed for inspection and possible refurbishment at each stage, the new valves will be installed to maintain operation of the filters at the two plants during the rehabilitation work.

In Phase 2 of the rehabilitation projects, staff will proceed with the sequentially staged refurbishment work. Subject to future board action, staff will prepare plans and specifications for an initial construction contract at each plant for the replacement of 80 existing valves with the first set of pre-purchased valves. In addition to installing the 80 new valves, the contractors for these two initial contracts will make necessary piping changes at the filters. Metropolitan staff will perform detailed inspections of the removed valves to determine which units are candidates for refurbishment, and which have deteriorated beyond repair and must be replaced. Based on the results of these inspections, staff will finalize the scope and budget for the remainder of the two rehabilitation projects. Phase 3 will prepare plans and specifications for multiple future construction contracts to replace, or if appropriate, refurbish the remaining 242 filter valves at both plants.

Timing and Urgency

Filter valves must provide a water-tight seal in order for the filters to perform efficiently and reliably. Despite regular maintenance, performance of the 40- to 50-year-old filter valves at the Jensen and Diemer plants has deteriorated in recent years. Some valves leak even following repair. When leakage becomes excessive, portions of the filters cannot be isolated, resulting in increased pumping costs through the reclamation systems. A filter must then be removed from service, which reduces treatment capacity and reliability of the plant. These two

projects will enhance the reliability and performance of the filters by replacing or rehabilitating filter valves at both plants. Due to the long lead-time needed to procure or refurbish filter valves, and the importance of the Jensen and Diemer plants in delivering treated water to Metropolitan's Central Pool, staff recommends that both rehabilitation projects move forward at this time.

These two projects have been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria. Both projects are categorized as Infrastructure Rehabilitation projects and are budgeted within Metropolitan's CIP for fiscal year 2010/11.

Background

The Jensen plant was placed into service in 1972 with an initial capacity of 400 million gallons per day (mgd). The plant was expanded in the early 1990s to its current capacity of 750 mgd. The Jensen plant exclusively treats water from the West Branch of the State Water Project and delivers it to Metropolitan's Central Pool portion of the distribution system and to exclusive service areas on the west side of the distribution system.

The Diemer plant was placed into service in 1963 with an initial capacity of 200 mgd. In 1969, the plant was expanded to its current capacity of 520 mgd. The plant treats and delivers a blend of waters from the Colorado River and the State Water Project to Orange County and to Metropolitan's Central Pool.

In a typical filtration cycle, filters are operated by opening and closing a series of valves which allow water to flow in and out of the filter beds during filtration and backwashing operations. These valves are designed to close tightly and thereby prevent leakage into the washwater reclamation system, and to prevent the mixing of filtered and unfiltered water. Over the life of the Diemer and Jensen filter valves, staff has performed regular maintenance to enable continued effective operation. Over time, gradual deterioration has occurred, including corrosion of the valve body and degradation of embedded seals. Due to this deterioration, and based on a recent condition assessment of the valves at both plants, at least 20 of the 78 existing filter valves at Jensen Module No. 1 will need to be replaced with new valves. At the Diemer plant, at least 60 of the 244 existing valves will need to be replaced. Staff believes that it may be viable to refurbish the remainder of the existing valves, which would be substantially more economical than replacing them with new valves.

Staff has assessed several options for executing these projects, and recommends that the work be phased in order to minimize operational disruptions to the Jensen and Diemer plants, and to identify the most streamlined and cost-effective methodology to perform the work. Due to piping configurations in the filter galleries and plant operating constraints, five Jensen filters and six Diemer filters may be isolated at one time for valve maintenance/replacement. Valves must be removed from service in order to determine if they can be repaired or must be replaced.

In order to complete the rehabilitation of filter valves at the Jensen and Diemer plants within a five-year period, the planned sequence of work to refurbish all 322 valves will be as follows:

Phase 1

- Conduct pilot program to identify vendors capable of refurbishing valves
- Purchase an initial set of 80 new valves for the five Jensen filters to be isolated at Module No. 1, six Diemer filters to be isolated on the east side of the Diemer plant, and six Diemer filters to be isolated on the west side, in preparation for the sequentially staged rehabilitation program

Phase 2

- Prepare plans and specifications for installation of the 80 new valves, and receive bids
- Install the 80 new valves at the Jensen and Diemer plants via two construction contracts, and save the 80 existing valves
- Examine each valve just removed to determine if it may be repaired or must be replaced
 - If repairable, send the valve to a pre-qualified vendor shop for repair

- If non-repairable, purchase a new valve

Phase 3

- Prepare plans and specifications for installation of the 80 refurbished/new valves, and receive bids
- Install the 80 refurbished/new valves via two construction contracts, and save the next set of 80 existing valves
- Examine the set of valves just removed to determine if they may be refurbished or must be replaced
- Repeat until all 322 valves have been refurbished or replaced

This action authorizes the Phase 1 final design activities, which will develop two procurement documents to purchase 80 filter valves: one for 20 valves at the Jensen plant, and another for 60 valves at the Diemer plant. In addition, a pilot program will be conducted to identify vendors capable of refurbishing valves through replacement of their embedded elastomeric seals and repair of corroded valve bodies. Metropolitan has not performed valve refurbishment projects of this magnitude in the past. If successful, this pilot program will promote competitive bidding and proper workmanship from interested vendors, providing a cost-effective repair program.

Staff will return to the Board at a later date to award the two valve procurement contracts and to authorize Phase 2 final design activities. During Phase 2, staff will develop plans and specifications for one construction contract at each plant for installation of the pre-purchased filter valves. Existing valves installed at the plants were custom-designed and did not follow the American Water Works Association's (AWWA) standard dimensions for these types of valves. During the years following construction of these filters, Metropolitan shifted to standardized valves and now typically specifies AWWA-type valves. As part of the Phase 2 design activities, staff will evaluate existing valve locations and equipment to identify possible dimensional conflicts prior to construction. It is expected that piping and equipment modifications will be required inside the piping galleries to accommodate the dimensional differences and revised actuator locations for the new valves.

If the Phase 1 pilot program successfully identifies qualified refurbishment vendors, the plans and specifications developed during Phase 2 will direct the contractors to deliver to Metropolitan the 80 existing filter valves which will be removed from both plants. Staff will then evaluate the removed valves to determine which ones can be repaired, and which ones must be replaced. If refurbishment does not prove feasible via the pilot program, all remaining valves at both plants will be replaced with new valves.

Phase 3 will develop multiple construction contracts to replace or, if appropriate, refurbish the remaining filter valves at both plants, based on each plant's capacity and shutdown constraints. The work will continue until all valves are replaced or refurbished. This approach will ensure that plant flowrates are not impacted during the rehabilitation process.

Project No. 1 – Jensen Module No. 1 Filter Valve Refurbishment – Final Design, Phase 1 (\$608,000)

Jensen Module No. 1 contains 20 filters which have been in continuous service for nearly 40 years. Each filter in Module No. 1 contains four filter valves which are operated in conjunction with two large-diameter isolation valves in the Module No. 1 backwash system, for a total of 82 valves. The filter valves range in diameter from 30 to 48 inches. During a January 2007 Jensen plant shutdown, four valves in Filter No. 16 were removed and replaced, while the remaining 78 valves were inspected. Although these valves have received routine maintenance, the older valves in Module No. 1 no longer function properly due to corrosion of the steel valve bodies and deterioration of embedded elastomeric seals. All remaining 76 filter valves and the two isolation valves need to be rehabilitated or replaced. The motorized actuators that open and close the valves appear to be in good condition, and actuator replacement is not recommended at this time.

In October 2007, Metropolitan's Board authorized preliminary design to replace the Jensen Module No. 1 filter valves. Preliminary design of the Jensen project is now complete and staff recommends proceeding with the preparation of procurement documents to purchase 20 new valves. Pre-purchasing this quantity of filter valves and phasing the construction contracts will eliminate the need for extended outages of the filters.

Phase 1 final design activities will include: field investigations to gather dimensional data of existing piping and valves; preparation of a valve procurement contract and receipt of bids; development of a vendor pre-qualification process for valve refurbishment; and development of a refined cost estimate. As part of the vendor pre-qualification process, staff will implement a pilot program with interested vendors to refurbish three spare valves removed during the previous Jensen plant shutdown. This program will evaluate vendor capabilities to refurbish deteriorated valves and will prepare detailed valve refurbishment specifications. The program will prequalify vendors to provide refurbishment services under the Jensen Module No. 1 Filter Valve Refurbishment project, as well as the Diemer Filter Valve Refurbishment project.

This action appropriates \$608,000 and authorizes Phase 1 final design activities to rehabilitate filter valves for the Jensen Module No. 1 filters. The appropriated funds include \$104,000 for development of the valve procurement documents; \$152,000 for disassembly and refurbishment of the spare valves by three vendors; \$41,000 for development of an RFQ (Request For Qualifications) and the vendor pre-qualification process; \$137,000 for project management, receipt of bids for valve procurement, and administration of the three refurbishment contracts; \$84,000 for valve refurbishment inspection and support; and \$90,000 for remaining budget. Except for the spare-valve refurbishment work, all activities will be performed by Metropolitan staff. The future cost to procure and install the 20 new valves and 3 refurbished valves is estimated to range from \$1.3 million to \$1.5 million. Staff will return to the Board for award of the valve procurement contract and for authorization of Phase 2 activities.

Project No. 2 – Diemer Filter Valve Refurbishment – Final Design, Phase 1 (\$242,000)

The Diemer plant has 48 filters in two modules. Each filter contains five filter valves, and each module is operated in conjunction with two large-diameter isolation valves in the backwash system. The existing filter valves were installed during the original plant construction in 1963 and during the plant expansion in 1969. The filter valves range in diameter from 16 to 48 inches. The 244 existing valves have received routine maintenance, but are approaching 50 years old and have reached the end of their service life. Many valves now leak excessively. During a March 2007 Diemer plant shutdown, staff inspected several of the filter valves. The inspection identified that the valves exhibit various stages of corrosion, while some have severely corroded discs and worn-out embedded elastomer seals, and must be replaced. The motorized actuators used to open and close the valves appeared to be in good condition, and actuator replacement is not recommended at this time.

In September 2008, Metropolitan's Board authorized preliminary design of the Diemer Filter Valve Replacement project. Preliminary design of the Diemer project is now complete and staff recommends proceeding with the preparation of procurement documents to purchase 60 new filter valves. Phase 1 final design activities will include: field investigations to gather dimensional data of existing piping and valves; preparation of a valve procurement contract and receipt of bids; and development of a refined cost estimate.

This action appropriates \$242,000 and authorizes Phase 1 final design activities to rehabilitate filter valves for both modules at the Diemer plant. The appropriated funds include \$122,000 for development of the valve procurement documents; \$85,000 for project management and for receipt of bids; and \$35,000 for remaining budget. All work will be performed by Metropolitan staff. The future cost to procure and install the 60 new valves is estimated to range from \$3.6 million to \$4 million. Staff will return to the Board for award of the valve procurement contract and authorization of Phase 2 final design efforts.

The cost of the initial phase of final design for both the Jensen and Diemer filter valve rehabilitation projects is approximately 5.4 percent of the estimated cost to procure and install the new valves. Engineering Services' goal for design of projects with construction costs greater than \$3 million is 9 to 12 percent.

Summary

This action appropriates \$850,000 and authorizes Phase 1 final design activities for the rehabilitation of filter valves at the Jensen and Diemer plants. Each project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2010/11 capital budget. See [Attachment 1](#) for the Financial Statements and [Attachment 2](#) for the Location Map.

The Jensen project is included within capital Appropriation No. 15371, the Jensen Improvements Program Phase I, which was initiated in fiscal year 2001/02. Appropriation No. 15371 also includes other projects such as the Ferric Chloride Retrofit, Filter Media Replacement, Solids Thickeners Nos. 5 and 6, and the Administration Building Seismic Upgrades. With the present action for the Jensen filter valve refurbishment project, the total funding for Appropriation No. 15371 will increase from \$31,474,000 to \$32,082,000.

The Diemer project is included within capital Appropriation No. 15436, the Diemer Improvements Program Phase II, which was initiated in fiscal year 2006/07. Appropriation No. 15436 also includes the Hatch Covers Replacement and the Lower Maintenance Road Rehabilitation. With the present action for the Diemer filter valve refurbishment project, the total funding for Appropriation No. 15436 will increase from \$16,887,000 to \$17,129,000.

These projects are consistent with Metropolitan's goals for sustainability by enhancing the reliability of the existing treatment system, in order to maintain reliable water deliveries in the future.

Project Milestone

August 2011 – Completion of Phase 1 final design for both plants, award of valve procurement contracts, and authorization of Phase 2 final design activities

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

CEQA determination for Option No. 1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The overall activities involve the funding, design, minor alterations and replacement of existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. Accordingly, the proposed action qualifies under 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).

CEQA determination for Option No. 2:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$850,000; and
- b. Authorize Phase 1 of the Jensen and Diemer Filter Valve Refurbishment projects.

Fiscal Impact: \$850,000 of budgeted funds under the following appropriations:

Approp. 15371: \$608,000

Approp. 15436: \$242,000

Business Analysis: A pilot program to demonstrate the feasibility of refurbishing existing valves could provide substantial cost savings. Procurement of filter valves at this time will enhance reliability of the Jensen and Diemer plants.

Option #2

Do not proceed with the Jensen and Diemer filter valve refurbishment projects at this time.

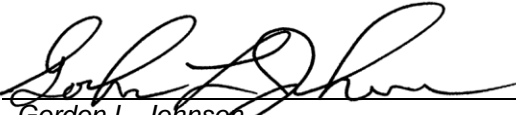
Fiscal Impact: Unknown

Business Analysis: This option would forego an opportunity to improve plant reliability and filter operating efficiency. Staff would replace or refurbish existing valves as they fail. Filters would be out of service during

the valve procurement or refurbishment process. The actual cost to refurbish valves with this approach is uncertain, but is anticipated to be significantly higher than with Option #1. The unit cost to repair each valve individually would be much higher than the unit cost to refurbish valves in groups. Since the timing of the valve failures is unpredictable, the Jensen and Diemer plants would remain at risk of reduced capacity if valves fail and filters are taken out of service. Replacing the valves as they fail is inefficient, and could increase the risk of violation of cross connection regulations if filtered and unfiltered water mix as a result of a valve failure.

Staff Recommendation

Option #1


Gordon L. Johnson
Manager/Chief Engineer, Engineering Services

2/24/2011
Date


Jeffrey Kichtlinger
General Manager

2/24/2011
Date

Attachment 1 – Financial Statements

Attachment 2 – Location Map

Ref# cr12608176

Financial Statement for Jensen Improvements Program

A breakdown of Board Action No. 16 for Appropriation No. 15371 for the Jensen Module No. 1 Filter Valve Refurbishment project* is as follows:

	Previous Total Appropriated Amount ** (Apr. 2009)	Current Board Action No. 16 (Mar. 2011)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 977,350	\$ -	\$ 977,350
Final Design	2,162,151	140,000	2,302,151
Owner Costs (Program mgmt., pre-qual. & bidding process)	3,032,396	137,000	3,169,396
Construction Inspection and Support	1,950,000	74,000	2,024,000
Metropolitan Force Construction	2,096,400	57,000	2,153,400
Materials and Supplies	2,236,219	-	2,236,219
Incidental Expenses	144,180	20,000	164,180
Professional/Technical Services	3,898,527	-	3,898,527
Equipment Use	104,000	-	104,000
Contracts	14,199,746	90,000	14,289,746
Remaining Budget	673,031	90,000	763,031
Total	\$ 31,474,000 **	\$ 608,000	\$ 32,082,000

Funding Request

Program Name:	Jensen Improvements Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15371	Board Action No.:	16
Requested Amount:	\$ 608,000	Capital Program No.:	15371-I
Total Appropriated Amount:	\$ 32,082,000	Capital Program Page No.:	294
Total Program Estimate:	\$ 121,935,000	Program Goal:	I-Infrastructure Reliability

*The total amount expended to date on the Jensen Module No. 1 Filter Valve Refurbishment project is approximately \$685,600, which includes \$540,600 for replacement of four valves in Filter No. 16 and for refurbishment of one valve.

**Includes a correction to reflect previous Action No. 15 in Apr. 2009. Also includes previous reallocation of \$84,312 from three completed projects to Remaining Budget for work completed below budget; and from Remaining Budget to the following projects: (1) \$315,338 to reflect the board-authorized Jensen Basin No. 3 hazardous material abatement; (2) \$294,570 for value engineering and incorporating cost-saving recommendations into the Jensen Solids Dewatering Facility and Lagoons project, and the Jensen Entrance Improvements project; (3) \$177,182 for the Jensen Solids Thickeners Nos. 5 and 6 due to differing site conditions during construction, and (4) \$93,600 for the Jensen Module No. 1 Filter Valve Refurbishment project.

Financial Statement for Diemer Improvements Program – Phase II

A breakdown of Board Action No. 10 for Appropriation No. 15436 for the Diemer Filter Valve Refurbishment project* is as follows:

	Previous Total Appropriated Amount (Oct. 2010)	Current Board Action No. 10 (Mar. 2011)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 653,300	\$ -	\$ 653,300
Final Design	1,765,100	112,000	1,877,100
Owner Costs (Program mgmt., bidding process)	1,676,438	80,000	1,756,438
Submittals Review	344,400	-	344,400
Construction Inspection & Support	1,135,191	-	1,135,191
Metropolitan Force Construction	1,717,900	-	1,717,900
Materials and Supplies	871,258	-	871,258
Incidental Expenses	81,793	15,000	96,793
Professional/Technical Services	850,943	-	850,943
Equipment Use	23,155	-	23,155
Contracts	6,663,366	-	6,663,366
Remaining Budget	1,104,156	35,000	1,139,156
Total	\$ 16,887,000	\$ 242,000	\$ 17,129,000

Funding Request

Program Name:	Diemer Improvements Program – Phase II		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15436	Board Action No.:	10
Requested Amount:	\$ 242,000	Capital Program No.:	15436-I
Total Appropriated Amount:	\$ 17,129,000	Capital Program Page No.:	283
Total Program Estimate:	\$ 155,182,000	Program Goal:	I- Infrastructure Reliability

* The total amount expended to date on the Diemer Filter Valve Refurbishment project is approximately \$196,473.

Jensen and Diemer Water Treatment Plants

