

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

September 12, 2000 Board Meeting

9-1

Subject

Appropriations for three Capital Investment Plan projects related to plant reliability and water quality

Description

The following three projects were evaluated and recommended by the Capital Investment Plan (CIP) Evaluation Team, and fully budgeted in the CIP for Fiscal Year 2000/01: 1) Refurbish Washwater Tanks for the Robert B. Diemer Filtration Plant, 2) Install Sparger System for the Robert A. Skinner Filtration Plant Modules 4, 5 and 6, and 3) Design and Construct Two Flow Control Facilities on the Orange County Feeder.

1) Refurbish Washwater Tanks for the Robert B. Diemer Filtration Plant

Inspections of East and West Washwater Tanks at the Robert B. Diemer Filtration Plant (Diemer plant) in February 2000 revealed significant deterioration of both the interior linings and the exterior coatings. Corrosion of the steel roof trusses of the east tank threatens the structural integrity of the tank. The west tank also shows signs of corrosion, although not as severe as the east tank. The rate of corrosion of the west tank walls is such that staff recommends recoating at the same time as the east tank to prevent more costly future repairs. These two washwater tanks provide backwash water for the filtration process and, as such, are critical process components of the Diemer plant. In order to maintain the ability of the Diemer plant to consistently and reliably supply treated water, it is proposed to recoat the tank interiors, recoat the exterior surfaces of both tanks and repair damaged steel roof trusses in both washwater tanks. See [Attachment 1](#) for the Detailed Report and [Attachment 4](#) for the Financial Statement.

2) Install Sparger Automation System for the Robert A. Skinner Filtration Plant**Modules 4, 5 and 6**

The Robert A. Skinner Filtration Plant (Skinner plant) Modules 4, 5, and 6 were constructed as direct filtration modules and do not have sedimentation basins. In order to manage the sediment build-up in the flocculator basins and filter forebay, a sparger system, consisting of four butterfly valves and one sparger pump per module, has been manually operated by plant staff. The purpose of the sparger system is to keep particles suspended to prevent sludge build-up at the bottom of the flocculation basins and filter forebay. Automating the operation of this system will decrease filter effluent turbidity and particle counts, reduce the risk of exceeding the Interim Enhanced Surface Water Treatment Rule requirements, prolong filter run lengths, improve flow management to the reclamation plant, and allow for more efficient use of plant personnel. See [Attachment 2](#) for the Detailed Report and [Attachment 4](#) for the Financial Statement.

3) Design and Construct Two Flow Control Facilities on the Orange County Feeder

The Orange County Feeder (OCF) experiences high levels of entrained air under elevated flow conditions. The occurrence of high levels of entrained air causes the water to appear “milky,” resulting in numerous complaints from the Rowland Water District (RWD) and Walnut Valley Water District (WVWD). The service connections impacted by these occurrences are PM-9, PM-12, and PM-22. The high levels of entrained air are the result of cascading flow conditions in the OCF at two locations in the vicinity of these service connections.

Flow tests demonstrated that levels of entrained air significantly increased at flows above 25 cfs, and that the “milky” appearance of the water is directly related to the levels of entrained air.

Operation of the OCF is driven by service connection demands and the need to maintain water surface levels in the Orange County (OC) Reservoir. Over time, as demands from member agencies increased, the frequency of flow rates greater than 25 cfs increased and resulted in more frequent occurrences of entrained air conditions in the pipeline and increased consumer complaints. Engineering studies have concluded that installing two flow control facilities immediately downstream of the two pipe sections experiencing cascading flow and upstream of service connections PM-9, PM-12, and PM-27, will eliminate cascading flow and the “milky” appearance in the water.

See [Attachment 3](#) for the Detailed Report and [Attachment 4](#) for the Financial Statement.

Policy

Pursuant to Section 5108 of the Metropolitan Water District Administrative Code, no expenditure shall be made unless the Board has approved an appropriation for the purpose intended. Pursuant to Section 8113 of the Metropolitan Water District Administrative Code, award of contracts following competitive bidding may be delegated by the Board to the General Manager.

Board Options/Fiscal Impacts

Option #1

- ❑ Appropriate \$1.05 million, authorize the General Manager to have all work performed, and delegate to the General Manager the authority to award contracts for the refurbishment of the East and West Washwater Tanks at the Diemer plant.
- ❑ Appropriate \$352,000 and authorize the General Manager to have all work performed to automate the sparger system in Modules 4, 5 and 6 at the Skinner plant.
- ❑ Appropriate \$1.65 million, authorize the General Manager to have all work performed, and delegate to the General Manager the authority to award contracts for the design and construction of two flow control facilities on the Orange County Feeder.
- ❑ Determine that the proposed projects qualify for Categorical Exemption under the California Environmental Quality Act (CEQA) in that they consist of the minor alteration of existing public facilities, involving no expansion of use beyond that currently existing (CEQA Section 15301, Class 1 Exemption).

Fiscal Impact: \$3.052 million

Option #2

Act on each item individually.

Fiscal Impact: \$3.052 million

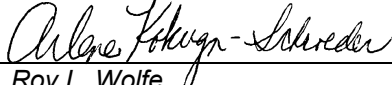
Option #3

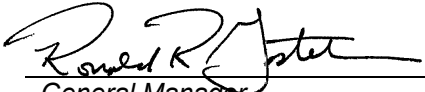
Defer action

Fiscal Impact: Increased costs over time.

Staff Recommendation

Option #1.


for Roy L. Wolfe 8/18/2000
Manager, Corporate Resources Date


General Manager 8/28/2000
Date

- Attachment 1 – Detailed Report, Washwater Tanks**
- Attachment 2 – Detailed Report, Sparger Automation**
- Attachment 3 – Detailed Report, Flow Control Facilities**
- Attachment 4 – Financial Statements**

BLA #554

Refurbish Washwater Tanks for the Robert B. Diemer Filtration Plant
Requested Amount: \$1.05 Million

Detailed Report

Purpose/Background. The East Washwater Tank at the Diemer plant is a 60-foot diameter by 80-foot tall steel tank containing approximately 1.7 million gallons that was constructed in 1962. The West Washwater Tank is the same size and was constructed in 1969. Water from the tanks is used to backwash the filters. Backwashing is an essential and required part of the filtration process that cleans the filter media. Without backwashing capability, the filters would eventually become obstructed and inoperable. The tanks are fabricated from carbon steel that has been lined and coated for corrosion protection. Despite making repairs to the liners and coatings, recent inspections have revealed that significant deterioration has occurred on the ceiling and sidewalls of each tank. Additionally, portions of the tanks' roof trusses and rafters have corroded to the point that welding additional steel plate is necessary to restore the structural integrity of the roofs.

Tank Inspections/Chronology. A series of thorough inspections of the east tank's inner lining and structural steel was conducted in December 1997 and January 1998. These inspections revealed that the interior lining on the tank roof and wall has deteriorated and corrosion of the steel has occurred in selected places. In June 1998, the Board appropriated \$300,000 under Appropriation No. 15322 to finance all budgeted costs and authorized the General Manager to have all work performed to recoat the interior of the east tank and make as-needed repairs to the tank's structural steel. The project was originally advertised on November 2, 1998, under Specifications No. 1408 and bids were opened on November 24, 1998. One bid was received for the proposed work at the amount of approximately \$448,000. This bid amount exceeded the engineer's estimate and was rejected. Subsequently, numerous and significant changes were made to the original specifications in an effort to encourage more bidders to participate in the subsequent advertisement process and to lower project costs. The project was re-advertised on August 24, 1999, for bids to be opened on October 5, 1999. On October 4, 1999, the project was temporarily deferred to complete an evaluation of the program as part of the CIP evaluation process.

Following the decision to temporarily defer the project, an inspection was conducted on February 8-9, 2000 to reassess corrosion rates in the east tank. This inspection indicated that the current condition of the coatings is extremely poor and is continuing to deteriorate at an accelerated rate. Sidewall coating failures have increased by 50 percent since the 1997 and 1998 inspections.

Inspections of the west tank were conducted in March 1993 and most recently on February 22-23, 2000. The most recent inspection revealed that the interior of the west tank also needs to be recoated. Although the west tank is newer than the east tank, the interior in the west tank is coated with coal tar epoxy, which has not proven as effective as the older, coal tar enamel coating used in the east tank. Areas of significant concern in the west tank include the coating in the tank's vapor zone, tank floor, and the sidewall coatings, all of which show moderate deterioration in the form of blistering, peeling and steel rusting. In addition, the exterior coating of the roof and sidewalls of both tanks is badly faded and also exhibiting heavy chalking. Accordingly, the program scope was revised during the CIP evaluation process to include recoating of the exterior and interior of both tanks.

Current project description. The existing program scope has been revised to include relining the interiors of both the east and west tanks and recoating the exterior of both tanks. The work will include removing the interior and exterior coatings by sand blasting, strengthening the corroded areas with weld overlay, and recoating the interior and exterior of both tanks. It is proposed to recoat one tank during fiscal year 2000-2001 and recoat the other tank during fiscal year 2001-2002 in order to minimize the impact on Diemer plant operations. Under this program, Metropolitan would prepare plans and specifications, administer the contracts, and inspect the construction. In order to streamline award of the construction contracts and to complete the repairs prior to increased summer water demands, this letter seeks the Board's approval of a delegation of authority to the General Manager to award the contracts immediately following competitive bidding in accordance with Section 8113 of the Metropolitan Water District Administrative Code.

Current cost estimate. Attachment 4 shows the breakdown of the total estimated cost of \$1,350,000.

CEQA Compliance / Environmental Documentation

The proposed project qualifies for Categorical Exemption under the California Environmental Quality Act (CEQA) as it consists of the minor alteration of existing public facilities, involving no expansion of use beyond that currently existing (CEQA Section 15301, Class 1 Exemption).

ACTIONS AND MILESTONES

- September 2000- Complete final design and specification for first washwater tank
- May 2001 - Complete recoating of first washwater tank
- September 2001- Complete final design and specification for second washwater tank
- May 2002 - Complete recoating of second washwater tank

**Install Sparger Automation System for the Robert A. Skinner Filtration Plant
Modules 4, 5 and 6**

Requested Amount: \$352,000

Detailed Report

Purpose/Background. The Robert A. Skinner Filtration Plant Modules 4, 5 and 6 were constructed as direct filtration modules and do not have sedimentation basins. Consequently, the heavy particulates settle out in the flocculator basins and filter forebay. To minimize the build-up of sediments each of these modules has a manually operated sparger system which keeps the particulate matter in suspension until it can be captured by the filters. The suspended floc is then removed from the filters during filter backwashing and sent to the washwater reclamation plant. If the sparger system is not manually operated on a regular basis (several times per day), undesirable amounts of particulates can settle in the basin. When the sparger system is then activated, the filters are overloaded, resulting in reduced plant capacity and higher effluent turbidity. The problem is exacerbated during periods of poor influent water quality, e.g. algae blooms in Lake Skinner or high turbidity episodes.

Sparger System Operation. Currently, there are four sparger butterfly valves and one sparger pump for each module. The sparger system is manually operated two to three times per day depending on water demands and particle loading. The valves are manually opened followed by manual activation of the pumps. Each time a sparger system is operated a plant operator is required to go out into the plant to open the valves on each module in sequence, and then come back approximately 30 to 60 minutes later to close those valves and open others. This labor intensive process means an operator has to make numerous trips per day out to the three modules to operate the valves manually. Occasionally, heavy particulate loading from high influent water turbidities and algae blooms requires more frequent sparging that can not be accomplished without additional plant operator personnel. The proposed project will enable a more efficient utilization of plant personnel by allowing them to be reassigned to other duties.

Water Quality Benefits. The new Interim Enhanced Surface Water Treatment Rule (IESWTR) has established goals that are intended to optimize treatment plant performance. The IESWTR contains more stringent requirements for individual filters, and compliance is required by January 2002. Although filter effluent meets current water quality standards, sparger automation will decrease the possibility of exceeding the limits in the IESWTR. Automation of the Modules 4, 5 and 6 sparger system provides water quality benefits by reducing particulate loading to the filters thereby decreasing filter effluent turbidity and particle counts. Reducing particulate loading to the filter influent will also prolong filter run lengths. Additional benefits are backwashing filters less frequently, thereby preventing overloading the reclamation plant. Metropolitan's Cryptosporidium Action Plan and the IESWTR recommend minimizing overloading of the reclamation process to maintain a consistent and predictable effluent from the reclamation plant. The automated system will optimize sparging frequency and flow rates to yield a reduction of power consumption as water quality conditions change. This project was recommended for approval as part of the Capital Investment Plan (CIP) evaluation process and is fully budgeted in Fiscal Year 2000/01.

Current project description. Metropolitan staff will design, procure and install equipment to automate the sparger system so that it can be activated from the control room or run by an automatic process control. The project includes replacing the manual valves with automatic valves/actuators, installing associated electrical and control cabling, and programming the automatic process control system.

Current cost estimate. The attached Financial Statement shows the breakdown of the total estimated costs of \$352,000.

CEQA Compliance / Environmental Documentation

The proposed project qualifies for Categorical Exemption under the California Environmental Quality Act (CEQA) as it consists of the minor alteration of existing public facilities, involving no expansion of use beyond that currently existing (CEQA Section 15301, Class 1 Exemption).

ACTIONS AND MILESTONES

- April 2001- Complete final design
- January 2002 - Complete installation and programming

**Design and Construct Two Flow Control Facilities on the
Orange County Feeder
Requested Amount: \$1.65 Million**

Detailed Report

Background

In response to concerns expressed by Three Valleys Municipal Water District (TVMWD) and its member agencies Rowland Water District (RWD) and Walnut Valley Water District (WVWD), Metropolitan performed tests to determine the cause of “milky” water from service connections on the Orange County Feeder (OCF). The tests determined that under elevated flow conditions, cascading flow at two locations upstream of service connections PM-9, PM-12, and PM-22 introduces high levels of entrained air into the OCF. The occurrence of high levels of entrained air causes the water to appear “milky,” and as a result both the RWD and WVWD receive numerous customer complaints.

Metropolitan’s staff performed tests to determine the levels of entrained air in the OCF and how those levels varied with flow rate. The flow tests determined the levels of entrained air increased significantly at flow rates above 25 cfs.

Operation of the OCF is driven by service connection demands and the need to maintain water levels in the Orange County (OC) Reservoir. Over time as demands from member agencies increased, the frequency and duration of flow rates greater than 25 cfs increased and resulted in increasing occurrences of entrained air conditions in the pipeline.

Discussion of Alternatives

There are two possible methods for eliminating the cause of the entrained air in the OCF:

- 1) Eliminating the cascading flow by constructing flow control facilities. Construction of flow control facilities immediately downstream of the two sections of pipeline experiencing cascading flow and upstream service connections PM-9, PM-12, and PM-22 will result in full pipe flow in those sections of the pipeline. The full pipe flow will pressurize those sections of pipeline and eliminate the cascading flow condition. The valves can be arranged and set to allow the full range of pipe flow while avoiding over-pressurization of the pipeline. The estimated cost of constructing two flow control facilities is \$1.65 million.
- 2) Constructing storage tanks downstream and at each of the service connections. Construction of storage tank facilities is estimated at a minimum of \$1.35 million per each of the three service connections affected by entrained air for a minimum estimated total cost of \$4.05 million. To ensure the storage facilities are at the proper elevation for the distribution could require construction at more remote sites and longer pipelines to deliver water, or construction of pumping stations, thereby further increasing the estimated costs.

Conclusions

Based upon analysis of the two alternatives the following was concluded:

Alternative No. 1, construction of flow control facilities, is the most cost-effective solution to the entrained air problem. This solution would not impact the surrounding neighborhoods or the environment, and can be implemented much sooner than Alternative No. 2.

Alternative No. 2, construction of storage tank facilities at each of the impacted service connections, represents a costly and difficult solution to the problem. This solution would potentially take several years to complete, and the estimated minimum costs would most likely significantly increase and could have environmental impacts.

Recommendation

Appropriate \$1.65 million, authorize the General Manager to have all work performed, and delegate to the General Manager the authority to award a contract for the construction of two flow control facilities on the OCF.

CEQA Compliance / Environmental Documentation

The recommended alternative qualifies for Categorical Exemption under the California Environmental Quality Act (CEQA) as it consists of the minor alteration of existing public facilities, involving no expansion of use beyond that currently existing (CEQA Section 15301, Class 1 Exemption).

ACTIONS AND MILESTONES

- September 2000 – Receive Board approval, begin preliminary design work.
- September 2000 – Start final design work.
- October 2000 – Complete final design and specifications, and issue Notice of Bids for construction.
- November 2000 – Begin construction.
- March 2001 – Project completed.

Summary of Board Action

| Appropriation No. | Description | Amount |
|--------------------------|---|--------------------|
| 15322 | Refurbish Washwater Tanks at Diemer plant | \$1,050,000 |
| 15357 | Install Sparger Automation System at Skinner plant | 352,000 |
| 15358 | Design and Construct Flow Control Facilities on OCF | 1,650,000 |
| | Total | \$3,052,000 |

Financial Statement for Washwater Tanks at Diemer plant

A breakdown of the Board Action No. 2 for Appropriation No. 15322 to finance design and construction to refurbish the Diemer filtration plant washwater tanks is as follows:

| | Board Action No.1 (June 1998) | Board Action No. 2 (Sept 2000) |
|---|--|---|
| Labor: | | |
| Owner Costs (Project Mgmt, Bidding Process) | \$ 9,000 | \$ 57,000 |
| Design and Preparation of Specifications | 14,000 | 108,000 |
| Construction Support | 17,000 | 140,000 |
| Operations | | 10,000 |
| Environmental Compliance | | 5,000 |
| Materials and Supplies | 2,000 | 15,000 |
| Incidental Expenses | 2,000 | 30,000 |
| Operating Equipment | 5,000 | 10,000 |
| Contracts | 251,000 | 975,000 |
| Total | <u>\$ 300,000</u> | <u>\$ 1,350,000</u> |

Funding Request

| | | | |
|-----------------------------------|---|----------------------------------|----------------|
| Program Name: | Diemer Filtration Plant –Washwater Tanks Refurbishment | | |
| Source of Funds: | Construction Funds (possibly General Obligation, Revenue Bonds, Pay-As-You-Go Fund) | | |
| Appropriation No.: | 15322 | Board Action No.: | 2 |
| Requested Amount: | \$1,050,000 | Capital Program No.: | 15322-R |
| Total Appropriated Amount: | \$1,350,000 | Capital Program Page No.: | E-15 |
| Total Program Estimate: | \$1,350,000 | Project Goal: | R- Reliability |

Financial Statement for Sparger Automation System at Skinner Plant

A breakdown of the Board Action No. 1 for Appropriation No. 15357 to finance design and construction to automate the Skinner filtration plant Modules 4, 5 and 6 sparger system is:

| | Board Action No.1 (Sept. 2000) |
|---|---|
| Labor: | |
| Study Phase | \$ 5,300 |
| Owner Costs (Administrative and Project Management) | 22,100 |
| Engineering Design | 67,800 |
| Engineering Support During Construction | 33,200 |
| District Forces Construction | 109,100 |
| Control Systems | 10,200 |
| Water Quality | 3,700 |
| Materials and Supplies | 98,200 |
| Incidental Expenses | 700 |
| Operating Equipment | 1,700 |
| Total | <u>\$ 352,000</u> |

Funding Request

| | | | |
|-----------------------------------|---|----------------------------------|----------------|
| Program Name: | Skinner Filtration Plant – Sparger Automation System for Modules 4, 5 and 6 | | |
| Source of Funds: | Pay-As-You-Go Fund | | |
| Appropriation No.: | 15357 | Board Action No.: | 1 |
| Requested Amount: | \$352,000 | Capital Program No.: | 00113-R |
| Total Appropriated Amount: | \$352,000 | Capital Program Page No.: | E-35 |
| Total Program Estimate: | \$352,000 | Project Goal: | R- Reliability |

Financial Statement for Control Facilities on OCF

A breakdown of the Board Action No. 1 for Appropriation No. 15358 to finance design and construction of two flow control facilities on the Orange County Feeder is as follows:

| | Board Action No. 1 (Sept. 2000) |
|---|--|
| Labor: | |
| Owners Costs (Project Mgmt., Environ., R/W) | \$ 80,000 |
| Design and Specifications | 98,000 |
| Construction Support & Inspection | 44,000 |
| Operations | 80,000 |
| Operating Equipment | 5,000 |
| Incidental Expenses | 4,000 |
| Contracts | 1,339,000 |
| Total | <u>\$ 1,650,000</u> |

Funding Request

| | | | |
|-----------------------------------|---|----------------------------------|----------------|
| Program Name: | Orange County Feeder Flow Control Facilities | | |
| Source of Funds: | Construction Funds (possibly General Obligation, Revenue Bonds, Pay-As-You-Go Fund) | | |
| Appropriation No.: | 15358 | Board Action No.: | 1 |
| Requested Amount: | \$1,650,000 | Capital Program No.: | 00111-R |
| Total Appropriated Amount: | \$1,650,000 | Capital Program Page No.: | E-31 |
| Total Program Estimate: | \$1,650,000 | Project Goal: | R- Reliability |