

- **Board of Directors**
Engineering and Capital Programs Committee

March 11, 2008 Board Meeting

7-5

Subject

Appropriate \$1.22 million; and authorize (1) four rehabilitation projects at the Weymouth treatment plant, and (2) an agreement with MWH Americas, Inc. (Approps. 15440, 15369)

Description

This action authorizes four rehabilitation projects at the F. E. Weymouth Water Treatment Plant: (1) preliminary design of upgrades to the washwater reclamation facilities; (2) final design to replace the reservoir gates; (3) final design to rehabilitate four filters; and (4) a study to upgrade the dry polymer system. This action also authorizes a consulting agreement with MWH Americas, Inc. for final design of the filter rehabilitation project. The Washwater Reclamation Reliability Upgrade, Reservoir Inlet Gates Replacement, and Filter Rehabilitation projects are categorized as Infrastructure Rehabilitation and Replacement projects within Metropolitan's Capital Investment Plan (CIP). The Dry Polymer System Study is categorized as an Infrastructure Upgrade project. All projects are budgeted within the CIP.

Background

The Weymouth plant was placed into service in 1941 with an initial capacity of 100 million gallons per day (mgd), and has been expanded twice to its current capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River and State Water Project to Metropolitan's Central Pool portion of the distribution system.

Metropolitan staff conducts regular maintenance of the Weymouth plant's structures, mechanical components, and electrical equipment. Although the plant continues to perform reliably today, its systems are exhibiting signs of normal wear and tear, as may be expected from nearly 70 years of operation. Some of the plant's facilities have reached the end of their life expectancy and have become less reliable, while other facilities require improvements to enhance treatment performance to ensure compliance with water quality regulations. Four projects are recommended at this time to address needed rehabilitation work to ensure plant reliability.

Project No. 1 - Weymouth Washwater Reclamation Reliability Upgrade – Preliminary Design Phase (\$280,000)

At the Weymouth plant, spent filter backwash water drains to backwash sumps located beneath Filter Buildings Nos. 1 and 2. The water in the backwash sumps is pumped to a vortex coal removal structure and then routed to the 22-mgd washwater reclamation plant for treatment and eventual return to the plant inlet. The California Department of Public Health has established a maximum turbidity goal in this recycled washwater. Although all regulations for turbidity are being met, it is occasionally difficult to achieve the nonenforceable goal for maximum turbidity levels. In the future, when ozone is added at Weymouth, the filters will become biologically active and will need to be backwashed more frequently than at present. Demand on the reclamation facilities will increase, which will in turn raise the potential for high turbidity levels in the recycled washwater.

In November 2005, the Board authorized a study to assess needed capacity of reclamation facilities at the Weymouth plant, based on planned operation, existing plant performance, and water quality requirements. The study concluded that while the existing capacity of 22 mgd is sufficient for current and foreseeable plant operations, equipment modifications are necessary to reliably meet water quality goals. Recommended process changes and equipment upgrades include:

- New 14-inch-diameter decant piping to the Filter Building No. 1 backwash sump -- Currently, decant water from the gravity solids thickeners, coal separator, and supernatant from the filter belt presses can only be returned to the Filter Building No. 2 backwash sump. Staff recommends adding new piping to allow decant flow to also be returned to the backwash sump in Filter Building No. 1. This will improve reliability by allowing the reclamation facilities to continue to operate when the Filter Building No. 2 backwash sump needs to be shut down for cleaning.
- Upgrade of three backwash sump pumps -- The backwash sumps receive used filter backwash water, which contains sand and coal particles. Each pump has a history of failure caused by erosion and corrosion of the carbon steel components, due to the pumping of sand and coal particles, which reduces the pump output. Staff recommends upgrading the pump internal components with hardened or stainless steel materials.
- Replacement of flocculator shafts, sedimentation basin chain-and-flight equipment, and drive motor assemblies -- The reclamation plant equipment has reached the end of its useful life, requiring frequent repairs. The 15-year-old flocculator shafts are corroded and periodically break near the shaft flanges. To resolve this, staff recommends replacing the flocculator shafts with new stainless steel shafts. In addition, the plastic chains on the flocculator drives have been worn out from grinding on grit build-up on the plastic sprockets and should be replaced in-kind. Staff also recommends replacing the flocculator drive units, which have corroded due to water splashing into the motor assemblies. The chain-and-flight equipment, which was replaced over a decade ago, is performing well. However, the tack welds that were used to mount the chain-and-flight equipment guides to the floor fail periodically, which requires that the basin be drained for repair. To reduce shutdowns, staff recommends replacing the tack welds with a new fastening system that does not require frequent re-welding repairs.
- New coal slurry dewatering system -- Coal slurry that is removed at the vortex coal removal structure is diverted to a dewatering system, which dewateres the captured coal and other solids. The dewatering system experiences frequent failure and metal corrosion. Staff recommends replacement of the coal slurry dewatering system to improve the separation process.

This action appropriates \$280,000 and authorizes preliminary design phase activities for upgrades to the existing reclamation facilities at the Weymouth plant. These activities include environmental review, development of a construction cost estimate, design of the equipment layout, and preparation of a preliminary design report. The preliminary design will be performed by Metropolitan staff.

Staff will return to the Board to authorize final design of the upgrades to the reclamation facilities.

Project No. 2 - Weymouth Reservoir Inlet Gates Replacement – Preliminary and Final Design Phases (\$247,000)

The Weymouth plant's Finished Water Reservoir (FWR) has three inlet gates, three bypass gates and three outlet gates. All nine gates were originally installed when the FWR was constructed in 1964. Properly functioning gates are required to isolate the reservoir when it is removed from service for maintenance. Each 8-foot by 8-foot gate is fabricated of cast carbon steel plate mounted vertically within a gate guide, and is motor-operated. The gates are routinely exercised to verify proper operation. In 2005, a scheduled test revealed that Inlet Gate No. 2 would not close due to corrosion of both the gate and its guides.

In September 2006, the Board authorized repair work on Inlet Gate No. 2, along with inspection of the other eight FWR gates. Inlet Gate No. 2 was replaced with a bulkhead to allow inspection of the two other inlet gates during a plant shutdown in December 2006. During the inspection, water leakage was detected in both Inlet Gates No. 1 and No. 3. The outlet and bypass gates could not be evaluated properly because the FWR was full and the bypass line and outlet structure could not be dewatered. These gates will be inspected during the next plant shutdown.

Leakage of the FWR gates impacts staff's ability to shut down and maintain the FWR, and to isolate water should a process upset condition occur. The FWR is classified as a dam by the State Division of Safety of Dams

(DSOD), and operable shutoff gates must be maintained. Staff recommends that the three inlet gates be replaced to ensure compliance with DSOD requirements and avoid potential violation fines.

This action appropriates \$247,000 and authorizes preliminary and final design phase activities for replacement of the three FWR inlet gates. These activities include engineering design, preparation of procurement documents, and development of a construction cost estimate. All work will be performed by Metropolitan staff. The anticipated cost of final design is approximately 13 percent of the estimated total construction cost. Engineering Services' goal for design of projects with construction costs less than \$3 million is 9 to 15 percent. The fabrication and installation cost for the three FWR inlet gates is estimated to range from approximately \$600,000 to \$750,000.

Staff will return to the Board to award procurement and installation contracts for the three inlet gates.

Project No. 3 - Weymouth Filter Rehabilitation – Final Design Phase (\$553,000)

The 48 filters at the Weymouth plant range in age from 40 to nearly 70 years old. While they were state-of-the-art at the time of their construction, the filters were designed to meet much less stringent performance and water quality standards than exist today. The filters were originally designed to operate at lower filtration rates, using a fine sand monomedia and low backwash rates. Since then, the filters have been retrofitted with a dual media composed of anthracite coal and silica sand to enhance performance. However, no other appurtenances that support the filtration process (e.g., troughs, underdrains, etc.) were changed to accommodate the higher performance expected of the filters. By modern standards, the existing filter cells are constrained by their shallow depth. This shallow depth can lead to short filter runs and a susceptibility to air-binding problems.

At the present time, four filters have been removed from service due to unacceptably high outlet turbidity levels. Although staff has conducted filter surveillance and box excavations to investigate filter performance, and has varied operating conditions by reducing the filter rate, changing the backwash rate, and adding filter-aid polymer, the performance of these four filters is inadequate and they remain out of service. Staff recommends that the media be removed and replaced in these four filters, so that the filters may be returned to service. This work creates a unique opportunity to evaluate alternate media types and filter appurtenances within the shallow configuration of the Weymouth filter cells.

Staff recommends that the four filters be rebuilt with new media and different configurations of design enhancements, so that the performance of these four filters can be monitored and evaluated at full-scale. A similar full-scale filtration evaluation was conducted in the early 1990s at the Jensen plant. Results of this evaluation showed that tri-media filters had lower outlet turbidity at higher filtration rates than the existing dual-media filters. Based on these results, Metropolitan has standardized on a tri-media filter design wherever possible. Because of the shallow filters and hydraulic constraints at the Weymouth plant, however, the tri-media filter design is not feasible for that plant.

In September 2006, the Board authorized preliminary design of improvements to the four filters, and inspection of the media and underdrains within one of those filters. Based on the results of the inspection and preliminary design, staff recommends full-scale evaluation of filter modifications that may include alternate types and layers of filter media, a new underdrain system, an air-scour system, and new washwater troughs. Test protocols will be followed, which are similar to those successfully employed at the Jensen plant, to ensure that all water quality criteria are met during the evaluation period. During the planned nine-month test period, staff will assess performance with respect to water quality and the impacts of physical constraints within the existing filter cells, in order to identify the optimal configuration for rehabilitation of the remaining 44 filters. Long-term treatment facility planning for the Weymouth site will compare the water quality performance and cost of this optimal filter configuration with the performance and cost of membrane filtration.

This action appropriates \$553,000 and authorizes final design phase activities for improvements to four Weymouth plant filters. These activities include design, preparation of drawings and specifications, development of a construction cost estimate, and receipt of bids. Final design is recommended to be performed by MWH Americas under a new agreement described below. The anticipated cost of final design is approximately 15 percent of the estimated total construction cost. Engineering Services' goal for design of projects with

construction cost less than \$3 million is 9 to 15 percent. The construction cost for the filter improvements is estimated to range from approximately \$1.8 million to \$2.2 million.

Staff will return to the Board to authorize construction of the improvements and evaluation of the four filters.

Project No. 4 - Weymouth Dry Polymer System – Study (\$140,000)

The Weymouth plant's dry polymer mixing system prepares a polymer solution that is used as a coagulation aid in the washwater reclamation plant, thickeners, and in the filters. A cationic polyacrylamide polymer is typically used in the reclamation plant and thickeners, while a nonionic polyacrylamide polymer is required to improve the plant filter performance when treating high blends of State project water (SPW). The cationic and nonionic polymers need to be mixed separately and used simultaneously during high blends of SPW. However, the Weymouth system has a single polymer mixer. During high blends of SPW, the polymer solutions are prepared in batches, requiring the system and piping to be cleaned before switching between polymers. Furthermore, the existing mixer uses an outdated design that is unreliable and clogs easily. This study will consider improvements, such as replacement of the current polymer mixer and addition of a second dry polymer mixing system, to allow simultaneous automated feed of both polymer types, and will recommend the most reliable, cost-effective solution.

This action appropriates \$140,000 and authorizes a study of the dry polymer system at the Weymouth plant. Metropolitan staff will perform the study, which will review operational requirements and consider new equipment layouts.

Staff will return to the Board to authorize preliminary design of the upgrades to the dry polymer system.

Technical Engineering Support – New Agreement with MWH Americas

MWH Americas, Inc. was selected through a competitive process (Request for Qualifications No. 833) to provide engineering services related to water treatment facilities. Staff recommends that a new professional services agreement be authorized with MWH for final design of the Weymouth Filter Rehabilitation project.

This action authorizes the General Manager to enter into a professional services agreement with MWH in an amount not to exceed \$375,000. For this agreement, Metropolitan established a Small Business Enterprise participation level of 18 percent. MWH has committed to meet this goal.

Summary

This action appropriates \$1.22 million, authorizes four rehabilitation projects at the Weymouth plant, and authorizes an agreement with MWH Americas, Inc. Each project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2007/08 capital budget. These funds are included under two capital programs within Metropolitan's CIP. See [Attachment 1](#) for the Financial Statements, and [Attachment 2](#) for the Location Maps.

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

Project Milestones

October 2008 – Completion of preliminary design of Washwater Reclamation Reliability Upgrade project and the Reservoir Inlet Gates Replacement project, and study of the Weymouth Dry Polymer System project.

November 2008 – Completion of final design of Weymouth Filter Rehabilitation project.

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

Metropolitan Water District Administrative Code Section 8121: General Authority of the General Manager to Enter Contracts

California Environmental Quality Act (CEQA)

CEQA determination for Options #1 and #2:

Projects Nos. 1-4 Preliminary and Final Design

The environmental effects from the funding, design, and construction of Routine Minor Repairs and Replacement of Existing Equipment, and Miscellaneous studies and investigations were evaluated in the F. E. Weymouth Filtration Plant Ozonation Facilities and Site Improvements Program Final Environmental Impact Report (Final EIR), which was certified by the Board on April 12, 2005. The Board also approved the Findings of Fact (Findings), the Statement of Overriding Considerations, the Mitigation Monitoring and Reporting Program (MMRP), and the projects themselves. Addendum No. 1 to the Final EIR was certified by the Board on January 9, 2007. The current board action is solely based on appropriating funding and authorizing preliminary and final design of the Washwater Reclamation Reliability Upgrade, Weymouth Reservoir Inlet Gates Replacement, Weymouth Filter Rehabilitation, and authorizing a Dry Polymer System study and not on any changes to the approved program itself. Hence, the previous environmental documentation acted on by the Board in conjunction with the proposed actions fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act on the proposed actions.

The CEQA determination is: Determine that the proposed actions have been previously addressed in the certified 2005 Final EIR, findings, SOC, MMRP, and 2007 Addendum and that no further environmental analysis or documentation is required.

New Agreement with MWH Americas

The authorization of a new professional services agreement with MWH Americas, Inc. is not subject to CEQA because it involves other government fiscal activities, which do not involve any commitment to any specific project which may result in a potentially significant physical impact on the environment (Section 15378(b)(4) of the State CEQA Guidelines).

The CEQA determination is: Determine that entering into a new agreement with MWH Americas Inc. is not subject to CEQA (Section 15378(b)(4) of the State CEQA Guidelines).

CEQA determination for Option #3:

None required

Board Options

Option #1

Adopt the CEQA determinations and

- a. Appropriate \$1.22 million in budgeted funds;
- b. Authorize preliminary design of the Weymouth Washwater Reclamation Reliability Upgrade;
- c. Authorize preliminary and final design of the Weymouth Reservoir Inlet Gates Replacement;
- d. Authorize final design of the Weymouth Filter Rehabilitation;
- e. Authorize a study of the Weymouth Dry Polymer System; and
- f. Authorize an agreement with MWH Americas in an amount not to exceed \$375,000.

Fiscal Impact: \$1.22 million of budgeted funds under the following appropriations:

Approp. 15440: \$940,000

Approp. 15369: \$280,000

Business Analysis: This option will aid in maintaining reliability of the Weymouth plant and in meeting Metropolitan's water quality goals.

Option #2

Adopt the CEQA determinations and

- a. Appropriate \$1.08 million in budgeted funds;
- b. Authorize preliminary design of the Weymouth Washwater Reclamation Reliability Upgrade;
- c. Authorize preliminary and final design of the Weymouth Reservoir Inlet Gates Replacement;

- d. Authorize final design of the Weymouth Filter Rehabilitation;
- e. Do not proceed with a study of the Weymouth Dry Polymer System at this time; and
- f. Authorize an agreement with MWH Americas in an amount not to exceed \$375,000.

Fiscal Impact: \$1.08 million of budgeted funds under the following appropriations:

Approp. 15440: \$800,000

Approp. 15369: \$280,000

Business Analysis: Under this option, the filter and reclamation plant projects would proceed because plant operations would be severely impacted if these facilities were to fail. The FWR gates project would also proceed in order to comply with DSOD requirements. Deferral of the Dry Polymer System study would forego an opportunity to improve the Weymouth plant’s ability to treat varying sources of water quality. Staff would track usage of dry polymer and the long-term ability to meet treated water goals with existing polymer-fed equipment, and would return to the Board in the future with a recommendation.

Option #3

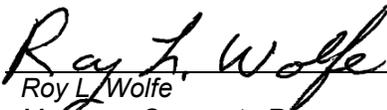
Do not proceed with the four Weymouth rehabilitation projects at this time, and do not authorize an agreement with MWH.

Fiscal Impact: None

Business Analysis: This option would likely impact the ability of the Weymouth plant to operate reliably. Process equipment would be repaired when it fails.

Staff Recommendation

Option #1


 Roy L. Wolfe
 Manager, Corporate Resources

2/26/2008
Date


 Jeffrey Nightlinger
 General Manager

2/26/2008
Date

Attachment 1 – Financial Statements

Attachment 2 – Location Maps

BLA #5712

Financial Statement for Weymouth Improvements Program

A breakdown of Board Action No. 25 for Appropriation No. 15369 for the Weymouth Washwater Reclamation Reliability Upgrade is as follows:

	Previous Total Appropriated Amount (Dec. 2007)	Current Board Action No. 25 (Mar. 2008)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 1,517,477 *	\$ 228,000	\$ 1,745,477
Final Design	6,693,033 *	-	6,693,033
Owner Costs (Project mgmt., envir. doc.)	4,865,000	49,000	4,914,000
Construction Inspection & Support	3,673,000	-	3,673,000
Metropolitan Force Construction	1,760,880 *	-	1,760,880
Materials and Supplies	1,420,120 *	-	1,420,120
Incidental Expenses	150,000	2,000	152,000
Professional/Technical Services	9,701,037 *	-	9,701,037
Contracts	47,187,896 *	-	47,187,896
Remaining Budget	5,771,557 *	1,000	5,772,557
Total	\$ 82,740,000	\$ 280,000	\$ 83,020,000

* Includes previous allocation of \$593,211 from Remaining Budget to Weymouth Power System Upgrade project (\$110,000) for Studies & Investigation; to Metropolitan Force Construction (\$158,200), construction Contract (\$25,000), and Materials and Supplies (\$36,800) for Weymouth Microturbine Design & Installation project; and to Final Design (\$64,100), Professional/Technical Services (\$65,900), Metropolitan Force Construction (\$38,680), construction Contract (\$77,211), and Materials and Supplies (\$17,320) for Weymouth Perimeter Improvements project.

Funding Request

Program Name:	Weymouth Improvements Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15369	Board Action No.:	25
Requested Amount:	\$ 280,000	Capital Program No.:	15369-I
Total Appropriated Amount:	\$ 83,020,000	Capital Program Page No.:	E-64
Total Program Estimate:	\$ 125,100,000	Program Goal:	I-Infrastructure & Reliability

Financial Statement for Weymouth Improvements Program – Phase II

A breakdown of Board Action No. 3 for Appropriation No. 15440 for the Weymouth Reservoir Inlet Gates Replacement, Dry Polymer System Study, and Filter Rehabilitation is as follows:

	Previous Total Appropriated Amount (Dec. 2007)	Current Board Action No. 3 (Mar. 2008)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 186,000	\$ 176,000	\$ 362,000
Final Design	75,000	77,000	152,000
Owner Costs (Program mgmt, bidding process)	91,000	207,000	298,000
Test Preparation (Water quality, control systems integration)		44,000	44,000
Construction Inspection & Support	-	-	-
Metropolitan Force Construction	46,000	-	46,000
Materials and Supplies	106,000	-	106,000
Incidental Expenses	7,000	10,000	17,000
Professional/Technical Services	85,000		85,000
MWH Americas		330,000	330,000
Equipment Use	-	-	-
Contracts	-	-	-
Remaining Budget	89,000	96,000	185,000
Total	\$ 685,000	\$ 940,000	\$ 1,625,000

Funding Request

Program Name:	Weymouth Improvements Program - Phase II		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15440	Board Action No.:	3
Requested Amount:	\$ 940,000	Capital Program No.:	15369-I
Total Appropriated Amount:	\$ 1,625,000	Capital Program Page No.:	E-65
Total Program Estimate:	\$ 10,100,000	Program Goal:	I-Infrastructure & Reliability

F. E. Weymouth Water Treatment Plant

