

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

August 15, 2006 Board Meeting

7-2

Subject

Appropriate \$700,000; and authorize final design of additional ozone system capacity at the Mills plant (Approp. 15434)

Description

The Henry J. Mills Water Treatment Plant was placed into service in 1978 with an initial capacity of 75 million gallons per day (mgd). The plant was expanded twice and is currently rated to treat 160 mgd, which is the design capacity of the existing ozone contactors. The Mills plant exclusively treats State project water (SPW) and serves Eastern Municipal Water District and Western Municipal Water District of Riverside County.

When the Mills Oxidation Retrofit Program (ORP) was initiated in 1996, the ozone treatment capacity was established at 326 mgd to match the overall hydraulic capacity of the Mills plant following completion of Mills Expansion No. 2 in 1996. Due to low flow conditions in the service area, the Mills ORP design hydraulic capacity was reduced to 160 mgd in January 2000. The Mills ORP construction was completed in 2003 with an ozonation hydraulic capacity of 160 mgd.

In March 2005, Metropolitan's Board authorized preliminary design for the Mills Capacity Upgrade Program. The objective of this program is to increase the hydraulic capacity of the ozone contactors to match the 326-mgd capacity of the remainder of the plant, and to rehabilitate existing plant facilities to reliably treat 326 mgd. The hydraulic capacity upgrade is expected to be completed in fiscal year 2008/09 to meet increasing treated water demands in eastern Riverside County.

Mills Ozone Disinfection Compliance Review

The existing Mills plant ozone generation system includes three ozone generators, two liquid oxygen (LOX) tanks, and related equipment to provide a design dosage of 2.0 mg/L ozone at a 326-mgd plant flow. However, due to changes in source water quality, ozone dosages between 2.0 mg/L and 3.0 mg/L have been needed approximately 35 percent of the time since October 2003.

With the current plant flow capacity of 160 mgd, the existing ozone generation system can reliably provide a 3.0 mg/L ozone dosage, while maintaining one of the three generators as a back-up unit for generator maintenance or for spare capacity. Restoration of the plant's capacity to its full 326-mgd flow is anticipated by fiscal year 2008/09, at which time the simultaneous operation of all three ozone generators will be required to provide a 3.0 mg/L dosage. To maintain treatment reliability at the Mills plant with changing source water quality, and to treat flows up to 326 mgd, an additional fourth ozone generator is required to provide a back-up unit that will allow one of the on-line generators to be removed from service for preventive or emergency corrective maintenance, and to provide ozone generation capacity when ozone must be dosed at concentrations greater than 3.0 mg/L.

Source Water Quality Changes

The need to operate the Mills plant ozone system above the 2.0 mg/L design ozone dose is due to substantially increased total organic carbon (TOC) levels in the East Branch of the State Water Project. The Mills plant receives East Branch SPW due to its proximity to the Department of Water Resources' conveyance system, via Lake Silverwood and Lake Perris. From 2003 to 2005, average TOC concentrations at the Mills plant inlet have increased nearly 30 percent, from 3.1 mg/L to 3.9 mg/L. In addition, maximum plant inlet TOC levels have

increased over 50 percent, from 3.9 mg/L to 6.0 mg/L, over this same period. Because ozone reacts rapidly with TOC, increased TOC levels require a proportional increase in ozone dosage in order to comply with disinfection requirements. Reducing TOC levels prior to the ozone contactors using enhanced coagulation is not possible because the Mills plant's coagulation and sedimentation processes are located downstream of the ozonation process.

Increased SPW TOC levels appear to be due to changes in the statewide operation of the State Water Project system, including increased blending with agricultural sources during transport through the Northern California Delta areas and increased storm water runoff. Since the reduction in Colorado River water deliveries from 2003, Metropolitan has increased its reliance on SPW and now takes deliveries from the East Branch on a year-round basis. Previously, Metropolitan took deliveries of East Branch SPW primarily from late spring to early fall. Because of the current delivery schedule, Metropolitan now experiences increased variability in water quality, particularly in late winter and early spring. These variations are similar to those experienced by other State Water Project contractors in both Northern and Southern California who have limited raw water storage capacities.

Variations in SPW water quality have had the greatest impact on the Mills plant. The Jensen plant receives water that passes through the west branch of the State Water Project. The large storage capacities of Pyramid Lake and Castaic Lake upstream of the Jensen plant dampen water quality variations in West Branch SPW, so changes in SPW water quality must be sustained for a longer period to affect the Jensen plant. Metropolitan's Diemer, Skinner, and Weymouth plants have not been impacted as greatly, due to their ability to blend SPW with Colorado River water supplies (which contain lower levels of TOC). Therefore, staff does not recommend increasing the current 2.0 mg/L design ozone dosages at the Diemer, Jensen, Skinner, or Weymouth plants at this time.

Higher ozone dosages may increase bromate formation when bromide is present in the source water. Bromate is a regulated ozonation disinfection by-product. However, Metropolitan's bromate control method of lowering the pH of the water entering the ozone contactor limits bromate formation, ensures disinfection, and maintains compliance with all current federal and state regulations.

Mills Ozone System Reliability – Final Design (\$700,000)

The existing Mills ozone generation system was constructed with provisions to easily accommodate additional equipment to increase ozonation capacity. These provisions include space reserved within the Ozone Generation Building for a fourth generator and its power supply unit; space reserved in the liquid oxygen (LOX) tank area for a third LOX tank; sizing of major electrical, cooling, and control systems to support a fourth ozone generator and power supply unit; and gas piping systems sized to convey oxygen to the Ozone Generation Building, and to convey ozone gas to the contactors.

Under the Mills Ozone System Reliability Program, the scope of work will include the addition of: a fourth ozone generator with power supply unit; a third LOX tank with concrete foundation; a supplemental nitrogen generation system package; additional ambient ozone gas analyzers; piping extensions; power feeds; control system programming; and related accessories. To maintain compatibility with current equipment, to minimize overall cost, and to maintain commonality of spare parts and automated control system features, staff recommends that a procurement contract be negotiated directly with Ozonia North America, the supplier of the existing Mills ozone equipment. Ozonia North America also supplied the ozone equipment for the Jensen and Skinner plants and is currently fabricating ozone equipment for the Diemer and Weymouth plants. Ozonia was selected via competitive bid to supply ozone equipment for each of Metropolitan's plants. Staff plans to return to the Board in 2007 for award of a procurement contract for the additional Mills ozone system equipment, and in 2008 for award of a construction contract for installation of that equipment.

This action appropriates \$700,000 and authorizes final design of the Mills Ozone System Reliability Program. Final design is recommended to be performed by Camp Dresser McKee, Inc. (CDM) under an existing professional services agreement. CDM prepared the Skinner, Diemer and Weymouth ORPs' ozone equipment bidding documents. Utilizing the same firm to develop the Mills ozone equipment specifications is the most efficient option for Metropolitan due to CDM's in-depth knowledge and recent experience with the Skinner, Diemer, and Weymouth projects. CDM was selected through a competitive process (Request for Qualifications

No. 578) and an agreement was authorized by the Board in June 2003. No amendment to the existing CDM agreement is required. The final design cost as a percentage of the estimated total construction cost is approximately 9 percent. Engineering Services' goal for design of projects with construction costs greater than \$3 million is 9 to 12 percent.

This project has been evaluated and recommended by Metropolitan's Capital Investment Plan Evaluation Team and funds have been included in the fiscal year 2006/07 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

The total program estimate for the Mills Plant Ozone System Reliability Program is \$7.5 million.

Project Milestones

March 2007 – Completion of equipment procurement specification

January 2008 – Completion of final design

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

Mills Ozone System Reliability – Final Design and Equipment Procurement Specification

The environmental effects from the design, construction, and operation of the Ozone Generator and LOX tank were originally evaluated in the Henry J. Mills Water Filtration Plant Expansion Final Environmental Impact Report (Final EIR), which was certified by the Board on February 12, 1991. The Board also approved the Findings of Fact (findings), the Mitigation Monitoring and Reporting Program (MMRP), and the overall expansion, including ORP and the Ozone Generator and LOX tank. The present proposed board actions are solely based on appropriating the budgeted funds, carrying out the final design, and implementing other related activities, such as equipment procurement specification, up to award of a construction contract for Ozone Generator and LOX tank at the Mills plant and not on any other substantial changes to the original project. Hence, the previous environmental documentation taken 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 1991 Final EIR and adopted documentation (i.e., findings and MMRP) and that no further environmental analysis or documentation is required.

CEQA determinations for Options #2 and #3:

Mills Ozone System Reliability – Final Design

None required

Mills Ozone System Reliability – Equipment Procurement Specification

The CEQA determination is the same as in Option #1.

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$700,000; and
- b. Authorize final design of additional ozone system capacity at the Mills plant.

Fiscal Impact: \$700,000 of budgeted funds under Approp. 15434

Business Analysis: Implementation of this option will ensure that Metropolitan can reliably treat the upgraded full plant capacity (326 mgd) at a 3.0 mg/L design ozone dose for the anticipated plant TOC levels, and maintain a standby generator for emergency use or during extended maintenance.

Option #2

Adopt the CEQA determination and

- a. Appropriate \$400,000;
- b. Authorize preparation of an ozone equipment procurement specification for competitive bidding by the two previously pre-qualified ozone generator manufacturers; and
- c. Defer final design to install the equipment until the Mills Capacity Upgrade Program is complete.

Fiscal Impact: \$400,000 of budgeted funds under Approp. 15434

Business Analysis: Under this option, the existing three installed ozone generators would be used to treat up to 326 mgd with a 3.0 mg/L design ozone dose with no spare (standby) ozone generator capacity. Staff would prepare ozone equipment procurement documents for bidding by the two previously pre-qualified ozone generator manufacturers. Following board award of the contract, the fabricated equipment would be warehoused until the Mills Capacity Upgrade Program is complete. After plant capacity is restored to 326 mgd in fiscal year 2008/09 and following board authorization, staff would proceed with final design for installation of the equipment, which would begin in 2010. Implementation of this option may increase the risk of unplanned flow reductions or inadequate disinfection if one ozone generator were to fail within the next four years, but would allow purchase of ozone equipment for eventual installation. If Ozonia were not the low bidder, the new ozone equipment may not be fully compatible with the existing equipment. In particular, a software interface would need to be developed between the existing Ozonia-proprietary ozone control system and the new alternate equipment.

Option #3

Adopt the CEQA determination and

- a. Appropriate \$400,000;
- b. Authorize preparation of an ozone equipment procurement specification and negotiations for purchase of Ozonia ozone equipment; and
- c. Defer final design to install the Ozonia equipment until the Mills Capacity Upgrade Program is complete.

Fiscal Impact: \$400,000 of budgeted funds under Approp. 15434

Business Analysis: Under this option, the existing three installed ozone generators would be used to treat up to 326 mgd with a 3.0 mg/L design ozone dose with no spare (standby) ozone generator capacity. Staff would negotiate a procurement contract with Ozonia and, after board award of the contract, the fabricated equipment would be warehoused until the Mills Capacity Upgrade Program is complete. After plant capacity is restored to 326 mgd in fiscal year 2008/09 and following board authorization, staff would proceed with final design for installation of the Ozonia equipment, which would begin in 2010. Implementation of this option may increase the risk of unplanned flow reductions or inadequate disinfection if one ozone generator were to fail within the next four years, but would allow purchase of compatible ozone equipment for eventual installation.

Staff Recommendation

Option #1


Gordon L. Johnson
for Roy L. Wolfe
Manager, Corporate Resources

7/21/2006
Date


Jeffrey Kightlinger
General Manager

7/25/2006
Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

BLA #4519

Financial Statement for Mills Plant Ozone System Reliability Program

A breakdown of Board Action No. 1 for Appropriation No. 15434 is as follows:

	Board Action No. 1 (Aug. 2006)
Labor	
Studies and Investigations	\$ 16,500
Final Design	26,700
Owner Costs (Program mgmt., permitting, bidding process)	157,100
Metropolitan Force Construction	-
Materials and Supplies	5,000
Incidental Expenses	5,000
Professional/Technical Services	
Camp Dresser McKee, Inc.	390,000
Project Controls Consultant	7,800
Equipment Use	-
Contracts	-
Remaining Budget	91,900
Total	\$ 700,000

Funding Request

Program Name:	Mills Plant Ozone System Reliability Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15434	Board Action No.:	1
Requested Amount:	\$ 700,000	Capital Program No.:	06713-W
Total Appropriated Amount:	\$ 700,000	Capital Program Page No.:	E-47
Total Program Estimate:	\$ 7,500,000	Program Goal:	W - Water Quality

