



- Board of Directors
Engineering and Operations Committee

9/13/2011 Board Meeting

7-2

Subject

Appropriate \$390,000; and authorize preliminary design of bromate control facilities (Approp. 15472)

Description

This action authorizes preliminary design to implement a new bromate control strategy at Metropolitan's five water treatment plants. With this strategy, chloramines will be used to minimize bromate formation during the ozonation process, instead of the current practice of pH adjustment. This new strategy will substantially reduce operating costs over a wide range of inlet water quality conditions.

Timing and Urgency

In order to control the formation of bromate, which is a regulated disinfection by-product (DBP), pH reduction is currently practiced at Metropolitan's three water treatment plants which employ ozonation. This method of bromate control involves the addition of sulfuric acid at the inlet to the ozone contactors to lower the water's pH during ozonation, followed by the addition of sodium hydroxide at the contactor outlet to return the pH to a neutral level. Between 2003 and 2010, Metropolitan's supply costs for sodium hydroxide and sulfuric acid increased by an annual average rate of 12 and 18 percent, respectively. These costs are expected to continue to escalate in the future. Using the present pH reduction control method, the fiscal year 2011/12 expected cost of sodium hydroxide for bromate control at the Mills plant would be \$605,000, while the expected cost of sulfuric acid would be \$290,000.

Demonstration-scale evaluations conducted at Metropolitan's Oxidation Demonstration Plant in La Verne, and full-scale tests at the Mills plant, have confirmed the viability of a new, more cost-effective bromate control method. The new strategy employs chloramines, instead of pH reduction, to minimize bromate formation. At the Mills plant, this alternate strategy is expected to save approximately \$700,000 per year in chemical costs. In order to identify the specific facilities required at each treatment plant to adopt this new bromate control method, staff recommends that preliminary design be initiated at this time.

This project has been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria and is categorized as a Water Quality project. This project is budgeted within Metropolitan's CIP for fiscal year 2011/12.

Background

Metropolitan initiated the Oxidation Retrofit Program (ORP) during the 1990s to change the primary disinfectant at its five water treatment plants from chlorine to ozone. The addition of ozone as the primary disinfectant substantially lowers chlorinated DBP levels for compliance with the U.S. Environmental Protection Agency's (USEPA's) Disinfectants/Disinfection By-Products Rule. Use of ozone also enhances Metropolitan's ability to treat water with varying source-water quality, and provides critical operational flexibility to meet treatment challenges resulting from periodic water supply events such as drought or other source-water limitations. Further, ozonation provides the capability to control taste-and-odor causing compounds which may be present from time to time, as well as emerging chemicals of concern such as pharmaceuticals/personal care products (PPCPs), endocrine disruptors (EDCs), and algal toxins.

Metropolitan has used ozone as the primary disinfectant at the Mills, Jensen, and Skinner plants since 2003, 2005, and 2010, respectively. Construction of the Diemer ozonation facilities is currently underway and is scheduled to be completed in 2012. The Weymouth ozonation facilities are planned to be operational in 2016.

While ozone forms fewer DBPs than chlorine with Metropolitan's source waters, bromate is formed as a DBP when waters containing bromide (such as State project water) are ozonated. Bromate is regulated by the USEPA at a maximum contaminant level (MCL) of 10 micrograms per liter ($\mu\text{g/L}$), which is equivalent to 0.01 milligram per liter (mg/L), based on a running annual average.

Currently, the control of bromate at the Mills, Jensen, and Skinner plants is achieved through use of sulfuric acid to lower the pH of the water during ozonation. This approach reduces the conversion of bromide to bromate. Following ozonation, the pH of the water is raised with sodium hydroxide to provide stable, non-corrosive finished water. To develop a lower-cost alternative to pH reduction, staff initiated a three-year demonstration-scale study at the Oxidation Demonstration Plant in La Verne. The study identified that, with low levels of chloramines introduced upstream of ozone treatment, the chloramine addition was as effective for bromate control as pH reduction, and performed better under certain conditions. Further, the use of chloramines will significantly reduce chemical costs versus the addition of sulfuric acid and sodium hydroxide.

A full-scale evaluation test of this new process is currently underway at the Mills plant. Test facilities funded under Metropolitan's Minor Capital Projects Program were commissioned in July 2010. This full-scale test was designed to confirm the long-term viability of using chloramines. Preliminary results of the full-scale test indicate that chloramines can reliably control bromate formation under current and anticipated water quality conditions. In addition, chemical savings of approximately \$700,000 per year will be realized at the Mills plant by implementing this new process on a full-time basis.

Staff recommends that preliminary design be initiated to adopt enhanced bromate control at the Metropolitan's five water treatment plants. At some plants, implementation may require the addition of new chemical tank farms and feed systems, and/or modifications to existing facilities, to provide reliable and effective chloramine systems for bromate control.

Bromate Control Facilities - Preliminary Design Phase (\$390,000)

The planned preliminary design activities for the new bromate control facilities include assessments of site-specific conditions, and identification of both new facilities and plant modifications needed at Metropolitan's five water treatment plants. Life-cycle cost estimates will be developed, and flow demands will be considered to optimize the facilities needed at each plant. At the Mills plant, staff's investigations will consider the feasibility and cost of converting the existing test system to full-time operation. During preliminary design, multiple options and implementation strategies will be evaluated, and a recommendation for the best option at each plant will be made on the basis of capital cost and operating cost savings. The planned scope also includes preparation of environmental documentation and development of preliminary construction cost estimates and schedules. All preliminary design phase activities will be performed by Metropolitan staff.

This action appropriates \$390,000 and authorizes preliminary design for new bromate control facilities at the Diemer, Jensen, Mills, Skinner, and Weymouth plants. This project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2011/12 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

This work is included within capital Appropriation No. 15472, the Enhanced Bromate Control Program. This is the initial action for Appropriation No. 15472.

This project is consistent with Metropolitan's goals for sustainability by reducing the required amount and costs of chemicals used in water treatment operations in order to maintain reliable water deliveries in the future.

Project Milestone

July 2012 – Completion of preliminary design of new bromate control systems

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed project involves the funding of a study and minor modifications to and replacement of existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. In addition, the proposed project will consist of basic data collection, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. This may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. Accordingly, the proposed action qualifies for a Class 1, Class 2, and Class 6 Categorical Exemptions (Sections 15301, 15302, and 15306 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 2, Section 15302; and Class 6, Section 15306 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$390,000; and
- b. Authorize preliminary design of new bromate control facilities at each of Metropolitan's treatment plants.

Fiscal Impact: \$390,000 in budgeted funds under Approp. 15472

Business Analysis: This option will reduce chemical costs for bromate control at Metropolitan's treatment plants employing ozone.

Option #2

Do not proceed with a new bromate control strategy at this time.

Fiscal Impact: None

Business Analysis: This option would forego an opportunity to reduce operating costs to control bromate at Metropolitan's treatment plants employing ozone.

Staff Recommendation

Option #1


Gordon Johnson
Manager/Chief Engineer,
Engineering Services

8/23/2011

Date


Jeffrey Kightlinger
General Manager

8/25/2011

Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12611968

Financial Statement for Enhanced Bromate Control Program

A breakdown of Board Action No. 1 for Appropriation No. 15472 for preliminary design of bromate control facilities* is as follows:

	Current Board Action No. 1 (Sept. 2011)	New Total Appropriated Amount
Labor		
Studies & Investigations	\$ 217,000	\$ 217,000
Final Design	-	-
Owner Costs	121,000	121,000
Construction Inspection & Support	-	-
Metropolitan Force Construction	-	-
Materials & Supplies	1,000	1,000
Incidental Expenses	1,000	1,000
Professional/Technical Services	-	-
Equipment Use	-	-
Contracts	-	-
Remaining Budget	50,000	50,000
Total	\$ 390,000	\$ 390,000

Funding Request

Program Name:	Enhanced Bromate Control Program		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15472	Board Action No.:	1
Requested Amount:	\$ 390,000	Capital Program No.:	15472
Total Appropriated Amount:	\$ 390,000	Capital Program Page No.:	297
Total Program Estimate:	\$ 24,624,000	Program Goal:	Water Quality

* This is the initial action for the Enhanced Bromate Control Program.

Metropolitan Water Treatment Plants

