



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

7/9/2013 Board Meeting

8-3

Subject

Appropriate \$4.2 million; and authorize final design of two electrical upgrade projects at the Joseph Jensen Water Treatment Plant (Approps. 15442 and 15371)

Executive Summary

This action authorizes final design of two projects to improve the electrical system at the Joseph Jensen Water Treatment Plant. These projects will replace aging electrical equipment, provide backup for potential component failures, and upgrade the electrical system to be consistent with modern codes and industry practices.

Timing and Urgency

Upgrades to the electrical system at the Jensen plant are needed because the aging electrical equipment has deteriorated through long-term continuous use, is difficult to maintain and repair, and requires improvements in backup capability. While the system was designed to meet current electrical codes at the time of its construction, much of the equipment is underrated by current standards and does not have adequate short-circuit interrupting capability, which may increase the risk of unplanned outages, equipment damage, and fire hazard. Staff recommends moving forward with two improvement projects to modernize the electrical distribution system, improve plant reliability, and enhance worker safety.

These two projects have been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria and are categorized as Infrastructure Upgrade projects. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2013/14.

Details

Background

The Jensen plant was placed into service in 1972 with an initial capacity of 350 mgd, and was expanded in the early 1990s to its current capacity of 750 mgd. A major plant modification was completed in 2005, when the ozonation process commenced operation. The Jensen plant exclusively treats water from the West Branch of the State Water Project and delivers it to Metropolitan's Central Pool and to exclusive service areas on the west side of the distribution system.

Principal components of the Jensen electrical system date to the plant's original construction in 1972. With each major upgrade that has occurred at the plant, the on-site electrical system was expanded or adapted to accommodate the increased electrical loads, without changing the architecture of the electrical system or its principal components. Many critical electrical components at the plant are over 40 years old, and their performance has begun to deteriorate. As the equipment continues to age, its ability to operate safely and reliably will diminish.

The electrical system at the Jensen plant needs to be upgraded to enhance plant reliability, to be consistent with up-to-date electrical codes, and to follow industry practices. The electrical system was initially designed as a radial system, with power running through a single path to each local unit power center (UPC) for distribution to powered equipment. This practice of powering all the components of a critical system from a single electrical

source does not provide backup or reliability, and leaves the plant vulnerable to an unplanned outage caused by a single failure in the power system. These unplanned outages are disruptive to plant operations and can impact reliability of the treatment process.

To address the various reliability concerns about the Jensen plant's electrical system, staff recommends moving forward with improvements to upgrade the system. To expedite completion of the most critical work, the electrical upgrades have been prioritized and staged. Stage 1 will address the upgrade of critical electrical equipment located on the western portion of the site. The Stage 1 work includes upgrade of the plant's 4 kV switchgear to provide a dual power feed to each UPC; expansion of the switchgear building; improvement of the standby generator control system; installation of electrical conduits and duct banks on the west side of the plant; upgrade of four UPCs and related motor control centers (MCCs) that power critical process equipment; and redistribution of the power feed to process equipment to improve reliability.

Under the future Stage 2 improvements, the remaining components of the electrical system in the eastern portion of the plant will be upgraded. Much of this area is located within a potential liquefaction zone. As a result, geotechnical issues regarding liquefaction of areas containing electrical facilities will be addressed. The Stage 2 work will include installation of new duct banks to the upgraded electrical equipment, and provision of a dual power feed.

To minimize potential impacts on plant operation and reduce construction costs, staff recommends that a component of the Stage 1 upgrades relating to the plant's Module No. 1 filter valve panels be performed in conjunction with another project, the Module No. 1 Filter Valve Replacement, which is currently underway. That project's scope of work will be adjusted to include the filter valve panel upgrades.

Project No. 1 - Jensen Electrical Upgrades, Stage 1 – Final Design Phase (\$4 million)

In July 2010, Metropolitan's Board authorized preliminary design of upgrades to the Jensen plant's electrical system. Preliminary design of the Stage 1 work has been completed, and staff recommends proceeding with final design at this time. Staff will return to the Board at a later date to authorize final design of the Stage 2 upgrades.

Planned final design phase activities include field surveys, preparation of drawings and specifications, shutdown planning, development of a construction cost estimate, receipt of competitive bids, and all other activities in advance of award of a construction contract. The field surveys will include potholing, surveying, tracing of cables lacking identification, and preparation of record drawings. All final design phase activities will be performed by Metropolitan staff.

This action appropriates \$4 million and authorizes final design of the Jensen Electrical Upgrades, Stage 1. Requested funds include \$225,000 for field surveys; \$2.75 million for final design; \$456,000 for permitting, hazardous material testing, receipt of bids, and project management; \$50,000 for third-party value engineering; and \$519,000 for remaining budget. The anticipated cost of final design is approximately 11.9 percent of the estimated construction cost. Engineering Services' goal for design of projects with construction cost greater than \$3 million is 9 to 12 percent. The construction cost for Stage 1 of this project is anticipated to range from \$23 million to \$25 million.

The total estimated cost to complete the Stage 1 electrical upgrades, including the amount expended to date, current funds requested, and future construction costs, is anticipated to range from \$32 million to \$34 million.

Project No. 2 - Module No. 1 Filter Valve Panel Upgrades – Final Design Phase (\$200,000)

In October 2012, Metropolitan's Board authorized final design to replace the existing filter valves at the Jensen plant's Module No. 1. To accommodate valve replacement, the existing valve actuators will be removed for maintenance, and then reconnected after the new filter valves are installed. When the actuators are reconnected, portions of wiring from the valve control panels to the filter valves will need to be relocated to suit the new valve dimensions. These valve control panels were installed in the 1960s during the original plant construction. Their starters and wiring show signs of degradation, and need to be replaced to prevent overheating, loss of valve control, and power interruptions to the new valves. These panels and associated wiring were originally intended to be replaced under the Stage 1 electrical upgrades contract. In order to minimize impacts on filter operation and

reduce construction costs, staff recommends that the valve control panels be upgraded in conjunction with the filter valve replacement work, under a single construction contract.

Planned final design phase activities for the filter valve panel upgrades include field investigations to document the current wiring configuration at each panel, preparation of drawings and specifications, and development of a construction cost estimate.

This action appropriates \$200,000 and authorizes final design of the Jensen Module No. 1 filter valve panel upgrades. Staff will return to the Board to award the construction contract for these upgrades in conjunction with the Module No. 1 Filter Valve Replacement contract. The requested funds include \$49,000 for field investigations; \$119,000 for final design; \$4,000 for project management; and \$28,000 for remaining budget. All design phase activities will be performed by Metropolitan staff. The cost of final design for the two projects is approximately 10 percent of the estimated total construction cost. Engineering Services' goal for design of projects with construction cost greater than \$3 million is 9 to 12 percent. The total construction cost for the combined projects is anticipated to range from \$8 million to \$9 million.

Summary

This action appropriates \$4.2 million and authorizes final design of two projects to upgrade the electrical system at the Jensen plant. These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2013/14 capital expenditure plan. See [Attachment 1](#) for the Financial Statements and [Attachment 2](#) for the Location Map.

The Jensen Electrical Upgrades is included within capital Appropriation No. 15442, the Jensen Improvements Program – FY 2006/07 Through FY 2011/12, which was initiated in fiscal year 2006/07. With the present action, the total funding for Appropriation No. 15442 will increase from \$20,146,000 to \$24,146,000.

The Jensen Module No. 1 Filter Valve Panel Upgrades is included within capital Appropriation No. 15371, the Jensen Improvements Program, which was initiated in fiscal year 2001/02. With the present action, the total funding for Appropriation No. 15371 will increase from \$37,122,000 to \$37,322,000.

Project Milestones

June 2014 – Board award of contract to install the new filter valves at Jensen Module No. 1

December 2014 – Completion of final design of Stage 1 of the Jensen electrical upgrades

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed actions 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 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that the proposed action is exempt from CEQA pursuant to Sections 15306 of the State CEQA Guidelines.

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination that the proposed action is categorically exempt and

- a. Appropriate \$4.2 million;
- b. Authorize final design of the first stage of electrical upgrades at the Jensen plant; and
- c. Authorize final design of control panel upgrades for the Model No. 1 filter valves.

Fiscal Impact: \$4 million in capital funds under Approp. 15442, and \$200,000 in capital funds under Approp. 15371

Business Analysis: This option will enhance electrical reliability and worker safety at the Jensen plant. This project will provide improved backup capability for critical treatment process equipment.

Option #2

Do not authorize the two projects at this time.

Fiscal Impact: None

Business Analysis: This option will forego an opportunity to enhance electrical reliability and worker safety at the Jensen plant. An electrical system failure could cause an unplanned outage of the plant.

Staff Recommendation

Option #1

 6/17/2013

 Gordon Johnson Date
 Manager/Chief Engineer
 Engineering Service

 6/25/2013

 Jeffrey Lightlinger Date
 General Manager

Attachment 1 – Financial Statements

Attachment 2 – Location Map

Financial Statement for Jensen Improvements Program – FY 2006/07 Through FY 2011/2012

A breakdown of Board Action No. 10 for Appropriation No. 15442 for the Jensen Electrical Upgrades¹ is as follows:

| | Previous Total Appropriated Amount (Jan. 2013) | Current Board Action No. 10 (July 2013) | New Total Appropriated Amount |
|--|---|--|--|
| Labor | | | |
| Studies & Investigations | \$ 958,495 | \$ 225,000 | \$ 1,183,495 |
| Final Design | 1,339,800 | 2,740,000 | 4,079,800 |
| Owner Costs (Program mgmt, permitting, bidding) | 939,963 | 456,000 | 1,395,963 |
| Submittals Review & Record Drwgs | 406,000 | - | 406,000 |
| Construction Inspection & Support | 1,488,500 | - | 1,488,500 |
| Metropolitan Force Construction | 1,693,256 | - | 1,693,256 |
| Materials & Supplies | 970,000 | - | 970,000 |
| Incidental Expenses | 54,500 | 10,000 | 64,500 |
| Professional/Technical Services | 402,840 | - | 402,840 |
| Value Engineering firm | - | 50,000 | 50,000 |
| Equipment Use | 19,000 | - | 19,000 |
| Contracts | 10,512,894 | - | 10,512,894 |
| Remaining Budget | 1,360,752 | 519,000 | 1,879,752 |
| Total | \$ 20,146,000 | \$ 4,000,000 | \$ 24,146,000 |

Funding Request

| | | | |
|-----------------------------------|---|--------------------------------|--------------|
| Program Name: | Jensen Improvements Program – FY 2006/07 Through FY 2011/2012 | | |
| Source of Funds: | Revenue Bonds, Replacement and Refurbishment or General Funds | | |
| Appropriation No.: | 15442 | Board Action No.: | 10 |
| Requested Amount: | \$ 4,000,000 | Budget Page No.: | 313 |
| Total Appropriated Amount: | \$ 24,146,000 | Total Program Estimate: | \$81,445,000 |

¹ The total amount expended to date on the Jensen Electrical Upgrades project is approximately \$620,000. The total estimated cost to complete the Stage 1 electrical upgrades, including the amount expended to date, current funds requested, and future construction costs, is anticipated to range from \$32 million to \$34 million.

Financial Statement for Jensen Improvements Program

A breakdown of Board Action No. 20 for Appropriation No. 15371 for the Jensen Module No. 1 Filter Valve Panel Upgrades¹ is as follows:

| | Previous Total Appropriated Amount (Dec. 2012) | Current Board Action No. 20 (July 2013) | New Total Appropriated Amount |
|-----------------------------------|---|--|--|
| Labor | | | |
| Studies & Investigations | \$ 2,184,415 | \$ 49,000 | \$ 2,233,415 |
| Final Design | 3,542,553 | 119,000 | 3,661,553 |
| Owner Costs (Program mgmt.) | 3,860,098 | 4,000 | 3,864,098 |
| Construction Inspection & Support | 2,211,400 | - | 2,211,400 |
| Submittals Review | 115,000 | - | 115,000 |
| Metropolitan Force Construction | 2,153,400 | - | 2,153,400 |
| Materials & Supplies | 2,167,219 | - | 2,167,219 |
| Incidental Expenses | 220,184 | - | 220,184 |
| Professional/Technical Services | 4,025,498 | - | 4,025,498 |
| Equipment Use | 84,000 | - | 84,000 |
| Contracts | 16,270,497 | - | 16,270,497 |
| Remaining Budget | 287,736 ² | 28,000 | 315,736 |
| Total | \$ 37,122,000 | \$ 200,000 | \$ 37,322,000 |

Funding Request

| | | | |
|-----------------------------------|---|--------------------------------|---------------|
| Program Name: | Jensen Improvements Program | | |
| Source of Funds: | Revenue Bonds, Replacement and Refurbishment or General Funds | | |
| Appropriation No.: | 15371 | Board Action No.: | 20 |
| Requested Amount: | \$ 200,000 | Budget Page No.: | 312 |
| Total Appropriated Amount: | \$ 37,322,000 | Total Program Estimate: | \$100,925,000 |

¹ This is the initial action for the Jensen Module No. 1 Filter Valve Panel Upgrades project.

² Includes previous reallocation of \$30,000 from Remaining Budget to Studies & Investigations for preparation of procurement specifications of the traveling bridge demonstration project.

Distribution System

