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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Daren E. Duff
EXECUTIVE SECRETARY

May 23, 1994

(Engineering and Operations
Committee--Information)

To: Board of Directors (Special Committee on Water Quality and
Environmental Compliance--Information)

From: General Manager

Subject: Los Angeles Department of Water and Power (LADWP) /
Metropolitan Water Exchange

Report

At your August 1993 meeting, staff recommended that Metropolitan proceed with the implementation of ozone/PEROXONE (combination of ozone and hydrogen peroxide) at Metropolitan's filtration plants to comply with new disinfection by-product (DBP) regulations (see Attachment 1). This recommendation was based on several years of bench-, pilot-, and demonstration-scale testing, as well as a cost analysis of several treatment technologies capable of achieving Metropolitan's water quality goals (e.g., ozone/PEROXONE, enhanced coagulation, granular activated carbon, and membranes such as reverse osmosis). Ozone/PEROXONE was identified as the least cost alternative.

In October 1993, staff from the LADWP suggested that a water exchange between LADWP and Metropolitan might permit both organizations to meet the future DBP and arsenic regulations (a new arsenic regulation is scheduled for proposal in November 1995), while deferring capital expenditures associated with ozone/PEROXONE at Metropolitan's Jensen plant and an arsenic removal strategy at LADWP's Los Angeles Aqueduct Filtration Plant (LAAFP). The proposed exchange would involve the treatment of West Branch State project water (SPW) at the LAAFP, controlling taste-and-odor problems in SPW with ozone, and the treatment of Los Angeles Aqueduct water (LAAW) at the Jensen plant, removing arsenic from LAAW through conventional treatment. Levels of arsenic in LAAW range from 20 to 30 µg/L, compared to 2 to 5 µg/L in SPW. Because the LAAFP lacks sedimentation basins, it can only achieve up to 35-percent arsenic removal, which would not be sufficient to meet the anticipated arsenic regulation of 2 to 10 µg/L.

At your November 1993 meeting, your Board approved funding for preliminary design and environmental documentation for ozone/PEROXONE facilities at the Jensen plant.

However, based on Board and member agency comments and the Engineering and Operations Peer Review Group findings regarding the capital cost estimates for ozone/PEROXONE, staff committed to thoroughly evaluating the potential for a water exchange between LADWP and Metropolitan, as well as reevaluating enhanced coagulation (the addition of significantly higher dosages of a coagulant such as alum to reduce DBP formation) as an alternative to ozone/PEROXONE.

A joint committee of staff from both LADWP and Metropolitan was charged with cooperatively evaluating the feasibility of the proposed LADWP/Metropolitan water exchange. Figure 1 presents the process and schedule that the committee used to evaluate the exchange proposal. In addition to 10 joint committee meetings during the six-month study, the committee met with LADWP/Metropolitan management and Metropolitan's member agencies (particularly the Jensen member agencies) several times during the evaluation to provide these groups with an opportunity to comment on the evaluation process and results.

The committee evaluated the feasibility of the exchange in terms of (1) costs, and (2) Metropolitan's, LADWP's, and other Metropolitan member agencies' ability to comply with future regulations (i.e., Disinfectants/DBP (D/DBP) Rule and arsenic regulation). Because the D/DBP Rule will be implemented in two stages (Stage 1 in 1998 and Stage 2 in 2002), the evaluation included the possibility that Stage 2 will be no more stringent than Stage 1, even though staff think this is very unlikely. Institutional/policy and environmental issues were assumed to be resolvable, and were initially not considered in this evaluation.

Seven alternatives (see Table 1) were selected by the joint committee for detailed evaluation, including ozone/PEROXONE at Jensen with no exchange (Alternative No. 1), enhanced coagulation at Jensen with no exchange (Alternative Nos. 2A and 2B), a partial LADWP/Metropolitan water exchange (Alternative Nos. 3A and 3B), and a complete LADWP/Metropolitan water exchange (Alternative Nos. 4A and 4B). The potential exchange connections between LADWP and Metropolitan are shown schematically in Figure 2. Figure 3 presents the present worth cost comparison (capital and O&M) of the seven alternatives. On the basis of the cost estimates, the alternative with the lowest overall cost is the implementation of ozone/PEROXONE at Jensen (Alternative No. 1). This alternative assumes that there is no exchange (LAAFP treats LAAW/SPW and Jensen treats SPW), LADWP builds an arsenic removal facility at Hot Creek (in

its LAAW watershed) to comply with the future arsenic regulation, and Metropolitan installs ozone/PEROXONE at Jensen to comply with the D/DBP Rule. The highest cost alternatives are those involving the water exchange (Alternative Nos. 3A, 3B, 4A, 4B).

Three alternatives, involving enhanced coagulation at Jensen (Alternative Nos. 2A, 3A, 4A), have lower capital costs, but significantly higher O&M costs, than the use of ozone/PEROXONE at Jensen. In addition to a higher overall cost, there are a number of environmental concerns associated with enhanced coagulation, including the disposal of large volumes of sludge.

A report detailing the results of the exchange evaluation is currently being prepared by the joint LADWP/Metropolitan Water Exchange Committee and will be available by early June 1994. The cooperative evaluation of this proposal by a group of LADWP and Metropolitan staff, with critical review and input by other affected member agencies, enabled the results to be far more comprehensive and valuable than would have been possible if Metropolitan staff alone performed the study.

While the exchange proposal does not appear to be economically feasible at this time, the exchange evaluation allowed for a more detailed analysis of ozone/PEROXONE and enhanced coagulation. This analysis confirms the previous recommendation, made in August 1993, to retrofit the SPW plants (Jensen and Mills) with ozone/PEROXONE facilities. Ozone/PEROXONE has a lower overall cost compared to enhanced coagulation, whether or not Stage 2 of the D/DBP Rule is implemented.

In order to ensure that Metropolitan and its member agencies comply with Stage 1 of the proposed D/DBP Rule by June 1998, a decision to commence with final design of ozone/PEROXONE facilities at both Jensen and Mills is needed by August 1994. Decisions on the need for ozone/PEROXONE facilities at the plants treating Colorado River water (Skinner, Weymouth, and Diemer) can be deferred for at least one year.

Board Committee Assignments

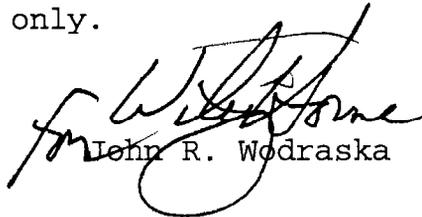
This letter was referred for information to:

The Engineering and Operations Committee because of its authority to study, advise, and make recommendations with regard to the treatment of water pursuant to Administrative Code 2431 (c); and

The Special Committee on Water Quality and Environmental Compliance because of its authority with regard to Federal and State water quality regulations pursuant to Administrative Code 2551 (a) and (b).

Recommendation

For information only.


John R. Wodraska

JTG/ei

Attachments

ATTACHMENT 1

REGULATORY BACKGROUND

In June 1994, the U.S. Environmental Protection Agency (USEPA) will propose Stage 1 of the Disinfectants/Disinfection By-Products (D/DBP) Rule, with compliance required by June 1998. Stage 1, resulting from regulatory negotiations conducted in 1993, will include maximum contaminant levels (MCLs) for several DBPs, as well as a requirement for total organic carbon (TOC) removal by enhanced coagulation (see Tables A-1 and A-2). In addition, the USEPA has included language in the draft D/DBP Rule regarding Stage 2, which reduces the key Stage 1 MCLs by 50 percent. These Stage 2 MCLs will take effect in the year 2002 if a second regulatory negotiation does not occur. Other future regulations that will impact Metropolitan are the Enhanced Surface Water Treatment Rule (will likely include inactivation/removal requirements for Cryptosporidium) and the arsenic regulation (potential MCL of 2-10 µg/L). In order to ensure that Metropolitan and its member agencies comply with these proposed regulations, Metropolitan will be required to make major modifications to its existing filtration plants.

**Table A-1
PROPOSED REGULATORY SCHEDULE**

RULE	PROPOSAL DATE	EFFECTIVE DATE	COMPOUND	MCL
D/DBP Rule Stage 1	6/94	6/98	THMs HAAs Bromate TOC	80 μ g/L 60 10 30%
D/DBP Rule Stage 2 (Proposed)	12/98	12/02	THMs HAAs Other	40 μ g/L 30 ?
ESWTR	6/94	6/98	Pathogens	---
Arsenic Rule	11/95 (Earliest)	5/99	Arsenic	2-10 μ g/L (Probable)

Table A-2
Enhanced Coagulation at Metropolitan's
State Project Water Plants
(Jensen and Mills)

- TOC REMOVAL REQUIREMENTS (30%) BASED ON INFLUENT TOC LEVELS (> 2 mg/L) AND ALKALINITY

- ELEVATED COAGULANT DOSAGES (UP TO 40 mg/L) AND POSSIBLE pH ADJUSTMENT; ANALYSIS ASSUMES 30 mg/L FERRIC CHLORIDE 50% OF TIME (TOC AND ARSENIC REMOVAL) AND 5-10 mg/L FERRIC CHLORIDE 50% OF TIME (ARSENIC REMOVAL ONLY)

- DISINFECTION DELAYED UNTIL AFTER TOC REMOVAL ACHIEVED; POST-FILTRATION CHLORINE CONTACTORS REQUIRED

- SLUDGE VOLUMES WILL INCREASE BY THREE TO FIVE TIMES; SLUDGE HANDLING WILL INCLUDE FILTER PRESSES, MECHANICAL DRYING, AND LANDFILL DISPOSAL

Table 1
List of Alternatives

<u>Alternative Number</u>	<u>LADWP</u>	<u>Metropolitan</u>	<u>Joint</u>
1 No Exchange	LADWP would construct an arsenic removal facility at Hot Creek (in watershed) and continue to treat a blend of LAAW/SPW at LAAFP.	Metropolitan would treat SPW with ozone/PEROXONE at Jensen in 1998 to comply with Stages 1 and 2 of D/DBP Rule.	---
2A No Exchange	Same as Alternative No. 1	Metropolitan would treat SPW with enhanced coagulation at Jensen in 1998 to comply with Stage 1 of D/DBP Rule (Assumes no Stage 2).	---
2B No Exchange	Same as Alternative No. 1	Metropolitan would treat SPW with enhanced coagulation at Jensen in 1998 to comply with Stage 1 of D/DBP Rule and construct ozone/PEROXONE facilities in 2002 to comply with Stage 2 of D/DBP Rule.	---
3A Partial Exchange	LADWP would treat 100% SPW with ozone and acid (to control bromate formation) and reduce arsenic peaks in LAAW at the Cottonwood plant upstream of Haiwee Reservoir.	Metropolitan would treat a blend of LAAW/SPW with enhanced coagulation in 1998 to comply with Stage 1 of D/DBP Rule (assumes no Stage 2).	Raw water connections
3B Partial Exchange	Same as Alternative No. 3A	Metropolitan would treat a blend of LAAW/SPW with enhanced coagulation in 1998 to comply with Stage 1 of D/DBP Rule and ozone/PEROXONE in 2002 to comply with Stage 2 of D/DBP Rule.	Raw water connections
4A Complete Exchange	Same as Alternative No. 3A	Metropolitan would treat 100% LAAW with enhanced coagulation in 1998 to comply with Stage 1 of D/DBP Rule (assumes no Stage 2).	Raw and treated water connections
4B Complete Exchange	Same as Alternative No. 3A	Metropolitan would treat 100% LAAW with enhanced coagulation in 1998 to comply with Stage 1 of D/DBP Rule and ozone/PEROXONE to comply with Stage 2 of D/DBP Rule.	Raw and treated water connections

Economic Assumptions

- 25 year facility life
- 5% interest rate.

Figure 1

LADWP/MWD WATER EXCHANGE COMMITTEE EXCHANGE EVALUATION SCHEDULE

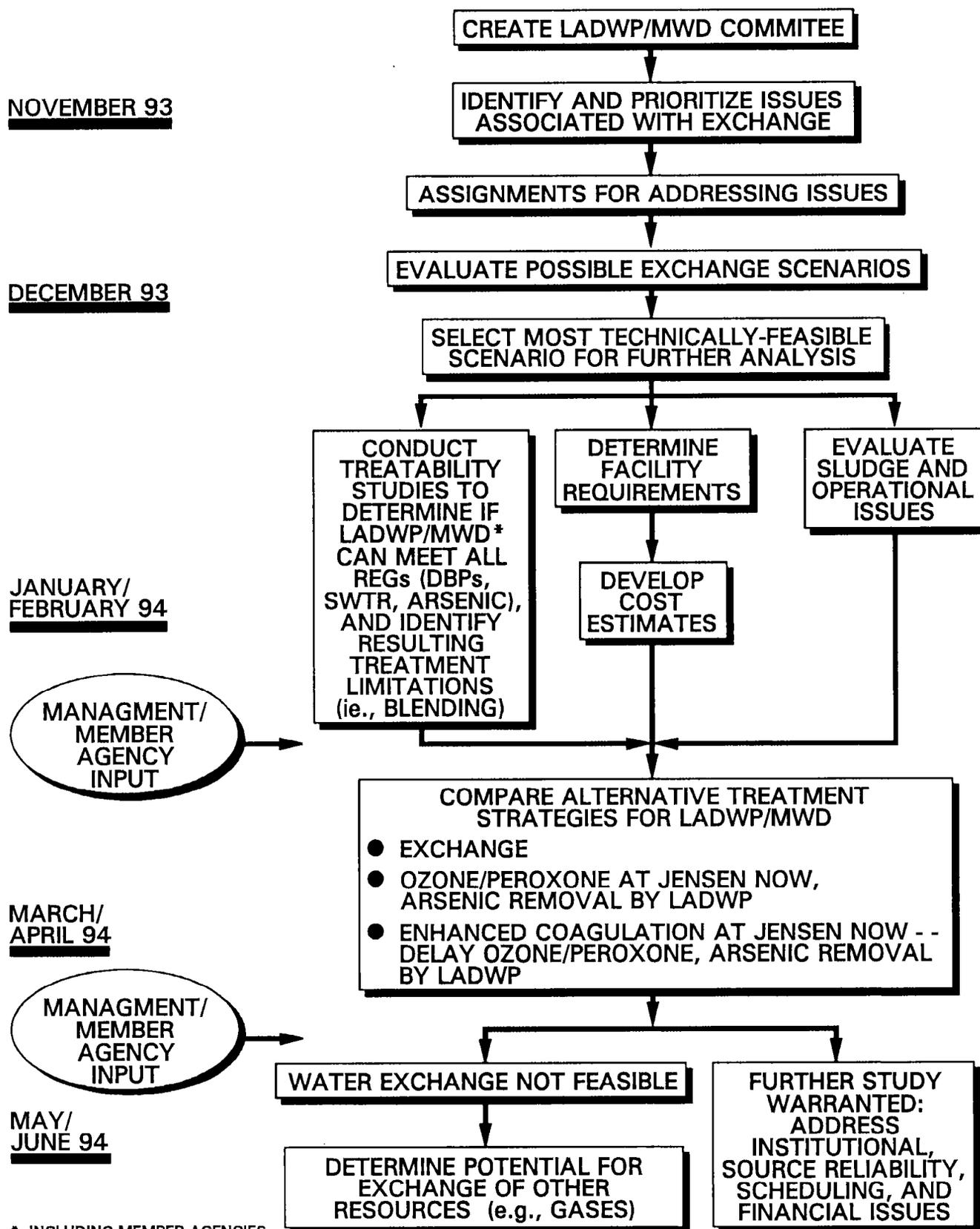


Figure 2
LADWP/MWD Water Exchange Connections

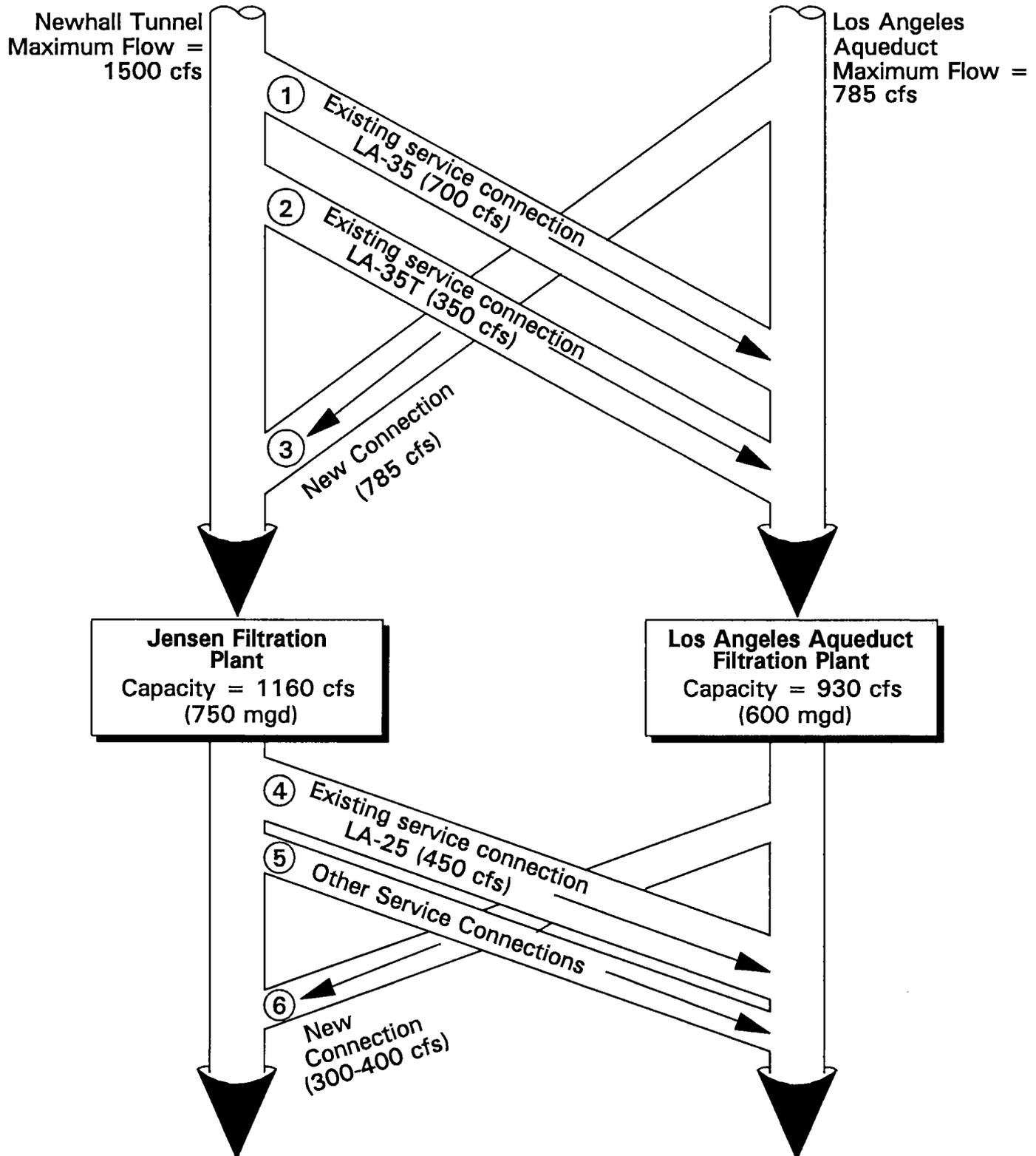
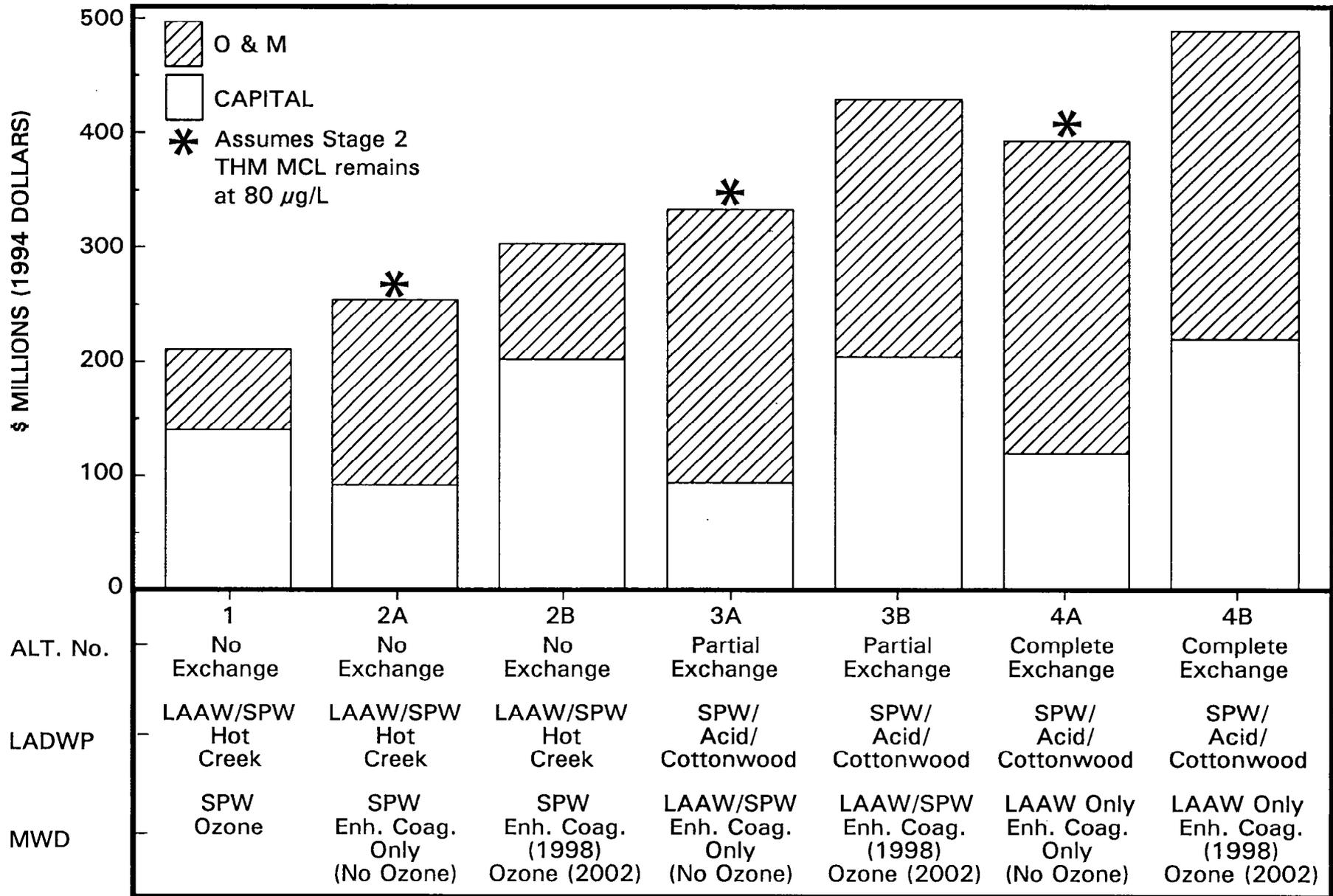


Figure 3 Present Worth Cost Comparison of Alternatives



See Table 1 for a more complete description of each alternative .