**MWD**
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

# Pending Board Letter 10-1

January 27, 1998

**To:** Board of Directors (Special Committee on Water Quality, Desalination, and Environmental Compliance--Action)
(Engineering and Operations Committee--Action)
(Water Planning and Resources Committee--Action)

**From:** for General Manager

**Submitted by:** Debra C. Man, Chief
Planning and Resources Division

**Submitted by:** Jay W. Malinowski
Chief of Operations

**Subject:** 1998 Interim Blending Plan for Salinity Management

## RECOMMENDATION

Adopt the proposed 1998 Interim Blending Plan for Salinity Management.

## EXECUTIVE SUMMARY

Many of Metropolitan's member agencies have expressed a desire to receive imported water supplies with lower salinity levels. Lower salinity levels in Metropolitan's imported supplies provide greater opportunity to reduce consumer impacts as well as for recycled water projects and groundwater storage. Recognizing the benefits of salinity management, Metropolitan initiated a multi-year Salinity Management Study. This study effort, involving Metropolitan and its member agencies, will result in a recommendation regarding appropriate long-term salinity management strategies. As a first step toward meeting longer term objectives of reducing salinity in the import system, staff recommends an interim blending plan to manage salinity in supplies provided by Metropolitan in 1998. The interim plan's objective is to provide an average salinity concentration of 500 to 550 milligrams per liter (mg/L) at specified locations within Metropolitan's system for the April through September 1998 period. It is recommended that this target range be met, subject to the following constraints:

- A cost cap of $10 million,
- Compliance with all water quality standards, and
- Availability of sufficient State Water Project (SWP) water to accomplish the blend necessary to meet the target.

Additionally, operational considerations over which Metropolitan has little or no control (changes in demands, variations in source salinity, changes in other source water quality parameters, and changes in water supply conditions) may affect the ability to achieve the target salinity concentration.

## DETAILED REPORT

### Background

On July 26, 1997, a water quality workshop focusing on salinity management was conducted for your board in San Diego. As a part of that workshop, significant time was spent on the issue of regional salinity management, including the use of blending by Metropolitan. Blending of our supplies can be used to reduce salinity to improve local water management and decrease consumer impacts. In response to comments received at the workshop, an interim blending plan for salinity management has been developed for 1998. Because it is anticipated that the filling of Eastside Reservoir will begin during 1999, and will entail significant changes in system operations, the proposed interim plan is intended for use only in 1998, if water supply conditions are favorable. The 1998 plan's effectiveness would be evaluated to develop an approach for 1999.

### Recommended Plan for 1998

An interim salinity management plan is recommended for April-September 1998, in place of the existing 25-percent State Water Project (SWP) water blending practice. This interim plan also attempts to manage salinity in Metropolitan's supplies in terms of concentration targets rather than simply a percent blend of SWP water. The plan is based upon achievable targets for 1998.

The 1998 interim plan would target a range of salinity to be measured at key locations on the system: the finished water reservoirs of the Weymouth, Diemer, and Skinner filtration plants, and the San Diego pipelines that carry raw water. A salinity target of 500 to 550 mg/L would be maintained at these locations for the April through September period in 1998. The effort to maintain this target range would be bounded by:

- A cap on additional operating costs of $10 million;
- Compliance with all existing water quality standards; and
- Availability of sufficient SWP water.

In addition, there are several operational considerations, over which Metropolitan has little or no control, that must be recognized if salinity is to be managed in this way. These operational considerations include changes in demands, variations in source salinity, changes in other source water quality parameters, and water supply conditions.

## Blend Options

In order to accomplish salinity management through a particular blend option, consideration must be given to the costs associated with the proposed strategy and the ability of the treatment and distribution system to provide the desired results. For next year, shifting of SWP deliveries from the West Branch to the East Branch and use of additional SWP water via the East Branch would be the method to reduce the salinity in the system. This would entail additional costs for pumping and treatment, as well as some added challenges to operating the system. Also, close coordination with the Department of Water Resources (DWR) as operator of the SWP to provide information on anticipated salinity levels would be essential.

### Current Operating Strategy for Blending

Before 1995, Metropolitan typically imported only enough SWP water to quantitatively meet demands on the system that could not be met with Colorado River water. Because of the lower cost to pump Colorado River water, this resulted in the lowest Metropolitan operational costs. Since 1995, however, Metropolitan has delivered additional SWP water via the East Branch during the April-September period to keep the minimum blend of SWP water at or above 25 percent in the Weymouth, Diemer, and Skinner plant service areas.

### Alternatives

Given existing system facilities and constraints, two alternatives are feasible for use in 1998:

- Continue the current strategy of operating based on the ***percentage*** of SWP water--now 25 percent for the April-September period.

- Provide a location-based ***concentration target*** in milligrams per liter (mg/L) for a specified period of the year.

It is recommended that the second approach of mg/L concentration target at specific locations within the system be utilized for the April-September 1998 period.

## Operational Considerations

The approach of concentration targets has garnered considerable interest, but issues regarding the ability to achieve such targets must be presented as a new salinity management strategy is developed. One such consideration--changes in demands--impacts both percent and mg/L target blending operations. As overall demands for Metropolitan water change, the amount of SWP water needed to meet them is adjusted. When such changes are made, the blend within the system is changed as well. Whether meeting percent blending requirements or when trying to maintain a specific concentration at a particular location, such changes could easily cause deviations from the policy if it is not sufficiently flexible. There are three other factors, however, that are not

important when operating to a percent system blend but do significantly affect the ability to achieve a specified mg/L target within the distribution system:

- ***Salinity variations in source supplies.*** The salinity concentrations in Metropolitan's source supplies vary significantly. In particular, the SWP supply has varied in recent years from about 100 mg/L to 450 mg/L, with the higher concentrations occurring in dry periods. As SWP water salinity rises, more of it is needed to achieve the same concentration target at a given location within Metropolitan's system.

- ***Other water quality conditions.*** Like salinity, other critical water quality constituents change frequently, particularly with respect to the SWP supply and within Metropolitan's system. Impacts of hydrologic conditions and weather are the most frequent causes. Concentrations of many constituents become more pronounced in dry runoff years. In particular, low Delta outflows can result in higher chloride and bromide concentrations in SWP water. Other constituents such as turbidity can cause problems in wet years due to excessive runoff entering the system. Biological activity within reservoirs (algae blooms, etc.) can result in the potential for taste and odor episodes. Undesirable water quality conditions are all typically mitigated by changing the blend of Colorado River or SWP water to minimize the impacts, and would likely result in a change in the salinity concentration within the distribution system.

- ***Water supply conditions.*** SWP water must be available in sufficient quantity to produce the desired concentration blend. In wetter years, large quantities of low-salinity SWP water will likely be available—as has occurred since 1995. In dry years, however, the needed quantities may not be fully available, and the salinity concentrations may be considerably higher than what is needed to achieve the desired target concentration. For 1998, the current supply allocation by DWR is for 60 percent of our Table A entitlement. This results in 1.2 maf for Metropolitan and should provide adequate water for the blending operations provided no large increases in salinity occur.

As operators of the facilities serving Metropolitan's two source supplies, the Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) will be informed of Metropolitan's goals. Metropolitan's staff will work with DWR and USBR to develop projections of supply and quality parameters, and to provide advance notice of potentially disruptive operations changes. Cooperation and coordination with these two entities is essential, and will reinforce Metropolitan's expressed concerns over salinity and lay a foundation for future operational relations and practices.

The most important point about these operational considerations is that Metropolitan has no control over them. These conditions can vary from year to year, and some will vary considerably

during a given year. This fact was taken into account when developing the proposed interim plan for 1998.

It should be noted that the detection of perchlorate in Colorado River water became an emerging issue in 1997, blending operations to lower salinity will also reduce perchlorate in Metropolitan's blended deliveries.

## Cost Considerations

The additional costs to achieve the blend target will be primarily dependent upon the salinity concentrations experienced in our source waters. Colorado River water is currently about 630 mg/L and has historically varied from 525 to 840 mg/L since Metropolitan began using the Colorado River Aqueduct. East Branch SWP water is currently about 300 mg/L, and has varied from about 100 to 450 mg/L since 1980. Salinity in both sources is dependent upon hydrologic conditions. While Colorado River salinity tends to change more slowly due to the large volume of reservoir system storage, SWP water salinity can change very rapidly, as much as 200 mg/L in a few months. This can possibly require major operational adjustments (delivery of additional SWP water) during such a year in order to meet a salinity concentration target. The primary sources of variable costs to deliver SWP water are for energy for pumping and treatment costs.

### Pumping Costs

Since actual SWP energy costs are not known until after the operating year is over, it is proposed to use a cost of $38 per acre-foot for pumping additional SWP East Branch water to estimate the additional costs associated with the proposed 1998 operation. This represents an estimate of the cost differential between pumping Colorado River water and East Branch water for 1998, and is based upon an estimate made in 1997. Also, up to a point, some replacement of CRA water can be achieved by shifting already-planned West Branch deliveries to the East Branch. The marginal cost for doing this is estimated at $13/AF for 1998.

### Treatment Costs

Compared to CRA water, extra expenses would also be incurred for the additional treatment of SWP water at our filtration plants. Based upon costs incurred during 1995 and 1996 for blending at the Weymouth, Diemer, and Skinner plants, the average treatment cost (chemicals and resultant sludge handling) is projected to average $5 per acre-foot for the three plants for 1998. In later years, after Stage I of the Disinfectants/Disinfection By-Products (D/DBP) Rule is promulgated and implemented, treatment costs may increase significantly, depending upon the blend of SWP water, in order to comply with the new D/DBP Rule. This treatment cost would only apply to additional SWP water imported to meet the blending criteria, not to water merely shifted from the West Branch to the East Branch.

Thus, total additional costs for blending in 1998 are estimated at $43 per acre-foot for pumping and treating when additional SWP water needed to replace Colorado River water, and $13/AF

when merely shifting SWP deliveries from the West Branch to the East Branch. The $10 million cap is proposed based upon costs incurred for blending operations in the previous three years. The funds needed during fiscal year 1997-98 are budgeted, based upon the previously anticipated costs of the present 25 percent blend policy. Funding needed during fiscal year 1998-99 would be included in the upcoming budget.

**Reporting**

Periodic reports on progress and pertinent factors that may affect our ability to achieve the target concentrations through blending will be provided to your Board as we progress through calendar year 1998.

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