



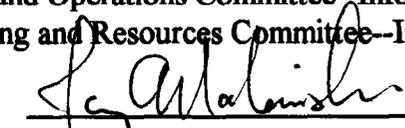
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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

9-8

June 23, 1998

To: Board of Directors (Engineering and Operations Committee--Information)
(Water Planning and Resources Committee--Information)

From: *for:* General Manager 

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

Subject: Draft Salinity Management Recommendations

RECOMMENDATION

For information only.

EXECUTIVE SUMMARY

Staff has completed the Phase I and II technical analyses for the Salinity Management Study, which address the regional problems caused by salinity levels in the region's water supplies and the increasing salt imbalance in Metropolitan's service area. Attached are a draft Policy Statement highlighting Metropolitan's commitment to managing salinity and an Action Plan to meet that commitment. The Action Plan consists of four basic components:

- Imported water source control actions
- Distribution system salinity management actions
- Collaborative actions with other agencies
- Local actions to protect groundwater and recycled water supplies

A draft Final Report is being completed and will be distributed shortly. A "Salinity Summit," in which water and wastewater agencies, regulatory officials, imported water agencies and local stakeholders would address the collective responsibilities toward a regional solution to the salt imbalance of the coastal plain is proposed as the next step in the outreach process on this issue. Based on comments received over the next several months and the Salinity Summit outcome, the proposed Policy Statement and Action Plan would be refined for consideration and action by your Board later this fiscal year.

DETAILED REPORT

Staff has completed the two-year technical investigation of the impacts of total dissolved solids or salinity to our region. The Salinity Management Study (Study) was conducted in close collaboration with member agencies and numerous other concerned agencies. The Bureau of Reclamation was a primary study partner, contributing \$300,000 under its congressional authority to develop a regional water recycling plan for Southern California. High salinity is a significant constraint to water recycling.

A draft report will be distributed shortly. It includes a summary document and 12 technical appendices with detailed analyses of salinity problems and potential solutions.

For analytical purposes, the Colorado River Aqueduct (CRA) was considered full for the study period, consistent with the objectives of the California 4.4 Plan.

Benefits of Reduced Salinity

The Study concludes that when salinity levels of imported water are high the region is adversely affected with:

- Impaired use of local groundwater and recycled water; and
- Economic impacts to water consumers and utilities.

Using a computer model developed for the Study, it is estimated that \$95 million per year of economic benefits (see attached graphic) would result if Metropolitan's CRA and State Water Project (SWP) water were to simultaneously experience a 100 milligram per liter (mg/L) reduction in salt content over their historic average. Primary salinity impact categories include residential, commercial, industrial and agricultural water users; groundwater and recycled water resources; and utility distribution systems. While the potential benefits of salinity reductions to the region are sizable, a key policy question arises as to the willingness of member agencies and their water consumers to pay for the remedial actions needed to realize those benefits, particularly since these benefits are achieved over a long period of time and the impact on individual users is small.

Salt Sources

The Study concludes that about half of the region's salt is contributed by imported water and the other half by local sources. The CRA constitutes Metropolitan's highest source of salinity, averaging about 700 mg/L. Hardness comprises about one-half of the CRA salt load and causes troublesome scaling problems to indoor water uses by residential, commercial and industrial entities. The SWP provides Metropolitan with lower salinity water (250 to 325 mg/L on average) which can be used to blend down CRA concentrations. SWP salinity levels can change rapidly in response to hydrologic conditions. Such changes are noticeable and disruptive as compared to the very gradual, almost imperceptible changes which occur in local streams, groundwater and

wastewater collection systems. A CALFED Bay-Delta solution could lower SWP salinity by 100 mg/L (see attached figure) and reduce short-term variability.

Local salinity sources include naturally occurring salts, salts added by urban water users, infiltration of brackish groundwater into sewers, irrigated agricultural and confined animal waste management practices.

Salinity Management Policy Statement and Action Plan

Attached are a draft Policy Statement and Action Plan addressing salinity management for the Metropolitan service area. The Action Plan consists of four basic components:

- Imported water source control actions
- Distribution system salinity management actions
- Collaborative actions with other agencies
- Local actions to protect groundwater and recycled water supplies

It is expected that the adopted action plan will be revisited and updated periodically as clarity arises in a number of critical areas including the CALFED Bay-Delta Plan, California's Colorado River Water Supply Plan, wheeling practices, Stage II disinfection by-products rules under the Safe Drinking Water Act Amendments, and operational experience gained through implementation. Staff recommends that the first major update occur in 2004 when the Inland Feeder becomes operational or sooner if a significant unanticipated change in controlling conditions occurs.

Resource Limitations on Blending Colorado River Water Salinity

The foundation of Metropolitan's draft Action Plan is an imported water salinity target of 500 to 550 mg/L. Managing imported water through blending would be supplemented by source control in the two imported water river systems, storage and exchange operations along the CRA, and a CALFED solution. Blending in Metropolitan's system is achieved by curtailing delivery of higher-salinity CRA water and substituting with comparable amounts of lower-salinity SWP water.

Annual changes in imported water supply availability and salinity concentrations greatly affect Metropolitan's ability to achieve the target through blending. For example, above-normal runoff this year has provided unusually favorable conditions resulting in lower than target salinity levels in some months. In contrast, under conditions like the 1977 drought, Metropolitan would not have been able to meet the target because SWP water salinity levels rose to over 400 mg/L. In order to do so, Metropolitan would have had to stop taking much of its CRA water. Whenever there is a concurrent shortage of SWP supply and high salinity, Metropolitan would have no choice but to fully use its CRA water and incur the higher salinity. The key trade-off to be weighed to achieve a salinity target is the risk to supply reliability. The attached figure shows

potential year 2000 resource impacts to achieve a 500 mg/L salinity target for assumed levels of salinity of imported supplies.

On average the target would be met in about seven out of every ten years. In the remaining years, hydrologic conditions constrain primarily the SWP with insufficient and often higher salinity supplies, limiting the ability to meet the target. The proposed policy includes clear recognition of this resource limitation and calls upon local agencies to develop and manage their local projects and groundwater to accommodate these inevitable swings in salinity of imported water due to natural hydrologic variation.

Recognizing the significant constraint of resource availability, the action plan calls for initially meeting the salinity target during the April through September period, which corresponds to the peak irrigation season and requires proportionally less curtailment of CRA water. That period would be progressively extended to ultimately achieve the target year-round as SWP water quality improvements are realized under the CALFED program. Success in the CALFED process in reducing the salinity of our SWP water is critical to the long-term solution for Metropolitan's water. Proposed arrangements for expanded storage and exchanges of CRA water for SWP water will also be important steps to achieving a year-round salinity target within water resource availability constraints.

Should the anticipated salinity benefits of a CALFED solution or CRA exchanges and storage fall short of need, then the ultimate method of achieving salinity targets may be desalination associated with the CRA. However, given the current state of technology, the costs would be high and there would be significant resource and environmental impacts associated with large quantities of brine disposal. Hence, the action plan calls for an aggressive program of research and development (R&D) of a more efficient desalination technology. This R&D effort is already being initiated by Metropolitan's Water Quality Division in partnership with interested local agencies. Significant grant funding has been secured from the California Energy Commission.

Integration of Quality and Quantity

The Study shows that management of imported water salinity is important to the region's overall supply mix, especially in regard to local groundwater and recycled water. Although Metropolitan's practice is to routinely assess the pros and cons of quality-to-quantity relationships when planning and negotiating new facilities and resources, it is valuable to emphasize this practice as part of the Salinity Management Policy.

Regional Approach

There is a need to manage both local and imported sources of salt in order for the region to effectively achieve a long-term salt balance. Staff proposes additional outreach at the management and policy level with other agencies that can influence the salt balance of the coastal plain. A regional Salinity Summit is contemplated, at which all of the involved parties can review their respective roles and acknowledge responsibilities toward a cohesive, regional strategy. Participants in the Salinity Summit could include:

- Association of Groundwater agencies
- Southern California Alliance of POTWs
- Pertinent Regional Boards
- U.S. Bureau of Reclamation
- Colorado River Basin Salinity Control Forum
- California Department of Water Resources
- CALFED
- Member agencies and other stakeholders

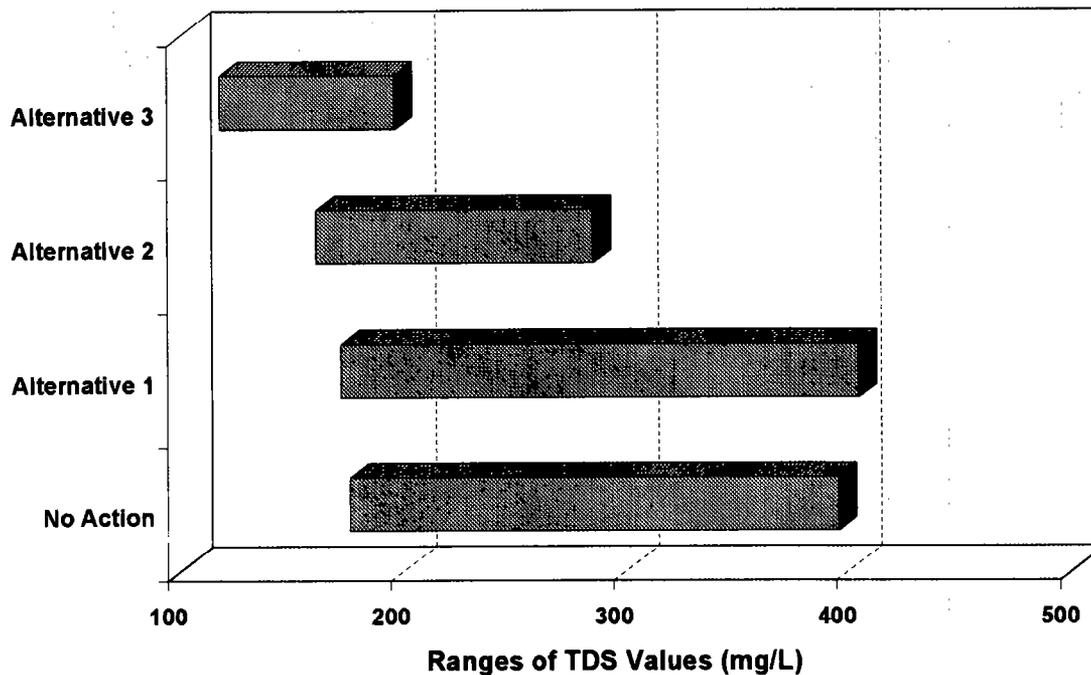
It would be beneficial to consider the outcome of such collaboration before your Board takes action on a Metropolitan salinity policy. Thus, approval by your Board on a policy and action plan is proposed for later this fiscal year following the Summit and consideration of other input.

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Attachments

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SALINITY OF CALFED ALTERNATIVES
SWP at O'Neill forebay
(Year 2020)



The CALFED alternatives are as follows:

NO ACTION: 1995 WATER QUALITY CONTROL BOARD ACCORD

ALTERNATIVE 1: EXISTING CONDITIONS WITH STORAGE

Some modifications for water conveyance in the vicinity of existing export pumps. Channels remain largely the same. The main effect is little change.

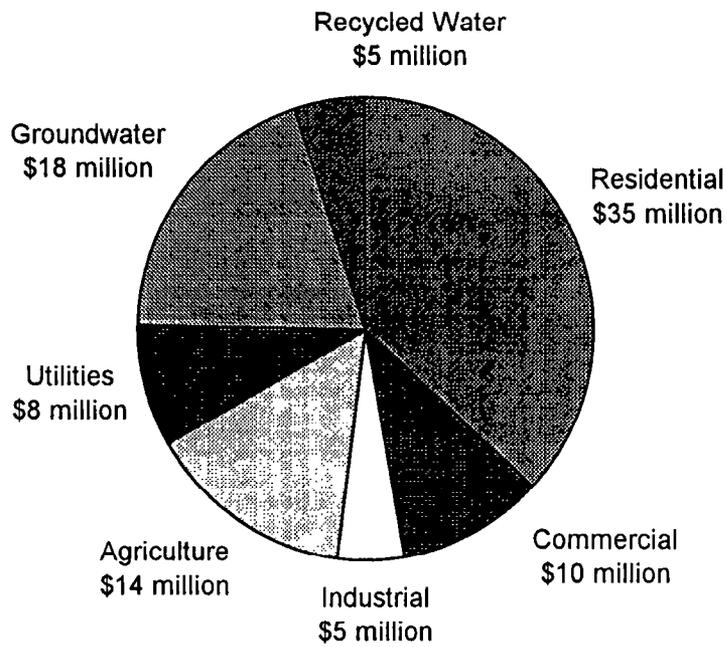
ALTERNATIVE 2: THROUGH DELTA SYSTEM WITH STORAGE

Widens channels and may flood islands. This alternative slows down and freshens Delta water flows and improves fish habitat. Levees are set back to create shallow habitat for fish. The main effect is the improvement of Delta water quality and fish habitat.

ALTERNATIVE 3: DUAL PLUMBING FACILITY SYSTEM WITH STORAGE

Allows export pumps to take water either from a conveyance structure, which bypasses the Delta, or directly from Clifton Court Forebay. The main effect is the improvement of supply reliability, quality and safety of water being exported south. It minimizes fish loss at the pumps.

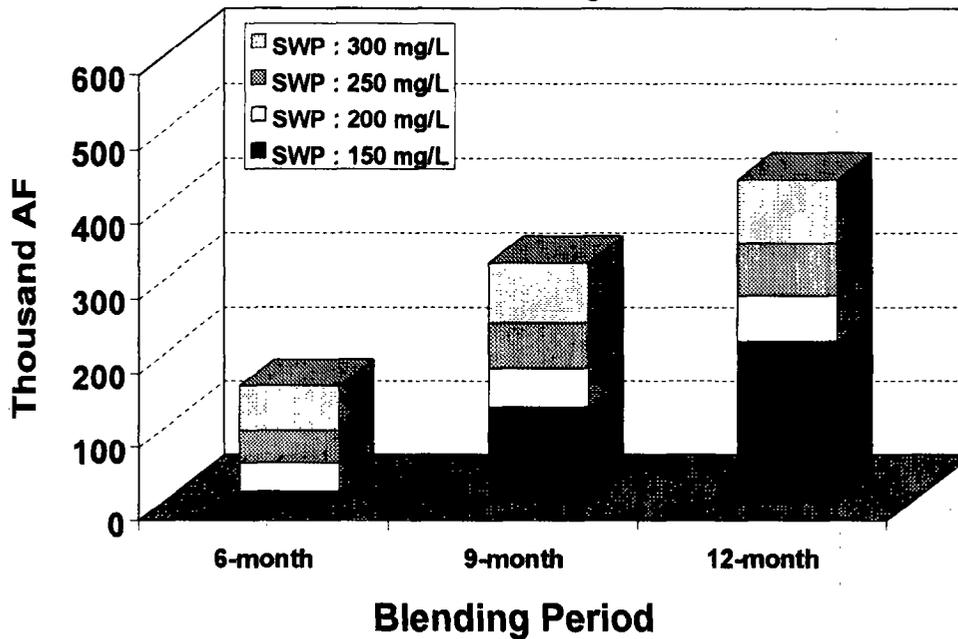
Annual Economic Benefits of 100 mg/L Salinity Decrease in Imported Water Supplies (\$95 Million)



Colorado River Layoff

Target: 500 mg/L (Year 2000)

CRA_{TDS}: 689 mg/L



Note:

1. This graphic is based on receiving imported water of uniform salinity concentrations throughout each blending period. Actual salinity values vary from month to month, resulting in somewhat different amounts of layoff.
2. Metropolitan is pursuing exchanges and 300,000 acre-feet per year of storage capacity along the Colorado River Aqueduct. To the extent that such programs are developed, the layoff water could be beneficially redirected to the storage accounts or exchanges.

**USBR/MWD SALINITY MANAGEMENT STUDY
FINAL REPORT**

**SECTION 4
PROPOSED POLICY**

**Management of Salinity by the Metropolitan Water District of
Southern California**

As regional leader in the management of Southern California's water resources, in recognition of the broad and pervasive impacts total dissolved solids (TDS) have upon the use and management of those resources, and in concert with its stated mission "...to provide its service area with adequate and reliable supplies of high quality water to meet present and future needs...", Metropolitan should adopt the following salinity management policy through 2004 or until a significant change in controlling conditions occurs:

- ◇ Make all reasonable efforts to protect Metropolitan's imported source supplies from the impacts of additional salinity, and where feasible seek to reduce the salinity received from those sources, taking into account the impacts of annually varying hydrologic conditions on salinity concentrations in the source supply systems.
- ◇ Manage Metropolitan's system to best utilize available supplies such that the impacts of salinity upon end users is minimized to the extent possible, with a reasonable and practical goal to maintain a total dissolved solids concentration in the blended areas of the system in the range of 500 to 550 mg/L during designated times of the year.
- ◇ Pursue a CALFED solution and storage and exchange arrangements along the Colorado River Aqueduct to minimize the loss of Colorado River Water periodically curtailed and replaced by State Project water to meet blending targets.
- ◇ Integrate water quality and quantity objectives in planning and negotiating facility and resource developments.
- ◇ Encourage local planning and management practices to recognize that natural events beyond Metropolitan's control will periodically increase the salinity of imported water supplies, hindering Metropolitan's ability to continuously meet the 500 to 550 mg/L goal.
- ◇ Encourage and support to a reasonable degree, consistent with other elements of this policy, other regional and local efforts to minimize the impacts of salinity on the groundwater and recycled water resources which have been or will be developed in Southern California.
- ◇ Make the Salinity Management Action Plan (see Section 5) the primary vehicle to carry out this policy. Direct the General Manager to fully implement the Action Plan. Periodically assess the Action Plan, and make revisions based upon experience gained and changing conditions.

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**SECTION 5
PROPOSED ACTION PLAN**

This section outlines a proposed Action Plan to carry out the proposed policy statement in Section 4. This Action Plan is focused to reduce salinity concentrations of impacted supplies and to implement collaborative actions to reduce salinity in southern California within Metropolitan's service area.

The Action Plan incorporates a comprehensive approach. It includes new as well as existing practices that would collectively constitute Metropolitan's response to the regional management of salinity. It also includes Metropolitan's expectations of other agencies with the ability to affect regional salinity impacts, recognizing that an effective solution requires a regional commitment. Four fundamental categories of action are included:

- ◇ Imported Water Source Control / Salinity Reduction Actions
- ◇ Distribution System Salinity Management Actions
- ◇ Collaborative Actions with Other Agencies
- ◇ Local efforts to Protect Groundwater and Recycled Water Supplies

Imported Water Source Control/Salinity Reduction Actions

(Action Item No. 1) Colorado River

Metropolitan will continue to diligently support funding for the Colorado River Salinity Control Program. Added emphasis will be given to accelerating implementation of program measures. This will entail coordination with the Colorado River Board of California, the Colorado River Basin Salinity Control Forum, and participating federal agencies. Key actions will involve identifying already-planned and new projects that will be more effective, updating and reinforcing the economic benefits of the Program, and procuring adequate federal appropriations and their potential funding.

Metropolitan will provide the US Bureau of Reclamation with its updated salinity impacts model for Reclamation's use to help develop economic justifications for new salinity control measures and funding.

(Action Item No. 2) State Water Project

Metropolitan will work with other SWP contractors, and the California Urban Water Agencies to encourage DWR to engage in operational practices which support Metropolitan's salinity management objectives including:

- ◇ DWR to develop the capability to provide timely water quality information to aid Metropolitan's operational decisions related to achieving its 500 to 550 mg/L salinity objectives.
- ◇ DWR to develop a TDS assessment methodology to provide routine salinity forecasts, and to assess actions that may affect source or delivered water quality.

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- ◇ DWR and Metropolitan to seek mitigation offsets for new projects that would significantly degrade source or delivered water quality.
- ◇ Metropolitan to encourage DWR to assess the tradeoffs of projects affecting SWP salinity including economic impacts.
- ◇ Metropolitan to promote inclusion of salinity control and reduction as a major objective for Delta exports through the Agriculture/Urban facilitation process to develop a long-term Bay-Delta solution under CALFED.
- ◇ DWR operational planning to take into account the benefit of providing sufficient cycling and flow-through water in DWR Southern Reservoirs to maintain lower salinity levels.

Distribution System Salinity Management Actions (Action Item No. 3) Blending

Metropolitan's interim policy provides an average salinity concentration of 500 to 550 mg/L in its blended water from its Weymouth, Diemer, and Skinner filtration plants and the untreated San Diego pipelines. Metropolitan will also operate its new Eastside Reservoir with the objective of maintaining a salinity level within the reservoir of 500 to 550 mg/L as soon as practical after the initial fill.

Achievement of the above salinity targets are subject to the following constraints:

- ◇ An annually budgeted amount to cover additional operational cost,
- ◇ Compliance with all water quality standards and significant aesthetic parameters,
- ◇ Availability of sufficient SWP water to accomplish the blend without invoking transfers or withdrawal from special storage accounts,
- ◇ Adequate distribution system delivery capacity.

Duration of blending operations:

- a) Initially, through 2004 Metropolitan will practice blending to meet the 500 to 550 mg/L target during the April through September period.
- b) In 2004 Metropolitan will assess changes in resource conditions and revise the blending duration to the extent that supply improvements permit. Metropolitan's long term goal is to achieve the 500 to 550 mg/L target on a year-round basis. Success in a CALFED solution and in developing new storage and exchange arrangements on the CRA will be important factors to expanding the blending duration beyond 6 months.

Accomplishment of this objective is estimated to be achievable in 7 out of 10 years. The ability to meet the objective can be periodically impacted by limited SWP supply availability, high salinity in imported supplies, and distribution system hydraulic constraints.

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(Action Item No. 4) Exchange and Storage

Metropolitan will pursue storage and exchange arrangements along the CRA to minimize the loss of Colorado River Water, periodically curtailed and replaced by State Project Water to meet blending targets.

Metropolitan will coordinate efforts with the Desert Water Agency and Coachella Valley Water District to increase the amount of Colorado River water it delivers to those agencies through exchanges for equal quantities of SWP water delivered to Metropolitan on the East Branch of the SWP. Metropolitan will support the sale of SWP water to Desert and Coachella for expanded exchanges that have salinity benefits to Metropolitan, when consistent with Metropolitan's other interests.

(Action Item No. 5) Integration of Water Quality and Quantity

Metropolitan will integrate water quality and quantity objectives in planning and negotiating facility and resource development. Particular facilities identified in the Salinity Management Study as in need of additional investigation include:

- ◇ Facilities needed to better manage the blend of SWP water in the San Diego Canal and Eastside Reservoir upon completion of the Inland Feeder;
- ◇ Expanded capacity of the Rialto Feeder between Devil Canyon and the Etiwanda Pipeline; and
- ◇ Future conveyance of blended water to the proposed Central Pool Augmentation filtration plant.

Collaborative Actions with Other Agencies

(Action Item No. 6) Local Resources Program Support

Metropolitan will continue its support of local desalination projects, including brine disposal through its Local Resources Program.

(Action Item No. 7) Desalination Research and Development

Metropolitan will continue to pursue research and development partnerships to reduce the costs associated with removing TDS from the CRA and other water supplies, including brackish groundwater, recycled water, and agricultural drainage. The Desalination Research and Innovation Partnership (DRIP) is a collaborative effort that will focus on developing new and innovative technologies to reduce the cost of desalting water supplies.

(Action Item No. 8) Annual Salinity Report Card

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Metropolitan, in collaboration with concerned agencies, will prepare an annual "Salinity Report Card" on salt balance to track key indicators including:

- ◇ Salt inflow in imported water;
- ◇ Salt outflow to the ocean, primarily in wastewater flow;
- ◇ Salinity of key areas of groundwater basins; and
- ◇ Efforts required for desalting.

The Salinity Report Card will provide an annual indication of the region's success in managing salinity.

Local Salinity Management Actions

The following action items represent Metropolitan's expectations of local entities to manage their part of the regional salinity problem. Metropolitan, as requested, would aid local leadership through participation in task forces, planning groups, technical studies, regulatory and legislative actions, and in obtaining outside funding.

(Action Item No. 9) Local Wastewater Discharge Management

Discharge Permit

Local leadership is needed to reduce the amount of salts entering groundwater and recycled water resources from sewer and agricultural discharges. In some locations as much as 600 mg/L of salts are added to water through the sewerage process. Opportunities for improvement include more stringent industrial permitting, controlling infiltration of brackish groundwater and seawater, as well as by developing dedicated brine or interceptor lines.

Local permitting and design practices need to consider the unavoidable salinity increases that will occur in imported water in response to periodic droughts and progressive changes in the Colorado River watershed. Normal fluctuations in imported water salinity need to be fully recognized in the design of water recycling facilities, in developing groundwater management plans, and in establishing waste discharge permit standards.

Metropolitan will work with wastewater agencies and Regional Boards, and will provide technical information and explain its policies when requested.

Expand Regional Brine Disposal

Local leadership is needed to develop new dedicated brine disposal lines to protect groundwater and recycled water resources. Metropolitan is currently working with a group of local agencies, member agencies, the Department of Water Resources and the Bureau of Reclamation in a regional water recycling planning study for Southern California. Part of that effort includes planning of new brine disposal lines that would support water recycling and groundwater desalination developments.

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Management of Water Softener Brines

Local leadership is needed to rectify existing statutes that prohibit local agencies from managing salt discharges from residential water softeners. Metropolitan can aid these efforts by identifying regional impacts and facilitating an effective outcome among the Water Reuse Association, the Water Quality Association, concerned local agencies and State regulators.

(Action Item No. 10) Replenishment Strategies

Local leadership is needed to pursue alternative groundwater replenishment practices to minimize groundwater basin salt loading. Agencies have the opportunity to use either direct recharge (spreading and injection) or in-lieu replenishment under Metropolitan's existing programs. In either case discounted water is available, although in-lieu replenishment incurs the extra cost of treatment by Metropolitan. Agencies have the opportunity to configure their systems to spread imported water when salinity is lower and to practice in-lieu replenishment when imported water salinity is higher.

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