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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

*Darren E. Duff*  
Executive Secretary

9-22

January 25, 1994

To: Board of Directors (Engineering & Operations Committee—Information)  
(Blue Ribbon Task Force Ad Hoc Committee—  
Information)  
From: General Manager  
Subject: Engineering and Operations Peer Review Committee Report

Report

Following a comprehensive evaluation of the Engineering and Operations divisions' philosophies, practices, and procedures, the Peer Review Committee issued its report on November 2, 1993. This report is attached to this letter. In the report, the Peer Review Committee made a number of recommendations and observations to improve the effectiveness of the two divisions. The attached includes comments and actions regarding those recommendations.

Board Committee Assignment

This letter is referred for information to the Engineering and Operations Committee and the Ad Hoc Committee on the Blue Ribbon Committee Report.

Recommendation

For information only.

*John R. Wodraska*  
John R. Wodraska

GMS:TS/pw  
(PEER\_REV.BL)  
Attachment

## COMMENTS TO PEER REVIEW COMMITTEE RECOMMENDATIONS

- **Engineering Division Organization** -- *We recommend that the organization structure be scrutinized to minimize duplication and that a strong, secondary Project Manager structure be formalized and used by the division.*

At present, the Engineering Division is preparing a request for proposals for a consultant to evaluate the Division's organizational structure and to make recommendations toward enhancing the Division's project management program to more effectively manage and administer the Division's work.

*We recommend that the construction phase management arrangements be reviewed in the light of the general concepts in Section 6.3 of the Touche-Ross report. (The Touche-Ross Report, titled "Study to Assess the Operational Strategies of the Engineering Division" was issued in December 1988. Section 6.3 recommended that project manager and project engineer talent be identified and developed within Metropolitan.)*

The Engineering Division began formalizing a project management system in 1989, in response to the Touche-Ross Report, by preparing written project management policies and procedures, developing computer systems to support manager- and project-manager decision making, and providing training in project management and computer systems.

The Engineering Division has instituted both a Project Manager and Project Engineer approach on all projects. A Project Manager approach is used on selected major projects (i.e., the Domenigoni Valley Reservoir and the Mills Treatment Plant Expansion No. 2), and a Project Engineer approach on all smaller projects. In addition, the Engineering Division has begun implementation of a matrix project management structure on selected major projects and smaller inter-disciplinary projects.

For major projects, a branch head may serve as the Project Manager, establishing a "line authority" which provides direct supervision of all Engineering Division personnel who are assigned to the project. On smaller projects, particularly inter-disciplinary projects which merit a matrix project structure, the Project Engineer has line authority only over personnel on the project that he or she normally supervises on a routine basis. Although the project, under the latter approach, may be staffed by persons who are outside his or her direct authority, the Project Engineer still has overall responsibility for the project. Project engineers and their subordinate staff routinely work on several different projects at the same time.

The Engineering Division will continue to evaluate upcoming projects and improve the use of project managers and engineers. An assessment of this form of project management will be included in the consultant's analysis of the Division's organization described previously.

***We recommend that top managers be given training in implementation of project management, and mid-managers and staff be given additional reinforcement in that activity.***

The Engineering Division has developed a mainframe-based Project Management Information System (PMIS) to assist in scheduling and cost control; written a number of project management policy, procedure, and informational documents; and provided comprehensive, formal project management training courses for approximately 70 management and staff personnel.

In addition, Engineering Division management and its Quality Control and Office Engineering branches continually refine, document, and reinforce its project management policies, procedures, and practices on an ongoing basis.

Currently, a draft of the Division's Project Engineering Manual is being circulated for review and comment. Once the manual is finalized, additional training classes are planned. In addition, the Division is anticipating future organizational changes, as a result of the upcoming Division organizational study, all of which will improve efficiency and enhance project management.

- ***Operations Division Organization -- The R. W. Beck report appeared complete and on target. The Committee recommends management review the report periodically and continue efforts to fully implement many of the recommendations.***

The Operations Division continues to review past studies and implement needed changes. Recently, the Division had a consultant, (Dembrowski and Associates) review the current structure considering the numerous changes that were made last year as a result of the R. W. Beck study. The consultant's study is now complete and will be submitted to District management for review.

The Dembrowski study recommendations primarily focus on reducing the number of supervisory layers within the Operations Division. Additionally, the study made several recommendations to increase the upward mobility for new employees in the Division. This is particularly important since the Operations Division is considering reducing the

number of high-level positions.

Most of the recommendations from the R. W. Beck Study which referred to issues other than Metropolitan's organizational structure have been implemented. Those that have not yet been implemented, are periodically to be reviewed.

● **Workforce Diversity -- *We recommend that Metropolitan demonstrate its leadership by emphasizing a committed, proactive effort to increasing workforce diversity.***

The Operations and Engineering divisions are committed to workforce diversification. In the last six months, Operations has initiated a program commonly referred to as the 15-week program which primarily targets unemployed women and minorities. The candidates are hired through a temporary agency and brought into the workforce. Significant training is provided, along with strong mentoring. As vacancies occur in the workforce, substantial consideration is given to these candidates. To date, the program has resulted in several permanent hires.

A new program has just been developed by R. W. Moon Consulting, in conjunction with Operations Division staff. This program concentrates on minority and women engineering students. It is designed to provide six months of working experience alternated with six months of college study. The students continue with the program until they graduate. With the experience and seniority they have gained, we hope they will seriously consider permanent employment at Metropolitan.

The Engineering Division has initiated a Minority Recruitment Action Plan which was presented to the Engineering and Operations Committee on October 11, 1993. The plan includes short-term and long-term strategies for improving the representation of minorities and women in the Division. Since the program began, Engineering staff has participated in job fairs sponsored by Professional Hispanics in Energy, the National Council of Black Engineers and Scientists, the NAACP and the National Society of Black Engineers. By year end 1994, staff will have participated in 15 additional job fairs sponsored by minority organizations and universities. Working with the Personnel Division, Engineering has advertised its job opportunities in minority newspapers, such as *Nuestro Tiempo*, *LA Sentinal*, and *La Opinion*. Personnel also places image advertising in minority publications, including the *Minority Employment Journal*, *U.S Black Engineer*, *Hispanic Today*, *Veterans Outlook*, and *Winds of Change*, a quarterly magazine of the American Indian Science and Engineering Society. The Division has also

sought applicants from minority professional organizations, such as the African American Engineers and Architects Association, the Society of Hispanic Professional Engineers, and the National Society of Black Engineers.

Engineering staff has joined the Industry Advisory Boards of the Minority Engineering Programs at California State University Los Angeles (CSULA), California State University Long Beach (CSULB), and Cal Poly Pomona, universities where the Engineering Division has historically drawn many of its employees. Activities with these groups have included a student tour of Metropolitan's Jensen Treatment Plant; participation in minority student/industry receptions; and student resume critiquing and mock interviews. Staff will participate in Engineering Shadow Days sponsored by the three schools, in which selected minority engineering students are invited to visit Metropolitan to observe the activities of engineers for a day; they will also serve as student mentors and guest lecturers. A work/study program for minorities and women will be initiated in 1994, in which students will work in Metropolitan's Engineering Division for six months and go to school for six months. In addition, the Engineering Division will sponsor a minority internship program for engineering students to work part-time while attending school, as well as a minority summer hire program. A program for awarding one-year engineering scholarships to minority students will be included in the 1994-95 budget of the Engineering Division.

Engineering and Operations divisions' employees will be among the first to participate in diversity and interviewer-rater training programs being developed for Metropolitan by outside consultants. Temporary help agencies used by Engineering have been notified about the Division's interest in seeking minority and women applicants. In addition, interview panels for Engineering Division job openings include at least one minority participant.

- **Project Design, Internal vs Consultant -- We recommend the Engineering Division review its staffing plan for the work remaining in the Capital Improvement Program with the goal of reducing the use of temporaries and optimizing the amount of in-house design consistent with considerations of maintaining staff expertise and minimizing staffing fluctuations.**

The Blue Ribbon Committee disagreed with this recommendation of the Peer Review.

In 1987, the Engineering Division devised a staffing philosophy to cope with the upcoming expansion program. That philosophy contained a mix of regular and temporary

employees blended with a liberal use of consultants, part-time help, and overtime to accomplish the needed work. In order to obtain the highest degree of efficiency and cost effectiveness, it was determined that District regular staff would design those projects for which they had, and needed to maintain, in-house expertise; for example, pipelines, treatment plants, rehabilitation of existing facilities, etc.

Consultants would be used on those projects which were either "independent" of other facilities or required expertise which was unique and not necessarily needed to be maintained at the District; for example, dams, maintenance facilities, etc.

The underlying theme to this philosophy was to ensure that, at the conclusion of the Capital Improvement Program (CIP), the District would be left with a highly skilled engineering force to continue the ongoing engineering work and the proper complement of personnel that is compatible with future work loads, thereby avoiding overstaffing and layoffs.

This staffing philosophy was validated by the Touche-Ross study in December 1988.

The Engineering Division will conduct a study of its use of temporary employees in relation to staffing needs for the CIP. It is expected to be addressed in its upcoming divisional organization study as well.

In recognition of the longevity of employment of many existing and expected future temporary employees during the CIP, staff will consider a new temporary employment classification referred to as limited-term employees. Under the limited-term employee program, these personnel would have the same benefits as regular employees, but only for the term of the employment and only during the course of the CIP when these employees are required. It is recognized that many of our current temporary employees are hired through agreements with temporary employment agencies, and a conversion of these employees to long-term status would be considered when appropriate.

- **Capital Improvement Program (CIP) -- *We recommend that the System Overview Study (or the CIP) be updated annually, and that sunk and projected costs be presented for various elements of each project.***

Programs in the Capital Improvement Program are divided into projects (elements). Each project has a schedule, cost

estimate, and a financial spreadsheet. These project level financial spreadsheets are linked together to produce a program level financial spreadsheet which is then linked to the CIP.

The Engineering Division updates the CIP on an annual basis as part of its preparation of the Capital Budget, which reflects the actual and projected expenditure of funds for each program in the CIP by fiscal year. A separate report based on the CIP is also prepared on a quarterly basis for the Finance Division, which uses it to project District cash flows and financing requirements to fund the Capital Program. Engineering will produce a special report in May of each year, after the Capital Budget has been completed, that will provide actual and committed costs (sunk costs) for each program.

- **Gold Plating** -- *The majority of the Committee recommends the Engineering and Operations Divisions establish value engineering programs, partially utilizing outside teams, to analyze significant projects, programs, and/or cost centers with the goal of maximizing the return on Metropolitan's investment.*

The Engineering Division currently uses value engineering concepts as part of the normal development of design criteria and selection of materials and review of the constructability of projects. It is preparing to review the current use of value engineering and recommend improvements that will lead to a more structured program which will enhance the return on future Metropolitan investments. In addition, the Division will be sending employees to value engineering training courses to enhance their expertise.

Key staff of the Operations and Engineering divisions will attend a short course on "value engineering" in February 1994. Once that training is completed, they will develop procedures to enhance use of "value engineering" for evaluating significant projects in both divisions.

- **Water Treatment Plant Design Criteria** -- *We recommend that a value analysis be performed to compare filtration processes, and to balance costs and benefits.*

The Engineering, Water Quality, and Operations divisions will continue their value analysis process, as they have in the past, which includes review of Metropolitan's design criteria for water treatment plants, including the filtration process.

Metropolitan's "uniform process design criteria" for

treatment plants has been incorporated into the design of the ongoing Mills and Jensen expansions and has been used to establish rated capacities for the other three filtration plants. These uniform criteria were developed in 1989 through an exhaustive review of the factors which influence treatment process performance. The effort was conducted by both internal and consultant staff, and received extensive review. Factors which were examined included:

- a. Historical plant performance, especially at or above the design flow rating or during adverse water quality conditions;
- b. Bench-, pilot-, and full-scale testing. This included a state-of-the-art process review to incorporate the full-scale experience of other agencies;
- c. Periodic episodes of adverse plant influent water quality, including algae blooms, pH spikes, taste-and-odor episodes, ash input to reservoirs from fires in the watershed, and high- and low-turbidity episodes. These periodic episodes can occur at any time during the year;
- d. Water quality regulations and Metropolitan goals, as described in Metropolitan's Strategic Plan, including anticipated future regulations (e.g. the Surface Water Treatment Rule) and prudent operational safety factors; and
- e. Cost/benefit analyses, which compare multiple process options, if available, and which provide equivalent process performances.

Since 1989, a number of developments have occurred which justify a reevaluation of the factors which led to the current uniform process design criteria. These developments include new and anticipated regulations, changes in the implementation schedules of new regulations, process changes at Metropolitan's treatment plants, additional operating experience, a more extensive cost history based on recent plant expansions, and the development of Metropolitan's Strategic Plan. These new developments, along with the above-noted factors considered previously, will be incorporated into future value analyses to continue an up-to-date balance of costs and benefits for Metropolitan's treatment plants.

- **Construction of Ozone-PEROXONE Treatment Facilities -- *We recommend that Metropolitan, in consultation with an Advisory Committee from member agencies, thoroughly develop treatment alternatives and scheduling options for complying with new water quality regulations and perform a value analysis of these alternatives.***

Metropolitan has formed an interdivisional task force to investigate integrated treatment strategies to meet two impending water quality regulations, the Disinfectant/Disinfection By-Product Rule and the Arsenic Rule. The task force is organized into several subcommittees to investigate alternatives to, and scheduling options for, the proposed construction of the Oxidation Retrofit Program (ORP) at one or more of Metropolitan's five filtration plants. The alternatives include:

- a) Construction of enhanced coagulation facilities to meet Stage 1 of the D/DBP Rule and defer ozone/PEROXONE facilities until Stage 2 of the D/DBP Rule is proposed;
- b) A concept of exchanging raw water between Metropolitan's Joseph Jensen Filtration Plant and Los Angeles Department of Water and Power's Los Angeles Aqueduct Filtration Plant; and
- c) Construction of the ORP, first at the filtration plants exclusively treating State Project water (e.g., Jensen and Mills) to meet Stage 1 of the D/DBP Rule and timing the ozone/PEROXONE retrofit work at the remaining plants to comply with Stage 2 of the D/DBP Rule.

A Member Agency Advisory Committee (MAAC) is being assembled to review the results of these investigations and to provide input from the specific member agencies impacted by the treatment alternatives recommended for each plant by the task force. In addition, an oversight Technical Advisory Group (TAG), consisting partially of outside experts, will conduct a value engineering analysis of the overall treatment strategy for Metropolitan to pursue, whether it be the ORP, enhanced coagulation or a combination of both. The results of the value engineering analysis would be presented to the MAAC for its consideration and input.

- **Machine/Fabrication Shop - *We recommend that a set of criteria be developed for decision making as to what fabrication should be handled by the machine shop, and what work should be procured outside.***

As shop capabilities have improved with the acquisition of

new equipment, work that had been contracted out, has been brought in-house. In these cases, the decision was based upon Metropolitan's ability to do the job at a lower cost and/or the contractor's inability to meet needed completion dates. After staff completes the aforementioned "value engineering" course, they will reassess the criteria used for evaluating each new job before the "make/buy" decision is made.

Shop staffing will continue to be reviewed annually as a part of the budget process. This will ensure that we maintain the requisite skills to respond to all anticipated types of emergencies without overstaffing.

- **Water Quality Laboratory -- We recommend the Water Quality Division prepare a divisional strategic plan to demonstrate how its policies, staffing, equipment and physical plant relate to the water quality commitments stated in the Metropolitan Strategic Plan now under preparation.**

In 1990, the Water Quality Division completed a divisional review by outside experts in water quality in advance of initiating preliminary design for expanding the water quality laboratory. This divisional review will be updated as a divisional strategic plan to incorporate recent activities, such as completion of the Metropolitan Strategic Plan, the Blue Ribbon Committee Report, and the Peer Review Committee Report. The divisional strategic plan will also incorporate the input from member agency water quality managers received at an October 6, 1993, workshop on the laboratory expansion. An informational Board letter is planned to describe this process and to incorporate Board input into the divisional strategic plan. All of the required information will be used to document the need for the Water Quality Laboratory expansion.

- **Conversion to Unattended Desert Pumping Plants -- Regarding the Desert Region, Metropolitan should seriously consider the potential of moving to a centralized control system, and removing the live-in employees (and their families) from the pumping plants with the goal of phased conversion to unattended desert pumping plants.**

An interdivisional task force will be assembled to evaluate:

- a. The levels of maintenance required at the pumping plants and along the aqueduct;
- b. The economics of having the maintenance crews at remote locations, rather than on-site;

- c. The automated data acquisition necessary to fully monitor the operation of the aqueduct and pumping plants, and
- d. The requirements to automate the pumping plants and aqueduct for remote operation.

The task force will report to an oversight committee composed of top District staff and representatives from member agencies. They will evaluate the task force recommendations for implementation.

● **The Domenigoni Reservoir Project -- *We recommend a continuous and vigorous review and implementation of opportunities to reduce cost without jeopardizing ultimate completion of a safe, efficient and operable project.***

The Engineering Division's efforts in cost control and management are continuous and are, in fact, one of the primary tasks of the Domenigoni Valley Reservoir Project's program management consultant, who is required to review all design sub-contracts and invoices for contract compliance and all designs for cost effectiveness. Invoices are reviewed in detail by the program management consultant, and questionable charges are outlined in memorandums to the Program Manager for consideration and action.

Program management for the Domenigoni project has taken six preemptive actions to manage, control, and reduce costs. They are:

- a. Conduct continuous, comprehensive reviews of design and the evaluation of alternatives to ensure that the design is complete. Reviews are not only performed by District Engineering personnel, but also by Operations and construction personnel where appropriate. Reviews include constructability and value engineering as key components;
- b. Develop an aggressive and positive claims prevention and change control program to take the necessary precautions that will prevent cost and time growth in the future;
- c. Provide a monthly detailed review of all costs incurred to ensure contract compliance, and institute cost-control measures, including pre-approval of assigned manpower and overtime, issuance of work-package directives, and monitoring of actual design performance against

the approved CPM Schedule and work-package budget estimates;

- d. Provide written detail procedures of all work processes to help ensure that work is done right the first time. Included are state-of-the-industry processes for document control and managing design review comments;
- e. Continuous review of the options for construction packaging and contracting to balance concern for effective cost and schedule control and management with the need for local and minority/women-owned participation while, at the same time, preserving the cost effectiveness of each construction package; and
- f. Require advance planning for mobilization and demobilization of field crews to assure that staff is brought aboard and released, and facilities are provided and released in a timely fashion to control costs for field exploration.

● **Environmental Initiatives** -- *The Committee observed there are opportunities to present a more proactive environmental commitment.*

Metropolitan recognizes that minimizing impacts on the environment, and providing the proper level of mitigation, are critical components in obtaining the required clearances for all construction projects. The Division further recognizes that the proactive implementation of such measures provides an inestimable advantage to the District in gaining the support of affected agencies, organizations, and the public, and that such support inevitably benefits project schedules and costs.

Metropolitan's planning for the Domenigoni Valley Reservoir (DVR) Project is an example of cost-effective mitigation efforts and cooperative regional environmental planning for large capital projects. Endangered species issues have been addressed through development of a Multi-Species Habitat Conservation Plan (MHSCP), which provides for a 9,000-acre ecological reserve in the project area. Implementation of the MSHCP has resulted in significant benefits for the biological resources of the area. The DVR Project has also provided mitigation for, and preservation of, significant historic and prehistoric cultural resources.

Other major projects for which proactive environmental planning and mitigation have been undertaken include the

Inland Feeder, Mills Expansion No. 2, and San Diego Pipeline No. 6. For the Inland Feeder, Metropolitan has situated portal locations to minimize impacts to cultural resources. New construction methods and design specifications for the power plant on the feeder are also minimizing impacts to sensitive resources. Prior to the commencement of construction on Mills Expansion No. 2, Metropolitan complied with both State and Federal endangered species acts with regard to the Stephens kangaroo rat (SKR), which included measures such as live trapping and relocation to suitable habitat, and the construction of an SKR barrier around a portion of the Mills plant site. For the San Diego Pipeline No. 6, Metropolitan currently is reviewing construction methods and schedules to minimize environmental impacts, particularly at the San Luis Rey River crossing.

The District has developed an MSHCP at the Domenigoni/Shipley/Skinner complex and also is developing an MSHCP at Lake Mathews. Operations Division staff are heavily involved in the development and management of these Plans. Annual vegetation clearing below the high water line at Lake Mathews currently is underway and staff have gone to extensive lengths to coordinate their activities with the appropriate resources agencies. Division staff are attempting to maximize the environmental value of the area, while preserving operating flexibility. Also, an electric fish screen recently was installed at the end of the San Diego Canal to prevent fish from migrating up the canal from Lake Skinner. The fish kills resulting from chlorination of the canal had previously become a serious problem. At present, the screen appears effective, and Metropolitan will publicize its success if these results are confirmed in further tests. Staff are also working with several agencies to enhance the fishery at Lake Havasu.

- **First Responder Program** -- *The Committee concurs and recommends management continue its efforts to reduce the secondary staffing assignments required by the first responder program.*

An evaluation of the initial assumptions and interpretations leading to the present policy concerning the First Responder Program is nearing completion. It is expected that significant changes will be recommended and that program changes will result in a more effective use of personnel and reduce the manpower requirements for training.

- **Maintenance Management Control System** -- *We recommend a high priority be given to implementation of the maintenance management system and those features of the "corporate" system needed to support it.*

The Operations Division will continue to place a high priority on full implementation of a maintenance management system. One section in the Technical Services Branch works on a daily basis with management and maintenance personnel from the field branches. This work encompasses both support of the system as implemented to date and expansion of that system to incorporate all critical systems and components.

Because of the enormity of the physical plant operated and maintained by the Operations Division, implementation is divided into 13 phases. The last phases are scheduled for completion by the end of 1995.

Operations Division staff are working with Information Systems Division (ISD) staff to coordinate the implementation of Phase I of the (ISD's) Strategic Plan. We are ensuring that those features most necessary to support the maintenance management system are given the highest priority.

- **Use of Computers** -- *The Committee supports the concept of the divisions developing their own special needs computer programs and systems.*

*We recommend the Information Systems Division (ISD) be responsible for providing necessary information (costs, stores, etc.) to the divisions on a timely basis.*

*We recommend that adequate, current computer equipment be purchased by the Operations Division and that emphasis be placed upon computer training programs, and computer self-study courses.*

Although the Engineering Division actively supports and participates in the development of corporate business systems such as those included in ISD's Phase 1 project, the Engineering Division has found it necessary to develop and implement specialized computer applications to address its unique needs. The Division has implemented an Intergraph Computer-Aided-Drafting/Computer-Aided-Engineering (CAD/CAE) system throughout the Division, numerous smaller engineering application programs, and a mainframe-based Project Management Information System (PMIS) to support manager decision making. As ISD begins implementing and developing expertise in Phase 1 systems which are similar to and more compatible with Engineering's CAD/CAE system, the Division intends to work with ISD to develop a support structure and

computer infrastructure which addresses both engineering and corporate business system needs, and makes efficient use of resources.

While participating with corporate automation processes such as Phase 1, the Operations Division has continued to develop small custom applications for special needs. The Field Applications Committee has developed numerous custom applications for use in the field offices. The Division is establishing a user group to recommend standards and look for opportunities to improve productivity via automation.

The Operations Division initiated a computer upgrade plan in 1993 that would eventually upgrade all computers to 486-class at a cost of almost \$1.5 million over three years. This plan called for 143 computers and printers as part of the 1993/94 fiscal year budget at a cost of \$487,000. Due to the District's financial constraints, however, only \$381,000 was authorized. As part of the 1994/95 budget, we will recommend providing 486-class computers Division-wide at a cost approaching \$1.1 million. This will allow for full compatibility with advanced graphical user interface (GUI) software applications now available on the market and with all ISSP Phase 1 corporate applications. These computers will also increase the size of the user-base from about 400 to 500 of the Division's approximately 980 employees.

- **Adequacy of Operational Control Systems** -- *We recommend a high priority be assigned to the design and completion of a modern SCADA system for the Colorado River Aqueduct, member agency metering stations, and the regional storage, treatment, and distribution system.*

A modern Supervisory Control and Data Acquisition System (SCADA) is one of the highest priorities of the Operations Division. The Division now has a contract with JWP Controls, Inc. to build and deliver a state-of-the-art control system. Unfortunately, the contractor has had serious financial and technical problems which have resulted in a significant delay. These problems have mostly been resolved and delivery of the system is expected to begin in the Spring of 1994.

The contract provides the option to buy additional units, giving Metropolitan the opportunity to include replacement equipment needed for our older systems. A letter requesting authorization to procure a Colorado River Aqueduct (CRA) SCADA system is being presented to Metropolitan's Board in February 1994. An Inter-Divisional Task Force has been established to implement the CRA system, if approved.

A second program under development provides for the remote reading of service connection meters. This program is anticipated to result in substantial increases in productivity. Meetings have already been held with vendors, preliminary requirements developed, and some testing completed. First test installations are expected to begin in the summer of 1994. Complete implementation will probably not be realized until 1996.

- **Maintenance, Internal vs Contractor -- *Our conclusion is that efforts to contract out large amounts of maintenance activity would be unproductive.***

The Operations Division concurs with the Peer Review Committee's conclusion in the areas of electrical and mechanical maintenance of the systems and components of the treatment and pumping plants and the distribution system. However, we have contracted out less critical maintenance, such as custodial services, for a number of years at several of our facilities. We intend to continue contracting for services outside our core business area.

- **Personnel Training -- *Management training of all employees in the supervisory and management hierarchy should be as high a priority as is technical training.***

Operations and Engineering divisions have recognized the need to be proactive with regard to managerial training. In the Operations Division, recent efforts include Division-sponsored seminars by training specialists on diversity in the workplace and team-building. In both divisions, all supervisors were provided sexual harassment prevention training and have attended a wide variety of management supervision and leadership courses offered by the Personnel Division. Most employees have attended the "Seven Habits of Highly Effective People" program and, to varying degrees, self-improvement courses. Both divisions will commit the resources necessary to actively promote and deliver these and other training programs to all their employees. For field employees, high quality training programs will be made available at local work sites.

- **Flexibility in Employee Work Assignments -- *Metropolitan should strive to maintain its capability in assigning multiple responsibilities in a given classification.***

The Operations Division takes great pride in the multi-disciplinary skills and abilities of its work force. Not only has this led to greater efficiency and reduced costs, as noted by the Peer Review Committee, it has also improved

our emergency response capabilities. The Division has resisted calls for classification specialization in the belief that this would reduce efficiency, increase costs, limit flexibility of operations, jeopardize emergency response, and reduce career development opportunities for its employees.

The Engineering Division has historically cross-trained its personnel to prepare them to perform a broad range of duties. Many employees accept new positions outside their section or branch which contributes to their diverse experience. The Division has monitored job descriptions to prevent them from becoming excessively specialized and restrictive. This practice is planned to continue in an effort to maintain flexibility and increase efficiency and productivity.

In addition, the Engineering Division has promoted and implemented programs to move key personnel from design to construction to gain an understanding of the effects of design decisions on construction activities. This program has also resulted in increased communication between design and construction because people know who to contact when problems or questions arise.

- **Adequacy of Housing for Field Offices, Facilities, Equipment and Supplies -- *We observed that division management has maintained tight control on requests for funds for more space, and while that practice prevails we recommend any requests which do come forward should be given serious consideration.***

Metropolitan gives serious consideration to all requests for additional space by its divisions. The Headquarters/LaVerne Space Study Project, completed by BDO Seidman in January 1991, provides an example of the extent to which the District studies office and support space problems in response to the needs of its employees. Although field management has requested new or expanded facilities in the past few years, many have been deferred because of budget constraints. For instance, requests for two new buildings at the Lake Mathews complex, which have been on hold for a number of years, are in the preliminary capital budget for fiscal year 1994-95. The divisions will make a concerted effort to better identify and resolve requests for additional space or improved facilities that support the District's mission.

As the Peer Review Committee observed, Metropolitan employees take great pride in District facilities and strive to maintain them in top condition.

- **Member Agency Relationships** -- *We recommend Metropolitan actively seek the input of member agencies, and consciously take it into consideration when making decisions.*

The Engineering and Operations divisions actively participate in the Member Agency Managers Meetings through presentations and discussions about its projects. Additionally, the Operations Division has assigned a team to further develop its customer service philosophy. In implementing the Maintenance Management System, the division is involving member agencies on the selection evaluation group. It is our intention to continue and expand this type involvement.

The Engineering Division will actively participate in and sponsor, when appropriate, special meetings with representatives of our member agencies at two levels. On small engineering projects, such as service connections, that pertain to only one agency, the Engineering Division will meet with agency representatives to discuss appropriate operating requirements and design criteria. With larger projects involving multiple agencies, Engineering will participate with other divisions and interested member agencies, as appropriate.

On appropriate technical issues of an engineering project, the Chief Engineer will serve as the initial contact person for the interested member agency. He will also coordinate his activities on such projects with the Operations Division.

- **Operations Division Strategic Operating Plan** -- *We recommend the Operations Division develop and publish a three- to five-year strategic operating plan.*

With the development of the District's Mission Statement, Strategic Plan, and Guiding Principles, the Operations Division is developing its own strategic plan. A Division Strategic Plan Committee is evaluating a methodology for developing and continually refining such a plan. It will make a recommendation to Division management shortly which will serve as a basis for developing and updating annually an Operations Division Strategic Plan with a three- to five-year horizon.



**MWD**

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

November 30, 1993

To: Engineering & Operations Committee--Information  
From: General Manager  
Subject: Engineering and Operations Peer Review Committee Report

Report

This letter transmits a copy of the Engineering and Operations Peer Review Committee Report.

Board Committee Assignment

This letter is referred for information to the Engineering and Operations Committee.

Recommendation

For information only.

for   
John R. Wodraska

PF:ly  
Attach.  
(Peer-Rev)

## ENGINEERING & OPERATIONS PEER REVIEW COMMITTEE REPORT

### Summary

Overall, the Peer Review Committee found the activities of the Engineering and Operations Divisions to be excellent. It is clear that the employees are dedicated, highly-skilled, with a high morale and a level of pride seldom found in organizations of this size. Their adaptability to new situations and their willingness to work as a team are indications of the organization's success. Throughout the Committee's review of work sites, the condition of the buildings, the shops, and equipment were found to be well organized, clean, and showed a high level of employee dedication and attention to maintaining a professional approach to all of their responsibilities.

The critical nature of Metropolitan Water District's responsibilities requires a committed, knowledgeable workforce led by management with clear vision and definite goals. The complexities of water supply development, treatment, distribution and delivery are increasing with time. An ongoing effort is required to assure a safe, dependable and efficient water supply for Southern California. We found Metropolitan's facilities, ranging in age from new to 60 years old, to be in good to excellent condition. Due to efforts to deliver a full water supply over a period of several years, the Colorado River Aqueduct pumping plants had slipped into an as needed maintenance mode several year ago. However, today these facilities, after refurbishing, in many ways are better than new in terms of pump efficiencies and delivery capability. The outdated supervisory control systems and a hands-on operational philosophy appear to be areas that could use updating and improvement to meet future requirements; however, the present capability to meet "on-demand" increases and decreases in water supply from water customers is significant. The Committee does believe that some changes can be made to improve the effectiveness of the two divisions.

### Recommendations and Observations

This is a summary of the recommendations and observations made by the Peer Review Committee. Discussion of these items is included in the Discussion section of the report

- **Engineering Division Organization** - *We recommend that the organizational structure be scrutinized to minimize duplication and that a strong, secondary Project Manager structure be formalized and used by the division.*

*We recommend that the construction phase management arrangements be reviewed in the light of the general concepts in Section 6.3 of the Touche Ross report.*

*We recommend that top managers be given training in implementation of project management and mid-managers and staff be given additional policy reinforcement in that activity.*

- **Operations Division Organization** - *The R. W. Beck report appeared complete and on target. The Committee recommends management review the report periodically and continue efforts to fully implement many of the recommendations.*
- **Workforce Diversity** - *We recommend that Metropolitan demonstrate its leadership by emphasizing a committed, proactive effort to increasing workforce diversity.*
- **Project Design, Internal vs Consultant** - *We recommend the Engineering Division review its staffing plan for the work remaining in the Capital Improvement Program with the goal of reducing the use of temporaries and optimizing the amount of in-house design consistent with considerations of maintaining staff expertise and minimizing staffing fluctuations.*
- **Capital Improvement Program (CIP)** - *We recommend that the System Overview Study (or the CIP) be updated annually, and that sunk and projected costs be presented for various elements of each project.*
- **Gold Plating** - *The majority of the Committee recommends the Engineering and Operations Divisions establish value engineering programs, partially utilizing outside teams, to analyze significant projects, programs, and/or cost centers with the goal of maximizing the return on Metropolitan's investment.*
- **Water Treatment Plant Design Criteria** - *We recommend that a value analysis be performed to compare filtration processes, and to balance costs and benefits.*
- **Construction of Ozone-Peroxone Treatment** - *We recommend that Metropolitan, in consultation with an Advisory Committee from member agencies, thoroughly develop treatment alternatives and scheduling options for complying with new water quality regulations and perform a value analysis of these alternatives.*
- **Machine/Fabrication Shop** - *We recommend that a set of criteria be developed for decision making as to what fabrication should be handled by the machine shop, and what work should be procured outside.*
- **Water Quality Laboratory** - *We recommend the Water Quality Division prepare a divisional strategic plan to demonstrate how its policies, staffing, equipment and physical plant relate to the water quality commitments stated in the Metropolitan Strategic Plan now under preparation.*

- **Conversion to Unattended Desert Pumping Plants** - *Regarding the Desert Region, Metropolitan should seriously consider the potential of moving to a centralized control system, and removing the live-in employees (and their families) from the pumping plants with the goal of phased conversion to unattended desert pumping plants.*
- **The Domenigoni Reservoir Project** - *We recommend a continuous and vigorous review and implementation of opportunities to reduce cost without jeopardizing ultimate completion of a safe, efficient and operable project.*
- **Environmental Initiatives** - *The Committee observed there are opportunities to present a more proactive environmental commitment.*
- **First Responder Program** - *The Committee concurs and recommends management continue its efforts to reduce the secondary staffing assignments required by the first responder program.*
- **Maintenance Management Control System** - *We recommend a high priority be given to implementation of the maintenance management system and those features of the "corporate" system needed to support it.*
- **Use of Computers** - *The Committee supports the concept of the divisions developing their own special needs computer programs and systems.*

*We recommend the Information Systems Division be responsible for providing necessary information (costs, stores, etc.) to the divisions on a timely basis.*

*We recommend that adequate, current computer equipment be purchased by the Operations Division and that emphasis be placed upon computer training programs, and computer self-study courses.*

- **Adequacy of Operational Control Systems** - *We recommend a high priority be assigned to the design and completion of a modern SCADA system for the Colorado River Aqueduct, member agency metering stations, and the regional storage, treatment, and distribution system.*
- **Maintenance, Internal vs Contractor** - *Our conclusion is that efforts to contract out large amounts of maintenance activity would be unproductive.*
- **Personnel Training** - *Management training of all employees in the supervisory and management hierarchy should be as high a priority as is technical training.*

- **Flexibility in Employee Work Assignments** - *Metropolitan should strive to maintain its capability in assigning multiple responsibilities in a given classification.*
- **Adequacy of Housing for Field Offices, Facilities, Equipment and Supplies** - *We observed that division management has maintained tight control on requests for funds for more space, and while that practice prevails we recommend any requests which do come forward should be given serious consideration.*
- **Member Agency Relationships** - *We recommend Metropolitan actively seek the input of member agencies, and consciously take it into consideration when making decisions.*
- **Operations Division Strategic Operating Plan** - *We recommend the Operations Division develop and publish a 3 to 5 year strategic operating plan.*

**Committee Design** — In connection with the Blue Ribbon Committee's overall evaluation of Metropolitan's structure and operation, and the assumption of managerial responsibility by John Wodraska, the Engineering and Operations Divisions Peer Review Committee was formed. Its Mission Statement is, "The Peer Review Committee shall evaluate the appropriateness of the Engineering and Operations Divisions' philosophies, practices, procedures, and criteria for its design, construction, operation and maintenance activities to accomplish Metropolitan's goals." The complete statement of the Mission and Goals is attached to this letter.

Metropolitan staff invited individuals with varying backgrounds to participate on the Committee. There are four who have responsibilities in the subject activities from other large, water resources agencies in the southwestern United States, one is a professor of civil engineering, four represent Metropolitan member agencies and, also, have experience in the subject activities. A list of the Committee members, with titles and addresses, is attached.

The Committee had a full-day, introductory meeting in Metropolitan's Cal Plaza offices on August 4, 1993. On August 25th, 26th and 31st, and September 1st, the Committee visited a broad variety of Metropolitan facilities ranging geographically from the Castaic Lake outlet works to Gene Village on the Colorado River. The facilities included treatment plants, hydroelectric plants, operations centers, maintenance centers, the La Verne complex, the Domenigoni Reservoir site, the Lake Skinner complex, and the Gene Village pumping plant and maintenance facilities. The Committee had a preliminary report-drafting session on September 1st, a full-day of deliberations on September 7th, a telephone conference on September 23rd, and a final wrap-up meeting on October 6th.

## Discussion

The Committee reviewed a number of specific items. Conclusions and recommendations are again included herein.

**Engineering Division Organization** - The Committee had some exposure to the personnel interaction within the present organizational arrangement. For the most part, no deficiencies were evident. Committee members reviewed the Touche Ross report which studied the division operations in 1988. The engineering organization is large and organizationally divided into detailed sections. Upon review of the branch responsibilities there appears to be a potential for overlap and duplication among branches; particularly among civil, structural, pipelines and safety of dams. There may be some potential for centralization/consolidation in support activities such as drafting, CAD/CAM, and surveying.

In most large design organizations, the trend is to establish a fluid, secondary organizational structure which facilitates implementation of individual projects by establishing a team, with members selected from needed design specialties, and placing responsibility for the project in the hands of a team leader, often called the Project Manager. This organizational feature appears to be only weakly used in the Engineering Division. We recommend that the organizational structure be scrutinized to minimize duplication and that a strong, Project Manager structure be formalized and used by the division.

While the true situation was not clear, it was not apparent to a majority of the Committee that construction administration has a project manager fully responsible during the contract and/or construction phase. There are various disciplines contributing to the construction management team (civil, mechanical, electrical, etc.) but it is not clear that these individuals report to a project manager. The project manager should be given the responsibility for project implementation and then held accountable for it. The Touche-Ross Report discussed the importance of project accountability in its Section 6.3, albeit the discussion concerned the design phase. We recommend that the construction phase management arrangements be reviewed in the light of the general concepts in Section 6.3 of the Touche Ross report.

A clear commitment to a project management philosophy must come from top management for successful implementation. Therefore, we recommend that top managers be given training in implementation of project management and mid-managers and staff be given additional policy reinforcement in that activity.

**Operations Division Organization** - The Committee had considerable exposure to the personnel interaction within the present organizational arrangement. Considering the large influence of the long distances between facilities and the interference of heavy traffic, we believe the present regional-type organization is appropriate.

The O & M organization appears to be doing a high quality job in an increasingly regulated environment, using an aging system with no significant growth in staff. Committee members reviewed the R. W. Beck report which studied the division operations in 1991. It notes considerable opportunity for modernization and, perhaps, increased efficiencies. The report appeared complete and on target. The Committee recommends management review the report periodically and continue efforts to fully implement many of the recommendations.

**Workforce Diversity** - Throughout the Committee's tour of construction sites and maintenance facilities, minorities and women in the workforce did not appear to mirror the diversity of the area in which the District is located. Notable, also, was the shortage in supervisory and management positions. We understand that special efforts are being made in some divisions, specifically the San Fernando Valley and Los Angeles Branches of the Operations Division. The particular difficulties of recruitment of minorities in the Desert Branch were explained. In general, turnover is low and internal promotion preferences limit opportunities.

The Committee reviewed with staff the current workforce statistics in both divisions and was briefed on current programs to recruit and promote minorities and women. While Metropolitan has recognized that diversity is an issue, proactive programs have been slow to develop in such areas as targeted minority recruitment, mentoring, apprenticeships, scholarships, and management training. We recommend that Metropolitan demonstrate its leadership in this arena by emphasizing a committed, proactive effort to increasing workforce diversity.

**Project Design, Internal vs Consultant** - Metropolitan appears committed to top quality design standards and oversight of the construction activity. It is hard to argue with spending a little more on engineering design aspects to provide long term reliability, and savings in O & M costs. Although reliability of designed facilities is of paramount importance to the region, efforts at engineering cost reduction without sacrificing quality should be encouraged. Newly completed "Design Standards" should be utilized to increase efficiency of in-house designers as well as for better utilization of outside consultants.

It is the Committee's understanding that the Engineering Division has developed a staffing plan for the Capital Improvement Program largely based upon the policy that design work should be performed by Metropolitan personnel if the expertise for such work is available. From that policy has arisen the general plan to design pipelines, tunnels, treatment plants, buildings, and retrofits with Metropolitan personnel. The study of the division's contracting practices made by Touche Ross in 1988 presented some fairly detailed steps for choosing projects adaptable to consultant design, but stopped short of making a recommendation of an appropriate level for such work. An important recommendation of the Touche Ross Report was that standard specifications and standard drawing should be prepared. That work has been completed and a Quality Control Branch has been established to maintain those specifications and drawings in a current condition. The availability of these and other tools now makes the management and

review of a consultant's work much simpler and provides more uniform adherence to Metropolitan standards.

Metropolitan has supplemented their full-time Engineering Division workforce with a significant number of temporaries, about 33%. It is the philosophy of the Committee that the use of long-term temporaries interspersed with permanent employees may lead to morale impairment and possibly other employment problems. It is our understanding that some temporary workers with less employment benefits than permanent employees, have been working for several years. We believe the reliance on temporaries should be reduced and substituted with either permanent staff or consultant expertise. While the philosophy of designing those projects in which the staff has expertise and contracting out other projects is sound, the workload of the capital improvement program is so large that there is little risk that the permanent staff will lack opportunities for maintaining its expertise. To resolve the problem of long-term, large numbers of temporaries described above, it would be practical to substitute some design consultants for planned in-house design. We recommend that the Engineering Division review its staffing plan for the work remaining in the Capital Improvement Program to reduce the use of temporaries and optimize the amount of in-house design consistent with considerations of maintaining staff expertise and minimizing staffing fluctuations.

**Capital Improvement Program (CIP)** - It is the Committee's understanding that the so-called Capital Improvement Program is really an off-shoot of a document called the System Overview Study. Further, it is our understanding that the study is updated occasionally. Those updates, together with the annual budget display of projected work for the following year in the Engineering Division, are the only references available for this \$6 billion program. The Committee believes that more detailed information is needed by member agencies, the public, and by interested business groups. We recommend that the study (or the CIP) be updated annually, and that sunk and projected costs be presented for various elements of each project.

**Gold Plating** - One of the primary goals of the Committee was to "list and evaluate past and present examples of real or perceived inappropriate philosophies, methods, or practices, i.e., "gold-plating." As a result, the Committee spent a considerable amount of time discussing exactly what "gold-plating" meant. It is our perception that Metropolitan has a reputation as an agency that is willing to spend additional funds to achieve the highest engineering standards.

While staff was sensitive about the label "gold-plating," there was a tremendous amount of pride on all levels about being the "leader in the state," "leader in the country," and even the "leader in the world" when it came to Metropolitan's technical, operational, maintenance, construction, and research efforts. Some of these efforts are noted below:

- The Water Quality Lab - extensive research effort with a goal of impacting the future of national water quality regulations.

- Construction Inspection - extensive investigation into tile underdrain fabrication resulting in vibratory placement of mortar rather than the typical construction practice of hand troweling.
- Construction Materials Testing - soil sampling (both trench and core drilling) at 1,000 ft. increments throughout the Domenigoni Reservoir bed.
- Survey - performing a GPS survey for the Inland Feeder and Domenigoni projects because the USGS data was not available and, due to USGS budget constraints, would not be updated timely.
- Shops - fabricating new meter boxes of heavy gauge steel in order to withstand gunshots and car crashes.

Metropolitan staff readily admitted that their philosophy is to spend extra money up front to avoid problems in the future. As mentioned in a previous section it is hard to argue with spending a little more on up front costs to save many times over on the final product. It is the Committee's perception however, that this is a pervasive attitude and ready justification for many aspects of the Engineering, Operations, and Water Quality Divisions. Metropolitan does not appear to have any identified value engineering-type program.

The only sure way to evaluate Metropolitan's policies is to examine the cost of a policy versus the benefit received. It does not appear that this is a common practice. Cost data is an essential component in the decision making process. If the extra efforts discussed above represent relatively minor expenditures as compared to the potential savings, then Metropolitan does not have a "gold plating" problem.

The majority of the Committee recommends that the Engineering and Operations Divisions establish value engineering programs, partially utilizing outside teams, to analyze significant projects, programs and/or cost centers with the goal of maximizing the return on Metropolitan's investment.

Water Treatment Plant Design Criteria - Water treatment plant design criteria is a good example of a need to do value engineering on a major program. Metropolitan has adopted a conventional design for water treatment plants. Using the conventional filtration process with settling basins, Metropolitan has designed for filter flow rates of 6 gallons per square foot per minute. Contrast this to the Los Angeles Department of Water and Power's (DWP's) recent filter plant completed in 1987 which eliminates settling basins, has filter flow rates of 12 gallons per square foot per minute and ozone pretreatment.

The table below compares the plant construction costs, excluding most site development, of Metropolitan's current filter plant expansion with the DWP's filter plant.

	Los Angeles DWP Plant/ with Ozone	Jensen Expansion	Mills Expansion
Capacity	600 MGD	400 MGD	220 MGD
Cost	\$98	\$112	\$75 million
Cost per MGD	\$163,000	\$280,000	\$341,000

Metropolitan costs for the expansion of Jensen and Mills are significantly higher than the DWP's costs for its plant, and it does not appear that there are significant differences in the quality of the water that will be produced by the plants.

**Construction of Ozone-Peroxone Facilities** - In the course of the Committee's reviews, numerous opportunities arose to discuss the current proposal to construct retrofit facilities at the various treatment plants for the use of ozone-peroxone to control the formation of disinfection by-products and the sources of tastes and odors. At the time of our field reviews, the proposal was estimated to cost \$750 million, and was planned to be completed at all locations by the year 2002. We understand that the staff is now modifying its recommendation to the Board of Directors to a more modest proposal to retrofit only the most likely location where the new standards would be exceeded.

We believe that before Metropolitan commits to major expenditures for ozone facilities, Metropolitan should thoroughly review the enhanced coagulation process for reducing disinfection by-products. Several factors favoring enhanced coagulation are (1) future regulations for arsenic removal may require Metropolitan to utilize a degree of enhanced coagulation anyway, and (2) Metropolitan could probably meet the phase I by-product regulations at Jensen and Mills without major capital expenses. This would allow deferral of major expenditures until phase II of the by-product regulations have been proposed and more is known about what contaminants will be regulated.

We recommend that Metropolitan, in consultation with an advisory committee from member agencies, thoroughly develop treatment alternatives and scheduling options for complying with new water quality regulations and perform a value analysis of these alternatives.

**Machine/Fabrication Shop** - Metropolitan management staff is convincing in their explanation that Metropolitan must maintain their own capability to accomplish large scale and unique machinery and fabrication to ensure timely and quality products. The Committee was duly impressed by the La Verne facilities. At this stage, there would appear to be little cost savings to reduce the machinery/fabrication facilities. Nevertheless, the Committee believes that a review needs to be made periodically as to whether the large, well-equipped machine shop continues to be the best alternative.

In view of the periodic nature of use of the unique capabilities of the shop, it might be well to reduce its permanent staffing to the threshold level where expertise is just maintained. It is the Committee's understanding that for peak use of the shop, temporary craftsmen are hired. We are suggesting that the system be used to the highest possible extent. The examples of fabrication we viewed may not be the best use of the shop, i.e. meter cabinets (although the unique specifications may not have been capable of being procured outside), and pipe support brackets for 12-to 15-inch diameter pipe.

We recommend that a set of criteria be developed for decision-making as to what fabrication should be handled by the machine shop, and what work should be procured outside.

**Water Quality Laboratory** - The Peer Review Committee visited the Water Quality Laboratory at La Verne. The Committee was extremely impressed with the high quality and technical expertise of Metropolitan's water quality laboratory and water treatment personnel. Metropolitan's water quality personnel and water laboratory are national leaders in research of new methods of water treatment and developing new laboratory techniques for detection of trace levels of contaminants and pathological organisms. They have provided data that was very valuable in recent regulatory negotiations which restructured the regulations for disinfection by-products. This data and knowledge was instrumental in arriving at more reasonable revised regulations for disinfection by-products proposed to take effect in 1998. The laboratory requirements associated with a large water treatment plant would typically be a great deal less than those present at the La Verne laboratory. Even in the context of a Metropolitan-wide lab, the staffing and equipment seemed generous. It was mentioned that the testing associated with the R&D projects such as peroxone, as well as new EPA regulations, required a facility of this magnitude.

While these activities have been beneficial, the personnel and equipment required for this research effort are costly. Metropolitan is devoting a large portion of the laboratory capacity and personnel to doing research activities. We recommend the Water Quality Division to prepare a divisional strategic plan to demonstrate how its policies, staffing, equipment and physical plant relate to the water quality commitments stated in the Metropolitan Strategic Plan now under preparation.

**Conversion to Unattended Desert Pumping Plants** - The Desert Region is both representative of the Metropolitan organization and unique within the organization. As was noted throughout the review, the facilities were well maintained and operated. The employees were dedicated and proud of their work, the engineering support and organizational cooperation exhibited during the recently completed major rehabilitation was commendable. This segment of the organization is also in the process of modernizing its use of computers and computer information systems, that is MMS, SCADA, etc. The Desert Region is well staffed and self sufficient wherever possible. In contrast to the rest of the organization, the facilities are in remote locations. The nearest communities are small and rural; living facilities are maintained on-site. The employees must enjoy and tolerate the benefits and drawbacks of living in remote locations. We were advised that it is becoming increasingly difficult to recruit quality employees for these remote sites. A cursory observation indicates many of the employees at these sites will be eligible for retirement over the next 10 years.

To provide and maintain living quarters, dormitory facilities, housing, and village infrastructure, as well as maintaining the primary remote, manually operated Colorado River Aqueduct (CRA) facilities requires a large staff. The Desert Region staff includes about 200 people, about 157 full time and 60 part time. A fully automated, centrally controlled system could probably be operated and maintained with about one-half the staff, if remote living/housing facilities were not required. There are capital costs associated with retrofitting a central control system and there would be additional ongoing costs, for travel and loss of work time, if living facilities were not maintained on site. However, with self protection features and SCADA systems incorporated into the operating facilities and pumping plants, and substantial storage on both ends of the CRA, immediate manned response to very infrequent operational problems may not be required. A response time of several hours would generally be sufficient.

Regarding the Desert Region, Metropolitan should seriously consider the potential of moving to a centralized control system, and removing the live-in employees (and their families) from the pumping plant sites. The evaluation should consider the overall efforts to improve the collection, transfer, and utilization of data on computer-based information management systems. A well developed long range plan could compliment concerns about the retirement of the existing workforce and the difficulties of recruitment at remote sites. We recommend a comprehensive study be made of the possibility of a phased conversion to unattended desert pumping plants.

**Domenigoni Reservoir Project** - The Domenigoni Reservoir and Inland Feeder represent one-half of Metropolitan's CIP (\$3 billion of a total \$6 billion). It is obvious that this is "the" project in the Engineering Division, and one which is of major significance to the Metropolitan organization. While the Committee did spend several hours reviewing both the design, construction, and operating plans for the reservoir project, such a limited overview should be characterized as preliminary and not an in-depth review.

The Committee did have several perceptions of the project, the foremost being that an extremely conservative approach is being used. This conservatism is in all aspects of this project including design parameters, construction methodology, and environmental and regulatory compliance. Staff is justifiably proud that this project is in development in today's regulatory and environmental climate and believes that this approach is essential to successful implementation of this project. The Committee has no basis to dispute this belief and assumes Metropolitan's board and member agencies fully support this approach. However, management should continuously and vigorously review and implement opportunities to reduce cost without jeopardizing ultimate completion of a safe, efficient and operable project.

**Environmental Initiatives** - While Metropolitan has organized to address environmental compliance and has a division to address this responsibility, there appears to be an opportunity to present a more proactive environmental commitment. The recent activities at Lake Mathews, where Metropolitan is working cooperatively with federal, state and local entities to enhance habitat for endangered species, is a good example of proactive environmental commitment by the agency. Activities such as this need to be highlighted both from the standpoint of public recognition and support, and as a means of developing and nurturing an environmental ethic within the organization. This in turn, will pay dividends in credibility and trust when difficult resource allocations must be negotiated on future environmental issues.

**First Responder Program** - The Committee is aware that the First Responder requirements of federal and state law are unclear and controversial. The program developed by Metropolitan appears to be a very conservative response. Many other organizations that use large volumes of hazardous materials are using remote monitoring and on-call personnel for response. Implementation of this program necessitated hiring about 70 additional maintenance people. We understand that the personnel used to staff the First Responder program have primary assignments with other duties. Nevertheless, we believe that management should continue efforts to ensure that their employees are fully occupied with primary duties and that staff is not employed only to provide First Responder capability.

**Maintenance Management Control System** - The Committee reviewed with Operations Division staff the current status of this system. We found the approach to be sensible and, through the stress on user-friendliness and user involvement, very likely to be successfully implemented. At the present time, some scheduling and control of maintenance activities is being accomplished. The present configuration allows use only at individual supervisory locations. No real-time oversight by division management is possible nor can division-wide resources be planned or managed. It is our opinion that there are considerable opportunities for cost containment and enhanced management control of resources and budgeting once this system has been completely implemented. We understand that some features of the maintenance management system cannot be implemented until certain features of the "corporate" system are completed which are being developed by the Information Systems Division. While the careful

involvement of users should not be unduly disturbed, we believe completion of the system should be expedited. We recommend that high priority be given to implementation of the maintenance management system and those features of the corporate systems needed to support it.

Use of Computers - The Committee had only a cursory look at the broad subject of usage of computers to increase productivity and quality. We did view two instances of use of the Intergraph system in the Engineering Division and discussed briefly the development of the Operations Division's maintenance management system.

With regard to the Intergraph system, we understand that it was developed and installed under the management of the Engineering Division. By now, it is being fully utilized by a large proportion of the staff. Further, we understand that maintenance of the hardware and software are being managed by the division. The Committee understands that the Operation Division is developing the initial phase of the maintenance management system because of the difficult task of gaining acceptance of the system by the variety of employees of the division. It appears that the later stages of development of the system will require integration with "corporate" systems of the District, and should involve developmental skills of the highest order. The Committee supports the concept of the divisions developing their own special needs computer programs and systems.

We understand Metropolitan has an Information Systems Division whose primary task is to manage computer activities. The potential exists for this division to provide expertise to optimize the use of these special programs throughout the organization. The Information Systems Division should also be responsible for insuring necessary information (cost, stores, etc.) is available to all divisions on a real-time basis.

The Committee observed there was a minimal use of personal computers by Operations Division field personnel and apparently a considerable computer illiteracy amongst its middle managers. While this situation is not unusual, productivity improvement often can arise when individuals are trained in usage of basic computer tools, such as word processing, spreadsheets, and databases, and encouraged to practice and use the tools. We recommend that adequate, current computer equipment be purchased by the Operations Division, and that emphasis be placed upon computer training programs, and computer self-study.

Adequacy of Operational Control Systems - The operational control systems generally appeared to be outdated. Some of the facilities were cramped or in transitional modes. The Committee was advised that work is underway to design and install a modern Supervisory Control and Data Acquisition (SCADA) System. In the view of the Committee, such a system is strongly needed. Apparently, the relatively trouble-free operation of the Colorado River Aqueduct and the regional distribution system, without SCADA in place, is due to the fact that major portions of the system were designed based upon early and mid-century technology, and

were expected to operate in an employee-intensive mode. It is quite likely that labor and payroll costs can be reduced markedly when a SCADA system is in place and operating. Supervisory control through a SCADA system may allow desert pumping stations to be changed to an unmanned mode, and provide for quicker, more accurate response for operation changes in the distribution system. In a major emergency situation, it is likely the SCADA system will be the primary medium for maintaining control of water waste and routing available supplies to important water distribution locations.

We recommend that high priority be assigned to the design and completion of a modern SCADA system for the Colorado River Aqueduct, member agency metering stations, and the regional storage, treatment, and distribution system.

**Maintenance, Internal vs Contractor** - It is sometimes appropriate to consider seeking cost savings with contracted maintenance personnel. This is usually possible only when large amounts of repetitive work is to be done, and where work procedures or work product can be easily specified and inspected for compliance. While the Committee did not study the question in detail, it is our conclusion that the bulk of the maintenance work done by the Operations Division is conducted on many varieties of instruments and facilities, where the writing of maintenance specifications and performing compliance inspection would not be cost-effective. Furthermore, some of these facilities are in locations requiring special training, or are themselves critical to system reliability. Our conclusion is that efforts to contract out large amounts of maintenance activity would be unproductive.

**Personnel Training** - Metropolitan, from the Committee's view, has a well-rounded technical training program. However, the Committee feels that emphasis on management training of its employees could be improved. The Committee's rating of the technical training program is excellent, and those employees and managers responsible seem to be well motivated. The same approach must be taken toward improving the training in the management areas. Metropolitan is embarking on some new territory in its collective bargaining with union locals. It is likely that past practices and dealings will be challenged. Changes in relationships may not be immediately evident, but will occur over time.

Management training of all employees in the supervisory and management hierarchy should be as high a priority as technical training. Metropolitan has an opportunity to be proactive in this area. Training such as managing a diverse workforce, listening skills for supervisors, managing change for employees, sexual harassment training, and verbal and written communication skills, will enhance the management and supervisory expertise of the responsible staff.

**Flexibility in Employee Work Assignments** - The Committee noted that Metropolitan has a high level of multi-disciplinary capability regarding work assignments to individual employees. This flexibility leads to efficiency and reduced costs. It is important Metropolitan maintain this

capability in assigning multiple responsibilities in a given classification. Should Metropolitan in its labor negotiations, allow classification specialization, the flexibility of work assignments will be lost, costs will increase and work assignments will become more complex.

**Adequacy of Housing for Field Offices, Facilities, Equipment and Supplies** - The Committee had the general observation that housing at field installations is spartan and tidy, and although often crowded, is adequately maintained, treated with a sense of pride and ownership by the employees. At a number of places, crowded space utilization has led to inefficient working space arrangements. The Committee's conclusion is that division management has maintained tight control on requests for funds for more space, and while that practice prevails, any requests which do come forward should be given serious consideration.

**Member Agency Relationships** - One of the major objectives of the Operations, Engineering, and Water Quality Divisions should be to focus on relations with Metropolitan member agencies. The three divisions and Metropolitan as a whole should strive to establish and maintain interactive relationships with its member agencies and pursue goals and objectives with sensitivity to goals and objectives of its member agencies. We recommend the Metropolitan actively seek the input of member agencies, and consciously take it into consideration when making decisions.

**Operations Division Strategic Operating Plan** - The Operations Division should develop a 3-to-5 year Strategic Operating Plan. The Strategic Operating Plan should list the major strategic objectives of the division. The fundamental purpose of the plan should be to identify areas upon which the division needs to focus to ensure that Metropolitan fulfills its mission. The plan should provide a basis for capital, resource, public affairs, and financial planning, and for preparing work programs and annual budgets. Such a plan would facilitate evaluation of the division operations as well as providing means to measure its success in accomplishing its goals. It would also have the added benefit of clearly communicating the direction of the division activities to Metropolitan's member agencies, employees, and the public at large.

### **Acknowledgements**

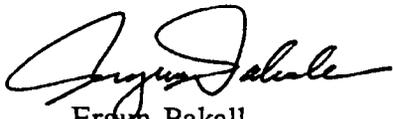
The Committee wishes to acknowledge the excellent staff planning for the four days visiting field installations. The time and energy of the Committee members was conserved by these efforts, which contributed to maximizing the time available for meaningful discussion and consideration.

We, also, want to recognize the considerable efforts of the personnel in the many organizational units of the two divisions to provide for us the concise, informative charts, written material, and oral reports about the units' responsibilities and procedures.

We want to thank Assistant General Manager Richard Balcerzak, and Division Heads, Gary Snyder and Don Adams, for the many hours spent with us away from their unforgiving schedule of managerial responsibilities.

The Peer Review Committee would like to emphasize the excellent cooperation by District staff at all levels during this Peer Review project. All segments of the project were well organized; all District staff were attentive to the needs of the Peer Review Committee, and our collective observation indicated that the District staff felt that the Committee's work was important and they responded accordingly. The District should be proud of the high degree of professionalism within its employee ranks.

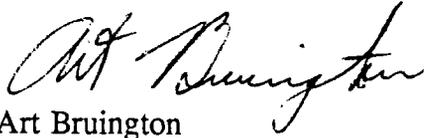
Sincerely yours,



Ergun Bakall  
San Diego County Water Authority



Donald Jackson  
East Bay Municipal Utility District



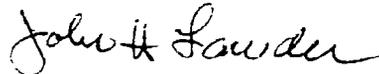
Art Bruington  
Municipal Water District Orange County



Frank Janger  
Cal Poly University, Pomona



Charles Calhoun  
U. S. Bureau of Reclamation



John Lawder  
California Department of Water Resources



Larry Dozier  
Central Arizona  
Water Conservation District



Larry McReynolds  
Los Angeles Department of Water & Power



Virginia Grebbien  
Central & West Basin MWD