



The Deer Island Treatment Plant, designed to treat 1.2 billion gpd, is the second largest wastewater treatment facility in the nation.

Outside Resources Contribute to Culture Change

Consultants, onsite visits, benchmarking, and conference attendance add fuel to the development of an asset management program.

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The Massachusetts Water Resources Authority (MWRA) is responsible for providing wholesale water and sewerage services, in whole or in part, to 61 communities and 2.6 million people. In addition to its operating responsibilities, MWRA is responsible for rehabilitating, repairing, and maintaining the regional water and sewerage systems.

Since its assumption of the ownership and operations of the systems in 1985, MWRA has undertaken an ambitious program of water and wastewater system capital improvements with estimated expenditures for fiscal years 1986 through 2009 of more than \$7 billion. Under one massive construction effort, the Boston Harbor Project, the MWRA assumed maintenance responsibility for the \$3.8 billion Deer Island Treatment Plant designed to treat 1.2 billion gpd. It is the second largest wastewater treatment facility in the nation. The new treatment plant's operations and

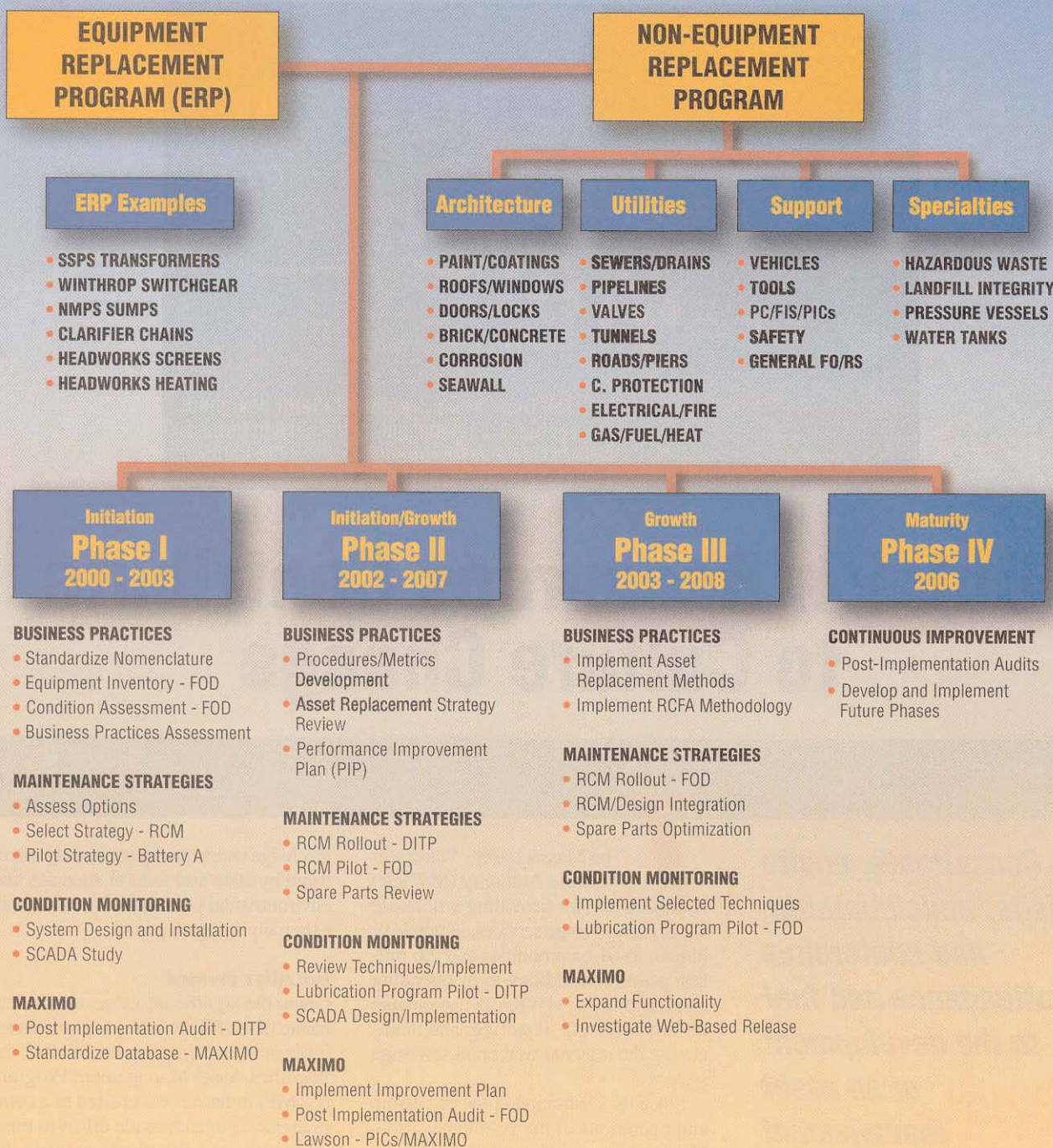
discharge water quality are closely monitored by state and federal agencies and environmental organizations through an extremely stringent permit.

Initiative created

Given the significant value and critical nature of the MWRA assets, maintenance is of paramount importance. In 1996, the Facilities Asset Management Program (FAMP) initiative was created as a comprehensive, agency-wide effort to most efficiently and effectively manage the region's water and sewer infrastructure. The purpose of the FAMP initiative is to optimize the efficiency and effectiveness of MWRA equipment maintenance practices (i.e., minimize critical equipment failures, minimize unnecessary maintenance practices, improve equipment reliability, and heighten system knowledge).

In summary, the program focused on areas such as standardization of maintenance practices, adoption of best

FACILITIES ASSET MANAGEMENT PROGRAM (FAMP) MODEL



practices, and optimization of labor and material resources. The program is a phased approach (see above).

In 1999, the Capital Programs Group, under the direction of Dan O'Brien, selected New Dimensions Solution consultants, New York, NY, to help facilitate changes in MWRA maintenance practices. The changes

included implementing a Reliability Centered Maintenance (RCM) strategy instead of the current time-based maintenance strategy, advancing the use and quality of the computerized maintenance management system, MAXIMO (MRO Software, Bedford, MA), and developing a design for the installation of permanent vibration and tempera-

ture monitoring for critical process equipment.

Site visits

As the Phase I program was implemented, there was uncertainty between the operating units of the benefits of a comprehensive asset management program. A critical turning point in the pro-

gram's success followed site visits to several industries. The Authority sent seven representatives, led by Deputy Director of Maintenance Gerry Gallinaro, to Dofasco Inc., Hamilton, ON, and Broward County, FL (a water/wastewater utility), to learn about the implementation of RCM and CMMS at their sites.

The Authority team was made up of a cross-section of staff including maintenance management, work coordination, process control, plant engineering, capital programs, and warehouse personnel. The host sites provided invaluable insight and lessons learned from their asset management projects including corporate commitment, culture change agents, best practices, resource requirements, and sustainment structures to support the new business approaches.

The results were presented to the various operating units and senior staff and a detailed trip report with recommendations to be implemented was prepared. The trip resulted in a giant step forward by empowering in-house staff and solidifying the FAMP program's goals and objectives. After these trips, senior staff support increased and the program gained significant momentum.

One additional key element that was identified was the need to institute a communications plan to facilitate change. The plan was needed to institute cultural changes to a diversified staff in multiple locations and to institute standardized practices Authority-wide.

The communication plan included activities such as regular program briefings, team meetings, newsletter articles on progress, forum events, and an Intranet site. The director of Deer Island, John Vetere, held informational meetings with all staff to discuss the program elements and their importance. It proved to be an essential component to our successful maintenance management optimization campaign allowing connectivity between workforce members and business goals. In addition, the communication plan is used to highlight and track program success.

SMRP conference

As the FAMP program moved ahead, it was clear to MWRA that staff needed to look outside the box from traditional maintenance thinking. Historically, water quality professionals relied on civil engineering type conferences to gain operations and maintenance knowledge. Our consultant team recommended involvement in the Society for Maintenance & Reliability Professionals (SMRP, www.smrp.org).

Four members of the Authority attended SMRP's 2001 conference to gain insight into high level company approaches to asset management. The

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results of this trip were overwhelmingly positive. Staff gained tremendous insight into "for profit" best maintenance practices approaches allowing MWRA to gain beneficial knowledge to map out future program phases and best practices implementation.

An updated FAMP Strategic Model and detailed five-year schedule or master asset protection plan (MAPP) were subsequently developed as a result of information gathered at the conference. Additional maintenance practices such as root cause failure analysis (RCFA), performance metrics, spare parts optimization, and additional condition monitoring techniques were identified and added to the program model.

An additional key element was also identified and adopted. Task teams were formed for nine key areas of the

FAMP program including:

- Metrics
- Criticality analysis
- Reliability Centered Maintenance implementation
- Condition monitoring
- Permanent condition monitoring equipment installation
- Maintenance procedures
- Asset replacement strategy
- Warehouse optimization
- Work coordination/CMMS

Team charters were developed for each task team to facilitate the MAPP implementation plan of best practices throughout the organization. The task teams have support throughout the Authority and include representatives from maintenance, operations, process control, finance, budgeting, planning, warehouse, and management.

The highlights of the conference and recommendations to implement at the Authority were formalized in both a detailed report and multiple presentations to senior management. Lessons learned from this single event fueled the program's momentum, allowing staff to paint a clear picture of a comprehensive approach to a cost-effective asset management program that could be shared and explained easily to the various operating units staff.

Collaboration

Interactions with a large international manufacturing facility in Boston, MA, and Coors Brewing Co., Golden, CO, allowed the Authority to expand its asset management program base and provided useful opportunities for technology transfer. These interactions have provided insight into best practices techniques as well as allowed the MWRA to affirm the asset management program's direction and approach.

One common thread among these companies included reorganization of staff to support the development and sustainment of best maintenance practices throughout diverse organizations. Dedicated staff are needed to work on the process of defining and implementing best maintenance prac-

tices, and refining the existing maintenance program. The "on the process" staff support the maintenance staff working "in the process" that complete the required day-to-day maintenance activities.

Another key element at these companies was the use of periodic forums as a communications plan tool. The use of such events allows multi-unit organizations, with national and/or international locations, to facilitate change and communicate consistent goals and objectives of the asset management programs. The forums allow key staff to come together and build a standardized approach to asset management allowing timely program rollout. Involvement breeds commitment.

As a result of the collaboration with these private companies, the Authority has initiated a quarterly forum with each task team presenting its results to a larger Authority group.

Milestones

In the development of a strong asset management program, it is important to reach out to all available resources. Program successes need to be documented and shared to guide the organization through interim milestones on its way to achieving world-class status.

The program has had early success because of the changes initiated from the technology transfer. These successes were possible only with the support and dedication of our staff who have balanced normal workloads while implementing the new maintenance practices. The results have been significant in many ways.

National award. In May 2002, the MWRA's FAMP initiative received national attention at the Association of Metropolitan Sewerage Agencies' 2002 National Environmental Achievement Awards in the *Operations* category. It is clear that the MWRA is leading change in utility asset management as it demonstrated an "innovative and effective project developed and implemented in a cost-effective manner while achieving environmental compliance."

Staffing reductions. The maintenance

Through the RCM effort and task team development, teamwork is at its highest levels.

staff at Deer Island has decreased from a high of 176 in 1999 to 142 today. The reduction occurred even though more equipment required maintenance as each construction package was turned over. The staff reduction has not impacted the maintenance provided. The maintenance backlog is anticipated to remain within industry standards (3-6 weeks). An enhanced and expanded condition monitoring program is progressing—we will be able to do more with less.

Work schedule. Historically, work orders were scheduled daily by the supervisors. The Work Coordination Group initiated scheduling work one week in advance to help the program move from reactive to proactive maintenance. The goal of this initiative is to have maintenance staff thinking about work one week in advance and planning for parts, tools, and labor. In addition, each technician is assigned 8 hours of work for each day.

In the first seven months, the number of corrective maintenance and project work orders decreased from 2586 to 1454 (a 43 percent reduction). Work order backlog has been reduced from 5.3 weeks to 3.3 weeks from the implementation of this scheduling initiative. The reduced backlog has resulted in higher equipment availability and improved plant performance.

Teamwork. Through the RCM effort and task team development, teamwork is at its highest levels. The RCM effort has built bridges between the operations and maintenance staffs. The task teams have resulted in a wider circle of

Authority staff being involved in the project and moving toward a common goal. In addition, the implementation of a cross-functional flexibility program includes multi-trade teams working together on maintenance activities.

Alliances built

Industry site visits and conference attendance has allowed MWRA staff to build a network of asset management alliances. This network provides an ongoing opportunity to share ideas and lessons learned, helping those involved from traveling down the wrong road that could result in lost time and money. MWRA's goal is to continue developing alliances in its effort to reach world-class status.

The MWRA has worked hard over the past several years to research and initiate many new optimization programs. Although we have shown significant results proving our asset management program is on target, we need to remain diligent and focused on our implementation. Continuous improvement leads to maximum efficiency and effectiveness—the process is a journey not a destination. Our true challenges lie ahead as we continue our aspiration to become a world-class maintenance organization.

Details of how MWRA approached Phase I of its asset management program can be found at www.mt-online.com/current/0902_mwraphase1.html

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