

CMOM: Does it Work?

Clearwater's Program Performance History

Robert Fahey, Tracy Mercer, Janice "Nan" Bennett,
Donald McCullers, Dorean Modjeski, and Kelly Wehner

Because of its coastal location on the Gulf of Mexico in west central Florida, the city of Clearwater (approximate population 138,000) offers multiple challenges for a sanitary sewer system. Most significant are its rainfall and its topography. On average, almost 45 inches of rain falls on the city each year, mostly during the rainy season from June to November. The topography is quite flat, varying from sea level to 100 feet.

Clearwater's sanitary sewer system includes approximately 35,800 service connections, 359 miles of gravity sewer pipeline, 35 miles of force main pipeline, 8,330 manholes and cleanouts, 78 pumping stations, and three advanced wastewater treatment facilities with a combined capacity of 28.5 million gallons per day. Its wastewater collection system was first developed in the early 1900s and further developed as the city grew. The last big system

Robert Fahey, P.E., is the utilities engineering manager for the city of Clearwater; Tracy Mercer is the public utilities director for the city; and Janice "Nan" Bennett, P.E., is the city's assistant public utilities director. Donald McCullers is a water/wastewater manager in the Clearwater office of the civil and environmental engineering firm Cardno TBE; Dorian Modjeski, P.E., BCEE, is a water/wastewater director with the firm's Clearwater office; and Kelly Wehner P.E., is a project manager with the Clearwater office. This article was presented as a technical paper at the 2009 Florida Water Resources Conference.



expansion occurred in the mid 1970s.

According to the U.S. Environmental Protection Agency (EPA), protecting our country's surface waters (wetlands, lakes, rivers, estuaries, bays, oceans, etc.) from pollution is a formidable task. The EPA has put many programs in place to safeguard our nation's waters. One of these programs, introduced by the EPA's Region 4, is the Management, Operations and Maintenance (MOM) Program, designed to help municipalities eliminate sanitary sewer system overflows (SSOs)—a significant cause of pollution of these surface waters. The program later added "Capacity" to its title and became known as the CMOM Program.

CMOM—Does It Work? Program Performance History

In November 1998, Clearwater received a letter from EPA Region 4 inviting the city to participate in the new MOM program. The invitation arose from the concern over possible water quality stress from pollutant loadings in the Tampa Bay Estuary watershed. The Tampa

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Randall Britt operates a TV truck's camera for the city of Clearwater as Tony Miles points out a possible crack in a residential sewer line that will need to be repaired.

*Photo by Laura Davis Cameron,
senior staff assistant, city of Clearwater*

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Bay Estuary is Florida's largest open water estuary, encompassing almost 400 square miles.

Prior to receiving the letter of invitation from the EPA, the city had already begun implementing a detailed sanitary sewer system evaluation survey (SSES) and management plan. Activities required for both the SSES and

the MOM program were interrelated and worked to Clearwater's advantage.

In 1999, the city's public utilities wastewater collection division embarked on a structured analysis of its methods of operation and maintenance activities, using the CMOM program approach. With the assistance of TBE Group, the division approached the self audit in two phases.

Phase 1

This part of the evaluation included the following program elements:

- ◆ System mapping with manhole and pipe identification
- ◆ System asset inventory
- ◆ Pumping station capital improvement plan (CIP) report for the first 24 stations
- ◆ Inspection of 648 manholes
- ◆ Smoke testing of 25 miles of gravity sewer
- ◆ Performing a sediment survey on key interceptor manholes
- ◆ Performing the EPA self audit report

Investigations for the self audit report included a detailed review of the following program areas:

Management:

- ◆ Financial Reviews
- ◆ Organization and Personnel Records
- ◆ Funding
- ◆ Legal
- ◆ Engineering
- ◆ Performance indicators
- ◆ Water Quality Monitoring Complaints
- ◆ Public Relations
- ◆ Emergency Maintenance Procedures
- ◆ Contingency Plans and Spare Parts Inventory
- ◆ Operations and Maintenance

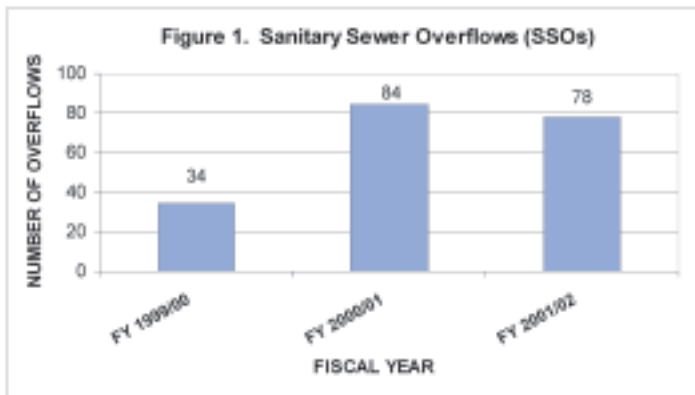
Operation & Maintenance:

- ◆ Maintenance Scheduling (Proactive and Reactive)
- ◆ Sewer Cleaning
- ◆ Hydrogen Sulfide Monitoring and Control
- ◆ Pump Stations

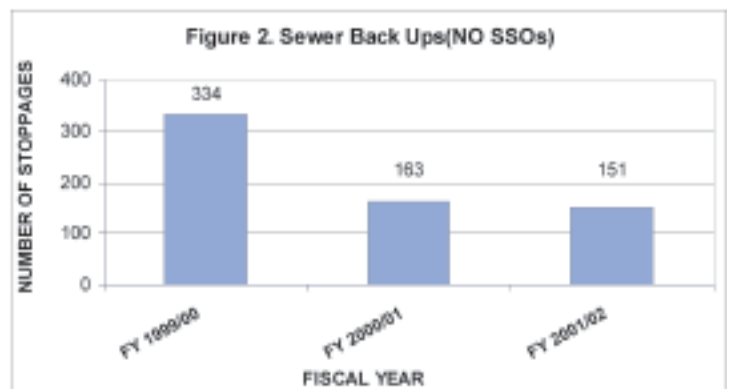


Tony Miles and Randall Britt lower the TV truck camera into a manhole to inspect the sewer main in a neighborhood as part of the proactive line inspection component of the city of Clearwater's CMOM program.

Photo by Laura Davis Cameron, senior staff assistant, city of Clearwater



Note: FY 1999/2000 SSOs not all accounted for.



- ◆ Sewer System Evaluation
- ◆ Rehabilitation
- ◆ Service Laterals
- ◆ Equipment and Tools
- ◆ Performance Indicators
- ◆ Sanitary Sewer Overflows
- ◆ Safety Programs
- ◆ Record Keeping
- ◆ Communications
- ◆ Training

In September 1999 the city finalized and submitted its performance audit report to the EPA and the Florida Department of Environmental Protection (FDEP). Preliminary results of the self audit had the following recommendations:

- ◆ Evaluate funding.
- ◆ Develop a standard operating procedures (SOP) manual.
- ◆ Develop and implement a structured pump station routine monitoring and maintenance schedule.
- ◆ Implement a five-year, system-wide cleaning plan.
- ◆ Develop and implement a system to track sewer cleaning and maintenance.
- ◆ Implement a customer complaint log by the end of 2000.
- ◆ Standardize pump station construction details and develop a pump standardization plan. Bring pump stations up to regulatory requirements by the end of 2009.
- ◆ Put all significant pump stations on SCADA by the end of 2005.
- ◆ Evaluate corrosion on concrete pipes by the

end of 2002.

- ◆ Document technical and skills training programs.
- ◆ Implement a grease ordinance by the end of 2001.
- ◆ Develop performance indicators.
- ◆ Designate one or more individuals to become knowledgeable in and be responsible

for the sewer system hydraulic model.

- ◆ Discontinue vapor rooting unless used in conjunction with sewer sealing or sewer lining.
- ◆ Develop historical background water quality parameters during significant storm events.

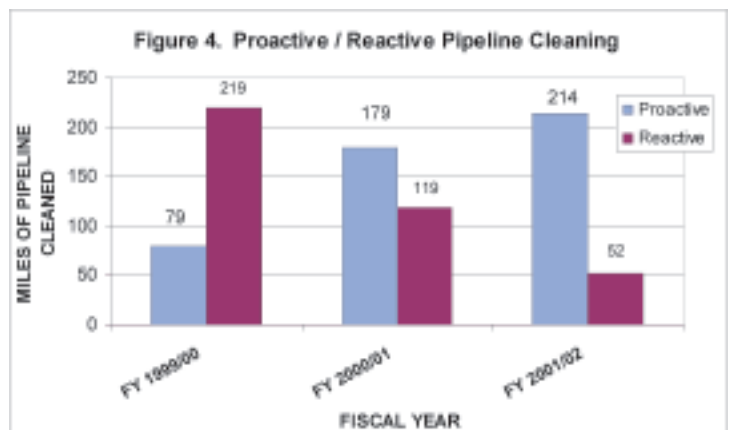
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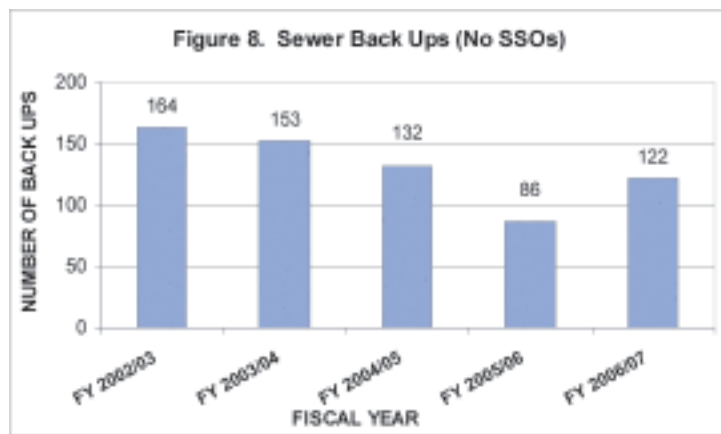
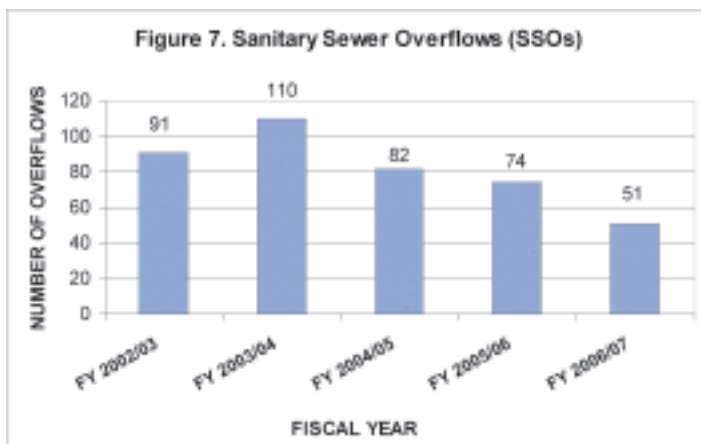
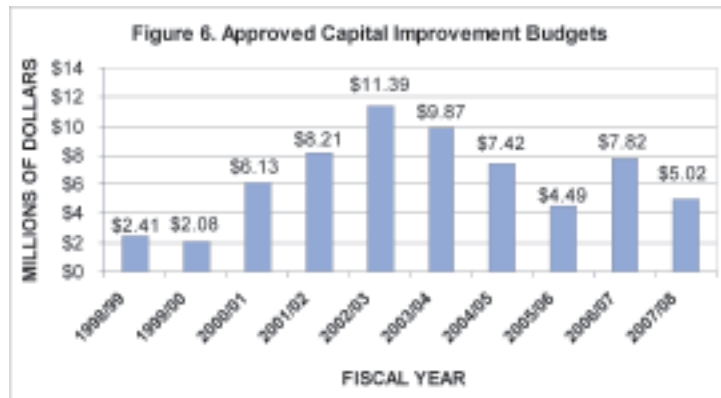
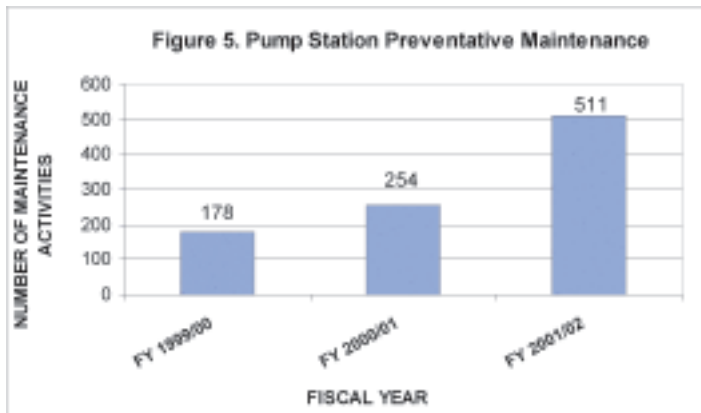
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Lawrence Wynn, foreground, operates the vacuum truck used by a wastewater crew to repair a sewer line break identified during smoke testing, another component of the city of Clearwater's CMOM program.

Photo by Laura Davis Cameron, senior staff assistant, city of Clearwater





2003/04 – Rainfall 14-inches above normal

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EPA, the FDEP, the city of Clearwater and TBE Group met to review the self audit and assign “levels of review” for each program element and recommendation. Levels of review ranged from 1 to 4 and established the EPA’s involvement in the program, with Level 1 having the most involvement from the EPA. Only one item in the audit received a Level 1 ranking, which was a grease ordinance that the city had already been in the process of developing and adopting.

Performance activities and timelines were established to address deficient areas of the CMOM program. The timelines for the activities ranged from one to five years, with a requirement that the EPA receive annual reports on progress and a final review of the completed program.

Important CMOM program elements, including a CIP and budget, were developed. The initial CIP budget was based on system performance data gathered from the preliminary Phase I inspection of the gravity and pump station systems. The data was used to provide a prioritized funding plan to implement the CMOM program.

Using the results of the preliminary inspection, a comprehensive five-year budget was prepared, addressing known and anticipated

physical deficiencies of the gravity and pump station systems. The flexibility of redirecting wastewater flows from one treatment facility to another was also included in the budget to facilitate the management of flows when necessary.

Phase 2

This phase of the self audit was a detailed collection system investigation that included the population of the sanitary sewer database, an additional physical survey of the collection and transmission system, best management practices (BMP) on SSO abatement, flow monitoring, development of a hydraulic model, an initial analysis of the system, and implementation of the CMOM program audit.

At the conclusion of the SSES, the following recommendations were implemented:

- ◆ Implement the SSO abatement projects.
- ◆ Complete all repairs such as pipe defects, storm water cross-connects and roof drain connections.
- ◆ Continue the smoke testing program.
- ◆ Continue the program to inspect and rehabilitate all manholes.
- ◆ Implement a cleaning and televising program so that all sewers within the system are inspected, cleaned, and televised on a regular basis.

- ◆ Evaluate videotapes for pipeline repair and rehabilitation requirements.
- ◆ Evaluate the wastewater treatment plant facilities to determine if any improvements or additions are required due to the SSO abatement program.
- ◆ Implement an odor and corrosion control monitoring program.
- ◆ Continue pump station and force main maintenance activities.
- ◆ Use, expand, and upgrade the hydraulic model of the sanitary sewer system.
- ◆ Continue rehabilitation of the 24 pump stations and prioritize the remaining pump stations for rehabilitation.
- ◆ Continue to develop SOPs for wastewater collection.
- ◆ Continue to clean and evaluate force mains.
- ◆ Standardize pump station construction details and develop a pump standardization plan.
- ◆ Implement a customer complaint log and filing system.
- ◆ Document technical and skills training programs.
- ◆ Put all significant pump stations on SCADA.
- ◆ Update the CMOM Report dated September 1999 to include the results of the SSES report.

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The initial CIP budget was aggressive in nature. Pump stations were rehabilitated or replaced, new force mains were installed, and wastewater flows were redirected for more efficient transportation to the treatment facilities. Gravity system basins were cleaned and inspected, and as a result, manholes and pipes were lined or replaced where needed.

The city kept track of a variety of performance indicators after the CMOM recommendations were implemented. Comparing improvements from 2000 to 2001, the city found that blockages decreased from 248 to 163, pump station failures decreased from 224 to 56, and the number of homeowner clean-up claims decreased from 62 to 55. These reductions exceeded the city's initial expectations. Recorded SSOs did increase, from 34 to 84, but this was the result of better tracking (SSOs were not recorded consistently before the CMOM program was implemented).

The performance indicators were even more impressive when the first half of 2001 was compared to the second half. Sewer back-ups (blockages), decreased from 123 to 40, pump station failures decreased from 32 to 24, clean-up claims decreased from 25 to 8, and SSOs, which showed an increase from 2000 to 2001 because of better record keeping, de-

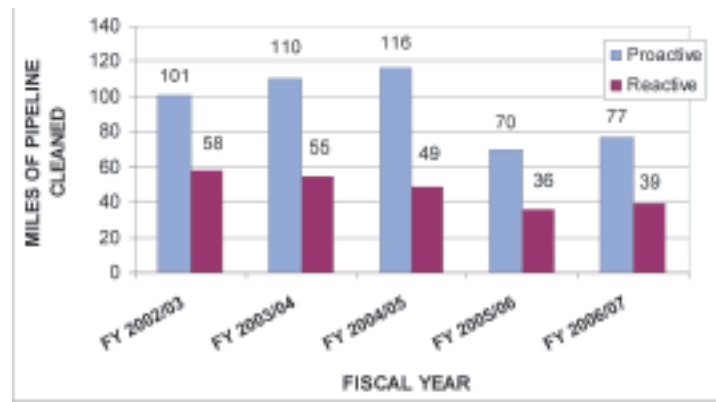


Figure 9. Proactive / Reactive Pipeline Cleaning

creased from 55 to 29 from the first to the second half of the year.

From 2000 to 2001, reactive pipeline cleaning decreased from 219 to 119 miles, while proactive pipeline cleaning went up from 79 to 179 miles. The city's proactive cleaning and maintenance program resulted in improved system performance and decreased SSOs, and helped reduce system failures and unplanned, or reactive, repairs.

For the first half of 2001 the city had 55 miles of unplanned maintenance and 49 miles of planned maintenance, but by the end of 2001 the balance improved to 87 miles of planned maintenance and only 16 miles of unplanned repair, demonstrating the success of the city's

emphasis on a proactive approach. Extending the number of miles of planned, or proactive, repair maintains the system before it has a chance to fail and require reactive maintenance.

The benchmark activities shown in Figures 1 through 5 were monitored and showed that the CMOM program was working. Benchmark activities monitored included overflow reduction (volume and number of occurrences), gravity system reactive maintenance, customer property and maintenance claims, pump station failures, operational job backlog, and overtime activities.

During the EPA's monitoring of the city's CMOM program performance, the Agency decided to use the city of Clearwater as a

MOM/CMOM example on its Web site that shows the program effectiveness.

In the years 2001 through 2004, the city experienced a surge in redevelopment along the coastal beach areas and select inland parcels, which required adjustments to the immediate CIP budgets of the Public Utilities Department. Operational priorities within the department and subsequent realignment of capital funds required that select gravity and pump station system projects be delayed or phased over several years. Despite these adjustments, the CIP budget continued to provide funding to the CMOM program elements, and the Wastewater Collection Division continued to refine operational performance and achieve benchmark goals in all areas.

A new, five-year CIP budget was initiated in fiscal year 2004/2005, providing general and project-specific line item funding through fiscal year 2009/2010. This budget was less aggressive in performance on a year-to-year basis but still kept the primary benchmark goals of reducing sanitary sewer blockages and overflows on track.

The budget allowed for the Public Utilities Department to phase funding of specific wastewater projects across several fiscal years while keeping other identified general activities funded on an annual basis. The capital improvements budgets from fiscal year 1998/1999 through 200/2008 are shown in Figure 6.

In 2005, EPA Region 4 representatives met with the Public Utilities Department staff to make an audit of the CMOM program performance that was implemented in 2001. EPA representatives examined the management structure, operational and performance records, personnel performance, and operational and capital budgets. After the two-day visit, the representatives later stated in writing that, "EPA commends the City for making ex-

ceptional progress toward meeting its program improvement needs, and considers the City's participation in the CMOM Programs Project to now be complete."

The city of Clearwater continues to be proactive in the capacity, management, operations, and maintenance evaluation of their wastewater collection system, as shown in the benchmark activities indicated in Figures 7 through 9.

Conclusion

As a result of the CMOM self-audit and

recommendations, the city of Clearwater has developed a clear, targeted plan for reducing and controlling SSOs, which is accounted for within the CIP budgets shown in Figure 10. Management, operations, and maintenance programs and tools have been developed and are in place, not only to protect the system from further deterioration, but also to upgrade and enhance it for optimum performance and for meeting future population growth and impact needs. By progressing from a reactive approach to a proactive approach, the city was able to show statistically that the CMOM program works. ◊

