

Fairfax County Wastewater Collection Division Burke, Virginia



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Updated November, 2004

Introduction

Fairfax County Wastewater Collection Division (WCD) is using a capacity, management, operation and maintenance (CMOM) approach based on the EPA-recommended model to abate sanitary sewer overflows (SSOs), extend the life of its sewer system assets, and improve customer satisfaction.

Since its inception in 1995, WCD's CMOM program has cut SSOs by 66%, reduced operations and maintenance (O&M) and capital improvement costs, and led to a major restructuring of WCD's personnel organization. Over time, WCD believes CMOM will help optimize the service life of sewer system assets and ensure that adequate sewer capacity remains available to the growing county.

WCD believes the success of its CMOM program hinges on three important factors:

- Every element of CMOM must be addressed,
- Personnel at all levels in the organization must be involved in the planning and implementation of activities, and
- Planning must be rooted in CMOM goals yet flexible enough to respond to changing conditions.

Overview of Fairfax County and WCD



Despite the growth, Fairfax County still retains much of its rural character in many areas.

Fairfax County, VA CMOM Facts



Sewer collection system serves a population of over one million in rapidly developing area

3,200-mile sewer system with 64 pump stations transports an average of 100 mgd to five treatment plants

CMOM goals: SSO abatement, improved customer service, and improved productivity

Fairfax County is a 399-square-mile region in northeastern Virginia located along the western bank of the Potomac River. Fairfax County was for many years a farming region that once provided the main supply of dairy products to the District of Columbia. Between 1970 and 2004, the county's population grew from 300,000 to over one million, resulting in steady suburban residential development and a number of high-technology business and industrial

The WCD sewer collection system serves 234 square miles of Fairfax County and nearly 85% of its population. Some parts of the county are not sewered, including some portions of the Occoquan Reservoir watershed in the extreme western portion of the county, and the Great Falls area in the north. The Occoquan Reservoir is protected from development because it is a major source of drinking water, and the Great Falls area contains a number of state park lands.

The 3,200-mile sanitary sewer system contains 64 pump stations, 280 grinder pumps, 53 permanent flow meters, and 11 rain gauges. The oldest system components were installed in areas that developed around the City of Alexandria and Arlington County in the 1940s and 1950s. Components were added as the system grew south and west over the next 60 years. Older lines were constructed using vitrified clay pipe. Lines installed between 1950 and 1970 were primarily concrete, and lines installed after 1970 were made of PVC. The system collects an average of 100 million gallons per day (mgd) of flow and delivers it to five treatment plants: Fairfax County's Noman M. Cole, Jr., Pollution Control Plant (which receives 45% of the flow), and four regional treatment facilities operated by the Alexandria Sewerage Authority (ASA), District of Columbia Water and Sewer Authority, the Upper Occoquan Sewage Authority, and Arlington County.

WCD Service Area



[Click to view a map of WCD's sewer collection service area.](#)

SSO History

WCD began tracking SSOs closely in 1995, when there were 128 occurrences. There were no known water quality violations as a result of SSOs, and 22 sewer damage claims were paid to private property owners. WCD's primary reason for embarking on major operational and management changes were based on its desire to improve customer service and to prepare for the anticipated EPA SSO control rule, which at that time was in the early stages of development.

The Local Solution: Integrated CMOM

Targeted I/I Reduction Program Exposes Underlying Problems

In 1995, engineering design for upgrading and improving the ASA wastewater treatment plant was underway, and peak flows from the two contributing jurisdictions (Fairfax County and the City of Alexandria) were an issue. WCD's wet weather peak flows of more than 80 mgd were well over its allocation of 65 mgd. Rather than construct a large wastewater storage facility to contain excess peak volumes, WCD opted to reduce I/I into its system in the service area contributing flow to ASA. WCD had already planned a similar I/I abatement program in the adjacent Little Hunting Creek (LHC) sewershed in the historic Mount Vernon area, so a sewer system evaluation study (SSES) of both areas was launched. In addition, WCD began tracking SSOs throughout the collection system.

The SSES included CCTV inspection of all trunk sewers in the LHC area. The video revealed that several large diameter (15-inch and above) lines were severely deteriorated due to age and corrosion. Prior physical inspection of these lines had failed to detect the severity of deterioration. These trunk sewers were rehabilitated during 1995 and 1996 using the cured-in-place pipe relining process to restore structural integrity; however, little I/I improvement was observed.

In 1996, the inspection program was expanded to include sewer mains in the ASA area. Using flow data from the hydraulic study, WCD ranked the three ASA subsewersheds according to the severity of I/I, and discovered the most serious problems were concentrated in the Dowden Terrace sewershed. Comprehensive television inspection was performed on all sewer mains in this area, revealing a large number of deteriorated lines. These lines were rehabilitated using trenchless rehabilitation processes, including

cured-in-place, fold-and-form, pipe bursting, and a robotic point repair system. These repairs yielded significant progress toward WCD's goal of reducing peak flows to the ASA plant, with peak flows reduced to below 50 mgd—well below the target reduction of 65 mgd.

The rehabilitation project also led to a slight reduction in SSOs, but the continuing incidence of basement backups and manhole surcharges indicated that more work was needed. As a result of the SSO data tracking and the extensive video inspections, WCD learned that except for a few overflows caused by vandalism, most SSOs resulted from grease buildup and root intrusion. Because the rehabilitation efforts had been focused in the ASA area, the number of blockages had remained high in other parts of the system.

WCD realized that in order to address the blockages effectively, the program had to be expanded to the entire system, and had to address operation and maintenance (O&M) issues as well as rehabilitation needs.

WCD's CMOM program mirrors the approach identified by EPA in the draft SSO Control Rule. WCD believes that CMOM works best as a system, and leaving out one element diminishes the value of the effort; therefore, no elements were overlooked.

WCD Restructures to Accommodate New CMOM Approach

With the other branches of the Fairfax County Wastewater Management Program, WCD underwent leadership training on the High Performance Organization (HPO) model through the University of Virginia's Senior Executive Institute. The HPO model provides a framework to create a participative and collaborative work culture through team-building, improving communication, and empowering front line employees. The first step was to establish vision, mission, values and leadership philosophy, which constitute the guiding principles of the Wastewater Management Program. These principles were used in the development of a strategic plan for the entire CMOM program.

Click on the links below to learn more about WCD's strategic planning statements.

[➤ Vision](#)

[➤ Mission](#)

[➤ Leadership Philosophy](#)

[➤ Values](#)

Within WCD, the primary strategic plan activity is improving the relationship between management and field staff. Formerly a typical hierarchical or top-down organization, WCD now involves field staff in program planning and encourages them to use their knowledge and expertise to make decisions and improve collection system operation and customer service. In fact, staff involvement was critical to the development of the CMOM program. By collaborating closely with field staff, WCD gained the benefit of their years of expertise and ensured their enthusiastic cooperation in implementing the new procedures.

CMOM Program Elements

To learn more about the elements of WCD's CMOM program, click on the links below.

[➤ Goals, Organization and Legal Authority](#)

[➤ Measures and Activities](#)

[➤ Design and Performance Provisions](#)

[➤ Monitoring, Measuring and Modification](#)

[➤ Overflow Response Planning](#)

[➤ Program Audit](#)

Results

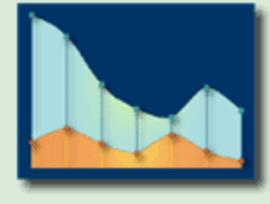
The success of WCD's CMOM program is measured by reductions in the number and impacts of SSOs, and by reductions to peak flows to the ASA wastewater treatment plant.

SSO Reductions

Between 1995 and 2004, WCD reduced the number of SSOs by 66%, and also made significant reductions in the impact of SSOs on the environment and private property.

As shown in the attached graph, the number of SSOs declined from 128 in 1995 to 53 in 2004. For the past several years, total number of SSOs has ranged between 15 and 20 per thousand miles. There was an aberration in 2003 when 67 SSOs occurred on February 22, due to heavy rainfall on two feet of snow on the ground. As the stormwater inlets were blocked by snow, very large quantities of water from rain and snow melt entered the sanitary sewer system through manhole lids. WCD has initiated several capital projects to improve the hydraulics in the sanitary sewers that backed up during this event.

CMOM Program Achievements



[WCD's CMOM program has resulted in reduced SSOs and significant rehabilitation, system-wide. Click to view more information.](#)

Peak Flow Reductions to ASA Wastewater Treatment Plant

WCD's I/I reduction goal was to decrease its peak flow to the ASA wastewater treatment plant from 85 mgd in 1995 to a maximum of 65 mgd. With the exception of an extremely heavy rain associated with Hurricane Floyd in September 1999, peak flows have remained around 50 mgd even during heavy rainfall events.

Costs and Funding

WCD is part of an enterprise fund that includes all three divisions of the Fairfax County Wastewater Management Program. While some revenue bond financing is used to support wastewater treatment plant expansion, WCD's annual operating expenses are covered by customer revenues. Fees are charged at a rate of \$3.03 per 1,000 gallons of water used—among the lowest rates in the region. Established annual rate increases of between 2% and 4% ensure a stable rate structure that mitigates the impact of annual budget fluctuations. The affordability of sewer fees is demonstrated by the fact that 99% of customers pay their bills on time each year.

Annual O&M and Rehabilitation Budgets



[A breakdown of WCD's O&M and rehabilitation budgets since CMOM began in 1995.](#)

Between 1995 and 2004, WCD invested \$161 million in its CMOM program. Of this total, 61%, or \$97.5 million, was dedicated to O&M, compared to 39%, or \$63.5 million spent on rehabilitation. The average annual O&M budget is \$9.8 million and the average annual rehabilitation budget is about \$6.3 million. WCD expects to continue this level of expenditure through its long-term planning cycle.

Next Steps

In late 2001, WCD began a comprehensive audit of its CMOM program. The purpose of the audit was to determine which strategies are working and which can benefit from further improvement. The audit has identified gaps in the program as compared to the proposed SSO regulation. One of the intended outcomes from this audit is the



development of a written CMOM Plan. This Plan will contain enough details to serve as an operational guide for all WCD staff, but will be flexible enough to allow for changes in response to changing conditions in the collection system.

Learn More About WCD

Fairfax County provides additional information about WCD through its website at <http://www.co.fairfax.va.us/living/publicworks/default.htm>.



Vision

We aspire to achieve a pure and natural state of air and water quality by providing superior wastewater utility service in a spirit of teamwork and excellent customer service.

Mission

Our mission is to collect, treat, and monitor wastewater in compliance with all regulatory requirements, using state-of-the-art technology in the most effective manner.

We work to improve the environment and enhance the quality of life in Fairfax County.

Leadership Philosophy

We believe in and support the desire and motivation of all of us to excel.

We ensure teamwork and a collaborative environment.

We foster innovation and the creative talents and knowledge of all to produce excellent service.

We take pride in and celebrate our service excellence through recognition of those who exemplify it.

We accept responsibility and hold ourselves accountable for actions.

Values

We, the members of the Wastewater Management Line of Business (LOB), in our quest to provide the highest level of public service, embrace these values to guide our daily actions:

Integrity is demonstrating consistent adherence to the principles of honesty, fairness, sincerity, and openness.

Respect for People is valuing diverse contributions and demonstrating fairness, compassion, appreciation and understanding toward everyone.

Trust is assuring that individual obligations and responsibilities are fulfilled and relying upon others to do the same.

Open Communications is listening and sharing information in all directions to create common understanding.

Initiative is taking action and creating opportunities to prevent or resolve problems and get the job done consistent with organizational goals and values.

Teamwork is collaborating with colleagues, customers and organizations to achieve the best results.

Personal Growth is fostering and seeking continuous personal and professional self-improvement.

CMOM Program Goals, Organization and Legal Authority

SSO Proposed Rule Requirement:

Goals: The permittee must specifically identify major program goals, consistent with environmental and human health protection rules and policies as stated in the SSO Rule.

Organization: The permittee must identify administrative and management positions responsible for implementing measures in the CMOM program, including lines of authority. It must also document the chain of communication for reporting SSOs, from receipt of a complaint to notification of permitting authority officials, other affected agencies, and the public.

Legal Authority: Legal authority must be obtained through sewer use ordinances, service agreements, or other legally binding documents, to carry out the CMOM requirements of the SSO proposed rule.

Goals

WCD's stated program goals are to eliminate backups and overflows, prolong the useful life of sewer system assets, and provide adequate system capacity for the current and future needs of Fairfax County residents and businesses. While procedures were well-established to ensure the latter goal (i.e., adequate system capacity), strategic and tactical plans were formulated to achieve the former two goals, which were in alignment with the CMOM program requirements.

- Operations and maintenance (O&M): This includes inspection of as many system components as possible, followed by cleaning of sewer mains with grease buildup and root intrusion on a planned schedule.
- Rehabilitation: Plan and execute rehabilitation projects to ensure the physical integrity of system components. Rehabilitation projects include trunk lines, sewer mains, manholes, and pumping stations.

Organization

WCD is one of the three divisions of the Fairfax County's Wastewater Management Program. The other two include the Wastewater Treatment Division (WTD), which operates the Noman Cole, Jr. Pollution Control Plant, and the Wastewater Planning and Monitoring Division (WPMD), which is responsible for ensuring the



system capacity, fiscal management, and environmental laboratory services. Within WCD, there are three branches: Administration, Pump Stations, and Gravity Sewers.



The Administration Branch manages personnel, procurement, budget, warehousing, and the 24-hour Trouble Response Center. The Pump Stations Branch operates and maintains the wastewater pump stations, flowmeters, pressure sewer system, and

chemical addition stations (for odor and corrosion control). The Gravity Sewers Branch operates and maintains the gravity sewer system, providing sewer inspection and cleaning, system rehabilitation and replacement, and line location and marking. All three branches collaborate on CMOM planning and implementation.

Legal Authority

Fairfax County Code Chapter 67, Article 10, establishes WCD's legal authority to operate the collection system, enforce design and construction standards, establish and enforce collection system rules, and charge fees for sewer service.

Measures and Activities

SSO Proposed Rule Requirement:

The CMOM program must include the eight measures and activities listed below, as they may be appropriate and applicable to each permittee's system.

Adequate Maintenance Facilities and Equipment

One of the most important features of the program is to ensure field crews have state-of-the-art equipment and knowledge to operate it.

WCD operates six combination units, four sewer rodding machines, two bucket machines, various cleaning devices, and pole-mounted digital cameras for visual inspection. Two Extend-a-Jet units allow crews to park their equipment in an accessible area and extend sewer cleaning devices into easements farther from the road. Staff responsible for sewer inspection and cleaning are trained annually by equipment manufacturers.



Pole-mounted digital cameras are used for sewer inspection during overcast days when the traditional way of "mirroring" the lines cannot be done.

Development and Maintenance of a Map of the Collection System

Historically, WCD staff have used and maintained grid maps bound in the form of books. These maps show sanitary sewers superimposed on property tax maps drawn at a scale of 1":500'. A one-square-mile area is shown on each map. In 2000, all of the collection system was digitized and added as a separate layer to the Fairfax County geographical information system (GIS). All sewer lines, pump stations, and manholes are included in this GIS layer. As new sewer lines are added, the developer provides WCD with as-built drawings that are used to update both the maps and the GIS.

Management of Information and Use of Timely Information to Establish and Prioritize CMOM Activities

WCD uses a computerized asset management system to track all CMOM-related information, including maintenance, rehabilitation, and emergency calls. WCD plans to link the GIS with the asset management system and, in the future, may extend the linkage to its sewer capacity model and/or

to the sewer billing system. Such linkages would allow various departments within WCD to work more closely on capacity analysis, CMOM short- and long-term activity planning, budget development, rate setting, and annual reporting.

Routine Preventive Operation and Maintenance Activities

WCD believes that a formal operations and maintenance plan is a CMOM necessity, but the program must have the flexibility to adjust based on performance data and changing conditions. For instance, as a result of the operations audit, WCD realized the inefficiency of scheduling sewer lines for inspection and maintenance as a single task. By separating these functions and creating specialized crews, WCD was able to schedule many more sewers for inspection and send the cleaning crews only to those that needed work.



In the initial phase of the program, the impetus was to televise lines in the ASA service area to facilitate rehabilitation planning. As the rehabilitation phase is nearing completion, WCD is placing a renewed emphasis on blockage identification and removal, by readjusting its inspection tactics.

Now, rather than televising every sewer (which is slow and resource-intensive), crews will perform physical and visual inspection of lines in neighborhoods as indicated by sporadic television inspections, and thus will cover much larger areas each day. Based on an evaluation of all available information (trouble reports, maintenance/rehabilitation history) video inspection will be performed on several, but not all, sewers in older neighborhoods. If a severe problem is found, the video inspection will be expanded to additional lines in that area. If a line requires immediate maintenance or rehabilitation, the appropriate crew will be called. If a lower-priority problem is detected, the line will be added to the maintenance (inspection or cleaning) schedule. If no problem is found, the crews will move to a different neighborhood.

Line cleaning and routine maintenance includes rodding and flushing of lines blocked by tree root intrusion and heavy grease accumulation. Routine pump station maintenance is also planned to ensure around-the-clock operation without service interruption.



To protect manholes from damage during road construction, WCD coordinates manhole maintenance



with planned street repaving. When a repaving project is scheduled, WCD raises the manhole covers to the height of the finished pavement, which ensures that street crews do not seal off the manhole covers.

WCD has a grease control program for commercial facilities, since most of the blockages caused by grease buildup have occurred at or downstream of commercial centers. WCD has permanently assigned a crew to inspect grease-buildup "hot spots" on an ongoing basis. This has virtually eliminated sewer blockages at these locations. To better control grease deposits, WCD plans to work with the Fairfax County Department of Health, which is responsible for ensuring that grease trap maintenance requirements are enforced at commercial facilities. WCD has determined that most commercial establishments have the required traps, but often fail to hire contractors to clean them out. Once the traps become blocked by grease, they are no longer effective in keeping the grease from entering the sewer lines, and the sewer lines then become blocked.

WCD has sonar inspected a number of inverted siphons that run under the Potomac River and other major streams. These siphons had never been cleaned and were shown evidence of reduced capacity. The sonar inspection revealed that the flow carrying capacity of all siphons has been significantly reduced due to grease and debris. WCD has cleaned all small diameter siphons and plans to outsource cleaning of large diameter siphons under Cameron Run and the Potomac River. WCD plans to expand the sonar inspection to all siphons and to hire a specialty contractor to clean these facilities.

A Program to Assess the Current Capacity of the Collection System and Treatment Facilities

As part of the CMOM self-audit, a complete sewer system evaluation survey (SSES) was performed between 1995 and 1997. In this study, WCD analyzed flow capacity of all major system components and performed detailed hydraulic analysis of the ASA and LHC service areas. Capacity assessment is performed annually with assistance from a static sewer system model called Capacity Assessment Program (CAP).

CAP is applied to all lines 12" or larger, plus all lines that connect to pump stations. It is supported by a network of 53 permanent real-time flow monitors and 34 temporary monitors. Permanent meters measure flows that cross jurisdictional boundaries, producing data that are used for billing purposes, as well as model input values. Portable meters are used to assess flow conditions in the system under various storm conditions and are extremely useful in identifying capacity limitations. CAP is linked to the Fairfax County Comprehensive Plan, which is updated every year. WCD's philosophy is to design the system using a conservative interpretation of available data and growth estimates. This allows

flexibility when new development is permitted that wasn't anticipated in the long-term growth plan.

Identification and Prioritization of Structural Deficiencies Along With Short- and Long-term Rehabilitation Plans to Address Them

Since 1995, WCD has maintained an ongoing prioritized schedule of rehabilitation projects to correct structural deficiencies and upgrade out-of-date equipment. Major programs are:

- **Trunk line rehabilitation program.**

Initiated in 1995, this phased program was completed in 2000. In the future, the program will be expanded to other neighborhoods where trunk sewers have been found to be less severely deteriorated.

- **Pump station rehabilitation program.**

A program to rehabilitate all pump stations has been underway since 1990. Under the phased program, all 31 older stations and 250 grinder pumps have been rehabilitated. Depending on the condition of each



individual pump station, rehabilitation may include replacement of pumps and pump motors, control panels, level control systems, standing power generators, and alarms. Even though the pump stations have been functioning well, many are being rehabilitated to take advantage of new technologies. These upgrades will also facilitate the installation of a new supervisory control and data acquisition (SCADA) system that will enable staff to monitor pump stations from the WCD headquarters or other remote locations.

- **Sag elimination program.** As a result of the SSES, several sewer line segments with sags ranging in length and severity have been identified throughout the system. The major causes include faulty installation (improper bedding and/or backfill), poor soils, and settling of support piers. So far, no pipe failures have been attributed to sag problems, but they do contribute to grease blockages resulting from sluggish flows, and thus require frequent maintenance. Minor sags are replaced by WCD crews, and lines with large sags are replaced under contract.

- **Flow meter replacement program.** WCD has 53 permanent flow meters that measure inter-jurisdictional flows, and 34 temporary flow meters at various locations to identify areas that have excessive I/I. WCD has initiated a phased replacement program to replace flow meters that have reached the end of their useful lives with state-of-the-art meters. All 53 permanent flow meters have been replaced in 2003 and the remaining 34 temporary meters will be replaced in 2004.

- **Appropriate training on a regular basis.** Staff training and motivation are top priorities for WCD. No matter how well-conceived the CMOM program is, if staff lack training, expertise, or the drive to succeed at their tasks, the program cannot succeed.

All field personnel are trained by manufacturers on the use of any equipment relevant to their tasks and refresher training is provided annually. The significant benefits of manufacturer training over on-the-job training include more in-depth knowledge about all equipment functions, and avoidance of having incorrect practices passed on to new employees. Motivational programs include empowering staff to have more input into their jobs, encouraging individual leadership, and recognizing good performance. Positive feedback is given through celebration of achievements and recognition of employees based on internal staff awards and positive customer feedback. This type of motivation gives each member of the team a sense of accomplishment, which instills a desire to continue performing well so that the positive feedback will continue.

Equipment and replacement parts inventories, including identification of critical replacement parts.

WCD's information management system is used for tracking equipment and parts inventory. Critical replacement parts that are nonshelf items are identified and kept on hand. For instance, 16-foot pipe lengths and gaskets for 30-inch, 36-inch, and 42-inch prestressed concrete force mains are stored for emergency repairs.

Design and Performance Provisions

SSO Proposed Rule Requirement:

Permittees must establish construction requirements and standards for the installation of new appurtenances to the system, and procedures for inspecting and testing installations. These standards are essential to avoid improper connections, premature line and equipment failures, interferences with other infrastructure, etc.

Design and construction specifications for collection system components are outlined in the Fairfax County Public Facilities Manual, which covers everything except pump stations. Pump stations and publicly owned treatment works are covered by Virginia Department of Health standards. Fairfax County standards are, in most cases, more strict than state standards for the same public facility designs. Contractors are required to meet the Fairfax County standards for all collection system appurtenances prior to final acceptance.

New sewer line segments are routinely air-tested and TV-inspected before acceptance in the WCD system. Rehabilitated sewer lines are inspected before and after the pipe relining process.

Monitoring, Measuring, and Modification as Appropriate

SSO Proposed Rule Requirement:

The proposed SSO rule calls for monitoring of the major CMOM program elements. The information gathered should be used to evaluate the performance of each element, leading to program adjustments as needed.

The primary performance measures for WCD's CMOM program are:

- Reductions in the number of backups and SSOs
- Reduction in peak flows in the system
- No pump station shut downs due to equipment malfunction

These measures are tracked and evaluated throughout the year. If performance goals are not met, program adjustments are made.

Overflow Response Planning

SSO Proposed Rule Requirement:

The CMOM program must include an overflow emergency response plan that includes measures to protect public health and the environment; a way for the operator to be made aware of all overflows; assurance that overflows are properly responded to, such as notifying and dispatching personnel immediately; immediate notification of public, health agencies, other impacted entities, and the NPDES permitting authority; identification of officials by name who will be notified; proper personnel training; and an emergency operations plan.

WCD's 24-hour Trouble Response Center is equipped with a comprehensive overflow response plan. When a sewer trouble call is received from a citizen, the Trouble Response Center pinpoints the location within the collection system, and dispatches the field inspector nearest to that location. Response time is from 30 minutes to an hour during business hours, and between one and two hours on evenings and weekends.



Field inspectors are trained to diagnose the problem and call for appropriate staff and cleaning equipment. All sewer manhole overflows are reported to Virginia DEQ. First notification is by phone, within 24 hours of the incident, followed up by a written report within five days. Water quality monitoring is conducted

when an SSO causes visible stream impairment.

A total of 177 critical sewer line segments—those that cross major highways or streams—have been identified. For each segment, WCD has prepared a documented overflow response plan. Each critical segment plan contains specific information about the line: location on the sewer grid map, elevation, as-built construction drawings, and a bypass plan. The bypass plan gives specific instructions on how to divert flow until the critical segment is repaired.

The Trouble Response Center also houses the pump station alarm system.

By 2005, the new SCADA system will allow Trouble Response Center staff to monitor pump stations remotely. Once the system is operational, overflow response plans will be developed to take advantage of this capability.

Program Audit

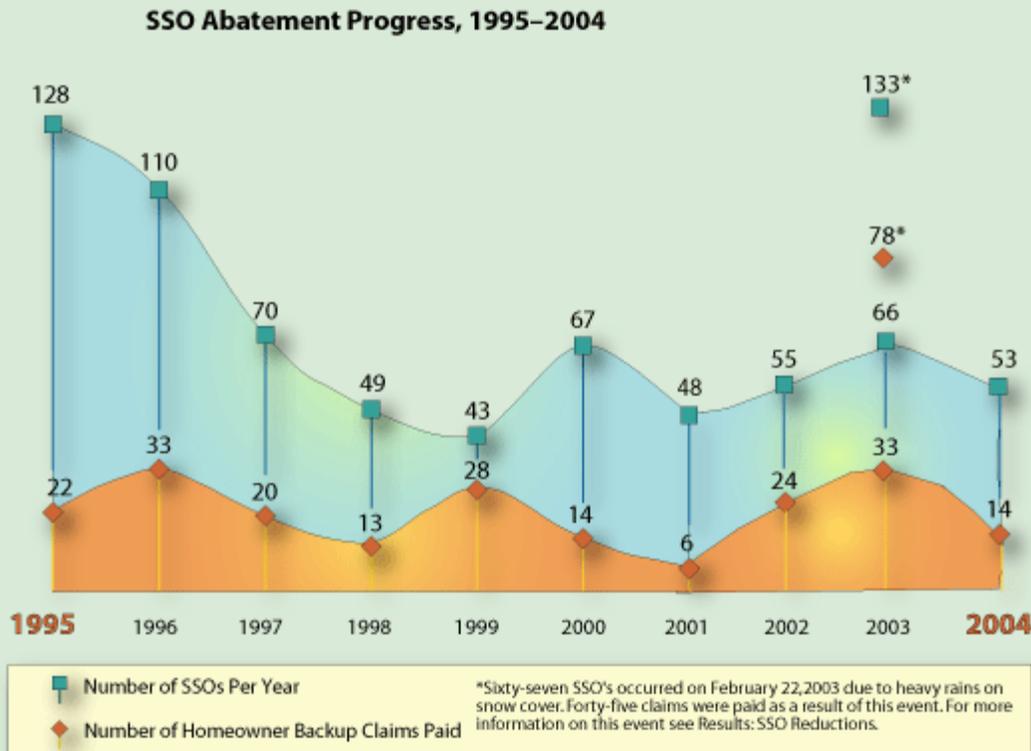
SSO Proposed Rule Requirement:

The CMOM program must be audited on a regular basis with the NPDES permitting authority, health officials, members of the affected public, and other interested parties, to evaluate the implementation and performance. The extent of the audit is based on the size of the system and the number of overflows during the audit period. It should cover the program's compliance with permit requirements, any identified deficiencies, and steps to address them.

In late 2001, WCD began a comprehensive audit of its CMOM program to determine which strategies are working and which can benefit from further improvement. For this purpose, WCD has used the US EPA Region IV CMOM guidelines as a yardstick. The audit has determined that while most of the WCD programs are in compliance, opportunities for improvement exist in such areas as reporting of SSOs to the public and documentation of business practices and procedures. WCD has started documentation of all standard operating procedures and plans to complete this project in 2004.

CMOM Program Results

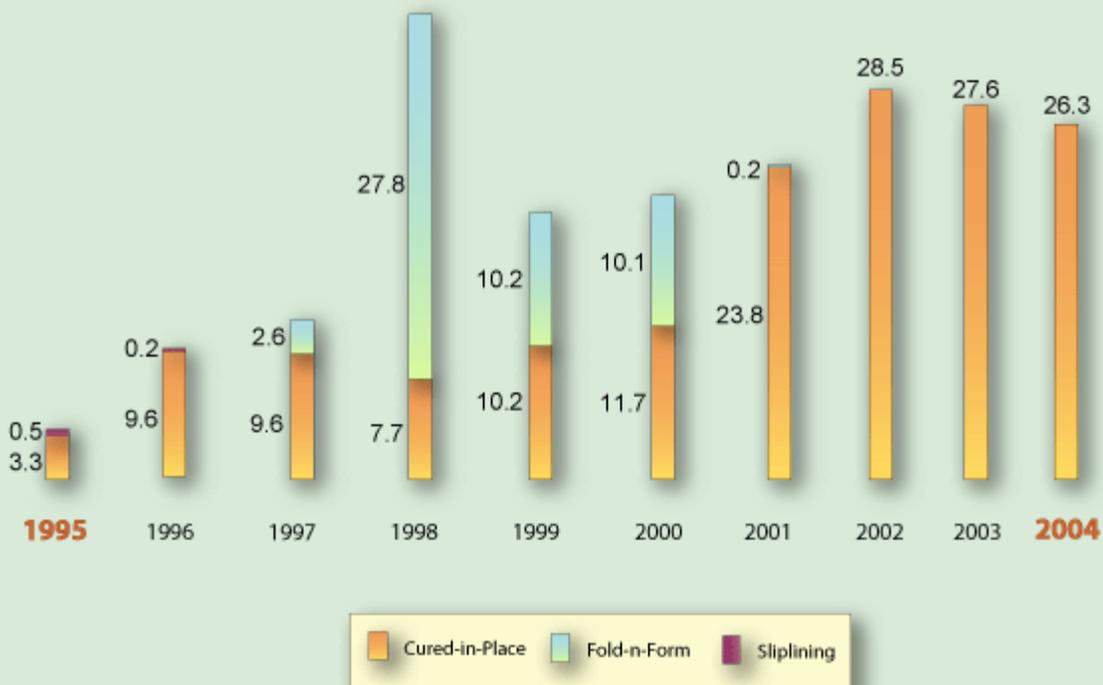
SSO Reductions



Sewer Line, Manhole, and Pump Station Rehabilitations

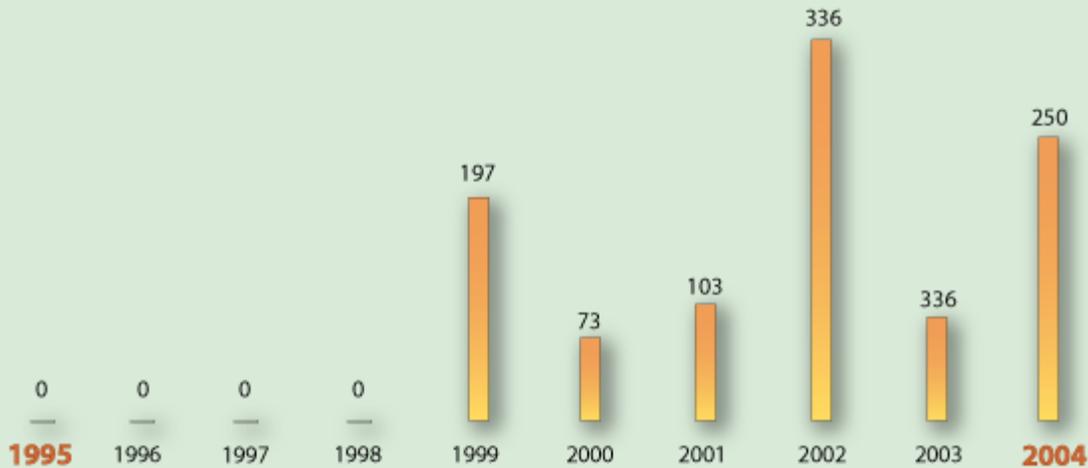
The WCD CMOM program has also included extensive rehabilitation of lines, manholes, and pump stations. Line and manhole rehabilitations were performed primarily to reduce I/I. As the second graph shows, WCD completed more than 207 miles of sewer line rehabilitations— almost 6.5% of the total system mileage. Many of these rehabilitations addressed severely deteriorated trunk lines and sewer mains that were discovered during a 1995 SSES.

Sewer Line Rehabilitations (in Miles), 1995-2004



Line rehabilitation will continue to be an important part of WCD's CMOM program, but the focus has shifted from correcting severe deterioration affecting several neighborhoods, to correcting less urgent flaws, such as sags and misalignments.

Trenchless Point Repairs Completed, 1995-2004



For pipes that are found to be in generally good condition but with a few minor defects, WCD performs trenchless point repairs using the Ka-Te robotic repair

CMOM Program Annual Cost

Because WCD's collection system is in relatively good condition, it is able to devote an average of 60% of its budget to O&M, and 40% on rehabilitation. WCD expects this budget ratio to remain stable through its long-term planning cycle.

Between 1995 and 2004, WCD invested \$161 million in its CMOM program. Of this total, 61%, or \$97.5 million, was dedicated to O&M, compared to 39%, or \$63.5 million spent on rehabilitation.

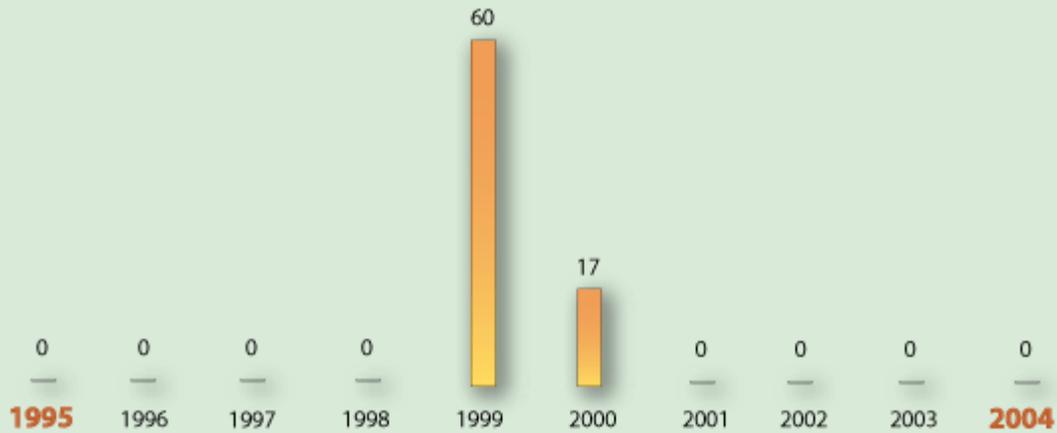
The average annual O&M budget is \$9.7 million and the average annual rehabilitation budget is about \$6.4 million. WCD expects to continue this level of expenditure through its long-term planning cycle.

Annual O&M and Rehabilitation Budgets, 1995-2004



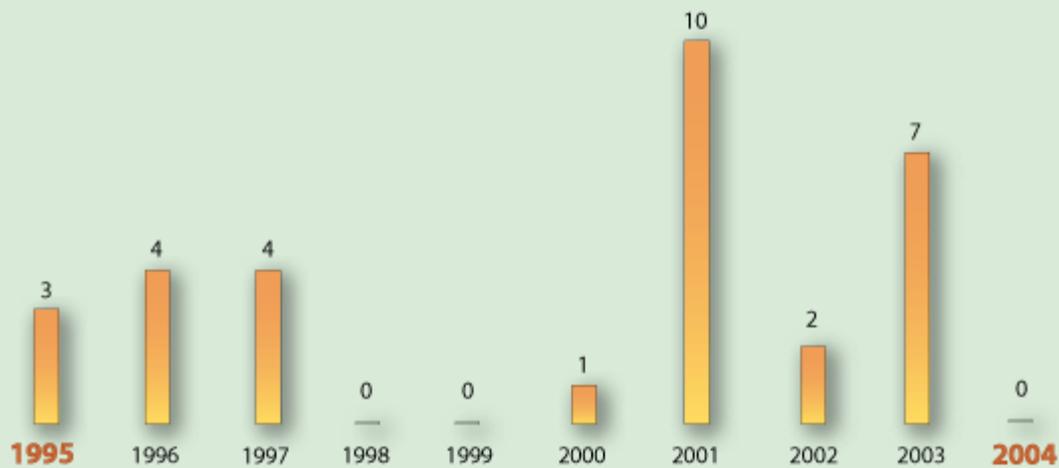
system.

Manholes Rehabilitated, 1995-2004



In 1999-2000, WCD rehabilitated 77 manholes that were either severely corroded by hydrogen sulfide gas or deteriorated due to age. No additional manhole has been observed to be in need of rehabilitation since then, which reflects WCD's proactive approach toward sewer maintenance.

Pump Stations Rehabilitated or Replaced, 1995-2004



Due to its proactive pump station rehabilitation program, WCD has never experienced an SSO due to a pump failure. Through extensive rehabilitations,

WCD has been replacing old components with state-of-the-art technology in pumps, motors, controls, standby power generators, and other equipment. New technology ensures smooth system operation and reduced operational costs. By 2004, a total of 31 pump stations will have been completely rehabilitated. Since the remaining pump stations are less than 15 years old, they will not require extensive rehabilitation during the next several years.