SEWER DIVISION PERFORMANCE AUDIT

MAINTENANCE SERVICES DEPARTMENT

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Summer 2007

Sewer Division Performance Audit
Staff Preface

As with all of our performance audits, success would be impossible without the active and willing cooperation and support of the program's managers. The Sewer Division Superintendent, the Sewer Supervisor, and the rest of the Division's employees were very helpful, supplying us with documents and information as quickly as possible. The Sewer Program Specialist was extremely forthcoming with information on sewer system planning and work tracking. The Sewer Division's staff made themselves available for interviews and informal meetings, sometimes on very short notice. Their help made the audit process much easier and more efficient for the analysis team.

Performance audits by their nature tend to highlight problems or unresolved issues. The audit team wishes to make it clear the problems and issues discussed in the report in no way reflect negatively on the personnel—managers and employees—of Maintenance Services' Sewer Division. The Division's staff are dedicated professionals who want to do the best job possible for the people of Fullerton. Indeed, as you read through the audit report, it should become clear the Division is one of the most efficient and effective in the department. The audit team believes the issues, conclusions, and recommendations made in this report will assist Division and Department managers in making important decisions for the future.

City of Fullerton—Maintenance Services Department--Administration Division
Advanced Analysis Unit/Performance Audit Team

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Sewer Division Performance Audit
Executive Summary

In February 2007, the Sewer Division Superintendent asked Maintenance Services' audit team to conduct a performance audit of the program. He wanted to assess the Division's efforts to meet state and federal requirements, and ensure the program is productive and effective. An internal audit is also a requirement of the State Regional Water Quality Board.

Our research included surveys of local sewer agencies, review of the program's goals and objectives, interviews with managers and employees, review of state requirements, and observations of field work. We compared target budget goals to actual workload, and the workload to industry standards. Based on our research and findings, we developed the following conclusions and recommendations:

Conclusion One: The Sewer Program is meeting the requirements of the State Water Quality Control Board. Based on the analysis team's review, both the number and size of sewer overflows have declined sharply over the past three years.

Conclusion Two: As far as can be determined with the data available, the Sewer Program is being run effectively and efficiently. Resources are being assigned to the areas where they are most effective, e.g. to preventive maintenance and routine line cleaning.

Conclusion Three: The Sewer Program has refined its work tracking procedures. Before the beginning of fiscal year 2007-2008, the program used work codes that did not provide enough detail of work being done in the field. By developing new work codes and providing additional training to field staff, the program should be able to provide more accurate work data in the future.

Conclusion Four: Cost per lateral and cost per line mile are not meaningful performance measures. As new work codes have been introduced, there are now more meaningful measures available, such as the cost per mile cleaned.

Conclusion Five: There is justification for at least one additional Source Control Inspector. The present inspector's workload does not allow him to perform some of the institutional and oil\water separator inspections that fall under the FOG Control Program's responsibility. A second inspector would provide the position needed for these and other tasks.

Conclusion Six: The Sewer Fee is properly funding sewer operations, maintenance, and repairs. Judging by the first complete fiscal year, the sewer fee's rates are structured so as to collect the targeted amount of $8 million to $8.4 million per year.

Based on the conclusions stated above, the analysis team prepared the following recommendations:

Recommendation One (Addresses Conclusion One): The Sewer Division should monitor its operations to ensure it continues to meet state and federal requirements.

Recommendation Two (Addresses Conclusions Two and Three): The Sewer program should be managed to continue its efficient and effective operation.

Recommendation Three (Addresses Conclusion Three): The Sewer program should continue to develop and refine its performance measures.

Recommendation Four (Addresses Conclusion Four): The cost per lateral and cost per mile measures should be eliminated and replaced by more meaningful performance measures.

Recommendation Five (Addresses Conclusion Five): At least one additional Source Control Inspector position should be filled as soon as possible.

Recommendation Six (Addresses Conclusion Six): **The Sewer Fee should be reviewed as part of the bi-annual budget process.**

GLOSSARY OF TERMS AND ACRONYMS

FOG **Fats, Oils, and Greases**. Typically associated with restaurants and other food service establishments, this acronym refers to the cooking waste products in commercial food service. Discharging significant amounts of FOG into the sewer system can lead to clogs and is prohibited by City ordinance.

FSE **Food Service Establishment**. Any business that prepares food for customers or processes food for later consumption. Examples include traditional restaurants, fast food establishments, and food preparation facilities such as institutional kitchens and commercial food operations. To qualify as an FSE, a business must change the color, texture, temperature, or taste of food. A convenience store that sells pre-packaged sandwiches or other foods is not an FSE.

GWDR **General Waste Discharge Requirement.** An order issued by the State Water Board regulating the discharge of effluent into a sanitary sewer system. Unlike a WDR (see below), a GWDR applies to all sewer agencies throughout the state.

NPDES **National Pollutant Discharge Elimination System**. The over-arching federal law prohibiting pollution of natural waterways and oceans from sewer and storm drain run-off. The General and Waste Discharge Requirements are based on NPDES rules.

OCSD **Orange County Sanitation District.** The special district that collects sewer discharges - from about 80% of Orange County cities. Fullerton's effluent flows into OCSD collector mains and continues to the district's treatment plant in Fountain Valley.

SARWQCB **Santa Ana Regional Water Quality Control Board.** The division of the State Water Board with authority over sewer agencies in Orange County.

SSMP **Sewer System Management Plan.** A plan required by the state (see GWDR/WDR) detailing the City's short and long term programs for proper operations, maintenance, and capital repair of its sewer system.

SSO **Sanitary Sewer Overflow.** A discharge from the sanitary sewer system that results in a release or potential release of untreated sewage into the public right of way, and therefore the waters of the United States.

SWRCB **State Water Resources Control Board**. The state department that regulates sewer agencies throughout California.

WDR **Waste Discharge Requirement**. An order issued by the Regional Water Board regulating the discharge of effluent into a sanitary sewer system.

SECTIONS I THROUGH IV: INTRODUCTION

I. BACKGROUND

In 2002, the Santa Ana Regional Water Quality Control Board (SARWQCB) issued a Waste Discharge Requirement (WDR) for sanitary sewer systems. The WDR imposed many new maintenance and operations requirements on sewer agencies, including Fullerton. In its efforts to meet the new regulations, the City significantly expanded its sewer program; in fiscal year 2000-01, the sewer program consisted of one vacuum/jet cleaning truck and 4.9 employees. By FY 2007-2008, staffing had increased to 19 positions and three vacuum trucks, a video inspection van, and other equipment.

In February 2007, the Sewer Division Superintendent asked Maintenance Services' audit team to conduct a performance audit of the program. He wanted to assess the Division's efforts to meet the WDR's requirements, and ensure the program is productive and effective.

II. PURPOSE

The purpose of this study is to assess the Sewer Division's compliance with the state Waste Discharge Requirement, and to measure the program's efficiency and effectiveness. The audit team will recommend what, if any, program changes or improvements may be required to make the sewer maintenance program more effective. The audit also meets the internal audit requirement for sewer systems issued by the State Water Resources Control Board.

III. SCOPE AND METHODOLOGY

This performance audit was conducted in accordance with Generally Accepted Government Auditing Standards (GAGAS) published by the United States General Accounting Office, 2007 Revision. The audit includes the following issues:

Performance Measures: Are measurable and meaningful performance criteria being used to assess the program's productivity?

Workload Assessment: Are staffing and equipment levels proper for the workload?

Management Controls: Are appropriate management controls in place? What methods are used to ensure field crews are properly reporting work, and all state requirements for reporting spills are being met?

Compliance Assessment: Has the City made meaningful progress in meeting the WDR requirements?

Issues of Concern to Management and Employees: What concerns do managers and employees have regarding the Sewer Division's short and long-term needs?

The audit team used the following methods to perform the study:

- Inspection of work records, from their origination in the field to final entry into the department's maintenance management system;
- Interviews with managers and employees to ensure the team developed an accurate program description;
- Comparison of Fullerton's operations with other agencies;
- Direct observation of field crews at work;
- Review of state and federal requirements, and comparison of those requirements with Fullerton's compliance efforts.

IV. RISK ASSESSMENT

A common method auditors use to measure a program's potential impact on the public health is a risk assessment. Risk assessment involves determining the program's consequence of error and the likelihood that error will occur. In the case of the sewer program, there are several risks. The table below summarizes the analysis team's risk assessment.

Table One: Risk Assessment

RISK FACTOR	CONSEQUENCE	LIKELIHOOD OF OCCURRENCE
Major sanitary sewer overflow (SSO)	May pose a danger to the public health. City may be fined if too many preventable SSOs occur.	Was high through 2005; now low due to program expansion. (See Table Six on page 19).
Failure to comply with state and federal program requirements (WDR/GWDR)	City would face enforcement action (including fines).	Was high through 2004, until program expansion.
Failure to properly enforce Fats, Oils, and Grease (FOG) ordinance	Potential for major lateral and/or main line clog due to grease build-up. City would face enforcement action (including fines).	Moderate. Not all food service establishments may be in full compliance.
Major sewer main failure due to structural deficiency (e.g. age, root intrusion, cracks, etc.)	A structural failure would result in long-term sewer line closure and expensive repairs/replacement.	Current likelihood is high because the sewer capital repair program has been in effect only one year. The City's entire system has not yet been inspected and many sections are more than 50 years old.

The analysis team kept these risk factors in mind as it reviewed the Sewer Division's programs and activities. The team wanted to ensure each risk factor was being properly addressed in relation to its consequence and likelihood of occurrence.

V. PRIOR AUDITS

The Sewer program was last studied in 1996, before the Waste Discharge Requirements went into effect; therefore, the previous audit's findings have little relevance to the current operation.

SECTION VI: PROGRAM DESCRIPTION

SECTION VI. PROGRAM DESCRIPTION

VI-A: Regulatory History

Before 2002, the Sewer Program was a small operation within Maintenance Services' Water Division. The program had a budget of less than $500,000, and included only 4.9 employees. Equipment consisted of one combination vacuum/jetter truck to clean sewer lines, and a truck and equipment to chemically or mechanically clean laterals clogged by City tree roots. Because of the sewer system's design and the City's limited resources, more intensive sewer maintenance programs were never contemplated.

In late 2001, the Santa Ana Regional Water Quality Control Board (SARWQCB) notified cities in Orange County a new, far more stringent Waste Discharge Requirement was being reviewed for adoption. A Waste Discharge Requirement (WDR) is a regulation, carrying the weight of law, governing an agency's sanitary sewer system operations. In the case of this particular WDR, the Regional Water Quality Board was acting to implement provisions of the Federal Clean Water Act, which is intended to protect natural waterways from pollution.

By the time the SARWQCB issued its new WDR in April 2002 (Rule R8-2002-0014), the Maintenance Services Director and Water Division Superintendent had already begun drafting plans for compliance based on the draft regulations. In June 2002, the Director brought an agenda letter to the City Council, explaining the new WDR, and outlining the potential fiscal impact. The primary goal of the WDR was to eliminate sanitary sewer overflows (SSOs) in the Board's jurisdiction. According to the WDR, most SSOs occur due to sewer main blockages caused by infrequent maintenance and accumulations of fats, oils and greases. The WDR was comprehensive, encompassing the design and construction of new sewer mains, maintenance programs, and long-range master planning.

The WDR's central element was the requirement for each city to create a Sewer System Management Plan (SSMP). The SSMP included several pages of very specific maintenance and operations requirements, ranging from creating a regular maintenance program to enacting and enforcing a fats, oils, and grease prevention program. The SSMP contained 38 separate requirements divided into 10 general areas.[1] The SSMP also contained a requirement for sewer management, maintenance and repair programs to receive proper and sustainable funding.[2] Failure to comply the WDR's provisions could have resulted in large fines.

After reviewing the WDR and consulting with SARWQCB staff, it became clear to the Maintenance Services Director, the Regional Board expected Fullerton to significantly increase its proactive maintenance and repair programs. By mid-2003, the City hired its first full-time Sewer Supervisor, and increased its field crews. As the program grew, it became apparent the Water Superintendent could no longer effectively manage the sewer program as well as existing water systems operations. In 2005, the City Council authorized the creation of the Sewer Maintenance Division and a superintendent's position.

To fund the program's expansion, the City Council approved a sewer enterprise fee, which was implemented in January 2006. The fee, which is based on effluents discharged into the City's sewer system, provides approximately $8 million per year for sewer maintenance and capital repair projects.

In May 2006, the State Water Resources Control Board (SWRCB), which is the state's parent agency for the Regional Boards, issued Order No. 2006-0003-DWQ, enacting a state-wide WDR nearly

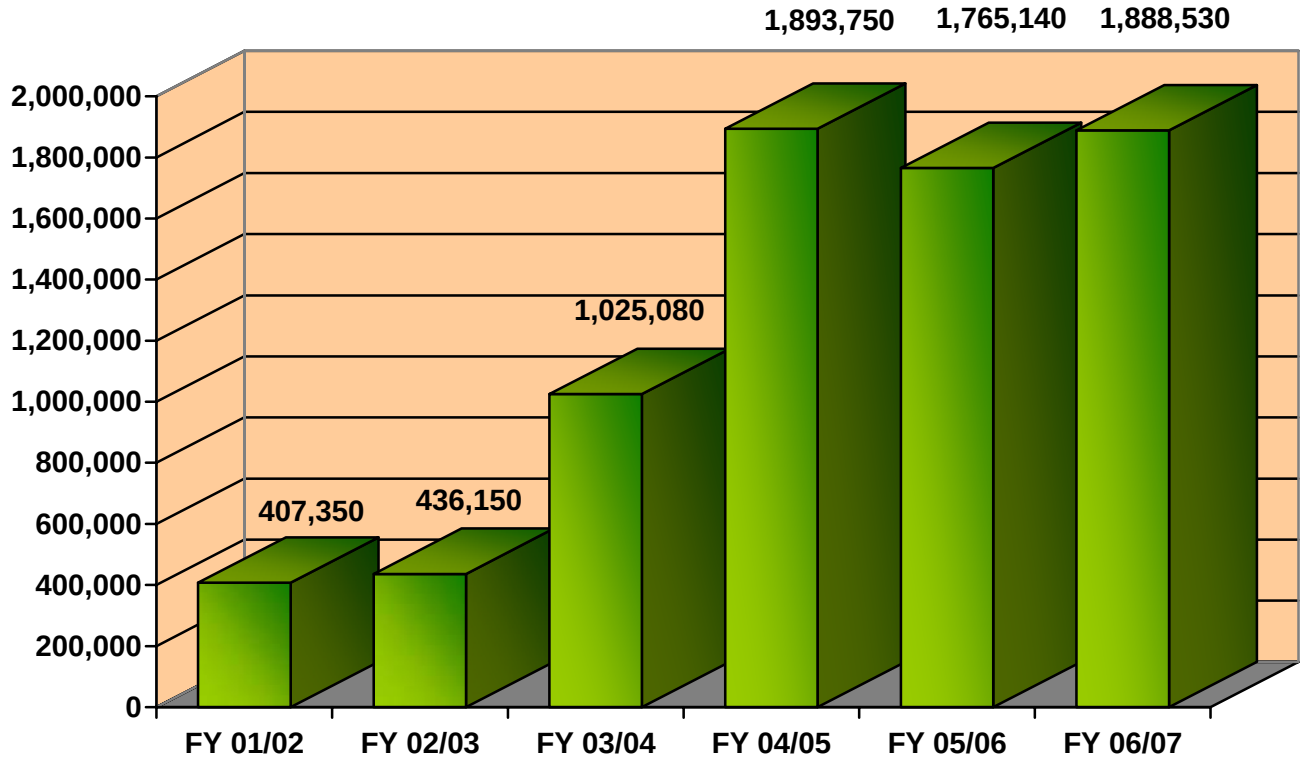
[1] Order No. R8-2002-0014, Section 12, sub-sections i through xi
[2] Order No. R8-2002-0014, Section 7

identical to the previous Regional Board rule. The new rule contains more explicit funding requirements, stating in part "The Enrollee [City] shall…establish a proper rate structure…to ensure an adequate measure of revenues and expenditures." [3] The Maintenance Services and Engineering Departments continue to modify the sewer maintenance and repair program to ensure the City is meeting the requirements of both rules.

VI-B: Budget and Staffing

The fiscal year 2006-2007 Sewer Division budget was $1,888,530; $1,205,110 in salaries and benefits, and $683,420 in maintenance and support. The budget is funded from the Sewer Enterprise Fee. As you can see in Chart One below, the program's budget has increased by more than 400% in the last six years:

Chart One: Sewer Program Budget Since Fiscal Year 2001-02



FY 2004-05 included funding for two consulting firms: one for developing the sewer enterprise fee and another to assist the City in creating a fats oils and grease enforcement program.

[3] SWRCB Order No. 2006-0003-DWQ, Section D-9

In fiscal year 2001-02, the Sewer Program had 4.9 authorized positions, most of which were shared with the other Water Division programs:

Table Two: FY 01-02 Staffing	
Position	**Number**
Water Superintendent	.1
Water Trans. & Dist. Supervisor	.1
Sanitation Specialist	1
Skilled Maint. Worker	.3
Equipment Operator	1.1
Senior Maint. Worker	2.3
TOTAL	4.9

By fiscal year 2006-07, Sewers was its own division and had 19 authorized positions, as shown in Table Three below:

Table Three: FY 2006-07 Staffing	
Position	**Number**
Sewer Superintendent	1
Sewer Supervisor	1
Sanitation Specialist	1
Sewer Program Specialist	1
Source Control Inspector	3
Equipment Operator	4
Senior Maint. Worker	7
Clerical Asst. III	1
TOTAL	**19**

From one combination truck, the Sewer Division now includes three combination trucks, a video inspection van, and a dedicated lateral service truck, among other vehicles and equipment.

Chart Two below shows the Sewer Division's current organization. Field operations consist of four basic functions:

1. Vacuum Trucks: Three vacuum/jetter trucks provide routine cleaning, emergency overflow response, and sewer main cleaning before video inspection.

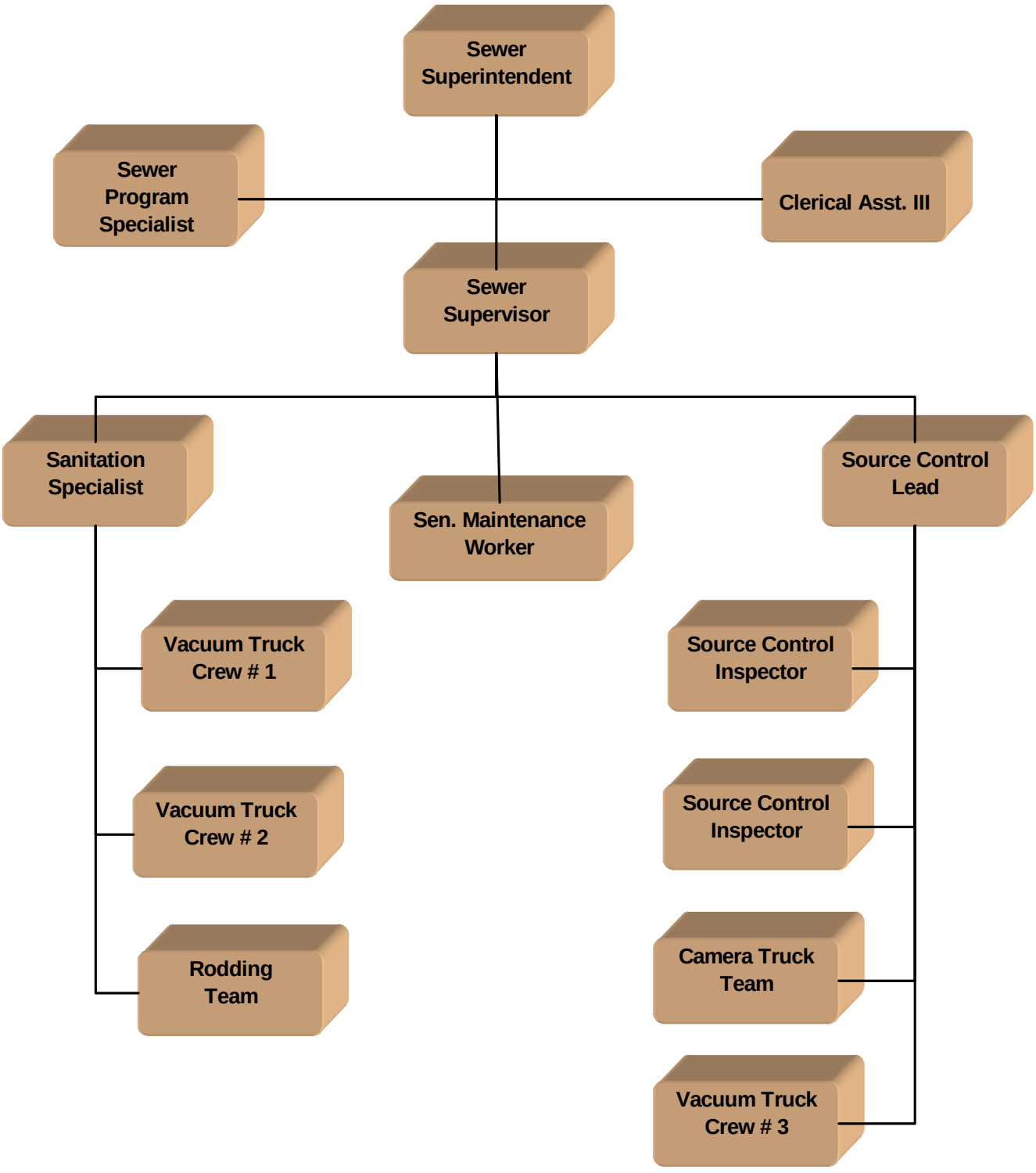
2. CCTV Inspection: A remotely-operated camera inspects sewer lines for damage and blockages.

3. Lateral Rodding: A crew mechanically cleans residential sewer laterals with a history of street tree root intrusion.

4. Source Control: Three positions (two currently vacant) are assigned to inspect food service establishments for proper grease control practices and enforce the fats, oils, and grease control ordinance. Once the other positions are filled, the inspectors will inspect other commercial and industrial facilities for proper grease and waste disposal practices.

Because of the extensive reporting and documentation requirements of the program, two positions provide administrative support; a Sewer Program Specialist to track work and sewer overflow trends, and a Clerical Assistant to prepare reports and track documentation. (See Chart Two on the next page).

Chart Two: Current Sewer Division Organization



VI-C: STATUTORY REQUIREMENTS

VI-C-1 Sanitary Sewer Overflow Reporting Requirements

California State Waste Discharge Requirements include regulations for reporting sanitary sewer overflows:

Category One Overflow: Equal to or exceeding 1,000 gallons, or a spill resulting in a discharge to a drainage channel and/or surface water; or a discharge into a storm drain that was not fully captured. Category One spills must be reported online to the State Water Resources Control Board database within three business days after knowledge of the spill. A final certified report must be completed and filed with the Board within 15 calendar days of the conclusion of the SSO response and remediation. Also, any SSO greater than 1,000 gallons must be reported to the Office of Emergency Services.[4]

Category Two Overflow: All other discharges resulting from failures in the sanitary sewer system. Category Two SSOs must be reported online to the State Water Resources Control Board within 30 days of the end of the calendar month in which the spill occurs. Should a spill reach a storm drain or public right-of-way, the Regional Water Quality Control Board needs to be notified via telephone as soon as possible.

Category Three Overflow: Private Lateral Sewage Discharges. Category Three SSOs may be reported online and a responsible party, if known, should be identified. If a resident fails to clean up an SSO and a health hazard results, Sewer staff notifies the Orange County Health Department. All restaurant SSOs are reported to the Orange County Health Department.

If no SSOs occurs within a calendar month, an online statement to the State Water Resources Control Board certifying there were no SSOs for that month should be provided within 30 days from the end of the month.

VI-C-2 Fats, Oils and Grease Program

In 2004, Fullerton's City Council adopted Ordinance No. 3051 amending Chapter 12.20 of the Municipal Code, dealing with the control of fats, oils and grease (FOG) in food service establishments. FOG is a major cause of sanitary sewer overflows. The ordinance includes:

A. A prohibition against installing food grinders (garbage disposers) in the plumbing systems of new food service establishment construction. The ordinance required all food grinders to be removed from existing food service establishment within 180 days of adoption of the ordinance.
B. Introduction of any additives into a wastewater system for the purpose of emulsifying fats, oils and grease is prohibited unless a specific written authorization from the FOG control program manager (Sewer Superintendent) is obtained.
C. Disposal of waste cooking oil into drain pipes is prohibited. Discharge of wastewater from dishwashers into any grease trap or interceptor is prohibited.
D. Discharge of wastewater with temperatures above 140°F to any grease control device is prohibited.
E. Biological additives for grease remediation are prohibited without prior authorization from the FOG control program manager.
F. Discharge of wastes from toilets, urinals, wash basins and other fixtures containing fecal matter to any grease control device is prohibited.

[4] California Water Code Section 13271

G. Discharge of any waste, including FOG removed from the grease control device to the sewer system is prohibited.

All food service establishments are required to use prescribed best management practices, obtain a wastewater discharge permit, and have an adequately sized and maintained grease interceptor that separates and removes fats, oils and grease from wastewater before discharge into the sewer system. There are certain circumstances that allow an FSE to obtain a conditional permit or a variance.

VI-D. DIVISION ORGANIZATION

VI-D-1. ADMINISTRATION

The Sewer Division's administrative section includes the Superintendent, Supervisor, Sewer Program Specialist, and Clerical Assistant III. Sewer Administration is responsible for direct program management and arranging ongoing public education and training for employees.

Public Education

The WDR and GWDR require public education programs to inform residents and businesses on the sewer system's operation and maintenance, and proper grease disposal methods. Tools used for public education include:

- Brochures
- Videos aired on the local public cable channel
- Newspaper articles
- Signage displayed during construction work

Training

The GWDR recommends certification in sewer operations for most division employees.[5] Employees obtain certifications from the California Water Quality Association (CWEA), a professional organization providing water and wastewater educational programs.

CWEA offers a Collections Systems Maintenance Certification program for sanitary sewer workers. The certificate has four grade levels, from one to four, and each requires successively more experience and education than the one before. Regardless of grade level, the employee must pass a written test. Grade One requires minimal experience and education, and applies to basic field operations. Grade Four requires the equivalent of a bachelor's degree and at least five years experience in collection systems maintenance, including at least one year of supervisory experience. Grade Four is intended for managers; those with Grade Four certification are expected to be familiar with all aspects of sewer operations and management.

[5] GWDR § C-12-iv-G

Seven of the Division's employees hold CWEA certifications:

Table Four: Current Certifications

JOB TITLE	CERTIFICATION TITLE	GRADE
Superintendent	Collections Systems Maintenance	4
	Environmental Compliance Inspector	1
	Plant Maintenance Technology	1
Supervisor	Collections Systems Maintenance	3
	Environmental Compliance Inspector	1
Source Control Inspector	Environmental Compliance Inspector	4
	Collections Systems Maintenance	1
Sanitation Specialist	Collections Systems Maintenance	3
Equipment Operator	Collections Systems Maintenance	3
Equipment Operator	Collections Systems Maintenance	1
Sewer Program Specialist	Collections Systems Maintenance	2
Senior Maint. Worker (2)	Collections Systems Maintenance	1

As you can see in the table, some employees have gone beyond the minimum qualifications and obtained additional CWEA certifications.

In addition to CWEA training, Division managers encourage employees to obtain training from other sources, such as trade seminars and other professional organizations. For example, Sewer Division employees recently participated in Confined Space Entry training sponsored by the Fullerton Fire Department.

Besides formal training, there are several informal training methods in place. For example, every two weeks, staff members make short presentations on various topics, including safety. Refresher training is offered on topics such as Hazwoper (Hazardous Materials Spill Response), Confined Space Awareness and various other issues. Other training sessions are given by the Fire Department or outside vendors.

Reporting

Federal and state regulations require sewer agencies to:

- implement general monitoring;
- report all sanitary sewer spills;
- take corrective action in response to a spill;
- use adequate maintenance procedures;
- and have a systematic repair and replacement program.

If a public spill reaches a storm drain, the Sewer Division must notify the County Health Department, the State Regional Water Quality Control Board, the County Resource and Development Management Department and the State Office of Emergency Services (if a spill is more than 1,000 gallons) within certain time frames.

Statewide General Waste Discharge Requirements include the requirement that agencies (enrollees) follow various rules and regulations including obtaining an SSO database account, reporting all spills, completing a "Collection System Questionnaire", and updating the questionnaire annually. Failure to adhere to the regulations can result in civil monetary penalties.

The Division's administrative component coordinates all inter-agency monitoring and reporting.

Sewer Program Specialist

To assist in meeting the GWDR's additional requirements, the Sewer Division added a Sewer Program Specialist to the staff. One of the Sewer Program Specialist's primary tasks is to review sewer inspection videos from the camera truck. The Specialist begins this process by transferring sewer videos from the CCTV's portable hard drive to a high-capacity storage device on the City's network. Sewer videos are converted using POSM (Pipeline Observation System Management) software. The converted videos can be viewed using Windows Media Player or similar software. The video footage reveals potential problems such as fractured pipes or tree root intrusion. Identifying these defects allows the Specialist to prioritize and schedule sewer repairs and maintenance.

The Sewer Program Specialist updates and maintains the Sewer Division's geographic information system (GIS) sewer map layer. Sewer pipe maps are approximately ninety percent accurate at any given time. However, rapid development in areas such as Downtown Fullerton and Amerige Heights, plus sewer system improvements, make updating sewer maps a continuous process. *ArcGIS* software allows sewer data to be displayed spatially, which is useful for tracking "hot spots" or problem areas. Additionally, the camera truck's equipment allows the CCTV operator to embed information in the video as it is being recorded. For example, when the operator sees tree roots in a pipe, the point of intrusion can be marked and linked with the appropriate "Asset ID" or segment of pipeline on the GIS map. These points can be imported to the GIS using the POSM software. By analyzing sewer video footage and the data layers displayed in the GIS, the Specialist prioritizes and modifies the maintenance schedule as needed.

Since the City's sewer program and its various subprograms are relatively new, residents and business owners often call with questions about sewer policies. The Specialist responds to questions from the public related to programs such as FOG control by telephone or in writing. The Specialist submits reports to the SARWQCB and provides the agency with necessary information on Sanitary Sewer Overflows. The position also requires some field work. The Specialist occasionally responds to call-outs related to sewer spills to identify hazards. He photographs spills for documentation and investigation purposes. Finally, the Specialist sometimes oversees the work of field staff when the Superintendent or Supervisor are unavailable.

VI-D-2 MAINTENANCE PROGRAMS

VI-D-2.a Combination Vacuum/Jetter Truck Operations

The Sewer Division currently has three vacuum/jetter (combination truck) crews. The trucks pick up (vacuum) waste water and use high-pressure water jets to clean lines and clear blockages. The high-pressure jets use various nozzles for routine cleaning, root removal, or grit removal. Penetrating nozzles clear blockages. The Division rarely uses auger-type cleaners (also known as pipe snakes) because they merely break up debris and move it farther down the line. Hydro-jetting creates much smaller particles that flow more easily.

Photo 1: A combination truck crew performing routine line cleaning

VI-D-2.b Routine Sewer Main Cleaning

The Sewer Division plans routine maintenance using the City's 105-page master sewer map. The maintenance crew cleans and evaluates all sewer main lines on the designated page, with the exception of those locations on a high-risk schedule. The entire city system is cleaned every 18 to 24 months. Routine maintenance is used to evaluate all sewer main lines for problems such as root intrusion or pipe failure.

VI-D-2.c High Frequency Cleaning Program

One of the three combination trucks is assigned to locations requiring high frequency cleaning on a scheduled basis. These are locations with a history of chronic sewer blockages. The blockages can be caused by several factors: high grease content in the waste water (usually from food service establishments); areas where the pipe slope is fairly flat and does not provide the velocity needed to keep waste flowing; pipe sections of low flow, e.g. places where relatively few customers discharge into the system, creating low flow problems; or pipe segments with inverted siphons where grease and debris build up. High frequency locations require cleaning on a regular basis, from once to several times a year. There are currently 450 to 500 high frequency locations in 65 line segments on the high frequency program,.

VI-D-3 Lateral Program

A crew is assigned to mechanically clean private lateral lines known to have city tree root intrusion problems. The program is limited to residential property; the property must meet certain criteria and must have an approved lateral cleanout. The lateral crew uses mechanical rodding equipment with various blades for different situations. After clearing the line, the crew records the location and footage on its daily work report for data entry. Currently there are approximately 1,100 residences on the lateral list. The crew tries to clean each lateral once a year. The division feels providing annual lateral maintenance is more cost effective than removing and replacing street trees. If a street tree is causing excessive infrastructure damage (e.g. constantly clogging sewer lines, uplifting sidewalks and gutters) it may be removed.

Photo 2: The lateral rodding crew responding to a commercial lateral blockage that threatened to enter a public drain.

To verify roots from a City-owned tree are responsible for a lateral block, the lateral crew uses a portable CCTV unit to inspect the lateral and confirm tree roots are the cause of the blockage.

VI-D-4 Fats, Oils and Grease Control Program

The Sewer Division has one Source Control Inspector assigned to the Fats, Oils and Grease (FOG) program. Three positions are budgeted but two remain vacant until the program is fully staffed The FOG program includes contacting and inspecting all food service establishments (FSE's) to ensure the kitchen staff uses best kitchen management practices to avoid sanitary sewer overflows. The City has approximately 400 food service establishments.

The Source Control Inspector inspects all food service establishments once a year to ensure they are complying with FOG ordinance provisions. FSEs that violate the FOG ordinance may have their discharge permits suspended or revoked. Violators may also be subject to disconnection from the water supply system, and other penalties and fines, including criminal charges.

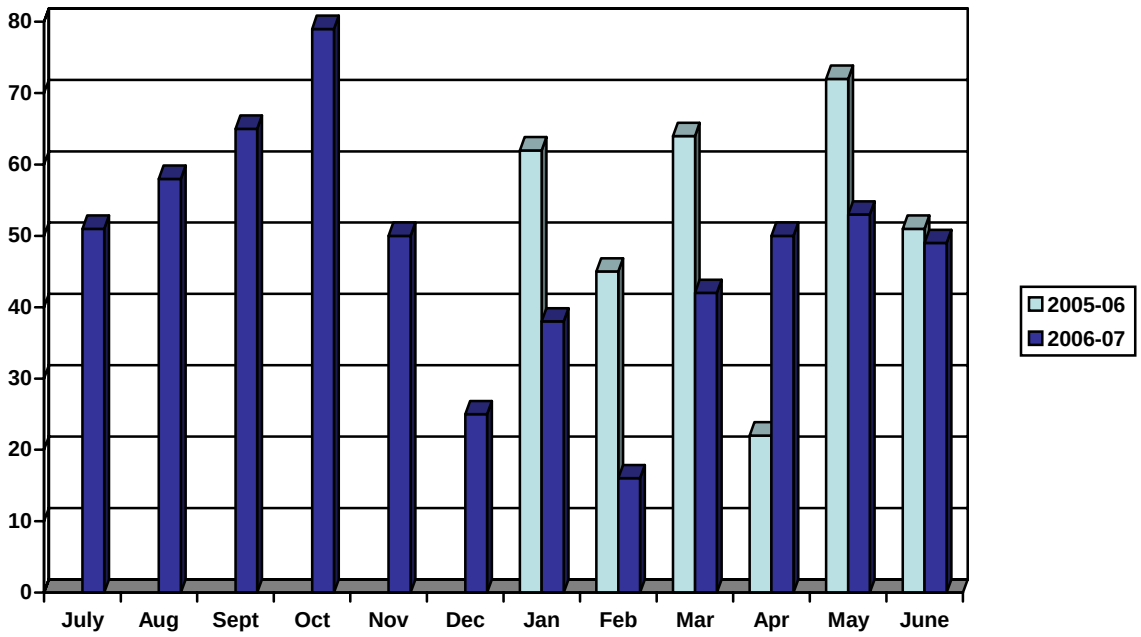
Since the FOG requirements are still fairly new, the Sewer Division takes an educational, rather than a punitive, approach. The Inspector educates FSEs on the requirements for grease interceptors/traps and proper interceptor maintenance. If the Inspector finds violations, he schedules a follow-up inspection to ensure the FSE has made corrections. Along with restaurant and food service inspections, the Source Control Inspector provides public education about the program and the proper care, handling and disposal of grease products; responds to complaints; and works with City and outside agencies to resolve FOG issues.

Photo 3: The Source Control Inspector meeting with Morningside kitchen staff

The Source Control Inspector maintains the inspection schedule, meets all reporting requirements and makes additions/changes to the schedule as FSEs open, close, or change ownership or operations.

Chart Three reflects the number of inspections completed since the FOG program's inception in 2005:

Chart Three: FSE Inspections by Month



Included in the inspections shown above are:

- Routine Inspections
- Follow-up Inspections
- Spills
- Private
- NPDES
- Complaints
- Administrative
- Used Oil Disposal
- Public Education

Each type of inspection is described below:

- A routine inspection usually includes the initial inspection of the establishment to make sure best practices are being employed, a grease interceptor is in place, a permit has been obtained, and employees have been trained on proper grease disposal practices.

- A follow-up inspection verifies any noted deficiencies or violations have been corrected; a follow-up inspection can also be the result of a complaint.

- On a spills inspection, the Source Control Inspector evaluates the nature and cause of a spill, the compounds involved, works with a field crew to contain the spill, calls other agencies for assistance, determines responsibility for the spill, and/or photographs and documents the event.

- Private spills have not reached or impacted public property. The inspection can entail standing by to ensure the spill does not reach public property, informing the responsible party of its obligation to clean up the spill and/or providing direction on how to mitigate the spill.

- An NPDES spill is any spill that impacts the public right-of-way. An NPDES inspection entails determining the source of the spill, the spill's contents, a threat assessment to determine the effects on the environment and/or public, determining the agencies that need to be contacted, and ensuring the responsible party has properly contained and cleaned the spill.

- Complaints can range from reports of a spill or suspected illegal discharge to an odor complaint or report of abandoned chemicals. This inspection might include determining responsibility when a violation has occurred, contacting other agencies and/or departments and any necessary follow-up inspections to ensure the complaint has been resolved.

- An administrative inspection might be any one of the following: a visit to an FSE that is delinquent in paying its annual permit fee; reviewing records; providing copies of brochures; distributing the Fats, Oils and Grease program CD; providing lists of waste haulers and clean-up companies; explaining program fees.

- Used oil disposals result from abandoned used motor or cooking oil, usually in some type of container. The inspector tries to determine the source of the abandoned or dumped oil. The inspector usually writes a report and takes scene photos; he or a contractor transports the oil to a hazardous waste disposal site for proper handling.

- Public Education visits to food service establishments include the following topics:
  - FOG program requirements
  - Maintenance of grease interceptors and grease traps
  - Waste hauling requirements
  - NPDES requirements
  - Sewer line maintenance requirements
  - Proper documentation and records retention
  - Employee training
  - An inspection of the facility to show owners and managers the areas of their facility that are inspected and why they are inspected
  - Information on what to look out for after having a grease disposal contractor do work on their facility
  - Liability information in terms of spills or illegal discharges
  - Enforcement response plan explanation
  - Fee explanation
  - Records review process information
  - Responsibility of the owner to mitigate spills
  - Cleanup requirements and responsibilities in case of a spill

VI-D-5 CCTV Program

The Sewer Division has one closed circuit television (CCTV) camera truck crew whose responsibility is to video tape sewer mains to determine their condition and the sources of problems. Naturally, suspected hot spots and emergencies take precedence over routine camera work.

Before a main line can be videoed, one of the cleaning trucks cleans the line to give the camera a better view of the pipe's condition and to prevent obstructions from blocking the camera's path.

As part of its routine work, the crew inspects manholes as the covers are removed for CCTV access. The crew notes the manhole's condition on a "Manhole Inspection Report". If it is damaged, the manhole may be placed on a schedule for replacement during sewer main repairs, or replaced immediately of it is a safety hazard. It is not cost-effective to repair a manhole lid, so they are replaced if they are damaged. Replacement lids are installed during sewer main repairs.

VI-D-5-a Hydro-Jetting

The services of the jetting crew are essential to ensuring the success of the CCTV crew in capturing video footage of sewer pipes. The pipes must be relatively clear of blockages for the sewer camera to travel through the pipe. The jetting crew consists of two employees who operate a combination jetter/vacuum truck. Each morning, the crew fills the truck's jetting tank with 1,200 gallons of water from a fire hydrant. The crew reports to the assigned site and positions the truck so the jetting line can be lowered into the manhole and inserted into the sewer line. Water is then forced through the line under approximately 2,000 of pounds of pressure per square inch. The intensity of the water pressure clears most types of blockages and restores water flow in the lines. The crew uses a device called a "tiger tail", a heavy rubber jacket that surrounds the pressure hose where it enters the sewer line. The tiger tail protects the pressure hose from abrasion and assists in guiding the jetting hose into the line as well as removing the hose once jetting is complete.

This combination truck can also vacuum overflow from sewer blockages when necessary. Collected waste is separated into solid and liquid waste tanks as it is vacuumed into the truck. Liquids are re-released into the sewer line or sometimes used for jetting. Solids are generally stored in special containers at Basque Yard. Once all of the containers have been filled, the solid waste is taken to the Orange County Sanitation District in Fountain Valley for permanent disposal.

VI-D-6 Capital Repairs

During the CCTV process, the camera crew looks for structural damage, capacity issues and potential SSOs in the lines. Structural defects are assigned a numeric value. These values, in addition to other considerations (roadway crossings, proximity to buildings, diameter, flow volume, and access) are weighted to form a risk assessment in a software program called PISCES.

The Sewer Program Specialist compiles the data to determine if there are areas where high priority problems are grouped together. Several problems in the same area usually indicate issues requiring capital repairs or replacement. Once an area is identified, Sewer Division managers send a report to the Engineering Department, which evaluates the problems and creates a capital project. Engineering tries to make repairs/replacements coincide with major street reconstruction projects. It is more cost-efficient to design and replace the sewer mains in a basin pattern than to have replacements spread over a wider area.

Section VII: SUMMARY

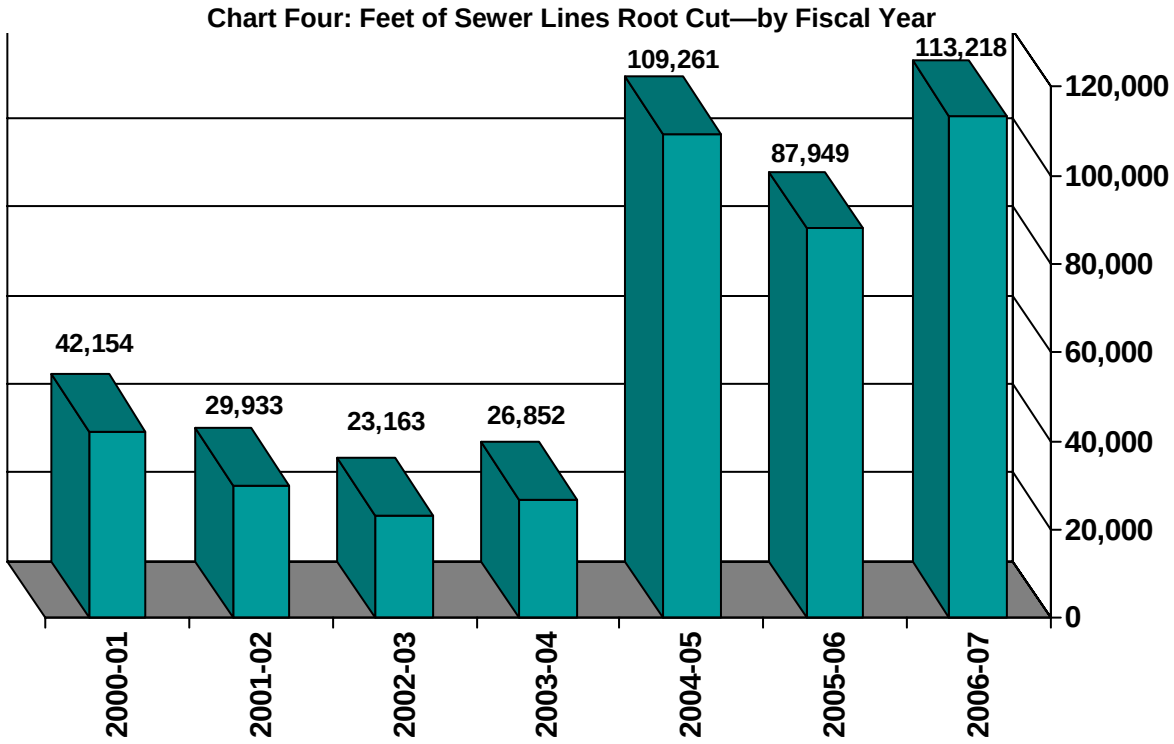
VII. SUMMARY

The purpose of the Summary Section is to compare the information from the Program Description with actual observations. The observations include work site visits, records reviews, interviews, and historical performance data. The Summary Section provides the detailed information needed to perform a thorough program analysis.

VII-A Performance Measures

VII-A-1: Root Cutting

The analysis team reviewed the Sewer Division's work records for the past several years to see if production has increased since program expansion began in 2003. The first measure the team examined was root cutting:

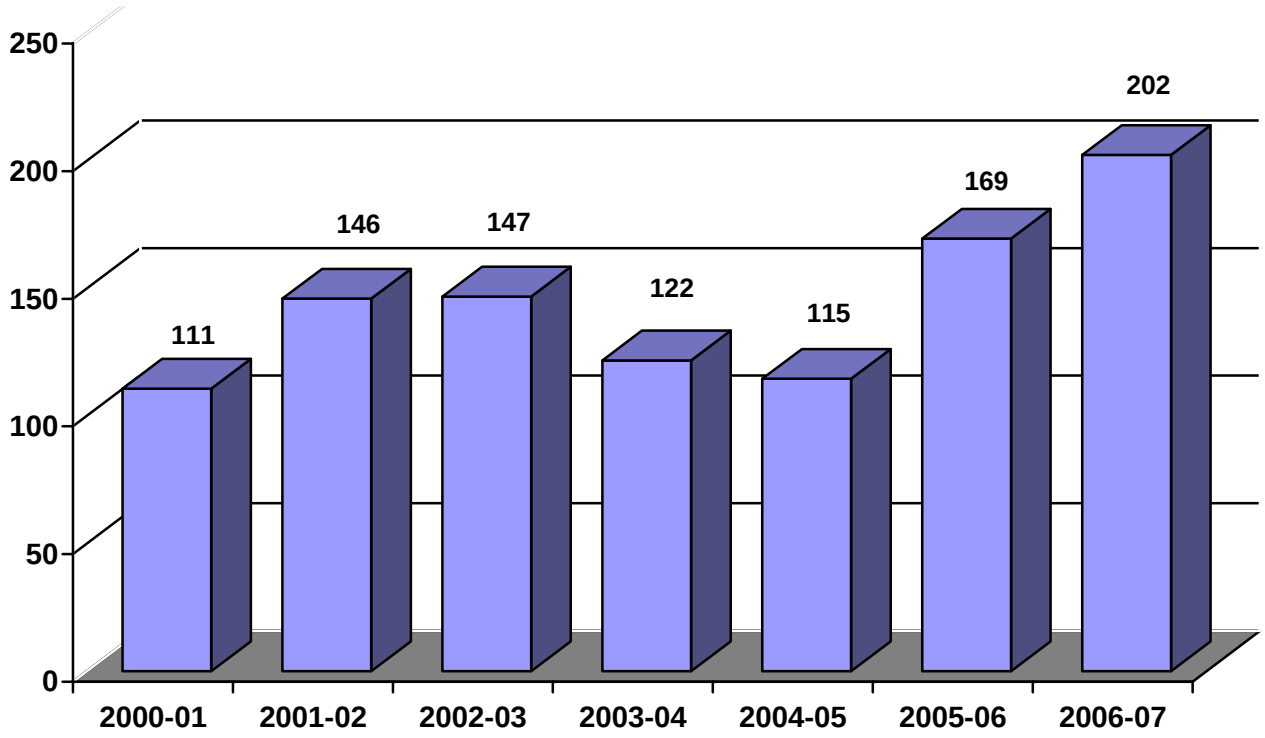


As you can see in Chart Four, mechanical root cutting increased from 42,154 lineal feet in fiscal year 2000-01 to 113,218 in fiscal year 2006-07, an increase of 168%.

VII-A-2: Hydro-Jet Cleaning

The analysis team next measured the increase in hydro-jet cleaning, the primary method of cleaning main lines:

Chart Five: Miles of Sewer Lines Hydro-jet Cleaned—by Fiscal Year



As you can see, there has been an increase in hydro-jetting production. In FY 2000-01, crews cleaned 110 miles of sewer lines. In FY 2006-07, the amount increased to 202 miles, (83%), using two additional trucks.

The numbers in Chart Five do not include cleaning performed during contract CCTV work from FY 2003-04 through FY 2004-05. They reflect only routine cleaning by Sewer staff. The initial cleaning and video inspection by the contractors included more than 176 miles of sewer main.

VII-A-3; Sanitary Sewer Reporting Results

Both the WDR and the GWDR require the City to report all sanitary sewer overflows (SSOs), public and private, reaching the public right-of-way, to the Santa Ana Regional Water Quality Control Board (SARWQCB). Table Five reflects sanitary sewer spill reporting results for the 2002-03 through 2006-07 fiscal years.

Table Five below shows Sanitary Sewer Overflows and resulting reporting during fiscal years 2002-02 through 2006-07. For example, in fiscal year 2004-05, there were a total of 29 sanitary sewer overflows, 11 of which reached storm drains, and therefore needed to be reported to an agency. Six of those 11 spills were reported on the same day the spill occurred, two were reported one day after the spill

occurred and three spills were reported within 3 days of the respective spills. All reportable spills (those reaching a storm drain) were reported within the required timeframes. The other 18 spills did not require reporting to any agency since they did not reach a storm drain and were appropriately cleaned up.

Table Five: SSO Reporting to Agencies by Fiscal Year

Fiscal Year	Total Number of Spills	Spills Reaching Storm Drain		Number of Days From Spill Begin Date To Spill Reported to Proper Agencies										No Reporting Required
		Public	Private	**Same Day**	**1**	**2**	**3**	**4**	**6**	**8**	**13**	**20**	**40+**	
2002-03	32	7	0	12	6	3	1	1	1			1	2	5
2003-04	32	8	1	4	3	1		1						23
2004-05	29	9	2	6	2		3							18
2005-06	14	3	7	7	4		1							1
2006-07	12	5	1	6	1									5

As previously mentioned in the Program Description, all sanitary sewer overflows equal to or exceeding 1,000 gallons, or a spill discharging to a drainage channel and/or surface water, must be reported online to the State Water Resources Control Board database within three business days. Division records indicate all instances of this type of spill were reported within the required timeline. A final certified report was completed and filed with the Board within 15 calendar days of the conclusion of each SSO response and remediation. Also, the Office of Emergency Services was notified of all spills greater than 1,000 gallons. Records also indicated every other spill not reaching a drainage channel, surface water, or storm drain resulting from a failure in the sanitary sewer system was reported to the State Water Resources Control Board within 30 days of the end of the calendar month in which the spill occurred. In all cases of a restaurant grease spill or an SSO reaching a storm drain and/or any surface water, staff notified the Orange County Health Care Agency.

Tables Six and Seven show the approximate gallons per spill for the years 2000-01 through 2006-07.

Table Six:
City Sewer Main Spill Size 2000-01 Through 2006-07

GALLONS SPILLED	00-01	01-02	02-03	03-04	04-05	05-06	06-07	Grand Total
0 – 200	27	14	24	19	16	1	2	
201-400	2	1		4	4		3	
401-600	1		1	2	1	2		
601-800	2			1	2	1	2	
801-1000	2	1			1	1		
1001-3000	1			1	1		2	
3001-6000		1			1			
6001 +	1							
Total	36	17	25	27	26	5	9	145

Table Seven:
Private Lateral Spill Size 2000-01 Through 2006-07

GALLONS SPILLED	00-01	01-02	02-03	03-04	04-05	05-06	06-07	Grand Total
0-200	2	4	7	5	1	4	2	
201-400							1	
401-600	1							
601-800					1	3		
801-1000					1	1		
1001-3000								
3001-6000						1		
6001 +								
Total	3	4	7	5	3	9	3	34

Grand Total of Public and Private Spills	**39**	**21**	**32**	**32**	**29**	**14**	**12**	**179**

As you can see by reviewing Tables Six and Seven, the number and size of spills has decreased over the past few years.

VII-A-4: Management Controls

Below is a list of work codes and units of measure used by sewer crews for fiscal years 2005-06 and 2006-07 and entered into the maintenance management system.

Table Eight: Works Codes, Units, and Production

Description	Units	2005-06	2006-07
Cleaning	Each	67	69
Preventative Maintenance	Feet	1,321	1,192
Small Equipment Maint	Hours	247	261
Large Equipment Maint	Hours	N/A	34
Lateral Line Cleaning	Each	N/A	150
Main Line Cleaning	Feet	1,321	130,570
CCTV Lateral	Each	185	195
CCTV Main	Feet	N/A	23,286
General Repairs	Hours	497	222
Wash Down/Clean Up	Hours	N/A	36
Preparation/Clerical	Hours	1,236	1,109

Table Eight: Works Codes, Units, and Production

Description	Units	2005-06	2006-07
Direct Inspection – No SR	Each	32	237
SR Response – site	Each	0	37
Public Education	Hours	N/A	33
Routine Traffic Control	Hour	N/A	4
Spill Response-Non Sewage	Hour	N/A	1.5
Emergency Repairs	Hours	N/A	5
Supervision	Hours	6,433	4,924
Inspection	Each	N/A	8
Indirect Inspection	Hours	366	240.5
Admin Support/Disp	Hours	374	118
Comp Time	Hours	637	847.1
Other Paid Leave	Hours	677	678
Holiday	Hours	8,674	11,343
Clean Up	Hours	721	371
Wash/Maint/Fuel Vehicle	Hours	1,477	1,182
Meetings	Hours	1,389	1,725
City Business/Appointment	Hours	N/A	29
Training	Hours	2,092	3,999
Sick Leave Personal	Hours	4,696	5,005
Sick Leave Family	Hours	2,429	1,228
FMLA Medical Leave	Hours	N/A	596
Vacation	Hours	11,943	13,423
Injured On Duty	Hours	269	568
Non-Paid Leave	Hours	417	354

The information above does not reflect all the actual work performed by sewer staff over the past two years. According to the Sewer Supervisor, units were tracked separately and not recorded in the Workmanager system. Looking at the numbers recorded in the system, it would appear the division would not have met any performance measures for the year. However, in June 2007 a new daily work report was distributed to Sewer Division staff to more accurately reflect the work performed. The new work report includes updated units of measure and new reporting instructions. The “Cleaning” work code has been eliminated since “Cleaning” and “Preventative Maintenance” covered the same duties. The new code combining both of these work codes is “Main Line Cleaning” and has been used since July 1, 2007, with “feet” as the unit of measure.

Often, routine maintenance is interrupted by situations that take crews off their regularly-assigned duties, reducing crew performance. The time spent away from regular maintenance was not tracked, nor were the units of measure performed during the interruptions. As of July 1, 2007, division managers created new work codes and project numbers to more accurately account for the time crews have been drawn away from their regular tasks.

Work for other Maintenance Services divisions also takes crews off routine maintenance. The Sewer Division has frequently assisted other departments without charging labor or equipment to requesting departments. Beginning July 1, 2007, the new timecard will have appropriate codes to track work performed for the following divisions and/or departments:

- Street Division
- Water Division
- Facilities Division
- Landscape Division
- Equipment Division
- Engineering Department
- Community Development Department
- Other City Departments
- Other Public Agency or City of Fullerton Private Contractor (plumber)
- City-hired Contractor

Work performed for other divisions/departments includes:

The Street Division frequently asks for the combination truck to clean clarifiers in the City Yard. Also, the truck will vacuum catch basins and storm drains. The CCTV crew is sometimes asked to video tape storm drains to determine their condition. In fiscal year 2007-08, the Street Division has funded the purchase of a combination truck to performs drain cleaning, thereby eliminating the dependence of the Sewer Division's trucks and crews.

Many Sewer crew members are former Water Division employees, and in the event multiple water main breaks occur, those crew members assist with repairing the breaks since they are experienced in the repair process. Sewer crews are called to assist with cleaning up water main breaks. The vacuum truck is requested to wash down the streets. Vaults housing water valves are sometimes filled with water and debris; the vacuum truck is used to clear out the vaults.

Photo 4: The line cleaning crew at work as a member of the analysis team looks on

The Facilities Division occasionally requests assistance in clearing City lateral lines in parks and public buildings when its crew cannot clear the lines.

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The Landscape Division sometimes requests clearing drainage swales that fill with mud and debris. The vacuum truck clears swales.

The Engineering Department frequently requires assistance from the Sewer Division for CIP projects by requesting CCTV service instead of hiring a contractor. The only costs charged to the Engineering Department had been for any overtime used. Beginning July 1, 2007, the Engineering Department will be charged regular Sewer crew time for any assistance during work hours. Engineering also requests CCTV services to determine the storm drain condition. The crew also spends significant time clearing sewer main blockages that were a direct result of CIP construction projects.

Community Preservation occasionally requests assistance from the Source Control Inspector concerning environmental inspection issues.

Occasionally the Sewer Division is called by citizens requesting assistance after their plumbers have jammed their equipment in the lines during lateral cleaning.

All of these "assists" add up to a substantial number of hours and resources put into work for other departments, taking crews off regular assignments and negatively impacting performance goals.

VII-A-5.a Inventory Control

Fullerton has a gravity-driven sewer system, so there are no lift stations to maintain. Therefore, a minimal parts inventory is kept on hand for repairs and maintenance. The equipment inventory and shelf item inventory are maintained in an MS Access database by Division staff. Fullerton's current Sewer System Management Program (SSMP) lists all equipment being used by the department.

VII-A-6 Orange County Sanitation District (OCSD) City and Agency Collection Facilities Operations and Maintenance Survey – FY 2004-05 Data

For the past nine years, the Orange County Sanitation District has conducted a Collection Facilities Operations and Maintenance survey. OCSD compiles the responses and sends them back to the agencies. The survey results are an excellent resource of information and for learning from other agencies' successes. The analysis team extracted data from agencies with gravity sewer systems and those cities with 1,000 linear feet or less of forced main lines. The table below shows survey results.

Table Nine: OCSD City and Agency Collection Facilities O & M Survey FY 2004-05 Data

							SSOs		BUDGET	
CITY	PIPE AGE	MILES OF SEWER	PIPE DIAMETER	FSE'S	DAILY MGD DISCHARGED	FIELD FTES	PUBLIC	PRIVATE	OPS, MAINT, MINOR REPAIR	CAPITAL IMPROVEMENT
Anaheim	1911-2003	554.17	4" - 39"	1060	50	10.5	9	19	2,200,000	200,000
Brea	1925-1999	108.5	4" - 27"	175	?	2	3	0	30,000	104,000
Buena Park	1930-2002	168	6" - 18"	220	9.5	3	4	12	151,470	220,000
Fountain Valley	1961-2002	133	4" - 24"	220	7	2	0	6	566,000	100,000
Fullerton	1913-2004	285	6" - 16"	300	7 - 11	6	26	3	1,893,750	415,000
Garden Grove	1922-2005	320	8" - 24"	645	20	8	10	27	2,311,900	1,170,000
La Habra	Unk	115.6	4" - 30"	120	6.4	11	11	7	775,000	0
La Palma	30 years	25	6" - 18"	25	1.7	0.5	5	2	333,900	0
Orange	1922-2000	313	3" - 24"	400	14.6	2.5	25	13	132,000	0
Placentia	1950-2000	76	8" - 18"	101	4.7	3	0	3	60,000	0
Rossmoor/ Los Alamitos Sewer Dist	1954-2000	56.7	8" - 18"	72	2.7	0	0	0	85,000	45,000
Santa Ana	1919-2005	390	4" - 24"	700	31	10.7	6	2	2,290,235	1,470,000

Table Nine: OCSD City and Agency Collection Facilities O & M Survey FY 2004-05 Data

							SSOs		BUDGET	
CITY	**PIPE AGE**	**MILES OF SEWER**	**PIPE DIAMETER**	**FSE'S**	**DAILY MGD DISCHARGED**	**FIELD FTES**	**PUBLIC**	**PRIVATE**	**OPS, MAINT, MINOR REPAIR**	**CAPITAL IMPROVEMENT**
Stanton	1955-1996	55.4	8" - 24"	125	4.1	3	0	0	265,000	8,500
Tustin	1942-2000	51.5	8" - 12"	160	7.29	1.5	2	1	54,000	0
Villa Park	1960-1995	25	6" - 15"	7	0.8	0.2	1	0	31,940	250,000
Yorba Linda	1930-2005	152	8" - 15"	90	4.4	3.5	6	1	375,040	1,098,540

Table Nine shows agencies are in different phases of expanding their sewer maintenance programs to meet the GWDR/WDR requirements. The analysis team believes it is too early in the process to be able to make meaningful comparisons amongst cities and agencies. For example, Fullerton's policy has always been to report all SSOs to the proper agencies, (based on direction given the City by the EPA and state Water Board staff). Some cities may not have reported all of their SSOs before FY 2004-05. The new GWDR/WDR rules contain specific reporting requirements, and future surveys should reflect reliable SSO counts for all agencies.

VII-B: Summary Of Field Observations

VII-B-1 Summary of CCTV Field Observation

The analysis team observed the CCTV crew during a routine maintenance inspection. CCTV crew procedures are as follows:

- The CCTV crew consists of two members.
- In orange safety vests, crews place traffic cones around the working area and remove the manhole cover.
- One crew member, wearing safety gloves, readies the camera by checking wheels, cables, cleans the lens if needed, and places a cable guide in the manhole.

Photo 5: The self-propelled sewer inspection camera

- The second crew member operates the camera's computer inside the CCTV truck and checks equipment. As the camera moves down a sewer main, this crew member uses controls to move the camera lens.

- The camera is self-propelled and does not need to be pulled by a cable from one manhole to the next. The camera operator can remotely control the camera's speed, lens angles, and zoom feature.

- The camera's guidance computer records the location, distance, date, and time of the inspection. The camera operator can insert comments into the video, either by using a pull down menu of common issues (e.g. lateral locations, cockroach infestations, etc.) or through a microphone.

- The camera is lowered into the manhole and is pointed against the direction of the water flow toward the next manhole. The camera travels down the sewer main, recording video and statistics.

- Should the camera reveal a blockage, the crew calls the office for a jetter truck to remove the clog. The jetter usually arrives within 20 minutes. After removal of the blockage, the CCTV camera is re-inserted in the sewer main to ensure complete debris removal.

- Before beginning the inspection, the camera operator centers the lens in the manhole. When the camera reaches the next manhole, the operator once again centers it in the manhole, and notes the distance the camera has traveled. Using the centering method provides very precise measurements for locating laterals along the line. For example, the operator said he once located more than a dozen laterals for a capital repair project, and gave the locations to the contractor. The locations were precise within five inches, allowing the contractor to save time and money by making fewer and smaller excavations.

- Video is recorded on a hard drive and given to the Sewer Program Specialist for logging and filing. If pipe failures, cracks or blockages are discovered during taping, the CCTV crew notifies the sewer division's managers of the conditions and locations.

- Upon completing a segment, the operation moves to the next manhole site and repeats the process.

The CCTV crew can be called off regularly-scheduled maintenance to respond to spills and/or blockages discovered by jetting crews. Upon removal of blockages by jetter crews, the CCTV camera is used again to ensure complete debris removal.

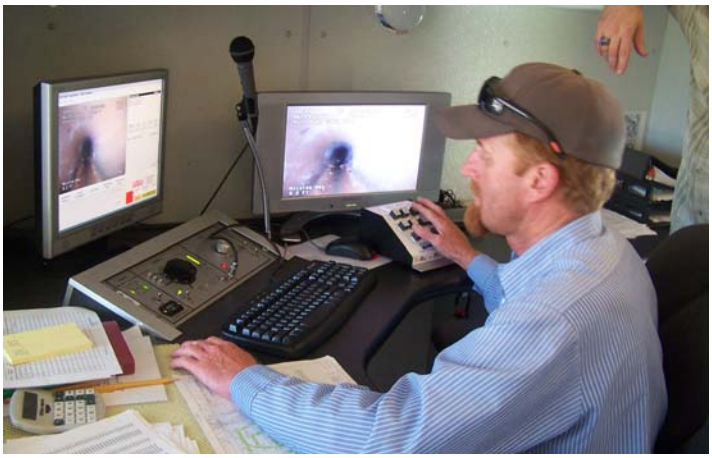


Photo 6: The CCTV camera operator controls the sewer camera from a workstation inside the truck

VII-B-2 Summary of FOG Inspection Site Visits

On May 29, 2007, analysis staff met the Source Control Inspector at three locations to get a first-hand look at some of the processes involved in the Fats, Oils and Grease Program.

Spill Inspection

The first inspection was a visual inspection of two grease bins that had overflowed during the weekend. The bins serve three restaurants. Waste kitchen oils and grease were stored in the bins for removal by a contract grease hauler. The spill had been reported over the weekend and a member of the Sewer Division was dispatched to apply an absorbent material over the grease to ensure the spill did not reach the public right-of-way. The area had a thick layer of grease and absorbing material surrounding the grease bins. There were also three five-gallon buckets with varying levels of used oil in the area. The owners were not on-site at the time of the inspection, so the Source Control Inspector said he would return to the site to address the issue with the owners.

Follow-up Inspection

The second inspection was conducted at an assisted living facility that had previously been instructed to remove a food grinder in their kitchen. The inspection confirmed the food grinder had been removed as requested and the facility was in compliance with all regulations.

Initial Inspection

The analysis team accompanied the Source Control Inspector on an initial inspection and orientation meeting at the Morningside retirement complex. The inspector met with the head chef, the kitchen manager and the director of Morningside's physical plant. Before beginning the orientation meeting, the inspector toured the kitchen, and explained some of the key features he was looking for: screens over drains, proper food disposal into garbage cans and no waste disposers. He found one waste disposer and wrote a citation requiring it to be removed within 30 days. Morningside is a large facility and has two kitchens; one was inspected before the orientation meeting and one was inspected after.

The Source Control Inspector met with the Morningside staff to review the City's "FOG Program Information" binder. The inspector gives each food service establishment the binder during his first visit. The Inspector explained to the staff Morningside had not yet been inspected because most retirement and nursing facilities are on a lower priority than full-service restaurants. He stated the purpose of the first visit was to perform an initial kitchen inspection, and to explain the City's FOG control program.

The inspector reviewed the material in the binder:

- Best Kitchen FOG Control Practices: To be used for employee training. These are checklist-style sheets kitchen managers can use during employee training, and to which the employee can refer during the course of work. The information sheets are translated into four languages: English, Spanish, Korean, and Chinese.

- Training Log Sheets used by employers to certify their kitchen employees have been trained on best kitchen practices for grease control. Training is required every six months.

- Grease Interceptor Maintenance Log: The Inspector wants interceptors cleaned at least every three months for the first year to establish a baseline for grease loading. After the first year, the cleaning interval may be increased or decreased depending on how often it reaches capacity. Kitchen managers use the maintenance log to record the date the interceptor was cleaned, the

company performing the cleaning service, and how much material was removed. The facility must keep the cleaning contractor's receipts as verification.

- Recycled Grease Log: Some types of cooking grease can be captured and recycled by approved recycling companies. The log records the date, company, the amount of grease taken, and its ultimate destination. Kitchen managers must keep the hauler's receipts for verification.

- Fume Hood Filter Service Log: Fume hoods are large vented hoods above commercial ranges. Fans vent smoke and fumes through the hood and out a roof vent. Fume hoods have filters that catch evaporated grease before it enters the vent system. The filters must be cleaned so the fan can vent fumes efficiently; excessive grease can also create a fire hazard. The service log is used to record filter cleaning/replacement and to verify the facility staff regularly inspects the ductwork for grease build-up.

- Lateral Sewer Line Maintenance Log: Facility managers use this log to record maintenance such as routine and emergency lateral cleaning of the lateral connection.

- Grease Interceptor Graphics: Include a diagram of a typical interceptor, plus maintenance requirements: there is a 25% limit on grease or solids in the trap. The graphics can be used by facility managers during employee training.

- Waste Discharge Restrictions: A copy of the FOG control ordinance and examples of some simple FOG control measures, such as scraping plates and wiping down pots and pans.

- Outside Drain Information: A sheet explaining the prohibition against cleaning floor mats near drains that discharge to the storm drain system. The sheet also includes best management practices for any outdoor cleaning processes.

- A List of Approved Interceptor Pump Companies and Grease Recyclers. The list provides contact information for properly licensed haulers.

- A FOG Control Practices Poster: to be posted in a conspicuous place in the kitchen.

After reviewing the binder's material, the Source Control Inspector answered questions from Morningside's staff. He then inspected the facility's second kitchen and concluded the visit.

Photo 7: The Source Control Inspector checking a drain for grease build-up during the Morningside inspection.

Grease Interceptor Inspections

On May 30, 2007, the analysis team accompanied the Source Control Inspector to two locations to observe grease interceptor inspection procedures.

The first inspection took place at a McDonald's restaurant. The interceptor passed inspection and it appeared the restaurant was following proper interceptor maintenance procedures. However, one of the access lids was damaged and could not be opened. There was a white powdery substance on the rim of the broken lid, which is evidence of the presence of Hydrogen Sulfide (H_2S). Hydrogen Sulfide forms when a grease interceptor or sewer pipeline has insufficient flow to move waste matter through the system. Stagnant waste reacts with water and air to form an acidic gas, Hydrogen Sulfide. H_2S erodes concrete, causing structural damage to the interceptor. The Inspector told the McDonald's manager to contact the company's grease hauler and have the interceptor cleaned, and to replace the lid. The Inspector told the manager he would return in 30 days to check on the status of replacing the interceptor lid.

The second inspection took place at the Fullerton Country Club and Golf Course. One of the interceptor's intake pipes was broken inside the tank area. It appeared that when a grease hauler inserted the hose to extract the grease and water, the cross pipes were dislodged, making the entire interceptor ineffective and leaving a pool of rotting grease and sediment. This mix of grease and sediment became stagnant and a rancid odor could be detected several feet from the interceptor. The second interceptor lid was sealed shut with some type of adhesive, making it impossible for the Source Control Inspector to open the lid to make an inspection. The Inspector advised the manager to have both items corrected and that he would return in 30 days to follow up.

VII-B-3 Summary of Vacuum/Jetter Truck Observations

On July 23, 2007, the analysis team observed a two-man hydro-jetting crew performing routine preventive sewer maintenance on Camino Del Sol, just north of Rosecrans Ave. When the team members arrived the crew had attached a large hose to the back of a 1,500-gallon Aqua-Tech truck, and inserted the hose in a manhole. Fastened to the hose's end was an aluminum jet nozzle that created a powerful, direct water flow of about 1,800 pounds per square inch (PSI) into the eight-inch diameter pipe.

Upon completing the hydro-jetting process of the first length of the sewer line, the Aqua-Tech's crew moved approximately 230 feet down the street to the next manhole in the direction of flow. One member of the hydro-jetting crew used a hammer to loosen and lift the manhole cover. Covers can weigh from 60-300 pounds, so the employee is careful to use proper lifting techniques. When the analysis team looked into the manhole, there were no signs of a blockage, but rather smoothly-flowing water in the pipe. The hydro-jetting process began by lowering the hose into the manhole and sending the jetter up the pipe against the direction of flow, toward the previously cleaned section. The crew slightly overlaps each cleaning segment to ensure the line is cleaned as thoroughly as possible.

The 600-foot hose was in the line for approximately one minute, and when raised back to the surface, there was but a single small weed caught on the tip of the nozzle, indicating very little debris present in the sewer pipes.

On July 16, 2007, the Sewer Supervisor notified the analysis team of a major sewer blockage on Magnolia Avenue at Carol Drive, just south of Commonwealth. When team members arrived, they observed a pile of what appeared to be rocks lying next to an open manhole. Upon closer inspection, the "rocks" were shown to be large chunks of congealed grease removed from the sewer line. During a

routine preventive cleaning, the vacuum truck crew lifted a manhole to discover the water level was nearly at the top of the manhole. The crew immediately notified the supervisor and moved farther downstream to assess the extent of the blockage. After opening a few manholes, the crew found no blockages, but very low flow.

The blockage had been caused by excessive grease discharged into the sewer line. The grease congealed on the sewer pipe's walls until its own weight caused it to break away in sheets, forming the large "rocks" observed by the analysis team. The supervisor called an additional crew to help; as one crew forced the grease down the line with the jetter, the other used rakes to pick the grease chunks from the manhole. Based on the severity of the blockage and the amount of grease retrieved, the supervisor estimated the grease filled most of the pipe and formed a "dam" several dozen feet long.

There are several large-scale food processing facilities north of the blockage site; the Source Control Inspector is investigating to determine if the source of the excessive discharge can be identified. The line had been cleaned less then six months before, so the large quantity of grease in the line indicated an industrial establishment was not properly treating its waste before discharging it into the sewer system.

In addition to the grease "rocks", the sewer crew recovered a small plastic gasoline can from the manhole. Since the can's source and contents could not be identified, the Sewer Supervisor called the Fire Department's Environmental Compliance Specialist for advice. The Specialist asked one of the sewer crews to take the can back to the City Yard, where it could be stored as a hazardous substance until the contents were identified. Whenever a field crew finds a container with unknown contents, it is treated as hazardous until its contents are examined.

The incident shows the value of regular preventive maintenance; had the vacuum truck crew not been there for routine cleaning, the block could have easily resulted in an SSO. The large grease "rocks' were a vivid example of the consequences of discharging waste grease into the sewer system, and of disposing trash (e.g. the gas can) in manholes. Both the field crew and supervisor said it is not unusual to find all forms of refuse in manholes, from regular trash to construction debris.

Photo 9: Container discarded in sewer line

Photo 8: Grease "rocks" removed from Magnolia sewer line

VII-B-4 Summary of Lateral Rodding Field Observation

On August 29, 2007 the analysis team observed the sewer lateral crew cleaning a residential drain. On the site were a two-man lateral crew, the Sanitation Specialist and the resident. The resident had a cleanout installed at the front of the house.

The Sanitation Specialist explained the resident called about the same issue before this date, and had the line rodded, but the clog had re-occurred twice. Since the property was not yet on the routine lateral cleaning list, a CCTV camera was going to be placed down the lateral after rodding to ensure the line was cleaned, and street tree roots were the source of the clog. On regularly-scheduled lateral cleanouts, the line is rodded, and if the line appears to be clear, no video is recorded.

Photo 10: The rodding machine operator shows the two types of cutting heads: the finisher on the left and the bullet on the right.

As sites are assigned, the crew checks the lateral's length on the appropriate sewer map. The crew readies the spiral steel rodding cables (15-foot segments that are joined and inserted in the cleanout), attaches the cutting blade (referred to as the "bullet") to the end of the cable and runs the assembly through the lateral rodding machine, which spins the cleaning head as it goes down the lateral. As the rodding cable goes down the lateral, a crew member guides it into the lateral. When he feels resistance, the crew member pulls the cable back a few feet, runs it back through and repeats the process until the lateral feels clear.

This process is performed the entire length of the lateral; this day's line was approximately 52 feet long. After clearing the line, the rodding machine operator inserted a water hose into the cleanout access and ran clear water through the lateral. Crews run water down the line for two reasons: 1) to ensure the line is clear and 2) to wash off the rodding cable and cutting blade as they are pulled from the lateral. The operator then changed the cutting blade to a "finishing" blade, a spring-loaded blade that opens to the diameter of the pipe as it spins, insuring any roots pushed or bent aside will be cut. The rodding cable was re-inserted into the lateral until it reached the sewer main. The rodding process can take up to an hour, depending on the size of the obstruction and the length of the lateral.

The CCTV equipment consists of a small monitor and hard drive with battery, and the CCTV cable spool with a camera on the end. The camera and cable were placed in the clean-out access (while the clear water ran down the line); the camera sent images to the monitor and recorded the entire length of the lateral. The line appeared clear, so the Sanitation Specialist removed the camera and cable. The Sanitation Specialist took the monitor and hard drive back to his office for proper labeling. The video is kept on file on a high-capacity network drive.

Photo 11: The lateral crew operating the rodding machine

The Sanitation Specialist sometimes takes the small monitor and hard drive to a resident at a later date and shows the property owner the video recording; this makes it easier for the owner to understand the nature and extent of the problem, and is especially helpful if there are structural problems in the lateral.

VII-C: Sewer System Capital Repairs

Section D-9 of the GWDR states "Each sanitary sewer system agency shall allocate adequate resources for the operation, maintenance, and repair of its sanitary sewer system by establishing a proper rate structure and dedicated source of revenue."

In June 2004, the City Council approved an ordinance creating a Sewer Service Enterprise Fund with revenues to come from sewer service fees. During the year that followed, the Maintenance Services Department conducted extensive closed circuit television inspections of the sewer system and discovered as much as 50% of the system would require repairs over the next 20 years. With this information, and in response to the WDR requirements, the City retained the services of a consulting firm to perform an analysis of the City's finances, the legal requirements for funding sewer operations and capital costs and to create a proposed budget to support mandated programs.

The consultant recommended creating a sewer fee, consisting of two components: 1) a general rate assessed to all water customers based on water consumption and associated discharge into the sewer system; and 2) a second component charged to food service establishments to offset the costs of the Fats Oils and Grease Control Program. In September 2005, the sewer service fee was proposed and adopted by the City Council and has been in effect since that date, with minor modifications in November 2005, establishing reduced rates for low-income residents and property owners on large residential lots.

Revenues generated from the sewer surcharge fees are deposited into the Sewer Enterprise Fund to be used for maintenance, repairs and replacement of existing sewer main lines. An estimated $6,000,000 per year is earmarked for replacement and lining of deficient sewer mains. As a result of the initial inspection and CCTV footage of Fullerton's sewer system, a list of damage and needed repairs and/or replacements was established and scheduled. The status of repairs and replacements for the 2006-07 through 2008-09 fiscal years are as follows:

Table Ten: Capital Improvement Program for Fiscal Year 2006/2007

Projects	Linear Feet	Estimated Cost	Status
Replacement of Sewer Mains	4,100	$1,500,000	Design Complete. Bidding in Progress
Replacement of Sewer Mains	6,000	$2,200,000	Design in progress. Going out to bid in September, 2007
Replacement of Sewer Mains	1,300	$500,000	Construction in progress
Replacement of Sewer Mains	170	$28,000	Completed 5/2007
Lining Rehabilitation	14,000	$1,000,000	Contract awarded. Construction to begin Fall, 2007

Table Eleven: Capital Improvement Program for Fiscal Year 2007/2008

Project Type	Linear Feet	Cost	Status
Replacement of Sewer Mains	2,100	$800,000	Design complete. Bidding in progress
Replacement of Sewer Mains	6,200	$2,300,000	Design in progress
Replacement of Sewer Mains	3,300	$1,200,000	Design in progress
Lining Rehabilitation	13,000	$1,000,000	Scheduled to begin early Fall, 2007
Realignment of Sewer Mains	800	$800,000	Design in progress
Realignment and replacement of Sewer mains	1,500	$1,100,000	Design in progress

Table Twelve: Capital Improvement Program for Fiscal Year 2008/2009		
Type of Project	**Linear Feet**	**Cost**
Replacement of Sewer Mains	5,600	$2,000,000
Replacement of Sewer Mains	6,800	$2,500,000
Lining Rehabilitation	14,000	$1,000,000

SECTION VIII: ANALYSIS

SECTION VIII: ANALYSIS

The Analysis section combines the information presented in the Program Description and Summary sections to create an accurate profile of the Sewer Division's operations, and to reveal any strengths and weaknesses in the program.

To measure the Sewer Program's effectiveness and efficiency, the analysis team used the GWDR requirements as the industry standard. Since the program must meet the GWDR's requirements, they provide an objective basis for comparing actual operations to known standards.

VIII-A: Performance Measures

Because most of the Sewer Division's field operations center around preventive maintenance, the analysis team first reviewed the two primary types of line cleaning, hydro-jetting and root cutting. Table Thirteen shows maintenance activity for fiscal years 2000-01 through 2006-07.

Table Thirteen: Preventive Maintenance Activities

Fiscal Year	Miles of Main Sewer Line Hydro-Jetted	Feet of Root Cutting Performed
2000-01	110.70	42,154
2001-02	145.93	29,933
2002-03	146.77	23,163
2003-04	121.79	26,852
2004-05	114.57	109,261
2005-06	169.47	87,949
2006-07	202.23	113,218

Next, the analysis team reviewed the sanitary sewer spill history to see if spills decreased as maintenance increased. The number, nature and size of spills are shown in Table Fourteen:

Table Fourteen: Sanitary Sewer Spills

	Private Spills		City Main Spills		Total Blockages		Spills over 1,000 Gallons		Spill Cause		
									Grease	Debris	Root Intrusion
2000-01	4		35		39		2		8	8	23
2001-02	4		17		21		1		7	4	10
2002-03	7		25		32				5	7	20
2003-04	5		27		32		1		5	11	16
2004-05	3		26		29		1		1	13	15
2005-06	9		5		14				2	9	3
2006-07	3		9		12		2		1	9	2
TOTALS	35		144		179		7		29	61	89

The GWDR's primary objective is to eliminate sanitary sewer overflows.[6] Although the practicality of permanently eliminating all future SSOs is questionable, the GWDR requires sewer agencies to make every effort to prevent as many overflows as possible.

As you can see in Table Fourteen, division records show the City's sanitary sewer spills decreased dramatically upon the implementation of a pro-active maintenance program. In 2003, Maintenance Services began expanding the Sewer Program. One of the first major projects was cleaning and video inspection of more than 931,000 linear feet (176 miles) of sewer main. In 2003, staffing was increased and crews began routine preventive maintenance efforts on pre-scheduled cleaning routes and at known hotspots. As shown in the table, the average number of spills before the initial cleaning of City sewer mains and CCTV inspection was approximately 26 per year. The records for FY 2005-06 and 2006-07 show an average of 19 fewer spills per year.

Spills caused by grease and root intrusion dramatically decreased from prior years due to maintenance efforts through increased hydro-jetting and root cutting as shown in the chart above.

Cleaning methods have improved over the past few years. Hydro-jetting used to involve only inserting the hose, jetting the line and retracting the hose. Complete obstruction removal was not guaranteed and many of the sites had repeat blockages in less than 12 months. Crews now use upgraded equipment that cuts along the sides of the pipe; the cutting head remains in the line for as long as needed to completely clear the line, and jetting is performed in all directions, not just toward the blockage.

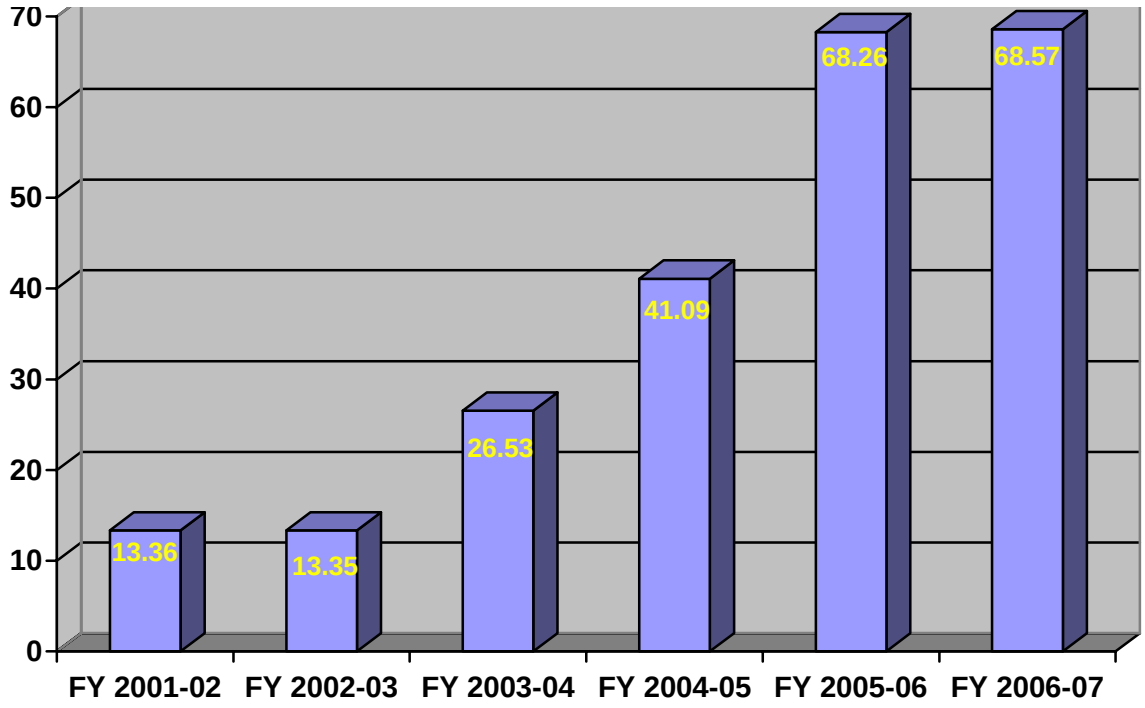
Spills decreased by nearly two-thirds between 2004-05 and 2006-07. Spills caused by root intrusion and grease have decreased, from a high of 23 and eight respectively in FY 2000-2001 to two and one in 2006-07. The State Water Quality Board cited root intrusion and grease as two of the primary causes of sewer overflows. By adopting an aggressive cleaning schedule and effective FOG control program, the Sewer Division has greatly reduced overflows caused by these factors.

[6] GWDR Sections C-1 and D-3

VIII-A-1: Cost Per Lateral

For the past several years, Sewer Maintenance has used cost per lateral as a performance measure. The measure was created when the program was small and few other performance indicators were available. The cost per lateral is calculated by dividing the Sewer Program's budget by the approximate number of laterals in the system. As the program has expanded, the cost per lateral has increased.

Chart Six: Cost per Lateral



Although the cost per lateral shows the program's cost in relation to all of the City's laterals, it is not an indicator of efficiency or effectiveness. Nor does it indicate the cost of servicing specific laterals. It is simply a statement of cost. The cost would be the same regardless of how many miles of lines were cleaned.

Until the beginning of fiscal year 2006-2007, there were few work codes in the Workmanager system that could be used as reliable performance measures. However, as of July 1, 2007, the Sewer Division began tracking its main line and lateral cleaning in the management system rather than using a separate database. Crews now use three new work codes to track main line cleaning, lateral service, and root cutting:

Table Fifteen: New Works Codes & Measures

Work Code	Title	Unit of Measure
27030	Main Line Cleaning	Feet Cleaned
27031	Lateral Line Cleaning	Each/Job
27035	Root Cutting	Feet Cleaned

Although one of the codes, Main Line Cleaning, has been used in the past, it combined mains with other work and did not give an accurate indication of production. Division managers have clarified the proper use of the program's work codes and units of measure, so beginning in FY 2007-08, the data should accurately reflect the actual work completed.

The new work codes will do a much better job of measuring the program's performance, since they are indicators of actual work completed, rather than a general statement of system-wide cost.

VIII-B: Analysis of Source Control Inspections & Enforcement

There are approximately 400 restaurants in Fullerton; each must be inspected at least once per year. In FY 2006-07, the Source Control Inspector performed 576 inspections, which included repeat visits to some FSEs. According to his records, the Inspector visited 447 separate sites in FY 2006-07, meaning he performed 129 follow-up inspections. Assuming there are about 400 FSE's in the City, it would initially appear one inspector is sufficient to perform the required inspections. After further discussion with Sewer Division managers, however, it became apparent the inspector does more than merely inspect restaurants.

As detailed in Section VII, the Source Control Inspector performs three types of inspections: spills, initial inspections and grease interceptor inspections. Since Fullerton's FOG control program is educational rather than punitive, one of the Inspector's assignments is to meet with FSE operators and educate them in best management practices, as illustrated by the Morningside site visit. Because he has been concentrating on restaurant inspections and spill investigations, the Inspector has not been able to perform all of the initial educational site visits.

Not all FSEs are restaurants. There are several businesses in Fullerton involved in food processing, such as creating packaged meals or processing cooking oil. Under the GWDR's definition and the City's FOG control ordinance, these businesses are considered FSEs and must be inspected for proper grease control programs. The Source Control Inspector has not had a chance to inspect all of these businesses because he has been concentrating on restaurants.

In addition to inspecting food establishments, the Sewer Division is implementing a commercial and industrial oil/water separator program. Oil/water separators are similar to grease interceptors, except they are installed in non-food service environments such as car washes, loading docks, and service stations, or anywhere where oil and other toxins can mix with runoff water. The oil/water inspections, while not strictly sewer related, are part of the City's overall NPDES compliance efforts. According to Sewer Division managers, the second Inspector position will be heavily involved in oil/water separator inspections.

The Sewer Superintendent intends to fill the second Source Control Inspector position within the year, and then assess the workload to see if the third position should be filled.

VIII-C: Analysis of Sewer Fee

A complete description and financial audit of the sewer fee is beyond the scope of this audit. However, the analysis team felt a brief review would help the reader gain a better understanding of the entire program.

In 2004 and 2005, the City retained the services of PBS&J, a nationally-recognized utility rate consultant, to calculate the sewer service rates for residents and businesses in the City. PBS&J took the following factors into consideration when it calculated the fees:

- ☞ The Sewer program's operating costs, based on the organization needed to meet state water board requirements.

- ☞ Capital repair needs, based on an assessment indicating 50% of the sewer system would need some type of repair within the next 20 years.

- ☞ Reserves for capital equipment replacement, fund reserves, and a rate stabilization reserve to compensate for fluctuating water use.

Using these factors, PBS&J estimated it would take approximately $8 million annually to properly fund sewer maintenance, operations and repair.[7] The $8 million was divided into $6 million for capital repairs and $2 million for operations and fund reserves.

PBS&J developed a tiered rate structure, based water consumption and the type of customer (residential versus commercial or industrial) plus an additional fee for FSE inspections. Although this report will not go into detail, it should be noted the rate structure did account for landscaping and non-sewer use of water. For example, residents are charged based on 40% of their overall consumption, under the industry-wide assumption 60% of residential water use is for landscaping and other non-sewer uses. The consultant estimated the average residential cost to be $15.00 per month.

The fee was implemented in January 2006. Based on PBS&J's rate plan, City staff estimated the FY 2006-07 (the first full year of revenue) to be $8.4 million. According to the June 2007 budget report, actual revenue was slightly more than $8.3 million, or 98.8% of the revenue target, which indicates the rate structure assumptions were correct.

Operating costs were assumed to be $2 million per year; the Sewer Program's fiscal year 2007-08 budget is $2,274,740 and the FY 2008-09 budget is $2,207,100, within a reasonable margin of the initial assumption.

The Engineering Department has indicated it can schedule as much as $6 million in capital repairs every year, once it can dedicate an engineer to sewer projects. Even with existing staff, Engineering has earmarked $5.5 million for capital projects in FY 2007-08: $2.5 million for in-place repairs (e.g. slip lining), and $3 million for construction projects.[8]

There is an additional $400,000 set aside for a new Sewer System Master Plan, a joint project between Engineering and Maintenance. The last Master Plan was completed in 1974, and although it meets the state water board's technical requirements, its usefulness as a modern planning tool is questionable .

VIII-D: Analysis Of State Requirements

The state requires each sewer agency to adopt a Sewer System Management Plan (SSMP). The SSMP's stated goal is to provide a plan that ensures the proper operation and maintenance of sewer systems, which will lead to fewer sewer spills.[9] The SSMP contains ten main requirements:

1. Proof of an effective and efficient sewer system management organization.

[7] 2005 PBS&J Rate Study
[8] City of Fullerton CIP Budget for Projects 5140 & 5134
[9] GWDR Section 13 (i)

2. Each agency must establish the proper legal authority to properly manage the sewer system and enforce prohibitions against illicit discharges.

3. Each agency must describe its operation and maintenance programs.

4. Each agency must have standards for the design, construction, and performance of new and existing sewer lines.

5. An effective overflow emergency response plan.

6. A program to control the discharge of fats, oils, and grease into the system (FOG Control program).

7. Each agency must have a sewer system evaluation and capacity assurance plan in place to ensure the long-term viability of the system.

8. A process for monitoring the plan's activities (performance measures) and modifying the plan as needed.

9. A requirement to conduct an internal performance audit of the program at least once every two years. This performance audit fulfills this requirement.

10. A public communications program.

Assuming it has met the SSMP's requirements to the state's satisfaction, a sewer agency would be considered to be run efficiently and effectively. The analysis team reviewed the Sewer Division's response to each of the ten criteria and measured its progress towards meeting the state's goals. The results of the review are shown in Table Sixteen:

Table Sixteen: Sewer Division's Progress Towards SSMP Goals

Section Title	Summary of Requirements	Current Status
Organization	The SSMP must identify the staff responsible for managing the sewer maintenance function, as well as field employees involved in emergency spill response and the chain of command to ensure relevant health agencies are notified.	The Sewer Division has complied with this requirement since the Regional WDR took effect in 2003. The spill response plan is attached as Appendix A.

Table Sixteen: Sewer Division's Progress Towards SSMP Goals		
Section Title	**Summary of Requirements**	**Current Status**
Legal Authority	Each agency must prove it has the legal authority to: (a) Prevent illicit discharges into its sanitary sewer system; (b) Require that sewers and connections be properly designed and constructed; (c) Ensure access for maintenance, inspection, (d) Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and (e) Enforce any violation of its sewer ordinances.	In 2004, the Sewer Division obtained City Council approval of ordinances 3050 and 3051, amending Chapter 12 of the Fullerton Municipal Code, giving it the necessary authority to meet the Legal Authority requirement.
Operation and Maintenance Program	Each agency must: (a) Maintain an up-to-date map of the sanitary sewer system; (b) Describe routine preventive operation and maintenance activities by staff and contractors; (c) Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies (d) Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, (e) Provide equipment and replacement part inventories, including identification of critical replacement parts.	The Sewer Division complied with this requirement when the regional WDR was issued in 2003.
Design and Performance Provisions	(a) Design and construction standards and specifications for the installation of new sanitary sewer systems; and (b) Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects	The Sewer Division, working with the Engineering Department, has ensured all of the specifications meet this requirement.

Table Sixteen: Sewer Division's Progress Towards SSMP Goals		
Section Title	**Summary of Requirements**	**Current Status**
Overflow Emergency Response Plan	Each agency must develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment.	The SSO response plan is shown in Appendix A.
FOG Control Program	The agency must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system.	The Division implemented a FOG control program in 2004.
System Evaluation and Capacity Assurance Plan	Each agency shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event.	The Sewer Division has been working with the Engineering Department to implement a long-range CIP plan for repairing and replacing aging or deficient sewers. (Please see the section on CIP programs for additional details).
Monitoring, Measurement, and Program Modifications	Each agency must: (a) Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities; (b) Monitor the implementation and measure the effectiveness of each element of the SSMP; (c) Assess the success of the preventative maintenance program; (d) Update program elements as appropriate based on monitoring or performance evaluations; and (e) Identify and illustrate SSO trends, including: frequency, location, and volume.	The Division has implemented several procedures for measuring its progress towards meeting the SSMP's goals. The Sewer Program Specialist's primary duty is to monitor and evaluate the division's activities as they relate to the preventive maintenance program.

Table Sixteen: Sewer Division's Progress Towards SSMP Goals		
Section Title	**Summary of Requirements**	**Current Status**
Program Audits	The agency shall conduct periodic internal audits appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.	This performance audit fulfills this requirement.
Communications Program	The agency shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the agency as the program is developed and implemented.	The Sewer Division takes advantage of the City's website and cable TV channel to provide the public with updated sewer program information.

As part of this audit process, the analysis team asked the Santa Ana Regional Water Quality Board office for verification that all reports of Sanitary Sewer Overflows were submitted within the required timeframes. The Regional Quality Control Board responded:

"Based on the information we have in our files, we believe Fullerton is in compliance with the requirements of the Waste Discharge Requirements for Sewage Collection Systems, Order No. 2006-003 DWQ. Since Fullerton developed and implemented a Sewer System Management Plan (SSMP) in accordance with the requirements adopted by this Regional Board for Orange County in 2002, Fullerton has already met all the requirements of Order No. 2006-003 DWQ, except for having the SSMP approved by the city council." (The SSMP is not due until 2009 and will be brought to the City Council for approval before the deadline).

Using the State Water Quality Assurance Board's criteria as a performance measure, the Sewer Division has met all of the Sanitary Sewer Management Plan's requirements. Therefore, under the state's definition of an efficient and effective program, Fullerton's program is both efficient and effective.

Combined with the data showing a significant decrease in sewer spill size and frequency, the Division's ability to meet the SSMP's requirements indicates it is making sufficient efforts to eliminate sewer spills and operate the sewer system effectively.

VIII-E: Cost per System Mile

To provide an additional measure of cost-effectiveness, the analysis team reviewed the sewer mileage and budget information from 15 Orange County cities and sewer agencies, and calculated the cost per system mile for each agency. The team then compared the costs amongst all 15 agencies, as shown in Table Seventeen:

Table Seventeen: Cost of Maintenance of Sewer System per Mile FY 2004-05 Data[10]

CITY	PIPE AGE	MILES OF SEWER	Maintenance Budget	Cost Per Mile
Anaheim	1911-2003	554.17	$2,200,000	$3,971
Brea	1925-1999	108.5	30,000	277
Buena Park	1930-2002	168	151,470	902
Fountain Valley	1961-2002	133	566,000	4,256
Fullerton	1913-2004	285	1,893,750	6,644
Garden Grove	1922-2005	320	2,311,900	7,224
La Habra	Unknown	115.6	775,000	6,739
La Palma	30 years	25	333,900	13,356
Orange	1922-2000	313	132,000	422
Placentia	1950-2000	76	60,000	789
Rossmoor/ Los Alamitos Sewer Dist	1954-2000	56.7	85,000	1,499
Santa Ana	1919-2005	390	2,290,235	5,872
Stanton	1955-1996	55.4	265,000	4783
Tustin	1942-2000	51.5	54,000	1,058
Villa Park	1960-1995	25	31,940	1,277
Yorba Linda	1930-2005	152	375,040	2,467
AVERAGE				$4,084

The cost of maintaining sewer systems varies greatly by city. No meaningful comparison can be done since there are too many circumstances to take into consideration, e.g. age of sewer mains, composition of pipes, gravity vs. pumped lines, frequency of cleaning and video taping, budget constraints, etc.

For example, Fullerton appears to have a fairly high cost per mile, $6,644. However, considering the relatively low level of maintenance devoted to the sewer system before 2003, the City has had to devote a relatively high level of resources to meet state and federal requirements. The City of Garden Grove, which assumed sewer maintenance from a defunct special district in 2002, is in a similar situation, and has a higher cost per mile than Fullerton.

[10] Source: 2005 OCSD Survey of Sewer Maintenance and Operations

VIII-F: Performance Analysis

It is difficult to arrive at a definitive statement of the Sewer Program's overall efficiency and cost effectiveness. The program has gone through extensive structural changes over the past four years, and state and federal regulations continue to evolve. Other cities are in the same situation, so comparing Fullerton's operations to other agencies produced no meaningful results.

Despite the lack of empirical evidence, there is anecdotal evidence that can be used to assess the program's efficiency and effectiveness:

- The program is meeting the goals set forth in the state GWDR, which can be used as industry standards (see pages 40 through 42).

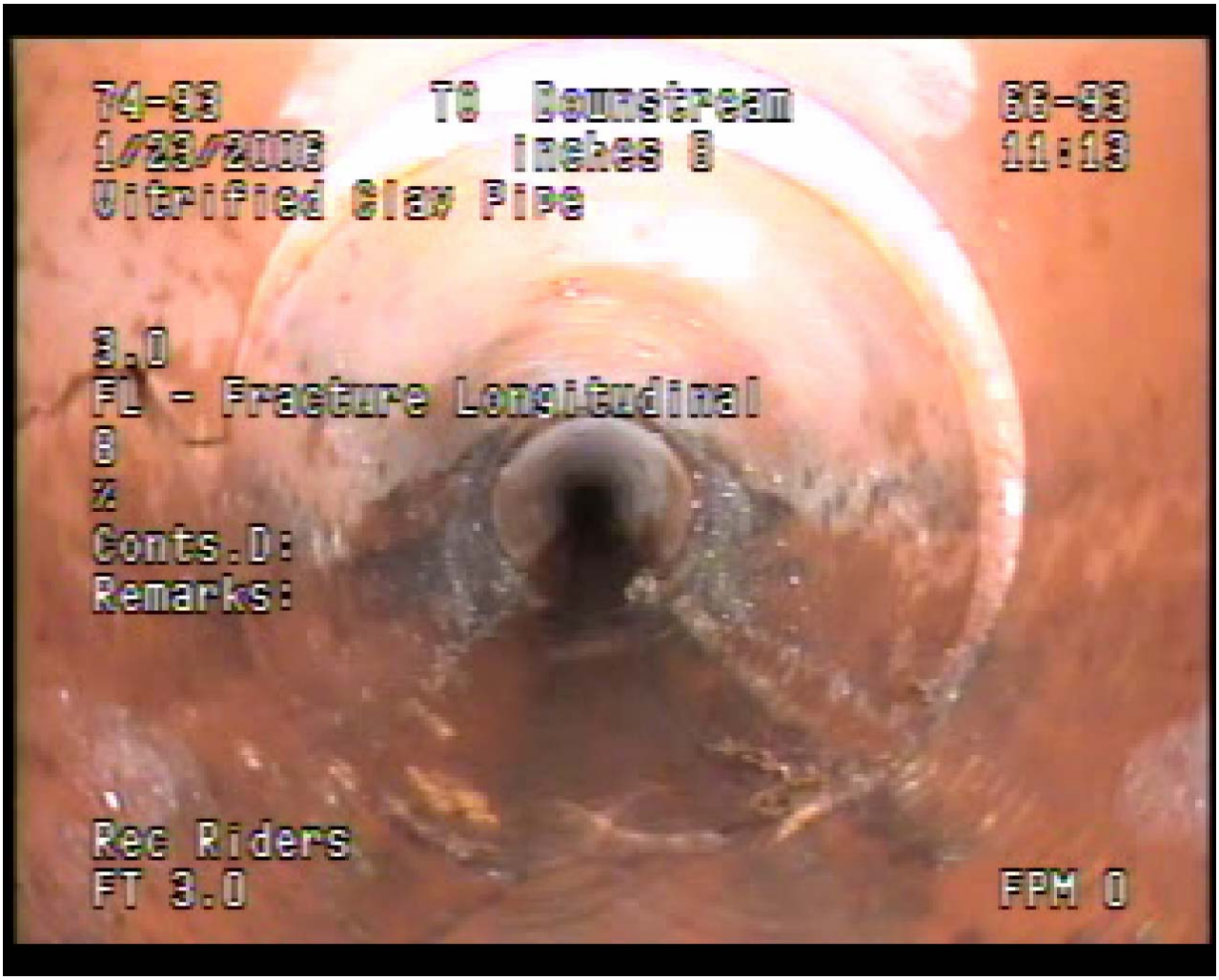
- As routine cleaning and other preventive maintenance activities have increased, the number and size of spills have decreased, indicating the Sewer Program is devoting the proper resources and efforts to system maintenance.

- According to a 2001 EPA field audit, Fullerton's Sewer Program should have one field position for every 16 miles of main line, or 17.8 positions. As of FY 2006-07, the program had 15 field positions, or one for every 19 miles of line. With this staffing level, the program is meeting its productivity goals.

- The Sewer Program won the 2006 Collection System of the Year Award from the California Water Environment Association (CWEA). The CWEA bases its awards on industry standards for efficiency and effectiveness.

Until the Sewer Program has accumulated several years of performance data, it will not be possible to make an empirically based assessment of its efficiency and effectiveness. However, all of the factors examined by the analysis team indicate the program is achieving its goals and continues to progress.

SECTIONS IX & X: CONCLUSIONS AND RECOMMENDATIONS



SECTION IX: CONCLUSIONS

The purpose of the Conclusions Section is to provide the reader with a list of conclusions based on analyzing relevant data. In turn, the conclusions form the basis for the recommendations that follow.

Conclusion One: The Sewer Program is meeting the requirements of the State Water Quality Control Board. Based on the analysis team's review, both the number and size of sewer overflows have declined sharply over the past three years. Besides the reduction in spills, the Sewer Division has developed a coordinated program for capital repairs with the Engineering Department, and implemented an effective FOG Control program. All WDR and GWDR legal requirements have been met.

Conclusion Two: As far as can be determined with the data available, the Sewer Program is being run effectively and efficiently. Because other agencies' sewer programs are in the process of complying with state requirements, and due to the differences in each city's sewer system, the team had difficulty developing an objective set of criteria to measure the program's performance. However, based on the decrease in spills, existing industry standards, and EPA guidelines, it appears the program is being run efficiently and effectively. Resources are being assigned to the areas where most effective, e.g. to preventive maintenance and routine line cleaning. Before 2003, routine maintenance was practically non-existent and line cleaning was reactive, performed only at known hotspots and in response to overflows. As scheduled line cleaning has expanded, the number of spills has decreased.

Conclusion Three: The Sewer Program has refined its work tracking procedures. Before the beginning of fiscal year 2007-2008, the program used work codes that did not provide enough detail of work being done in the field. By developing new work codes and providing additional training to field staff, the program should be able to provide more accurate work data in the future.

Conclusion Four: Cost per lateral and cost per line mile are not meaningful performance measures. In past years, when there were no other measures available, the cost per lateral and line miles may have been the only data available. However, as new work codes have been introduced, there are now more meaningful measures such as the cost per mile cleaned.

Conclusion Five: There is justification for at least one additional Source Control Inspector. The present inspector's workload does not allow him to perform some of the institutional and oil\water separator inspections that fall under the FOG Control Program's responsibility. A second inspector would provide the position needed for these and other tasks.

Conclusion Six: The Sewer Fee is properly funding sewer operations, maintenance, and repairs. Judging by the first complete fiscal year, the sewer fee's rates are structured so as to collect the targeted amount of $8 million to $8.4 million per year. There should be sufficient fund reserves in the near future. The Engineering Department should be able to schedule $5 million to $6 million in projected capital repairs each year. This assumption is based on the accuracy of the projections from current video inspections of the sewer system. If more of the system is damaged than the inspections indicate, additional funding may be needed.

SECTION X: RECOMMENDATIONS

Based on the conclusions stated in the previous section, the analysis team has prepared the following recommendations:

Recommendation One (Addresses Conclusion One): The Sewer Division should monitor its operations to ensure it continues to meet state and federal requirements. Over the past three years, the Sewer Division has made great progress in meeting WDR and GWDR requirements. Since the GWDR rules are new and will undoubtedly change in the future, division managers should monitor the program to ensure Fullerton continues to meet state mandates.

Recommendation Two (Addresses Conclusions Two and Three): The Sewer Program should be managed to continue its efficient and effective operation. Based on the evidence, the Sewer Program is being efficiently and effectively managed and run. Our only recommendation would be for managers to develop additional standards by which to measure the program's performance. As other agencies' programs become more stable, there should be empirical data available to compare Fullerton's programs with other cities.

Recommendation Three (Addresses Conclusion Three): The Sewer Program should continue to develop and refine its performance measures. The work codes introduced at the beginning of fiscal year 2007-2008 should make performance measurement much easier. Division management should continue to review and adapt its work measures as needed to achieve the most accurate and meaningful performance indicators.

Recommendation Four (Addresses Conclusion Four): The cost per lateral and cost per mile measure should be eliminated and replaced by more meaningful performance measures. The cost per lateral and mile are simply arithmetic statements of overall program cost and are not indicators of performance. As new data become available under the revised work codes, better measures such as cost per foot or cost per mile cleaned should be implemented.

Recommendation Five (Addresses Conclusion Five): At least one additional Source Control Inspector position should be filled as soon as possible. The source control workload justifies filling at least one of the two vacant inspector positions. Additional FSE inspections, combined with commercial and industrial enforcement, exceed the current inspector's availability. After an additional assessment period of at least six months, division managers should make the decision to fill or eliminate the third position.

Recommendation Six (Addresses Conclusion Six): **The Sewer Fee should be reviewed as part of the bi-annual budget process.** The current fee structure has adequately funded maintenance and capital repairs, and should continue to do so for the next few years. However, as the commodity costs of materials and consumables (e.g. pipe, fuel, etc.) fluctuate, the fee should be reassessed as part of the regular budget process, and necessary adjustments proposed to the City Council.

Conclusion

Based on the evidence available, and using the GWDR requirements as a measure, the Sewer Program is well-managed and meeting the state mandates. Department and Division managers have done an excellent job of meeting the challenges of developing programs under new (and often changing) requirements, well within the deadline set by regulatory agencies. Based on past performance, there is every reason to believe the Division will continue to meet its challenges in the future.

A copy of the audit report has been given to the Sewer Superintendent for his review and response. His response letter will be included in the final version.

Appendix A

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CITY OF FULLERTON
MAINTENANCE SERVICES DEPARTMENT

TO: Tim Campbell **DEPT**: M.S. Admin

FROM: William Roseberry **DEPT**: M.S. Sewer

SUBJECT: Sewer Division Performance Audit Response **DATE:** September 14, 2007

Tim,

After reviewing the performance audit compiled by yourself and your staff, I would like to state that I agree with most if not all of the conclusions and recommendations. Your audit team did an outstanding performance in reviewing all of our records and operations methods. I feel that only by viewing the operations of our maintenance staff in the field can one get a feel for the procedures that must be followed on a daily basis to meet all of the requirements set forth in the State GWDR.

Our Division attempts to do the best work we can in a field in which the regulations are becoming evermore strict. This audit will allow us to improve upon our existing procedures so we can continue to be one of the top collection systems agencies in the State of California.

After reviewing the recommendations based on your conclusions I have addressed them individually.

Recommendation 1: We will continue to monitor and implement new procedures and methods as necessary to comply with the State WDR. Since this is a living document, changes are being made continually as changes arise in the Division. This in itself has made the transition from the Region 8 WDR to the State WDR easier to comply with in a timely and efficient manner.

Recommendation 2: The tracking, monitoring and reduction of the Sanitary Sewer Overflows (SSO's) are the primary goal of our Division and the State. Our intent is to continue to reduce the spills from our system, and through public education and assistance, to also reduce the number of private spills. As we develop new tracking methods of our maintenance procedures with the new CMMS system, and display it graphically on the GIS maps, we can better understand if there are patterns or trends that may lead to changes in our tactics.

Recommendation 3: Since we have implemented the new work codes for monitoring production of maintenance operations, I feel that we will get a better idea of the Division's performance. These changes may not be evident for a few more months, but as we continue to monitor and change them, and train our staff as to their proper use and importance, I am confident that they will better reflect our program production.

Recommendation 4: I agree that the new set of work codes will let us understand the proper costs for the individual tasks within our operations and maintenance procedures. Hopefully through discussion among group leaders of all local agencies, we can develop a more uniform method of determining cost comparisons among the different agencies. I will bring this item into discussion at one our WDR group meetings.

Recommendation 5: In regards to the additional Source Control Positions that have been budgeted, I have identified a minimum of 150 locations that have the potential for illicit discharges to the sanitary sewer. These can range from automotive repair shops to dry cleaners to film processors and other commercial activities. Not all of these processes are classified as industrial waste dischargers, and are therefore not covered by the OCSD Source Control Division. My intent is to hire another Source Control Inspector at a lead position to cover all of the inspections for the Sewer Division. I agree with the recommendation for re-evaluation for the potential third position after a minimum 6-month period.

Recommendation 6: A better review of the Sewer Enterprise Fee can be done after we have ample sewer capital projects completed. This will allow for a realistic cost evaluation for the replacement and rehabilitation of the sanitary sewer using the cost allocations for the completed projects. The estimates used for the project when the fee was developed were based on industry standards in Southern California. They were not necessarily targeted for this area of Orange County, and the project sizes were not taken into consideration. As for the Operations and Maintenance portion of the funding, this can be evaluated annually based on actual costs for the production levels we have targeted.

Again, I wish to commend your audit team for an excellent evaluation of the Sewer Division.

William Roseberry
Sewer Superintendent
City of Fullerton