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## ***This Executive Summary Report***

summarizes the project's purpose, recommendations, overview, findings, and conclusions of the Grease Impact Assessment Project. This report also addresses the impact of the changing regulatory environment in regards to sanitary sewer overflows (SSO) and ways to prevent those overflows.

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### INTRODUCTION

The purpose of this project was to determine if grease entering the collection system from food preparation facilities adversely affects the operation of County Sanitation District 1's (CSD-1) sewers. Historically staff's ability to reduce grease stoppages, Sanitary Sewer Overflow's (SSO's) and lower claim costs have been limited to sewer cleaning methodologies and daily sewer line cleaning production by field crews. The escalating number of mainline stoppages (MLS) stoppages and sanitary sewer overflows coupled with the high cost of flooded claims is an increasing concern to the

District. Another concern that contributed to critical nature of this project is the increasing attention that regulatory agencies are currently placing on collection system overflows. These concerns stimulated staff to look for other grease reduction possibilities such as mitigating grease accumulation in the collection system by limiting and controlling the amount of grease that enters CSD-1 sewer system. Staff initiated this project to quantify ways to optimize resources and reduce collection system maintenance costs while maintaining a high level of customer service.

County Sanitation District 1 provides wastewater collection to the developed and unincorporated areas of Sacramento County, the Cities of Citrus Heights and Elk Grove and portions of the Cities of Sacramento and Folsom. This service area covers approximately 270 square miles and includes approximately 2,180 food preparation businesses, primarily restaurants.

CSD-1 collection system performance data for the last four years shows that grease blockages account for 44 percent of the total annual mainline stoppages. Grease blockages from restaurants accounted for seven percent of the total annual mainline stoppages in the collection system. Grease caused stoppages attributed to restaurants accounted for 36 percent of the annual mainline stoppage flooded claims mitigation costs. In the past four fiscal years CSD-1 has experienced 88 mainline stoppages resulting in flooded claims costs of \$4,331,500\*. Six specific mainline stoppages were directly attributed to restaurant generated grease that cost the District \$1,412,200\* in flooded claims. It is significant to note that the average mainline stoppage caused flooded claim is \$48,700, whereas the restaurant caused mainline stoppage flooded claim averaged \$235,400 during the four-year period.

\* Note: All of these CSD-1 mainline stoppages are classified as sanitary sewer overflows.

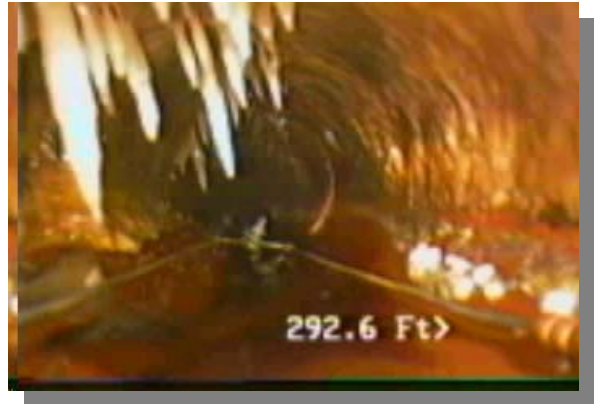
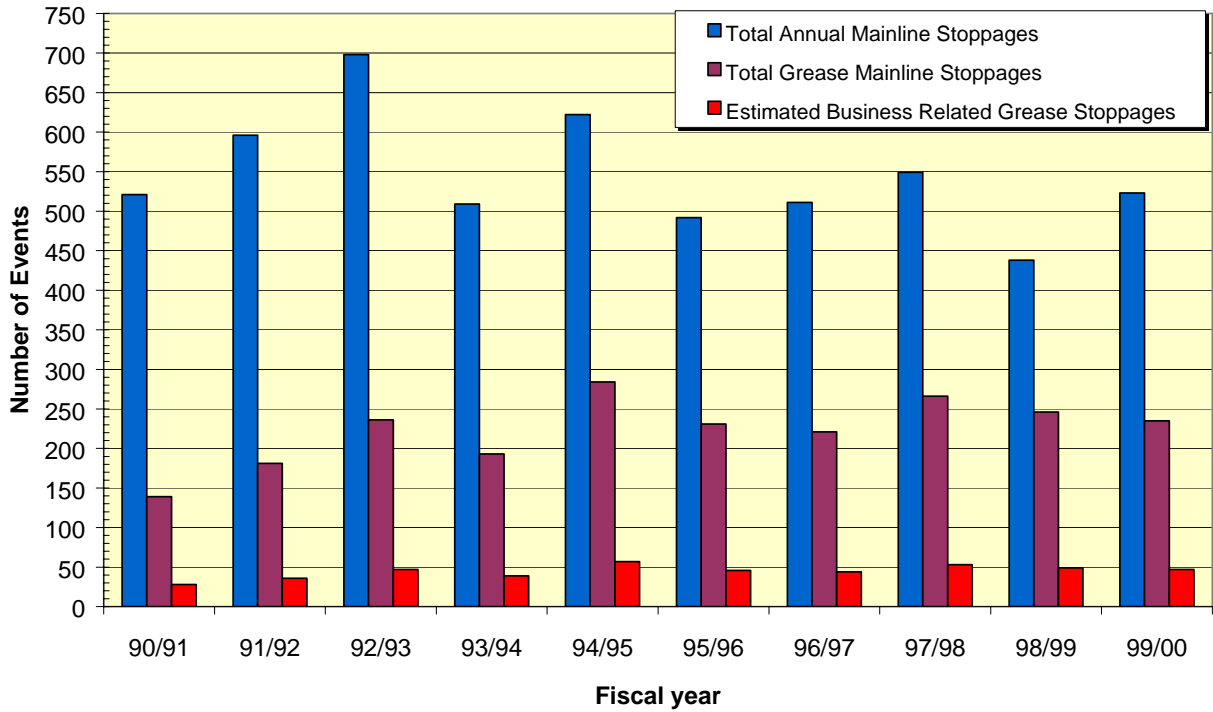
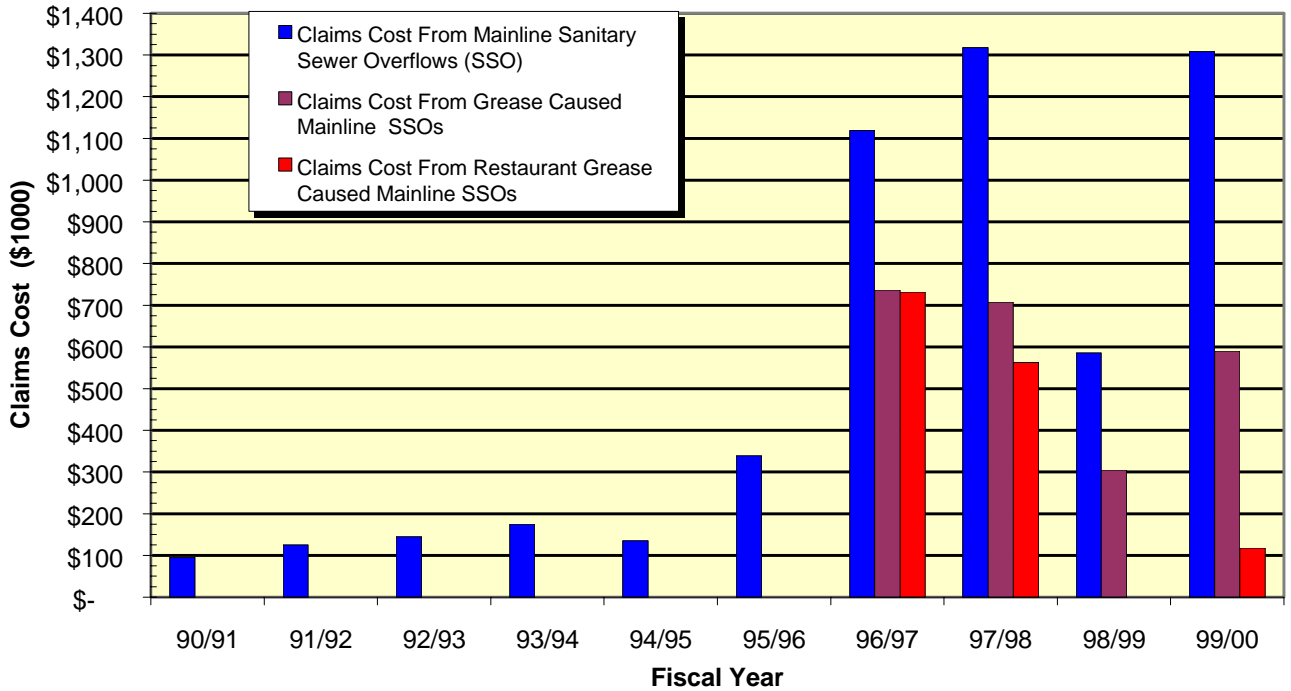


Photo of grease build-up in a sewer



**FIGURE ES-1  
TOTAL ANNUAL STOPPAGES**



**FIGURE ES-2  
ANNUAL CLAIMS COST DUE TO SEWER OVERFLOW**

## **PROJECT RECOMMENDATIONS**

The project team recommends that CSD-1 develop and implement an active grease source control program. The drivers for this recommendation are:

1. Reduce mainline stoppages,
2. Reduce sanitary sewer overflows,
3. Reduce flooded claims cost,
4. Ensure CSD-1 remains in compliance with the existing Clean Water Act requirements and currently changing USEPA SSO requirements. (See 'Measurements' for drivers.)

The following eight elements are required to develop and implement a grease source control program:

### **1. CSD-1 REVISED ORDINANCE**

Revise the existing CSD-1 ordinance to require the installation of an appropriately sized grease control device for all food preparation facilities. The following is an example of what the new policy might say:

“County Sanitation District-1 (CSD-1) requires industrial and commercial grease producing customers to install grease intercepting devices and maintain them in a manner that prevents grease discharge into the sanitary sewer, with the following conditions:

- New food processing facility construction (including change of ownership) will require the installation of a correctly sized grease trap/interceptor as part of the change of ownership, building construction, or renovation.
- Food preparation facilities that have grease trap/interceptors will be required to maintain them on a routine basis and record the maintenance of the grease trap/interceptors.
- Food preparation facilities with grease traps or other under the counter grease control devices will be allowed to maintain them as long as no grease stoppage occurs in the sewer immediately downstream that is traceable to the food preparation facilities.
- Food preparation facilities with no grease trap/interceptor will be required to install one within a specified timeframe. In kitchen grease traps will be allowed in some cases when the physical location or size of a grease trap/interceptor will make the installation of the grease trap/interceptor unusually difficult or disruptive. Use of in kitchen grease traps will be allowed on an individual basis with a specific variance granted by the District Engineer.
- Food preparation facilities that can demonstrate the active use of Best Management Practices to control grease discharge into the sewer will be allowed to do so unless a grease stoppage occurs immediately downstream that is traceable to that food preparation facility.
- Food preparation facilities using BMPs to control grease or with in kitchen grease control devices will be required to install an appropriately sized grease

trap/interceptor if a stoppage in the sewer is traced to their food producing facility.

- Food Preparation Facilities determine to be directly responsible for a sewer stoppage/SSO shall be responsible for all associated mitigation costs and fines levied against CSD-1 by regulatory agencies.

## **2. GREASE SOURCE CONTROL PROGRAM**

Develop a CSD-1 program, with appropriate stakeholder involvement, to implement the grease source control ordinance including specific phasing for existing food preparation facilities that do not have grease control devices or have inadequately sized devices. Part of this program will include development of Best Management Practices for Fats, Oils, and Grease that can be used by the food preparation facilities.

## **3. PUBLIC OUTREACH**

Develop a CSD-1 public outreach program with appropriate stakeholders that focuses on grease control best management practices for food production facilities and residential customers to eliminate grease disposal into the collection system.

- The food producing facility outreach and education program would focus on the implementation of best management practices for the removal of fats, oils, and grease. Specific sizing guidelines for grease trap/interceptors would be developed and included as part of this outreach effort.
- Public outreach on the need for grease control by the general public would focus on best management practices for grease handling in private kitchens.

## **4. DESIGN STANDARDS**

Modify existing CSD-1 design standards to include the appropriate sizing and installation of grease trap/interceptors. Modify the existing design specifications for new sewers with low flows. Design standards and specifications will be based on Uniform Plumbing Code requirements and CSD-1 criterion established in the grease source control program

## **5. STAFFING**

One new Industrial Waste Inspector position will be required to initiate the grease inspection program for food preparation facilities. Additionally, the implementation of the proposed grease source control program will require training for all staff associated with building permit design reviews, and will include: building inspectors,

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environmental health inspectors, and industrial waste inspectors currently employed by the County.

### **6. ENFORCEMENT OF GREASE CONTROL PROGRAM**

A grease control program must be enforceable for it to be effective. Businesses need to understand that non-compliance with the recommend policy and the implementation program will result in formal actions, up to and including fines or disconnection if the business does not work within the guidelines of the grease control program that is adopted. There are currently three existing inspection mechanisms within the County and CSD-1 and a fourth that could be established to enforce the recommended grease control policy:

1. Designs for new buildings where food preparation will take place must be reviewed for compliance with the required grease control trap/interceptor as part of the design. This effort will take place as part of the current design review process.
2. County Building Inspectors must ensure that the correctly sized trap/interceptor devices are installed properly as part of new construction or tenant improvements.
3. It is anticipated that a cooperative inspection program to include inspection staff from County Environmental Health and Industrial Waste Section will be implemented to inspect locations where grease trap/interceptors are required. These inspections will ensure compliance with CSD-1's grease source control program. Inspections must be continually performed for a grease control program to be effective. At least one new inspector will be required within the Industrial Waste Section to initiate this program and work in conjunction with other county inspectors in regards to training in conducting and documenting inspections and follow-up enforcement actions.
4. A progressive warning and penalty system will need to be instituted with reasonable response times for compliance to give the inspectors the proper leverage to achieve an effective grease control program. The use of fines and penalties should be a last resort option to gain compliance.

### **7. MEASUREMENTS**

The effectiveness of the grease control program that is implemented must have sufficient measurements or metrics to optimize the benefit of the program for CSD-1 and the community. Measurable effectiveness of an active grease control program should be based on four key factors:

1. Reduced number of system stoppages and overflows.
2. Reduced claims cost associated with cleanup costs due to grease stoppages from businesses.
3. Reduced need to clean certain sewers that are on frequent cleaning program allowing for reallocation of staff resources to other locations within the service area.

4. Improved regulatory compliance by reducing the number of grease stoppages that could result in an overflow, which reaches the river or, exposes the public to unnecessary health risks.

## **8. COST IMPACT OF GREASE CONTROL PROGRAM**

The grease control program will need to be sufficiently funded to have a long-term benefit for the operation of the collection system and to reduce grease related stoppages and associated cleanup claims.

### **Agency Costs**

Funding related to the grease control program for CSD1 can potentially come from several sources as identified below:

1. A modified fee schedule for food preparation facilities, which has two tiers. The tiers would reflect whether a food producing facility has a working grease trap/interceptor and maintenance program or a food producing facility that has no grease control system installed. The difference in the two fees should be based on the increased collection system cleaning costs and the projected cost related to a sewer stoppage cleanup.
2. Reduced cost of claims associated with grease related stoppages from food preparation facilities. Restaurant related mainline cleaning claims costs due to grease account for approximately 36 percent of the flooded claims cost for cleanup and replacement of damaged goods. This “cost savings” would be moved from one portion of the budget to the waste source control budget to partially pay for the inspector’s time on grease control inspections.
3. Reduced cleaning costs for sewers on the frequent cleaning program because of grease from businesses. Where a grease problem currently exists in a 1,000 ft of sewer that is cleaned bi-monthly before a grease trap/interceptor is installed, could result in a revised cleaning schedule of once every two years. The revised cleaning schedule would produce a reduction in cleaning costs of approximately \$5,500 for the two-year period. The benefit of the revised cleaning schedule will allow the Maintenance and Operations staff to redirect cleaning crews to other problem areas within the collection system.
4. When a food preparation facility is directly responsible for a sewer stoppage, after the implementation of the CSD-1 grease source control program, then all mitigation costs, and any fines levied against CSD-1 by any regulatory agency shall be paid in full by the food preparation facility owner.

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### Business Costs

Costs to the food preparation facilities for installing grease interceptors for new construction averages \$20,000 or more depending on the size, location, and any special plumbing required for the proper installation of the grease interceptor. Under the sink grease traps cost significantly less than a buried grease interceptor, but also require more frequent maintenance and cleaning. Under the sink units, like those made by the Big Dipper, cost from \$750 to several thousand depending on the size of the unit.



Grease Dipper unit for under sink installations

### PROJECT OVERVIEW

The Grease Impact Assessment Project used a three-phase approach in determining the food preparation facility grease discharge impact and what types of grease control would be appropriate for CSD-1. Each phase focused on a different aspect of grease control and included the following items:

- Field investigations of four locations within CSD-1 to quantify the effectiveness of grease removal at the source. Each location was selected based on current needs to perform frequent cleaning due to grease build up from food preparation facilities.
- Agency survey of grease control practices. This survey included 21 agencies around the country that have similar operating conditions to CSD-1 and have or are in the process of implementing a grease source control program.
- Potential regulatory impacts due to the recent active enforcement of existing regulations and the currently proposed regulations by the United States Environmental Protection Agency. The proposed regulations regarding Sanitary Sewer Overflows (SSO) and the Capacity Management Operations and Maintenance (CMOM) program requirements require an effective grease control program and the elimination of sanitary sewer overflows.

### Field Investigation

Four study sites in CSD-1 sewer system were selected for extensive grease accumulation monitoring and system defect rehabilitation. Approximately 58 percent of the food preparation facilities in the Project study areas have grease control devices of some type. Most of these food preparation facilities did not appear to be consistently maintaining their grease control devices. Each site was selected to represent a particular test condition to quantify the amount and effect of grease entering the sewer system from food preparation facilities and provide information on the effectiveness of an active grease source control

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program. Monitoring began with a review of the structural condition assessment of the sewers followed by selected repairs to improve the hydraulic condition of selected sewer segments at specific sites. All the monitored sewer sites were then cleaned and televised to confirm the quality of line cleaning. Each test site was televised every two months over the next 14 months to monitor the grease build up at each represented site. The four sites were selected because:

- They have multiple grease generating food producing facility discharging into them.
- They have experienced some prior grease-related sewer maintenance.
- They contain pipe reaches accessible without main roadway closures (improved safety and minimized traffic impacts).
- They are the extreme upstream reaches within the each study site.
- They contain small diameter, vitrified clay pipes (VCP).

The sites were numbered and named as follows:

Site 1	Arden Fair Mall No sewer repairs and no grease trap/interceptor maintenance(Control Group)	This area represents the existing condition of the collection system and the current practice of no grease control for restaurants.
Site 2	Tributary Lane Sewer repairs and grease trap/interceptor maintenance	This area represents a new or rehabilitated sewer and active grease source control program.
Site 3	Sunrise Village Center Sewer repairs and no grease trap/interceptor maintenance	This area tested the impacts from grease deposits in the collection system when structural repairs to improve the hydraulic conditions of the sewer are made.
Site 4	Riverbank Marina No sewer repairs with grease trap/interceptor maintenance	The restaurants in this area do not have grease trap/interceptors installed. A local pumping station wet well was used to act as a combined grease trap/interceptor for the three restaurants in this section of the study.

After 6 months of inspection the inspection frequency was refined to better track the grease accumulation in each area. Consequently Site 4, Riverbank Marina, was inspected on a monthly basis due to the very high rate of grease build up at that site. Site 1, Arden Fair Mall, was inspected prior to peak holiday shopping season to make sure that the grease build up was not jeopardizing the overall capacity of the sewer line. While the goal of the study was to track how grease accumulated in the sewer across a one-year period, the Project team did not want an overflow to occur in any of the study areas because of insufficient cleaning.

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### **Results of Field Investigations.**

The field investigation program provided clear evidence of the performance enhancement of the collection system where active grease source control is implemented. Site 2, Tributary Lane, showed only minimal grease accumulation during the study period compared to the other sites in the study. Tributary Lane restaurants have grease interceptors already in place and the Project team arranged to have the interceptors pumped on a monthly basis during the study. The sewers in this location have flat slopes and relatively low flows, conditions that allow grease to build up quickly when it is present. All of the other sites in the study area showed rapid grease accumulation that if left without frequent maintenance would lead to an overflow in the collection system.

### **Sewer Condition Summary.**

The physical condition of the sewer is a very important factor in how easily grease will accumulate in a particular sewer reach. All of the sewers were designed to the standards of CSD-1 that were in place at the time of construction. However, many of the sewers do not meet current CSD-1 design standards. Observations of the sewers in the study areas resulted in the following conclusions:

- Low flows that have velocities less than 2 fps allow the accumulation of grease and other solids to deposit on the pipe wall, creating a capacity restriction.
- Sewers in upstream reaches where wastewater flows are low should have steeper slopes to increase velocity of wastewater in the pipe.
- Sewer slopes ranged from about 0.0020 to 0.0050 for the 8-inch diameter sewers. Current CSD-1 standard minimum slope is 0.0035 and is based on achieving a 2 feet per second (fps) flow velocity when the pipe is flowing half full. For lower flows the velocity approaches 1-fps, which will allow grease accumulation on the pipe wall.
- Almost all of the sewers with minimum slopes also have minor sags that allow the wastewater velocity to slow down and the grease to accumulate quickly.
- Many of the sewers have small offset joints and protruding laterals that create points where the grease can accumulate.
- Proper maintenance hole channelization is essential to reduce backwater conditions that lead to grease and solids accumulation.
- Root intrusion in the sewer can cause grease to accumulate at a faster rate.

### **Grease Volume Variations.**

Grease volumes in the sewers were tracked during the study and consistently increased in each sewer during the study with some notable exceptions. In some locations a high grease build up was gone at the next monitoring event. A high temperature flushing of the local lateral that is contributing the high grease load from a restaurant could cause this change in condition. Several other cases showed that “grease logs” had sloughed from the sewer wall and moved downstream. Both of these types of grease movement are a concern because

they present the possibility of a future blockage in a sewer downstream of the food producing facility in an unknown location. This situation makes it difficult to keep the sewers properly maintained, since maintenance crews have no way of knowing where the grease will next be deposited and create a flow restriction.

### **GREASE CONTROL SURVEY OF OTHER AGENCIES**

Twenty-one sewer agencies participated in the project survey. Key findings from the survey are summarized below for the main areas of influence that could be applied to CSD-1 for maintenance improvements or grease source control.

- Most public agencies have some form of grease source control program.
- The method of implementation for the grease source control program varies from basic enforcement of the Uniform Plumbing Code to specialized programs with specific fats, oil, and grease (FOG) limits and specific sizing requirements for grease trap/interceptors based on food producing facility size and type.
- Costs associated with grease source control are considered as part of the operating budget for most agencies.
- Some agencies use dedicated inspectors for grease source control, while others combine inspection as part of the industrial waste source control program. The most successful grease source control programs have ongoing food producing facility inspection to achieve grease control compliance.
- Many agencies have successfully implemented a progressive set of citations and fines to gain compliance with the grease source control ordinance or regulation.
- Several agencies have implemented cost sharing or co-funding programs to encourage grease trap/interceptor installation.
- Grease accumulations move through the collection system in an unpredictable manner, which results in the need for additional maintenance of the collection system.

### **REGULATORY CONDITIONS**

Regulatory constraints related to the performance of sanitary sewer collection systems are in the process of significant changes. These changes will greatly increase the level of acceptable performance of the collection system for CSD-1. Existing regulations are being more strictly enforced throughout the country and particularly in California. A brief overview of new and upcoming regulations that will impact the minimum collection system performance level are provided below:

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- The United States Environmental Protection Agency (USEPA) is in the process of approving a policy regarding Sanitary Sewer Overflows (SSO) that requires the elimination of dry weather stoppages and overflows in the collection system. A focal point for the SSO policy is the elimination of chronic or repeat stoppage locations associated with grease or roots. Action by the USEPA against the City of Los Angeles for its lack of a grease control program is a strong indicator of the need for an active program.
- Coupled with the SSO policy is the USEPA requirement for a program development by each agency called Capacity, Management, Operation and Maintenance (CMOM). Each agency will prepare an annual CMOM report that focuses on the operational characteristics of the agency. One of the items specifically required in CMOM is the presence of and ongoing performance associated with a grease source control program. CSD-1 is currently in the initial stages of developing a CMOM program.
- The California Water Resources Control Board and the associated Regional Water Quality Control Board are taking aggressive positions on overflows or spills related to the performance of collection systems.

## **CONCLUSIONS**

The conclusions developed as a result of the Grease Impact Assessment Project are:

- The physical condition of the collection system has a significant impact on the amount of grease that accumulates in the sewer. Sags and obstructions, such as roots, allow the wastewater to slow down, letting the grease accumulate on the pipe wall.
- CSD-1 sewer design standards are functional for normal flow volumes, but have low velocities in low flow conditions that contribute to grease accumulation on the sewer walls.
- Public education and outreach programs are essential in obtaining support from the community for a grease source control program.
- Grease trap/interceptors when actively maintained provide an effective means of grease source control.

Implementation of an active grease source control program by CSD-1 will reduce the number of grease caused stoppages, sanitary sewer overflows, and annual flooded claims cost. It will also benefit the District in terms of an affirmable defense posture when regulators consider enforcement action against the District for sanitary sewer overflows.