WEST COUNTY WASTEWATER DISTRICT

SSO Hearing: 2/8/06

A Public Agency

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January 24, 2006

Ms. Tam Doduc, Chair & Members
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

SUBJECT: **PROPOSED WDRS FOR SANITARY SEWER COLLECTION SYSTEMS**

Dear Chair Doduc and Members of the State Water Board:

The West County Wastewater District ("WCWD") appreciates the opportunity to provide comments regarding the proposed waste discharge requirements ("WDRs") applicable to sanitary sewer collection systems in California. As our district is currently the subject of a citizen suit for sanitary sewer overflows ("SSOs") despite having a good sewer system management program in place, this topic is of sincere interest to our district.

WCWD is primarily concerned that while this WDRs purports to be a waste discharge permit, it does not really *permit* anything. Although not express, the WDRs contain findings and provisions alluding to the fact that any drop of sewage outside of a publicly-owned collection system constitutes an actionable violation of the WDRs and potentially of state and federal law. If SSOs are prohibited, then a permit is not necessary and the Sewer System Management Program ("SSMP") program that the WDRs is requiring could be accomplished through a Water Code section 13267 program instead of this proposed WDRs. This is the current program in the Bay Area and should be considered in lieu of WDRs if the proposal is to merely prohibit spills and mandate the development and implementation of SSMPs.

Another concern is that the WDRs treat public entities more stringently than other similarly situated dischargers. Private homeowners, mobile home parks, and other large private companies can maintain sewer systems, yet are not being subjected to the same stringent regulatory program. Such unequal treatment without a scientific reason for disparate treatment brings into question the scope and reasonableness of the proposed new regulatory program.

WCWD would ask that the State Water Board reconsider the entire premise of the WDRs. A more reasonable approach would be to require an operational and technology-based program, such as the Nine Minimum Controls required for Combined Sewer

Systems ("CSOs") under NPDES permits throughout the country.[1] Combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies. (*See* http://cfpub.epa.gov/npdes/home.cfm?program_id=5.) CSOs discharge diluted raw sewage similar to that contained in wet weather SSOs, yet these discharges are not prohibited because of the recognition that all such discharges cannot be readily or feasibly stopped. Instead, the discharges are permitted so long as the Nine Minimum Controls have been undertaken prior to discharge. A similar program would be appropriate for SSOs and should be considered by the State Water Board.

Under a permitted SSO program, the SSMP requirements would be imposed along with a time schedule to come into compliance with each of the SSMP requirements. Like other permits, the compliance schedule would authorize explicit levels of non-compliance in the interim until the mandated level of compliance was achieved. At the end of the compliance schedule, operational benchmarks could be imposed as permit conditions or limitations that recognize that blockages and spills can occur even in the best systems. If this were not the case, then plumbers would be unnecessary and cease to exist as a profession.

The spill rate benchmark measure, which should be selected as the measurable standard of performance, is expressed as a number of sewer spills per hundred miles of sewer pipe. Rather than considering the total number of system spills, the spill rate (per 100 miles of pipe) allows a normalized measure for comparison between different sized sewer systems. The spill rate is calculated by dividing the total number of spills from a system in a year by the total number of miles in the sewer system and multiplying by 100. The spill rate is a common performance measure used in several published benchmark studies and by regulatory agencies as a means for comparing system performance in varying systems.[2]

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[1] The nine minimum controls are as follows:

1. Proper operation and regular maintenance programs for the sewer system and the CSOs
2. Maximum use of the collection system for storage
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized
4. Maximization of flow to the publicly owned treatment works for treatment
5. Prohibition of CSOs during dry weather
6. Control of solid and floatable materials in CSOs
7. Pollution prevention
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

See http://cfpub.epa.gov/npdes/cso/ninecontrols.cfm?program_id=5 and http://www.epa.gov/npdes/pubs/owm0030.pdf; 59 Fed. Reg. 18688 (Apr. 19, 1994); 33 U.S.C. §1342(q).

[2] *See attached* "Expert Report" prepared by Kenneth D. Greenberg, Environmental Engineer, USEPA Region IX for U.S. v. City of Los Angeles, (hereinafter "Greenberg Report") at pg. 11 citing Arbour 1998, Black and Veatch 1999, Black and Veatch 200 and www.swrcb.ca.gov/rwqcb9/programs/sso.html.

The appropriate benchmark depends on the location of the system. EPA Region IX set a benchmark for southwestern communities, based on review of systems in Arizona and central and southern California. The average spill rate for these systems was 5.9 spills/100 miles and the median was 4.7 spills per 100 miles. *See* Greenberg Report at pg. 21. Similar benchmarks could be set with the express recognition that zero spills is a goal, but is not necessarily an achievable or reasonable requirement. No requirement of the Porter-Cologne Water Quality Control Act, or the Clean Water Act, mandates zero discharge and the State Water Board can certainly exercise its discretion to impose reasonable requirements for reducing SSOs and setting benchmark requirements after the adoption and implementation of an SSMP

We would like to be able to support the WDRs or even an NPDES permit authorizing a benchmark requirements approach, but the proposed WDRs create an unworkable and unprecedented new regulatory program without remedying the current problems associated with third-party and duplicative liability for the same SSO events, many of which may be unavoidable.

<u>Specific Comments on the WDRs</u>:

1. The State Water Board must comply with Water Code section 13263 when adopting this WDRs, including an analysis of the 13241 factors. Since this is not being proposed as an NPDES permit, there is no shield of federal law to prevent this analysis from being performed. Thus, the State Water Board must consider the water quality conditions that can <u>reasonably be achieved</u> as well as <u>economic considerations</u>. A zero spill condition cannot be reasonably achieved and the cost to do so, if possible at all, would be astronomical.

2. The State Water Board must perform an appropriate CEQA analysis. The proposed regulatory program will likely have significant environmental impacts in that sewer lines will be unearthed and replaced all over the state, creating land and air impacts that must be considered. The State Water Board would not be able to lawfully rely upon the Water Code for an exemption from CEQA requirements since Water Code section 13389 only applies to NPDES permits. In addition, the claimed CEQA exemptions included in the proposed WDRs are inadequate. The exemption in 14 C.C.R. §15308 does not apply when construction activities are included. Since the SSMP program includes rehabilitation and replacement, both of which are construction activities, this exemption cannot apply. Similarly, since the existing sewer system facilities are anticipated to be repaired or replaced, it is questionable whether the existing facilities categorical exemption under 14 C.C.R. §15301 can apply, particularly where the cumulative impacts of sewer repair and replacement both locally and statewide may have significant effects on the environment.

3. Sewer backups into buildings and private property should not be included in the definition of SSO. These should be included under a separate definition of "Sewer Backups" or be deleted entirely. It is not clear that the State Water Board has the authority to regulate backups into buildings or other private property where there is no

identifiable threat to surface or ground waters. The State Water Board does not have general public health protection as a legislatively granted power where that protection is unrelated to surface and ground water. Inclusion of anything not related to a discharge to land that could adversely affect surface or ground water is beyond the defined authority of the State Water Board.

4. The bypass provision language should be removed, or else included as a defense to enforcement. Part of the currently proposed enforcement discretion provisions are derived from federal NPDES regulations. (*See* 40 C.F.R. §122.41(m).) The WDRs should only include this language, taken from federal regulations and relating to conditions necessary to establish bypass, if such language establishes a defense against enforcement as it does under federal law. If such a defense is not being provided, then the requirements for bypass are inappropriately being applied. Instead, the bypass and upset defenses for sewer conveyance facilities, as authorized with facilities regulated under NPDES permits, should provide meaningful legal protection from enforcement actions when the permit holder is otherwise in compliance with the WDRs' conditions. An permittee that satisfies conditions necessary to demonstrate bypass, including C.6. (iii), or that has an incident that meets the definition of an upset, including C.6. (iv), and that satisfies the conditions to demonstrate upset, including C.6.(ii), should be deemed to have established an affirmative defense and, thereby, receive legal protection from government enforcement as is the case under federal law.

Although WCWD believes that an affirmative defense is the better approach, and that such a defense is lawful, in the context of the proposed enforcement discretion approach, no such protection from enforcement actions has been incorporated into the WDRs. Therefore, these proposed provisions are overly onerous, and do not provide commensurate protection from enforcement for permittees that are fully compliant with the terms of the draft WDRs yet experience unavoidable SSOs.

5. Provision 6 should reference Chapter 5 as the relevant sections for consideration instead of merely Water Code sections 13327 and 13385. Section 13385 is in Chapter 5.5, applicable only to NPDES permits, and is inappropriately referenced in the proposed WDRs. In addition, Provision 6 should incorporate the concept of practicability in lieu of a requirement for adequacy.

6. The proposed time schedule is overly inclusive and does not provide sufficient flexibility for individual agencies to design and implement an SSMP appropriate to their particular circumstances. Entities subject to the WDRs will vary significantly with regard to such factors as topography, urbanization, budget, opportunities to partner with other systems, and so on. Rather than specify individual compliance dates for the SSMP interim milestones, the WDRs should simply specify the deadline for completion of an SSMP that includes all the required components.

In summary, while WCWD supports the State Water Board's goals of reducing the volume and frequency of SSOs and bringing consistency to the regulation of collection systems. However, the same result can be achieved without a permit, or with a permit that recognizes that zero spills, while a laudable goal, is not a realistic requirement and, even if possible, cannot occur overnight. For these reasons, WCWD urges the State Water Board to direct its staff to revise the WDRs to address the concerns identified in this letter and to re-circulate a revised draft for additional comment prior to adoption.

Thank you for your consideration of our comments.

Sincerely,

E.J. Shalaby
District Manager, WCWD

EXPERT REPORT in United States v. City of Los Angeles

prepared by

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October 15, 2003

EVALUATION OF:
1. THE CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM PERFORMANCE USING SEWAGE SPILL BENCHMARK DATA and
2. THE CITY OF LOS ANGELES FATS, OILS AND GREASE SOURCE CONTROL PROGRAM

1.0 EXPERT QUALIFICATIONS

I am currently employed by the United States Environmental Protection Agency (EPA) and have been assigned the task of preparing this report evaluating: 1) the rate of sewage spills from the City of Los Angeles wastewater collection system as compared to spill rates found in various benchmark data sets and 2) the City of Los Angeles fats, oils and grease (FOG) source control program.

I am currently employed as an Environmental Engineer in the Water Division of the United States Environmental Protection Agency, Region 9 office in San Francisco, California. I hold a Bachelor of Science degree in civil engineering and a Master of Engineering degree in civil engineering, both from Cornell University. I am a registered professional Civil Engineer in the State of California. I have over 26 years experience in environmental engineering and environmental regulatory matters with most of that experience in the fields of wastewater treatment and water pollution control. My experience includes compliance evaluations of wastewater treatment and collection systems and review of compliance monitoring reports including reports of sewage spills. I am presently the EPA Region 9 lead coordinator for technical and regulatory matters related to wastewater collection systems. My qualifications are contained in my resume, which is attached as Appendix A.

A list of documents I used in my investigation and for preparation this report is attached as Appendix B.

I am receiving no compensation for preparation of this report or testimony in this case other than my normal salary as an employee of the EPA.

All of the evaluations and data analysis discussed in this report was done by me or by EPA employees and EPA contractors under my supervision.

To the extent that additional documents or information relevant to my analyses are later disclosed by the City of Los Angeles, I may supplement this report or alter my opinions as the information becomes available.

2.0 SUMMARY OF OPINIONS

2.1 Opinions Regarding Sewage Spill Rate Comparisons

- $ The sewage spill rate (spills/100 miles of sewer pipe/year) is a valid measure of collection system performance.
- $ Over the last three years, Los Angeles had 2,007 sewage spills which equates to about 10.3 sewage spills/100 miles/year. I estimate that 341 of those spills were in buildings or on private property but caused by problems in the City=s sewer pipes. Excluding the private property spills, Los Angeles spills at a rate of about 8.5 spills/100 mile/year.
- $ The spill rate in the Los Angeles Collection System is worse than the average and median spill rates of dozens of Southern California and Arizona collection systems evaluated in this report.
- $ The spill rate in the Los Angeles Collection System is worse than the average and median spill rates in four published benchmark studies.
- $ Based on these benchmark comparisons, I conclude that the Los Angeles Collection System performs poorly as measured by the spill rate benchmark measure.
- $ It is possible for collection systems to achieve low rates of sewage spills. The fact that dozens of collection systems examined in this report have very low spill rates is evidence that it is possible to operate a collection system to have few sewage spills.
- $ Los Angeles should take steps to reduce sewage spills.
- $ Los Angeles established a goal to reduce sewage spills and meet a benchmark goal of 4.5 spills/100 miles/year.[1]
- $ Older sewer pipes in the Los Angeles system spill more frequently than the newer pipes.
- $ The average age of sewer pipes in Los Angeles is about 50 years.
- $ The Los Angeles sewer system is aging rapidly. Unless the City undertakes a significant sewer renewal program, in 20 years, about 90% of the Los Angeles sewer pipes will be more than 50 years old.
- $ The newer portions of the Los Angeles collection system have few sewage spills. The northern districts (Reseda and North Hollywood) of the Los Angeles collection system have fewer sewage spills than the other districts of the Los Angeles collection system. Los Angeles has demonstrated an ability to operate parts of its system at low spill rates.

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[1]City of Los Angeles. July 7, 2003. *City of Los Angeles Wastewater Collection System, CMOM Program.*

$ Los Angeles should direct improvement efforts to the older secondary sewer pipes.[2]

2.2 Opinions Regarding the Los Angeles FOG Program

[2]The City of Los Angeles defines secondary sewer pipes as pipes with diameters of 15" or less. Primary sewers are pipes with diameters larger than 15". The City of Los Angeles collection system has about 5,866 miles of secondary sewer pipes and 634 miles of primary sewers (City of Los Angeles, March 1999). Between 2000 and 2002, more than 98% of Los Angeles spills were from the secondary sewer pipes. (WISE database.)

- $ In practice, food service establishments (FSEs) that have not undergone major renovations or engaged in new construction (existing FSEs) are only required to implement best management practices (BMPs).[3]
- $ The City has not required any existing FSEs to install a grease interceptor.[4] Yet neither has it issued a conditional waiver relieving any FSEs of the requirement to install a grease interceptor, as required under the FOG ordinance.[5]
- $ Each of the 8 FSEs inspected by EPA and contractor Pat Tripodi in August 2003 was not implementing one or more BMPs required by the City FOG ordinance.
- $ None of the inspected FSEs was dry wiping pots, pans and dishware prior to dishwashing, one of the BMPs required by the City FOG ordinance.
- $ In my opinion, it is impractical for FSEs to effectively dry wipe pots, pans and dishware prior to dishwashing.
- $ Failure to eliminate FOG from pots, pans and dishware prior to dishwashing leads to FOG discharges to the City wastewater collection system.
- $ None of the inspected FSEs were using absorbent material to soak up oil and grease under fryer baskets as required by the City FOG ordinance.
- $ Several of the inspected FSEs were observed to have spilled grease on their kitchen floors. Each of the inspected FSEs described floor washing practices which would lead to this grease being washed to the City collection system.
- $ Since adoption of its FOG ordinance, the City has not required any existing FSE to install a grease interceptor based on the FSE=s failure to properly implement BMPs.[6]
- $ Grease interceptors and alternative grease removal devices (such as self cleaning traps) are effective at removing FOG discharges from FSEs and preventing discharge of the removed FOG to City sewers.
- $ In my opinion, given the impracticality of certain BMPs (such as dry wiping) and the City=s failure to ensure FSEs are implementing BMP requirements, the City should require more existing FSEs to install grease interceptors or alternative grease removal

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[3]Dafeta deposition, August 27, 2003, page 33:12-24 and pages 50:24 to 51:3.

[4]Dafeta deposition, August 27, 2003, page 87:11-16.

[5]Dafeta deposition, August 27, 2003, pages 37:3 to 38:17 and page 64:18-22.

[6]Dafeta deposition, August 27, 2003, pages 40:20-24 and 87:11-16.

devices, as contemplated by the City=s FOG ordinance.

3.0 INTRODUCTION

In this report, the performance of the City of Los Angeles wastewater collection system is compared against the sewage spill rate benchmark measures for sewage collection systems in the Southwest United States and to the spill rates cited in four published benchmark studies.

Benchmark measures provide an objective method for comparing characteristics, practices and performance within a peer group. Benchmark studies can be used to identify standard or typical industry practices and performance. Benchmark comparisons can also be used to identify poor performers and best in class performers. Individuals can use benchmark comparisons to identify program or performance areas needing improvement.[7]

For municipal wastewater collection systems, benchmark measures can be used to compare operations and maintenance (O&M) practices (such as percentage of sewer pipes cleaned annually), fiscal activity (O&M expenditures per mile of sewer pipe) or system performance. Typical performance measures include number of sewage spills, spill volume, customer complaints, sewage flooding claims, and a variety of focused measures such as number of pump station failures or number of mainline breaks. Benchmark measures are expressed as base unit measurements that normalize the data thus allowing comparison between systems with different characteristics.[8]

In this report, the sewage spill rate, expressed as number of sewage spills per 100 miles of sewer pipe per year, was selected as the benchmark measure for comparing the performance of the City of Los Angeles sewage collection system to other municipal collection systems throughout the southwestern United States. Sewage spill data was collected from dozens of sewage collection systems in coastal Southern California and from several systems in Arizona. Coupled with data on the length of sewer pipe in each system, spill rates were calculated for the systems in the selected benchmark universe. Los Angeles is also compared against spill rate benchmark measures from published benchmark studies. Finally, Los Angeles is compared to itself. First, by contrasting the Los Angeles overall system spill rate to the spill rate from newer sewer pipes in the Los Angeles system. Second, spill rates are compared among the six different maintenance districts in the Los Angeles system.

The report explains selection of the spill rate benchmark as a measure of system performance and

[7] Arbour, Rick and Kerri, Ken. 1998. *Collection Systems: Methods for Evaluating and Improving Performance*, page 63.

[8] Arbour 1998, Chapter 4.

explains selection of southwestern systems for comparison to Los Angeles. Data collection procedures are described and a critique of data quality is provided. Meaningful benchmark evaluation depends on comparable data sets. In other words, care must be taken to compare apples to apples and oranges to oranges. The report includes a discussion of comparability of Los Angeles spill rate data to spill rate data from the selected benchmark universe. Based on the benchmark comparisons, conclusions are offered on the performance of the Los Angeles wastewater collection system.

Section 11.0 of the report examines the City=s program to control sources of fats, oils and grease discharges to the collection system.

4.0 BACKGROUND

4.1 The City of Los Angeles Wastewater Collection System

The City of Los Angeles owns and operates the wastewater collection and treatment system serving approximately 4 million people in the City of Los Angeles, California. The system includes the wastewater collection system, consisting of approximately 6,500 miles of sewer pipes and 48 sewage pump stations, used to transport domestic, commercial and industrial wastewater to four sewage treatment plants. The City of Los Angeles system also collects, transports and treats wastewater from 26 contract agencies, including neighboring cities such as Santa Monica and Beverly Hills. The contract agencies own and operate their own wastewater collection systems up to the point where their wastewater is introduced to the Los Angeles system. The contract agency sewer pipes are not addressed in this report and are not included in the 6,500 mile Los Angeles system described above. Los Angeles does not assume responsibility for private lateral connections to their system, and these private laterals are not included in the 6,500 mile length of the Los Angeles system.

The average age of the Los Angeles sewage collection system is about 50 years.[9] The oldest sewer pipes were installed in the late 1800's. The majority of sewer pipes were installed during the building booms in the 1920's and 1950's and >60's. Sewer pipes in the Los Angeles system range in size from 4" diameter to 150@ diameter. The vast majority (approximately 76% or 4,943 miles) of the system consists of 8" diameter mainlines that collect sewage directly from homes and businesses by way of private lateral connections.[10] The City describes its system as consisting of the secondary system, 5,866 miles of small diameter pipes (≤ 15" diameter); that feeds sewage to the 634 mile primary system of large interceptor and outfall pipes ranging from 16" to 150@.[11] The primary sewer pipes convey sewage to the four sewage treatment plants.

[9]City of Los Angeles 1999 and City of Los Angeles sewer pipe inventory.

[10]City of Los Angeles sewer pipe inventory.

[11]City of Los Angeles 1999 and City of Los Angeles sewer pipe inventory.

The City of Los Angeles actually operates two separate sewer pipe networks. The largest is the Hyperion service area consisting of 6,210 miles of sewer pipe feeding sewage to the Hyperion Wastewater Treatment Plant, Tillman Water Reclamation Plant, and the LA-Glendale Water Reclamation Plant. The southern-most part of Los Angeles, around San Pedro Harbor, is served by the 290 mile sewer system culminating at the Terminal Island Wastewater Treatment Plant. In this report, sewage spill data and spill rate calculations are given for the entire 6,500 mile Los Angeles system, combining the Hyperion and Terminal Island service areas. Details of sewer pipe age and size are provided in Appendix C.

4.2 City of Los Angeles Sewage Spill Data

In this report, the term Asewage spill@ (or spill) refers to an overflow of any volume of sewage escaping from the sewage collection system regardless of the ultimate destination of the spilled sewage. (A spill that is entirely recovered and returned to the system counts as a spill the same as a spill that flows to a storm drain, stream or ocean.) Sewage may escape from the public parts of collection systems through maintenance hole covers, broken pipes, pump stations or other sewer appurtenances. Sewage may also overflow from private connections to the public systems including private laterals, lateral cleanouts or indoor plumbing fixtures. In this report, the term Asewage spill@ (or spill) includes all spills from the public sewage collection system and spills from private property if caused by a problem in the public system such as a blockage in the mainline. Because some systems do not report private spills caused by problems in the public mainlines, in the benchmark comparison section of this report, adjustments are made to ensure comparability.

Los Angeles maintains records of its sewage spills in its WISE database. WISE includes a listing of sewage spills from the Los Angeles collection system and private property spills where the spill was caused by a problem in the City=s mainline. Private property spills caused by the property owners troubles are not included in WISE.[12] The WISE database, made available to the author, includes spill data from 1994 to February 28, 2003. A tabulation of Los Angeles spill data for the years 1997 through 2002 is provided in Table 1.

TABLE 1: CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM NUMBER OF SEWAGE SPILLS[13]

Calendar Year	1997	1998	1999	2000	2001	2002
Number of Spills	244	298	506	689	680	638

[12]Berggren deposition.

[13]City of Los Angeles WISE database.

For this report, the three most recent complete years (2000 to 2002) of spill data are considered as being most representative of current performance in the Los Angeles system.[14] Between January 1, 2000 and December 31, 2002 Los Angeles reported a total of 2,007 sewage spills, averaging 669 spills annually. Los Angeles spill rates were calculated using a system mileage of 6,500 miles. Between 2000 and 2002, the three year average spill rate for the Los Angeles system was 10.3 spills per 100 miles of sewer pipe per year.

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[14]Between 1994 and 1999 the number of sewage spills reported by the City in WISE steadily increased. Between 2000 and 2002 the number of spills stabilized at between 638 and 689 spills. At the writing of this report, a full year of data is not yet available for 2003.

As noted above, Los Angeles claims to report all sewage spills from the public system (regardless of volume, cause or destination) plus private property spills that they determine to be caused by problems in the City of Los Angeles mainline. Not all systems in the benchmark data sets considered here report private property spills, whether caused by problems in the public mainline or by problems in the private property owners= plumbing. To make the Los Angeles spill rate data comparable to the benchmark data sets, an adjustment was made to the Los Angeles data to exclude private property spills. (According to Berggren, the only private property spills in the WISE database should be those caused by problems in the Los Angeles mainlines.[15]) It is estimated that approximately 17% of spills reported in WISE are private property spills caused by problems in the City=s mainlines.[16] Los Angeles spill data and calculated spill rates for the years 2000 through 2002, with and without the adjustment for private property spills, are provided in Table 2.

TABLE 2: CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM SEWAGE SPILL RATES

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[15]Berggren deposition.

[16]Los Angeles does not indicate in WISE if a spill is a mainline spill or a private property spill. To identify private property spills, therefore, it was necessary to examine Los Angeles= field spill reports to look for notes indicating whether or not the spill was from private property. Under my supervision, EPA contractor, SAIC, examined 9 months of Los Angeles= field spill reports and the comments field in the WISE database to determine that 17% of spills listed in WISE for the 9 months examined appear to be private property spills caused by problems in the City sewer mains. The estimated percentage was then used to extrapolate to arrive at a three-year total estimate of private property spills between January 1, 2000 and December 31, 2002. Ref. Hahn, 9/5/03.

Calendar Year	Total Number of Spills (from WISE database)		Spills, Adjusted to Exclude Private Property Spills (estimate per Hahn, 9/5/03)		Private Property Spills Caused by Los Angeles (estimate per Hahn, 9/5/03)
	Number of Spills	Spill Rate (spills/100 mi./yr.)	Number of Spills	Spill Rate (spills/100 mi./yr.)	Number of Spills
2000	689	10.6	572	8.8	117
2001	680	10.5	564	8.7	116
2002	638	9.8	530	8.2	108
Totals	2,007	—	1,666	—	341
Averages	669	10.3	555	8.5	114

The adjustments to spill numbers and rates provided in Table 2 were made to allow a fair comparison of the Los Angeles spill data to benchmark data sets where the benchmark systems do not report private property spills. The adjusted three-year spill rate of 8.5 spills/100 miles of sewer/year (Table 2) will be used to compare Los Angeles to the southwestern data sets presented in this report. If Los Angeles provides more definitive evidence identifying which of its spills are private property spills, I can supplement my report to reflect the new data.

Table 2 also includes an extrapolated estimate of 341 private property spills caused by problems in the Los Angeles sewer mains between January 1, 2000 and December 31, 2002. Los Angeles spill reports indicate that many of these spills emerge in buildings and homes from indoor plumbing fixtures. Blockages or back-pressure in the City=s sewer mains can cause sewage to back into private plumbing where it can spill out of toilets, floor drains or other fixtures. We have requested, but not received, Los Angeles= documentation of damage claims filed by private property owners against the City of Los Angeles for sewage backups caused by the City. This documentation may provide more complete evidence of the rate of private property spills in Los Angeles. If this documentation is made available, I can supplement my report to reflect the new information. It is possible that for some of the private property spills, there was also an associated overflow from a City manhole. This information, requested but not provided, would be significant for arriving at a true benchmark spill rate for Los Angeles. Simultaneous manhole overflows, if they occurred, would increase the Los Angeles spill rate used for benchmark comparisons.

5.0 THE SEWAGE SPILL RATE BENCHMARK

The spill rate benchmark measure, which was selected as the measure of system performance for this report, is expressed as number of sewage spills per 100 miles of sewer pipe per year. Rather than considering a total number of system spills, the spill rate (spills per 100 miles of pipe) is a normalized measure that allows comparison between different sized systems. The spill rate is calculated by dividing the total number of spills from a system in a year by the total length (in miles) of sewer pipe in the system and multiplying by 100. Spill rates considered in this report are calculated using a full year of spill data (either calendar or fiscal year) which negates the affect of seasonal variations in spill numbers. The spill rate is a common performance measure used in several published benchmark studies and by regulatory agencies as a means for comparing system performance among systems of varying size.[17] The data needed to calculate the spill rate is readily available and based on clear, objective measures - sewer system pipe length and number of spills. Sewer systems participating in one benchmark study identified the spill rate as the most important of several measures of sewer system performance.[18]

Other performance measures considered for use in this report include spill volume measures, stoppage rates (a stoppage is a partial blockage of a sewer pipe that does not result in a spill), customer complaints, sewage flooding claims, and a variety of focused measures such as number of pump station failures or number of mainline breaks. While each of these measures is valid for certain purposes, the spill rate measure (spills/100 miles of sewer pipe/year) was selected as the best overall measure of system performance.

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[17]Arbour 1998. Black and Veatch 1999. Black and Veatch 2000. California Regional Water Quality Control Board web site http://www.swrcb.ca.gov/rwqcb9/programs/sso.html

[18]Black and Veatch 2000, page 6-2.

The spill rate provides a good overall indicator of system performance as affected by system capacity, management, operations and maintenance. A well managed and maintained system with adequate capacity tends to have fewer spills than a poorly managed system or a system with inadequate capacity.[19] Sewage spill incidents are used by many systems, including Los Angeles, as a trigger to increase cleaning or maintenance frequencies.[20] The sewage spill rate is recommended as a metric to assess the effectiveness of maintenance and management procedures or to track progress in improving system performance.[21]

6.0 BENCHMARK DATA

In this section, the City of Los Angeles spill rate is compared to spill rates calculated for three spills data sets from the southwestern United States and the spill rates cited in four published benchmark studies. The process of selecting the southwestern benchmark data sets is described as well as steps taken to ensure data quality.

6.1 Southwestern Benchmark Communities

Sewage collection systems selected for the benchmark universe evaluated in this report are all located in the Southwestern United States, with most of the systems being located in coastal Southern California. Selected collection systems include:

$ 32 systems in central and northern Orange County, California;

$ 48 systems in the San Diego region (the area regulated by the California Regional Water Quality Control Board, San Diego Region: San Diego County, southern Orange County, and southern Riverside County); and

$ 15 systems surveyed by the United States Environmental Protection Agency including 3 systems in Arizona and 12 systems ranging along the California coast from Pacific Grove in the north to the Los Angeles area in the south.

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[19] Black and Veatch 1999, pp. 1-3 to 1-5 and 5-10 to 5-14; Arbour 1998, p. 2.

[20] WISE database comments field and Berggren deposition.

[21] Arbour 1998, pages 38 and 63 to 65.

These systems were selected because they are similar to Los Angeles in various characteristics as discussed below. All of the selected systems are located in dry or summer-dry regions with average annual precipitation ranging from a low of 8.29" in Phoenix, Arizona to a high of 22.91" in Flagstaff, Arizona. Rainfall at the selected California cities range from a low of 10.77" at San Diego to a high of 20.35" at Pacific Grove. Average annual rainfall in Los Angeles is in the middle of this range at 15.14".[22] Most of the California systems in the benchmark universe are located along the coast in terrain similar to Los Angeles where there is a mix of flat coastal plain and steep hills. All of the California systems evaluated are located within20 miles of the coast. Vegetation throughout the California benchmark universe is similar to Los Angeles, including chaparral scrub and planted vegetation suited to Southern California=s Mediterranean climate.

The three Arizona systems, Phoenix, Pima County (Tucson) and Flagstaff experience annual precipitation of 8.29", 12.17" and 22.91" respectively, amounts that are not dissimilar to the rainfall seen at the coastal California systems. (Rainfall at the coastal California systems range from 10.77" in San Diego to 20.35" in Pacific Grove.)[23] As compared to Los Angeles, Phoenix is generally flatter terrain while Pima County has a mix of flat and hilly terrain similar to Los Angeles. The Arizona systems experience weather extremes (cold and snow in Flagstaff and heat in Phoenix and Pima) not seen in the California systems. As compared to the California systems, Phoenix and Pima County have more sparse desert vegetation. It is not clear what effect the differences in climate, topography and vegetation might have on the benchmark systems. For example, each climatic setting presents its own challenges. Flagstaff endures snow melt flows in the spring. High temperatures in Phoenix and Pima County can accelerate corrosion of sewer pipes. Considering all these factors, I conclude that while variations exist, they are not large enough to compromise the benchmark comparisons considered in this report.

Some published benchmark studies compare systems located throughout the country.[24] But when possible, I conclude that it is better to make regional comparisons. In fact, the Black and Veatch 1999 study divides systems into the broad geographic regions of northeast, southeast, central, northwest and southwest. California and Arizona are included in the southwest region identified in Black and Veatch 1999.

While there are similarities in the geographic and climatic settings of the benchmark universe examined in this report, there is variability in the physical characteristics of the systems in the benchmark universe. Systems range in size from the 6 mile system in Emerald Bay, California to the 6,500 mile Los Angeles system. Los Angeles and each of the systems in the benchmark data

[22]http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html

[23]http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html and www.weather.com

[24]Arbour 1998. Black and Veatch 2000.

sets include a mix of large and small pipes. In fact, many of the systems in the benchmark universe are satellites to larger regional systems and as such, have few if any large interceptor pipes. The affect of these system characteristics and others on benchmark comparisons are examined below in the Data Comparability section.

The methods used to collect spill data and system pipe length information for the three Southwestern benchmark communities are described below along with descriptions of the spill rates found in each data set. A summary of the benchmark data from the three data sets is presented in subsection 6.1.4, Los Angeles Compared to the Southwestern Benchmark Data Sets. The spill rate data is presented as both average and median spill rates. As explained in section 8.0, Data Comparability, the median value is the preferred statistic for comparing Los Angeles to the benchmark data sets examined in this report.[25]

6.1.1 Central and Northern Orange County Systems

The Orange County Sanitation District (OCSD) operates 2 regional wastewater treatment plants serving 27 member agencies (cities and sanitation districts) in the central and northern parts of Orange County, California. The member agencies own and operate their own local sewage collection systems that convey wastewater to the regional sewer interceptor system operated by OCSD. In addition to operating about 450 miles of large diameter regional interceptor pipes, OCSD operates local sewers in the City of Tustin, the Irvine Business Complex and unincorporated parts of the regional system. The OCSD regional system, including member agency pipes, has about 5,400 miles of sewer pipe serving about 2.3 million people.[26] As such, the size of the OCSD system taken as a whole is not dissimilar from the Los Angeles system. But, as noted above, the OCSD system is managed as 27 separate collection systems.

Since 1997, OCSD has conducted annual voluntary surveys of its 27 member sewage collection agencies. The survey includes dozens of questions about system characteristics and the management, operations and maintenance practices of the member agency sewer systems. Each of the annual surveys asked for a reporting of all sewage spills of any volume. OCSD survey spill data (pipe miles and spill numbers) for fiscal years July 1, 2000 to June 30, 2001 and July 1, 2001 to June 30, 2002 are compiled in Appendix D. Using the sewer pipe lengths and spill data reported by the member agencies, I calculated sewage spill rates (spills/100 mi./yr.) for each agency (Appendix D).

In this report, the OCSD survey results are used for two comparisons against Los Angeles.

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[25]The median is the data point with an equal number of both higher and lower values. The median is normally the preferred statistical comparison when a few very high data points can skew the average upward to the point of being a misleading representation of the data set.

[26]Orange County Sanitation District June 2003.

First, Los Angeles is compared to the member agencies grouped as a data set of separate systems. For this comparison, I excluded the large regional interceptor pipes owned and operated by OCSD. (Blockages, the most common cause of sewage spills, are unlikely in large interceptor pipes. For this reason, it is not fair to compare Los Angeles, an integrated system with a full range of pipe sizes, to a system with predominantly large pipes.) The second comparison made with the OCSD survey data is to compare Los Angeles with the sum of the separate survey responses, including the data for the OCSD regional interceptors. In this way, the OCSD system is treated as one large system for purposes of comparison to Los Angeles.

Before using the OCSD survey data I evaluated the quality and completeness of the data. While participation in the survey is voluntary, a review of the survey reports reveals universal participation by all of the member agencies. What=s more, survey participants answered nearly all of the survey questions. (Nick Arhontes, of OCSD, the survey organizer, explained to me that his team encourages full participation and communicates with each participant to ensure complete responses.) The one exception was for the City of La Habra, which in the FY00/01 survey responded to the spill number questions with a response of Anot applicable@. It=s not clear if they meant Azero@ or if it meant the City simply did not respond to this question. Because of the uncertainty, La Habra is excluded from my tabulation of the FY00/01 survey responses. (La Habra provided spill numbers in the FY01/02 survey and these results are included in the data set presented here.) The level of respondent participation in the OCSD survey is much better than some of the published benchmark studies. In Black and Veatch 1999, for example, only 25 of 42 participating systems provided requested sewage spill data. In my opinion, the fact that the OCSD survey is voluntary has not diminished the integrity of the responses.

My second quality check of the OCSD surveys was to compare its spill data to spill data maintained by the Orange County Department of Health and spill data collected by the California Regional Water Quality Control Board for the Santa Ana Region. OCSD survey results were compared against Health Department records for the same time periods covered by the OCSD surveys. Sewer systems are required by state law[27] to report all sewage spills (regardless of volume or destination) to the County Health Department.[28] With two exceptions, this comparison revealed that the OCSD survey responses were either identical to or more complete than the Health Department records. It appears, however, that the City of Stanton may not have reported all of its spills in the OCSD surveys. Because of the uncertainty regarding the true number of spills from the City of Stanton system, Stanton is excluded from my benchmark data

[27]California Health and Safety Code, Division 5, Chapter 6, Article 2, section 5411.5.

[28]In a personal communication with Monica Mazur, Orange County Health, in October, 2003 Mazur stated her agency=s interpretation that 5411.5 requires reporting of all spills regardless of volume or destination.

set. The Yorba Linda Water District reported slightly more spills to the Health Department than to the OCSD survey. Lee Cory of the Yorba Linda Water District verified the accuracy of the spill data reported to the Health Department and this data is used for the benchmark comparison in this report.[29]

[29] In FY 00/01, the Yorba Linda Water District (YLWD) reported 8 spills to County Health and 5 spills in the OCSD survey. In FY 01/02, YLWD reported 2 spills to County Health and 1 spill in the OCSD survey.

OCSD survey responses for FY 00/01 and FY 01/02 were also compared to May 2002 to April 2003 data, the first full year of spill reporting made to the RWQCB pursuant to Waste Discharge Requirement No. R8-2002-0014.[30] While the date ranges for the OCSD survey and RWQCB data don=t match, I found the overall spill rates to be similar in the two data sets. This bolsters my confidence in the accuracy of the OCSD spill data.

Among the collection systems surveyed by OCSD, sewage spill rates ranged from a low of zero spills/100 miles/year at several agencies to a high of 13.7 spills/100 miles/year in the Garden Grove system during fiscal year (FY) 2000/2001. In FY 2000/2001, the average spill rate for the surveyed systems (excluding the OCSD regional pipes) was 4.0 spills/100 miles/year and the median spill rate was 3.9 spills/100 miles/year.[31] In FY 2001/2002, the average spill rate (excluding the OCSD regional pipes) was 3.7 spills/100 miles/year and the median spill rate was 2.5 spills/100 miles/year. By comparison, the Los Angeles adjusted spill rate for 2000 to 2002 was 8.5 spills/100 miles/year. The Los Angeles spill rate not only exceeds the average and median rates from the OCSD surveys, but in fact is higher than the FY00/01 and FY01/02 spill rates for all but three of the OCSD systems (Garden Grove, Fullerton and La Habra). A comparison of the Los Angeles spill rate to the Orange County data set is presented in a bar graph at Appendix E.

The OCSD system as a whole (sum of all participant responses including the OCSD regional pipes) had a two year (FY00/01 + FY01/02) spill rate of 4.3 spills/100 miles/year compared to the Los Angeles adjusted spill rate of 8.5 spills/100 miles/year.[32]

6.1.2 San Diego Region

In 1996, the State of California Regional Water Quality Control Board for the San Diego Region issued general Waste Discharge Requirement (WDR) Permit No. 96-04 which regulates operations of 46 sewage collection systems in San Diego County, southern Orange County and southwestern portions of Riverside County. Among the requirements in WDR No. 96-04 is a requirement to submit quarterly reports to the Regional Board listing each and every sewage spill

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[30]Waste Discharge Requirement Order No. R8-2002-0014, is a permit which regulates operations of 32 municipal and federal sewage collection systems in Orange County (including the 28 member agencies of the OCSD). Among other things WDR No. R8-2002-0014 requires monthly reports to the Regional Board listing each and every sewage spill, regardless of volume or destination. Spill reports available at the RWQCB.

[31]Average spill rates for the survey data sets presented in this report are calculated by dividing the sum of the individual system spill rates by the number of systems in the data set.

[32]The Awhole system@ spill rate was calculated by dividing the sum of all spills by the total system mileage and multiplying by 100.

from the permittee=s collection system, regardless of volume or destination.[33] The San Diego Regional Board spill data for fiscal years 2000/2001 and 2001/2002 is compiled in Appendix F.

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[33]From Monitoring and Reporting Program 96-04 (as clarified by Addendum #5, 9/13/00): AQuarterly Reporting to the Regional Board. For all sanitary sewer overflows, regardless of volume or final destination, the discharger shall: enter the data on a computer disk in the format described in Section C of Monitoring and Reporting Program 96-04 for submission to the Regional Board after the end of the quarter.@

Sewage spill data collected by the San Diego Regional Water Quality Control Board (RWQCB) is compiled into a report titled ASanitary Sewer Overflow Statistics@ and posted and regularly updated on their web site.[34] The spill data cited here was taken from the RWQCB web site. But first, as a quality control measure, my contractor and I held two separate meetings with RWQCB staff and managers to discuss their data management and data quality control procedures. I conclude that the RWQCB quality control procedures are sufficient to ensure complete and accurate spill data. Among the procedures employed by the Regional Board staff are comparing quarterly report data against phone logs of spill reports to look for spills missing from the quarterly reports. Missing spills are added to the data set if detected. Some of the permitted collection systems report private property spills in their quarterly reports. The RWQCB staff marks obvious private property spills so they are not wrongly attributed to the collection system agencies in the Sanitary Sewer Overflow Statistics report posted on the RWQCB web site. RWQCB staff conduct annual inspections of the permitted collection systems and use this opportunity to look for evidence of unreported spills. Finally, the Waste Discharge Requirements have been in affect for many years (since 1996) and RWQCB staff are confident that the permitted systems are now well aware of the spill reporting requirements.[35]

Based on the data quality check meetings described above, I have made only minor adjustments to the pipe mileage for a few systems. It was noticed that in the SSOS data on the RWQCB web site, some systems had significantly different pipe mileage listed in different years of data maintained by the Regional Board. EPA contractor, Dianne Stewart of SAIC, contacted the systems for clarification of the correct pipe mileage associated with FY 00/01 and 01/02.[36] Spill

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[34]http://www.swrcb.ca.gov/rwqcb9/programs/sso.html

[35]Greenberg meeting with Vasquez and Kelley, RWQCB 9, May 2003. Stewart report of meeting with Vasquez, RWQCB 9, September 2003.

[36]Stewart contacted Carlsbad, Moulton Miguel, Santa Margarita Water District and Fallbrook to verify correct pipe mileage. Cam Pendleton was also contacted regarding variations in its reported pipe mileage (50 miles in FY00/01 and 144 miles in FY 01/02). At the writing of this report, we do not have a response from Camp Pendleton. Stewart October 2 and 6, 2003.

data for the US Marine Corps, Camp Pendleton was dropped from the data set because we were not able to resolve a significant discrepancy between the pipe mileage reported for its system in FY 00/01 (50 miles) and FY 01/02 (144 miles).

Among the San Diego Regional Board collection systems, sewage spill rates ranged from a low of zero spills/100 miles/year at several systems to a high of 30.6 spills/100 miles/year at the Fallbrook PUD. In FY 2000/2001, the average spill rate for the San Diego Regional Board data set was 5.4 spills/100 miles/year and the median spill rate was 2.45 spills/100 miles/year. In FY 2001/2002, the average spill rate was 3.8 spills/100 miles/year and the median spill rate was 2.5 spills/100 miles/year. The spill rates for FY 2000/2001 and FY 2001/2002 combined were an average of 4.6 spills/100 miles/year and a median of 2.3 spills/100 miles/year. By comparison, the Los Angeles adjusted spill rate for 2000 to 2002 was 8.5 spills/100 miles/year. The Los Angeles spill rate not only exceeds the average and median rates from the San Diego Regional Board data set, but in fact is higher than the combined FY00/01 + FY01/02 spill rates for all but 6 of the 46 systems in the San Diego Regional Board data set. A comparison of the Los Angeles spill rate to the San Diego Region data set is presented in a bar graph at Appendix G.

6.1.3 EPA Region 9 Survey

In 2001, EPA Region 9 sent Clean Water Act information request letters to 29 collection systems in Arizona (3 systems) and coastal Southern California (26 systems). The letters required the collection systems to submit a report to EPA listing all of their sewage spills over the last five years (regardless of volume or destination).[37] Sixteen of the 29 systems surveyed by EPA Region 9 are located in Orange County (2 systems) and the San Diego Regional Board (14 systems). The data reported to EPA by these systems is the same as the data included in the OCSD surveys and the San Diego Regional Board data set. Spill data for these 16 systems is not repeated in this section of the report. Spill data from the remaining systems is provided in Appendix H for calendar years 1999 and 2000, the two most recent full calendar years of spill data reported to EPA pursuant to the information request letter. One of the remaining systems, the Los Angeles County Sanitation District, is excluded from the data set in Appendix H because they reported spills only for their large, regional interceptor pipes.

For data quality control, the survey responses were reviewed for obvious private property spills which, if identified, were culled from the data set. Eight of the 12 systems listed in Appendix H have been inspected by EPA since submitting their survey responses. Each system was

[37] EPA Region 9 section 308 information request letters, May and July 2001. Paragraph 3: AProvide a list of all sewage spills from your sewage collection system between July 1, 1996 and June 30, 2001. Include dry and wet weather spills from sewer pipes, maintenance holes, sewage pump stations, and basement backups caused by problems in your sewer mains.@

evaluated for spill reporting irregularities and none were discovered.[38] I conclude that the respondents provided complete records of their sewage spills.

Among the EPA survey respondents listed in Appendix H, sewage spill rates ranged from a low of 1.4 spills/100 miles/year at the Santa Barbara system to a high of 12.9 spills/100 miles/year at the City of Pacific Grove system (combined 1999/2000 rates). Combining calendar years 1999 and 2000, the spill rate for the EPA survey data set averages 5.9 spills/100 miles/year with a median spill rate of 4.7 spills/100 miles/year. By comparison, the Los Angeles adjusted spill rate for 2000 to 2002 was 8.5 spills/100 miles/year. A comparison of the Los Angeles spill rate to the EPA Survey data set is presented in a bar graph at Appendix I.

6.1.4 Los Angeles Compared to the Southwestern Benchmark Data Sets

Table 3 summarizes the comparison of the Los Angeles spill rate to the three southwestern data sets examined in this report.

TABLE 3: City of Los Angeles Spill Rate Compared to Median Spill Rates from Southwestern Spill Data Sets

System/Data Set	Number of Systems in Data Set	Spill Rate (spills/100 mi./yr.)
City of Los Angeles Combined CY 2000, 2001, 2002 (average)	1	8.5
Orange County Combined FY 00/01 + 01/02 (median)	26	3.5
San Diego Region Combined FY 00/01 + 01/02 (median)	45	2.3
EPA Region 9 Survey Combined CY 1999 + 2000 (median)	12	4.7

In Table 4, The Los Angeles spill rate is compared to the large systems (systems with more than 2,000 miles of sewer pipe) from the southwestern data sets. Table 4 includes data reported by Pima County (Tucson, Arizona area) and the City of Phoenix, Arizona in response to the EPA Region 9 section 308 information request letters. The Orange County Sanitation Districts spill

[38]EPA inspection reports and discussions with EPA inspectors.

rate is the full system spill rate calculated by adding responses for the individual respondents to the OCSD surveys (including the OCSD regional pipes) and calculating the spill rate as if OCSD was a single large system. Two spill rates are reported for the San Diego system because there was a large decrease in its spill rate between FY 00/01 and FY 01/02.

TABLE 4: City of Los Angeles Spill Rate Compared to Large Systems

System	Pipe Mileage	Spill Rate (spills/100 mi./yr.)
Los Angeles combined CY >00, >01, >02	6500	8.5
San Diego FY 00/01	2800	11.3
San Diego FY 01/02	2894	7.8
Pima County combined CY >99 + >00	2989	6.0
Phoenix combined CY >99 + >00	4172	1.6
OCSD full system combined FY 00/01 + 01/02	5307	4.3

6.2 Published Benchmark Studies

This report examines spill rate benchmark data from the following published benchmark studies:

1. "Collection Systems: Methods for Evaluating and Improving Performance", California State University, Sacramento, (Arbour and Kerri) 1998.
2. "Optimization of Collection System Maintenance Frequencies and System Performance", ASCE/Black and Veatch, February 1999.
3. AProtocols for Identifying Sanitary Sewer Overflows@, ASCE/Black and Veatch, June 2000.
4. ABenchmarking Analysis of the Collection System Division Metropolitan Wastewater Department City of San Diego, California@, RW Beck, February 2000.

Each of these benchmark studies collected data from collection systems located throughout the country. Data collected included system characteristics, maintenance activities and a variety of performance measures, including spill rates. Spill rate data from these studies is summarized below.

The surveys in the Arbour and R.W. Beck studies asked participating systems to report all sewage spills regardless of volume or destination.[39] The R.W. Beck study further categorized the spill data by identifying spills exceeding 1,000 gallons as well as the total number of spills (all

[39] Arbour 1998. RW Beck 2000.

volumes). It is not clear that either of these spills included private property spills caused by system problems in their definitions of spills. For this reason, the Los Angeles adjusted spill rate is used for comparison to Arbour and R.W. Beck. Spill rate data from the studies are summarized in Table 5 below. The Los Angeles adjusted spill rate of 8.5 spills/100 miles/year exceeds the average and median spill rates in both studies. When looking only at large spills (spills > 1,000 gallons), Los Angeles performs comparably to the median spill rate in the R.W. Beck study.

TABLE 5: PUBLISHED BENCHMARK STUDIES

Study	Number of Responses		Spill Rate (SSOs/100 miles/year)	
			Median	Average
Arbour, 1998	13		1.72	3.43
RW Beck, 1999	9	SSOs > 1000 gal	0.44	0.75
	8	all SSOs	3.82	5.82
Los Angeles (1/1/00 to 12/31/02)		SSOs > 1000 gal	0.47	
		all SSOs	8.55	

The Black and Veatch studies categorized spills by cause (pipe and pump station failures) and type (basement backup and manhole overflow). Black and Veatch, 2000 further divides spills into dry and wet weather spills. Using the WISE spills database, Los Angeles spills were categorized by cause (pipe and pump station failures).[40] Los Angeles basement backups were estimated based on examination of field spill reports.[41] The remaining spills (after deducting pipe and pump station failures and basement backups) were assumed to be manhole overflows. (Los Angeles does not indicate in WISE if its spills are manhole overflows. In the absence of information to the contrary, I assume that other than pipe and pump station failures and basement backups, all remaining spills are manhole overflows.) Because the Black and Veatch definition of dry and wet weather spills is not clear, I was not able to divide the Los Angeles spills in a like manner. For this reason, Los Angeles spill totals are compared to a sum of the

[40]City of Los Angeles WISE database.

[41]Hahn, 9/5/03

Black and Veatch wet and dry weather numbers. The Black and Veatch and Los Angeles data are summarized in Table 6 below.

A reading of the Black and Veatch reports leaves some uncertainty as to the definition of spill used by the survey respondents. In communications with Rick Nelson, the principal author of the Black and Veatch studies, Mr. Nelson clarified that respondents were instructed to report all sewage overflows, regardless of volume or destination.[42] This is comparable to the spill definition used by Los Angeles.

TABLE 6: BLACK AND VEATCH BENCHMARK STUDIES

Performance Measure (spills/100 miles/year)	B&V 1999 Average (Median)[43]	B&V 2000 Average[44] (Median[45])			City of Los Angeles, years 2000 to 2002[46]
		Wet	Dry	Total	
Pipe Failure	4.1 (0.9)	1.40 (0.21)	0.88 (0.12)	2.28 (0.32)	0.28
Pump Station Failure	0.6 (0.2)	0.34 (0.14)	0.50 (0.11)	0.84 (0.25)	0.02

[42]Ken Greenberg/Rick Nelson communications - June 6 and 7, 2001.

[43] Medians calculated from Black & Veatch 1999, Table 6-3 (pipe failure and pump station failure) and Appendix B (basement backups and manhole overflows), data for last 5 years.

[44]Data from Black & Veatch 2000, Table 3-1.

[45] Medians calculated from raw data for Black & Veatch 2000, provided by author Rick Nelson.

[46] Data from City=s WISE spill data base (January 1, 2000 - December 31, 2002, categorized based on information in spill cause field. Basement backups determined by Hahn 9/5/03. Manhole overflows equal spills remaining after deducting mainline breaks, pump station failures and basement backups from total.

Basement Backups	3.59 (1.93)	4.76 (0.94)	2.30 (0.73)	7.06 (1.67)	1.72 (estimate)
Manhole Overflows	4.18 (3.28)	2.02 (1.02)	2.14 (0.42)	4.16 (1.44)	8.25

As shown in Table 6, at 8.25 manhole overflows/100 miles/year, Los Angeles compares poorly to the manhole overflow rates identified in the two Black and Veatch studies. Los Angeles has very few pump station failures and compares favorably to Black and Veatch for this type of spill. Los Angeles experiences basement backups at rates comparable to the medians in the Black and Veatch studies. The Los Angeles rate of pipe failures (0.28 spills/100 mi/yr) is compared to median pipe failure rates of 0.9 spills/100 mi/yr in Black and Veatch 1999 and 0.32 spills/100 mi/yr in Black and Veatch 2000.

7.0 LOS ANGELES COMPARED TO LOS ANGELES

7.1 Los Angeles= Old Sewer Pipes Spill More Frequently Than Its New Pipes

Finally, Los Angeles is compared against itself. The Los Angeles WISE database record of sewage spills provides a pipe segment identification for each spill. When merged with the City=s GIS sewer pipe inventory it is possible to identify the pipe installation date (or pipe age) associated with each spill. This analysis reveals a significantly higher spill rate among the older pipes in the City of Los Angeles system (see Appendix J).

To compare Los Angeles to itself, the spill rate for the entire system (10.3 spills/100 miles/year - calendar years 2000 to 2002, including basement backups) is compared against the spill rates associated with newer portions of the Los Angeles system including the 2,945 miles of sewer pipes installed since 1950, the 1,463 miles of sewer pipe installed since 1960 and so forth (see Table 7). This comparison reveals that the newer pipes in the Los Angeles system have a considerably lower spill rate than the older pipes.

TABLE 7: CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM COMPARED TO NEW PORTIONS OF THE LOS ANGELES WASTEWATER COLLECTION SYSTEM

[47]Calculations based on data from the WISE spills database merged with Los Angeles pipe inventory.

Spills: January 1, 2000 to December 31, 2002[47]			
Portion of the Los Angeles System	**Pipe Length (miles)**	**Number of Spills (including basement backups)**	**Spill Rate (spills/100 mi/yr)**
Total System	6,509	2,007	10.3
Pipes installed since 1950	2,945	548	6.2
Pipes installed since 1960	1,463	212	4.8
Pipes installed since 1970	390	30	2.6
Pipes installed since 1980	235	16	2.3
Pipes installed since 1990	165	9	1.8

Older sewer pipes are responsible for most of the spills from the Los Angeles sewer system. Excluding the 327 spills from pipes with unknown installation dates (see Appendix J), pipes installed before 1950 are responsible for 67% or 1,132 of the spills between January 1, 2000 and December 31, 2002.

The Los Angeles sewer system is an old system. Excluding the 756 miles of sewer pipe with unknown installation date, nearly half of the system, or 2,808 miles of pipe, was installed before 1950 and, therefore, exceeds 53 years of age. What=s more, the system is aging very rapidly. In 7 years (by the year 2010), 75% of the system, or 4,291 miles of pipe, will be more than 50 years old. By the year 2020, 93% of the system, or 5364 miles of pipe will be more than 50 years old and 49% of the system will be more than 70 years old. The aging projections cited above assume the total system size remains at 6500 miles of pipe and that there is no renewal of existing pipes. These, of course, are unlikely scenarios. But the projections, nevertheless, illustrate the dynamics of the aging process in the City=s sewer system. Similar to the wave of aging baby-boomers the City is facing a huge wave of sewer pipes that will soon be at retirement age.

7.2 More Spills Occur in the Southern Districts of the Los Angeles System

Using the merged WISE and pipe inventory databases I also calculated spill rates for each of the maintenance districts in the Los Angeles system. The City has divided its system into six maintenance districts. Table 8 provides the spill rates calculated for each maintenance district using spill data (including basement backups) from January 1, 2000 to December 31, 2002. This same data is depicted on a map in Appendix K. Spill rates in the northern districts (North Hollywood and Reseda) are considerably lower than the spill rates in the other four districts. The biggest contrast is between the Reseda district with a spill rate of 3.7 spills/100 mi./yr. and the Hollywood district with a spill rate of 25.9 spills/100 mi./yr.

The analysis depicted in Table 8 illustrates that large parts of the Los Angeles system (Reseda and North Hollywood districts) operate at less than half the spill rate of the remainder of the system. It is not clear why this difference exists but one possibility is the fact that the Reseda and North Hollywood districts have generally younger sewer pipes. Other possible explanations not examined in this report include differences in operations and maintenance practices between the districts, differences in pipe design and differences in pipe capacities. At any rate, the data illustrates that the City of Los Angeles is able to operate nearly half of its system (Reseda plus North Hollywood districts) at a combined spill rate of 4.6 spills/100 mi./yr., a rate comparable to the high end of the median spill rates found in the southwestern benchmark data sets examined earlier in this report.[48]

[48]Reseda plus North Hollywood pipe miles total 2,760 miles or 42% of the total system. WISE database lists 385 spills in the Reseda and North Hollywood districts between January 1, 2000 and December 31, 2002. Southwestern benchmark data sets= median spill rates range from 2.3 in the San Diego Region to 4.7 in the EPA Survey.

TABLE 8: City of Los Angeles Spill Rates by Maintenance District, Calculated Based on Spills from January 1, 2000 to December 31, 2002[49]			
District	Pipe Miles	Number of Spills	Spill Rate (spills/100 mi./yr.)
Reseda	1459	163	3.7
North Hollywood	1301	222	5.7
South Los Angeles	1397	451	10.8
North Los Angeles	893	313	11.7
West Los Angeles	917	476	17.3
Hollywood	486	375	25.7
TOTAL[50]	6453	2000	10.3

8.0 DATA QUALITY
Each of the Southwestern benchmark data sets presented in this report (Orange County, San Diego Regional Board and EPA survey) were reviewed for the quality and completeness of data. The first step in this review was to ensure that a common definition of sewage spill was used for purposes of making the benchmark comparisons in this report. The definition of Asewage spill@ used in this report for purposes of benchmark comparisons is:

[49]All figures calculated from data in the merged Los Angeles WISE data base and pipe inventory. (Stewart analysis of spills by district, October 2003.)

[50]Pipes and spills in the Beverly Hills/West Hollywood District are excluded from this analysis. This district includes only a small number of City pipes that pass through neighboring jurisdictions. (Stewart analysis of spills by district, October 2003.)

A Asewage spill@ is any amount of wastewater escaping a sanitary sewage collection system upstream of the wastewater treatment plant regardless of the destination of the spill and regardless of the cleanup disposition of the spill. Spills from private property (private laterals or indoor plumbing) are excluded from the definition of Asewage spill@.

There is some variation in the ways that private property spills are reported by the City of Los Angeles and the way private property spills are reported to the three southwestern benchmark data sets. The City of Los Angeles, its WISE database claims to report spills consistent with the definition above plus private property spills caused by problems in the City sewers. The Orange County Sanitation Districts survey asks respondents to report only spills from their sewer pipes. Private property spills, whether caused by owners trouble or the problems in the public system, are excluded. The San Diego Regional Board requires reporting of spills consistent with the definition above plus private property spills caused by problems in the public system if the spill escapes the building. The EPA Region 9 information request letters required systems to report all spills consistent with the definition above plus private property spills caused by problems in the public system. In the spill reports to the San Diego Regional Board and the responses to the EPA survey, it is difficult to tell if some of the private property spills are caused by owners trouble or by problems in the public system. For this reason, and because all private property spills are excluded from the OCSD surveys, I decided to exclude all private property spills (whether caused by owners trouble or problems in the public system) from the three southwestern benchmark data sets examined in this report. To make the Los Angeles data comparable to the southwestern data sets, I adjusted the Los Angeles spill rate to exclude the private property spills included in WISE.[51] For benchmark comparison purposes, the Los Angeles spill rate was adjusted downward to from 10.3 spills/100 miles/year to 8.5 spills/100 miles/year by deducting a percentage of spills estimated to be private property spills. In the section of this report that compares Los Angeles to itself, no adjustment was made to eliminate spills from private property caused by problems in the City system. In this section of the report, spill rates were calculated based on the total number of spills reported in WISE.

The next question on data quality is whether or not the data is complete. In other words, are all spills reported? For the San Diego Regional Board data set and the EPA data set, the primary safeguard ensuring complete reporting is that the spill reports are required pursuant to a permit in the San Diego Region and, in EPA=s case, a formal information request letter.[52] Each of these reporting requirements obligates the respondents to make complete and accurate spill reports with enforcement consequences for incomplete or inaccurate reporting. The San Diego Regional Board permit has been in effect since 1996 and systems subject to the permit are now well aware of the spill reporting requirements. The San Diego Regional Board uses a quality control step to

[51]Hahn September 2003.

[52]EPA 308 letters, May and July 2001. RWQCB 9 WDR 96-04.

ensure complete spill reporting.[53] If any omitted spills are noticed, the Regional Boards= procedures are to add the omitted spills to their data set. Both the San Diego Regional Board and EPA have conducted inspections of systems included in their spill data sets. One aspect of the inspections is to look for evidence of unreported spills. (For example, work orders and maintenance crew field notes and reports are examined for notes regarding overflows and compared against official spill reports. System operators are asked to explain their spill record keeping and reporting procedures.) Based on these examinations, I am not aware of any system in the benchmark data sets presented in this report that has failed to report any sewage spill that they were aware of.

The Orange County Sanitation District voluntary surveys are not subject to the same legal obligations and safeguards cited above. The survey, however, has been made for 6 consecutive years and the survey respondents are likely well aware of the questions and prepared to provide requested responses. OCSD has provided spill response training to its member agencies so the agencies have been trained in spill record keeping procedures. Those in charge of the OCSD survey also meet or consult with each respondent to ensure complete survey responses are provided. Finally, the OCSD survey responses were compared to spill reports to the Orange County Health Department and the spills reported to the Santa Ana Regional Board pursuant to its new Waste Discharge Requirement for sewage collection systems in Orange County.

To address the concern that systems may not report very small spills, each data set was examined and found to include a mix of both large and small spills. The fact that a sewage collection agency reports a small spill leads me to believe that they are being thorough in their spill reporting.

9.0 DATA COMPARABILITY

One common theme of the data comparability issues addressed in this section is the need to ensure selection of the appropriate peer group for comparison to Los Angeles. The data sets presented in this report are from the southwestern United States, with all but three of the systems being located in coastal southern and central California. Rainfall in the southwestern data sets range from a low of 10.77" at San Diego to a high of 20.35" at Pacific Grove. This fact minimizes comparability differences caused by rainfall, one important natural factor that can influence sewage spills. Many systems subject to high rainfall and high water tables, such as systems in the southeastern United States, are known to have problems with capacity related spills more than systems in the Southwestern United States. Additional data comparability issues are addressed below.

9.1 Median vs Average

The median spill rate (normally lower than the average spill rate) provides a better statistical

[53] Stewart September 2003.

measure for comparing a single system (Los Angeles) to a group of systems (the benchmark sets). The median is the data point with an equal number of figures both higher and lower. In other words, the median value is the middle of the pack. The median is normally the preferred statistical comparison when a few very high data points can skew the average upward to the point of being a misleading representation of the data set. For example, real estate values are normally given as a median rather than an average which can be skewed upward by a few very expensive properties. This is illustrated in the spill rate benchmark sets by observing the data for the EPA survey. In 2000, the small system of Avalon (11 miles of sewer) had only 2 spills, yielding a very high spill rate of 18.2 spills/100 miles/yr. This unusually high spill rate can skew the average rate upward.

9.2 System Size

As noted above, systems included in the benchmark data sets range in size from the very small, 6 mile, Emerald Bay system to the very large, 6,500 mile, Los Angeles system. But use of the normalized spill rate negates these differences and makes it possible to fairly compare large and small systems. Some may argue that it is easier for small systems to achieve zero or very low spill rates. This may be true, but this is countered by the fact that it is also very easy for a small system to have only a couple of spills resulting in a very high spill rate. (See Avalon example above.) The data set also includes examples of medium and large systems with very low spill rates. Some may also argue that it is difficult for a large system to achieve low spill rates, but this is not true. The benchmark data set includes a number of large systems with spill rates significantly lower than Los Angeles (see Table 4). Finally, it may be argued that it is difficult for a large system to reduce its spill rate. To the contrary, the City of San Diego has significantly reduced its spill rate from 11.3 in FY 00/01 to 7.8 in FY 01/02.

9.3 Seasonal Variations

It is known that some systems have seasonal variations in their spill rates. Los Angeles, for example, has more spills in the rainy winter months than in the dry summer months.[54] To eliminate effects of seasonal variations, each data set included in this report uses a full, consecutive 12 months of spill data. Care was also taken to use the most recent data available to provide data similar to current operations.

9.4 Big Pipes vs Small Pipes

Most sewage spills in Los Angeles and in the benchmark data sets happen in small diameter pipes (<15"), due to blockages by grease, root or debris. Because of this, systems with relatively more large sewer pipes would be expected to have fewer spills than a system with more small diameter pipes. For this reason, the Orange County Sanitation District regional interceptor pipes and the Los Angeles County Sanitation District regional interceptor pipes were excluded from the

[54]WISE database.

survey data sets presented in this report. (Indeed, OCSD and LACSD have very low spill rates from their regional interceptor pipes. Similarly, the City of Los Angeles has very low spill rates from its large diameter pipes.[55]) Other systems in the southwestern benchmark data sets include a mix of large and small pipes. If anything, many of the systems have a higher proportion of small local pipes, which gives an advantage to Los Angeles in benchmark comparisons. Los Angeles has hundreds of miles of large interceptor pipes that rarely spill.[56] Many of the small and medium size systems in the benchmark sets (the OCSD member agencies for example) have few large sewer pipes.

9.5 Old Systems vs New Systems

[55]WISE database.

[56]WISE database sorted by pipe size.

Examination of the Los Angeles spill data reveals more frequent spills in the older sewer pipes. It was not possible to analyze the pipe age/spill rate correlation in other systems in the benchmark data sets. However, there is some indication that a similar correlation between pipe age and spill frequency exists in other systems. Pacific Grove, for example, is a very old system and it has a high spill rate. Respondents to the OCSD survey commented that they have spill and stoppage problems in the older parts of town.[57] Orange County cities are generally younger than Los Angeles, and the OCSD member agencies as a whole have a lower spill rate than Los Angeles.

Some may argue that it is not fair to compare old systems to new systems. Pipe age, however, is a factor that can be controlled by the system. Good management and maintenance practices can prevent spills even in old pipes. Pipe rehabilitation and replacement can be used to renew systems and thus prevent sewage spills. For these reasons, it is fair to compare old and new systems.

10.0 SPILL RATE CONCLUSIONS

The Los Angeles spill rate exceeds the average and median benchmark rates of each data set examined in this report. In fact, there are few individual systems in the southwestern benchmark data sets with spill rates higher than the Los Angeles spill rate.

By these comparisons, I conclude that the Los Angeles sewer system performs more poorly than the typical system in the southwestern United States. I also conclude that, with system improvements, Los Angeles could achieve a lower spill rate. Neighboring systems have demonstrated that it is possible to design, build, manage and operate sewage collection systems to yield very low spill rates. Finally, as illustrated in Tables 7 and 8 above, Los Angeles has demonstrated an ability to manage and operate the newer portions of its system to yield much fewer spills than the system as a whole.

I conclude the following:

5. The sewage spill rate is a valid measure of collection system performance.

6. The spill rate in the Los Angeles collection system exceeds the average and median spill rates of collection systems in Southern California and Arizona.

7. The spill rate in the Los Angeles collection system exceeds the average and median spill rates in four published benchmark studies described in this report.

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[57] OCSD Surveys.

8. The Los Angeles collection system performs poorly as measured by the spill rate benchmark measure.

9. It is possible for collection systems to achieve low rates of sewage spills. The fact that dozens of collection systems examined in this report have very low spill rates is evidence that it is possible to operate a collection system to have few sewage spills. Los Angeles could do better - good performance by peers demonstrates that low spill rates are possible.

10. Los Angeles should take steps to reduce sewage spills. Published benchmark studies suggest that systems should react to poor performance by improving capacity, management, cleaning and/or maintenance programs.

11. Los Angeles established a goal to improve its performance as measured by the sewage spill benchmark measure. Los Angeles established a goal to achieve a spill rate of 4.5 spills/100 miles/year.[58] In the same document, Los Angeles established a program of management, maintenance and sewer renewal efforts presumably meant to achieve the benchmark goal. In the CMOM program document, Los Angeles acknowledges the need to improve its performance as measured by the spill rate.

12. Older sewer pipes in the Los Angeles system spill more frequently than the newer pipes.

13. The Los Angeles Sewer System is Aging Rapidly. With the rapid aging comes a risk that Los Angeles sewage spill rates will continue to rise unless steps are taken to reduce spills.

14. Steps can be taken to achieve reduce spill rates in the Los Angeles system. Los Angeles has demonstrated an ability to operate parts of its system at low spill rates. Published benchmark reports cite various system management, operations and maintenance practices as influencing spill rates. Based on the correlation between pipe age and spill rates in Los Angeles, I conclude that one key element to spill reduction in Los Angeles is renewal of sewer pipes by sewer repair, rehabilitation or replacement.

15. Los Angeles should direct improvement efforts to the older secondary sewer pipes. Improved performance at LA may require improved operation and maintenance, pipe renewal and/or additional capacity. The published benchmark reports suggest that poor performance, as measured by benchmarks, should be addressed by improving maintenance practices. In the Los Angeles system, correlation between pipe age and spill rate suggests that LA needs to direct more attention (cleaning, maintenance, pipe renewal) to its older

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[58]Los Angeles, July 2003. CMOM Program.

pipes. The Los Angeles spill data also indicates that most spills are from small pipes. This suggests the need for more maintenance and pipe renewal in the older secondary sewers.

11.0 THE CITY OF LOS ANGELES FATS, OILS AND GREASE SOURCE CONTROL PROGRAM

In July 2001, the City of Los Angeles adopted an ordinance to regulate discharges of fats, oils and grease (FOG) from food service establishments including restaurants, establishments engaged in food preparation, and food processing facilities. The ordinance requires all FOG producing FSEs to install grease interceptors unless granted a conditional waiver exempting the FSE from the requirement to install a FOG removal device. FSEs may be granted a variance to allow installation of an alternative grease removal device, such as a grease trap, in lieu of a grease interceptor. New or substantially remodeled FSEs may not be granted a conditional waiver and are required to install a grease interceptor. All FSEs are required to implement best management practices (BMPs) as required in the ordinance and implementing regulations.

According to City estimates, there are about 14,000 to 15,000 FSEs in Los Angeles subject to the FOG ordinance.[59] The City further estimates that only about 400 of these FSEs have any kind of grease removal device (interceptor or trap).[60]

COPY AND PASTE In practice, food service establishments (FSEs) in operation at the July 2001 adoption of the Los Angeles FOG ordinance (existing FSEs) are only required to implement best management practices (BMPs). Despite the provisions of the ordinance requiring FSEs to install grease interceptors unless a conditional waiver or variance is granted, the City doesn=t actually issue conditional waivers to existing FSEs relieving them of the requirement to install a grease interceptor. Instead, at permitting, FSEs are simply required to implement BMPs. The City claims that if FSEs are found to not be implementing the required BMPs, the City can require them to install a grease interceptor.[61] Since adoption of its FOG ordinance, however, the City has not required any existing FSE to install a grease interceptor based on the FSE=s failure to properly implement BMPs.[62] In fact, no existing FSEs have been required to install a grease interceptor.[63]

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[59]Dafeta deposition, August 27, 2003, page 42:18-22.

[60]Dafeta deposition, August 27, 2003, page 89:1-7.

[61]Dafeta deposition, August 27, 2003, pages 37:3 to 38:17.

[62]Dafeta deposition, August 27, 2003, page 40:20-24.

[63]Dafeta deposition, August 27, 2003, page 87:11-16.

On August 28 and 29, 2003, contractor Pat Tripodi and I conducted inspections of 8 FSEs subject to the City of Los Angeles FOG ordinance. A list of FSEs inspected is included in Appendix L. None of the FSEs inspected were implementing all of the BMPs required by the City of Los Angeles ordinance. During the inspections I observed pots, pans and dishware washing operations that were introducing FOG to the City of Los Angeles collection system.

None of the inspected FSEs was dry wiping pots, pans and dishware prior to dishwashing, as required by the City FOG ordinance. In my opinion, it is impractical for FSEs to effectively dry wipe pots, pans and dishware prior to dishwashing. For example, at Chinese style restaurants, wok stations are built to allow rinsing of the woks on the stove between cooking operations. With this style of cooking, there is no time, nor is it practical, to dry wipe the wok before the next dish is cooked. During the inspections, I observed woks being rinsed to kitchen drains without dry wiping to remove FOG. The typical operation is for the chef to scoop a cooked meal out of the wok and then rinse the wok, while it=s still on the range, before cooking the next dish. During the rinsing operation, a water tap above the wok range is opened and the chef uses a brush to quickly wash the wok. The wok, still on the cooking range, is then tipped to the water trough surrounding the range spilling the wok contents (rinse water mixed with FOG and food particles) to the kitchen drain.

In other kitchens, I observed washing of tilt pots. This is another washing operation where the pot is washed in place, at its fixed cooking location. I observed wash water being introduced to the tilt pot without first dry wiping. The wash water was then allowed to discharge to the kitchen drain. In some of the inspected kitchens, I observed big piles of dishware either being washed or awaiting washing. I observed kitchen staff rinsing or washing soiled dishware to sinks without first dry wiping. In my opinion, it would be impractical for dishwashing staff to dry wipe all dishware before dishwashing.

Failure to eliminate FOG from pots, pans and dishware prior to dishwashing leads to FOG discharges to the City wastewater collection system.

None of the inspected FSEs were using absorbent material to soak up oil and grease under fryer baskets as required by the City FOG ordinance. Several of the inspected FSEs were observed to have spilled grease on their kitchen floors. Each of the inspected FSEs described floor washing practices which would lead to this grease being washed to the City collection system.

As a consequence of these observations, I conclude that the inspected FSEs were discharging FOG to the Los Angeles collection system. Such discharges would be mostly eliminated if the FSEs were fully implementing required BMPs in combination with having an effective grease interceptor in place to treat kitchen discharges.

Grease interceptors and alternative grease removal devices (such as self cleaning traps) are effective at removing FOG discharges from FSEs and preventing discharge of the removed FOG to City sewers. With a grease interceptor or alternative grease removal device in place, FOG that escapes BMPs can still be captured in the removal device before discharge to the City sewer. In my opinion, given the impracticality of certain BMPs (such as dry wiping) and the City=s failure to ensure FSEs are implementing BMP requirements, the City should require more existing FSEs to install grease interceptors or alternative grease removal devices.

APPENDIX A: RESUME

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Environmental Engineer
Water Division
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105

EDUCATION:
Bachelor of Science, 1975, Cornell University
Master of Engineering (Civil and Sanitary Engineering), 1976, Cornell University.

PROFESSIONAL LICENSE:
Civil Engineer, State of California.

WORK EXPERIENCE:
1977 to Present: U.S. Environmental Protection Agency, Region 9, San Francisco.

1977 to 1979: U.S. Environmental Protection Agency, Region 9 Air Division
Oversight of development state and local air pollution control regulations. Compliance and enforcement of Clean Air Act.

1979 to 1985: U.S. Environmental Protection Agency, Region 9 Water Division
Inspections of industrial and municipal wastewater treatment plants. Compliance evaluation and enforcement of the Clean Water Act.

1985 to 1987: U.S. Environmental Protection Agency, Region 9 Water Division
Inspections and of public drinking water systems. Compliance evaluation and enforcement of the Safe Drinking Water Act. Oversight of grant to the State of California Department of Health services drinking water program.

1987 to 1989: U.S. Environmental Protection Agency, Region 9 Water Division
Supervisor of the NPDES Permits Section. Responsible for oversight of state issued permits and issuance of NPDES permits.

1989 to 1996: U.S. Environmental Protection Agency, Region 9 Water Division
Supervisor of the Clean Water Act Compliance Section. Responsible for Inspections of industrial and municipal wastewater treatment plants. Compliance evaluation and enforcement of the Clean Water Act.

1997: United States Environmental Training Institute

Responsible for development of and delivery of environmental training programs to international audiences.

1998 to 1999: U.S. Environmental Protection Agency, Region 9 Water Division
Coordination of EPA activities at Lake Tahoe. Member of the Lake Tahoe Basin Federal Interagency Task Force.

1999 to Present: U.S. Environmental Protection Agency, Region 9 Water Division
Senior Engineer in the Clean Water Act Compliance Office. Responsible for inspections of industrial and municipal wastewater treatment plants. Compliance evaluation and enforcement of the Clean Water Act. Region 9 coordinator for matters related to hard rock mining operations and lead of the Region 9 Mining Task Force (1999 to 2001). EPA Region 9 coordinator for matters related to municipal wastewater collection systems and sanitary sewer overflows.

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APPENDIX C

APPENDIX C: CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM PIPE AGE AND SIZE			
Pipe Installation Dates	**Miles of Sewer Pipe**	**Pipe Diameter**	**Miles of Sewer Pipe**
Unknown/Blank	755.7	Unknown	27
1880 - 1889	9.2	< 6"	2
1890 - 1899	117.5	6"	179
1900 - 1909	190.3	8"	4943 (76%)
1910 - 1919	281.5	10"	291
1920 - 1929	1261.5	12"	207
1930 - 1939	377.7	14"	18
1940 - 1949	570.9	15"	167
1950 - 1959	1482.4	16"	20
1960 - 1969	1073.4	18"	165
1970 - 1979	154.9	> 18"	491
1980 - 1989	69.9		
1990 - 1999	108.1		
2000 - 2003	56.8		
TOTALS	6,509		6510

Note: Data derived from City of Los Angeles sewer pipe inventory.

Appendix D:	FY00-01			FY01-02		
Orange Co. S.D. Survey	Length (miles)	Number of Spills	spills/100mile/y	Length (miles)	Number of Spills	spills/100mile/y
City of Anaheim	510	26	5.1	510	33	6.5
City of Brea	109	1	0.9	109	1	0.9
City of Buena Park	250	3	1.2	250	5	2
Costa Mesa S.D.	326	15	4.6	326	17	5.2
City of Cypress	89	4	4.5	108	1	0.9
City of Fountain Valley	130	3	2.3	130	2	1.5
City of Fullerton	284	34	12.0	284	16	5.6
City of Garden Grove	329	45	13.7	329	26	7.9
City of Huntington Beach	351	13	2.2	351	11	3.1
Irvine Business Complex	25	1	4.0	25	2	8.1
Irvine Ranch Water District	566	5	0.9	587	5	0.8
City of La Habra	excluded - uncertain data quality			106	10	9.4
City of La Palma	25	0	0	25	0	0
Midway City S.D.	246	14	4.64	246	26	10.6
City of Newport Beach	240	21	8.75	240	9	3.7
City of Orange	314	20	6.36	314	16	5.1
Orange County S.D.	450	2	0.44	450	2	0.4
City of Placentia	76	3	3.95	76	4	5.3
Rossmoor/Los Alam. S.D.	56	0	0	56	1	1.8
City of Santa Ana	400	13	2.89	400	8	2
City of Seal Beach	34	0	0	34	1	3
City of Stanton	excluded - uncertain data quality			excluded - uncertain data quality		
Sunset Beach S.D.	5.7	0	0	6	0	0
City of Tustin	52	4	7.77	52	1	1.9
Unincorporated Area 7	124	7	5.63	124	10	8
City of Villa Park	28	0	0	28	0	0
City of Yorba Linda	72	0	0	72	1	1.4
Yorba Linda Water District	138	58	5.79	147	2	1.4
Total	**5230**	**242**		**5384**	**210**	
Average			**3.87**			**3.58**
Median			**3.83**			**2**

Total w/o OCSD reg. pipes	4780	240		4934	208	
Avg. w/o OCSD reg. pipes			4.00			3.70
Med. w/o OCSD reg. pipes			3.95			2.49

Appendix F: San Diego Regional Board	FY00-01			FY01-02		
	Length (miles)	Number of Spills	spills/100mile/yr	Length (miles)	Number of Spills	spills/100mile/yr
ORANGE COUNTY						
El Toro WD	75	0	0	75	3	4
Emerald Bay SD	6	1	16.67	6	0	0
Irvine Ranch WD	50	1	2	50	0	0
Laguna Beach	90	24	26.67	90	10	11.11
Moulton Niguel WD	530	13	2.45	530	2	0.38
San Clemente	150	9	6	150	6	4
San Juan Capistrano	96	1	1.04	96	0	0
Santa Margarita WD	502	11	2.19	525	14	2.67
South Coast WD	150	12	8	150	5	3.33
Trabuco Canyon WD	43	0	0	43	0	0
RIVERSIDE COUNTY						
Eastern MWD	250	6	2.4	250	1	0.4
Elsinore Valley MWD	49	1	2.04	49	0	0
Rancho CA WD	150	0	0	150	2	1.33
SAN DIEGO COUNTY						
Buena SD	84	0	0	84	0	0
Carlsbad MWD	212	12	5.67	212	15	7.08
Chula Vista	420	7	1.67	420	6	1.43
Coronado	46	11	23.91	46	5	10.87
Del Mar	30	2	6.67	30	2	6.67
El Cajon	188	3	1.60	188	2	1.06
Encinitas	80	4	5	80	2	2.5
Escondido	340	10	2.94	340	15	4.41
Fairbanks Ranch CSD	12	0	0	12	0	0
Fallbrook PUD	72	27	37.5	72	17	23.61
Imperial Beach	84	9	10.71	84	1	1.19
La Mesa	145	3	2.07	145	12	8.27
Lemon Grove	65	3	4.62	65	9	13.85
Leucadia CWD	165	5	3.03	165	5	3.03
National City	97	0	0	97	0	0

Oceanside	450	19	4.22	450	17	3.78
Olivenhain MWD	14	1	7.14	14	1	7.14

continued, next page

Appendix F (continued)	FY00-01			FY01-02		
	Length (miles)	Number of Spills	spills/100mile/yr	Length (miles)	Number of Spills	spills/100mile/yr
Otay MWD	60	0	0	60	0	0
Padre Dam MWD	143	1	0.70	143	4	1.75
Pauma Valley CSD	2	0	0	6	0	0
Poway	170	6	3.52	170	1	2.06
Rainbow MWD	52	3	5.77	52	2	4.81
Ramona MWD	85	3	3.53	85	5	4.71
Rancho Santa Fe CSD	45	1	2.22	45	1	2.22
San Diego Co. Pub Wks	380	1	0.26	380	4	0.66
San Diego, City of, MWWD	2800	316	11.29	2894	225	9.53
Solana Beach	54	3	5.56	54	2	4.63
US Navy	150	26	17.33	150	18	14.67
Vallecitos WD	176	4	2.27	176	4	2.27
Valley Center MWD	45	0	0	45	0	0
Vista	192	5	2.60	192	3	2.08
Whispering Palms CSD	30	0	0	30	1	1.67
Total	9029	564		9150	422	
Average			5.36			4.56
Median			2.45			2.27

Appendix H: EPA Region 9 Survey	CY 1999			CY 2000		
	Length (miles)	Number of Spills	spills/100mile/y	Length (miles)	Number of Spills	spills/100mile/y
Flagstaff	228	24	10.53	228	26	11.40
Phoenix	4172	45	1.08	4172	86	2.06
Pima County	2989	181	6.06	2989	180	6.02
Carpinteria SD	40	5	12.5	40	4	10
Goleta SD	127	5	3.94	127	1	0.79
Montecito SD	73	3	4.11	73	2	2.74
Pacific Grove	58	6	10.34	58	9	15.52
Santa Barbara	248	3	1.21	248	4	1.61
Avalon	11	0	0	11	2	18.18
Ojai Valley SD	120	2	1.67	120	4	3.33
Oxnard	300	7	2.33	300	12	4
Ventura	450	29	6.44	450	31	6.89
Total	8816	310		8816	361	
Average			5.02			6.87
Median			4.02			5.01

APPENDIX J: CITY OF LOS ANGELES WASTEWATER COLLECTION SYSTEM SEWAGE SILL RATES BY PIPE AGE FOR SEWAGE SPILLS JANUARY 1, 2000 to DECEMBER 31, 2002			
Pipe Installation Dates	Miles of Sewer Pipe	Number of Spills	Spill Rate (spills/100 mi./yr.)
Unknown/Blank	755.7	327	14.4
1880 - 1889	9.2	4	14.5
1890 - 1899	117.5	40	11.3
1900 - 1909	190.3	83	14.5
1910 - 1919	281.5	106	12.6
1920 - 1929	1261.5	592	15.6
1930 - 1939	377.7	129	11.4
1940 - 1949	570.9	178	10.4
1950 - 1959	1482.4	336	7.6
1960 - 1969	1073.4	182	5.7
1970 - 1979	154.9	14	3.0
1980 - 1989	69.9	7	3.3
1990 - 1999	108.1	7	2.2
2000 - 2003	56.8	2	1.2
TOTALS	6,509	2,007	10.3

Note: Figures in this table were derived by merging the Los Angeles WISE spills database with the Los Angeles GIS sewer pipe inventory. Nearly all of the spills in the WISE database list the pipe identification for the pipe segment where the spill occurred. The number of spills associated with each decade of pipe installation dates was counted by checking the pipe installation dates associated with each spill in the merged databases. 755.7 miles of pipes have no pipe installation date or nonsense dates provided in the GIS pipe inventory. The length of these unknown installation date pipes is assumed to be the difference between the total system length (6500 miles) and the total length of pipes with known installation dates. Spill rates are calculated as follows: (number of spills associated with a given decade of pipe installation)) (total pipe length installed during the given decade) x 100) 3 = spill rate.