NACWA
A Clear Commitment to America's Waters

August 2, 2010

Water Docket
U.S. Environmental Protection Agency
Mail Code 4203M
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attention: Docket ID No. EPA-HQ-OW-2010-0464

Dear Sir or Madam:

The National Association of Clean Water Agencies (NACWA) submits these comments in response to the U.S. Environmental Protection Agency's (EPA's) request for stakeholder input on National Pollutant Discharge Elimination System (NPDES) permit requirements for municipal sanitary sewer collection systems, municipal satellite collection systems, sanitary sewer overflows, and peak wet weather discharges from publicly owned treatment works (POTWs) serving separate sanitary sewer collection systems, which was published in the *Federal Register* on June 1, 2010 (75 *Fed. Reg.* 30395). NACWA appreciates the opportunity to provide comments on the suite of sanitary sewer system issues of critical importance to the nation's public clean water utilities.

NACWA is a non-profit advocacy organization representing public wastewater treatment and collection system utilities located all across the United States. NACWA also includes affiliate members involved in support of the national business of wastewater treatment and collection system management, such as contractors, engineers and consultants. NACWA member agencies serve the majority of the sewered population in the United States and treat and reclaim more than 18 billion gallons of wastewater each day. NACWA members actively participated in the development of EPA's Combined Sewer Overflow (CSO) Policy and served on both the Urban Wet Weather Flows Federal Advisory Committee (FAC) and its Sanitary Sewer Overflows Subcommittee. Since 1994, NACWA has worked tirelessly with EPA in an effort to develop a comprehensive regulatory program for sanitary sewer collection systems and related wet weather facilities.

Introduction

NACWA commends the Agency for taking this important step towards completing the process it began 15 years ago with the creation of the Urban Wet Weather Flows

NACWA at 40 A WATERSHED MOMENT 1970–2010

National Association of
Clean Water Agencies
1816 Jefferson Place, NW
Washington DC 20036-2505

p 202.833.2672 f 202.833.4657
www.nacwa.org · info@nacwa.org

Advisory Committee. NACWA has repeatedly stressed the need for a comprehensive regulatory program for sanitary sewer collection systems, a position that has been consistently articulated in its meetings and correspondence with EPA over the past decade. The Association applauds EPA's decision to begin collecting information in support of the development of such a program for the nation's sanitary sewer systems. Although some of the elements from the 2001 draft sanitary sewer overflow (SSO) rule may serve as the basis for further discussion, much new information has been gathered and much progress made over the past decade.

NACWA hopes that the process initiated by this request for stakeholder input will include a meaningful dialogue between all interested parties, culminating in a final regulation that takes a comprehensive, holistic approach to the regulation of sanitary sewer collection systems, including uniform national requirements for permitting of satellite sewer collection systems, peak excess flow treatment facilities, and wet weather flow management practices at municipal wastewater treatment facilities.

NACWA feels strongly that the management of peak flows at the treatment plant must be addressed as a component of the sanitary sewer system rulemaking. The issue of peak flow management at the treatment plant is inextricably linked to collection system management and utilities must be able to develop a system-wide program for collection system and wet weather management that meets their Clean Water Act (CWA) mandates and the needs of their communities. The 2005 proposed peak flows policy was conceived and developed at a time when collection system standard conditions were lacking. A solution to the peak flows issue was attempted, but the underlying collection system issues were not part of that solution. Now that EPA has expressed an interest in addressing the broader issue of sanitary sewer system management holistically, pursuing the requirements contemplated in the 2005 proposed policy separately would be inappropriate. NACWA believes that all options for the management of peak flows at the treatment plant must be on the table as EPA considers a comprehensive solution. A system-wide approach has always been NACWA's preferred path forward and the Association applauds EPA for taking on this important challenge.

Much work has been done over the past decade and NACWA believes that the imposition of standard collection system management, reporting, and notification requirements by EPA must be done carefully and with the appropriate level of detail that ensures the federal program overlay does not over-prescribe requirements that are best left to site-specific determinations.

NACWA attended all of EPA's Listening Sessions held to gather public input on this issue and also presented public comments at the Listening Session held in Washington, DC on July 13. These written comments serve to supplement NACWA's public statement. Additionally, NACWA believes a clear consensus emerged from the Listening Sessions that EPA should address all SSO issues, including treatment of peak flows, management, operation, and maintenance standards, reporting and notification requirements, and satellite collection systems as part of a comprehensive SSO policy and not through a piecemeal approach. NACWA strongly encourages the Agency to acknowledge this stakeholder input by pursuing a comprehensive approach to SSOs.

Legal and Policy Considerations

NACWA is in general agreement with EPA's description of the statutory and regulatory background and the Agency's previous activities to address SSO requirements as described in the June 1 *Federal Register* notice. However, NACWA believes that EPA's assertion that "[s]anitary sewers are part of the treatment works under the Clean Water Act and discharges from sanitary sewers have historically been viewed as required to achieve secondary treatment in order to be eligible to receive an NPDES permit" greatly over-simplifies the unresolved debate regarding these important legal questions. Whether or not sanitary sewers are part of the treatment works is an issue that has not been resolved by the courts. Given that the courts have determined in the context of combined sewer systems that collection systems are not part of the treatment works, NACWA believes the legal question as to whether collection systems in separate sanitary sewers are part of the treatment works is still

unanswered. It is NACWA's position that separate sanitary collection systems are not part of the treatment works.

Furthermore, the question whether secondary treatment requirements must be strictly imposed on collection system discharges outside the treatment works has been the subject of much inconsistency among state permitting agencies and EPA regional offices. In purely historical terms, many collection systems were designed and built long before the Clean Water Act imposed any form of treatment requirements, and overflow structures were intentionally included in those systems. Rather than forcing those systems to comply with standards that were specifically developed for treatment works, NACWA believes that EPA has the obligation to develop distinct technology-based standards that are appropriate for collection systems as opposed to treatment works.

With regard to the draft notice of proposed rulemaking (NPRM) regarding SSOs that was released by EPA at the end of 2000, although it reflected in part the work that had been achieved by the SSO FAC, NACWA wishes to note that it also contained a number of additional elements that were not included in the draft paper that had been developed at the end of the FAC process in October 1999. In particular, as EPA itself acknowledged in the NPRM, the SSO Subcommittee did not have an opportunity to review the draft regulatory language addressing municipal satellite collection systems, the detailed language describing the watershed approach, the final language defining the term "sanitary sewer overflow," or the alternative requirements for small governments. Each of these topics, therefore, should be included among the topics for further discussion in the Agency's current rulemaking initiative.

Finally, NACWA wishes to add some additional perspective to EPA's statement that it "documented the extent of the [SSO] problem" in its August *2004 Report to Congress*. As NACWA noted at that time, both the CSO and SSO volume figures cited in the report must be placed in context. When municipal discharges are looked at in their totality, the annual volume of CSO and SSO discharges are small compared to other sources. At the time of the *2004 Report*, it was estimated that approximately 11,425 billion gallons of treated wastewater and 10,068 billion gallons of urban stormwater runoff entered the nation's waters each year. Of the total combined "municipal" discharges (CSOs, SSOs, treated wastewater, and urban runoff), CSOs represented only about 4% of the total volume, and SSOs less than 1%.

One of the key facts set forth in the report was that there is little evidence of widespread human health impacts occurring as a result of CSOs and SSOs, and that overflows tend to occur when the likelihood of exposure is greatly reduced (e.g., during periods of heavy rainfall or snowmelt when the public is not engaged in swimming or other aquatic recreational activities). Consequently, any final SSO policy or regulation should, like the CSO Policy, be based on a realistic assessment of risks to public health and recognize both the costs and benefits of additional controls, including the opportunity costs of spending on those controls rather than on other programs that have a more direct impact on public health and the environment. EPA should recognize the importance of financial capability considerations in addressing all water quality issues, including SSO issues, and ensure that new regulatory requirements result in a reasonable level of burden and meaningful water quality improvements.

Input on Specific Issues that EPA is Considering

NACWA's responses to EPA's specific requests for comment are set forth below in the order presented by EPA in the June 1 *Federal Register* notice. In addition, EPA mentions in the *Federal Register* notice, but does not seek input on, two issues that are of particular interest to NACWA and its member agencies: 1) the use of remote treatment facilities (or peak excess flow treatment facilities) in the collection system upstream from the wastewater treatment plant; and 2) developing a set of principles for the application of watershed management

concepts to municipal sanitary collection systems. NACWA will address those issues in section 7 ("Other Considerations") below.

1. Should EPA propose to clarify its standard permit conditions for SSO reporting, recordkeeping and public notification?

NACWA agrees that the public should be notified of spills that could pose a risk to their health so that those risks can be minimized. Most NACWA members are already subject to notification requirements imposed by EPA regulations and guidance under the CWA, local ordinance, or state regulations. Communities with combined sewer systems must implement monitoring and notification programs for overflows as part of the nine minimum controls required under EPA's CSO Policy. Any additional federal requirements on monitoring and reporting should acknowledge the programs that are already in place and ensure that any new requirements do not interfere with existing efforts or impose duplicative, unnecessary, and unduly costly mandates.

NACWA does not believe that EPA has the authority to require reporting, monitoring, or notification of overflows which do not reach the waters of the United States, including basement backups or overflows that are quickly contained and cleaned up before reaching waters of the United States. However, NACWA also recognizes that there may be certain situations where reporting and/or notification of overflows that do not reach waters of the United States is appropriate due to public health or environmental concerns. Decisions and protocols about possible reporting and notification of these overflows occurring outside the jurisdiction of EPA and the CWA should be left to utilities to work out with their local public health authorities and state environmental regulators.

Many municipalities are spending large sums on overflow control and pollution abatement efforts, and no single approach would be appropriate for every city. As these efforts proceed, communities need the flexibility to work with their state permitting authorities to design and implement monitoring and reporting systems that best meet their needs and the needs of their citizens in an affordable, common sense way. A one-size-fits-all approach to monitoring a vast network of pipes, in systems that may vary depending on the geographic region, would not be the best option.

With regard to public notification requirements, although NACWA agrees that overflows with the potential to harm human health should trigger public notification requirements, it is important to articulate how that determination will be made and by whom. For example, small spills in unpopulated areas that pose relatively small risk to public health should not be on an equal footing with larger spills occurring in areas or times of the year that would pose a more significant health risk. Similarly, spills near populated areas may pose a risk only if they occur in places and during times when exposure is likely. Minor spills of a few gallons that can occur during routine sewer line maintenance should not trigger the notification requirement threshold.

NACWA believes that notification of overflows, when necessary, should be made to the appropriate regulatory authority based on the nature of the event. If the overflow presents the potential of imminent harm to public health, notification should be made to the appropriate public health department or other public health regulatory agency. If the overflow does not impact public health but poses a potential environmental hazard, notification should be made to the relevant environmental regulator.

While recent Congressional efforts on public notification of sewage spills can provide data points for EPA's rulemaking effort, NACWA believes that elements of those legislative proposals are too prescriptive to be effective nationally. In particular, NACWA believes the monitoring programs contemplated by previous legislation are overly restrictive and may be too costly, especially in light of new economic realities. NACWA

also disagrees with the legislation's requirements for reporting and notification of basement backups that do not reach waters of the Unites States.

Instead of including prescriptive requirements on a national basis, it is NACWA's position that any SSO rule should provide a flexible framework that allows clean water utilities to work with local health departments in developing appropriate public notification protocols for SSOs based on sound science and economic analysis. Traditionally, in many communities with monitoring and reporting requirements, it is the role of local health departments to evaluate a spill report and determine if public safety is at risk before reporting the spill to the general public. This remains the best course of action, and any final regulation should retain the flexibility for local authorities to review and determine the consequences and potential health threats of these spills to the public. Notification requirements must put protection of public health first, which means developing a balance between notifying the public when there is potential for imminent harm and avoiding unnecessary notification that can lead to desensitization when there is no public health threat.

While NACWA did not agree with all aspects of the Agency's 2000 NPRM, that proposal did embrace a flexible approach to monitoring and notifying the public of spills that allowed municipalities to work with their state regulators and affected entities on a framework for case-by-case notification based on the nature of the event. The framework in the proposal acknowledged the complexities of immediate notification and provided for a flexible, system-specific overflow response to identify and clarify specific notification responsibilities and notification protocols. However, as NACWA has previously commented to EPA, certain elements of the NPRM approach were in need of further refinement. Specifically, 1) language defining what constitutes an SSO should exclude overflows or releases of wastewater that do not reach waters of the United States, including basement backups; 2) POTWs should not be held responsible for monitoring, notifying or reporting of SSOs from satellite collection systems over which the POTWs have no control; and 3) there needs to be maximum flexibility in defining what constitutes "feasible" monitoring requirements for all utilities, especially for small and medium sized communities, that does not place an unreasonable burden on clean water agencies.

2. Should EPA propose to develop a standard permit condition with requirements for capacity, management, operations and maintenance programs based on asset management principles?

In the absence of a uniform national policy, a patchwork of state and regional approaches has developed toward the regulation of SSOs, the use of wet weather treatment facilities and the authorization of blending. Communities are spending limited resources defending enforcement actions rather than complying with a consistent and comprehensive regulatory program. Clear requirements for sewer system management will assist municipalities in establishing and maintaining sufficient funding to adequately manage and operate their collection systems.

NACWA believes that: 1) SSOs should be addressed through a nationally consistent technology-based best available technology/best control technology (BAT/BCT) approach, using the management, operation and maintenance (MOM) concept as the standard for measuring compliance, and that 2) adequate system capacity should be established through development of a site-specific capacity assurance plan, using a metric such as site-specific design storms or overflow recurrence characteristics to develop a performance standard that is protective of water quality and public health.

The approach taken to developing and implementing a CMOM standard in the Agency's 2000 NPRM was problematic because it did not draw this essential distinction between the capacity and MOM components. NACWA agrees that proper and consistent management, operation and maintenance of collection systems is a necessary and effective mechanism for reducing certain dry and wet weather overflows. NACWA also recognizes that recurring overflows can be caused by insufficient capacity in both dry and wet weather conditions. Management, operation and maintenance issues and capacity needs require vastly different types of

evaluations and analyses, however, and cannot be addressed in a single process. An effective MOM program requires short-term, day-to-day management-based efforts to provide consistent operation and maintenance, an adequate tracking system, and appropriate staffing and recordkeeping. Capacity issues, however, require long-term planning and significant capital investment to evaluate and restore or upgrade existing pipes. In the CSO context, this distinction is reflected in the two-step control process, where the nine minimum controls contemplate low-cost operational measures and any significant capital investments or capital planning efforts are addressed through Long Term Control Plans. The SSO policy should be consistent with the approach taken to these two different issues in the CSO Policy.

Because of the distinct differences between MOM and capacity issues, NACWA supports separating the two programs in the final regulation and applying appropriate standards to each. For the MOM component, NACWA supports the development of a menu of program elements that must be addressed by each utility but without EPA imposing overly prescriptive, uniform requirements in each permit. Under this approach, development and implementation of an appropriate MOM program based on overarching standard principles but specific to the unique needs of each utility would establish compliance with the MOM standard, and any non-recurring overflows that occur after MOM implementation would be deemed unavoidable under the standard. However, NACWA would be opposed to EPA mandating a prescriptive version of MOM as previously outlined in various Agency documents that requires specific metrics or benchmarks such as rates of sewer system inspection or cleaning. Instead, EPA should develop a MOM requirement that sets a series of broad standards or management practices while leaving specific details such as the methods or frequency needed to meet these standards to individual utilities to determine based on the unique needs of their sewer systems. For the capacity component, NACWA supports an approach modeled on the CSO Policy's Long Term Control Plan process, with standards established for proper site-specific collection system design, through the development and implementation of a site-specific capacity assurance plan. EPA should also recognize, as it did with the CSO Policy, that it will take POTWs time to develop and implement both the MOM and capacity program requirements.

Since August of 2007, members of NACWA's Facility & Collection System Committee have been working in collaboration with representatives from the Water Environment Federation (WEF) and other key stakeholder groups to develop a set of core attributes for the management of municipal sanitary sewer collection systems that could be formally accepted by the water sector organizations and used nationally to provide much-needed consistency. This effort moved from concept to reality when NACWA, WEF, the American Public Works Association (APWA), and the American Society of Civil Engineers (ASCE) approved the core attributes and released a document entitled *Core Attributes of Effectively Managed Wastewater Collection Systems* in July 2010. NACWA has appended the document to this comment letter for EPA's consideration.

In brief, the document lists the following essential attributes for the efficient management of wastewater collection systems:

- Implement and maintain a system inventory and information management system.
- Implement and maintain a records management system.
- Adopt and implement a safety and training program.
- Develop and implement overflow, emergency response, and reporting procedures.
- Perform timely and adequate system operation and maintenance.
- Develop and implement source control measures.
- Conduct system structural condition assessment and evaluation.
- Conduct system hydraulic capacity assessment, evaluation, and assurance.
- Adopt and use standard design, construction, and inspection attributes.
- Develop and implement a communication and outreach program.
- Develop and implement procedures to identify and enact program monitoring, measurement, and

modifications.
- Ensure adequate and sustainable funding revenue source and reliable accounting practices.

Because there is significant interdependence among these attributes, all 12 elements are generally implemented as part of an integrated program to provide a properly managed and operated system. While it is anticipated that effectively managed wastewater collection systems, regardless of size, will have elements of the core attributes, it is also anticipated that operators of larger collection systems will address these attributes in greater detail than operators of small systems and will adopt performance metrics that are appropriate in light of the scale of their systems and predicted impact on water quality. NACWA agrees with the need to give permitting authorities the flexibility to tailor individual capacity assurance and MOM programs for all communities – both large and small – in accordance with the size and complexity of the collection system.

EPA's June 1 *Federal Register* notice draws parallels between CMOM and asset management. NACWA believes that these are very different programs and that while MOM and capacity programs may be elements of a utility's larger asset management program, asset management is a far broader, utility-level effort that includes not only physical assets like pipes and pumps, but also personnel, financing, and other utility assets.

3. Should EPA propose to require permit coverage for municipal satellite collection systems?

NACWA believes that satellite collection systems must be brought into the CWA permit program. The issue of dealing with flows from satellite systems to regional treatment authorities is very complicated, especially when there are satellite systems "nested" within other satellite systems. In these types of situations, a satellite system can deliver flow to another satellite without ever having any direct connection with the ultimate regional treatment authority. In order to truly address all capacity and flow issues in this type of situation, all of the satellite systems involved must be subject to some type of capacity controls. Additional complications can arise when there are private collection systems which discharge to satellite systems, which then in turn discharge to the regional treatment authority. These private systems can include very large entities such as private universities or private housing developments with their own collection systems. These private sewers and collections systems must be considered as well when determining how to better regulate the flow coming from satellite systems.

Collection system owner/operators should be required to establish both MOM and capacity assurance programs. NACWA recommends that permits be issued directly to the collection system owner/operator, but also recommends studying existing regional collaborations and contractual or intergovernmental agreements between satellite systems and treatment utilities to determine other possible approaches. Under appropriate circumstances, the Agency should also provide flexibility to state and regional NPDES permitting authorities to issue joint permits to multiple co-permittees on a regional or system-wide basis.

EPA should establish a flexible framework whereby permitting authorities and regional treatment utilities can mutually decide whether individual permits for satellite systems, satellites as co-permittees with the POTW, or establishing intergovernmental/contractual agreements is the appropriate way to regulate satellite systems on a case-by-case basis. Such an approach will allow for the continuation of those current situations where treatment authorities and satellite systems are pleased with their existing capacity and flow management programs as well as provide a framework to resolve those situations where there are current problems between treatment authorities and satellite systems. In any case, regardless of the permitting structure, satellite collection systems should be required to comply with capacity limits established by regional treatment systems. This requirement must apply to all collection systems, both public and private.

In 2009, NACWA published a white paper on working with satellite systems, which is attached at the end of this comment letter. The white paper explores a variety of ways in which regional wastewater treatment authorities

have worked with satellite collection systems to address wet weather flow management. The issues paper looks at both voluntary, collaborative programs between treatment authorities and satellites as well as more prescriptive, non-voluntary approaches and includes a number of valuable case studies. NACWA encourages EPA to use this document as a resource as the Agency explores ways to better regulate satellite systems.

4. What is the appropriate role of NPDES permits in addressing unauthorized SSOs that are caused by exceptional circumstances?

Any final regulation must include a meaningful defense for overflows that are beyond the reasonable control of the collection system operator. A zero-discharge standard for SSOs is inappropriate, technologically impossible, and does not reflect the risks posed to water-quality by overflows. The "prohibition and excuse" approach adopted in the NPRM imposes an unrealistic standard that would expose even the best-designed and best-operated systems to costly enforcement actions and citizen suits with little environmental benefit. Collection systems cannot be built to completely eliminate all overflows. EPA acknowledges this in the NPRM, stating that "some overflows are unavoidable, even in the best run systems," and reiterates this point in the June 1 *Federal Register* notice by stating "even municipal collection systems that are operated in an exemplary fashion" may have overflows in exceptional circumstances. Systems that are in compliance with the capacity assurance and MOM requirements of the final regulation should not be held liable for overflows that are caused by exceptional circumstances or conditions that are beyond the reasonable control of the system operator.

As explained above, NACWA believes that standard NPDES permit conditions for sanitary sewer collection systems should include the establishment of a site-specific MOM program and the development of a site-specific, long-term capacity assurance plan that includes a metric such as a design storm or overflow recurrence characteristics to establish the system's performance standard. Compliance with these standard conditions and the system's site-specific performance level should determine whether a collection system is in compliance with the CWA and its permit. If a collection system is in compliance with all of these elements, there should be no liability for SSOs. This protection from liability for SSOs should either be in the form of a permit shield defense or available as a specific affirmative defense that will protect the collection system operator from citizen suit liability.

5. How should EPA address peak flows at POTW treatment plants?

The use of blending is absolutely essential for many POTWs to treat wet weather flows and still meet effluent limitations. During wet weather conditions, the treatment plant receives and must treat flow volumes which are many times greater than dry weather flows. Collection systems and plants were not designed to store and treat this excess flow, and it would be both inefficient and technologically infeasible to redesign these facilities to accommodate all wet weather conditions. As long as a POTW is meeting its applicable permit limits, EPA should not be concerned with the treatment processes used at the plant or engaged in monitoring water quality within the plant. Over the last several years, high rate clarification or high rate filtration, such as ballasted flocculation or compressed media, has shown in both pilot and full scale operation that these technologies can consistently provide high levels of treatment. EPA should not pursue policies or regulations that create disincentives to installing and operating these and other types of peak wet weather treatment systems.

In January 2001, NACWA conducted a member-wide survey to determine the current extent of blending as a treatment practice, and it shared the results of that survey with EPA by letter dated January 10, 2002. Out of the 122 respondents to the survey, 50% indicated that they operate plants that are designed to blend peak flows. 31% of those plants that used blending had permits that specifically authorized the practice. 82% had received state or federal funding to construct the plant's blending facilities. These peak flow facilities are essential elements of many of today's wastewater treatment plants.

As explained in the *Introduction* above, NACWA believes that, with the development of a holistic, national SSO policy it is inappropriate and unnecessary to address the blending issue through a forced and ill-fitting adaptation of the Agency's current bypass regulations in 40 CFR § 122.41(m). So long as the POTW engages in appropriate capacity and management practices, the existence of a comprehensive collection system regulatory program should enable permitting agencies to incorporate blending as an alternative flow routing scenario in NPDES permits under appropriate conditions and circumstances. As EPA considers an SSO rule, NACWA believes that all options regarding peak flows must be on the table, including a final SSO regulation that authorizes peak flow treatment scenarios at POTWs without classifying such peak flow treatment under the current bypass regulation.

6. What are the costs and benefits of CMOM programs and asset management of sanitary sewers?

NACWA members that have engaged in robust CMOM or asset management programs have generally found these programs to have a favorable cost-benefit ratio, provided that each utility has the flexibility to develop programs that are responsive to the unique needs of a given sewer system. The reality is that many if not all sewer program costs can be considered CMOM costs in some fashion. However, specific information on the costs and benefits of CMOM programs will vary from utility to utility.

NACWA's *Financial Survey*, published every three years, collects a variety of financial data from clean water agencies, including information on rate structures, capital expenditures, and debt load. This information could be helpful to EPA in determining some of the costs that utilities spend on CMOM programs. For instance, data from NACWA's most recent survey indicate that capital needs for clean water agencies have increased by 20% between 2005 and 2008, and have increased by 85% as compared with 1999. A significant portion of these costs are related to MOM programs as well as rehabilitation projects for sewer lines, pump stations, and treatment plants. Additionally, survey data indicate that long-term debt for these same utilities has increased by 27% from 2004 to 2007 and debt service now represents 28% of annual expenditures for clean water utilities on average. Much of this debt has been incurred to finance upgrades in capacity in both sewer systems and at POTWs.

NACWA would be happy to share its *Financial Survey* data with EPA if the Agency believes this information would be helpful in better understanding the financial impacts of CMOM programs as it develops an SSO rule. NACWA is also willing to work with EPA to gather specific CMOM cost/benefit information from specific utilities, as well as assist EPA in gathering any other data the Agency believes would be helpful.

7. Are there other considerations?

NACWA believes that any final SSO regulation should include appropriate standards for permitting of peak excess flow treatment facilities ("PEFTFs") located in the collection system upstream from the treatment works, using the BAT/BCT approach. This is particularly true for any existing PEFTFs, which should be grandfathered in any potential SSO rule.

NACWA also believes that the rule should incorporate watershed-based planning principles that provide flexibility to prioritize both collection system management activities and other wet weather management investments based on risk and to focus on providing the greatest opportunities for health and environmental improvements as early in the process as possible.

Any final regulation must recognize that in addition to SSOs, municipalities are also working to meet water quality requirements related to CSOs and municipal stormwater systems, and must have the flexibility to prioritize limited resources in a manner that will result in the greatest environmental benefit. A realistic

assessment of the risk of human health impacts from overflows and how that risk compares to other water quality program needs should be included in the process of developing capacity plans and provide a basis for selecting the target level of performance for the system.

Such a watershed-based planning approach should also allow for and encourage the use of innovative approaches such as green infrastructure, with the recognition that green infrastructure solutions cannot be mandated as a one-size-fits-all approach but instead must be available as an option that communities can pursue where appropriate based on local needs. In the context of SSO regulations, green infrastructure must be considered carefully due to its potential for actually increasing inflow and infiltration (I&I) problems.

Additionally, EPA must also recognize the importance of financial capability considerations in addressing SSO issues, especially in the context of the costs associated with pre-existing and new CWA requirements. This is particularly true in light of the most severe economic downturn since the Great Depression and at a time when municipalities are facing the most severe economic challenges since passage of the CWA.

Conclusion

NACWA thanks EPA for this opportunity to provide input on this important rulemaking initiative. NACWA believes that a comprehensive, holistic approach to SSOs as outlined in these comments that allows clean water utilities to address issues such as reporting and notification, CMOM, satellite system permitting, and treatment of peak flows on a utility specific basis will provide the nation's clean water agencies with the regulatory consistency and predictability they need to reduce SSOs while at the same time improving the quality of our nation's waters.

NACWA further believes it imperative that as EPA considers moving forward with an SSO rule, the Agency must engage in an open and transparent rulemaking process that includes the participation of the clean water utility community, including consultations with clean water agencies on the many complex engineering, management and operation, and legal components that will be part of any final SSO rule. NACWA and its member utilities stand ready to assist EPA in this important effort and we look forward to a continuing and productive dialogue with EPA and other stakeholders as the process moves forward.

If you have any questions, please do not hesitate to contact Chris Hornback, NACWA's Senior Director of Regulatory Affairs, at *chornback@nacwa.org* or 202/833-9106, or Nathan Gardner-Andrews, NACWA's General Counsel, at *ngardner-andrews@nacwa.org* or 202/833-3692.

Sincerely,

Ken Kirk
Executive Director

ATTACHMENTS

Core Attributes of Effectively Managed Wastewater Collection Systems

July 2010

Developed in partnership by:

APWA AMERICAN PUBLIC WORKS ASSOCIATION

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

NACWA A Clear Commitment to America's Waters

Water Environment Federation® Preserving & Enhancing the Global Water Environment

Acknowledgments

Thank you to the volunteers from NACWA and WEF who have worked for more than two years to draft the attributes and the representatives from APWA and ASCE who have made valuable contributions to the final attributes.

American Public Works Association
Washington DC Office
1275 K Street, NW, Suite 750
Washington, DC 20005
Phone: (202) 408-9541

www.apwa.net

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191
Phone: (800) 548-2723

www.asce.org

National Association of Clean Water Agencies
1816 Jefferson Place, NW
Washington DC 20036
Phone: (202) 833-2672

www.nacwa.org

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314
Phone: (800) 666-0206

www.wef.org

Table of Contents

1.0 Introduction and Purpose

The American Public Works Association (APWA), American Society of Civil Engineers (ASCE) National Association of Clean Water Agencies (NACWA) and the Water Environment Federation (WEF) are committed to advancing effective management of our nation's wastewater infrastructure and to providing wastewater treatment plants (WWTPs) with tools for maintaining infrastructure in the most responsible, efficient way possible.

The wastewater collection system is a critical element of the wastewater infrastructure in the United States. The Clean Water Act generally prohibits sanitary sewer overflows (SSOs) discharges to waters of the U.S. However, the U.S. Environmental Protection Agency (EPA) has not established national guidance for design or operation of sanitary sewer systems. As a result, separate sanitary collection system managers still do not have clear, consistent national guidelines on which to base management of their systems.

In response, the above-named organizations worked collaboratively to engage a broad group of industry stakeholders to identify and develop good engineering practices and core attributes essential to managing and operating separate sanitary collection systems. Collectively, these organizations are referred to in this document as the Core Attribute Partner Organizations or "Partner Organizations."

Many states have used their existing authority under statute to develop programs for management and oversight of collection systems. This patchwork of programs has had some success in parts of the country, but there is no consistently applied national guidance upon which collection system managers can rely. These core attributes were defined to present the key principles that support a good management system. Many communities have developed programs and incorporated specific technologies and tools that go above and beyond the performance levels resulting from these core attributes. They are recognized as necessary to meet specific local objectives. The core attributes are intended to support existing state programs, not to conflict with or preempt state efforts.

In the absence of clear federal guidance, the Partner Organizations have developed these baseline attributes as fundamental elements in the effective management of sanitary sewer collection systems. These core attributes are intended to provide guidance for wastewater agency[1] collection system managers to evaluate their existing programs and confirm they are performing according to industry good engineering practices, or have practices that are lacking and need enhancement. Implementation of a collection system management program incorporating these attributes will vary from one system to the next based on size, organizational structure, and the character of the waste stream, the history of the system, needs, and availability of resources. Through development and implementation of a management program encompassing these attributes, wastewater agencies can provide efficient and effective collection system maintenance and operation while protecting public health and the environment.

The following core attributes should be used in conjunction with other industry documents that expand on these engineering approaches. References have been provided to key resources available from the Core Attribute Partners and other organizations, including manuals of practice, research projects, and case studies for wastewater agencies and collection system managers interested in more detail.

1 Collection systems may be operated by a wastewater agency or as publicly-owned community infrastructure. This document uses the term "wastewater agency" or "agency" to refer to the system operator.

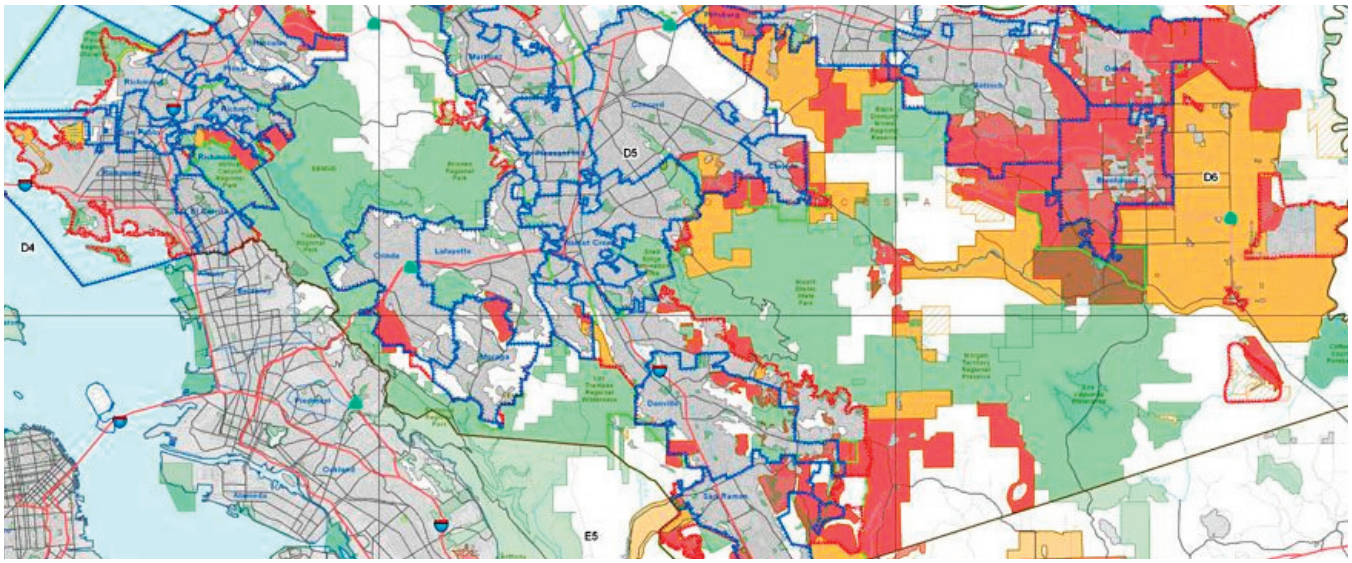
2.0 Core Attributes

The efficient operation and management of collection system assets is critical to minimizing performance failures and potential effects. Efficient operation and maintenance of a collection system requires several essential elements regardless of a wastewater agency's local performance requirements. Documenting programs, practices, and protocols helps produce successful and efficient performance of collection systems. The Core Attribute Partners jointly have developed a list of essential attributes for the efficient management of the wastewater collection system:

- Implement and maintain a system inventory and information management system.
- Implement and maintain a records management system.
- Adopt and implement a safety and training program.
- Develop and implement an overflow, emergency response, and reporting procedures.
- Perform timely and adequate system operation and maintenance.
- Develop and implement source control measures.
- Conduct system structural condition assessment and evaluation.
- Conduct system hydraulic capacity assessment, evaluation, and assurance.
- Adopt and use standard design, construction, and inspection attributes.
- Develop and implement a communication and outreach program.
- Develop and implement procedure to identify and enact program monitoring, measurement, and modifications.
- Ensure adequate and sustainable funding revenue source and reliable accounting practices.

Because there is significant interdependence among these attributes, it is important that all 12 are implemented as part of an integrated program to provide a properly managed and operated system. They are discussed in greater detail in this document.

While it is anticipated that effectively managed wastewater collection systems, regardless of size, will have elements of the core attributes, it is anticipated that operators of larger collection systems will address these attributes in greater detail than operators for small systems. In developing a comprehensive program based on these attributes, each wastewater agency should review its legal authority to ensure that it is sufficient to implement the planned program.



Core Attribute 1:
System Inventory and Information Management

Description

To efficiently manage the collection system, the wastewater agency needs to provide staff with suitable resources to enable effective collection, storage, evaluation, forecasting, and communication of data and information. Design, construction, and maintenance information needs to be readily available to meet a wastewater agency's performance goals and system maintenance requirements. The wastewater agency should plan, design, and implement data and information systems and processes the way it would a capital improvement project.

The information management system needs to be able to identify and locate system assets, relevant attributes, performance records, and reporting documents. The type and extent of information management system will vary based on system size and the wastewater agency resources. Many wastewater agencies use geographic information system (GIS) for storing, managing, analyzing, and mapping spatially referenced information of the collection system. Wastewater agencies also can use an information database that is integrated within a maintenance management system and linked to GIS.

Benefits

Effective system inventory and information management programs can provide several benefits to the wastewater agency and public:

- Provides necessary information to effectively respond to service requests.
- Improves knowledge of system components and connectivity.
- Allows efficient operation and maintenance system wide.
- Generates consistent and reliable planning and forecasting information to improve management decisions.
- Builds confidence in analysis and decisions.
- Reduces unexpected service disruptions and other risks.
- Supports continual improvement of system.
- Creates the validation of needs assessment within a Capital Improvement Plan (CIP).

Elements

Asset Identification and Documentation

Knowledge of what assets are in the collection system and how they are connected provides the foundation for achieving performance goals. Size and complexity of the collection system and performance goals will influence how asset data are stored and displayed. Procedures are needed for keeping system attributes current with system additions or modifications.

Data and Process Needs Assessment

When a wastewater agency wants to begin or improve their data management program, they must first understand the way data flows through their organization. Managers use data mapping to chart where or how data is generated, where it resides, and how it is used. Managers also can use this exercise to identify data gaps and needs internally and externally.

Information Management Plan Development

The wastewater agency's goals and results of needs assessment form the basis for an information management plan. The plan should include short- and long-term prioritized data needs. The plan should assess what data will be collected; who is responsible for its generation and integration throughout the wastewater agency; where it will reside from creation to storage; and what resources and schedules are required to accomplish the work. The plan should outline data needed to determine if each functioning level of the wastewater agency is meeting performance objectives.

Information Management Plan Implementation

The implementation plan will include a sequence of activities and a schedule for implementation. Standard protocols, staff training programs and ongoing systems performance evaluation should be included in the implementation plan.

Process Monitoring Adjustments

Managing and analyzing data is a continuous process. The plan will include performance targets established for various operating levels of the wastewater agency. The information management system should be designed to provide reports that show performance results over specified periods. The results can be compared with performance targets to enable appropriate process adjustments.

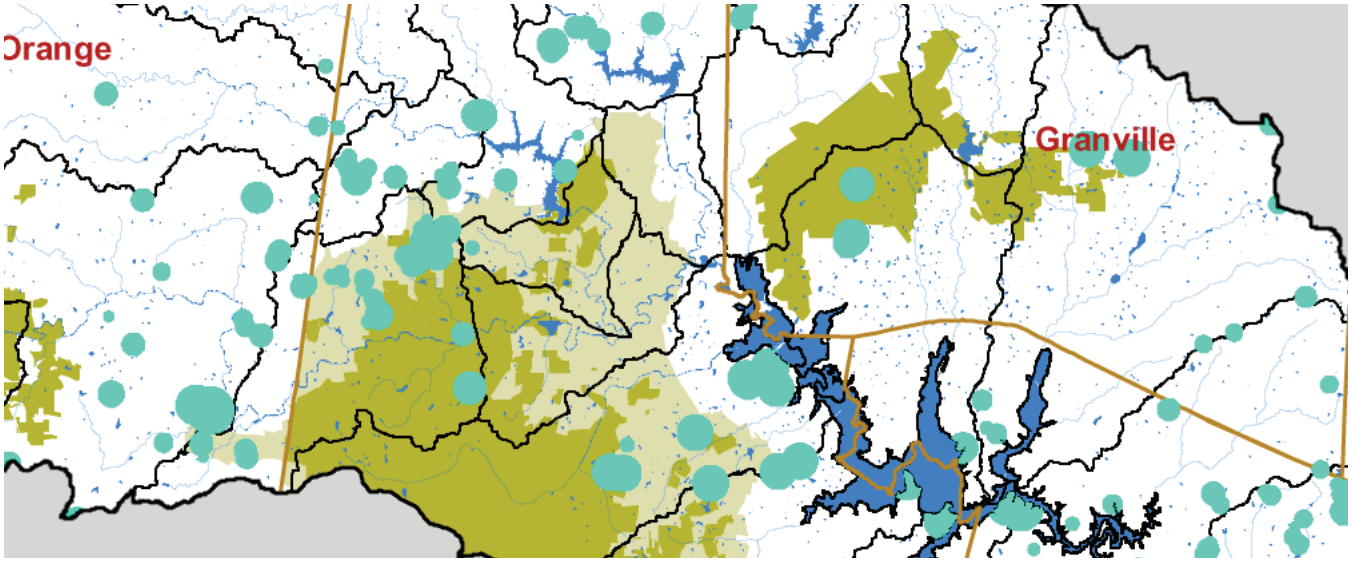
Resources

Arbour, R., and Kerri, K. (2009) *Collection Systems; Methods for Evaluating and Improving Performance, 2nd edition*; Office of Water Programs, California State University: Sacramento, California.

National Association of Clean Water Agencies (2004) *Continual Improvement in Utility Management: A Framework for Integration*; National Association of Clean Water Agencies: Washington, D.C.

Water Environment Federation (2009) *Wastewater Collection System Management,* 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2006) *Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Collection and Treatment Systems*; Water Environment Federation: Alexandria, Virginia.



Core Attribute 2:
Maintenance Management System

Description

Keeping records of maintenance activities is essential to track performance, optimize maintenance, and identify areas requiring frequent attention. Maintenance management systems enable utilities to track and document system maintenance and performance. Many wastewater agencies use maintenance vehicles equipped with onboard computer systems that provide online access to maps, inventory, maintenance history, and work orders. Staff are provided quick access to field information and can close work orders as work is completed.

Benefits

An effective maintenance management system can provide several benefits to the wastewater agency and public:

- Organizes and distributes customer comments and complaints to appropriate staff.
- Issues work orders to staff.
- Tracks performance against targets for key measures.
- Tracks cost of repairing or maintaining specific assets, asset groups, or types of asset groups.

Elements

Maintenance management systems are moving away from handwritten documents to computer software programs.

Maintenance Management System Software

Several software programs can integrate work-order history, asset attribute data, analysis, and GIS visualization. Wastewater agencies may find it beneficial to integrate multiple software database applications.

Maps of the Collection System

Wastewater agencies use maps to help plan and communicate information. The type of mapping system used should consider and address the enterprise user and data needs. Application and database design are important tasks in mapping system development.

Maintenance Records

Data should be kept up to date and accurate, so that maintenance systems can enable success of other activities, such as preventative maintenance. Documentation and reporting also helps develop critical parts inventory or need for special performance testing. These systems are fundamental tools to maintenance staff and system managers.

Resources

National Association of Clean Water Agencies (2004) *Continual Improvement in Utility Management: A Framework for Integration*; National Association of Clean Water Agencies: Washington, D.C.

Office of Water Programs, California State University – Sacramento (2010) *Operation and Maintenance of Wastewater Collection Systems*, 7th edition, Volume 2; Office of Water Programs, California State University: Sacramento, California.

Paracher, M. (1998) *Wastewater Collection System Maintenance*; Technomic Publishing Co.: Lancaster, Pennsylvania.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2006) *Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Collection and Treatment Systems*; Water Environment Federation: Alexandria, Virginia.

Core Attribute 3:
Safety and Training

Description

Safety and training programs are integral parts of any well-managed collection system. Collection systems, by their nature and location, can be dangerous places to work. Workers regularly are exposed to hazardous structures, materials and atmospheres, vehicular traffic, and biological contaminants. It is important to provide hazard communication so that employees know and understand the hazards they may encounter while doing their job. Most states require specific safety training commensurate with the challenges faced by collection system workers. Training also may include continuing professional education. In many states there are requirements for continuing education to maintain, or renew licenses or certification.

Emergency response training also is important and is covered in detail in Core Attribute 4: Overflow Emergency Response Plan. At a minimum, wastewater agencies should train employees on how to respond to basic anticipated emergencies and, if possible, conduct a tabletop exercise to see how the plan works in simulated emergency conditions.

Benefits

Effective safety and training programs offer several benefits to the wastewater agency and public:

- Reduce insurance premium rates.
- Increased productivity.
- Reduction in lost-time accidents.
- Better regulatory compliance.
- More knowledgeable workforce.

Elements

Hazard Communication

The Occupational Safety & Health Administration (OSHA) requires employers to inform their workers of hazardous materials and locations. There are several ways to accomplish this task:

- Right-to-know (RTK) program—identifies hazards and teaches employees how to minimize the risks.
- Material safety data sheets (MSDS)—provide information on specific hazardous materials that employees use on the job. This information typically is kept in a central location accessible to employees.

- Product labeling—provides on-the-container information regarding a specific product.
- Location identification—employers are required to tell their employees about specific locations in the collection system that may be hazardous, and what safety measures the employee should use for each. For example, this may include specific manholes, pump stations, and meter pits.

Safety Training

Depending on organization size and employees skills, either in-house trainers or safety consultants can provide safety training. Most programs require retraining at regular intervals. Regulatory inspectors may require proof of training through documentation. All programs should be tailored to the specific needs of the wastewater agency. A good safety program addresses but is not limited to, the following elements:

- Confined space entry and rescue,
- Blood borne pathogens,
- Lock out/tag out (LOTO),
- Ladder safety,
- Fire extinguisher training,
- Trench excavation,
- Safe vehicle operation,
- Ergonomics of lifting,
- Hazard communication,
- Chemical awareness,
- Personal protective equipment (PPE),
- Work zone safety, and
- Right-to-know (RTK).

Other Staff Development Needs

Collection system employees need to keep up with the professional development, regulatory changes, and technological advances. In some states, it is mandatory for certified or licensed collection system operators to take professional development classes to maintain their certifications. Professional associations (i.e., WEF, NACWA, APWA. ASCE and American Water Works Association), along with colleges and technical institutions, typically provide these training opportunities.

Adequate Workforce Resources

The agency should evaluate their resources to ensure the adequate implementation of these core attributes at the established levels of service.

Resources

Office of Waters Program, California State University (2003) *Operation and Maintenance of Wastewater Collection Systems*, 6th edition, Volumes 1 and 2; Office of Waters Program, California State University: Sacramento, California.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Core Attribute 4:
Overflow Emergency Response Plan

Description

Sanitary sewer overflows (SSOs) emergency response plans should include protocols and resource alternatives necessary to effectively respond, control, report, and mitigate an event. Advanced response preparation to an SSO event which could be under emergency conditions is crucial to managing the collection system to protect human and environmental health and other wastewater agency values. A timely and effective response to SSOs is a fundamental objective of emergency response management and should conform to a risk based prioritization process.

The protocols for reporting and notification will depend on many site specific factors with State regulatory or public health organizations specifying the minimum requirements for various classes or categories of overflows.

Benefits

An effective overflow emergency response plan offers several benefits to a wastewater agency and the public:

- Enhance the protection of public health and the environment.
- Provide compliance with regulations and permits.
- Maintain trust with the public, the regulatory agencies and the non-governmental organizations.
- Minimize the wastewater agency's exposure and liability from claims, enforcement, or litigation.

Elements

Overflow Response Planning

Written procedures for assessing, notifying, containing, clearing the cause, documenting, estimating the volume, sampling and analysis, posting warning signs, and conducting necessary cleanup should be developed and implemented. Collection system managers should develop and implement Overflow Response Plans in cooperation with the Local and/or State Public Health Officials, if possible. Response priorities will depend on the local circumstances. However, stopping and/or containing the overflow should generally be the highest priorities followed by containing, minimizing or preventing SSOs from reaching the storm-drain system, and limiting public health effects.

Following are the key suggested activities to include in an SSO response plan. Implementation sequence is based on site-specific needs, regulatory requirements, and expectations. The first items listed below should be performed as rapidly and simultaneously if possible. The amount of detail provided for each activity will depend on the wastewater agency or regulatory agency.

- Perform initial SSO investigation and assessment of root cause
- Provide adequate traffic control as necessary for worker protection and public safety,
- Correct or stop SSO cause(s)
- Establish containment of SSO,
- Perform final volume estimate,
- Perform cleanup including chemical disinfection, if appropriate,
- Sample receiving waters, if required,
- Provide notification and report, and
- Document the incident, including recording in information management system.

Prior to the start of construction by in-house crews or outside contractors, an approved on-site or readily accessible wastewater flow bypass system and emergency response plan should be in place. Contractors should be instructed to take immediate action to stop overflows caused by their activities, using the emergency response plan. These requirements should be included in the contract documents and discussed at the preconstruction conference.

Notification Procedures

The overflow emergency response plan should outline notification steps and include a comprehensive contact list. The notification extent, media, and manner depend on the severity and potential effect of the overflow. The notification lists should include up-to-date information for contacts and officials. SSOs should be reported in accordance with federal and state laws, and other permit requirements.

Procedures for Overflow Emergency Response Planning and Training

The emergency response plan should be clearly documented and available to wastewater agency personnel and the public. It should be used as a resource in emergency response training. Wastewater operation and maintenance staff should be trained on emergency response procedures on regular basis. New employees should receive this training as part of their orientation and attend refresher courses according to the day-today responsibilities.

Essential Resource Preparedness Procedures

Following are suggested steps necessary to confirm a wastewater agency's readiness to respond to overflows:

- Standardize containment, cleaning, and response equipment.
- Maintain emergency equipment.
- Stock or have immediate access to critical parts.
- Train staff and designate stand-by personnel.
- Secure contracts to acquire additional equipment, if needed.
- Establish contracts to acquire cleanup and construction services on an emergency basis (on-call emergency contracts).
- Provide quick, accurate, updated system maps.
- Develop support or mutual aid agreements with neighboring agencies.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA, Project No. CP-828955-01-0) (2004) *Solutions for Sanitary Sewer Overflows*.

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (2000) *Protocols for Identifying Sanitary Sewer Overflows (SSOs)*.

California Collection System Collaborative Benchmarking Group (2004) *Best Practices for Sanitary Sewer Overflow Prevention and Response Plan,* California Collection System Collaborative Benchmarking Group: Oakland, California.

Office of Water Program, California State University – Sacramento (2010) *Operation and Maintenance of Wastewater Collection Systems,* 7th edition, Volume 2; Office of Water Programs, California State University: Sacramento, California.

Paracher, M (1998) *Wastewater Collection System Maintenance*; Technomic Publishing Co.: Lancaster, Pennsylvania.

Water Environment Federation (2004) *Managing the Water and Wastewater Utility;* Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Water Environment Research Foundation (2003) *Effective Practices for Sanitary Sewer and Collection System Operations and Maintenance;* Water Environment Research Foundation: Alexandria, Virginia.

Core Attribute 5:
Collection System Maintenance

Description

Proper maintenance of a collection system provides for the safe conveyance of wastewater to the treatment plant and mitigation of gases. Maintenance also maintains system flow performance with the design service capacity. An operation and maintenance (O&M) program should use an asset management approach for scheduling and implementing inspection, maintenance, cleaning, and repair of the system. Type and level of maintenance needs will vary based on system size and characteristics such as age and materials. The frequency and schedule of maintenance activities is an important element in development of an effective maintenance program. Managers should develop a schedule to perform maintenance in a timely manner based on history and collection system performance and other risk based criteria.

Benefits

Effective maintenance program provides several benefits to a wastewater agency and the public:

- Averts or minimizes public health and the environment impacts
- Reduces backups and sewer overflows.
- Reduces odors in communities.
- Minimizes backup claims.
- Optimizes resources and reduce overall operation and maintenance costs.
- Increases the service life of the facilities.
- Minimizes potential and exposure to enforcement and third-party litigation.
- Enhancing the image of the wastewater agency.
- Maximizes available system hydraulic capacity.

Elements

Preventative Maintenance Practices

Maintenance of collection system hot spots, or high-priority areas, is an important element of maintenance and typically is the most time and resource consuming. Maintenance of hot spots requires high-frequency maintenance of known problem locations within the system. These include locations that have regular blockages because of grease buildup, root intrusion, or vandalism. The frequency of maintenance for these hot spots varies and should be documented.

Routine maintenance schedule and frequency depends on system performance and risk factors, maintenance history, and the latest maintenance findings. Wastewater agencies should undertake routine evaluation and maintenance based on field findings. For example, if the maintenance crew sees minimal buildup, then staff should recommend a less frequent cleaning schedule to reduce cost. If, on the other hand, field maintenance finds severe buildup or blockage, then staff should recommend a more frequent scheduled cleaning as a proactive risk management measure. The cause of the frequent blockages should be determined and eliminated if possible. Quality assurance and quality check of cleaning quality is essential in providing maintenance staff with the feedback necessary to evaluate performance. Some communities have automated the data and quality control process to reduce costs, allow more focused quality control, and produce quicker results.

There are several cleaning methods and tools for collection systems. Use of each varies based on the site, condition, and type of debris.

Hydraulic cleaning typically is used for debris buildup and grease accumulation. High-velocity flushing machines most typically are used with various types of cleaning nozzles. Balls, bags, kites, scooters, and tires also are used in large collection systems or siphons to create a constriction thereby increasing the water velocity which scours the debris and advances it downstream for eventual removal.

Mechanical cleaning typically is used to remove roots and heavy debris from collection systems. Bucketing machines are used mainly for debris removal from large collection systems.

Preventive maintenance of pump stations should be performed on a set schedule to confirm that system components are operating properly, especially those related to backup power and control system. Scheduling routine preventative maintenance and inspection of the backup power and electrical systems should be conducted on a set schedule in alignment with the manufacture's recommendations and based on historical performance. Mechanical equipment and emergency backup systems should be tested during scheduled maintenance activities to verify adequate operation of system and alarms.

Wet well cleaning also is a critical element of preventive maintenance. In addition, staff should be trained routinely on applicable preventative maintenance procedures and standard operating procedures. Key replacement components should be identified, and adequate inventory of these components should be readily available.

While difficult to clean due to the typically limited access points, force main preventive maintenance should include routine visual inspection of the force main route for evidence of potential leaks or surface depressions. All valves installed on the force main piping should be included in a routine preventive maintenance program as well.

Proactive Maintenance Program

Proactive maintenance includes system components that are not subject to focused maintenance, are not experiencing any performance issues, and have no history of contributing to overflows or blockages. Maintenance of these components will need to be conducted on a set schedule but with much less frequency.

As part of this proactive maintenance program, a regular, system wide cleaning should be developed and implemented. Wastewater agencies often target a five- to 10-year cleaning cycle, but longer or shorter intervals may be needed based on site-specific conditions and parameters, especially for small-diameter, local systems. A more aggressive schedule could be implemented for the first cycle and then, using that data, a more realistic schedule could be established. Maintenance should be done based on either a sewer-shed or a specific geographic area to increase effectiveness and minimize cost. Prioritizing theses basins or areas as part of this program is essential where you want to start with the ones that have the highest potential for a problem or consequence of a problem. Visual inspection is another component to proactive maintenance in which a wastewater agency sends crews to an area to physically inspect flow in the maintenance hole to determine if there is any issue with the system. These visual inspections are set on either an annual or biannual frequency.

Proactive maintenance for pump stations is critical and includes the following activities and components:

- Estimate retention time and provide onsite stationary power backup for pumping plants with limited retention time at peak flow based on a wastewater agency's risk criteria. Identify low points in the system where overflows may occur because of pump station failure.

- Locate, store, and secure mobile power generators at key geographical locations to provide adequate response times.
- Identify the proper generator for each pump station.
- Develop "pump around" plans, redundant power sources, or dual-barrel mains for each facility. Use auxiliary equipment and components.
- Use a simplified telemetry system or a more complex SCADA system, based on site-specific conditions and needs.
- Provide pump redundancy.
- Standardize, as much as possible, the size and type of equipment to allow for exchange and ease of troubleshooting and repair.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA, Project No. CP-828955-01-0) (2004) *Solutions for Sanitary Sewer Overflows*.

Office of Water Programs, California State University – Sacramento (2010) *Operation and Maintenance of Wastewater Collection Systems*, 7th edition, Volume 2; Office of Water Programs, California State University: Sacramento, California.

Paracher, M (1998) *Wastewater Collection System Maintenance;* Technomic Publishing Co.: Lancaster, Pennsylvania.

Water Environment Federation (2004) *Managing the Water and Wastewater Utility;* Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2009) *Wastewater Collection System Management,* 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Water Environment Federation; American Society of Civil Engineers (2009) *Existing Sewer Evaluation and Rehabilitation*, 3rd edition; Manual of Practice No. FD-6; ASCE Manuals and Reports on Engineering Practice No. 62; McGraw-Hill: New York.

Core Attribute 6:
Source Control

Description

Maintenance issues such as blockages and overflows could be caused or increased by what is discharged into the system. Controlling what is discharge into the collection system can assist in enhancing and improving the collection system performance.

Benefits

Source control programs targeted to control sources provide benefits to wastewater agencies and the public:

- Reduced maintenance frequency downstream of sources.
- Reduced overflows due to blockages.

Elements

Fats, Oils, and Grease Control

Fats, oils, and grease (FOG) buildup in collection systems is a significant cause of blockages and overflows in a collection system. Controlling the sources from food service establishments, multi-family residential units, and residential properties, as well as, ensuring proper maintenance and cleaning of collection systems dramatically can reduce FOG blockages and overflows. A program should consider the following:

- Adequate sizing of grease traps,
- Inspection of grease establishments on a regular basis,
- Furnishing informational and educational resources on grease prevention techniques to both residential and grease-producing establishments, and
- Inputting grease-producing establishments on GIS.

Root Control

Root intrusion in collection systems is another source of blockages and overflows. Control of root intrusion in combination with routine maintenance dramatically can reduce blockages and overflows. A chemical root-control program is effective in controlling growth. A program should include several tasks:

- Identify those areas where standard maintenance practices are not cost effective because of the speed and density of root growth within laterals and mains.
- Introduce specifically formulated chemicals to identified problem areas to retard or eliminate intrusive root

growth which are compatible with plant operations and in compliance with applicable regulatory requirements.
- Provide public outreach materials to educate the public on areas to avoid planting deep-root plants and trees.

Corrosion Control

Unmanaged corrosion degradation of the sewer system can lead to eventual pipe collapse or blockages that may contribute to overflows. Developing a corrosion-control program for collection systems that are susceptible to corrosion can be effective. A corrosion control program should help a wastewater agency do the following:

- Identify where corrosion is occurring,
- Identify the type of corrosion occurring,
- Identify the cause of corrosion, and
- Determine a cost-effective short and long-term control method.

Application of chemicals to the waste stream can not only provide structural protection and reduce the rate of corrosion but also reduce odor problems. Chemicals used could include but are not limited to magnesium hydroxide solution, caustic soda solution, hypochlorite, peroxide, nitrates, and iron salts. Some wastewater agencies are spraying the crown of the collection system pipes that are susceptible to corrosion with magnesium hydroxide. This provides a buffer from corrosion. The application is typically done annually.

Vandalism Prevention

Vandalism—when debris and foreign material intentionally are introduced into a segment of the collection system—can be a source of blockages. A wastewater agency may need to develop and implement a Vandalism Prevention Program to protect its sewer system from damage and the potential for an SSO attributed to vandalism. A Vandalism Prevention Program should consist of several steps:

- Lock down maintenance hole covers to discourage vandalism where practical.
- Refer problem to appropriate law enforcement governmental agencies to investigate and prosecute the vandals.
- Provide ongoing education and outreach efforts to explain why it is important to not introduce inappropriate materials into manholes.

Odor Prevention and Control

The best odor control is prevention or source control. Prevention starts with the appropriate design and construction that maintains minimum design flow velocities and conveys the flow with the least turbulence.

In areas where adequate design parameters cannot be achieved, control of collection system gases may have to be implemented. This may include chemical treatment or installation of biofilters, scrubbers, or air treatment facilities.

Effective cleaning and removal of debris in the system is an important preventive measure to reduce hydrogen sulfide generation. In addition, access structure sealing can also help in controlling the emission of odors.

System monitoring for hydrogen sulfide levels and pressure levels is a preventive measure that enables corrective action to be taken and minimize odor complaints. In addition, mapping odor complaints to identify priority areas for necessary corrective action is a helpful tool to supplement preventable measures.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA, Project No. CP-828955-01-0) (2004) *Solutions for Sanitary Sewer Overflows*.

Paracher, M. (1998) *Wastewater Collection System Maintenance*; Technomic Publishing Co.; Lancaster, Pennsylvania.

Water Environment Federation (2004) *Managing the Water and Wastewater Utility;* Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2009) *Wastewater Collection System Management,* 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Core Attribute 7:
Structural Condition Assessment and Evaluation

Description

Sewer pipes deteriorate at different rates for many reasons. It is important to know the structural condition of the sewer because deteriorated pipes can collapse and cause a blockage or sinkhole if not addressed in a timely manner. In addition, as other utilities and structures are installed, sewer pipes in good condition could be damaged or broken. Structural condition assessment can identify these situations and enable timely repair.

Assessment methods and tools are most commonly dependent upon the pipe or structure's size, material, date of construction, and accessibility. Similar to capacity-related inspection, technologies structure inspection can be a progressive series of inspection techniques. Inspections often capture structural and capacity problems in the same inspection. Closed circuit television (CCTV) is a popular structural inspection technique. It is important to have an easy-access retrieval storage system for any videos so that it can be used for comparison with future videos.

Benefits

Systematic structural condition assessment and evaluation provides many benefits to a wastewater agency and the public:

- Helps minimize collection unexpected system failure, blockages, and overflows by identifying potential problems before they occur.
- Provides information that can be used to identify, predict, and prioritize necessary capital improvement projects.
- Helps wastewater agency prioritize maintenance, rehabilitation and repair activities.

Elements

The key element of this program is the combination of inspection technique and of the conversion of the observed or recorded data into assessment knowledge. This knowledge then can be used to determine the need for priority of repair, rehabilitation, or replacement. An analysis of system performance, maintenance history, age, materials, or structural risk analysis should be used to help prioritize collection systems for CCTV inspection. The extent of the system that should be inspected by CCTV should be based on what supports the wastewater agency's performance objective and then more specifically what information about the system is progressively revealed by the execution of other, more cost-effective inspection techniques.

Each sewer reach or segment is assessed and ranked based on an adopted ranking or risk-based system. Utilizing the data from previous inspections, a projection can be developed to predict the percentage of the collection systems that will need different types of repair, rehabilitation, or replacement. This could be then translated into a financial implementation plan for collection system rehabilitation.

Resources

American Society of Civil Engineers (2009) *Manhole Inspection and Rehabilitation, ASCE Manual of Practice No. 92.*

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (2000) *Protocols for Identifying Sanitary Sewer Overflows (SSOs)*.

American Society of Civil Engineers (Under Cooperative Agreement with EPA, Project No. CP-828955-01-0) (2004) *Solutions for Sanitary Sewer Overflows*.

Paracher, M. (1998) *Wastewater Collection System Maintenance;* Technomic Publishing Co.: Lancaster, Pennsylvania.

U.S. EPA (2009) *Condition Assessment of Wastewater Collection Systems White Paper*, U.S. EPA Office of Research and Development: Cincinnati, Ohio.

Water Environment Federation; American Society of Civil Engineers (2009) *Existing Sewer Evaluation and Rehabilitation*, 3rd edition; Manual of Practice No. FD-6; ASCE Manuals and Reports on Engineering Practice No. 62; McGraw-Hill: New York.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Core Attribute 8:
System Hydraulic Capacity Assessment, Evaluation and Assurance

Description

Once the design capacity of the system conveyance components are established it is important to continuously assess, evaluate, and assure that the expected design capacity performance is met. Several tools and activities are available to support these practices, including computer models, flow monitors, and field investigation equipment and software. The mix and selection of these will be site specific. Operations and maintenance data also can provide valuable information about system capacity, especially where problems have been observed and reported. Proper application of the analysis activities and tools enables the wastewater agency to (1) characterize the capacity status of different segments of the system, (2) identify areas with capacity limitations, (3) predict areas with future capacity limitations, (4) undertake efforts to quantify and reduce inflow and infiltration (I/I) to manageable levels, (5) quantify capacity requirements, and (6) plan, design, and implement corrective or preemptive actions to maintain system design capacity and performance.

Benefits

An effective hydraulic capacity assessment, evaluation, and assurance program provides many benefits to a wastewater agency and the public:

- Enhance the protection of public health and the environment.
- Reduces backups and sewer overflows.
- Minimizes backup claims.
- Optimizes resources and reduces overall planning, engineering, and operation and maintenance costs.
- Supports sound wastewater system, land-use planning, and development practices.
- Minimizes potential for and exposure to enforcement actions and third-party litigation.
- Confirms available hydraulic capacity.
- Provides information required for management infiltration/inflow.

Elements

Flow Monitoring and I/I Assessment

Flow monitoring in conjunction with rainfall monitoring is an effective tool for quantifying the rainfall dependent inflow and infiltration and assessing the hydraulic performance of a portion of the system. A network of flow monitoring provides a more comprehensive assessment of the system. The design of the flow monitoring network will vary

according to the purpose of the monitoring effort. As part of the hydraulic assessment, quantifying the flow discharge from satellite system entering the system is essential to provide a holistic analysis of the system needs.

Computer Modeling

Computer models have evolved rapidly over the past three decades and are now a widely used tool for hydraulic analysis of collection systems and integration of results with wastewater treatment plants. Computer models enable system hydraulics to be simulated under a variety of conditions, including varying antecedent moisture conditions, existing conditions, and a variety of future scenarios that include expansion, changes, and improvements. System response and adequacy can be simulated for various inputs such as increases in infiltration/inflow (I/I) from intense precipitation or I/I reduction from system rehabilitation, or increasing dense service populations. Modeling is used in cost-effectiveness analysis to help determine the best mix of capacity restoration alternatives. However, the need and extent of modeling varies based on the specific needs of the system.

Field Investigation

Condition and capacity related field investigations of the collection system usually involve a progressive sequence of inspection technologies. Investigation techniques such as manhole, lamping, smoke and dye testing, sonar, and CCTV can help characterize system conditions that affect the hydraulic capacity of the system. Direct entry for larger conduits can provide useful information about system conditions. Operation and maintenance records that identify system performance problems (e.g., basement flooding complaints) can provide additional insights on system capacity, especially when evaluated in combination with flow monitoring data, characterized overflow points, and computer model simulations.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA, Project No. CP-828955-01-0) (2004) *Solutions for Sanitary Sewer Overflows*.

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (2000) *Protocols for Identifying Sanitary Sewer Overflows (SSOs)*.

Water Environment Federation (2006) *Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Collection and Treatment Systems*; Water Environment Federation: Alexandria, Virginia.

Water Environment Research Foundation (1999) *Reducing Peak Rainfall-Derived Inflow and Infiltration Flow Rates;* Water Environment Research Foundation: Alexandria, Virginia.

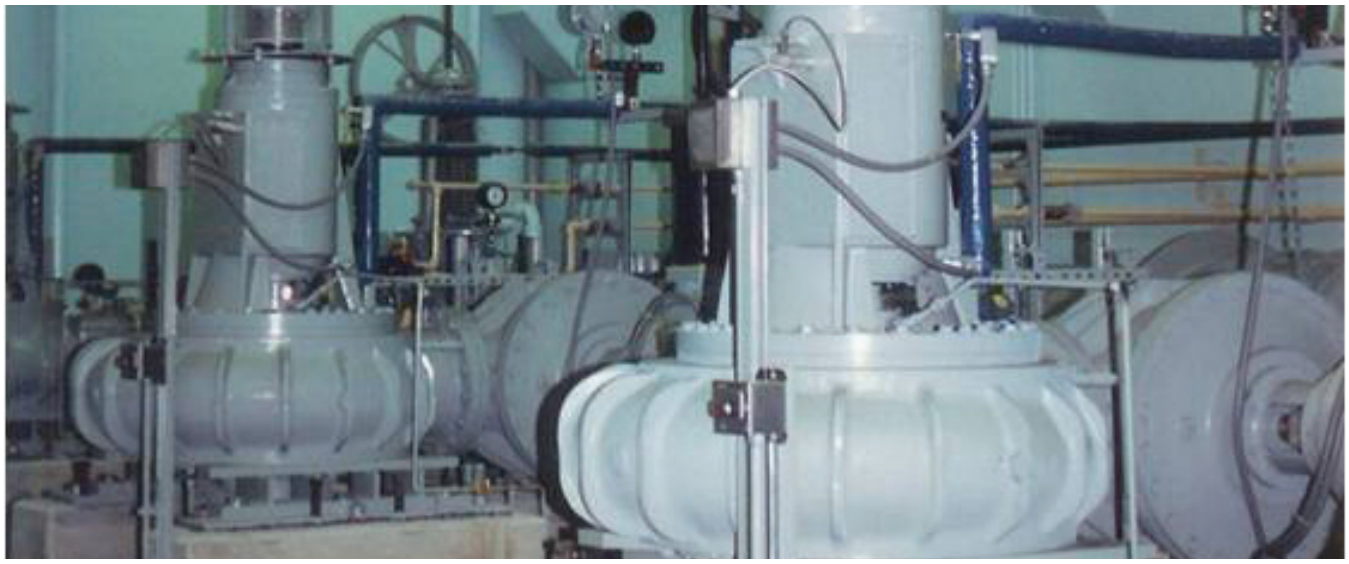
Water Environment Research Foundation (1999) *Using Flow Prediction Technologies to Control Sanitary Sewer Overflows;* Water Environment Research Foundation: Alexandria, Virginia.

Water Environment Research Foundation (2001) *An Examination of Innovative Methods Used in the Inspection of Wastewater Systems;* Water Environment Research Foundation: Alexandria, Virginia.

U.S. Environmental Protection Agency (2005) *Storm Water Management Model – User's Manual (Version 5.0)*, EPA/600/R-05/040; U.S. Environmental Protection Agency: Washington, D.C.

U.S. Environmental Protection Agency (2005) *Computer Tools for Sanitary Sewer System Capacity Analysis and Planning*, EPA/600/R-07/111; U.S. Environmental Protection Agency: Washington, D.C.

Yen, B.C. (2001) *Hydraulics of Sewer Systems in Stormwater Collection Systems Design Handbook;* Mays, L.M., ed.; McGraw-Hill: New York.



Core Attribute 9:
Standard Design, Construction, and Inspection

Description

Proper design, construction, and inspection is necessary to enable the collection system projects address the wastewater collection needs of the community, meets regulatory standards, and provides for efficient, reliable service at the best cost.

Standard design, construction, and inspection start with recognition of the need for new collection system facilities. Several important steps are required to make the initial concept a reality. *Planning* involves developing design criteria necessary to provide that the final facilities fulfill needs and expectations of the system. This requires understanding short- and long-term local needs for the system and regulations applying to the new facilities. *Design* brings the concepts identified in the planning process to paper and provides a set of documents (plans and specifications) that will be used to construct the facilities. Efficient design requires understanding the engineering and science involved in the technology and knowledge of current construction practices and materials. *Construction* builds the actual facilities that are planned and designed. *Inspection* helps resolve issues that arise during construction and confirms that the facilities are constructed as planned and designed.

Benefits

Effective collection system design, construction, and inspection provide many benefits to the wastewater agency and the public:

- Provides necessary wastewater collection systems to protect public health and the environment.
- Provides that local wastewater management service needs are addressed.
- Provides that regulatory requirements are met.
- Provides a system that minimizes infiltration and exfiltration of wastewater.
- Maximizes the use of public money by providing the best facilities at the least cost.
- Minimizes O&M requirements over the life of the facilities.
- Provides efficient service and maximum life.

Work Elements

Planning

The project typically begins with the identification of a need, which may be to provide new service, replace an existing system, or address a regulatory requirement. The planning step describes and records project needs, including

performance criteria, which are used to size facilities. For a new collection system project, a preliminary sizing and routing and cost estimate is drafted.

Design

The design must take into account issues of performance such as minimum and maximum flow rates, flow velocities, life-cycle costs, and maintenance issues. At this stage, the location and slope of the system is defined; rights-of-way and property needs are identified (and often purchased), and a cost estimate and construction bidding documents are prepared. Typically, the regulatory authority reviews and approves the design at this stage. Local construction permits are obtained and other necessary elements are completed so that the project can be set out for construction bidding.

Construction

The construction contractor typically is determined by competitive bidding, although other forms of selection such as emergency direct award or sole source are sometimes used. The project should be constructed as designed, using the materials and procedures specified. The owner and permitting authorities need to approve any significant changes, which should be documented. Testing of new pipe typically is required to show that it is watertight and meets project requirements.

Inspection

The wastewater agency owner provides inspection of construction to assure that the project is constructed as designed and specified. The inspection for a collection system project will verify that the pipe and appurtenances have been installed correctly for line and grade and with the proper materials. The inspector should perform or witness tests of installed pipe. It is a good idea to CCTV a new sewer to verify its condition and establish a baseline for subsequent inspections. Some wastewater agencies require tests of CIPP and manhole rehabilitations as well as new pipe construction.

Resources

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental (2004) *Recommended Standards for Wastewater Facilities, Ten States Standards,* 2004 ed.; Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers: Albany, New York.

Office of Water Programs, California State University – Sacramento (2003) *Operation and Maintenance of Wastewater Collection Systems*, 6th edition, Volume 1; Office of Water Programs, California State University: Sacramento, California.

Water Environment Federation; American Society of Civil Engineers (2007) *Gravity Sanitary Sewer Design and Construction*, 2nd edition; Manual of Practice No. FD-5; ASCE Manuals and Reports on Engineering Practice No. 60; Water Environment Federation: Alexandria, Virginia.

Core Attribute 10:
Communication and Outreach

Description

Communication and outreach with customers, constituents, and other stakeholders is critical to effectively managing a wastewater collection system. To be effective, communications must be ongoing, open, timely, and *two-way*, with reciprocal information sharing.

Key stakeholders for collection system operators include policymakers, customers, local residents and businesses, regulatory agencies, local health officials, environmental organizations, community and business groups, neighboring agencies and systems, and employees. Effective communications with each of these groups will require different techniques that are tailored to their specific interests and perspectives and the situation.

Effective communication and outreach goes well beyond the historic reactionary approach when facing crisis situations, service disruptions, spills, unflattering press coverage, legal challenges, or rate increases. Wastewater agencies should practice proactive, ongoing information sharing regarding system needs, challenges, and programs and opportunities for meaningful involvement planning, enhancements, and improvements.

Communication and outreach should be integral to planning efforts. Collection system managers should develop strategies for ongoing communication and outreach as part of their multiyear strategic plan. Efforts should be incorporated into crisis management documents and exercises, including clearly delineated protocols, procedures, and resources in the same manner that these are defined for critical operations.

Benefits

Effective communication and outreach provide many benefits to the wastewater agency and the public:

- Strengthens understanding, trust, and collaboration between system operators and stakeholders.
- Builds support in times of crisis and when funding and resources, through educated stakeholders.
- Improves participation when educated customers and community members leads efforts, for example, to reduce discharge of FOG into drains and other intrusions out of the system.

Elements

To be effective, communication and outreach must be ongoing, reaching key stakeholders on a regular basis. Following are some of the many elements of successful programs:

- Publications—fact sheets, brochures, booklets, flyers, door tags, bill stuffers, newsletters, work notices, and updates.
- Emergency phone lines to report spills or problems.
- Prompt information on operational problems and service disruptions affecting customers.
- Websites, podcasts, and videos.
- Displays, exhibits, posters, and banners.
- Facility tours.
- School curricula, visits, programs, and contests.
- Talks and presentations to city councils, civic groups, interest clubs, and community organizations.
- Collaboration and positive interactions with non-governmental organizations.
- Discussions with community leaders and members in planning new facilities, upgrading existing facilities, and rate changes.
- Speakers and community ambassadors.
- Information exchange workshops.
- Media presence—feature stories or appearances on radio and television or community cable programs and community cable announcements.
- Newspaper presence—feature stories, press releases, press events, and paid advertisements.

Resources

AWWA Research Foundation (2005) *Message Management: Effective Communications;* AWWA Research Foundation: Denver, Colorado.

AWWA Research Foundation (1995) *Public Involvement Strategies: A Manager's Handbook;* AWWA Research Foundation: Denver, Colorado.

Campbell, D. and Cherniak, M. (2005) *Manage for Success;* Office of Water Programs, California State University: Sacramento, California.

Water Environment Federation (2009) *Wastewater Collection System Management,* 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Core Attribute 11:
Monitoring, Measurement and Program Modifications

Description

As part of efficient management, managers should routinely track and evaluate system and program performance and make necessary modifications and adjustments.

Benefits

Routinely reviewing system performance and implementing necessary program adjustments or changes provides many benefits to the wastewater agency and the public:

- Optimizes resources.
- Enhances performance and achieves results.
- Validates effectiveness and needs.
- Reports progress.
- Engages staff and stakeholders while maintaining their support and trust.

Work Elements

Monitoring, Measurement and Modifications

The following is a summary of suggested activities for effective monitoring, measurement and program modifications.

- Identify performance measurements for data collection, analysis, and review.
- Maintain a data management and reporting system.
- Implement routine monitoring, measurement, and modification.
- Compare performance against locally specific performance targets and identify potential areas for improvement.
- Be aware of similar wastewater agency performance measures and targets.
- Compare performance on a routine basis to identify performance trends within a wastewater
- agency.
- Allocate resources to deficient areas.
- If the results of performance trends vary outside the wastewater agency's levels of acceptability develop how to address and document the improvement action.

Performance Measures

Performance measures should vary at different levels of the organization but support the level above it and the overall mission of the agency. Selected metrics will establish performance criteria for system components. These metrics will then be applied in the evaluation of individual staff members and organizational groups based upon specific work activities. The following are examples of commonly used, but not mandatory, performance measures for collection systems:

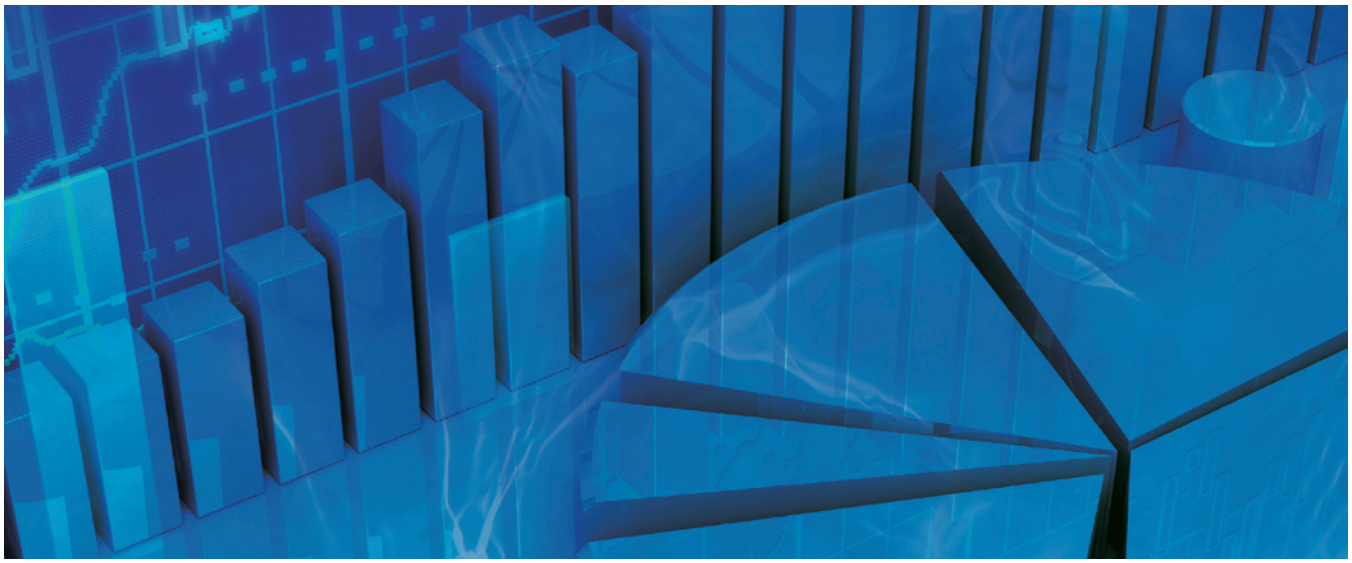
- Number of SSOs per 100 miles of mainline sewer.
- Number of backups per 100 miles of mainline sewer.
- Number of system failures per 100 miles of mainline sewer.
- Customer service calls.
- Odor complaints.
- Ratio of peak wet weather flow to peak dry weather flow.
- Rainfall derived infiltration and inflow (RDII) per acre.
- RDII per linear foot of pipe.
- RDII per inch of rain per linear foot of pipe.
- RDII per inch of rain per inch-diameter.
- Percentage of calls that are repeats.
- Percentage of problems cleared per month.
- Percentage of system cleaned annually.
- Percentage system televised annually.
- Percentage system inspected annually.
- Percentage system renewed annually.
- Percentage of corrective work orders.
- Percentage of preventative work orders.
- Collection systems maintenance cost per mile.
- Percentage of work orders completed per month.
- Fleet costs per total O&M (by function).
- Value of capital additions/net asset value.
- Overtime costs.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (1999) *Optimization of Collection System Maintenance Frequencies and System Performance.*

Arbour, R. and Kerri, K. (2009) *Collection Systems: Methods for Evaluating and Improving Performance,* 2nd edition; Office of Water Programs, California State University: Sacramento, California.

Water Environment Research Foundation (2003) *Effective Practices for Sanitary Sewer and Collection System Operations and Maintenance;* Water Environment Research Foundation: Alexandria, Virginia.



Core Attribute 12:
Adequate Funding

Description

Develop adequate revenue stream and effective accounting practices to support the effective management of the system.

Benefits

Having a sustainable and adequate revenue stream and effective accounting practices provides many benefits to the wastewater agency and the public:

- Separates the wastewater collection system funding from the vulnerable general fund.
- Protects the wastewater collection system activities from cuts in general funds.
- Provides reliable source of funds.
- Prevents transferring of funds and assets to other municipal needs.
- Reduces political influence in distribution of funds.
- Enhances performance and achieves results.

Elements

Rate Structure Characteristics

Rate structures should be designed to recover costs in a fair and equitable manner and should accommodate various community considerations and policy directions. A growing community needs to consider how it will fund expansion costs (will growth pay for growth, or will the cost be shared among all customers?). An established community without major capital improvements planned may use a pay-as-you-go philosophy to fund its capital improvements, while one that is making major capital improvements may use debt financing to smooth out rate impacts. A community trying to encourage conservation may have an increasing block rate structure. There is no "best" rate structure that will work for every community. Some issues to consider are:

- Fairness and equitability
- Debt financing policies
- Conservation goals
- Growth policy
- Simplicity

Revenue Requirements

The first step in designing a rate structure is to determine the revenue required to operate and maintain (including replacement) the wastewater system. Rate revenues can also be used to fund all or a portion of capital costs for expansion and process improvements. It is advisable to project revenue requirements for at least a few years to minimize fluctuations in rates.

Cost of Service

The next step is to allocate the costs to customer classes. Potential classes include:

- Residential
- Commercial
- Industrial
- Governmental
- Institutional

Costs are typically allocated based on flow and strength. Suspended solids and biochemical oxygen demand are two strength characteristics that are commonly used.

Rate Structure

The Federal Clean Water Act requires any agency that receives grant funding to adopt a system of charges to assure that each recipient of wastewater services pays its proportionate share of the costs of operating and maintaining the system. One of the most straightforward ways to do this is to base the charges on water consumption. This works particularly well if the same agency provides both water and wastewater services due to the availability of data. In cases where there are multiple water providers within a wastewater agency's service area, it may be too difficult to use water data as the basis for billing.

If this method is not feasible, flat rates can be employed. However, different rates must be developed based on user classes. Residential and commercial customers typically have different rates, and these classes may be further refined. Rates for residential customers may be set based on number of bedroom or bathrooms. Rates for commercial customers may be based on type and size of the business.

In flat rate structures, all costs are recovered through a fixed charge. Volumetric rate structures often contain a minimum component to recover fixed costs, such as meter reading, billing, and customer service, while recovering the remaining costs through the volumetric-based portion of the bill. The Federal Clean Water Act does allow reduced rates for low-income residential customers.

Some regional systems have developed and included rates to account for peak wet weather flows from satellite system above acceptable levels. These rates are included in the form of higher rates and/or penalties. In many cases, the added fees could be used by the satellite systems to reduce the peak wet weather flow to the acceptable levels.

Additional Funding Sources

In addition to user charges, revenues may be received from property or sales taxes or the general fund of a city or county. Any user fees not applied to the operating costs of the system may be used for capital improvements. Separate capital facilities charges may also be used to fund improvements required for new development. Grants and debt financing can also be used to fund capital improvements.

Resources

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (1999) *Optimization of Collection System Maintenance Frequencies and System Performance.*

Campbell, D. and Cherniak, M. (2005) *Manage for Success;* Office of Water Programs, California State University: Sacramento, California.

Water Environment Federation (2004) *Managing the Water and Wastewater Utility;* Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Appendix A – Additional Resources

American Society of Civil Engineers (2009) *Manhole Inspection and Rehabilitation, ASCE Manual of Practice No. 92.*

American Society of Civil Engineers (Under Cooperative Agreement with EPA) (1999) *Optimization of Collection System Maintenance Frequencies and System Performance.*

Arbour, R., and Kerri, K. (2009) *Collection Systems; Methods for Evaluating and Improving Performance*, 2nd edition; Office of Water Programs, California State University: Sacramento, California.

AWWA Research Foundation (2005) *Message Management: Effective Communications*; AWWA Research Foundation: Denver, Colorado.

AWWA Research Foundation (1995) *Public Involvement Strategies: A Manager's Handbook*; AWWA Research Foundation: Denver, Colorado.

California Collection System Collaborative Benchmarking Group (2004) *Best Practices for Sanitary Sewer Overflow Prevention and Response Plan*; California Collection System Collaborative Benchmarking Group: Oakland, California.

Campbell, D. and Cherniak, M. (2005) *Manage for Success*; Office of Water Programs, California State University: Sacramento, California.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental (2004) *Recommended Standards for Wastewater Facilities, Ten States Standards*, 2004 ed.; Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers: Albany, New York.

National Association of Clean Water Agencies (2004) *Continual Improvement in Utility Management: A Framework for Integration*; National Association of Clean Water Agencies: Washington, D.C.

National Association of Clean Water Agencies, Association of Metropolitan Water Agencies (2007) *Implementing Asset Management: A Practical Guide*; NACWA, AMWA: Washington, D.C.

Office of Waters Program, California State University - Sacramento (2003) *Operation and Maintenance of Wastewater Collection Systems,* 6th edition, Volumes 1; Office of Waters Program, California State University: Sacramento, California.

Office of Water Programs, California State University – Sacramento (2010) *Operation and Maintenance of Wastewater Collection Systems*, 7th edition, Volume 2; Office of Water Programs, California State University: Sacramento, California.

Paracher, M. (1998) *Wastewater Collection System Maintenance*; Technomic Publishing Co.: Lancaster, Pennsylvania.

U.S. Environmental Protection Agency (2005) *Computer Tools for Sanitary Sewer System Capacity Analysis and Planning*, EPA/600/R-07/111; U.S. Environmental Protection Agency: Washington, D.C.

U.S. Environmental Protection Agency (2009) *Condition Assessment of Wastewater Collection Systems White Paper*, U.S. EPA Office of Research and Development: Cincinnati, Ohio.

U.S. Environmental Protection Agency (2005) *Storm Water Management Model – User's Manual (Version 5.0)*, EPA/600/R-05/040; U.S. Environmental Protection Agency: Washington, D.C.

Water Environment Federation (2006) *Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Collection and Treatment Systems*; Water Environment Federation: Alexandria, Virginia.

Water Environment Federation (2004) *Managing the Water and Wastewater Utility;* Water Environment Federation: Alexandria: Virginia.

Water Environment Federation (2009) *Wastewater Collection System Management*, 6th edition, Manual of Practice No. 7; Water Environment Federation: Alexandria, Virginia.

Water Environment Federation; American Society of Civil Engineers (2009) *Existing Sewer Evaluation and Rehabilitation*, 3rd edition; Manual of Practice No. FD-6; ASCE Manuals and Reports on Engineering Practice No. 62; McGraw-Hill: New York.

Water Environment Federation; American Society of Civil Engineers (2007) *Gravity Sanitary Sewer Design and Construction*, 2nd edition; Manual of Practice No. FD-5; ASCE Manuals and Reports on Engineering Practice No. 60; Water Environment Federation: Alexandria, Virginia.

Water Environment Research Foundation (2001) *An Examination of Innovative Methods Used in the Inspection of Wastewater Systems;* WERF: Alexandria, Virginia.

Water Environment Research Foundation (1999) *Benchmarking Decision Criteria for Urban Wet Weather Abatement*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2002) *Best Practices for the Treatment of Wet Weather Wastewater Flows*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2007) *Case Studies: Methods for Cost-Effective Rehabilitation of Private Lateral Sewers*; WERF: Alexandria, Virginia

Water Environment Research Foundation (2001) *Controlling Pollution at Its Source: Wastewater and Stormwater Demonstration Projects*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2001) *Decentralized Stormwater Controls for Urban Retrofit and Combined Sewer Overflow Reduction*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2003) *Effective Practices for Sanitary Sewer and Collection System Operations and Maintenance;* WERF: Alexandria, Virginia.

Water Environment Research Foundation (2009) *Fats, Roots, Oils, and Grease in Centralized and Decentralized Systems*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2007) *Inspection Guidelines for Ferrous Force Mains*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2007) *Methods for Cost-Effective Private Lateral Rehabilitation*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (2007) *Minimization of Odors and Corrosion in Collection Systems, Phase I*; WERF: Alexandria, Virginia.

Water Environment Research Foundation (1999) *Reducing Peak Rainfall-Derived Inflow and Infiltration Flow Rates;* WERF: Alexandria, Virginia.

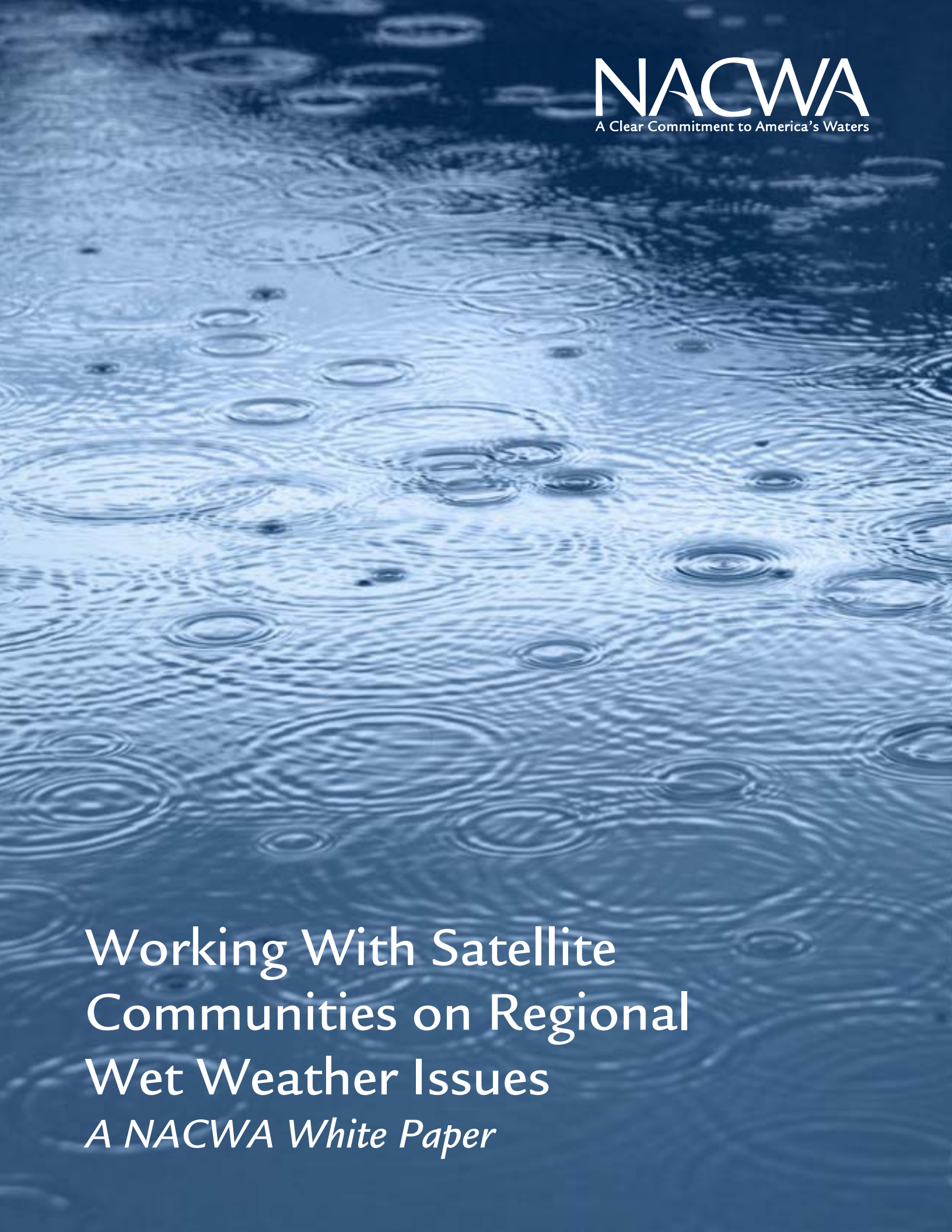
Water Environment Research Foundation (1999) *Using Flow Prediction Technologies to Control Sanitary Sewer Overflows;* WERF: Alexandria, Virginia.

Water Environment Research Foundation (2001) *Wet Weather Flow Assessment Protocols*; WERF: Alexandria, Virginia.

Yen, B.C. (2001) *Hydraulics of Sewer Systems in Stormwater Collection Systems Design Handbook*; Mays, L.M., ed.; McGraw-Hill: New York.

Appendix B – Acronyms

APWA	American Public Works Association
ASCE	American Society of Civil Engineers
CCTV	Closed Circuit Television
CIP	Capital Improvement
EPA	United States Environmental Protection Agency
FOG	Fats, Oils and Grease
GIS	Geographic Information System
I/I	Inflow/Infiltration
LOTC	Lock Out, Tag Out
MSDS	Material Safety Data Sheet
NACWA	National Association of Clean Water Agencies
PPE	Personal Protection Equipment
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Agency
RDII	Rainfall Dependent Inflow and Infiltation
RTK	Right to Know
SCADA	Supervisory Control and Data Acquisition
SSO	Sanitary Sewer Overflow
WEF	Water Environment Federation



NACWA
A Clear Commitment to America's Waters

Working With Satellite Communities on Regional Wet Weather Issues

A NACWA White Paper

Table of Contents

Acknowledgements

The *NACWA Satellite Issues Paper* was produced and published by the National Association of Clean Water Agencies (NACWA) under the direction of its Board of Directors, Executive Director Ken Kirk, and the Facility and Collection System Committee.

The paper was prepared for NACWA by Brown and Caldwell, Milwaukee, Wis. Special thanks are due to the very capable individuals who worked on the project, including Andy Lukas (Wet Weather Leader), John Salo, Richard Stahr, Tim Keegan, and Pervaiz Anwar.

Significant contributions to the case studies presented herein were made by the following agencies and staff members:

- Renewable Water Resources, S.C. (formerly Western Carolina Regional Sewer Authority): Ray Orvin, Executive Director;
- Hampton Roads Sanitation District, Va.: Ted Henefin, Executive Director;
- Milwaukee Metropolitan Sewerage District, Wis. : Debra Jensen, Planning Services Supervisor, and Kevin Shafer, Executive Director;
- Metropolitan Council Environmental Services, Minn.: Kyle Colvin, Engineering Planning Assistant Manager, and Bill Moore, General Manager; and,
- Orange County Sanitation District, Calif.: Nick Arhontes, Director of Operations, Maintenance, & Regional Services.

NACWA also extends its appreciation to the Association's Collection System Workgroup for their invaluable advice, detailed comments and dedication to this project. In particular, NACWA thanks

- Ben Horenstein, East Bay Municipal Utilities District, Calif.;
- Adel Hagekhalil, City of Los Angeles, Calif.;
- Martin Umberg, Metropolitan Sewer District of Greater Cincinnati, Ohio; and,
- Lisa Hollander, Northeast Ohio Regional Sewer District, Ohio.

Executive Summary

Over recent years, several drivers have emerged that create an environment for regional clean water agencies and their satellite communities to address wet weather flow management. Federal and state regulations on sanitary sewer overflows (SSOs) and wet weather flow management at wastewater treatment plants have been drafted and in some cases implemented. Chronic SSO problems have resulted in enforcement actions by the United States Environmental Protection Agency (EPA) and states, which in turn have led to administrative orders and consent decrees. Wastewater treatment plants that use wet weather flow operating schemes to "blend" wastewater effluent are also under significant regulatory pressure to discontinue this practice.

> The term 'satellite community' is used to describe a municipality or other government entity that owns and operates a collection system, but relies on a regional treatment authority or neighboring community to provide wastewater treatment services.

While a spectrum of approaches can be used to make regional progress in addressing wet weather issues, two overall strategies can be followed to achieve progress, but the two are quite different. Voluntary efforts, often collaborative between the regional clean water agency and its satellites can be productive in achieving progress. However, there are situations in which conditions cannot support a completely voluntary approach, and more direct involvement through required programs (including financial impacts), oversight, or even regulatory approaches may need to be taken by the regional agency. Each option is discussed further in this issue paper.

Regional collaboration on wet weather flow management often occurs due to the combination of responsibilities involved. Compliance problems at the permitted treatment plant and the regional wastewater system are the responsibility of the regional agency. However, a regional system will typically consist of only 10 percent of the publicly-owned pipe upstream of the permitted treatment plant, and five percent of all pipe in the system. Therefore, the regional agency can typically make limited progress in reducing wet weather flows by improving just its own system. In many cases, a significant amount of the stormwater and groundwater entering the sewer system, or infiltration and inflow (I/I), enters the collection system through defects on private property. Private property sewer systems usually fall under the jurisdiction of satellite system owners as the private property owners are customers of the satellite municipality and not the regional agency. Often, local elected officials see little benefit in addressing private system I/I or I/I from their municipal systems unless they themselves experience system performance problems. In order to address the wet weather problem, the I/I entering the system, all parties need to take action where they have responsibility. Several models exist for regional collaboration, and these are discussed in general and with specifics provided from five case studies:

- Renewable Water Resources (ReWa), S.C.;
- Hampton Roads Sanitation District (HRSD), Va.;
- Milwaukee Metropolitan Sewerage District (MMSD), Wis.;
- Metropolitan Council (MCES), Minn.; and,
- Orange County Sanitation District (OCSD), Calif.

The challenges with satellite municipality coordination are wide-ranging and include governance; institutional relationships; and political, financial, and legal factors. Many regional agencies have strained or non-existent relationships with their satellites, which exist due to differing political or management situations/systems. Often, standing agreements, statutes, and policies represent roadblocks for achieving progress. Financial conditions in the various agencies can also pose significant barriers to making collaborative progress. Under these situations, a more direct approach may be necessary to make the progress expected from the overseeing regulatory authorities. Such a direct approach may involve implementing new local regulations that impose enforceable limits for peak flow discharges with financial penalties for not complying. Several models exist for this approach that are discussed in general and in the case studies presented.

The purpose of this issue paper is to provide agencies with a platform for initiating a dialogue with satellites. By following the lead of the case study agencies, several paths may be available to any agency having an ultimate goal of making progress on regional wet weather flow issues.

Section 1 of the paper provides an overview of the issues, including the drivers for regional progress, the anticipated benefits, the constraints facing both regional authorities and satellite communities, and a range of considerations for engaging stakeholders on a regional basis.

Section 2 outlines several incentive-based strategies for achieving environmental progress and provides linkages to effective approaches for reducing peak flows regionally. Voluntary and a spectrum of mandatory approaches are considered.

Section 3 provides a brief introduction to the Case Studies that are included as an appendix. The information in the case studies will provide the most valuable information for the reader and Section 3 provides the highlights from each.

Background

This issue paper was initiated as a result of concerns expressed by a growing number of NACWA members that changing regulations and associated regulatory/legal pressures prompt a review of approaches on regional wet weather flow issues. Since over 80 percent of the respondents to a 2003 *NACWA Wet Weather Survey* indicated having satellite sewer systems, such a review would add value to the NACWA membership as a whole. It was observed by several members that there were likely a number of examples where progress had been made in addressing wet weather flow issues, and that a NACWA issue paper would be an appropriate medium to review these different models and success stories.

Section 1:
Overview of Wet Weather Issues

Regional wet weather issues are the result of a number of important factors including fractured system ownership and performance expectations for the sewer system as a whole. Regional wastewater agencies manage the wastewater discharged to their systems, but typically own less than five percent of the total pipe upstream of the wastewater treatment plant, with the balance typically evenly shared by local governments and private property owners. While historically regional agencies have had ordinances, discharge rules, or contracts with their satellites, often these vehicles either did not provide specifics about what amount of wet weather flow was allowable, or the regional agencies lacked the political strength to enforce these requirements to a meaningful degree. The situation such regional agencies now find themselves in is a changing regulatory and legal environment that requires compliance with the Clean Water Act (CWA), regardless of the cost. An additional concern is third party lawsuits by outside parties which can lead to uncertain outcomes and damage an agency's public image.

In general, wet weather flows are caused by infiltration and inflow (I/I) problems and can result in the following system issues:

- Water quality problems caused by SSOs;
- SSOs in violation of the CWA;
- Base and peak I/I that consume collection and treatment capacity;
- Growing pressures to reduce or eliminate the practice of blending at publicly owned treatment works (POTWs);
- Treatment plant violations during wet weather;
- Sewer service interruptions, water in basements (WIBs), sewer backups, etc.; and
- Exposure to third party lawsuits.

The term 'satellite community' is used to describe a municipality or other government entity that owns and operates a collection system, but relies on a regional treatment authority or neighboring community to provide wastewater treatment services.

These problems can be found anywhere in the United States, but tend to be found more widely in older systems with mean annual rainfall greater than 10 inches (non-arid areas). However,

inadequate sewer cleaning and other routine maintenance further reduces the carrying capacity of the system and exacerbates the effect of wet weather I/I regardless of how much rainfall is experienced.

1.1. Drivers for Regional Progress

There are several drivers causing regional wastewater agencies to seek solutions to wet weather issues. Real progress can only be made if satellite communities are involved. These drivers include:

- Federal consent orders or decrees,
- State consent orders, decrees, or stipulated agreements,
- Federal or state administrative orders,
- National Pollution Discharge Elimination System (NPDES) permits,
- Regional sewer system master plans that focus on capacity,
- Asset management programs,
- Third-party lawsuits, and
- Desire to end the cycle of building more conveyance and treatment capacity to manage increasing I/I resulting from system degradation.

A growing number of communities experiencing frequent SSOs have received some manner of enforcement by federal and state regulators. The financial impact of the associated penalties and fines can be substantial, ranging from hundreds of thousands to several million dollars. These are funds that could have otherwise been used for capacity enhancements, operation and maintenance improvements, or rate reductions.

Activities related to negotiation with the regulators will generate other costs that will further burden a utility. Such activities include:

- Document Requests,
- Negotiation Meetings,
- Inspections and Technical Meetings,
- Litigation preparation if negotiation fails,
- Outside legal counsel, and
- Stipulated penalties for failure to abate overflows by an established date

Regional agencies bear the burden of these costs and enforcement actions, though much of the root cause of the underlying problem comes from parts of the system beyond the regional agency's control.

1.2. Benefits of Regional Progress

Taking steps to address wet weather issues will demonstrate that the regional utility is aware of the problems that wet weather flows cause in its system, has made plans to address this flow, has implemented programs to reduce it, and is monitoring the effects of its activities. There are several benefits to initiating the path toward progress before it is dictated by some other entity:

- Demonstrating progress in the event that regulatory or legal actions are initiated,
- Focusing activities on those that have the most impact, and
- Fostering an environment of cooperation that could lead to collaboration on other regional environmental issues.

Making proactive regional progress on wet weather issues will provide a better platform for negotiating federal and state orders, with the potential to reduce the likelihood and impact of third party lawsuits. Many negotiated consent orders require implementing programs that are already in place. A regional agency may have requested that these programs be included in order to preserve them into the future and demonstrate value relative to the goals of the consent order. In other cases, where the recipient had made no meaningful progress on the issue, the consent orders include very broad language.

Significant sums of money can be wasted on activities that may have no net effect on a regional wet weather flow problem. Proactive agencies, having started long before any regulatory or legal action, learned the causes and effects of wet weather flows on their systems and determined the most beneficial improvements. A specific example under negotiation in northern Minnesota consists of a regional agency that is now negotiating a consent order with EPA. Long before the agency started negotiations, it had completed a regional master plan that included a thorough evaluation of wet weather flows and identified system improvements to achieve a state approved control standard. As a result, the agency was able to provide documentation and evidence that specific overflow control facilities and I/I reduction activities were making demonstrated progress on specific problem areas, allowing local preferences, not regulations, drive its capacity planning.

When progress in wet weather flow management is approached in a collaborative manner over a longer period of time, the results can be used as a springboard to addressing other regional environmental issues. A case study from Milwaukee, Wisconsin, presented in this issue paper details how regional progress on SSO reduction has led to regional collaboration on flood control. The technical and political vehicles used to share information and obtain consent between the various parties on SSO reduction were used to implement regional storrmwater discharge regulations for new development and redevelopment in the Milwaukee Metropolitan Sewerage District (MMSD) service area. Additional areas MMSD is considering for a regional approach includes sewer cleaning residuals disposal and manure management.

1.3. Constraints Facing Satellites

There are constraints for satellite communities' potential participation in regional programs. These include:

- Political support for changing wet weather management policies,
- Legal constraints for addressing private system I/I sources,
- Financial capability to address I/I issues and a lack of financial incentive to do so,
- Staff capabilities to implement wet weather flow investigations and mitigation plans, and
- Public relations with customers to explain the need to initiate I/I reduction programs on private property.

The extent to which the regional agency can support directly or indirectly the activities of the satellites with the greatest needs will likely determine how quickly progress can be made. Many times it is those satellites that have the farthest to go with the above issues that represent the majority of the problems in a service area. Strategies to make progress, therefore, require a thorough understanding of these conditions.

1.4. Constraints Facing Regional Authorities

Constraints facing regional agencies include legal, governance and financial. Legal issues can include statutory limits for setting rules or ordinances, how fees are collected, how funds are expended, and how private property sewer issues are addressed. Contract terms and conditions between the regional agency and a satellite can also inhibit a regional agency's efforts to change policy concerning wet weather flows. Standing court orders and judgments can also limit how regional agencies interact with their satellites on certain issues.

Governance structures also affect how a region may be able to change policy regarding wet weather flows. A wide variety of governance structures exist for regional agencies, from directly elected board members to appointments by other elected officials. The case studies presented in this paper include specifics for each governance structure in place.

Financial constraints are another consideration for regional agencies. In particular, the affordability of wet weather programs (combined sewer overflow [CSO], SSO, and plant compliance) must be balanced with regulatory expectations. While EPA has guidance for affordability analysis of CSO programs, none exist for other wet weather programs. This situation has affected the finalization of a number of regional wet weather plans, since there are limited funds to apply to all of these needs.

1.5. Range of Regulatory Considerations

Regulatory considerations can range from a condition of "no involvement" to one in which the regulatory agency takes a very firm hand in the activities of a regional agency.

For satellites, there has typically been very little regulatory involvement in the past. In October 2007, the EPA Assistant Administrator for Water testified before the US House Subcommittee on Water Resources and Environment, using a 2005 draft NPDES permit fact sheet as an example of EPA's attention to the performance of satellite sewer systems. The draft fact sheet consisted of

model NPDES permit conditions, including the following argument for addressing compliance issues in satellite sewer systems:

> *Under 40 CFR 122.1(b)(1) the NPDES program requires permits for the discharge of pollutants from any point source into waters of the United States. Under 40 CFR 122.21(a)(1) the NPDES regulations provide that any person who discharges or proposes to discharge pollutants and who does not have an effective permit, must submit a complete application to the NPDES authority. Where there is a potential for an overflow from a collection system that discharges to waters of the United States, NPDES authorities would issue a NPDES permit to the owner or operator of the municipal satellite collection system consistent with the CWA. NPDES permits issued for municipal satellite collection systems should include the same requirements, as applicable, as a permit issued to any other publicly owned treatment works with a municipal sanitary sewer collection system, e.g. capacity, management, operation and maintenance (CMOM), reporting, third party notification and record-keeping. Any discharge from a municipal satellite collection system without a permit would be a violation of the CWA and would be subject to potential enforcement.*

This direct NPDES permitting of satellites, however, has not been widely used. Instead, permitting authorities continue to look to regional agencies to address the larger problem. One consideration for a regional agency is to involve the appropriate NPDES permitting authority in applying pressure on satellites to address I/I through a CMOM program. This could be done as an extension of the regional NPDES permit, with an individual NPDES permit to the satellite, or with a general permit such as exists in California through the Waste Discharge Rule.

In 2003, the State of Wisconsin issued individual discharge permits to four satellite municipalities of the MMSD. These satellites had SSOs from their own collection systems and also contributed peak wet weather flows to the MMSD system. Eventually, these satellites along with all of the other 29 MMSD satellites signed a "Stipulation Agreement" with the State of Wisconsin requiring, among other activities, implementing CMOM programs and I/I reduction.

1.6. Range of Legal Issues

Legal issues related to regional wet weather management can involve state law, local agreements, and private property rights. Typically, state statutes establish the purpose and scope for the formation of regional sewer authorities and at times can limit the ability of those regional authorities for making new rules and imposing new charges. The Renewable Water Resources case study provides an example of how such state limitations can be overcome.

Local agreements between the regional authority and its satellites can also impact the ability to implement new measures that would curb satellite peak wet weather flows. For example, in 2005, King County, Washington, completed a series of reports on regional I/I conditions. The analysis indicated that a peak flow threshold on satellites would be beneficial to the regional system; however, contracts dating to 1961 that formed the regional wastewater entity would exempt sewers pre-dating those agreements from fees for excessive I/I. The County is aware that these older sewers are more likely to be significant contributors of I/I to the regional system and is therefore continuing to work out how a regional I/I program can involve these sewers. The County and

local agencies found that implementing a surcharge would be costly to administer and would pose difficulties in verifying violations. The County is proceeding with large scale I/I reduction demonstration projects, and based on the results of those projects the County will develop recommendations regarding changes to local agency agreements and/or the King County Code.

The following example from Minnesota illustrates how multiple levels of legal issues can be overcome to address a local wet weather flow issue.

Legal Issues Case Study

In 1995, the City of Duluth determined a path to address its I/I issues that was focused on private property sources. Implementing the program started with a demonstration project that required authority to spend public funds on private property from the Minnesota Legislature. At that time, Minnesota statues prohibited (as do most state statues) the spending of public funds on private property. The City of Duluth was informed that a City request of state funding would have a very difficult chance of approval. However, if the request was only spending public funds on private property and would not include state funding, it would have a good chance of approval.

The City requested the State Legislature to pass legislation allowing the City to use sewer utility (public) funds to perform work on private property to remove I/I from the sanitary sewer system. The Legislature approved the request on a one time basis for the City to spend up to $400,000 on private property to perform a demonstration program. The stipulation was that no State funding was to be requested for this project.

The long term program would require the City Council to increase sewer rates another 14.9%, and the City would have to get approval from the State Legislature to continue spending public funds on private property to remove I/I from sanitary sewers. The City Council unanimously approved the long term plan, including the rate increase. At that point the plan was presented to the regional sewer authority -Western Lake Superior Sanitary District (WLSSD) - for approval, and the WLSSD Board also unanimously approved the long term plan.

Finally, the State Legislature had to be approached again. This time, the City was requesting permanent permission to use public funds for private property corrective work to remove I/I. The State Legislature reviewed the results of the Demonstration Program and determined that I/I was a state-wide issue. Based on the City of Duluth program, the state adopted legislation that would allow any municipality in the state of Minnesota the authority to use public funds for I/I remediation on private property. This legislation is Chapter 471 Section 471.342 in the State of Minnesota Statutes. The legislation allowed communities to establish a program that would provide loans and grants to property owners to assist in financing the cost of abating I/I on their property.

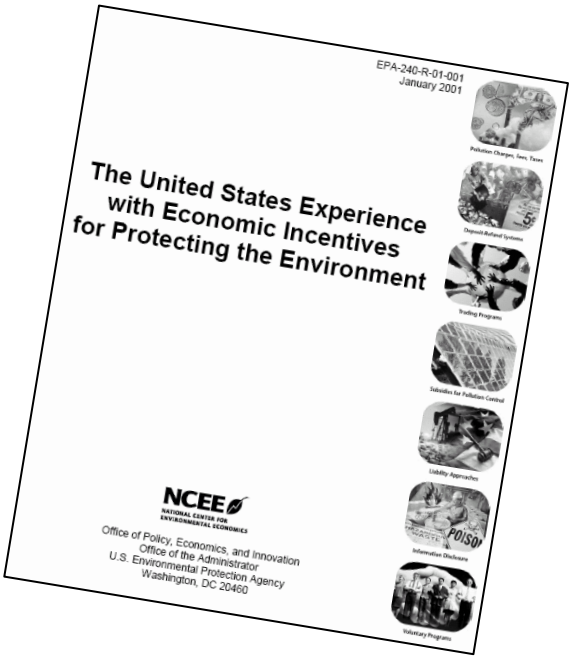
Section 2:
Strategies for Making Progress on Regional Wet Weather Issues

Regional wastewater agencies facing the challenge of making progress on wet weather issues have several options. One option is to establish programs that satellites are required to participate in. Another is to follow a path where satellites take steps in a voluntary manner with guidance from the regional agency.

2.1. Required Programs for Wet Weather Flow Reduction

Conceptually, peak flow reduction programs, if properly established and made mandatory for all members of a regional system, can successfully achieve a system's peak flow goals. Few specific models exist in the wastewater industry; however, case studies of Metropolitan Council Environmental Services (MCES), ReWa, and MMSD represent programs that are under way or under development (see case study discussion). Such programs hold great promise as they rely on significant financial incentives for complying with strict peak flow discharge limits for satellite municipalities.

Despite the fact that there are few working examples of peak flow reduction incentive programs, there are guiding principles available for incentive frameworks from other applications. In particular, the EPA document *Evaluation on Economic Incentives for Protecting the Environment (Incentives)* presented a study on the application of financial incentives in regulatory settings to achieve pollution reduction. This study found that in many cases, incentives were more successful than imposing regulations. In particular, market forces contributed heavily to the effectiveness of these programs. Although traditional "market forces" may not exist for peak flow reduction, other forces will apply and can ensure success. These other forces could include sewer extension or connection moratoria, installation of flow restrictions, or a satellite-specific consent decree or discharge permit.



The specific types of financial incentives described by EPA *Incentives* document were:

- Fees, charges, and taxes,
- Deposit-refund systems,
- Marketable permits (Cap/Trade/Credit),
- Subsidies,
- Risk-based user charge,

- Information disclosure, and
- Voluntary actions.

The *Incentives* document presented each type generically, usually in terms of air or water pollution emissions, but also provided specific examples of where they were applied successfully. This provides insight into how each could be applied to a peak flow reduction program in a regional sewer system. A discussion of each is presented in the following section.

2.1.1. Peak Flow Reduction Incentives: Fees, Charges, and Taxes

Within the EPA *Incentives* document, these three terms (fees, charges, and taxes) are largely interchangeable in terms of effect with respect to establishing a penalty system for exceeding a threshold of acceptable performance. Within such a system, the fee rate should be set at either an amount equal to the amount of incremental impact, or sufficient to force change in behavior. Many wastewater systems utilize "flow-based" user charge systems, in which a regional agency bills its satellites for the flow received and treated. In nearly every case, however, the charge is on the volume of flow, typically annually or monthly, and does not consider the short-term peak flows that occur during significant wet weather events. A properly imposed fee/charge/tax system could provide disincentives for flow rates above the standard or incentives for discharging well below.

The disadvantage of this approach is that fees do not guarantee reductions in peak flow, as the satellite could merely pay to keep their flows above the acceptable level. As such, any fee units for exceedence of a peak flow standard should be based on a rate related to cost to keep I/I in the system (i.e., incremental damage). This requires knowing the cost of not keeping wet weather flows within the established limits, which would typically be determined in a system wide wet weather plan. Alternatively the regional agency would need to know what charge rate would cause a change in behavior (i.e., spending on effective I/I reduction). The MCES performed such an evaluation in determining its excess peak flow charge at $350,000 per 1 million gallon per day (mgd) of instantaneous peak flow above each satellites peak flow limit.

2.1.2. Peak Flow Reduction Incentives: Deposit-Refund System

A Deposit-Refund system requires payment up front by a user in which the payment is related to potential pollution "usage." The user redeems refunds out of this initial payment, based on actual spending and actual measured results. If the ultimate goal in terms of pollution reduction is achieved, the entire deposit is refunded.

To apply this approach to wet weather control, the regional agency would first determine the amount of allowable peak flow in the system, and then base the up-front deposit required of any areas in excess of the wet weather flow limits. Under this concept, the deposit is based on either a) the cost of keeping I/I in the system, or b) the unit cost needed to cause change in behavior.

After peak flow reduction work is completed, refunds would be linked to documented flow reduction results and actual spending to reduce peak flows. If the entire peak flow reduction goal for a defined area is achieved, then the entire deposit would be refunded.

Some regional agencies have adopted I/I reduction bank programs, or I/I off-set programs, that essentially function in a deposit-refund system format. Such programs typically consist of tracking I/I reduction activities using an assumption of I/I reduction effectiveness in terms of recovered system capacity (e.g., 2 gallons per minute per rehabilitated manhole). As credits made into the I/I offset bank, they may be withdrawn to offset new connections to the system. Typically there is a mitigation ratio applied, such that the estimated amount of new connection flow is only a fraction of the amount withdrawn from the offset bank. These programs have been established and are being administered in several communities served by the Massachusetts Water Resources Authority (MWRA).

2.1.3. Peak Flow Reduction Incentives: Marketable Permits

The EPA *Incentives* document explains Marketable Permits, also known as Cap and Trade/Credit Programs, as tools used largely in air emissions regulation situations. Such a system requires setting hard limits within defined geographic areas. Each emitter is issued a permit to emit a maximum quantity of pollution. Those emitters that exceed their permitted limit are required to reduce their pollution. If emission reductions over-achieve (intentionally or not), then excess reductions are available as credits or futures. These can then be sold or traded to other emitters. Emitters that wish to expand emissions without reducing their existing discharges can purchase credits from others.

When applying marketable permits to peak flows in a regional sewer system, each "discharger" would be a defined contributing area to the regional system which could be reliably flow-monitored. After establishing the peak flow limits for the system, reductions could occur within nearly any area that was deemed to have a marketable flow reduction potential. Reductions achieved beyond a served area's limit could be sold to buyers, represented by a) those needing to reduce I/I today, or b) those that want to purchase futures to offset future I/I expected due to system deterioration. In both cases, buyers will be those looking for a good deal relative to what they would otherwise spend for I/I reduction. In such a system, the regional wastewater agency would want to manage any trades such that the regional benefit of a trade is not diminished (e.g., flow reduction in a portion of the system which has sufficient capacity traded to a portion of the system with insufficient capacity).

2.1.4. Peak Flow Reduction Incentives: Subsidies

According to the EPA *Incentives* document, subsidies are structured to offset the cost of achieving the emission reduction, thus promoting action by the emitter. Typical peak flow reduction activities will involve spending money on flow monitoring, flow modeling, field investigations, design, bidding, and construction. Some peak flow reduction projects will need to be substantial, possibly making them a larger burden on economically disadvantaged communities within a regional service area. A subsidy program would make peak flow reduction projects more financially feasible in such situations.

Subsidies for peak flow reduction can take several forms, including:

- Grants,
- Low-interest loans,
- Technical support, or
- Procurement support.

Subsidy strategies could target phases of the work (e.g., design) or elements of the system (e.g., private I/I source reduction). Options could include having the regional agency provide bonding for the work and allowing the community to pay back the cost over time as part of their regional sewer rates. As described in the MCES case study regarding the original I/I reduction program, if I/I reduction is confirmed with monitoring and modeling, the loan could convert to a grant. The Orange County Sanitation District (OCSD) case study also highlights a program for subsidizing I/I reduction work in satellites in which a system benefit was calculated.

The MWRA I/I Local Financial Assistance Program is another excellent example of flow reduction subsidies. Currently in its sixth phase, the program has reimbursed or committed to funding over $220 million of projects in MWRA's satellite municipalities through 2015. The program will reimburse costs for planning, designing, and constructing a variety of I/I reduction programs, including those that would reduce storm-related peaks and groundwater infiltration.

2.1.5. Peak Flow Reduction Incentives: Liability or "Risk-Based" User Charges

The financial damages for liabilities due to health and environmental impacts can be very large and unpredictable. This situation can be a very strong incentive for avoiding the risk of liability. Under this scenario, the polluter would tend to invest in technologies that would reduce the risk of liability. This approach differs from other user charge systems as the rate is set based on potential risk of future costs.

This concept is very applicable to a regional wastewater system, in that typically, the regional agency is the NPDES permit holder and is at risk of being sued for SSOs from its system. This occurs even though the majority of peak flows enter the system within private or satellite municipal system defects. Often times, legal settlements to those lawsuits routinely result in paying fines, performing costly supplemental environmental projects, and capital spending on new regional peak flow management facilities.

Since I/I from satellite municipalities contributes to those SSOs, a Risk-Based User Charge could be based upon anticipated financial liability to communities that exceed their peak flow allocation. As a result, communities would reduce I/I in order to minimize their cost exposure due to potential lawsuit resulting from SSOs.

2.1.6. Peak Flow Reduction Incentives: Information Disclosure

The EPA *Incentives* document provides ten types of approaches that have been used by federal and state agencies to regulate industry and municipalities with information disclosure. These include

such programs as the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Drinking Water Consumer Confidence Reports. In each, the requirement to make certain performance data available to the general public is an incentive for improvement.

Under this approach, each emitter is required to publish data on their emissions. Public pressure on the emitter to be "green" and "sustainable" provides the incentive to reduce emissions. Economic incentives do exist, but they are indirect and inferred from the market value of being a responsible member of the regional system.
Implementing such an approach for wet weather flow management would require the regional agency to produce a public document on peak flow discharges, specific to the status of each satellite. The publication would need to cite the cost of managing each satellite's peak flows in the regional system. The document would make the case that I/I control/management is a very "sustainable" approach to managing wastewater. Public pressure around "sustainability" in each satellite could create the incentive to reduce or avoid increases in I/I from public and private sources. This option would seem to be the least likely to succeed in reducing flow given the low visibility of I/I issues in many communities.

2.2. Voluntary Programs for Reducing Peak Wet Weather Flows

EPA's *Incentives* document also provides examples of Voluntary Programs for improving the environment that have revealed cost savings to emitters, usually related to better managing process byproducts. Voluntary Programs also may identify indirect economic incentives, based on tangible benefits derived from improved public relations.

For many regional wastewater systems today, voluntary Programs are the status quo position. In general, voluntary approaches provide no clear or direct economic advantages to satellite municipalities for reducing their peak wet weather flows unless a particular system is also experiencing SSOs.

In concept, the voluntary programs involve educating satellites on the potential cost savings available to them for reducing peak flows, how to determine their own economic incentives to change current behavior, and how reducing peak flows can provide overall system benefits and reduced costs to all rate payers.

For peak flow reduction, appropriate educational themes could include:

- I /I reduction recovers existing conveyance and treatment capacity;
- Good system preventive maintenance includes I/I management; and
- Cost-effective peak flow reduction results in lower overall cost of ownership, particularly in systems with significant pumping requirements

As further incentive, participation in voluntary programs may qualify a satellite system for technical assistance with their I/I reduction programs, legal assistance with obtaining private property access to perform repairs, other related programs managed by the regional sewerage agency.

Voluntary programs are anticipated to take significantly longer to achieve peak flow reduction goals unless there are other potential legal hammers at the disposal of the regional agency, such as sewer moratoria. Case studies from MMSD and OCSD each provide specific examples of methods for making regional progress using voluntary programs.

Section 3:
Introduction to Case Studies

This section provides a brief introduction to the case studies presented in this paper's appendix. Please see the appendix write-up for further details on each case study.

- Renewable Water Resources (South Carolina) – To minimize major capital improvements at a regional treatment plant, ReWa negotiates agreements with satellites requiring reduced peak flows to specific standards within 15 years.
- Hampton Roads Sewer District (Virginia) – Regional cooperation to negotiate and implement a state consent order for development of a regional wet weather control plan.
- Milwaukee Metropolitan Sewerage District (Wisconsin) – Long-term regional collaboration on facility planning, CMOM, and system operations overcomes significant wet weather control issues in local and regional systems.
- Metropolitan Council (Minnesota) – An innovative financial surcharge program is installed to motivate peak wet weather flow reduction in satellite systems, reducing the need for expanded regional facilities.
- Orange County Sanitation District (California) – Cooperation during negotiating a new state permit regarding SSOs leads to marked improvement in system performance and information exchange.

Each of the cited case studies has a local setting in which a significant regional wet weather flow situation needed attention. In all cases, the regional agency recognized the importance of involving its satellite municipalities in making progress. Common approaches among these case studies were:

- Studying and quantifying the regional wet weather flow problem;
- Evaluating regionally-beneficial regulatory compliance strategies;
- Engaging with satellite municipality political leadership through education and problem solving;
- Providing technical assistance to satellites in order to make early and sustained gains;
- Fostering an environment of collaboration and support through satellite decision-making processes; and
- When necessary, regional agency implementation of specifically required programs in order to meet performance objectives for the system during wet weather.

Conclusions

An increasing number of regional wastewater systems are at risk of enforcement or lawsuit because of inadequately controlled satellite system wet weather discharges. Effective strategies for proactively addressing this situation will help regional agencies and satellites alike.

This paper presents the drivers for using regional cooperation to respond to this trend of enforcement and lawsuit. Some proven approaches to achieve regional progress on wet weather issues are presented in the detailed case studies. These approaches include some old models that rely on collaboration and voluntary actions by satellites. By contrast, several new models look at regional wet weather capacity as a "limited resource." Consequently, wet weather flows are a demand on that capacity which must be managed, sometimes with financial incentives or penalties. Depending upon the level of existing cooperation being utilized in a specific regional system, one of these models may be more suitable than another.

As the issues surrounding regional-satellite efforts to reduce wet weather flow will continue to evolve, this paper provides an initial review of several effective approaches that will not doubt be expanded upon and added to as more regional agencies work to address the problem.

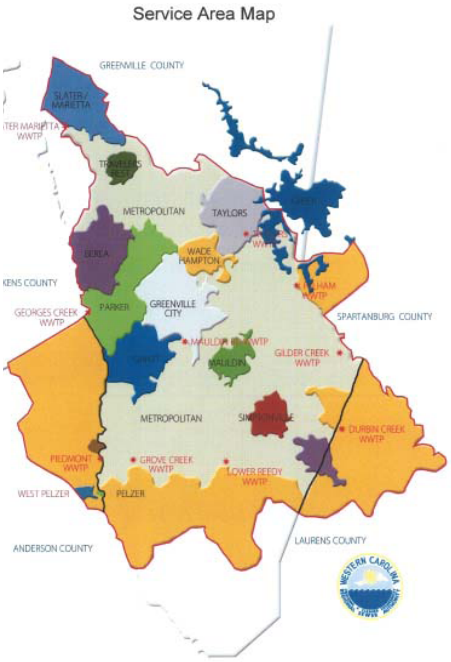
APPENDIX: Utility Case Studies

Case Study #1
Renewable Water Resources (ReWa), S.C.
*ReWa Responds to Wet Weather Capacity Challenges with Upstream Solutions Involving Satellite Flow Reductions**

Renewable Water Resources (ReWa), formerly the Western Carolina Regional Sewer Authority (WCRSA) was founded in 1925 and is a special purpose district of the State of South Carolina. ReWa provides wastewater treatment services to a population over 450,000 in Greenville County and parts of Anderson, Spartanburg, Pickens, and Laurens Counties of South Carolina, in a safe, cost-effective, and environmentally sound manner.

ReWa Case Study Profile:

- Service Area: 296 square miles in 5 counties and 17 satellite entities
- Population Served: 450,000
- Governing Body: Special purpose district
- Collection System: More than 290 miles of trunk sewer (regional system only), with 1,750 miles of satellite sewers
- Pump Stations: 63
- Metering Stations: 118 for measuring I/I
- Treatment Plants: 10
- Combined Design Capacity: >99 million gallons per average day or 250 mgd peak



In 1988, ReWa developed a long range plan consisting of three key initiatives.

- Consolidation of thirty-seven wastewater treatment plants into seven regional treatment facilities,
- Increase trunk line design capacities and monitor flow levels to insure adequate capacity for economic and residential growth, and

* Significant contributions to this case study were made by Ray Orvin, Executive Director, of Renewable Water Resources

- Encourage agencies contributing wastewater to ReWa trunk lines and treatment facilities to thoroughly evaluate their collection systems and reduce infiltration and inflow ("I/I") to acceptable levels.

To stimulate regional planning efforts and to accomplish long range plan initiatives, ReWa formed the Upstate Roundtable Wastewater Infrastructure Committee, a study group of fifty business, community, and neighborhood leaders. Included in the Upstate Roundtable's report were recommendations concerning long range planning and system capacity. A part of the Roundtable report was an evaluation of excessive wet weather flows to its wastewater treatment plants and the impact this increased flow would have on ReWa's operations. The study group concluded that this increased flow would decrease available treatment capacity and should be solved by community-wide solutions such as intergovernmental agreements addressing I/I problems.

Efforts to Reduce the Impact of Wet Weather Flows on Regional Facilities

ReWa has seen adverse wet weather impacts on its regional conveyance and treatment facilities in recent years. At certain plants, peak flows during wet weather can be more than six times average daily flows. These wet weather peak flows may cause trunk sewer surcharges which leave the potential for overflows from the ReWa system. The concerns over wet weather flows came to a head with the required expansion of the Mauldin Road wastewater treatment plant, ReWa's largest. On the table was an expansion from 29 MGD to 70 MGD in order to convey these wet weather flows without process bypasses. As this expansion would have required on the order of $100 million in capital expense, the ReWa Board initiated a process to address I/I from its satellites.

By a resolution adopted on May 5, 2008, the ReWa Board amended its regional Sewer Use Ordinance with the following requirement to Section 4.1, Prohibited Discharges:

> *(15) Wastewater which includes excessive infiltration and inflow, shall be defined as a flow which exceeds the applicable Babbitt Equation for the pipe in question during a 10 year rain event. For purposes of this regulation, excessive wet weather flows for any 3 consecutive rain events above 1" shall be considered non-compliant. In the case of a conflict between this provision and any separate Agreement between WCRSA and a User regarding I/I, the terms of the Agreement shall be controlling.*
> *(The Babbitt Equation is $PF=5/P^{0.1667}$, PF=allowable peaking factor, P= residential population in thousands.)*

In its resolution, the Board indicated such a rule change would establish a uniform standard against which adequate progress on individual I/I reduction work plans could be measured.

Over a period of 4 years (from 2004 through 2007), ReWa sent a total of 586 notification letters of excessive I/I to its satellites. Recently, ReWa initiated an extensive flow monitoring program, placing 118 flow meters into service to document the extent of I/I from its satellites. In studying the situation, ReWa determined that I/I from local industry contributed less than 2% of the region's wet weather flow.

Through this wet weather experience and resulting analysis, ReWa identified a number of impacts that excessive wet weather can have on local development:

- Limits areas where growth can occur;
- Increases costs for wastewater conveyance and treatment;
- Lowers property values, particularly in areas experiencing lower levels of sewer service due to high I/I;
- Makes retaining industry difficult; and
- Makes attracting new industry more difficult.

Cooperative Agreements Between ReWa and Satellites

ReWa is negotiating Cooperative Agreements with each of its 17 satellite entities. The agreements already negotiated have several mandatory objectives that apply to all satellites:

- Provide a work plan that outlines the satellite's 15-year Sewer Maintenance and Rehabilitation Program,
- Provide a dedicated annual revenue stream to fund the program,
- Show individual progress and improvements to satellite's sewer system, and
- Reduce the amount of excessive rain and runoff water entering the satellite system

Apart from the four mandatory elements the cooperative agreements allow for an individual, satellite-specific approach to the other issues included. Once the agreement is negotiated, ReWa has committed to supporting the implementing party through the following activities:

- Treatment/Pre-Treatment Support: ReWa provides their treatment plants as a disposal sites for satellites that vacuum out solids during their sewer cleaning activities. Pretreatment support includes the Grease Control Program, investigating specific grease issues, providing public education brochures, ensuring industrial dischargers obtain approval from satellites for increasing discharges, and providing flow information about specific industrial users.
- Engineering: ReWa provides a variety of support to its satellites, including technical engineering advice, a Cooperative Computerized Mapping Program, basin flow monitoring data, piggy backing onto ReWa supply and service contracts, and working to improve the County Planning Procedure.
- Collection System: Staff of ReWa provides technical advice on unusual sewer maintenance problems and assistance with short term emergency maintenance work. ReWa also provides specialty heavy equipment and crews under these challenging work conditions. Finally, ReWa works with satellites on chemical destruction of tree roots growing in local sewers.

After ReWa approval of a plan, the satellite would be required to submit annual status reports on the implementation. The 15-year I/I reduction plans, required under the agreements, include several mandatory elements:

- Initial sanitary sewer evaluation survey (SSES) and cycle for re-evaluation,
- Immediate correction plan, and
- Long term correction plan.

The agreements also include provisions whereby ReWa would require the satellite to "catch up" if the satellite was deemed to be lagging behind the plan. The agreements allow the satellites to construct storage facilities to achieve compliance with the peak flow standard, but ReWa staff feels it is unlikely that this approach will be embraced in any significant manner.

ReWa intends for the satellites to implement plans that will lead to compliance with the regional peak flow standard expressed by the Babbitt Equation. Compliance will be determined based on 15-minute peak flow readings made at the point of connection. As these readings are so important to the fairness of this program, ReWa performs regular (weekly for temporary sites and monthly for permanent sites) calibration checks of the meters and invites representatives of each satellite to be present when these checks occur. In addition, ReWa has established a web site through which each satellite will be able to retrieve and view flow data for monitors reading their system.

State of South Carolina Efforts to Regulate Satellite Systems

In June 2003 in an amendment to the South Carolina Pollution Control Act, the state of South Carolina established a rule for operation and maintenance of satellite sewer systems, including a General Permit for Satellite Systems. Administered by the Department of Health and Environmental Control (DHEC), this general permit went into effect on October 27, 2003. The DHEC also has the latitude to issue individual system permits. The regulatory definition of satellite system states: "... a sewer system that is owned or operated by one person that discharges to a system that is owned or operated by a different person. Satellite sewer systems depend on a separate person for final wastewater treatment and discharge and include systems approved under R.61-9.505.8." The basic elements of this general permit are very similar to the draft CMOM regulations that were developed by US EPA in 2000.

In March 2007, the State of South Carolina General Assembly introduced and then referred to committee a bill titled "Article 4 Removal of Excessive Infiltration and Inflow" which would have been an amendment to Chapter 55, Title 44 of the 1976 Code of Laws. While this bill still resides in the Agriculture, Natural Resources, and Environmental Affairs Committee, it would have required satellite systems of a multi-county regional NPDES wastewater permit holder to prepare and implement a 15-year excessive I/I reduction work plan. The bill would have also allowed the regional NPDES permit holder to assess civil penalties to satellites whose work plans did not result in compliance with the excessive I/I standard (defined as compliance with the Babbitt Equation).

ReWa staff believe that the existence of this general permit system, the potential threat of individual permits, and the existence of the draft excess I/I legislation for satellite systems greatly

improved the awareness of satellite system operation and maintenance and thus the ability for the regional I/I reduction program to succeed.

Legal Issues Encountered and Overcome

The 1972 South Carolina legislation that created Regional Sewage Authorities (RSA) did not require agreements between the regional and its satellites in order for wastewater conveyance, treatment, and disposal cooperation to occur. It did provide ReWa the ability to direct local system operations and this provided an ability to require I/I control plans in each case. The legislation prohibited any mechanisms for the RSAs to grant money to satellites for work on their systems.

Taking into account these conditions, ReWa approached each situation individually, with information being exchanged on the need for action happening at a peer to peer level. In this approach, with Board members of the two parties having dialog with one another and staff having similar dialog, progress was made because there was limited opportunity for technical issues to become politicized by either party.

Those satellites that refused to negotiate an agreement requiring them to perform an I/I plan were subject to a sewer connection moratorium by ReWa. There were situations in which a satellite did not see this as sufficient leverage for entering into the agreement. In those situations, ReWa was prepared to issue a permit to the satellite for discharging to the regional system – a permit that would presumably have very specific peak flow discharge limits and other strict requirements.

Findings and Next Steps

The ReWa case study presents a fresh approach to dealing with satellite agencies on pressing wet weather flow issues. Critical elements of this approach include the following:

- Establishing a clear need to do something different to address the wet weather problem,
- Obtaining full board member support for implementing a potentially controversial solution,
- Approaching the implementation with patience and consistency when dealing with the various parties,
- Anticipating problems during implementation, and
- Being flexible while looking for alternatives to achieve the mission at hand while not compromising the core objectives

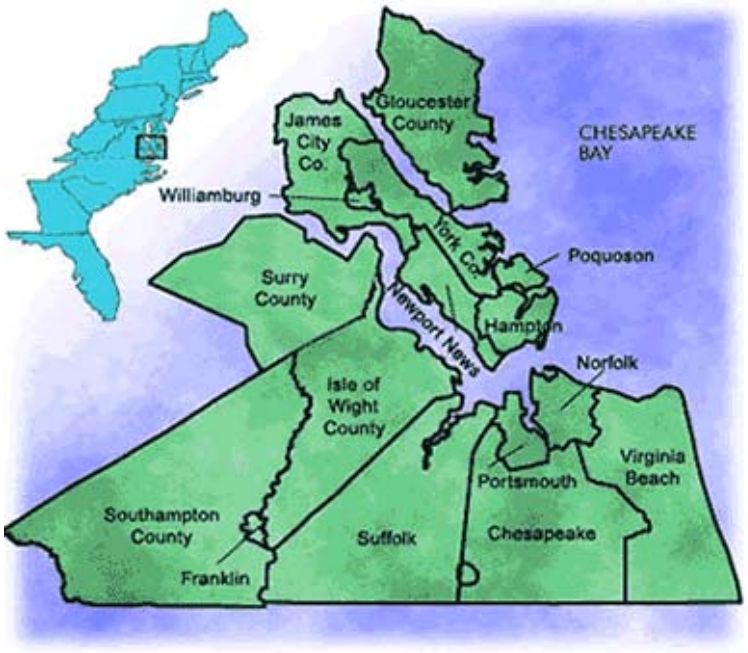
The proof of success for this peak flow reduction program will be with flow monitoring data over time. ReWa staff already suspect flow reductions are occurring and that the collected data will prove likewise.

Case Study #2
Hampton Roads Sanitation District (HRSD), Va.
*HRSD Collaborates with Satellite Communities to Tackle Wet Weather Challenges**

Hampton Roads Sanitation District (HRSD) is a large regional conveyance and treatment agency in coastal Virginia. Formed by the General Assembly in 1940, this agency manages an extensive sewage conveyance and treatment system including 13 treatment plants. HRSD is governed by a Commission that is appointed by the Governor. HRSD serves the communities in the Hampton Roads area with a service area population of 1.1 million people. There are no contracts in place with the satellite communities as HRSD bills customers directly for conveyance and treatment. In addition, localities bill customers for the cost of local conveyance to the regional system.

There are 13 satellite communities that have been actively engaged with HRSD on the issue of management of wet weather flows. These communities include the cities of Newport News, Hampton, Williamsburg, Poquoson, Chesapeake, Suffolk, Smithfield, Portsmouth and Virginia Beach and the counties of Gloucester, James City, Isle of Wight and York. The regional system serves over 1.6 million people, and consists of approximately 5,800 miles of gravity sewer, 1,500 pump stations and 1,100 miles of force main. The majority of the gravity sewer system and pump stations throughout the Hampton Roads region are owned and operated by the satellite municipalities.

Figure 1: Hampton Roads Regional Municipalities



In 2005, this group of communities was approached by the United States Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (VDEQ) regarding potential enforcement actions related to sanitary sewer overflows. The regional response by HRSD and the satellites was to form a working group called the Regional Capacity Team to begin development of regional standards for addressing these challenges. The Capacity Team worked for 2 years on the development of comprehensive Regional Technical Standards which covered assessment of existing information, flow monitoring, sanitary sewer evaluation survey (SSES), rehabilitation, hydraulic modeling and regional wet weather management plan. Technical representatives from HRSD and the satellite communities developed these standards

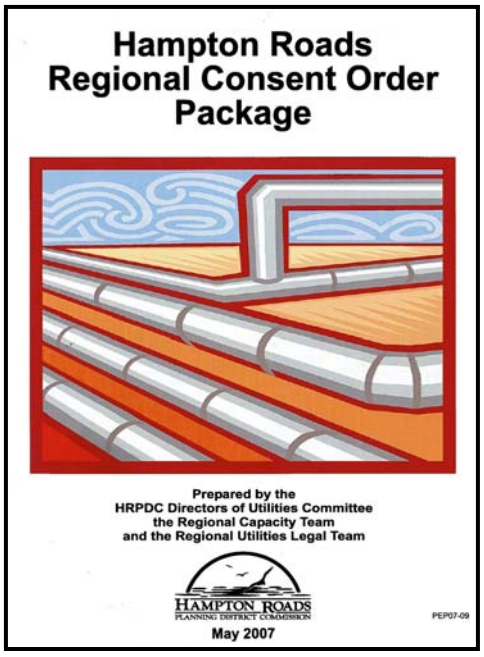
* Significant contributions to this case study were made by Ted Henefin, Executive Director, of Hampton Roads Sanitation District

through a highly collaborative negotiations process to produce a set of standards that were flexible and credible.

In addition to the work of the Capacity Team, a Legal Team was formed to manage the legal aspects of the Consent Order and the Memorandum of Agreement amongst the localities and HRSD.

Both the Legal Team and the Capacity Team reported to the Director's of Utilities Committee. This committee was composed of Utility Directors for each of the affected localities. The Hampton Roads Planning District Commission had formed this committee more than a decade ago to address issues of mutual concern.

The Regional Technical Standards were reviewed and commented on by both EPA and VDEQ. These comments were considered in development of the final standards and the RTS became an integral part of the VDEQ Special Order by Consent which was executed on September 26, 2007 by VDEQ.



The Regional Capacity Team developed the Consent Order Package in conjunction with the Legal Team, the Direcors of Utilties, Hampton Roads Planning District Commission (HRPDC), and VDEQ. The Regional Consent Order package includes the following documents:

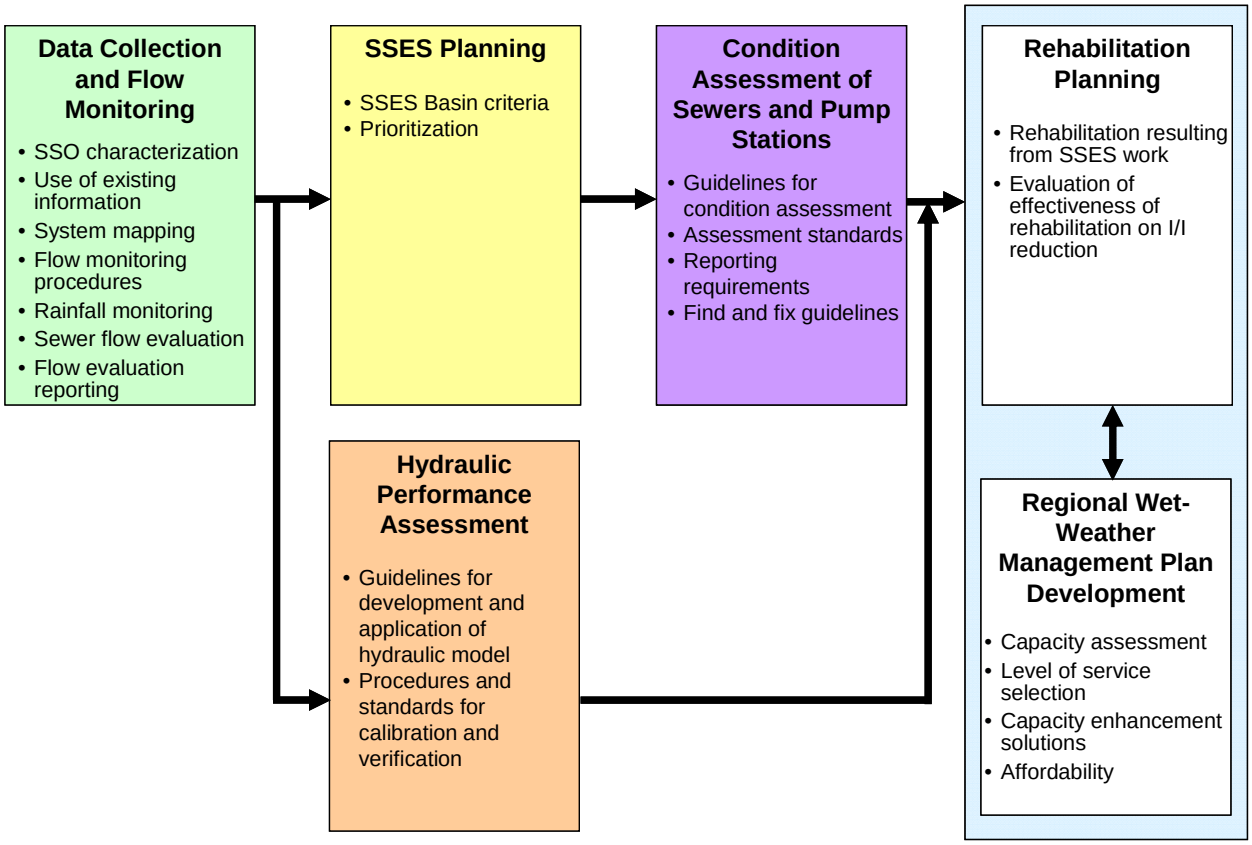
- Memorandum of Agreement (MOA),
- Regional Consent Order, and
- Regional Technical Standards.

The purpose of the Consent Order and the Regional Technical Standards is to reduce the occurrence of SSOs in the Regional Sanitary Sewer System. Special Order by Consent Goals include:

- Reduce SSOs;
- Provide methods to identify, characterize and cost-effectively address conditions that contribute to SSOs;
- Collect and analyze data in a regionally consistent manner; and
- Ensure a coordinated regional approach for identifying and implementing system capacity improvements.

The requirements, depicted in Figure 2, include analysis of existing data, collection of additional system data, preparation of rehabilitation plans, correction of serious defects requiring prompt attention, development of a hydraulic model, assessment of the hydraulic performance of the Regional Sanitary Sewer System, and development of a Regional Wet Weather Management Plan. In conjuction with these activties, HRSD and Localities will develop and implement Management, Operations and Maintenance (MOM) Programs.

Figure 2: Overview of Hampton Roads Regional Consent Order Requirements



The Regional Technnical Standards were developed to be information-based so that resources are focused on the areas that require attention to mitigate SSOs. Where appropriate, the Standards include quality assurance/quality control procedures related to field data collection.

The Standards also address the relationship between the hydraulic performance of the Regional Sanitary Sewer System, Rehabilitation Plans that will be developed and implemented by HRSD and the Hampton Roads Localities, and the Regional Wet Weather Management Plan. The longer term repairs of the sanitary sewer system will occur after the term of the September 2007 Consent Order in accordance with plans developed, and approved by VDEQ pursuant to the Consent Order.
The content of the Regional Technical Standards is as follows:

- Section 1 – Introduction and Purpose
- Section 2 – Definitions
- Section 3 – Data Collection and Flow Monitoring
- Section 4 – Condition Assessment of Sewers and Pump Stations
- Section 5 – SSES Planning
- Section 6 – Hydraulic Performance Assessment
- Section 7 – Rehabilitation Planning
- Section 8 – Regional Wet Weather Management Plan (RWWMP) Development
- Exhibit A – Regional Design Guidelines
- Exhibit B – Regional Operating Guidelines

VDEQ was engaged throughout the process and attended numerous Capacity Team meetings to check in and offer feedback on the development of the RTS. In addition, several sessions were spent negotiating the details of the Consent Order and the RTS. These sessions were resulted in documents that VDEQ staff supported and were credible for the region. Importantly, all parties believe that the Consent Order and the RTS will address the challenges in the sewer systems across the region. The fact that the localities and HRSD worked collaboratively to develop the RTS and Consent Order eliminated any finger pointed and presented a consolidate front and approach to VDEQ.

Significant accomplishments that have been achieved through the regional collaboration process include:

- Establishing a forum for open communication of issues and concerns related to performance of the regional sanitary sewer system,
- Adoption of consistent design criteria,
- Establishing definitions for adequate collection system capacity,
- Establishing standards for assessing collection system performance,
- Reaching agreement on the approach to developing a regional hydraulic model,
- Defining triggers for implementing Sanitary Sewer Evaluation Survey (SSES) activities,
- Adopting a mutual goal of providing an acceptable level of service at the lowest economic impact to the regional sanitary sewer system customers, and
- Establishing a framework for developing jurisdictional rehabilitation plans and a Regional Wet Weather Management Plan.

In addition to the RTS, the region also developed a Memorandum of Agreement (MOA), which binds the regional partners to be mutually accountable for progress and adherence to the RTS. While other approaches were considered, the region believed that the MOA approach was best

suited for the regional partners and had been used successfully in the past to address other issues such as stormwater. The stated principles embodied in the MOA include:

1. Although the local utilities have the responsibility for ownership, operation and maintenance of their sewer systems, there is also a mutual interest in ensuring that the individual systems function effectively as an integral part of a larger regional system.
2. A cooperative and coordinated effort is needed to share information, promote collective decision making and identification of regional cost effective solutions.
3. Each utility should operate its system in an efficient and cost effective manner while not negatively impacting other adjoining utilities.
4. Costs to investigate and mitigate the challenges of minimizing sanitary sewer overflows should be shared equitably among the utilities with the goal of achieving the lowest overall cost to the ratepayers of the region.
5. In the interests of regional collaboration, the utilities should seek to resolve their differences through dispute resolution prior to resorting to administrative or judicial remedies.

The MOA establishes roles and responsibilities of the regional players including the Hampton Roads Planning District Commission (HRPDC), the HRPDC Directors of Utilities Committee, HRSD and the Localities. Further the MOA addresses:

1. Compliance with the RTS and Implementation of the Regional Wet Weather Management Plan
2. Modifications to the Regional Order and the RTS.
3. Remedies and Rights including dispute resolution.

Findings and Next Steps

After the Virginia DEQ Special Order by Consent was finalized, EPA issued their own enforcement action against HRSD regarding SSOs without the benefit of public participation or negotiation with HRSD or the Localities. This Unilateral Administrative Order resembles the Virginia DEQ Special Order by Consent but is more detailed and prescriptive. EPA, DOJ and DEQ are negotiating a consent decree with HRSD to replace the administrative order. The Localities will execute the required work under the DEQ Special Order by Consent.

The Hampton Roads area has clearly recognized that regional collaboration is the best means to address sanitary sewer system challenges. By continuing to work together, the region will identify solutions that are in the best interests of all ratepayers and meet their sewer infrastructure challenges.

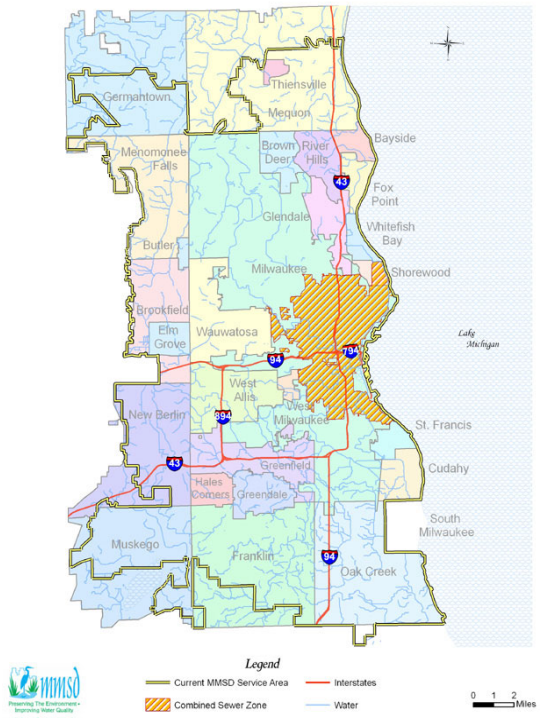
Case Study #3
Milwaukee Metropolitan Sewerage District (MMSD), Wis.
*MMSD's Continuous Collaboration with Satellite Municipalities**

MMSD is a state-chartered, governmental agency providing regional wastewater conveyance, treatment, and disposal for 29 satellite municipalities within a 411-square-mile service area, located within 5 counties, with a population of about 1 million. The MMSD is dedicated to protecting public health, property and the environment within all or portions of the six Greater Milwaukee Watersheds. The MMSD's chief responsibilities are to provide sewage treatment services and to maintain and improve over 110 miles of watercourses for nearly all of Milwaukee County, Wisconsin, and portions of municipalities in four surrounding counties.

MMSD Case Study Profile

- Service Area: 5 counties and 29 communities
- Population Served: Over 1 million
- Governing Body: 7 appointed by the mayor of the City of Milwaukee and 4 elected by the Intergovernmental Cooperation Council (ICC), which includes elected officers of the municipalities within the District other than the City of Milwaukee
- Collection System: More than 350 miles of pipes (regional system only)
- Pump Stations: 8
- Metering Stations: 147 permanent and 183 portable
- Treatment Plants: 2
- Combined Capacity: 630 million gallons per day (peak)

MMSD Service Area with Combined Sewer Zone



* Significant contributions to this case study were made by Debra Jensen, Planning Services Supervisor, and Kevin Shafer, Executive Director , of Milwaukee Metropolitan Sewerage District. For more information on MMSD's Rules and Regulations concerning CMOM and Peak Flow Limits (see www.mmsd.com, Rules).

The MMSD service area is comprised of both separated sewer and combined sewer areas. In addition to providing wastewater services, MMSD, in conjunction with area stakeholder groups, plans and oversees projects to manage the risk of flooding in six Milwaukee-area watersheds.

History of Regional Cooperation Within MMSD Service Area

In response to the 1972 Clean Water Act initiatives, MMSD launched work on a facility plan to upgrade treatment systems in order to meet the new regulatory requirements. In 1977, the MMSD undertook a multi-billion dollar program to repair and expand the entire metropolitan area wastewater conveyance and treatment system. To fund these efforts, the MMSD collected funds for its operations budget (assessed on water usage) and for its capital budget (assessed on equalized property value).

Ten of the MMSD satellite municipalities, all of which reside outside of Milwaukee County, filed a lawsuit against the MMSD challenging the method of assessment for capital expenditures. This lawsuit continued for many years, not settling until late in 1996. The many years during which this lawsuit was active eroded trust and working relationships.

In just over ten years, the MMSD has been able to re-establish the trust and develop excellent working relationships with its 29 satellite municipalities, as is demonstrated in the discussions below.

The District regularly updates its long-range facilities plan to address future population, land use and wastewater asset needs within the District's planning area. The most current generation of facilities plans ensures that the needs of the region are addressed through Year 2020. Projects identified in this recent facilities planning effort are comprised primarily of treatment plant upgrades, upgrades to the conveyance system, and flood management in the jurisdictional watersheds. Projects identified under the 2020 Facilities Plan are scheduled to be completed by the end of the year 2020.

Collaboration Elements

To coordinate with the satellite municipalities and other stakeholders, a number of vehicles were developed:

- Annual Executive Director Meetings: Each year, the MMSD Executive Director meets with local elected officials of the MMSD satellite system governing bodies. The purpose of the meetings is to establish and deepen relationships with the local officials, explain MMSD policies (past and present), and gain feedback on MMSD services. MMSD has found this collaboration vehicle to be extremely helpful in solidifying regional collaboration on wet weather issues, as well as other regional interests.

- Technical Advisory Team: The TAT is comprised of technical staff from each of the satellite municipalities, as well as from the U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources, Milwaukee County government, and Southeastern Wisconsin Regional Planning Commission. The TAT meets on a monthly basis to discuss matters of common technical concern. This team is headed by the MMSD

Director of Technical Services and Engineering Planning Manager. This team has been in existence for over ten years.

Currently, a topic of key interest is implementation of the 2020 Facilities Plan, including development of the Wet Weather Peak Flow Management Program. In addition to this topic, other topics of mutual interest are discussed, with presentations made by MMSD staff, satellite municipality staff, consultants, and other entities.

- Designated Municipal Liaison: A member of the Technical Services staff is designated the primary contact for all technical issues with the customer satellite municipalities. A single point of contact with the MMSD ensures MMSD familiarity with the customer satellite municipality and its staff and consistent handling of the wide range of issues. This single point of contact is critical in continuing the development of the customer relationships. The designated municipal liaison conducts annual meetings with each of the customer satellite municipalities to discuss general topics. As issues arise throughout the year, regular meetings occur between MMSD staff and the customer satellite municipality staff, with additional phone calls, written correspondence, and e-mails to easily address the issues and reach resolution. At present, the Planning Services Supervisor job description includes the express job purpose to "act as liaison to the 28 (sic) District satellite municipalities."

Collaboration Specifics

MMSD continues to collaborate with its satellite municipalities on a number of important regional issues. The following text describes each major component of collaboration.

Regional Planning of Sewerage Facilities

In recent years, however, the U.S. Environmental Protection Agency has encouraged agencies like MMSD to use a "watershed" planning approach to better address water resource issues. While this approach is not a radical departure from traditional planning, it is a significant step forward because it considers all activities within a region that impact the watershed's health, rather than segmenting planning decisions. Decisions are based on all water resources, all water uses and all the threats to water quality throughout a common geographical area: the watershed.

Utilizing this all-encompassing approach to address impacts to water quality requires coordination with all agencies, municipalities, the general public, and special interest groups not only in the MMSD planning area, but also those residing in the watershed portions *outside* of the MMSD planning area. Together, these watersheds – whether in or out of the MMSD planning area – comprise the Greater Milwaukee Watersheds. Recognition of the interdependences of the watersheds and their link to Lake Michigan is a large component of the MMSD's 2020 Facilities Plan.

To ensure regional coordination, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), which is undertaking an update to the Regional Water Quality Management Plan, and the MMSD developed a number of committees, including the Citizens Advisory Council (CAC)

and the Watershed Officials Form (WOF). The WOF is comprised of elected officials throughout the watersheds including areas outside of the MMSD planning area. Both the CAC and the WOF have input in both the MMSD 2020 Facilities Plan and the SEWRPC plan.

As part of the facilities plan development, Southeastern Wisconsin Regional Planning Commission works with municipalities to develop their land use plans during the MMSD planning horizon. This data is then utilized by the MMSD to ensure its facilities are adequate to meet the region's needs for the planning horizon.

To ensure that municipal sanitary facilities are constructed consistent with the approved facilities plan, the MMSD requires submittal of the plans for its review and approval. Because the planning horizon spans a number of years, if development not anticipated during the development of the plan arises, the MMSD has developed a protocol for assessing the sanitary sewer flow contributed by the municipality to the regional system and comparing it to that approved in the facilities plan.

From a regulatory perspective, it is important that the facilities plan be followed and that plans are not approved that would exceed the flow identified in said plan. From a regional perspective, it is important that development is not hindered. Therefore, in an effort to ensure both perspectives are met, the protocol was developed and applied consistently to the 29 satellite municipalities.

Regional Planning of CMOM Programs

The MMSD has developed a CMOM program and is in the process of implementing the program for its three functional categories of assets: Wastewater conveyance, Wastewater treatment, and Watercourse management. Because the MMSD receives sanitary flows from 29 satellite municipalities, it believes that implementing CMOM on its assets is the right thing to do but also realizes that, in order for this effort to fully effective, the 29 satellite municipalities also need to develop and implement a CMOM program.

To ensure consistency in the region's programs, the MMSD has hired a consultant team who worked with each of the satellite municipalities on this effort. Before the regional program was undertaken, it was important to communicate with and educate the municipal staff on the benefits of this important program. This communication and education was easily implemented because of the ongoing TAT efforts and single point of contact, the Municipal Liaison.

As this effort is proceeding, the municipalities realized that many of them have a similar gap – Standard Operating Procedures (SOP) are not in place for all activities. The municipal staff suggested a committee be created to work cooperatively on this effort, headed by the MMSD Municipal Liaison. The SOP templates were completed and distributed to all satellite municipalities in 2007.

Regional Planning of Flood Management

In 2002, the MMSD promulgated its Chapter 13 Surface Water and Stormwater rule. This rule was created in a collaborative effort that involved satellite municipal staff, designers, developers, Southeastern Wisconsin Regional Planning Commission staff, and Wisconsin Department of

Natural Resources staff. The goal of this rule is to protect structures from flooding that may be caused by new development.

When developers or designers desire to meet with MMSD staff, satellite municipality staff is included to ensure what is proposed by the developer or designer is consistent with the MMSD rule and the satellite municipality ordinance. These meetings have not only ensured that staff of both organizations will be able to approve a stormwater management plan when submitted, but have also resulted in improved working relationships and shared goals for the region.

State Stipulation Agreement Negotiations

In 2004, the Wisconsin DNR referred to the Wisconsin Department of Justice (DOJ) to take action against MMSD and its 29 satellite municipalities for system SSOs experienced during an extreme and extended period of wet weather. For several months, MMSD and its satellites were being jointly sued by Wisconsin DOJ for these overflows, and an extensive negotiating strategy meetings ensured. Eventually, the satellites reached a settlement with the Wisconsin DOJ and the judgment against MMSD continued on its own; however, the MMSD suit was eventually settled in May 2008. Several important requirements resulted from this settlement, including:

- Establishment and participation in the WWPFMP, a program to reduce the risk of increasing peak flows into the regional system.
- Regular Sanitary Sewer Evaluation Surveys (SSESs) in the satellite municipalities
- CMOM Program implementation in each satellite municipality

In response to the satellite suit settlement, MMSD promulgated new rules addressing a number of the stipulation requirements. Collaboration also occurred on the development of these rule changes (details provided in section 1.1.3 Legal Issues Encountered and Overcome).

Wet Weather Peak Flow Management

The objective of the WWPFMP is to manage peak flows in municipal sewer systems to levels at or below those established during the 2020 Facilities Planning process. To accomplish this objective, MMSD is developing a flow monitoring system that can accurately measure peak flows from the municipalities and a methodology to assess peak infiltration/inflow (I/I) rates in the municipal systems. The WWPFMP also requires a strategy for the long-term assessment of I/I rates, including procedures to determine whether I/I rates are increasing, decreasing, or remaining steady. MMSD is also evaluating enforcement/incentive alternatives, with the intent of implementing specific policies that would ensure a successful outcome of the WWPFMP. As with other recent activities, MMSD is continuing to involve municipal staff in development of the WWPFMP through preparation of presentations for and attendance at TAT meetings. In fact, a subcommittee of the TAT has been established to work specifically on the WWPFMP.

In addition, MMSD (the "District") formalized a specific CMOM Program goal (documented in its Management Plan) related to rule changes that established peak flow limits from satellite systems:

Modify District Rules to address peak wet weather flows from satellite systems that impact District system operation.

The District will use the 2020 Facilities Plan to manage satellite municipality flows via a sewershed capacity allocation process which considers base and peak flows. Chapters 2 and 7 of the District's Rules and Regulations articulate the current process for administering capacity. Chapter 3 of the District's Rules, which previously was titled "Infiltration and Inflow Control", but has been changed to "Management, Operation, and Maintenance of Tributary Sewers", has been rewritten and adopted by the District's Commission. The rule revisions include standards for sewersheds, including the maximum allowable I/I allocated by the 2020 Facilities Plan and requirements for CMOM implementation by the satellite system owners.

Legal Issues Encountered and Overcome

In 2001, the MMSD promulgated its Surface Water and Storm Water Rule. Because the MMSD and the satellite municipalities realize the important connection between management of storm water, flood management, and infiltration and inflow into sanitary sewers, it created a subcommittee that worked collaboratively to develop a rule that, once promulgated, would be implementable and would address the purpose as identified by the Subcommittee. The subcommittee was comprised of satellite municipal technical and legal staff, regulators, developers, regional planning staff, and MMSD staff. Collaboration resulted in a rule that has been implementable, and, to date, has not required amendment.

In 2003, the MMSD revised its Planning, Design, and Construction of Sewers and Ancillary Facilities Rule. Again this effort was undertaken in collaboration with the satellite municipal technical staff. The revisions primarily addressed municipal requirements for private interceptor main sewer construction. As the revisions were being drafted, input from the municipal staff was solicited from the TAT (see write-up on the TAT). Again, this effort resulted in a rule revision that is implementable and accepted by the municipalities.

In 2007, the MMSD revised its Management Operations & Maintenance of Tributary Sewers Rule, which again was revised through a collaborative effort with the satellite municipal technical staff. The revisions primarily addressed the requirement to implement a Capacity assurance, Management, Operation and Maintenance (CMOM) Program and Peak Flow Rate Reduction. As the revisions were being drafted, input from the municipal staff was solicited from the TAT (see write-up on the TAT). Again, the efforts resulted in a rule revision that is implementable and accepted by the municipalities.

Collaboration efforts with municipal staff on rule development and revision has resulted in public hearings where no substantive comments are received, thereby resulting in a rule that is widely accepted.

Findings and Next Steps

From a fairly recent point in time when collaboration seemed impossible, MMSD has seen its relationship with its satellite municipalities improve to a condition in which satellites are willing

to do more because of how these entities work together. This progress was earned over time by processes which valued openness, trust, and commitment. For regions that have time to invest in their collaborative futures, the MMSD story can be instructive model.

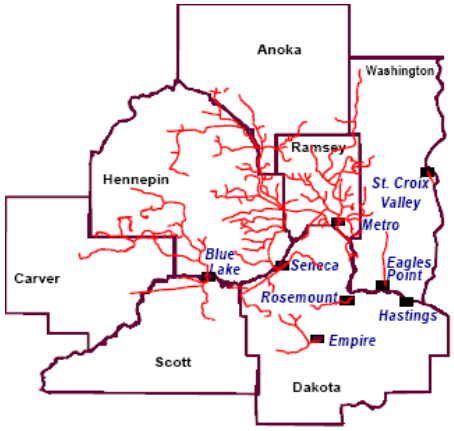
Case Study #4
Metropolitan Council Environmental Services (MCES), Minn.
*MCES Treads New Ground to Address Peak Flows from Satellite Municipalities**

Overview of Metropolitan Council

The Metropolitan Council is the regional planning agency serving Minnesota's Twin Cities' seven-county metropolitan area and providing essential services to the region. The Council works with local communities to provide critical services including the collection and treatment of wastewater. The 17-member Metropolitan Council has 16 members who each represent a geographic district and one chair who serves at large. They are all appointed by and serve at the pleasure of the governor. The State Senate confirms Council member appointments. The Council delivers regional wastewater collection and treatment services to 104 communities and the public through the Environmental Services (MCES).

MCES owns and operates eight treatment plants and an extensive interceptor system, as shown in Figure 1. The largest system conveys wastewater flow to the Metro Wastewater Treatment Plant and serves 65 communities. Smaller systems convey flow to the Council's regional plants: Blue Lake, Seneca, Empire, St. Croix, and Eagles Point. There is no interceptor system for the Hastings and Rosemount plants.

MCES Plants & Interceptor System



MCES Case Study Profile

- Service Area: 7 counties and 104 communities
- Population Served: Over 2 million
- Governing Body: Governor-appointed council board
- Collection System: More than 600 miles of pipes, up to 12 feet in diameter
- Pump Stations: 61
- Metering Stations: 190
- Treatment Plants: 8
- Combined Capacity: 372 million gallons per day

More than 100 communities own and operate local sewer systems that are connected to the MCES regional interceptor system. Through these local systems, wastewater service is extended to residents, commercial establishments, industry, and public agencies. These end users are charged for this service by the local community, which typically charges for wastewater on the basis of

* Significant contributions to this case study were made by Kyle Colvin, Engineering Planning Assistant Manager, and Bill Moore, General Manager, of Metropolitan Council Environmental Services. More information on this program can be obtained at the I/I Surcharge Program Home Page (http://www.metrocouncil.org/environment/ProjectTeams/I-I-Home.htm).

metered water use. MCES, as a wholesaler of the regional services, bills each community on the basis of its metered wastewater flow into the interceptor system. Only industries with high strength waste are billed individually by MCES.

Collaboration on Systemwide and Area Planning

Between 2000 and 2030, the Metropolitan Council projects that the Twin Cities seven-county area will grow by nearly 1 million people and 470,000 households. As the Council provides regional transportation, parks, and water resources planning, it was responsible for a long range plan to ensure a vibrant Twin Cities area into the future.

The Council's 2030 Regional Development Framework and the policy plans that implement it are intended to help accommodate the region's growth in an orderly, efficient manner and guide the expansion of four regional systems: transportation, aviation, water resources (including wastewater collection and treatment) and regional parks and open space.

In September 2005, the Council mailed "systems statements" to each community in the seven-county area, informing local officials how their community is affected by the Council's regional system plans. These statements are intended to help communities prepare or update their local comprehensive plans, which – under state law – must be consistent with regional plans. Local communities have until 2008 to submit their local comprehensive plans for Council review.

The local comprehensive plan must include a Water Resources Management Plan. This plan must include a wastewater and comprehensive sewer plan that specifies areas to be sewered by the public system, sets standards of operation for private systems and identifies areas that are not suitable for public or private systems.

The Council produces a Local Planning Handbook, intended to guide and support local municipalities in developing and amending their comprehensive plans. The Council's sector representative assigned to each municipality works closely with the community's planning staff as the local unit develops a comprehensive plan update that meets the criteria of statute and Metropolitan Council policy and meets with the approval of affected jurisdictions.

I/I Reduction Loan to Grant Program

In 1993 the Council initiated a grant program for local communities to address I/I. Under four separate offerings, the Council offered financial assistance to communities to identify, locate and remove sources of I/I within local sanitary sewer collection systems. Each of the four financial assistance programs required a matching dollar share to come from the recipient community. However, beginning with the 1996 offering, the program was expanded to offer matching dollar loans to communities to carry out capital improvements to physically remove targeted I/I from the system. Each loan had a provision in which, if the community could certify that the targeted I/I had not returned to the system, the annual repayment of the loan would be forgiven. The certification period for each loan project was 5 years in duration. By 2000, the Council had expended a total of $1.375 million to target I/I removal from local collection systems. At that time,

the total amount of I/I removed from the system was approximately 800 million gallons per year (or approximately 2 million gallons per day). While this program was intended to encourage I/I reduction in the Council's satellite sewer systems, it was clear that even greater steps would need to be taken to prevent significant future investments in regional sewers.

I/I Surcharge Program

The Metropolitan Council adopted an I/I Surcharge Program to reduce the impact of I/I on wastewater capacity and fees and to insure that the wastewater capacity of the system is available for future development. MCES estimated that 300,000 gallons per minute (gpm) of excessive I/I was entering the MDS during heavy rains and with a (regional) average mitigation cost of $500 per gpm an exceedance rate of $350,000 per million gallons per day was derived for 2007 surcharges.

The purpose of the surcharge program is to provide the Council with contingency funding to build additional capacity if necessary. Or alternatively, provide an incentive and a mechanism for communities to fund the cost of mitigating their excess peak I/I. Communities can avoid surcharges and/or receive rebates of their surcharges by eliminating their excess peak I/I through a combination of programs and system improvements. It is the intent of this program to encourage communities to eliminate their excess peak I/I over the next five-year period from 2007 through 2011.

The Metropolitan Council's funding of I/I mitigation projects by communities through the surcharge credit and rebate programs is based on the eligibility of these projects as likely to reduce the community's I/I. However, the actual effectiveness of any project is the responsibility of the community and the Metropolitan Council's granting of a credit and/or rebate does not relieve the community of its obligation to reduce its I/I to an acceptable level as determined by MCES.

Starting in 2013, the Council will institute a wastewater demand charge program for those communities that have not met their inflow and infiltration goals(s). The demand charge will help defray the cost of providing attenuation or capacity improvements within the MDS to avoid overloading downstream facilities. No credits or rebates to communities will be allowed. MCES will continue to review the communities' progress and will work with them on a case-by-case basis. At this time the demand charge rate has not been set but it is anticipated to be significantly greater than the current exceedence rate of $350,000 per million gallons.

Inflow/Infiltration Surcharge procedures were adopted by the Metropolitan Council pursuant to Minnesota Statutes (M.S.), chapter 473, including section 473.145-146 and section 473.858, and the Metropolitan Council Environmental Services Waste Discharge Rules, and are declared to be necessary for the efficient, economic, and safe operation of the MDS and for protection of the health, safety, and general welfare of the public in the metropolitan region. Additionally, the Council's Water Resources Management Policy Plan established I/I goals for communities served by the regional Metropolitan Disposal System. These goals were based on Metropolitan Disposal System design standards and regional growth requirements and projections. The I/I Surcharge is based on the authority in M.S. 473.517, subdivision 1, "Except as provided in Subdivision 3, the estimated costs of operation, maintenance, and debt service of the Metropolitan Disposal System to be paid by the council in each fiscal year, and the costs of acquisition and betterment of the

system which are to be paid during the year from funds other than bond proceeds, including all expenses incurred by the council pursuant to sections 473.501 to 473.545, are referred to in this section as current costs, and shall be allocated among and paid by all local government units which will discharge sewage, directly or indirectly, into the Metropolitan Disposal System during the budget year according to an allocation method determined by the council. The allocated costs may include an amount for a reserve or contingency fund and an amount for cash flow management." These funds will be held in reserve for Council costs to provide capacity unless municipal actions obviate the need for peak demand improvements to the MDS.

After extensive outreach, the Metropolitan Council adopted the I/I Surcharge Program by motion in February 2006. On April 8, 2003, the Metropolitan Council appointed individuals to serve on the Infiltration and Inflow Task Force, which was chaired by a Council Member. The task force included representatives from 15 communities from across the region as well as a representative from the Association of Metropolitan Municipalities.

The task force was charged with reviewing the I/I issues and formulating and proposing implementation strategies to reduce excessive Infiltration and Inflow (I/I) in local and regional wastewater collection systems. Reporting back to the Environment Committee, the task force met monthly and reviewed information presented by Environmental Services Division staff, who provided facilitation and administrative support. The recommendations and conclusions were arrived at by consensus of the task force members.

Legal Issues Encountered and Overcome

No legal challenges have been raised to the Metropolitan Council's I/I Surcharge Program. The only interesting legal issue that did arise pertained to one community's attempt to implement a policy that required inspection of homes to determine if sump pumps were illegally discharging to the sanitary sewer system. A homeowner refusing the inspection would have been fined by the community. The ACLU challenged this ordinance, accusing the community of violating homeowners' fourth amendment constitutional rights which protect against illegal search and seizure. The community subsequently changed its policy so that a homeowner would not be fined and could hire his or her own inspector.

Findings and Next Steps

Satellites of Metropolitan Council are responding to this Surcharge Program by actively working on I/I issues within their systems. Activities include:

- Investigations, flow metering, hydraulic modeling, sewer televising;
- Pipe and manhole rehabilitation;
- Storm drainage improvements; and
- Private property programs for sump pumps, foundation drains, downspout connections, and leaky laterals.

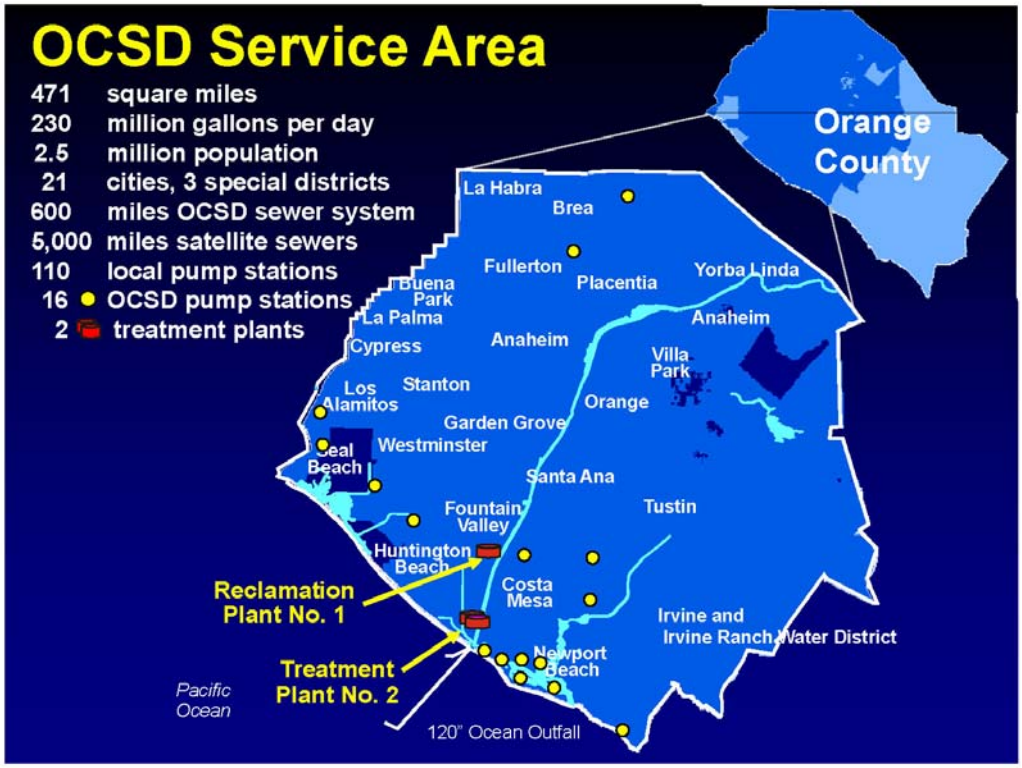
Each satellite exceeding its peak flow threshold is able to request a rebate against its surcharge if eligible I/I reduction activities can be documented. As of 2008, a total of 46 communities were required to submit such documentation.

Case Study #5
Orange County Sanitation District (OCSD), Calif.
*OCSD Commits to Long Term Program to Assist Satellite Municipalities on Collection System Issues for Regional Benefits**

Overview of OCSD

The Orange County Sanitation District (OCSD) operates the third largest wastewater agency west of the Mississippi River and is responsible for collecting, treating and disposing the wastewater generated by about 2.5 million people in central and northwest Orange County, as shown in Figure 1. OCSD is governed by a 25-member board, comprising elected representatives from each of the satellite sewer agencies or cities within its service area.

OCSD owns and operates two major wastewater treatment plants and has an extensive network of interceptors and main trunk lines feeding the two plants. OCSD does not have any combined sewers in its collection system.



* Significant contributions to this case study were made by Nick Arhontes, Director of Operations, Maintenance, & Regional Services, of Orange County Sanitation District

Regional Collaboration within the OCSD

In more than a half century since its formal beginning in 1954 under the Sanitary District Act of 1923 of the California Health & Safety Code, § 6400 et seq, OCSD has always recognized the critical importance of cooperation and effective collaboration with its satellites. In that context, OCSD has taken a leadership role in outreach, financial and technical support (including reserves), and educational efforts aimed at helping its satellite communities effectively manage their own collection systems.

The discussion below provides narratives on some relevant programs focused on OCSD's leadership role in fostering regional collaboration, interagency communication, and satellite systems' performance. OCSD believes that through the leadership, learning opportunities, and collaboration forum it provides, all its member agencies can better leverage knowledge to meet the service levels their respective constituents expect.

The Five Year Strategic Plan is a major effort now finishing its first year. Beginning in summer 2007, the General Manager's Office initiated the process of creating this important Strategic Plan for the organization. This was a facilitated staff-supported effort that engaged all their Board Members in an open forum. The focus was on agreeing to levels of service (L.O.S.) for the community and then the funding needed to support the L.O.S. targets. This streamlined the two-year fiscal planning process, rate setting and debt financing activities.

This Strategic Plan addresses several major objectives and critical challenges facing OCSD now, in the next five years, and further into the future. This Strategic Plan charts a focused roadmap of success for OCSD's future. Highlights include:

- Achieving a comprehensive five-year plan that focuses present and future efforts to meet the sanitation, health and safety needs of the 2.5 million people in the OCSD service area.
- Planning, designing and building $2.6 billion worth of essential capital improvement projects over a twenty-year period to continue to meet the regulatory, environmental, health and safety needs of a growing population. A key element of this effort is the build-out at both plants to 100% secondary treatment by December 2012. (The replacement of all facilities is over $6 billion.)
- Continuing to direct sufficient resources and keep investigating new technologies to effectively deal with odor issues.
- Applying sufficient funds to meet regulatory requirements related to air emissions.
- Continuing to support the Groundwater Replenishment System in partnership with the Orange County Water District to sustain local water supplies
- Continuing to aggressively pursue alternatives that make fiscal and environmental sense in the final disposition of biosolids, focusing on reuse options.

The two specific noteworthy programs described as follows are specific examples of how OCSD has implemented better working relationships with its member agencies during the past decade.

Satellite Collaboration and Outreach Program

In the fall of 1997, OCSD created an agency-wide strategic goal to develop a Collection Facilities O&M Outreach Program with their member cities and agencies. The principal objectives of this Program are for OCSD and its member cities and agencies to:

- Become more knowledgeable of all of the respective collection system assets in the entire service area;
- Leverage regional and local O&M expertise to reduce SSOs;
- Improve sewer capacity planning, interagency cooperation, collaborative asset management, and O&M efforts; and
- Facilitate improved regional communication.

As part of its outreach effort under this Program, OCSD conducts a comprehensive annual survey aimed at compiling, publishing and distributing updated information on sanitary sewer collection system assets and O&M issues pertaining to OCSD and its member agencies. This data represents the best available information on the collection system assets within the OCSD service area and any agency-specific programs related to management and O&M of these assets. This Program has greatly improved OCSD's knowledge of the assets managed by its satellite agencies, has leveraged collective regional and local expertise, and promoted improved networking among cities and collection system owners, operators, and managers on common issues and programs.

The program continues to be well received by all participants (including elected officials and regional regulators), and has developed into a significant means whereby OCSD's member cities and agencies are able to improve their own collection system O&M programs through better communication, increased asset management efforts, up-to-date sewer service fee benchmarking, and learning opportunities based on successes of their sister agencies.

Improved maintenance practices based on focused O&M programs (from the regional sewer system regulations in 2002 and the new statewide SSO regulations in 2006) have reduced the total number of public-agency related SSOs in the OCSD service area for the fifth straight year. Furthermore, for the third year in a row, there has been an increase in the reporting of private property SSOs, which represented 57 percent of the SSOs reported by the survey participants for FY 2006-07. Timely responses to SSOs and containment of spills to protect surface waters have also reduced the total volume of sewage released by SSOs, as well as their potential impact on the environment, public health and the local economies of the Orange County coastal cities.

Since 2002, this program has included a collection facilities Waste Discharge Requirements (or "WDR," a type of NPDES permit) Order Steering Committee that sets the agendas for monthly general meetings and workshops with the member cities and sanitary districts, and other interested regional stakeholders in our watershed.

Throughout this 11-year project, OCSD satellite agencies have developed more comprehensive O&M programs, have improved their funding mechanisms (in many cases by financing their programs thorough enterprise funds rather than general funds), and developed better SSO response, notification, and reporting procedures, especially for small public and private spills. The

Program has also greatly improved interagency and personal communications through the WDR Steering Committee and monthly WDR general meetings. The Program's annual report is often cited by regulators as well as the CWEA and WEF members because of the detailed facts and information it contains. Recently, this program was the subject of a WEF Collection System Specialty Conference in Pittsburgh, PA, as an example for other regional agencies to emulate for stimulating interagency collaboration.

Through the Program, OCSD has been able to resolve local/regional issues, assisted local agencies with maintenance problems, and helped reduce inflow by providing manhole cover plugs and manhole cover sealants where needed by the satellites.

Furthermore, the improved coordination and communication with the agency sewer managers has greatly facilitated the implementation of the regional WDR compliance effort (now statewide) since 2002.

Cooperative Projects Grants Program for I/I Reduction

OCSD's Master Plan contained estimates that approximately $120 million in capital improvements could be avoided by a 20 percent reduction in Rain Dependent Infiltration and Inflow (RDII). Based on that estimate, OCSD established the Cooperative Projects Grants Program (Cooperative Projects Program) to provide matching grants to its member agencies for up to 50 percent of project expenditures aimed at reducing RDII.

OCSD initiated the Cooperative Projects Program in 1998 to delay or eliminate the need to construct additional treatment and disposal facilities resulting from increasing amounts of RDII. The primary purpose of the Cooperative Projects Program has been to improve local sewer systems in order to achieve a 20 percent reduction in the RDII contribution to the District's peak wet weather flows by the year 2020 with the idea that OCSD would not have to construct expensive treatment facilities to accommodate the additional flows. Increasing I/I associated with aging sewers in the OCSD service area was identified as the principal source for the increase in wet weather flows. Up to 50 percent matching grants were provided for projects that met specific criteria.

Any member agency could submit an application for matching funds for local sewer system investigations and rehabilitation. In ranking the applications, staff prepared a project effectiveness analyses for each proposed project. These analyses were based on payback period (cost of project/savings per year from reduced I/I), type of funding request, environmental benefits, nature of project, and any other overriding considerations. Agencies receiving funds under the program must also meet certain qualification criteria, including identifying Best Management Practices for water conservation.

The payback period has been the most important funding criterion. In calculating the payback period, OCSD used the following cost factors:

- $0.90/gallon per hour of inflow for capacity of the treatment works

- $0.11/gallon per day of groundwater/seawater infiltration for treatment costs

During the first few years of the Cooperative Projects Program, OCSD also completed an extensive flow monitoring study of the entire collection system to determine where most of the RDII was originating. The results of this study helped modify the Cooperative Projects Program criteria by targeting projects in areas with the worst RDII problems.

Once approved, contracts were drawn up to define the scope of work, schedule, budget, and requirements. The grants were made to the approved applicants on a reimbursement basis after project completion. To date, OCSD has authorized matching grant funds totaling about $23 million, of which $15 million has already been contributed. The on-going projects are expected to be complete by the end of Fiscal Year 2009-10.

Legal Issues Encountered and Overcome

OCSD has faced no legal issues as they relate to its relationship with the member satellite agencies. Any legal issues have generally revolved around the right-of-way and easement challenges associated with the private property owners impacting access to OCSD facilities. OCSD is implementing a number of programs to address these issues, including stepped-up right-of way inspections, preparation of a Land Records Information Management System, and development of in-house expertise in right-of-way issues. A senior staff member has recently been certified by the International Right of Way Association's Property/Asset Management Certification Program.

Findings and Next Steps

OCSD has always recognized the critical importance of collaboration with its member agencies, regulatory community and state officials in addressing a whole host of issues in fulfilling its mission. And OCSD's success is closely tied to the success of its member agencies in managing, operating and maintaining their respective collection systems. In that context, both programs described above are aimed at maximizing the abilities of its member agencies to effectively address their needs for capital reinvestments and day-to-day management of their collection systems. OCSD's Cooperative Projects Program has been an important contributor towards compliance by its member agencies with many of the terms and conditions of the original regional WDR. For example, the establishment of fees by most of the local/satellite agencies was based on studies partially funded by OCSD. In addition, OCSD staff were vital in the development of the original WDRs and Sewer System Management Plans and in assuring that the regulations were fair and practical. Overall, this WDR development effort focused on improving infrastructure asset management in order to accomplish the goals of the Regional Water Quality Control Board.

National Association of
Clean Water Agencies
1816 Jefferson Place, NW
Washington, DC 20036
202.833.2672
www.nacwa.org