

NPDES Compliance Inspection Manual

Chapter 13



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CHAPTER 13 – SANITARY SEWER OVERFLOWS

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Related Websites

Office of Wastewater Management (OWM) home page: <http://www.epa.gov/owm>

A. OVERVIEW OF SSOS

In addition to materials in this chapter, inspectors must be familiar with Chapter 1, "Introduction," and Chapter 2, "Inspection Procedures."

Sanitary sewer collection systems are designed to remove wastewater from homes and other buildings and convey it to a proper treatment facility and disposal location. The collection system is critical to successful performance of the wastewater treatment process. The Environmental Protection Agency (EPA) estimates that collection systems in the United States have a replacement value of \$1 to \$2 trillion. Under certain conditions, poorly designed, built, managed, operated, and/or maintained systems can pose risks to public health and the environment. These risks arise from sanitary sewer overflows (SSOs) from the collection system. SSOs are discharges of wastewater (including that combined with rainfall-induced infiltration/inflow) from a separate sanitary sewer prior to treatment at the wastewater treatment plant. SSOs typically release untreated sewage into basements or out of manholes and onto city streets, public spaces, and into streams.

Effective and continuous management, operation, and maintenance, as well as ensuring adequate capacity and performing rehabilitation, when necessary, are critical to maintaining collection system capacity and performance while extending the life of the system. Many sanitary sewer collection systems, however, have received minimal maintenance over the years resulting in deteriorated sewers with subsequent overflows, cave-ins, hydraulic overloads at treatment plants, and other safety, health, and environmental problems. As one of the most serious and environmentally threatening problems, sanitary sewer overflows are a frequent cause of water quality violations and are a threat to public health and the environment. Beach closings, flooded basements, closed shellfish beds and hydraulically overloaded wastewater treatment plants are some symptoms of collection systems with inadequate capacity and improper management, operations, and maintenance.

Even though separate sanitary sewer systems are designed to collect and transport all the sewage that flows into them, SSOs can still occur. Recurring SSOs typically indicate that something is wrong with the system. Problems contributing to SSOs include:

- **Deteriorating sewer system:** Many sewer authorities neglect to plan and fund long-term sewer rehabilitation and replacement projects.
- **Infiltration and inflow (I&I):** This involves too much rainfall or snowmelt infiltrating through the ground into leaky sanitary sewers, excess water inflowing through roof drains connected to sewers, broken pipes, or badly connected sewer service lines. Unlike combined sewers, sanitary sewers are not intended to collect or convey rainfall or to drain property.
- **Undersized systems:** Sewers and pumps are too small to carry sewage from newly developed subdivisions or commercial areas; this may be exacerbated by I&I.

- **Pipe failures:** Pipe failures result from blocked, broken or cracked pipes. Sections of pipe settle or shift so that pipe joints no longer align with one another, sediment and other material build up causing pipes to break or collapse.
- **Pump station failures:** This results from pump failures, power failures, and inadequate wet well capacity.
- **Sewer service connections:** Discharges occur at sewer service connections to houses and other buildings due to pipe blockages and/or failures.
- **Pipe blockages:** Grease and tree roots are the primary causes of sewer blockages.
- **Vandalism and construction-related spills:** While there are many causes for vandalism, they often result in blockages or failure of pumps. For construction, breaks in lines occur due to improperly marked lines, or errant excavation contractors.

From a compliance standpoint, Chapter X of the *Enforcement Management System (EMS): Setting Priorities for Addressing Discharges from Separate Sanitary Sewers* (EPA, 1996a), establishes a series of guiding principles and priorities for use by EPA Regions and National Pollutant Discharge Elimination System (NPDES) states in responding to separate sanitary sewer discharge violations. Chapter X states:

“For a person to be in violation of the Clean Water Act: 1) a person must own, operate, or have substantial control over the conveyance from which the discharge of pollutants occurs, 2) the discharge must be prohibited by a permit, be a violation of the permit language, or not be authorized by a permit, and 3) the discharge must reach waters of the United States. In addition, discharges that do not reach waters of the United States may nevertheless be in violation of Clean Water Act permit requirements, such as those requiring proper operation and maintenance (O&M), or may be in violation of State law.”

The exact use of language in a NPDES permit disallowing SSOs may vary from one facility to another (often depending on how a state NPDES permit authority contends with SSOs). Some permits explicitly prohibit overflows from the system and in other cases, where the permit may be silent, SSOs that discharge to waters of the United States are treated as unauthorized discharges and a violation of the CWA. In either circumstance, SSOs that discharge to waters of the United States are prohibited and illegal.

Systems have been found to be out of compliance because of overflows (even those that do not reach waters of the United States) that are the result of improper operation and maintenance. The regulations at Title 40 of the *Code of Federal Regulations (CFR) Part 122.41(e)* require, as a standard NPDES permit condition, that permitted wastewater owners or operators must “properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit.”

Another standard permit condition regarding the duty to mitigate states that “the permittee shall take all reasonable steps to minimize or prevent any discharge... in violation of [the]

permit which has a reasonable likelihood of adversely affecting human health or the environment” (40 CFR 122.41 (d)). This may be interpreted to include sanitary sewer overflow discharges.

Most permittees are required to report any noncompliance, including any overflows, regardless of volume, that result in a discharge or that are caused by improper operation and maintenance. Most permits also require that any noncompliance, including overflows which may endanger the health or the environment, be reported within 24 hours, and in writing within five days (40 CFR 122.41(l)(6)). Most permits also require notification to the public and other entities (Third Party Notice) of overflows that may endanger health due to a likelihood of human exposure.

Since there are minor variations among permits regarding how to deal with overflows (except for the standard permit conditions that appear in all permits), the NPDES inspector should rely on the guidance in Chapter X of the EMS (part of which has been summarized above), NPDES permit requirements for municipal sanitary sewer collection systems and SSOs, and the Publicly Owned Treatment Work (POTW) NPDES permit for standards for evaluating compliance.

B. SSO INSPECTION PROCEDURES

During an inspection of a sanitary sewer system, the inspector will obtain information indicating whether the sewer authority is properly managing, operating, and maintaining its collection system and taking all feasible steps to stop sanitary sewer overflows. The inspection of one sanitary sewer system may involve visits to more than one municipality, depending upon the configuration and possible shared responsibility for the system. Before conducting the inspection, the inspector should identify the authorities responsible for operation of the system and define the scope of the inspection.

PREPARATION

In evaluating either a system with a history of SSOs or a system in which overflows may not necessarily be documented, the compliance inspector will rely primarily on the permit¹⁰ as a starting point. The inspector should refer to standard permit language contained in the NPDES permit. The inspector should also review the permit for any overflow-related requirements specific to the system.

An enforcement order, consent decree, or other enforceable document might also indicate prohibition, notification, or special circumstance language. Often, the establishment of a sanitary sewer discharge control program is the result of an enforcement action against a

¹⁰ Municipal satellite collection systems are sanitary sewers owned or operated by a municipality that conveys sewage or industrial wastewater to a POTW that has a treatment plant owned or operated by a different municipality. These types of facilities do not typically have their own NPDES permit. 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.

system. The inspector should refer to the enforcement document (e.g., consent decree, order, or other settlement) for a compliance schedule for sanitary sewer discharge control programs.

The compliance inspector will be faced with obtaining information to determine compliance in the following areas:

NPDES Standard Conditions

- **Proper Operation and Maintenance**. Regulatory language at 40 Part 122.41(e) states that: “The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit.” Poor operation and maintenance practices frequently lead to unpermitted discharges.
- **Duty to Mitigate**. Regulatory language at 40 CFR 122.41(d) states that: “The permittee shall take all reasonable steps to minimize or prevent any discharge... in violation of [the] permit which has a reasonable likelihood of adversely affecting human health or the environment.” These steps would include activities critical to the operation and maintenance of the system.
- **Non-compliance Reporting**. Regulatory language at 40 CFR 122.41(l)(6) states that: “The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.” Regulatory language at 40 CFR 122.41(l)(7) states that: “The permittee shall report all instances of noncompliance not reported under paragraphs (l)(4), (5), and (6) of this section, at the time monitoring reports are submitted.”

Notification Procedures

- In general, permits require that any noncompliance, including overflows that result in a discharge or that are caused by improper operation and maintenance, be reported at the end of each month with the DMR (see 40 CFR 122.41(l)(6) and (7)). At a minimum, permits typically require that overflow summaries include the date, time, duration, location, estimated volume, cause, as well as any observed environmental impacts, and what actions were taken or are being taken to address the overflow.
- Most permits also require that any noncompliance, including overflows, which may endanger the health or the environment be reported within 24 hours, and in writing within five days. Examples of overflows which may endanger health or the environment include major line breaks, overflow events that result in fish kills or other significant harm, and overflow events that occur in environmentally sensitive areas. Most permits also require notification to the public and other entities (Third Party Notice) of overflows that may endanger health due to a likelihood of human exposure.

Prohibition of Unpermitted Discharges

- Discharges to waters of the United States must be regulated by a NPDES permit. Any discharge from a location other than the effluent discharge point specified in the permit

constitutes an unpermitted discharge. This includes dry weather overflows and discharges from municipal satellite collection systems without permits.

RECORDS REVIEW

Prior to the inspection, the inspector should review the permittee's DMRs, SSO notification reports submitted by the permittee, sewer overflow service calls, and other documents that may have relevant information (e.g., annual reports). The permittee may have submitted information in response to EPA CWA section 308 information requests on SSOs. As required by an enforcement action, the permittee may have submitted plans or a report characterizing its program to eliminate SSOs or a report documenting progress of its sanitary sewer discharge control programs or describing SSO discharge points and overflow problems. Other documents and information that should be reviewed, if available, include:

- Citizen complaints
- Correspondence
- Notices of violation
- Annual capacity reports
- Inspection reports
- Maps illustrating the proximity of overflows to drinking water sources
- Depth of ground water
- Age of the city
- Extent of city ownership of service connection laterals
- Potential for impact to human health and the environment

Reviewing these reports in advance of the inspection will help the inspector become knowledgeable about the permittee's specific SSO problems, existing SSO controls, and/or plans to reduce or eliminate their SSO problems. The inspector should make copies of those documents that provide evidence of 1) any SSO occurring at the facility within the previous five years or 2) environmental problems related to SSOs at the facility. The inspector should make sure that EPA has a complete copy of the last five years of noncompliance notification reports, indicating the date, time, duration, flow rate, cause, and actions to correct, prevent, and mitigate each sewage overflow from the facility.

During the on-site records review, the types of records that the inspector should find at the facility include logs, reports, or internal memos describing maintenance and operation activities concerning the sanitary sewer system and SSOs. As in any NPDES evaluation, the inspector should review DMRs as well as monitoring results as reported by the laboratory that analyzed the data.

However, during inspections concerned with SSOs, the inspector might also request records pertaining to management, budget, and planning for sewer infrastructure improvements. The inspector might also want to review maps of the sanitary sewer system, indicating the locations of manholes, pump stations, etc. Table 13-1 contains a sample list of documents to review.

Items have been arranged under headings for each of the four major components: Capacity, Management, Operations, and Maintenance (CMOM). There is some overlap between the areas where an inspector would typically use some of the documents listed. For example, POTW flow records would be helpful in the section of the inspection report relating to operations and maintenance as well as capacity. As appropriate, the permittee should have as many of these records readily available as possible.

EPA has an inspection guide for CMOM programs at collection systems, the *Guide for Evaluating Capacity, Management, Operations, and Maintenance Programs at Sanitary Sewer Collection Systems* (EPA, 2005). This guide includes a detailed checklist for conducting evaluations of wastewater collection system CMOM programs. The guide also provides a form that provides examples of the types of information an inspector should attempt to obtain while on-site. In addition, EPA Region 4 has developed materials and guidance to help a municipality with its CMOM program (see references of this chapter).

INTERVIEWS

As with all NPDES compliance inspections, interviews with appropriate personnel are essential to understanding the context and meaning of the documents and records. In the case of SSO investigations, appropriate personnel would include people in the highest position of authority at the facility as well as those responsible for day-to-day operations, maintenance and/or oversight of crews such as the collection crew or others involved in inspecting, operating, and maintaining the system. It is particularly important that the inspector obtain written statements (see Chapter 2) where personnel are providing information that is not or cannot be substantiated by the facility's records or the inspector's own observations.

The following are examples of relevant questions that the inspector can use to obtain a general understanding of the facility.

- What is the capacity of the collection system? Is the capacity adequate? What measures have been taken to prevent SSOs?
- What flows does the municipality receive from other municipalities? What kinds of overflow problems have the upstream municipalities reported? What agreements exist to maintain various parts of the sewer systems?
- What are the causes of overflows, where do they occur, and how are they documented and reported?
- Where are the potential SSO point discharges located? Are any located at pump stations? What receiving stream does each SSO discharge to?
- How many SSOs have occurred in the past five years? What is the plan to reduce/eliminate SSOs?
- What are the SSO remediation policies and emergency Standard Operating Procedures (SOPs)?
- How does the authority identify and assess impact from non-municipally owned lateral lines?

- What preventive and response Best Management Practices (BMPs), such as containment, recovery, and minimization of impact to human health and the environment, are in place?
- How are personnel trained to manage and/or prevent SSOs, and what are current staffing levels?
- Are there any alarms or monitoring systems to alert you of an imminent SSO, and what are they?
- What are the goals of the authority's program for managing, operating, and maintaining the sanitary sewer conveyance system?
- What structural deficiencies have been identified in the system?
- What is the O&M schedule for replacement parts/equipment and collection system improvements?
- What studies have been performed of the authority's program for managing, operating, and maintaining the sanitary sewer collection system?

FACILITY SITE INSPECTION

Previous chapters of this manual provide guidance on general procedures for performing compliance inspections and are a valuable source of information on such topics as entry, legal authority and responsibilities of the inspector. However, there are some issues with entry that are specific to CMOM inspections. The inspector should be aware that some collection system components may be on private property, and they must gain entry properly through the property owner.

After reviewing records of SSO incidents, the inspector should visit previously identified SSO locations. The field inspection of the collection system should be directed by information gathered on prior SSOs, noncompliance notifications, citizen complaints, state reports, municipal studies, etc. Locations where large or representative SSOs have occurred or where SSOs occur more frequently should have higher priority for field inspection. The inspector should review causes (e.g., evidence of illicit connections) and determine whether the situation that led to the spill has been adequately addressed.

Field sampling must be conducted according to approved EPA methodology discussed in other chapters and may include sampling of the discharge and/or the receiving stream. Field sampling may be useful in developing enforcement actions to address chronic or acute violations, and as such, must be conducted with strict adherence to 40 CFR Part 136 and chain-of-custody protocol.

The inspector is reminded to take appropriate safety precautions. Collection systems may present physical, biological, chemical, and atmospheric hazards. Safety equipment should include a hard hat, steel-toed boots, safety glasses, gloves and for those with prescription eyeglasses, eyeglass straps are very important. A flashlight (and/or a small mirror) is also useful for collection system inspections. Collection system operators typically deal with manhole cover removal and other physical activities. The inspector should not enter confined spaces. In sewer collection systems, the two most common confined spaces are the underground pumping

station and manholes. The underground pumping station is typically entered through a relatively narrow metal or concrete shaft via a fixed ladder creating limited access and entry/exit.

Table 13-1. Documents to Review

Capacity	Management	Operations	Maintenance
<ul style="list-style-type: none"> • Information relating to system capacity. • Performance data. • POTW Flow Records. • Capital improvement projects (CIP) plan (including funding and planned improvements). • Collection system master plan. • Infiltration/Inflow studies. • I/I studies and evaluations (including programs for eliminating illegal connections). 	<ul style="list-style-type: none"> • Organization chart(s) and chain of communication for reporting SSOs. • Program goals. • Management policies and procedures. • Job descriptions. • Staffing plans, crew assignments and schedules. • Sewer Use Ordinance, Grease Control Ordinance. • Legal authority establishing control of system equipment and its maintenance. • O&M budget with cost centers for wastewater collection. • Recent annual report if available. • Procurement process. • Information systems. • Training plan. • Training and certification records. • Public education materials. • Policy and procedures for trenching, confined space, lockout tagout, PPE. • CMOM program audits. • Methods to extend good collection systems management to any satellite communities discharging to the central system. 	<ul style="list-style-type: none"> • Detailed maps/schematics of the collection system and pump stations. • O&M manuals. • Inspection strategy, forms, and records. • SSO reports detailing location, receiving water, volume, cause, start and stop date and time, system component, corrective action, and actions to mitigate impacts. • Safety manual. • Emergency response plan/SOP (awareness, notification, training, and emergency response). • SCADA and other alarm system information. • Materials management program. • Vehicle management. • Overall map of system showing facilities such as pump stations, treatment plants, major gravity. • Odor and corrosion control strategy. • Root control program. • Sampling procedures. • Industrial pretreatment oversight of the collection system. 	<ul style="list-style-type: none"> • Routine reports regarding system O&M activities. • Work order management system. • Maintenance tasks and frequencies. • Replacement parts inventory. • Performance measures for inspection, cleaning, repair, rehabilitation sewers, and force mains. • Preventive maintenance cleaning strategy. • Problem diagnosis records. • Repair, rehabilitation, replacement strategy for pipes and pump stations. • Record of citizen complaints and emergencies (normal hours and after hours). • Notifications to public health agencies, NPDES authority, and other entities.

C. REFERENCES

The following is a list of resources providing additional information on SSOs.

- U.S. Environmental Protection Agency. (1995). *Enforcement Efforts Addressing Sanitary Sewer Overflows*. EPA Memorandum.
- U.S. Environmental Protection Agency. (1996a). *The Enforcement Management System National Pollutant Discharge Elimination System (Clean Water Act) Chapter X: Setting Priorities for Addressing Discharges from Separate Sanitary Sewers*.
- U.S. Environmental Protection Agency. (1996b). *Sanitary Sewer Overflows: What are they and how can we reduce them?* EPA 832-K-96-001.
- U.S. Environmental Protection Agency. (1996c). *Sanitary Sewer Overflow and Sanitary Sewer Operation, Maintenance, and Management Draft Unified Paper*.
- U.S. Environmental Protection Agency. (2000a). *Compliance and Enforcement Strategy Addressing Combined Sewer Overflows and Sanitary Sewer Overflows*. EPA Memorandum.
- U.S. Environmental Protection Agency. (2000b). *Brochure: Benefits of Protection Your Community from Sanitary Sewer Overflows*. EPA 832-F-00-005.
- U.S. Environmental Protection Agency. (2001a). *Fact sheet: Why Control Sanitary Sewer Overflows?*
- U.S. Environmental Protection Agency. (2001b). *Benefits of Protecting Your Community From Sanitary Sewer Overflows*. EPA 832-F-00-005.
- U.S. Environmental Protection Agency. (2001c). *Evaluating POTW Capacity Management, Operation, and Maintenance Programs*. Office of Compliance and Region 4.
- U.S. Environmental Protection Agency. (2001d). *Fact sheet: Evaluating POTW Capacity, Management, Operation, and Maintenance Programs*. Office of Enforcement and Compliance Assistance & Region 4.
- U.S. Environmental Protection Agency. (2002a). *Case Study: Clearwater, Florida Abates Sanitary Sewer Overflows Using the EPA Region 4 Management, Operations and Maintenance Approach*. EPA 833-R-02-001.
- U.S. Environmental Protection Agency. (2002b). *Fact Sheet: Asset Management for Sewer Collection Systems*. EPA 833-F-02-001.
- U.S. Environmental Protection Agency. (2004). *Report to Congress: Impacts and Control of CSOs and SSOs*. EPA 833-R-04-001.

U.S. Environmental Protection Agency. (2005). *Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*. EPA 305-B-05-002.

U.S. Environmental Protection Agency. (2007a). *Fact Sheet: Draft NPDES Permit Requirements for Municipal Sanitary Sewer Collection Systems and SSOs*.

U.S. Environmental Protection Agency. (2007b). *Model NPDES Permit Language for Sanitary Sewer Overflows*.

U.S. Environmental Protection Agency. (2011). *Achieving Water Quality Through Integrated Municipal Stormwater and Wastewater Plans*. EPA Memorandum.