
13. SANITARY SEWER OVERFLOWS

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Related Websites

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

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13. A. Overview of SSOs

In addition to materials in this chapter, inspectors must be familiar with Chapter 1 - "Introduction" & 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. EPA estimates that collection systems in the U.S. 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, playgrounds, 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. Frequent 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.
- **Pipe Failures:** Pipe failures result from blocked, broken or cracked pipes. Sections of pipe settle or shift so that pipe joints no longer match, 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.
- **Pipe Blockages:** Grease and tree roots are the primary causes of sewer blockages.
- **Vandalism and construction-related spills.**

From a compliance standpoint, Chapter X of the Enforcement Management System *Setting Priorities for Addressing Discharges from Separate Sanitary Sewers*, 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 are treated as unauthorized discharges.

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. 40 *CFR* 122.41(e) requires, 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 overflows 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.

Since there are minor variations among permits regarding how to deal with overflows (except for the standard permit conditions which 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) and the Publicly Owned Treatment Work (POTW) NPDES permit for standards for evaluating compliance.

EPA has worked with State NPDES authorities to the extent possible to standardize language in permits regarding SSOs. However, a more uniform approach is being developed through a national rulemaking effort.

EPA has carefully considered the recommendations of the SSO Federal Advisory Subcommittee for regulatory and nonregulatory actions to reduce SSOs nationally and has developed draft proposed regulations regarding SSOs. The SSO Federal Advisory Subcommittee was organized to examine the need for national consistency in permitting and enforcement, effective sewer operation and maintenance principles, public notification for SSOs with potential health or environmental dangers, and other public policy issues. The draft regulations include provisions for the periodic self-auditing of capacity, management, operation, and maintenance (CMOM) programs; SSO prohibition language; recordkeeping, reporting and public notification requirements; criteria for remote treatment facilities; the inclusion of satellite collection systems in the scope of NPDES permitting; and watershed management principals.

At the end of March 2000, the SSO proposed rule package (also known as the CMOM proposed rule) was sent to the U.S. Office of Management and Budget for approval/comments. The Administrator signed the Notice of Proposed Rulemaking on January 4, 2001. In accordance with the memorandum of January 20, 2001, from the Administrator to President Clinton and Chief of Staff, entitled "Regulatory Review Plan," published in the Federal Register on January 24, 2001, 66 FR 7701, EPA has withdrawn this document from the Office of the Federal Register to give the Administrator an opportunity to review it. When the regulation is final, a regulatory scheme for the handling of SSOs will be phased in (over the following NPDES permit cycle) with some requirements taking effect upon publication in the Federal Register.

In the SSO proposed rule, EPA is proposing to clarify and expand NPDES permit requirements for municipal sanitary sewer collection systems and SSOs. The proposal includes standard permit conditions addressing capacity, management, operation and maintenance (CMOM) requirements; a prohibition on discharges (with a framework for a defense for unavoidable discharges); and requirements for reporting, public notification, and recordkeeping for municipal sanitary sewer collection systems and SSOs.

The Agency also is proposing a regulatory framework for applying NPDES permit conditions, including applicable standard permit conditions, to municipal satellite collection systems. Municipal satellite collection systems are sanitary sewers owned or operated by a municipality that convey 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. Implementation of this proposal would improve the capacity, management, operation and maintenance of municipal sanitary sewer collection systems and improve public notice for SSO events, which would:

- Reduce health and environmental risks by reducing SSO occurrences and improving treatment facility performance
- Protect the nation's collection system infrastructure by enhancing and maintaining system capacity, reducing equipment and operational failures and extending the life of its components.

Among the significant issues that the proposed rule addresses is establishing a definition of Sanitary Sewer Overflow. The rule proposes that a sanitary sewer overflow is an overflow, spill,

release, or diversion of wastewater from a sanitary sewer system. SSOs do not include combined sewer overflows (CSOs) or other discharges from the combined portions of a combined sewer system. SSOs include:

- Overflows or releases of wastewater that reach waters of the United States
- Overflows or releases of wastewater that do not reach waters of the United States
- Wastewater backups into buildings that are caused by blockages or flow conditions in a sanitary sewer other than a building lateral. Wastewater backups into buildings caused by a blockage or other malfunction of a building lateral that is privately owned is not an SSO.

In addition, national standards for reporting SSO events will be clarified by the proposed rule. These include immediate notifications and followup reports within five days for SSOs (including overflows that do not reach waters of the United States) that may imminently and substantially endanger human health; and for SSOs that enter waters of the US, reporting on Discharge Monitoring Reports (DMRs). The permittee must also prepare an annual report of all overflows in the sewer system, including overflows that do not discharge to waters of the United States. The annual report must include the date, the location of the overflow, any potentially affected receiving water, and the estimated volume of the overflow.

By defining what is a Sanitary Sewer Overflow and standardizing reporting requirements, EPA hopes to clarify national standards thereby enhancing inspector's ability to evaluate a permittee's program.

13. 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 past history of SSOs or a system in which overflows may not necessarily be documented, the compliance inspector will rely primarily on the permit 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 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 *CFR* 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. “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)) These steps would include activities critical to the operation and maintenance of the system.

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. 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 which result in fish kills or other significant harm, and overflow events which occur in environmentally sensitive areas.

Prohibition of Unpermitted Discharges

- Discharges to waters of the U.S. 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.

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 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
- 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 onsite 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. Consideration should also be given to the location of SIU connections and the possible effect of such industrial discharges could have when discharged untreated from a SSO. 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. 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 is developing a CMOM guidance related checklist which will be available on the EPA website. Note, EPA has developed an inspection guide for collection systems which incorporates CMOM concepts, *Guide for Evaluating Capacity, Management, Operations, and Maintenance Programs for Sanitary Sewer Collection Systems*, EPA 300-B-00-014, September 2000.

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 Two) 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 nonmunicipally 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 systems monitoring 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 is also useful for collection system inspections. Collection system operators typically deal with manhole cover removal and other physical activities. The inspector should refrain from entering confined spaces unless absolutely necessary and then, only with the proper personal protective (safety) equipment. 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.

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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 (SIU location) • 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.

13. C. References

References

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