Chapter 4

Sanitary Sewer Overflows

What are sanitary sewer overflows and why are they important?

Sanitary sewer overflows (SSOs) are releases of raw sewage from a sanitary sewer collection system before the wastewater reaches the headworks of a wastewater treatment plant. The most immediate health risks associated with SSOs are the release of bacteria, viruses, and other pathogens onto streets and into receiving waters.

What causes sanitary sewer overflows and how can they be reduced or prevented?

SSOs can be caused by many factors, including peak flows that exceed system capacity (wet weather SSOs); blockages; I/I; structural, mechanical, or electrical failure; and third-party actions or activities. Because SSOs have so many causes, good practice would dictate that municipalities implement a comprehensive set of capital and noncapital measures to prevent them. These measures can collectively be referred to as capacity assurance, management, operation, and maintenance (CMOM) programs.

SSOs caused by capacity problems in collection systems are typically addressed through a combination of capital improvements that increase the design capacity of the collection system or treatment plant and remove bottlenecks. Also important are flow reduction measures, including I/I reduction and O&M activities that restore the effective capacity to near the design capacity.

SSOs caused by blockages or structural, mechanical, or electrical failures can be reduced through improved collection system management and effective O&M programs. Such programs can include relatively minor capital improvements, such as providing backup pumps, and noncapital measures like routine sewer cleaning.

Photo courtesy of USEPA OWM

Is it possible that sanitary sewer overflows needs are already included in the documented needs for Categories I, II, III, and IV?

There is no CWNS category specifically for SSO correction. Some of the documented costs reported by the States, particularly in Categories I, II, III, and IV, do include costs for SSO correction. However, EPA was not able to determine what portion of these documented costs could be specifically attributed to SSO control. For example, a community might have an identified

need to expand an existing treatment plant, but EPA could not determine how much of that expansion is needed to accommodate population growth and how much is needed to address SSOs.

Why did EPA use a model to develop sanitary sewer overflow needs estimates for this report?

EPA used a model and included the model's results in this report because the Agency was concerned that the CWNS 2000 documented needs would not fully capture the SSO needs for the Nation. Some municipalities have indicated that they did not submit documented needs for SSO correction, such as I/I correction or sewer rehabilitation/replacement, because of the perceived low priority of these projects. The model is based on reducing wet weather overflows within a collection system to one every 5 years. "One in 5 years" is a level of control that could be reasonably estimated by a model at this time using available information.

In addition, the model includes estimates of the cost of reducing SSOs caused by conditions other than wet weather, such as SSOs caused by blockages or structural, mechanical, or electrical failures.

What are the CWNS 2000 modeled needs estimates for sanitary sewer overflows?

The national estimate for the capacity-related elements of future SSO controls that correspond to achieving one wet weather overflow in a collection system every 5 years is $88.5 billion. This estimate is provided only to give a rough idea of the capital investment required. The actual level of investment needed can be determined only through a case-by-case analysis of each system. The costs of improved system management and O&M activities necessary to actually achieve the desired level of control would be in addition to this estimated cost. The modeled estimates are illustrated geographically in Figure 4-1, and the State-by-State estimates are presented in Table 4-1.

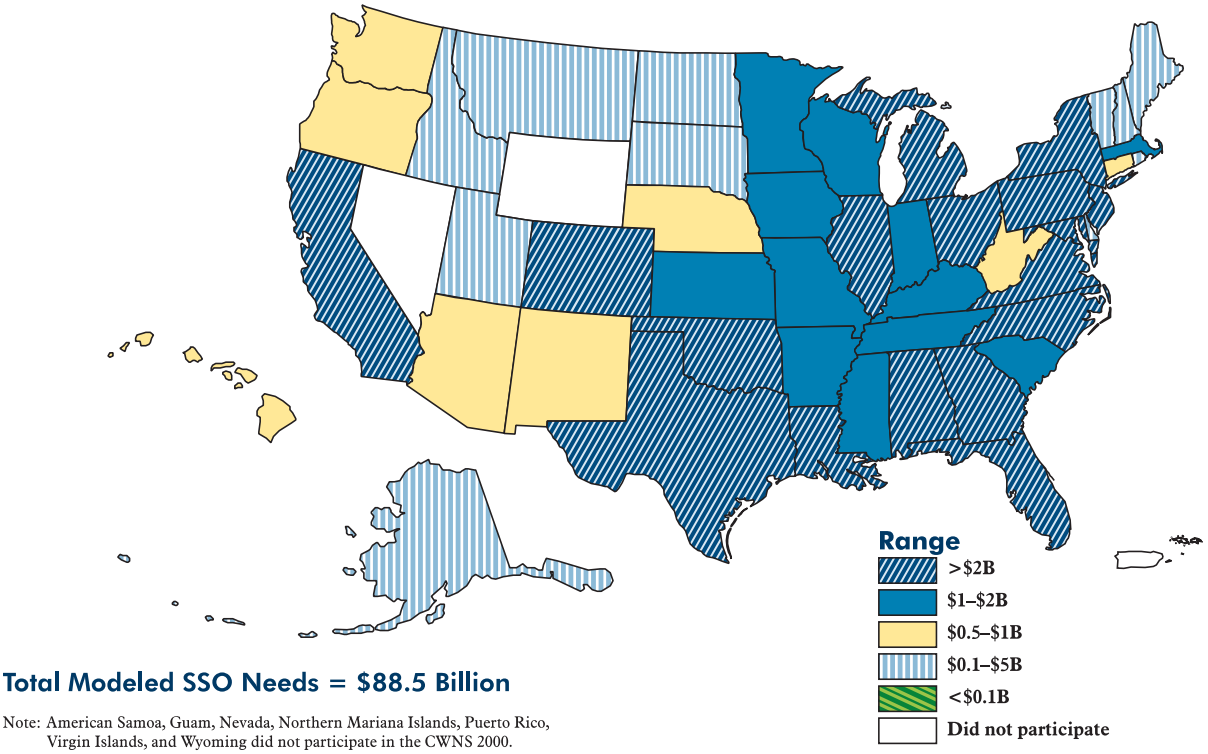

Figure 4-1. State-level needs estimate for one wet weather SSO per collection system in 5 years (January 2000 dollars in billions).

Table 4-1. State-Level Estimates for Capital Investments to Restrict SSOs to One Wet Weather Overflow Per System in 5 Years[a]

State	January 2000 Dollars in Millions	State	January 2000 Dollars in Millions
Alabama	2,440	New Hampshire	268
Alaska	187	New Jersey	3,044
Arizona	540	New Mexico	704
Arkansas	1,432	New York	3,313
California	3,321	North Carolina	2,471
Colorado	2,387	North Dakota	426
Connecticut	798	Ohio	3,688
Delaware	246	Oklahoma	2,533
Florida	5,788	Oregon	677
Georgia	2,995	Pennsylvania	3,813
Hawaii	722	Rhode Island	233
Idaho	287	South Carolina	1,797
Illinois	3,019	South Dakota	436
Indiana	1,040	Tennessee	1,837
Iowa	1,439	Texas	12,876
Kansas	1,292	Utah	454
Kentucky	1,036	Vermont	135
Louisiana	3,112	Virginia	2,237
Maine	239	Washington	923
Maryland	2,330	West Virginia	664
Massachusetts	1,023	Wisconsin	1,846
Michigan	2,456	Wyoming	0[b]
Minnesota	1,509	American Samoa	0[b]
Mississippi	1,346	N. Mariana Islands	0[b]
Missouri	1,847	Guam	0[b]
Montana	275	Puerto Rico	0[b]
Nebraska	971	Virgin Islands	0[b]
Nevada	0[b]	**Total**	**88,452**

[a] The modeled costs were based on information entered into the CWNS database on or before September 5, 2001. This date was chosen because EPA wanted to have estimates available for use in the allocation formula the Agency was to develop for the grant program authorized by the Wet Weather Water Quality Act of 2000. An estimate based on information in the CWNS database a few months later, when the data entry period officially ended (January 31, 2002), was not significantly different.

[b] American Samoa, Guam, Nevada, Northern Mariana Islands, Puerto Rico, Virgin Islands, and Wyoming did not participate in the CWNS 2000.

What are the limitations of the modeled sanitary sewer overflow estimates?

Caution must be exercised in using the modeled SSO estimates for the following reasons:

- The modeled needs should not be added to documented needs because the documented needs for Categories I, II, III, and IV might already include costs to address SSOs.
- The model was developed to provide national and state-level estimates of SSO needs. It would be inappropriate to use the model to develop facility-by-facility estimates because facilities must be evaluated individually.
- The model generated a capital cost estimate for every separate sanitary sewer system for which data were available from the CWNS 2000 database, regardless of whether other information did not support the existence of SSO problems.
- The modeled cost reported here does not include an estimate of the cost for improved collection system management and O&M, which can be a significant factor in reducing or eliminating SSOs.
- The model provided an estimate of a combination of I/I correction, increased storage capacity, and increased treatment capacity. It is not possible to separate out the costs for each of these elements.
- The cost estimates provided by the model give only a rough idea of the order of magnitude of investment needed for municipal sanitary sewers.
- The model used only five rainfall regions for the entire United States.
- The model assumed that additional storage is available across the entire collection system.