

Technologies for CSO and SSO Control

Stakeholder Meeting

June 24-25, 2003



Congressional directive

- **The Administrator of the Environmental Protection Agency shall transmit to Congress a report summarizing:**

... an evaluation of the technologies used by municipalities to address these impacts

Overview of key data sources

- **Extensive literature reviews**
- **Existing EPA documentation**
 - ▶ **Fact sheets**
 - ▶ **Technical reports**
 - ▶ **Products of cooperative agreements**
- **Interviews with municipal officials**
- **Meeting with key EPA staff in other offices**
- **Informal peer review by internal and external experts**

Methodological approach

- **Data analysis**
 - ▶ **Identify common and promising technologies used by municipalities to control CSOs and SSOs**
 - **Interviews with municipal officials**
 - **Extensive literature review**
 - ▶ **Develop technology descriptions summarizing available technologies and factors influencing their effectiveness**
 - **Existing EPA reports**
 - **Extensive literature review**

Methodological approach

● Data analysis

- ▶ Describe recent technological innovations that show promise in controlling CSOs and SSOs
 - Meetings with key staff in other EPA offices
 - Extensive literature review

Methodological approach

● Outreach

- ▶ Informal peer review of technology descriptions
 - Experts within and outside EPA

● Data considerations

- ▶ Relied on existing information to characterize performance
- ▶ Difficult to compare certain types of technologies

Key research questions

- What technologies have been used by municipalities to control CSOs and SSOs?
- What factors influence the effectiveness of these technologies?
- Have there been any recent technological innovations that have shown real promise in the control of CSOs or SSOs?

What technologies have been used to control CSOs and SSOs?

- Wide-range of technologies available
- Grouped technologies into five key categories:
 - ▶ Operations and maintenance activities
 - ▶ Collection system controls
 - ▶ Storage facilities
 - ▶ Treatment technologies
 - ▶ Low impact development techniques

Operation and maintenance practices

- Sewer cleaning and flushing
- Sewer inspection and testing
- Source control and pollution prevention
- Reporting and public notification



Operation and maintenance practices

Technology	Type of System	Relative Cost	Pollutants/Problems Controlled
Cleaning & flushing	CSS, SSS	\$\$	BOD, TSS, nutrients, toxic substances, pathogens, floatables
Inspection & testing	CSS, SSS	\$	I/I
Pollution prevention	CSS, SSS	\$	Nutrients, toxic substances, peak wet weather flow rate
Reporting & public notification	CSS, SSS	\$\$	Pathogens

Collection system controls

- Maximizing flow to the treatment plant
- Inflow reduction
- Manhole repair and rehabilitation
- Sewer repair and rehabilitation
- Private lateral repair and rehabilitation
- Sewer separation
- Monitoring and real-time control

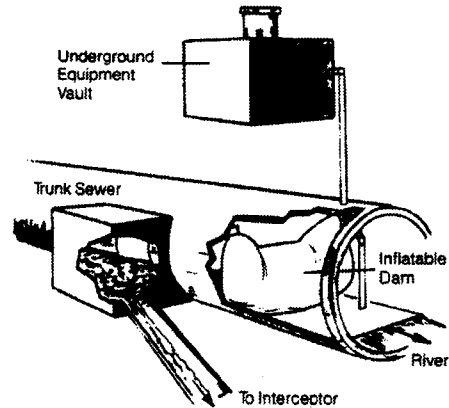


Collection system controls

Technology	Type of System	Relative Cost	Pollutants/Problems Controlled
Maximizing flow to the treatment plant	CSS, SSS	\$	BOD, TSS, nutrients, toxic substances, pathogens, floatables
Inflow reduction	CSS, SSS	\$	I/I, peak wet weather flow rate
Manhole rehabilitation	CSS, SSS	\$\$	
Sewer rehabilitation	CSS, SSS	\$\$	
Private lateral rehabilitation	CSS, SSS	\$\$	
Sewer separation	CSS	\$\$\$	I/I, peak wet weather flow rate
Monitoring and real-time control	CSS, SSS	\$\$	Peak wet weather flow rate

Storage facilities

- In-line and collection system storage
- Off-line storage
- On-site storage and flow equalization basins

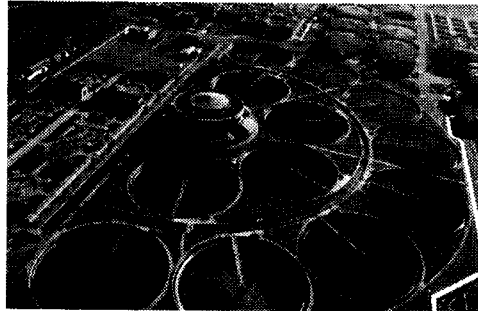


Storage facilities

Technology	Type of System	Relative Cost	Pollutants/Problems Controlled
In-line and collection system storage	CSS, SSS	\$\$\$	Peak wet weather flow rate, BOD, TSS, nutrients, toxic substances, pathogens, floatables
Off-line storage	CSS, SSS	\$\$\$	
On-site storage and flow equalization basins	CSS, SSS	\$\$	

Treatment technologies

- Supplemental treatment
- Plant modifications
- Disinfection
- Vortex separators
- Floatables control

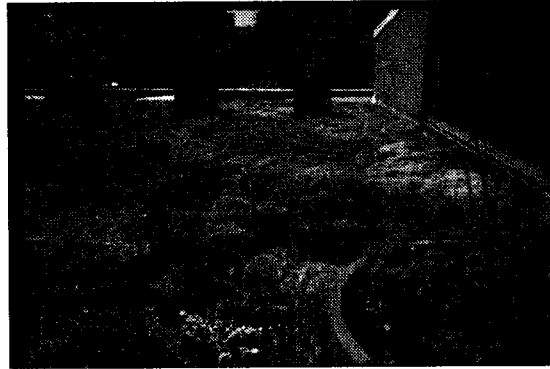


Treatment technologies

Technology	Type of System	Relative Cost	Pollutants/Problems Controlled
Supplemental treatment	CSS, SSS	\$\$\$	Peak wet weather flow rate, BOD, TSS, pathogens
Plant modifications	CSS, SSS	\$\$	Peak wet weather flow rate, BOD, TSS
Disinfection	CSS, SSS	\$\$\$	Pathogens
Vortex separators	CSS	\$\$	TSS, floatables
Floatables control	CSS	\$\$	Floatables

Low impact development techniques

- Porous pavement
- Green roofs
- Bioretention
- Water conservation



Low impact development techniques

Technology	Type of System	Relative Cost	Pollutants/Problems Controlled
Porous pavement	CSS	\$	Peak wet weather flow rate
Green roofs	CSS	\$	
Bioretention	CSS	\$	
Water conservation	CSS, SSS	\$	

Technologies used

- **CSO control tends to rely heavily on structural controls.**
 - ▶ Sewer separation (~1/2 of communities)
 - ▶ Storage facilities (~1/3 of communities)
- **SSO control tends to rely heavily on collection system controls.**
 - ▶ Inflow reduction
 - ▶ Sewer rehabilitation

Technology effectiveness

- **Enhanced operations and maintenance practices have proven effective in eliminating dry weather overflows from both combined and sanitary sewer systems.**
- **Technologies must be carefully selected to match site-specific requirements with technical capabilities.**

Recent innovations

- The majority of recent technological innovations related to CSO and SSO controls have enhanced existing practices, rather than developing new technologies.
- Improved information management systems support the selection of appropriate technologies and their cost-effective application.

Conclusions

- Technology descriptions will serve as foundation for *Technology Clearinghouse*, also required by the Wet Weather Water Quality Act of 2000.