

SAWS SSO Reduction Program and Consent Decree: Lessons Learned at the Halfway point

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ABSTRACT

Summary:

This presentation will provide information on the background/history of the San Antonio Water System (SAWS) Wastewater Collection and Treatment systems, provide background and key considerations during the Sanitary Sewer Overflow (SSO) Consent Decree (CD) process, discuss four phases associated with SAWS CD, provide lessons learned, and program effectiveness.

1. SAWS Background/History

- Water & Wastewater for the 7th largest city in the nation
- Over 360 miles Large Diameter (24-inch & greater) & 4,900 miles of Small Diameter sewer mains
- Approximately 100,000 manholes, 300 siphons, and 80 miles of force mains
- 156 Lift Stations & 3 Treatment Plants treating about 140 mgd
- Wastewater Trifecta
 - a. Digester Gas sold through public-private partnership
 - b. Biosolids management
 - c. Largest direct recycled water system in the United States

2. Consent Decree

- A 'Section 308' Letter is usually the first step in the CD Process
- In 2013, an SSO CD was lodged and subsequently entered into between SAWS and EPA.
- There are more than 40 cities in the US addressing SSOs as part of a CD
- CD and SSO reduction are comprehensive programs that require both Operation & Maintenance and Capital Investment

3. Objectives

- Reduce SSOs and comply with the CD
- Implement optimized and sustainable business practices and systems

- Enforce standards and ordinances to protect the infrastructure and the environment
- Continue to aggressively enhance operations and maintenance programs and capital improvement projects managing both capacity constraints and condition issues

4. Major Phases of the CD

- Assess: Pipes with high risk characteristics and capacity constraints (2013-2016)
- Plan: Complete alternative analysis to determine remedial measures (2017 & 2018)
- Report: Submit Condition and Capacity Assessment Reports (2018) and Remedial Measures Plan (2019)
- Rehab: Complete construction of projects by 2023/2025 (ongoing)

5. Assess

In the first 4 years of the CD, SAWS was required to perform both Capacity and Condition Assessments of sewer mains to help identify areas within the system that have caused or significantly contributed to previous SSOs, and/or are likely to cause or significantly contribute to the future occurrence of SSOs.

SAWS utilized closed circuit television (CCTV), sonar, and Pole Camera inspection methods to complete the Condition Assessment of the “High Risk Pipe”. Each pipe was assessed and rated “A-E” with “A” meaning good condition and “E” meaning very poor condition. The Capacity Assessment was completed using data obtained from flow meters, field verifications, and evaluation of the hydraulic model of our system.

6. Plan

The Planning Phase includes performing Alternative Analysis to identify the best option to address the structural defect or capacity constraint identified during the assessment phase. SAWS will select the most practical solution to resolve, considering both long-term performance and the life-cycle cost. Projects will be prioritized and scheduled to include cost forecasting. SAWS has three major basins, and hired two Basin Planning Consultants (BPCs) to evaluate and plan projects using a basin-wide, holistic view. There are 2 phases to the BPC Project: 1) 10% Design: Evaluate alternatives and complete a preliminary design. Provide a recommendation to SAWS on the “best” alternative, and 2) 30% Design: Conduct field verification, evaluation and complete 30% Design on the SAWS selected alternative.

The goal of the BPC is to complete all work within two years, identify the best alternative, and ensure all projects are buildable, operable and maintainable (no fatal flaws, hydraulics work, etc.). The BPCs will evaluate how we fix the problems identified (repair, replace, rehab, reroute, or store).

During the Planning Phase, SAWS implemented an aggressive Inflow and Infiltration Reduction Program. The purpose of this Program is to address a major issue adversely affecting our system during heavy rains. The program is comprised of 3 components: 1) Flood Plain Analysis, 2) Windshield Survey, and 3) Manhole Lid & Frame Leakage Testing. This Program is significant because inflow reduction is a critical element of our capacity program.

7. Report

SAWS was required to complete the Assessment Phase by July of 2017 and submit the results in a Condition and a Capacity Assessment Report to EPA on January 22, 2018. One year later, SAWS is required to submit the Remedial Measures Plans for both Condition and Capacity.

8. Rehab

SAWS is required to rehab “E” rated condition defects and confirmed capacity constraints for which Alternative Analysis identifies rehab/replacement as the selected alternative. All projects must be completed by 2023, or 2025 for Large Diameter pipe with easement issues.

9. Lessons Learned

Form a Dedicated Team:

So how do you create a program to reduce sewer spills? Our first approach was to gather input from industry experts on ‘Who does this better – and how?’ We visited top performing utilities such as San Diego CA and Clark County, NV. We studied their programs and learned from their experiences. We then formed a Team dedicated to SSO reduction including staff from all levels of SAWS consisting of managers, engineers, and combo operators.

What we learned is that the most important thing we can do is constantly assess and clean our sewer lines. One of the most important elements of assessment is the root cause analysis of each SSO. Our SSO reduction program is designed to focus on inspecting, televising, and cleaning sewers. This process allows us to identify problems in the sewer system that we can repair or maintain.

Develop Contracts for Support:

Due to timeline requirements with most CDs, we had to hit the ground running and enhance existing resources. This usually requires the development of a work load/staffing plan. The first part of the CD is mainly O&M/assessment. The second part is focused on fixing the issues identified using Capital Improvement Funds. Contracts included cleaning, CCTV inspection, point repairs, and a Program Manager. The final part of the Program is the development of the Remedial Measures Plan which requires engineering support.

Reporting Requirement & Data Management

The CD has numerous reporting requirements that include initial submittals (e.g. CMOM, SSORP) along with weekly, monthly and annual reports. Document control and tracking is paramount for a successful program.

Capacity

SAWS installed and managed data from over 270 sewer flow meters throughout the system during the peak of the Capacity Assessment Program. We also had 35 rain gauges installed throughout the system. This data is being used to enhance the calibration of an existing hydraulic model. It is also being used along with other field techniques to verify capacity constraints. Field verification is a key component of the program; it helps to ensure that the capacity constraints being addressed are actually issues identified in the field.

Fats, Oils and Grease Control Program (FOG)

Cleaning, Enforcement and Education are all key elements for a successful FOG Program. Grease related SSOs are one of the highest causes of SSOs and the FOG Program should focus on known grease generators to reduce FOG from entering into your system. SAWS has implemented a tiered inspection program to allow more focus on known problem areas.

Clean the Right Pipe at the Right Time

SAWS is asset based and every pipe has its designated cleaning frequency (1, 3, 6, 12, 24, 60 and 120 month) based on information obtained during cleaning operations. Removed material is evaluated and rated light, medium, or heavy for grease, debris, and roots. Cleaning frequencies are adjusted based on the cleaning observations recorded by the combo operators.

CCTV Inspection/Eliminating “Hot Spots”

Resources are focused on high risk pipe and areas of known issues. SAWS performs a “condition analysis” of each pipe after reviewing CCTV video. Assets are scored “A” through “E” based on the condition and each pipe is then placed in one of three buckets: maintain (through cleaning), monitor (CCTV Scheduled), or rehabilitation/replacement.

Remedial Measures/Smart Cover Program

Once a project is handed over to Engineering for rehab, it is important to ensure the asset(s) are still managed until construction occurs. SAWS uses Smart Covers to “babysit” assets awaiting design and construction, areas that have a known problematic maintenance issue such as high grease areas, and capacity constraint areas along with flow meters. Smart Covers alarm when the water rises to a pre-determined level indicating an issue. SAWS then dispatches crews to investigate the problem.

Cost

The anticipated cost of the CD is \$1.3 billion over the life of the CD.

10. Program Effectiveness

SAWS has reduced SSOs 60% since 2010. In 2014 we were at 196 SSOs or 3.7 SSOs/100 miles of pipe. As shown SAWS demonstrated amazing success during the earlier years of the SSO Reduction Program. In 2015 and 2016 downward trends shifted due to the large amount of rain which created an upward trend of inflow related SSOs. In 2017, we experienced another shift with continued downward trends setting a new record of 193 SSOs since the start of the program. This is proof that the Programs developed and implemented have made a significant difference.

Remember, SSO reduction is a process that only achieves success over the long term implementation of best management practices.