

Sanitary Sewer Overflow Prevention



Presented to
NCTCOG SSO Workshop

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Overview

- What is a SSO?
- Wet Weather Induced SSOs
- Dry Weather SSOs
- Industry Practices for Collection System Maintenance
- Municipal Perspective
- Conclusions

What is an SSO?

Regulatory Definition

- **An SSO is a type of unauthorized discharge of untreated or partially treated wastewater from a collection system or its components (e.g., a manhole, lift station, or cleanout) before it reaches a wastewater treatment facility.**
- **SSOs can occur if there is significant inflow/infiltration, the collection system is poorly operated and maintained, or the system lacks adequate capacity to collect or store flows for treatment, or to treat them.**



SSO Prevention

The impossible objective....

1. The 1972 Clean Water Act also set as a lofty goal the "zero discharge" of **pollutants** into the nation's waters by 1985.
2. Today, EPA and TCEQ acknowledge SSOs can occur but the goal should be for elimination (still impossible)
3. In reality, actions can be taken to reduce SSOs but there are no actions that will ensure no SSOs

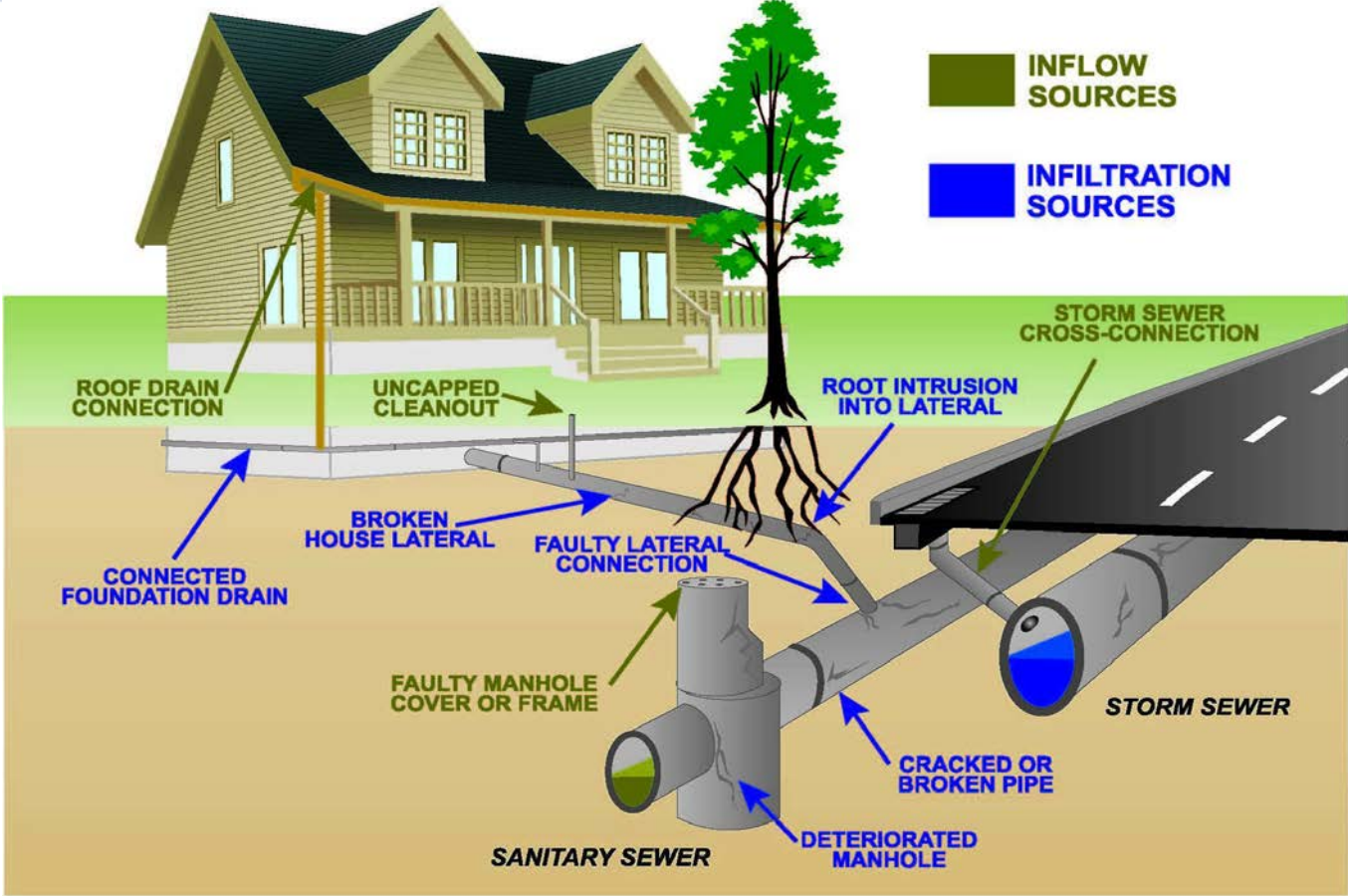
Why do SSOs Occur?

Cause of SSOs	Intuitive Solutions
Capacity restriction downstream	Install larger pipe or reduce groundwater leakage into pipe
Blockages in conveyance	Eliminate blockage or source of blockage (FOG, roots)
Unforeseen or unanticipated collection system failures	Establish redundancy, remote system monitoring, and improve foresight by defining asset condition and expected failures
Extraordinary events	Power redundancy, emergency response plan, on call contractors

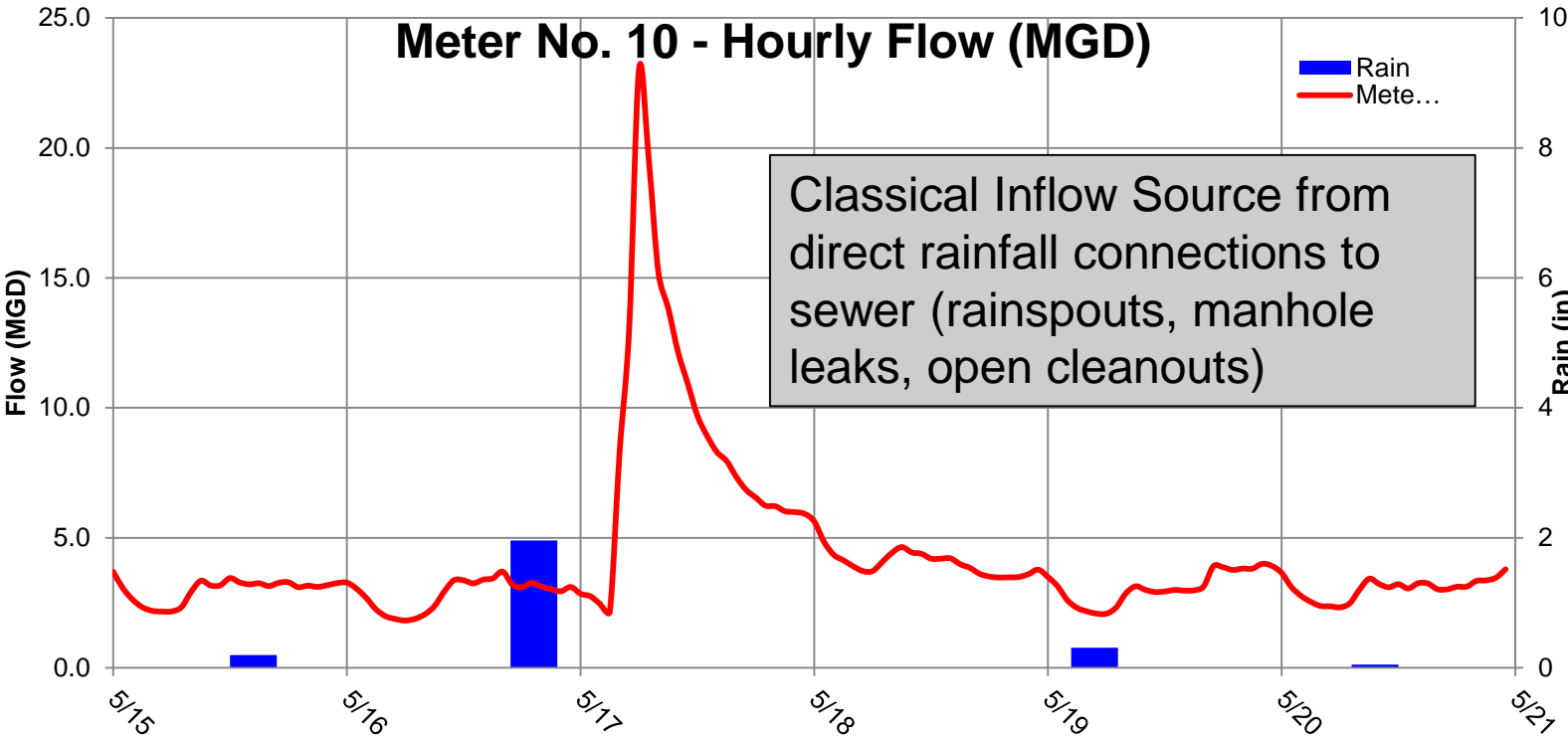
Types of SSOs

1. Wet weather SSO- A SSO that is triggered through I/I impacts following wet weather events
2. Dry weather SSO- A SSO that is triggered by a reduction in existing pipeline capacity due to either fats, oils, and grease (FOG) or other obstructions to flow or a system failure

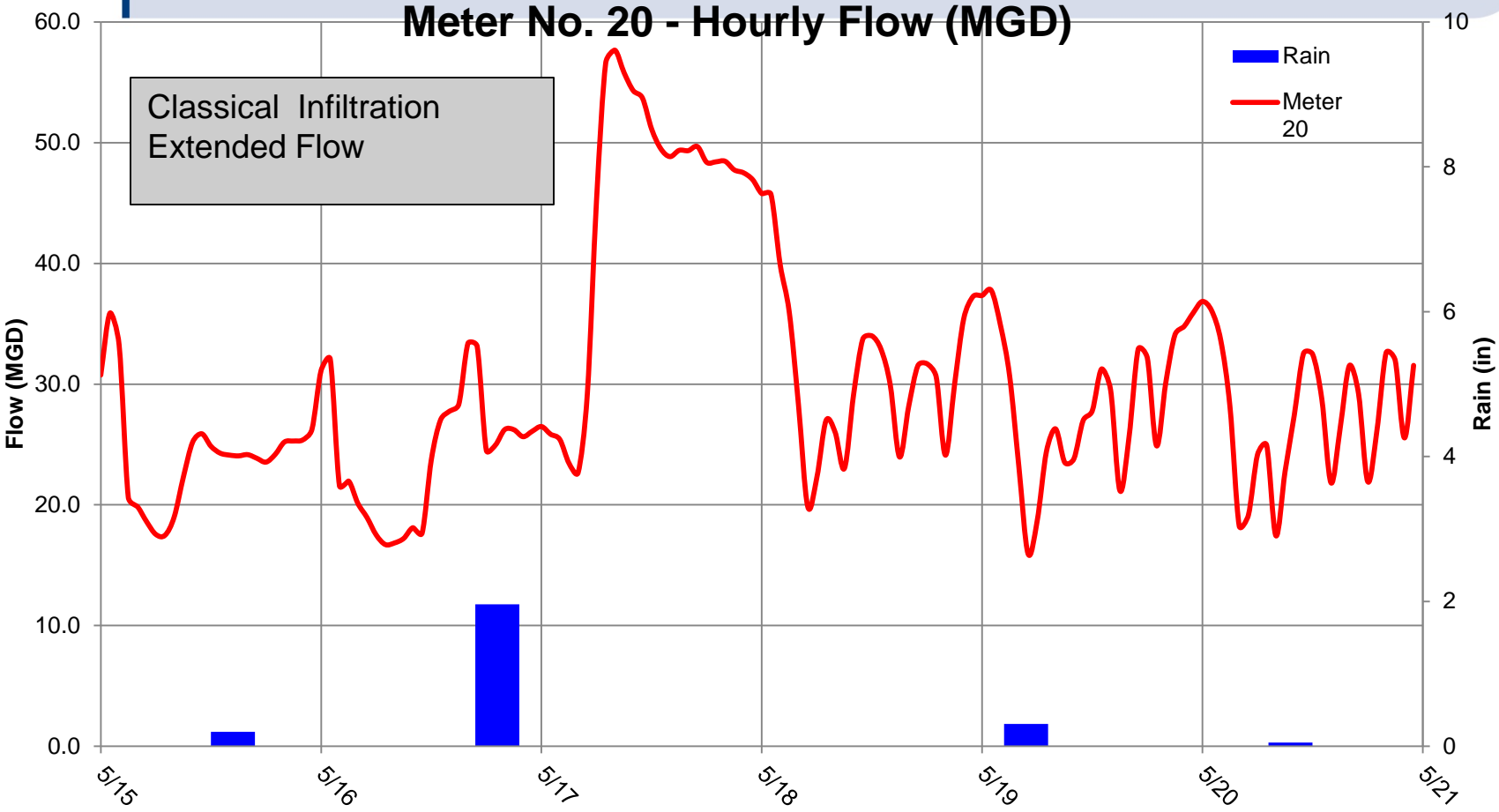
Types of SSO Sources



Approach to Wet Weather Induced SSO

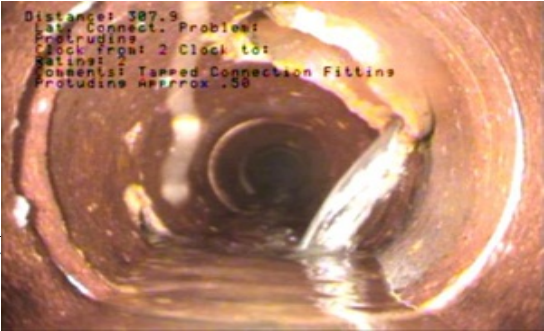
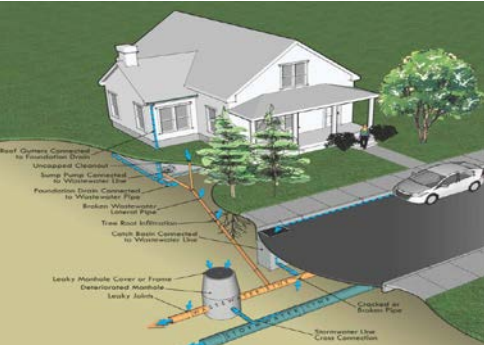


Approach to Wet Weather Induced SSO



Approach to Wet Weather Induced SSO

Diagnostic Toolbox	Relative Cost (\$- Low/Medium/High)
Smoke testing	Low, essential toolbox in municipalities
Flow measurement	Medium, common in larger city toolboxes
Pipeline inspection	Medium, common in larger city toolboxes
Hydraulic capacity analysis	High, typically outside services



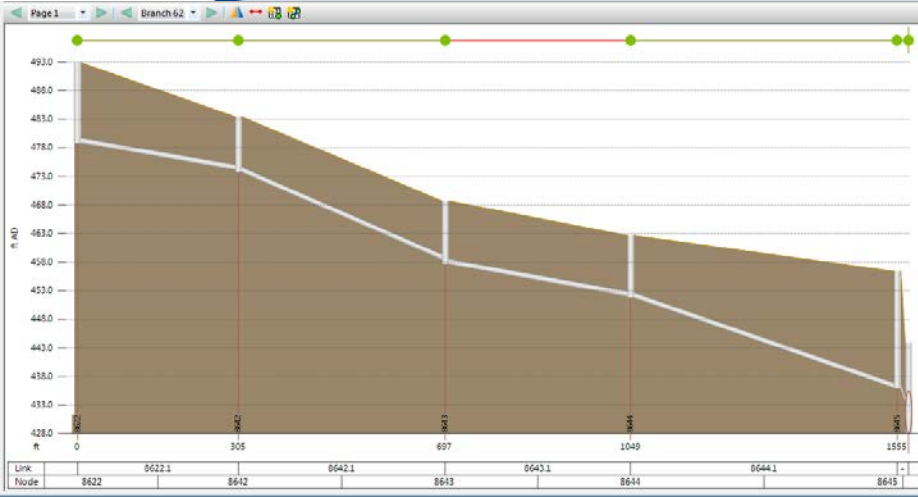
Approach to Wet Weather Induced SSO

Diagnostic Toolbox	Findings and Degree of Actionable Solution
Smoke testing	Locations of inflow, allows for enforcement of city ordinances on removal of roof drains and cleanout openings
Flow measurement	Flow characterization for relative understanding of source and possible understanding of capacity utilization of pipelines
Pipeline inspection	Identification of specific defects and may allow for root removal, FOG programs, line repair
Hydraulic capacity analysis	Holistic understanding of what capacity is needed to prevent capacity exceedance and identification of pipeline improvement to reduce SSO potential

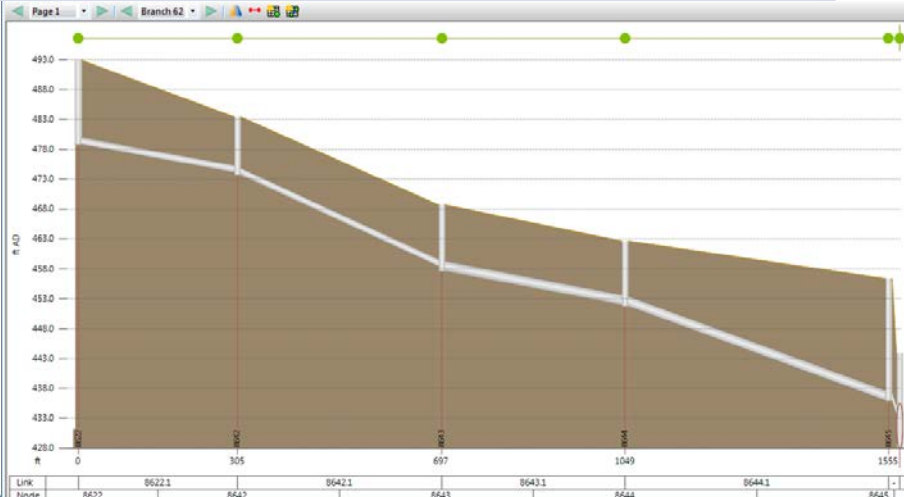


Approach to Wet Weather SSOs

Operating a Successful Business Model



Step 1- Create system in model



Step 3- Change downstream pipe size



Step 2- Load predicted flows



Step 4- Confirm HGL is below surface

Approach to Wet Weather Induced SSOs

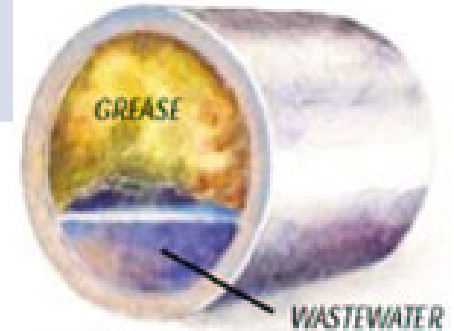
Solutions for Wet Weather SSOs

- **More capacity**
 - New pipeline or pipe burst existing pipeline
- **Elimination of capacity losses**
 - Remove I/I component
 - Remove sand/silt buildup with cleaning
 - Remove obstructions
- **Improve reliability**
 - Programmed cleaning
 - Programmed system review

Approach to Dry Weather SSOs

■ Diagnostic Toolbox

- Inspection
- CCTV or internal inspection



Approach to Dry Weather SSOs

Diagnostic Toolbox	Findings and Degree of Actionable Solution
Inspection	Identification of wax or grease buildup allows for execution of FOG or program for more frequent cleaning
Pipeline inspection	Identification of contributing effects from oil and grease, roots, or poor pipe condition as well as combination of multiple effects allowing for root removal programs, FOG programs, and/or pipeline repair

ASCE Collection System Optimization Of Maintenance Activities

- Established SW US regional characteristics:

- 21 feet sewer/capita or

0-10 YR	11-20 YR	21-50 YR	51-100 YR	> 100 YR
21.90%	23.40%	40.50%	13.30%	0.90%

- Peak to Average Ratio
 - 2.24 avg. peak flow to ADF

ASCE Collection System Optimization Of Maintenance Activities

- Sewer Cleaning- 0.38 Miles cleaned annually/Miles of System

- **Inspection Frequencies as Per Cent of Total System**

	1YR	5 YR	10 YR	20 YR
Flow Evaluation	32%	67%	106%	170%
Manhole Inspection	44%	186%	334%	598%
Smoke/Dye Testing	1%	17%	23%	34%
CCTV Inspection	10%	27%	35%	43%

SSO Prevention Considerations

■ Incentives- Public Impacts/Nuisance/ Safety

Tale of three metroplex cities late November 2015

- *Anytown reports two major sewage spills caused by the weekend's heavy rain*
- *Several sewage spills over weekend did not harm Anytown's public water supply, city says*
- *Record rains resulted in five 100,000-gallon 'domestic sewage' overflows in Anytown*

SSO Prevention Considerations

- Cost incentive
 - One SSO
 - \$ Mobilization of city staffing
 - \$ Barricade or monitoring
 - \$ Repair if required
 - \$ Diagnostic cost for cause
 - \$ Cost for permanent correction
 - \$ Increased wastewater treatment (power costs)

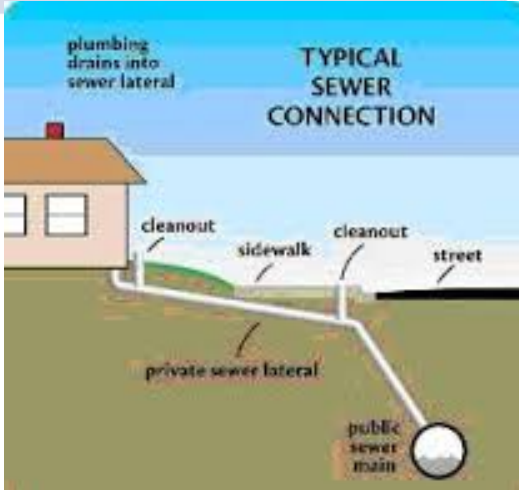
SSO Prevention Considerations

- Regulatory Incentive
 - TCEQ SSOIs
 - EPA prerogative to act when TCEQ is ineffective
- Fines if no action



SSO Prevention Considerations

- Challenges
 - Private sewer laterals (outside of control)
 - Unusual weather events



Climate

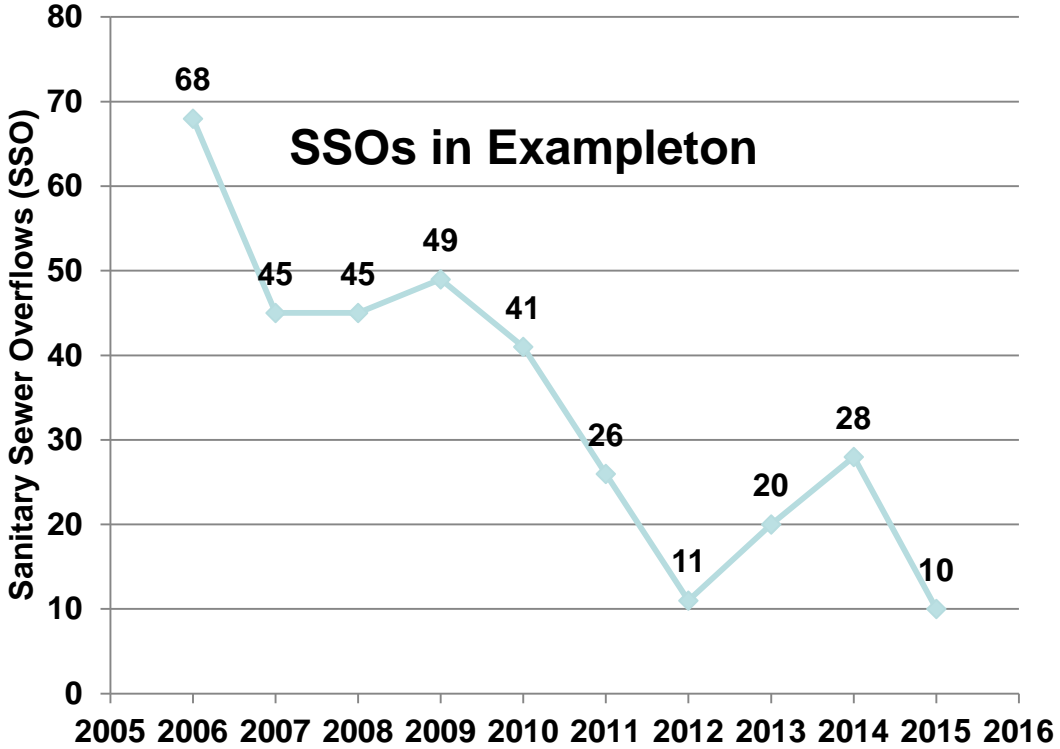
Monster El Nino expected to shape this winter's weather

Municipal Perspective

1. City's Have been successfully using capacity assurance for last twenty years to reduce wet weather SSOs, HOWEVER, SSOs have not stopped.
2. Exampleton is a city in DFW metropolplex with population over 100,000. In Exampleton, approximately 85% of SSOs are dry weather SSOs.
3. City has undertaken three strategies:
 - a. High frequency cleaning in problem areas prone to dry weather SSOs such as multi family high density, flat pipelines, tree root intrusion;
 - b. City has aggressively marketed its program for FOG reduction; and
 - c. City has begun remote monitoring flow levels inside manholes

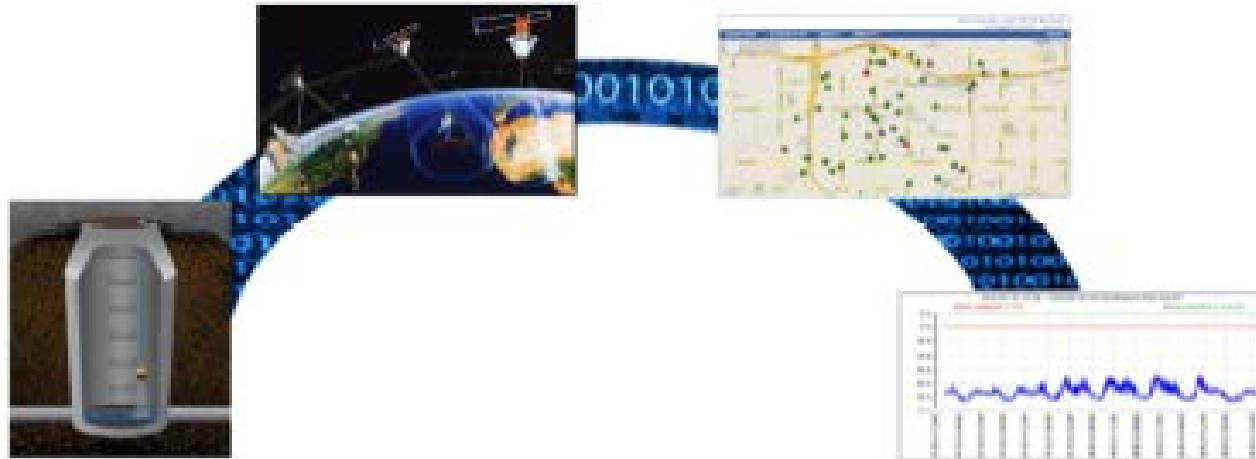
Municipal Perspective

1. Preventative maintenance at 30, 60, and 90 day cleaning cycles
2. 2008- added crew for preventative maintenance, cleaning lines throughout basins in advance of any problems
3. 2011- Smart Covers for use in dispatching crews in advance of SSOs
4. 2012- Root control and inhibition program
5. 2012- oxygen injection and fat emulsification system at lift stations



Municipal Perspective New Developments in SSO Prevention

- Example Tools Being Deployed
 - Increased vigilance during new construction
 - Improved Community FOG Awareness
 - Green Project funding for I/I
 - Smart Cover for mobilization



Conclusions

1. SSOs can be reduced but not eliminated
2. Once the causes are known, there are corrections that can be used specific to the problem
3. EPA continues to monitor Texas TCEQ progress in reducing SSOs with the potential to step in when it deems necessary

SSO Prevention Is a Journey, Not a Destination

Questions?

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