When MOM is Happy, Everyone is Happy!

NEWEA Collections Specialty Conference
September 10, 2014

Sean FitzGerald, Vice President, PE

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AGENDA

- MOM background and introduction
- MOM Program Components
  - Management
  - Operation
  - Maintenance
- Implementation Examples
- Key Takeaways

MOM
MANAGEMENT, OPERATION, AND MAINTENANCE

- MOM originated in Region 4 EPA to help utilities reduce overflows
- Incorporated into proposed SSO Rule in 2000 but never promulgated
- Currently being incorporated into Consent Orders and NPDES Permits
- USEPA is considering making CMOM mandatory for all NPDES Permits

MOM
MANAGEMENT, OPERATION, AND MAINTENANCE

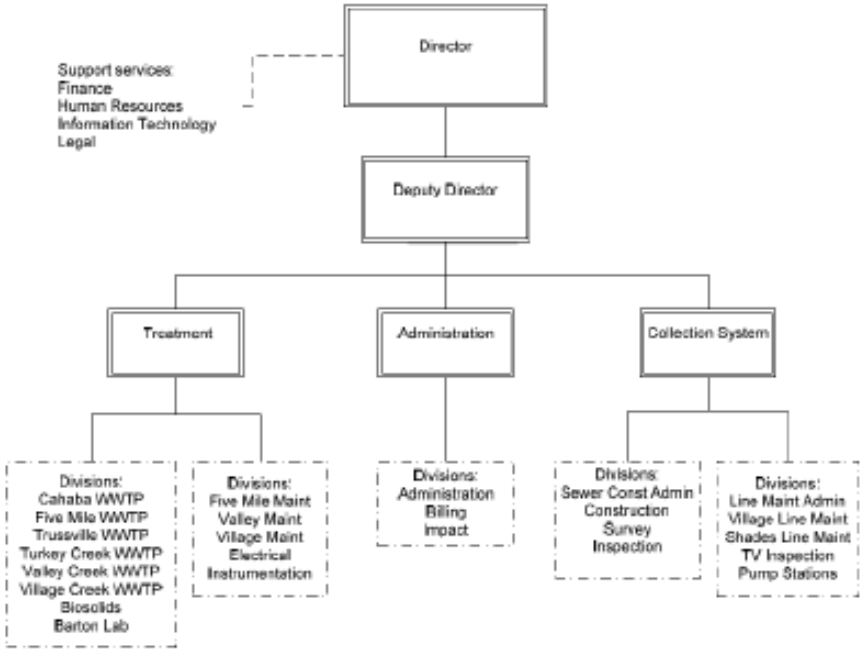
What is it?: Good Business Practice

- Structured approach to evaluate collection system management, operation, and maintenance
- Document and records review
- Staff interviews
- Observation of field practices
- Development of prioritized implementation plan
- Thorough assessment of means and methods to manage, design, build, operate and maintain wastewater collection system

MOM - MANAGEMENT, OPERATION, AND MAINTENANCE

Management -

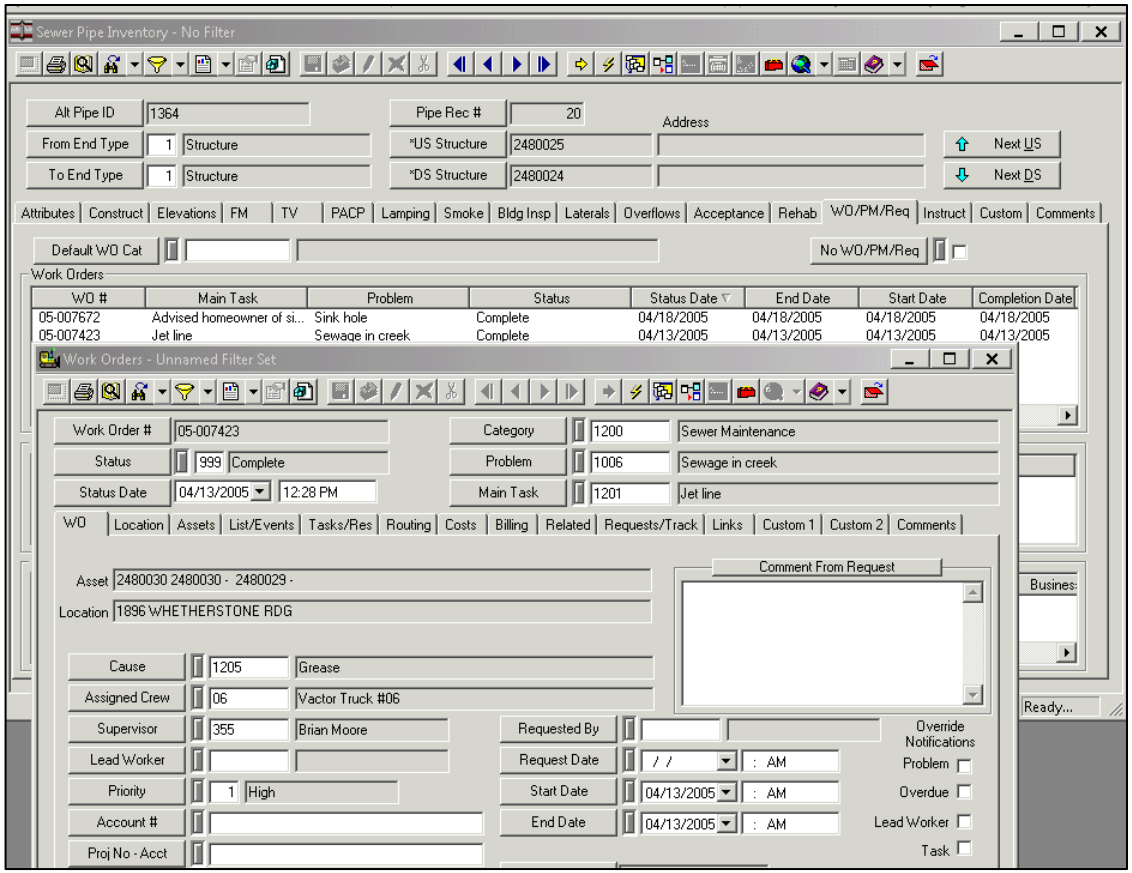
- Organizational structure
  - Clear organization chart
  - Enough staff to support program
  - Robust job descriptions
- Training
  - Adequate training necessary to perform operation and maintenance activities
  - PACP, cleaning, safety
  - Document!
- Communication and Customer Service
  - Public relations (customers, communication, feedback)
  - Fact sheets, web site



MOM - MANAGEMENT, OPERATION, AND MAINTENANCE

Management -

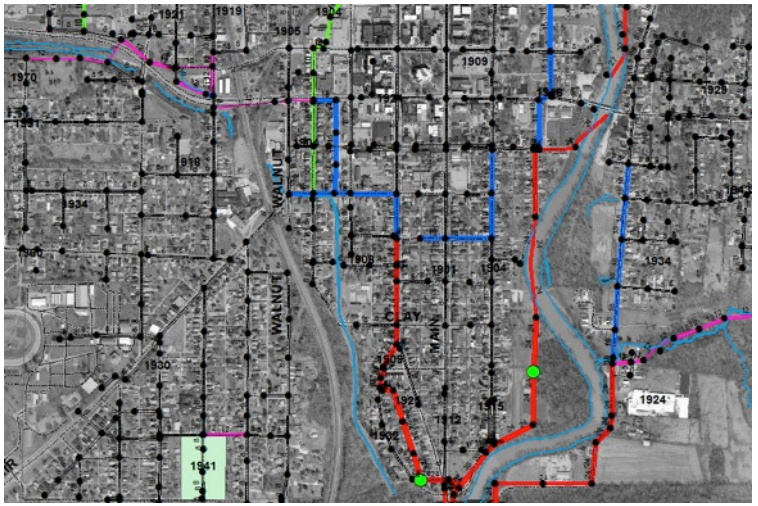
- Asset Inventory
- Management Information Systems
  - Work order management (CMMS)
  - GIS
- SSO Notification
- SORP
- Design standards
- Legal authority
  - Sewer ordinances
  - FOG



MOM - MANAGEMENT, OPERATION, AND MAINTENANCE

Operation -

- Budgeting
  - Adequately fund operations (supported by CMMS data)
- Monitoring of discharges into collection system and SSOs
- H2S monitoring and corrosion control
- Safety and Emergency response
- Modeling and mapping
- Pump station operation



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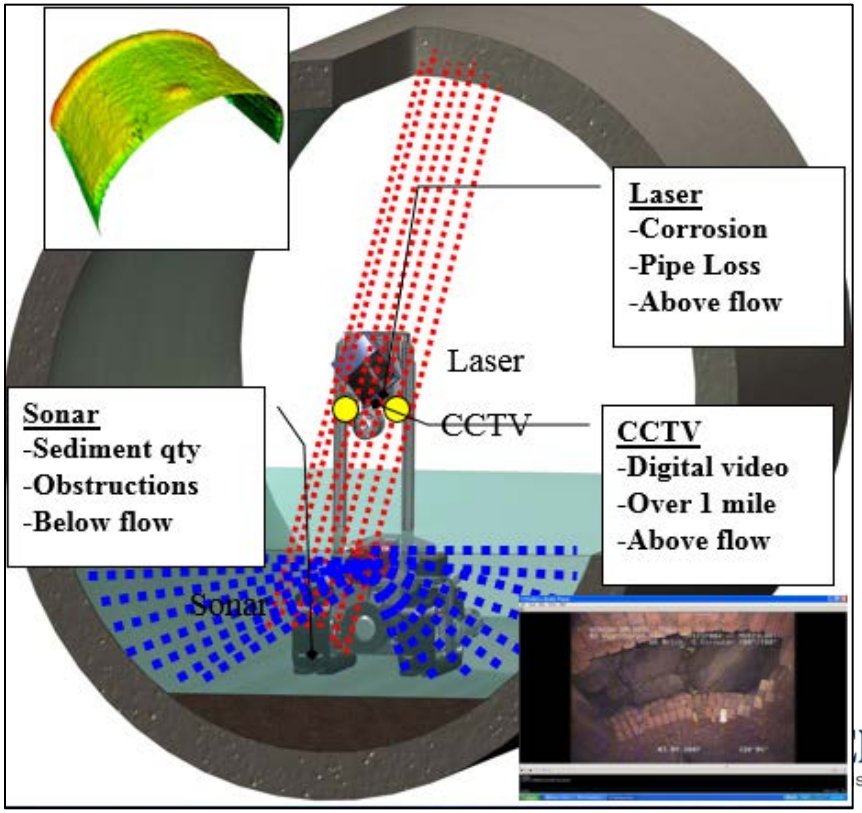
Maintenance -

- Budgeting
  - Adequately fund maintenance (supported by CMMS data and risk-based planning)
- Cleaning
  - Targeted and prioritized
- Pump station inventory
- Pump station maintenance
- Condition assessment



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MANAGEMENT, OPERATION, AND MAINTENANCE

Steps:

- Conduct self evaluation
  - EPA checklist
- Develop gap analysis
- Develop MOM program
- Develop metrics and measures
- Develop plan and schedule
- Implement and measure

GUIDE FOR EVALUATING CAPACITY, MANAGEMENT, OPERATION, AND MAINTENANCE (CMOM) PROGRAMS AT SANITARY SEWER COLLECTION

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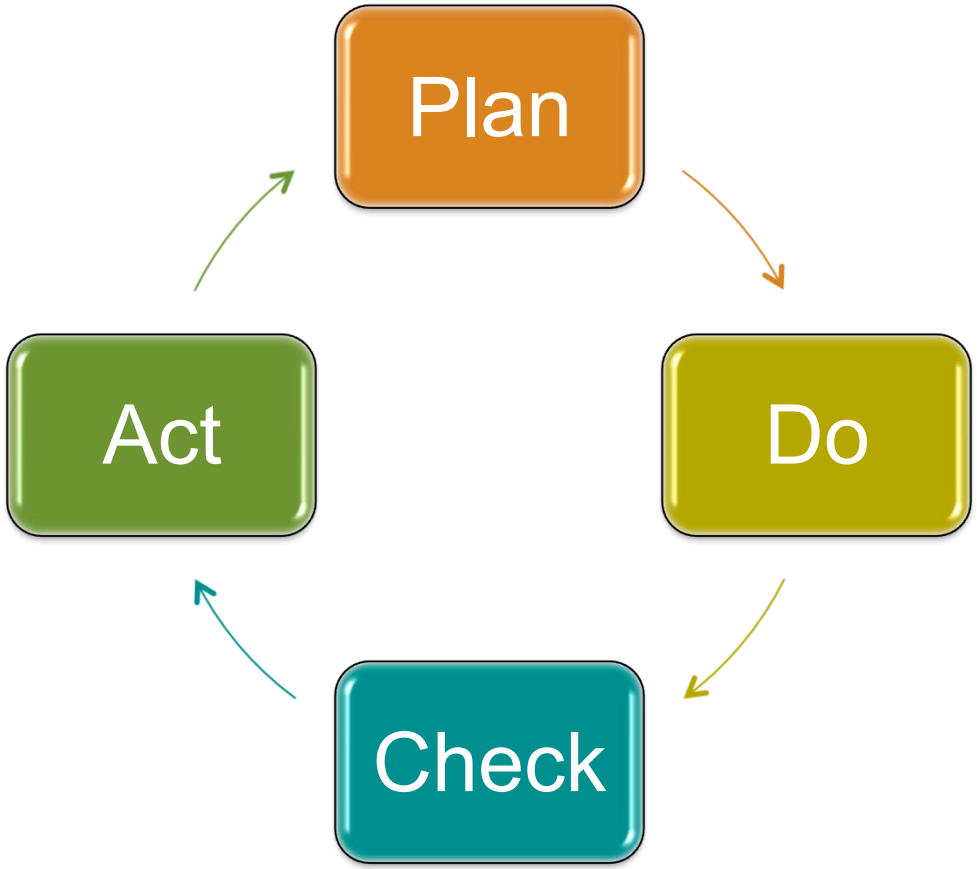
What is it?:
Continuous Improvement

And it's…

Asset Management



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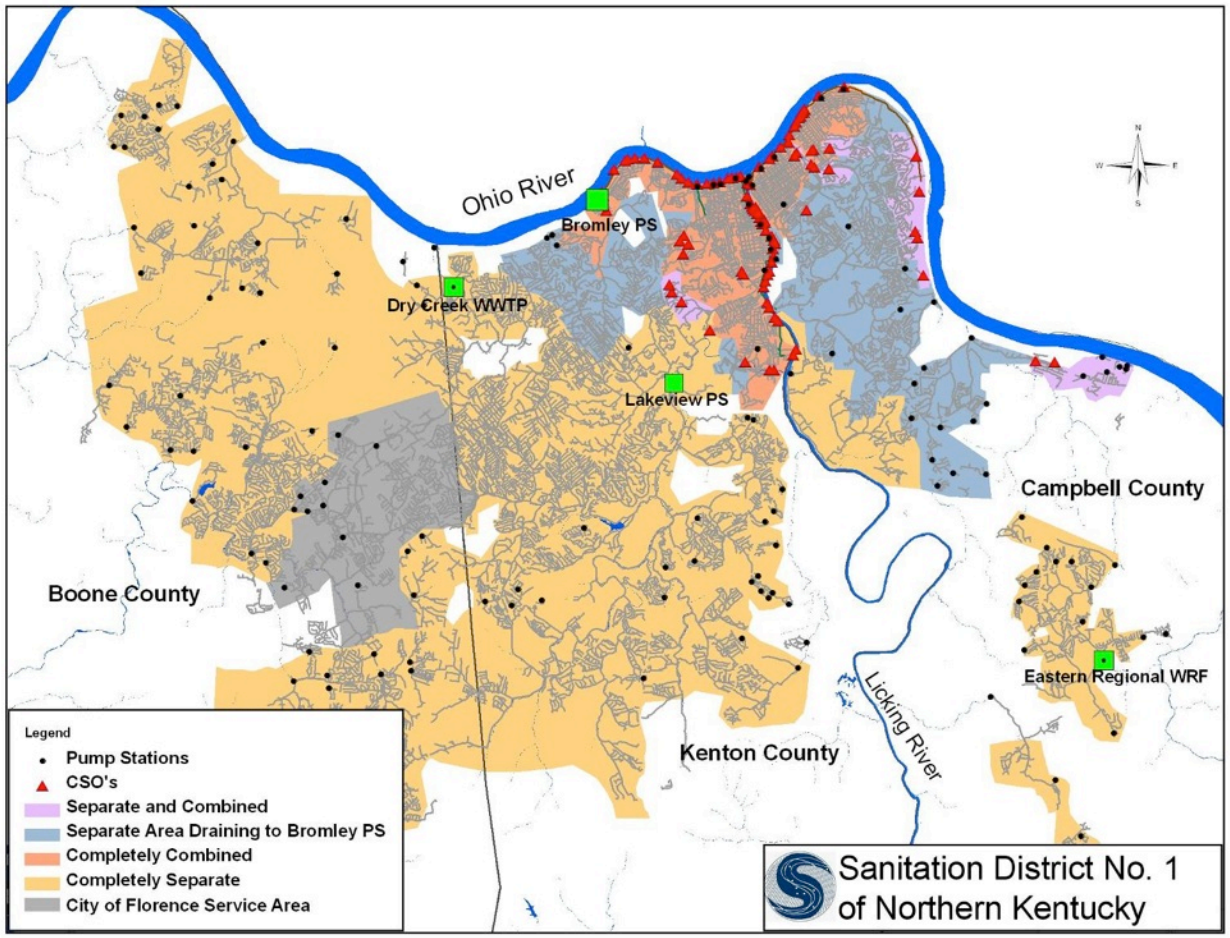
Case Study Examples

Case Study Examples

- Example Number 1 – Sanitation District No. 1 of Northern Kentucky Continuous Sewer Assessment Program
  - Ongoing 5 Years

Sanitation District No. 1 of Northern Kentucky (SD1) Background

- Created in 1946
- Serves 3 Counties in Northern Kentucky
- Until 1995 SD1 responsible only for interceptors and one regional WWTP (about 69 miles of sewer)
- Today SD1 has 1,600 miles of sewers and 3 large WWTP's
- CD in 2006 requires elimination of SSOs by 2025 and development of CMOM



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Background

Continuous Sewer Assessment Program Needed

- CMOM self assessment identified the need to develop a proactive inspection, cleaning, and rehabilitation/ replacement program.
- Wanted to incorporate into the Integrated Watershed Plan.
- All repairs were reactive. Proactive budgeting for rehabilitation and renewal was non-existent.
- Everything was an emergency!

Continuous Sewer Assessment Program Goals

- Develop integrated, prioritized Continuous Sewer Assessment program
- Go from a “reactive” maintenance mode to “proactive” mode
- **Asset Management approach**
- Estimate rehabilitation costs
- Develop a prioritized maintenance program to reduce spills

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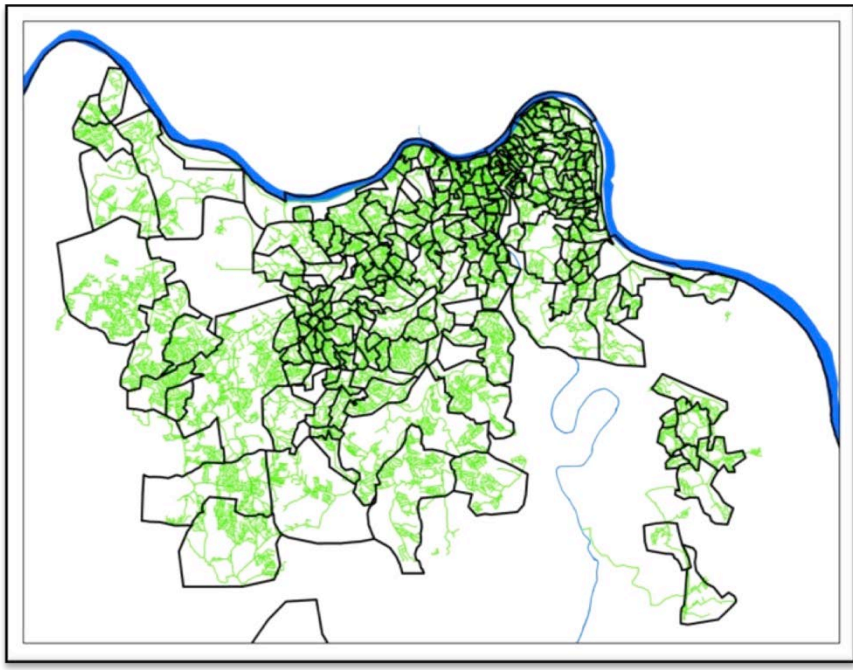
Continuous Sewer Assessment Program
Program Approach

- Prioritize the assessment using a modified Basin Priority approach
- Exceptions:
  - Pipes within 50’ of a creek
  - Pipes immediately downstream of an SSO
  - Pipes in SSES Priority areas
- Inspect entire system within 10 years
- Include automated “next action”
- Develop program standards and tools to track progress

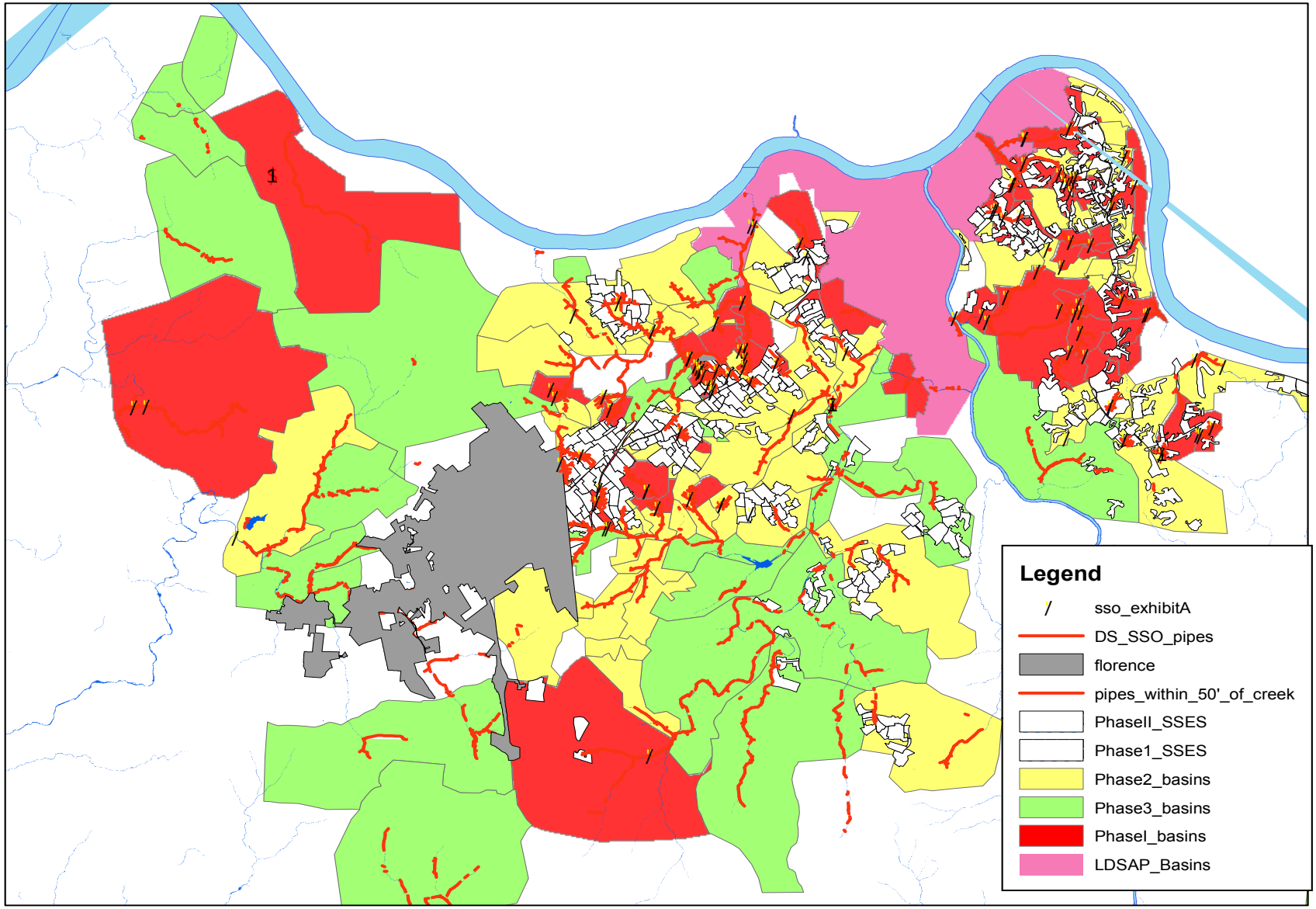


CSAP Program Development
Basin Scoring Process

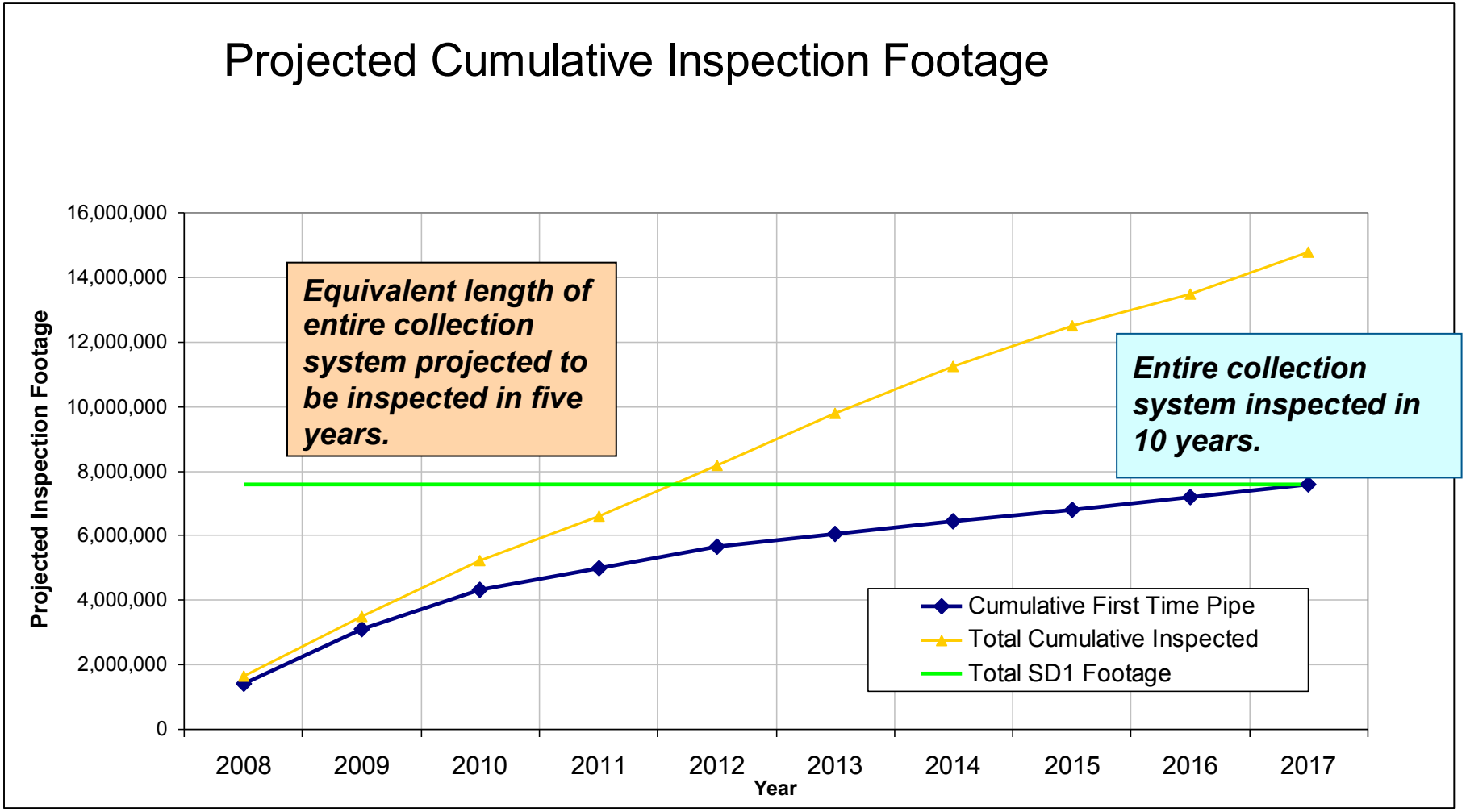
- Summarized the available historical data and create scores for the following priority criteria:
  - **Service performance priority**
  - **Structural performance priority**
  - **Work Order history priority**
- Applied priority scores of 1-5 for each criteria and sum for a total Raw Score
- Applied enhancement factor based on number and type of SSOs in each basin for a Total Adjusted Score
- Basins were ranked based on Total Adjusted Score

DA Basin	Total Length of Sewer (lf)	Percent Inspected	Percent with Service Defects	Service Defect Ranking	Percent with Severe Defects	Severe Service Defect Ranking	Percent Inspection Correction	Overall Service Performance Score
7	15,122	40	54	3.0	27	4.0	1.0	3.6

Prioritization Results

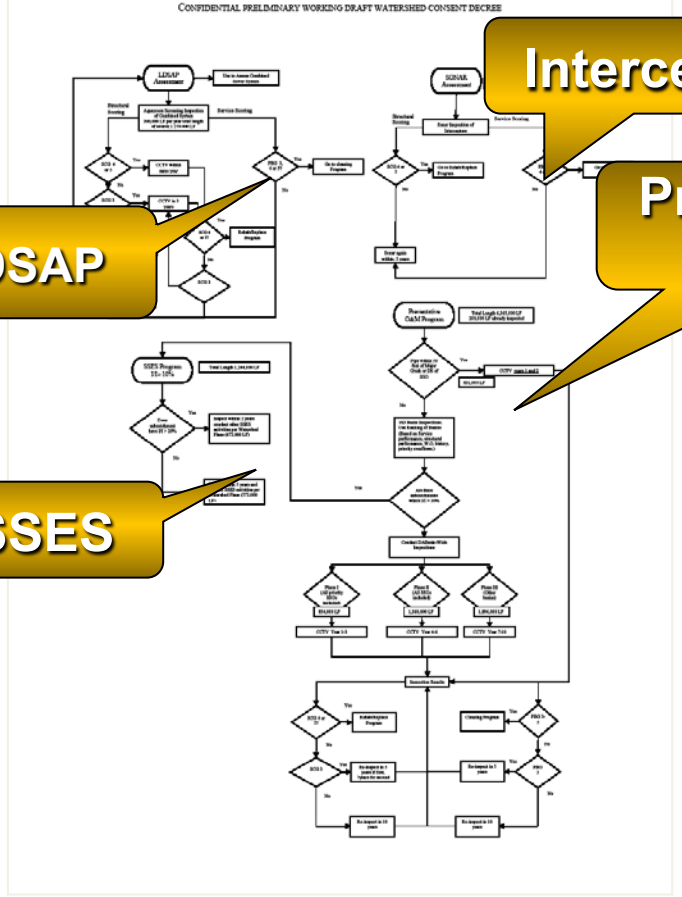


Program Implementation
CSAP Inspection Projections

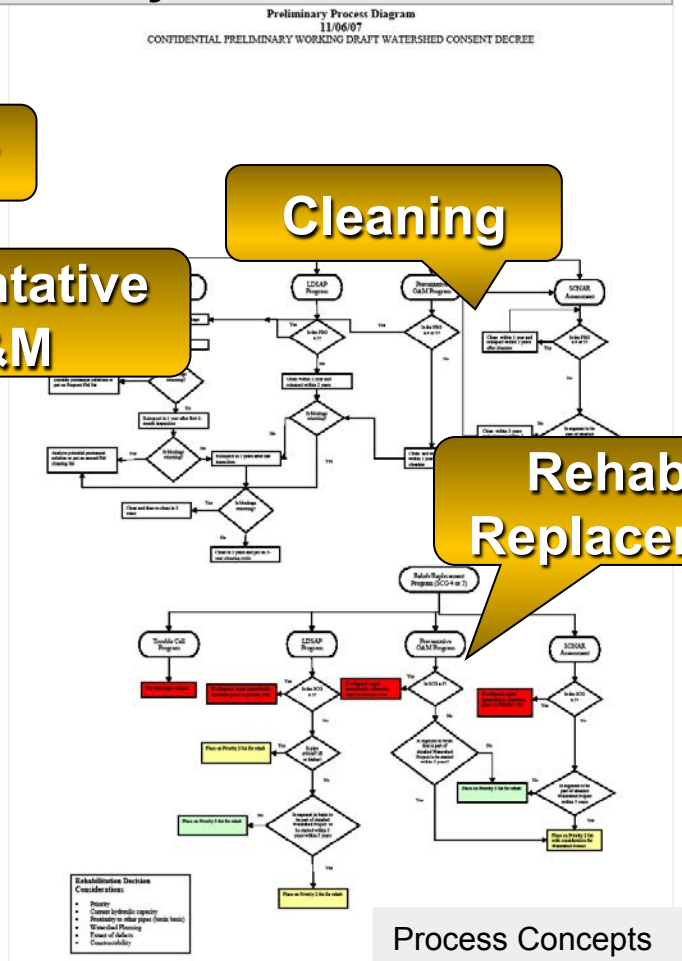


CSAP Work Flow Process

System Assessment



System Correction



Interceptor

Cleaning

LDSAP

Preventative O&M

Rehab & Replacement

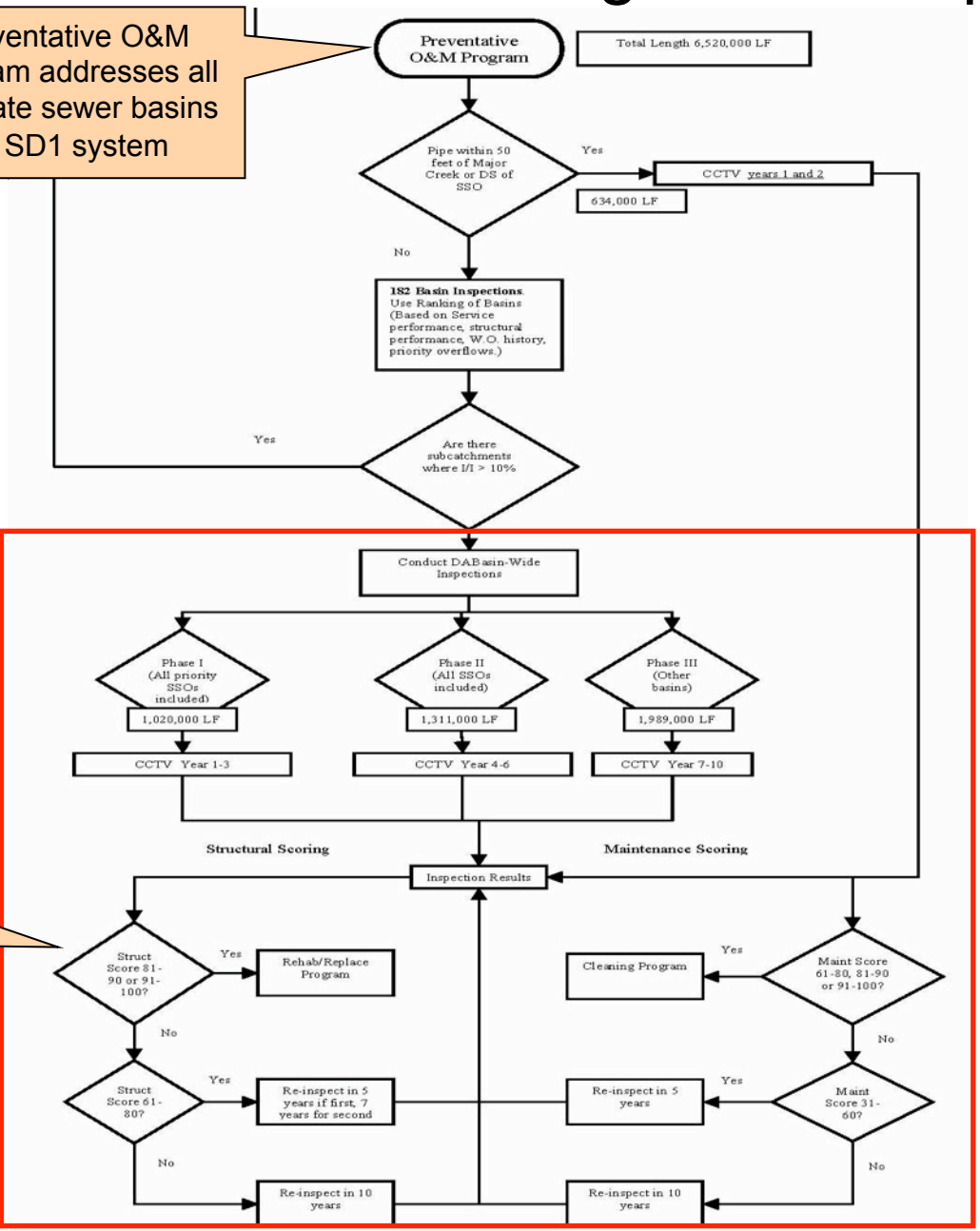
SSES

Process Concepts
by *Hazen & Sawyer*

CSAP Process Diagram Example

Preventative O&M Program addresses all separate sewer basins in SD1 system

SCREAM™ codes used provides scores 1-100



Program Implementation

- Developed decision tree logic to automatically generate next action and action date after inspection:
  - Clean
  - CCTV
  - Rehabilitate
- Decision tree automated in software tool
- Work Orders automatically generated

CSAP Pipe Details

Pipe Info	
Basin	083
USMAN	0830092
DSMAN	0830001
PipeID	4584
SubWatershed	Licking River
Program SubCategory	LDSAP
On or Off Road	Off Road
In Cleaning Program	yes
Rehab Perm Soln	
Cleaning Perm Soln	

CSAP Info	Maintenance	Structure
# Valid Inspections	1	2
Avg Previous Grade		
Highest Previous Grade		2
Latest Insp Type	CCTV	CCTV
Latest Grade	9	7
Last Action Date	9/22/2009 12:00:00 AM	09-22-2009
Next Action	Clean and CCTV now, CCTV 2 years. Enter CP	CCTV 3 years
Next Task	Clean	CCTV
Next Task's Target Date	09-22-2009	09-22-2012

Activities To Date

Date	Activity	Struct Score	Maint Score	Rev Comments	Trouble Call	Pre Rehab	Clean Too Close	No Clean Inbetween Ignore First	Pre-Entered CP	WO NUMBER	Review ID
08-26-2008	AZ	2	6					X			2693
09-22-2009	CCTV	64	87	NA CCTV greater than 18" -							2425
09-22-2009	Inspect			TV linewo_Cause_ty						09-019656	0

Assigned Tasks

Struct Or Maint	Task	Target Date	Before Or After	Flexibility In Weeks	Assigned Date	Complete	Rehab Perm Soln	Cleaning Perm Soln	Watershed Project Task
Struct	CCTV	09-22-2012	after	8					
Maint	Clean	09-22-2009	after	1	09-27-2009				
Maint	CCTV	09-22-2009	after	1	09-27-2009				

5 Years Later – How Are They Doing?

- Wanted to assess program effectiveness.
- Wanted to assess actual conditions versus assumptions.
- 49% of the system has been inspected
  - Utilized SCREAM scoring which is 1-100

Program Results - Prioritization Assumptions versus actual

	Structural Score Summary					
	SCREAM Score 81 - 100			SCREAM Score 61 - 80		
Sub Category	Footage	Percent	Projected	Footage	Percent	Projected
Phase 1 PB	109,419	20%	22%	76,970	14%	23%
Phase 2 PB	57,379	15%	17%	55,031	14%	18%
Phase 3 PB	28,770	8%	6%	21,399	6%	14%
Phase 1 SSES	159,674	32%	22%	80,313	16%	23%
Phase 2 SSES	88,584	28%	22%	60,890	19%	23%
50' Creek	73,640	9%		62,095	8%	-
DS SSO	8,429	17%	22%	6,473	13%	23%
Interceptor	5,916	8%	-	20,924	28%	-
LDSAP	100,676	20%	-	102,578	20%	-
LDSAP Diversion	62,569	18%	-	71,643	20%	-
N/A	282	4%	-	149	2%	-

Actual conditions slightly better than anticipated and priorities were confirmed

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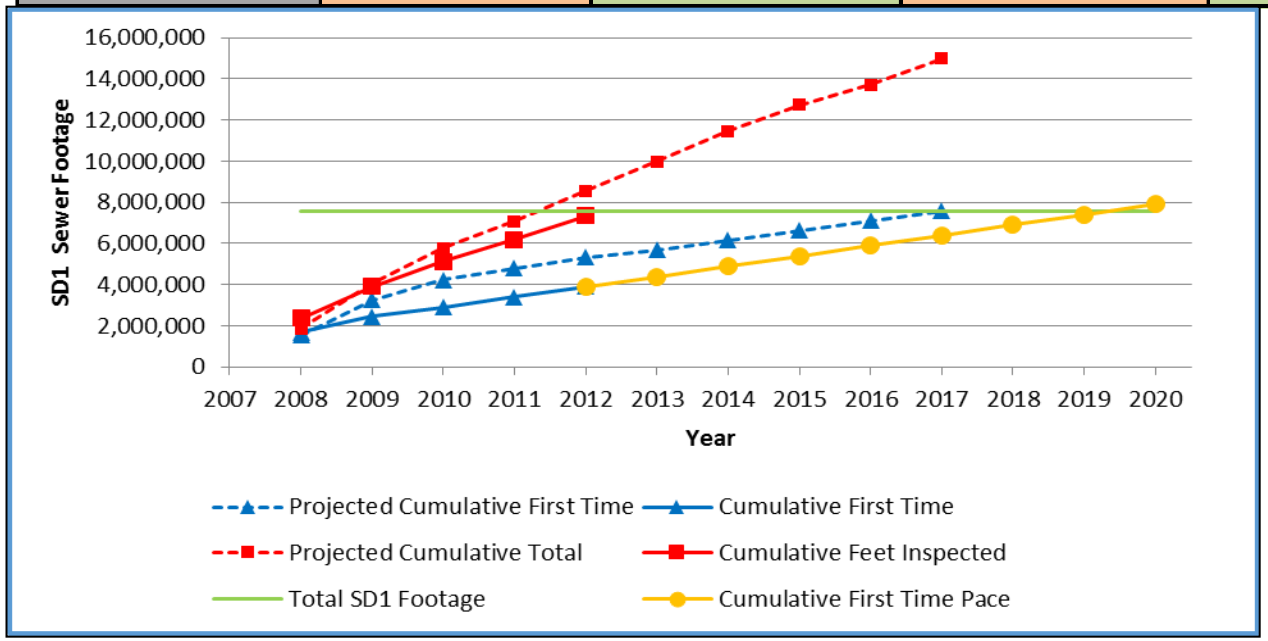
Program Results – Inspection and Re-inspection Assumptions versus Actual

Year	Initial Inspection Actual	Initial Inspection Projected	Follow-Up Inspection Actual	Follow-Up Inspection Projected
2006	373,784		1,888	
2007	395,272	365,000	9,401	
2008	918,185	1,158,238	655,789	195,627
2009	754,924	1,732,797	796,726	412,855
2010	447,462	981,470	764,091	731,027
2011	496,845	544,831	572,588	748,317
2012	504,657	544,831	644,907	520,347
Total To Date	**3,891,129**	**5,327,166**	**3,445,390**	**2,608,172**



Actual reinspection footage higher than anticipated 500,000 LF GAP

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Program Results – Inspection and Re-inspection Assumptions versus actual

- Reasons for variance includes several factors including:
  - Trouble calls
  - Quality control issues
- Only half of re-inspections due to CSAP trigger
- Utilizing Redzone “solo” cameras to rapidly increase production to 2,000 LF per day for one person
- Options to catch up include converting to “results-based” cleaning frequencies and rapid assessment tools such as the SL-RAT

Sewer line rapid assessment tool (SL-RAT) from InfoSense

Program Results - Program Effectiveness

Over 73% reduction in O&M Related Overflows in first five years with a reduction in cleaning footage

Year	O&M Related Overflows
2008	**143**
2009	**108**
2010	**63**
2011	**66**
2012	**38**

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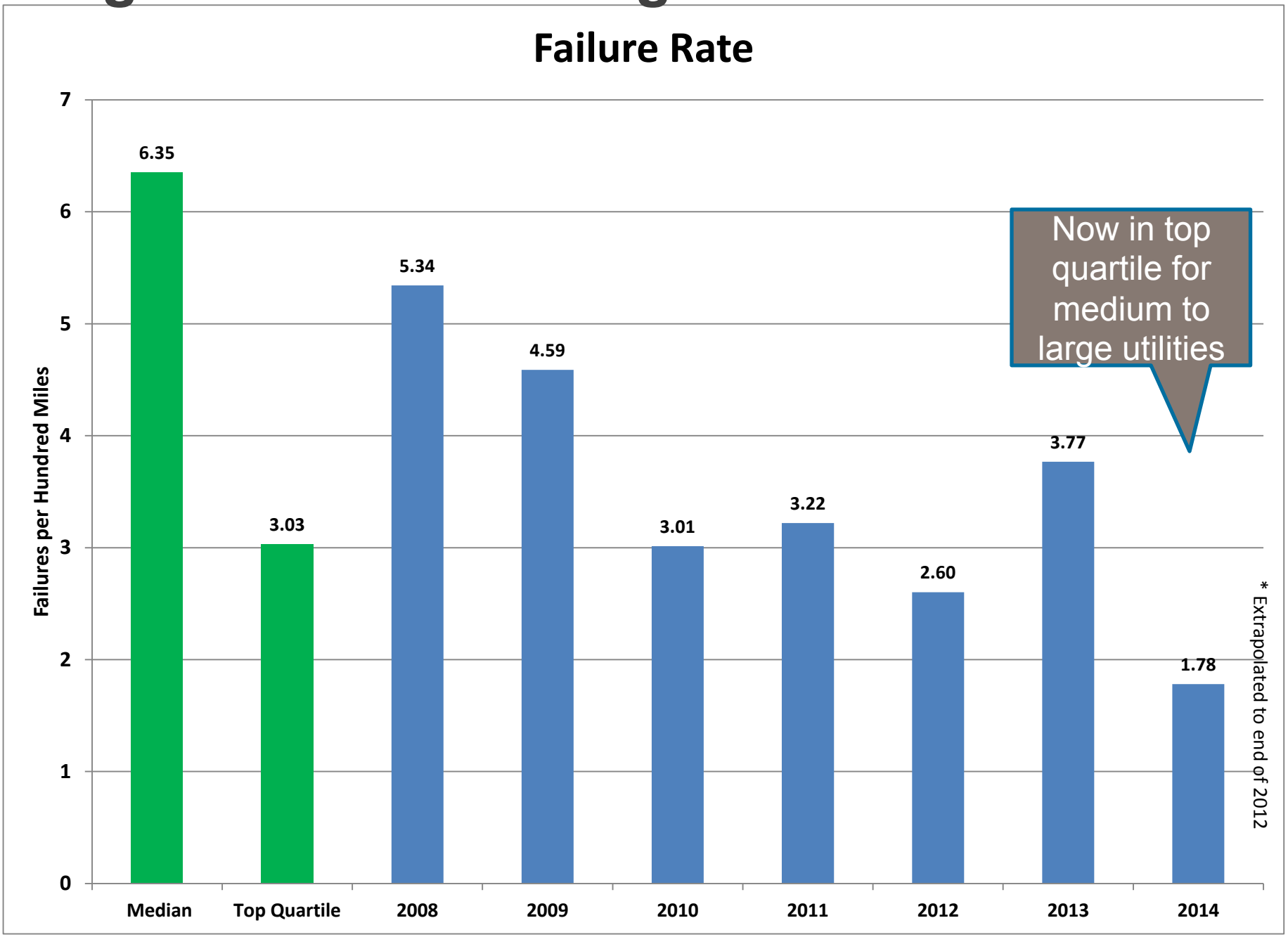
Program Results - Program Effectiveness



Program Effectiveness - Unit Costs Dropping as Program is More Proactive

Fiscal Year	2008	2009	2010	2011	2012
Capital Costs	$6,786,991	$5,352,198	$8,461,122	$9,631,655	$12,732,727
Total Footage Renewed	12,689	21,148	42,111	84,215	84,265
Capital Cost($)/ Foot Renewed	$611	$300	$225	$127	$164

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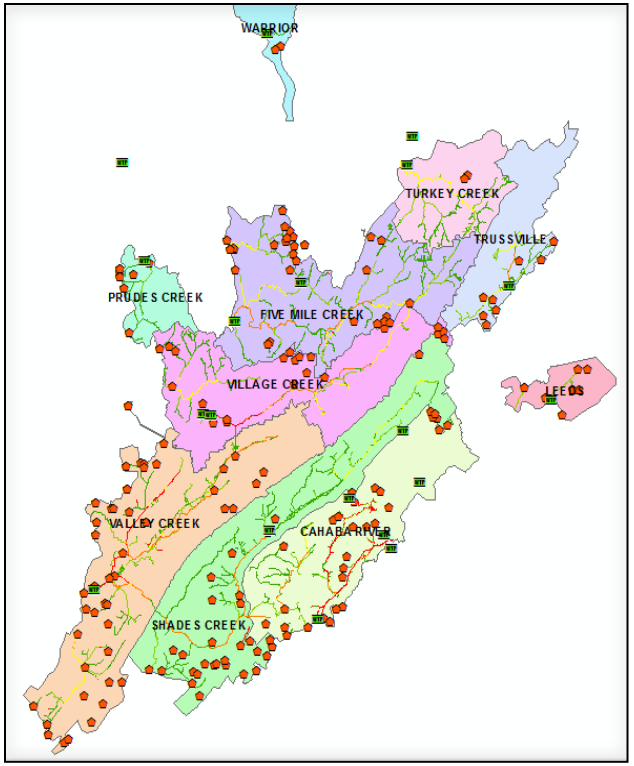
Case Study Number 2 – Jefferson County Alabama MOM Program

- Service Population 600,000 in 23 Municipalities
- 3,150 Miles of Sewer Line
- 80,500 Manholes
- 167 Inverted Siphons
- 174 Pump Stations
- 9 WWTP's with ADF of 103 MGD



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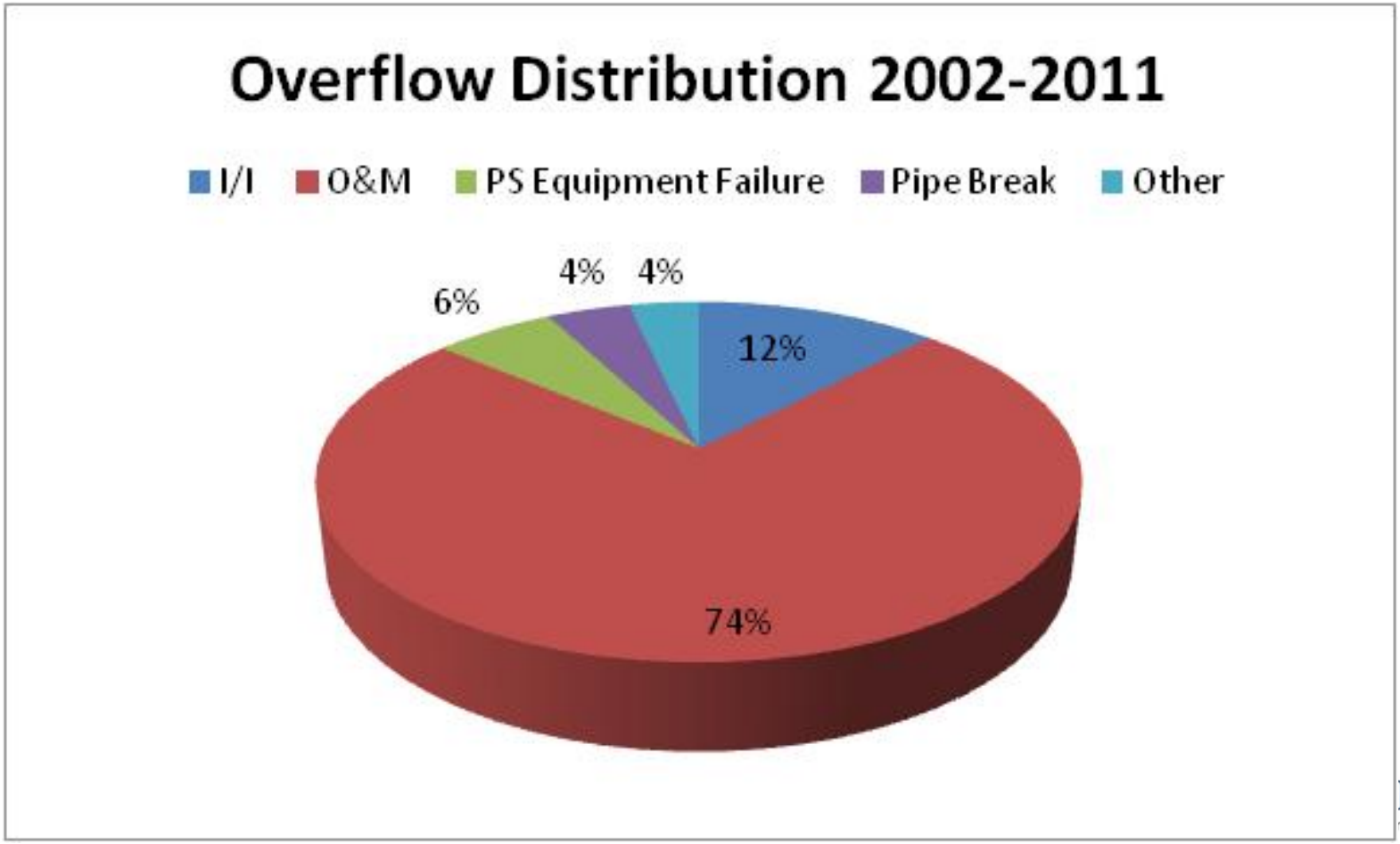
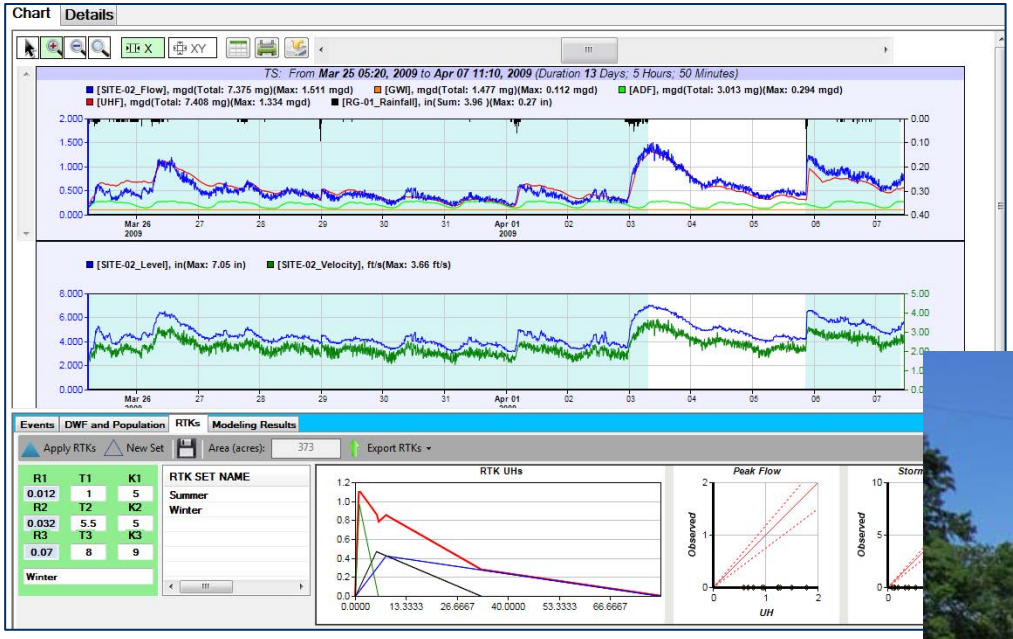
Jefferson County Issues

- Significant overflows primarily due to blockages (over 300 per year)and the County is under a Federal Consent Order.



Overall Approach and Goals

- Develop prioritized long term condition assessment, cleaning and SSES program.
- Develop aggressive **priority** cleaning program with **training** and better data management.

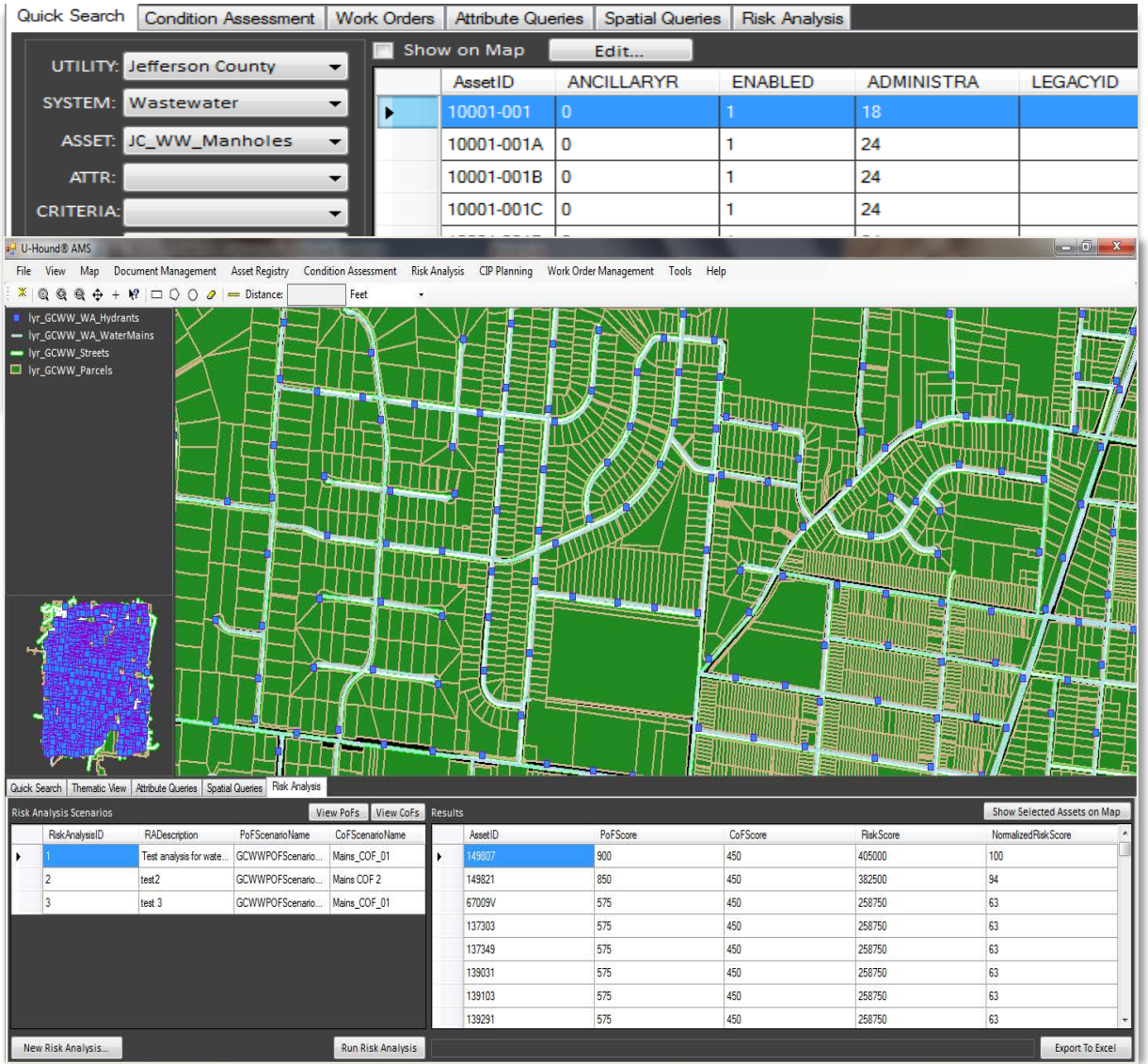


Data Input

Significant amounts of existing data were gathered and pulled together in a centralized database tool to conduct risk analysis.

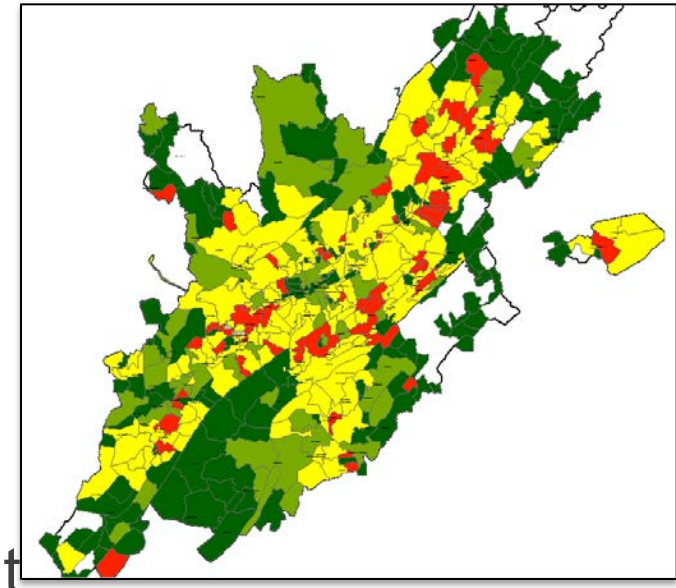
Existing Data Review

- Cityworks (CMMS)
- ArcGIS
- Infoworks (modeling)
- Infor (pump stations)
- Flow monitoring data



Jefferson County MOM Program

- Developed comprehensive risk-based condition assessment and SSES program for next 15 years
- Develop aggressive targeted cleaning program with training and better data management
- Helping with CityWorks implementation
- Developed SOPs
- Developed Supercritical pipe assessment program for large diameter and other critical pipes
- **Preventable overflows already down 40%**



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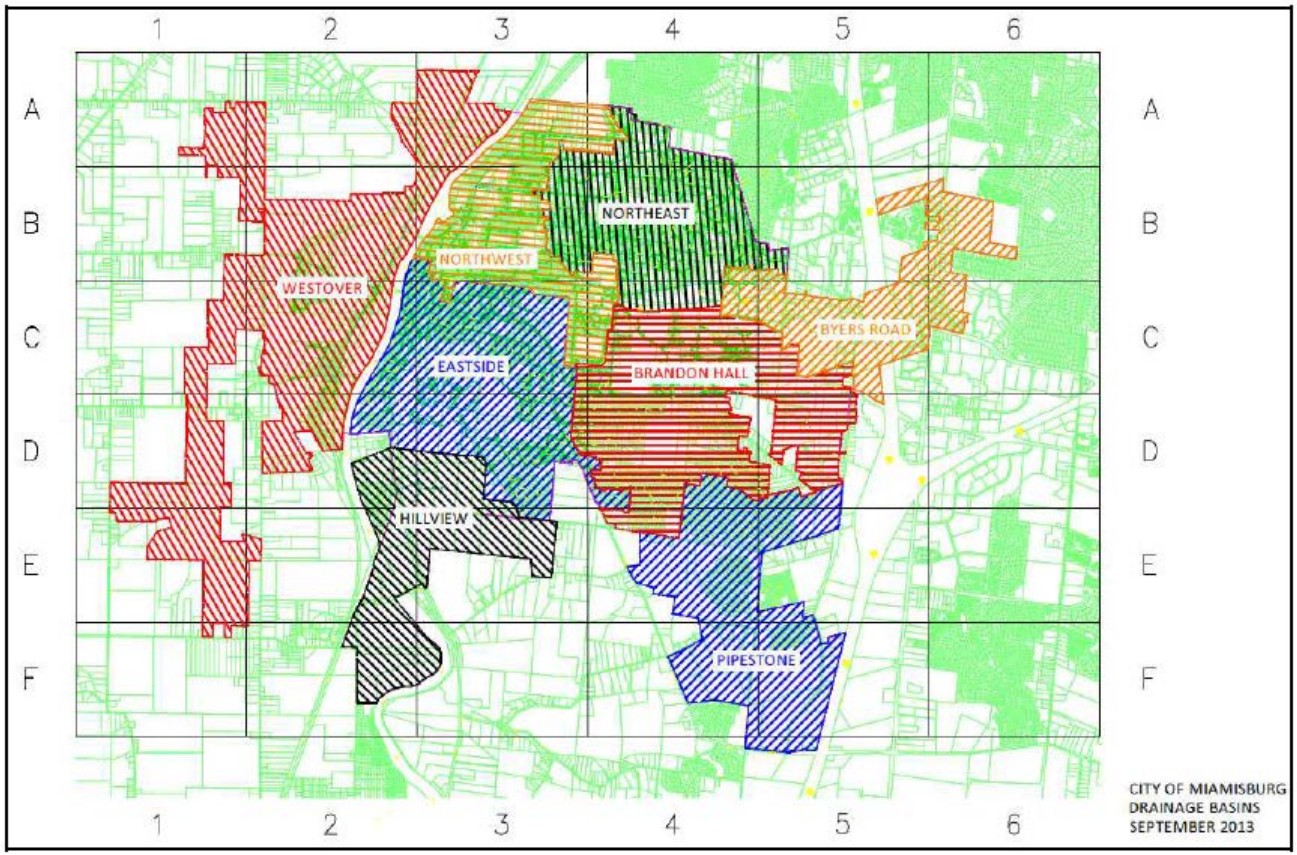
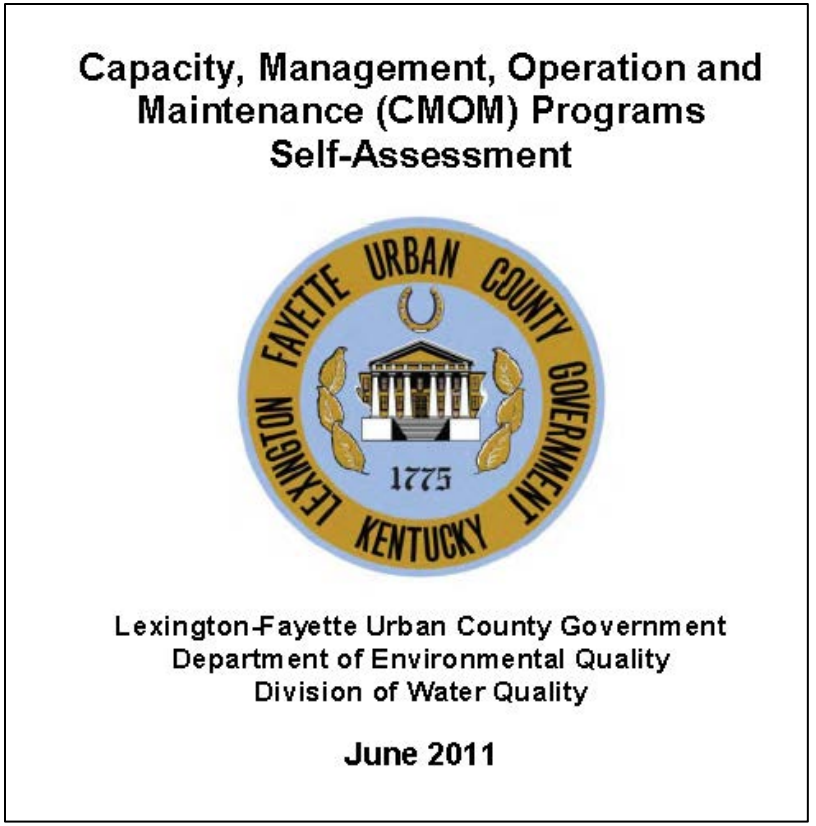
Miamisburg MOM Program

- NPDES Permit required development of CMOM program.
- Worked with regulators to allow phased approach with gap analysis followed by MOM program development.
- Schedule and implementation tailored to fit city's size and needs.



Lexington Fayette County MOM Program Implementation

- Implementation of over 150 CMOM Programs starting in 2012
  - Training
  - SOP development
  - Metrics
  - Reporting
- Challenges with changing staff culture
- Information management tools not robust



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Key MOM Recommendations

- Make sure robust information management processes and tools are in place prior to start of program.
- Work with regulators to ensure phased MOM program development.
- Make sure the implementation schedule is phased and realistic and commensurate with starting point.
- Program complexity should be tailored to the size of the utility.

Key MOM Recommendations

- Don’t underestimate staffing needs.
- Take a prioritized, results-based approach and avoid “clean and CCTV all pipes every X years” approach (Asset Management)
- Leverage existing data to inform priorities.
- Make program flexible and review frequently.
- A good MOM program IS GOOD BUSINESS PRACTICE!

Resources

- EPA Guide for Evaluating CMOM Programs:
  - http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf
- WEF O&M Reference Guide
  - http://www.cmom.net/WEF_CMOM_O&M_V23a.pdf
- Ohio EPA O&M Guide (currently being revised)
- New England O&M Guide
  - https://www.neiwpcc.org/collectionsystems/OMR.asp

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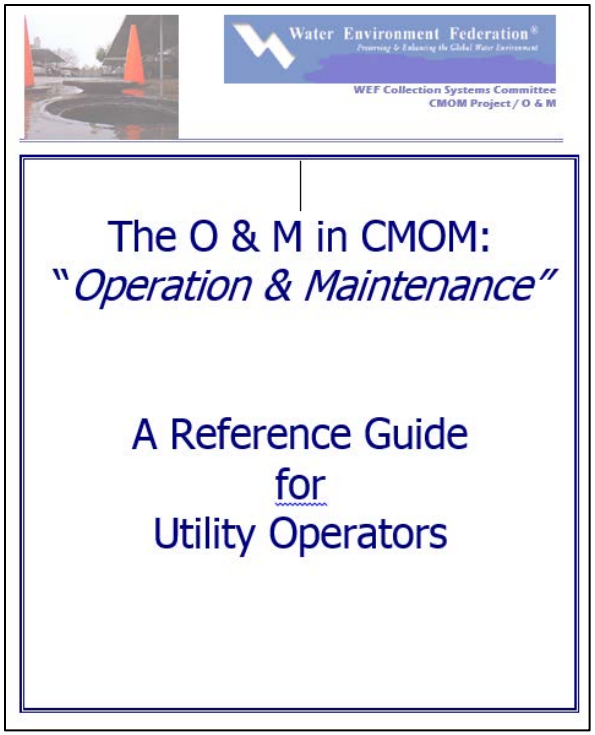

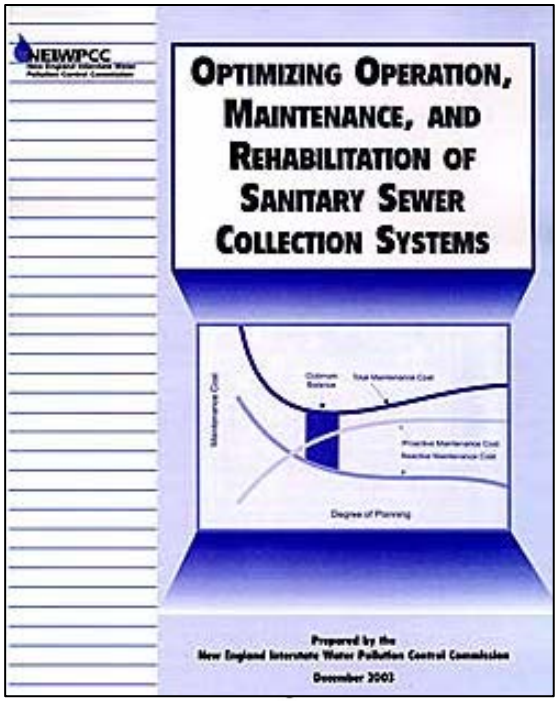

Collection Systems Taking Center Stage – SEIZE THE OPPORTUNITY

Water Environment Federation
Collection Systems Specialty Conference

Cincinnati, Ohio

April 19-22, 2015

METROPOLITAN SEWER DISTRICT of greater CINCINNATI

Water Environment Federation® the water quality people®

Ohio Water Environment Association

Preserving & Enhancing Ohio's Water Environment

www.wef.org/collectionsystems

Questions?

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