# COLLECTION SYSTEM COMPLIANCE MAINTENANCE

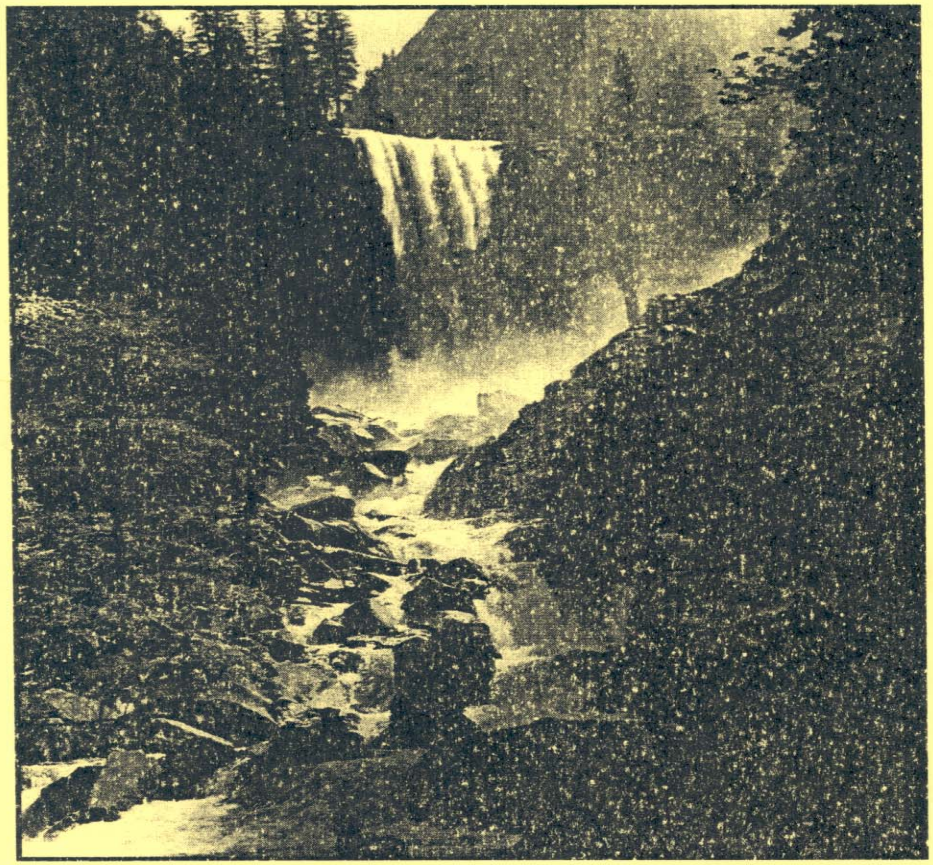
## O&M Program Development

# Essential Elements of an Effective O&M Program

- Program Development
- Program Implementation
- Local Enforcement (sump pumps, grease control, sewer use ordinances, etc)
- Public Education

# COLLECTION SYSTEMS:

## METHODS FOR EVALUATING AND IMPROVING PERFORMANCE



Office of Water Programs
California State University, Sacramento

# Collection System Performance Goal!

## “KEEP IT IN THE PIPE”

“With use, a sewer’s capacity is reduced and can only be maintained or restored by regularly scheduled maintenance”

CSU- Sacramento (1998)

“While infiltration and inflow (I/I) are major contributors to SSO problems, inadequate sewer maintenance is also a major factor”

CSU- Sacramento (1998)

"Operation and maintenance of a wastewater collection system can be defined as those O&M activities that result in conveying wastewater safely and efficiently to the wastewater treatment facility"

CSU- Sacramento (1998)

“The purpose of O&M programs is to maintain design functionality (capacity) through maintenance and restoration”

CSU- Sacramento (1998)

“Effective O&M programs are based on knowing what components make up the collection system, where they are located (mapping) and their condition”

CSU- Sacramento (1998)

“O&M of a collection system affects compliance therefore adequate resources need to be provided to support the O&M program”

CSU- Sacramento (1998)

JgS Advice: Separate line-item budget for collection system O&M and restoration

# Benefits of Collection System O&M

- Safety and Health To The Public!
- Environmental Protection
- Conveyance capacity (as designed ) is maintained
- Obtaining full use of the system through its design life
- Reliability of collection system & service to customers
- Asset Management (maintaining the value of the investment)
- Cost-effective use of utility resources
- Regulatory Compliance

# Types of Maintenance

- Corrective
- Predictive
- Preventative

# Corrective Maintenance

Emergency maintenance is reactive……something fails or breaks and you wait until then to fix it.

Crisis Management Is Stressful!

# Predictive Maintenance

A method of establishing baseline performance data , monitoring performance criteria over time , and observing changes in performance so that failure can be predicted and maintenance can be performed on a planned, scheduled basis.

(examples: manhole inspections; sewer televising)

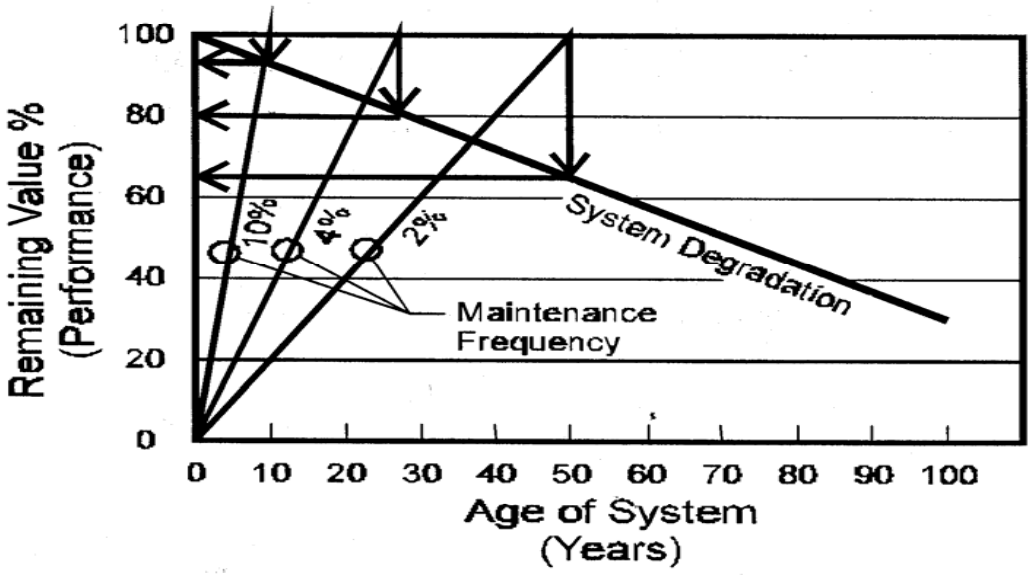
# Preventative Maintenance

Proactive and a programmed, systematic approach to maintenance activities based usually on time intervals ( examples: lubrication of pump motors based on run times; sewer cleaning a percentage of the system every year, etc.)

# Preventative Maintenance Benefits

- Maintenance can be planned and scheduled and is not reactionary
- Budgeting resources to support the O&M Program
- Capital Improvement Program can be identified and budgeted
- Human and materials resources best utilized

# OPTIMIZATION OF COLLECTION SYSTEM MAINTENANCE FREQUENCIES AND SYSTEM PERFORMANCE




American Society of Civil Engineers
EPA Cooperative Agreement #CX 824902-01-0

February 1999

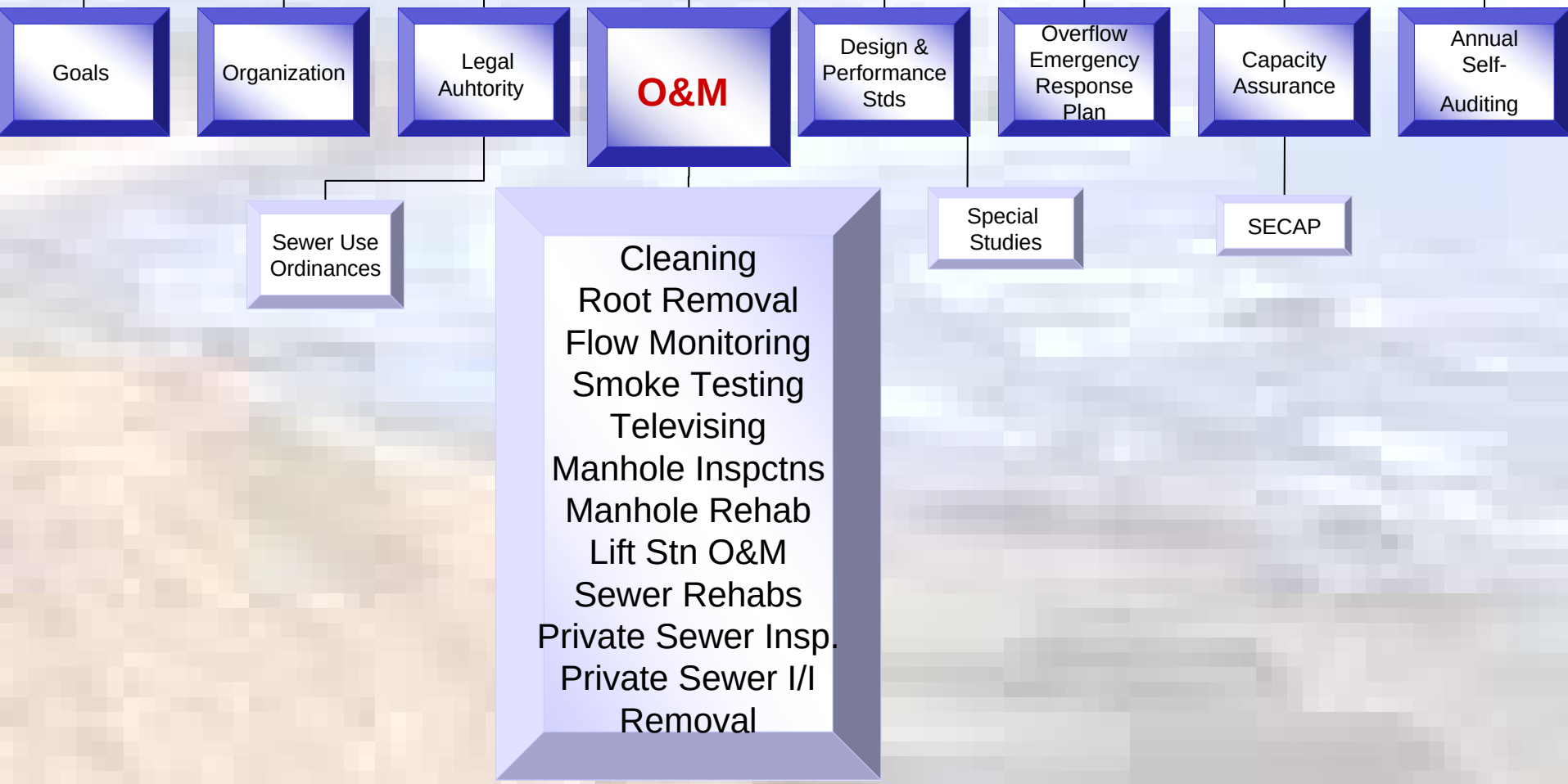
# Maintenance Activities Showing Improved Performance Correlation

- Cleaning
- Root Removal
- Flow Monitoring
- Smoke Testing
- Sewer Line Televising
- Manhole Inspections
- Manhole Rehabilitation


# Maintenance Activities Showing Improved Performance Correlation Continued

- Mainline Rehabilitation
- Lift Station O&M
- Private Sewer Inspections
- Private Sewer I/I Removal
- Grease Control Programs

# Compliance, Maintenance, Operation & Management (CMOM)



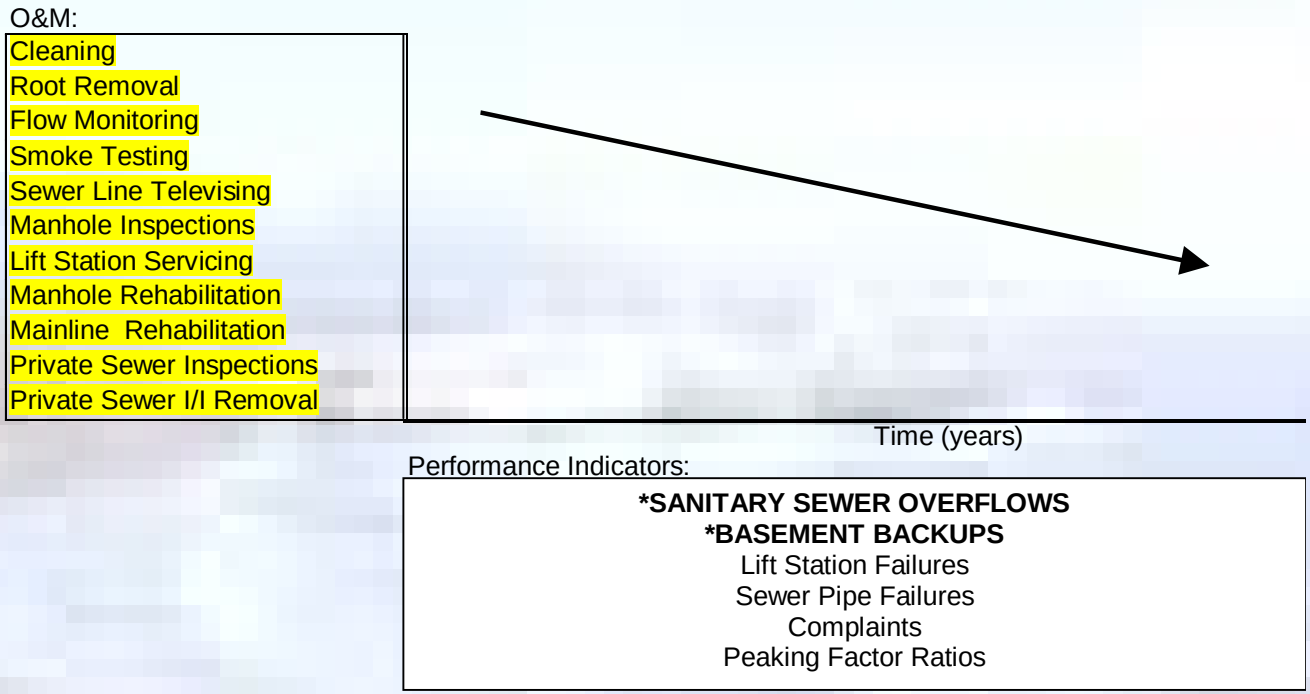
“Collection system managers throughout the U.S. have often expressed the need for performance indicators for collection system O&M program management that would provide criteria for evaluating the performance of their systems”

CSU- Sacramento (1998)

“It is possible to establish performance indicators which provide insight into the performance of the collection system and the effectiveness of the O&M program”

CSU- Sacramento (1998)

# *Collection System O&M = Improved Performance!*




***High-performing utilities have all developed performance measurements of their O&M program and track the information necessary to evaluate performance"***

Collection Systems: Methods For Evaluating and Improvong Performance
Office of Water Programs, California State University, Sacramento (1998)

# Compliance Maintenance Annual Report


Sanitary Sewer Collection System Section

**4. Did your sanitary sewer collection system maintenance program include the following maintenance activities? Complete all that apply and indicate the amount maintained:**

| | | |
|---|---|---|
| **Cleaning** | | % of system/year |
| **Root Removal** | | % of system/year |
| **Flow Monitoring** | | % of system/year |
| **Smoke Testing** | | % of system/year |
| **Sewer Line Televising** | | % of system/year |
| **Manhole Inspections** | | % of system/year |
| **Lift Station O&M** | | # per L.S/year |
| **Manhole Rehabilitation** | | % of manholes rehabed |
| **Mainline Rehabilitation** | | % of sewer lines rehabed |
| **Private Sewer Inspections** | | % of system/year |
| **Private Sewer I/I Removal** | | % of private services |

**Please include additional comments about your sanitary sewer collection system below:**

**5. Provide the following collection system and flow information for the past year:**

| | |
|---|---|
| | Total Actual Amount of Precipitation Last Year |
| | Annual Average Precipitation (for your location) |
| | Miles of Sanitary Sewer |
| | Number of Lift Stations |
| | Number of Lift Station Failures |
| | Number of Sewer Pipe Failures |
| | **Number of Sanitary Sewer Overflow (SSO) Occurrences: (10 points per occurrence)** |
| | Number of Basement Backup Occurrences |
| | Number of Complaints |
| | Average Daily Flow in MGD |
| | Peak Monthly Flow in MGD (if available) |
| | Peak Hourly Flow in MGD (if available) |

| | **PERFORMANCE INDICATORS** |
|---|---|
| | Lift Station Failures (failures/ps/year) |
| | Sewer Pipe Failures (pipe failures/sewer mile/yr) |
| | Sanitary Sewer Overflows (number/sewer mile/yr) |
| | Basement Backups (number/sewer mile) |
| | Complaints (number/sewer mile) |
| | Peaking Factor Ratio (Peak Monthly:Annual Daily Average) |
| | Peaking Factor Ratio (Peak Hourly:Annual Daily Average) |

“Data that is used as performance indicators can be tracked over time to observe trends. Utilities can track trends of their own performance indicators over time to assess O&M success and target levels of service ”

CSU- Sacramento (1998)

| | | |
|---|---|---|
| 6 | Miles of Sanitary Sewer | |
| 0 | Number of Lift Stations | |
| 0 | Number of Lift Station Failures | |
| 0 | Number of Sewer Pipe Failures | |
| 1 | **Number of Sanitary Sewer Overflow (SSO) Occurrences: (10 points per occurrence)** | |
| 0 | Number of Basement Backup Occurrences | |
| 0 | Number of Complaints | |
| .0872 | Average Daily Flow in MGD | 10 |
| .1708 | Peak Monthly Flow in MGD (if available) | |
| | Peak Hourly Flow in MGD (if available) | |

**PERFORMANCE INDICATORS**

| | | |
|---|---|---|
| 0.00 | Lift Station Failures (failures/ps/year) | Graph |
| 0.00 | Sewer Pipe Failures (pipe failures/sewer mile/yr) | Graph |
| 0.17 | Sanitary Sewer Overflows (number/sewer mile/yr) | Graph |
| 0.00 | Basement Backups (number/sewer mile) | Graph |
| 0.00 | Complaints (number/sewer mile) | Graph |
| 2.0 | Peaking Factor Ratio (Peak Monthly:Annual Daily Avg) | Graph |
| 0.0 | Peaking Factor Ratio (Peak Hourly:Annual Daily Avg) | Graph |

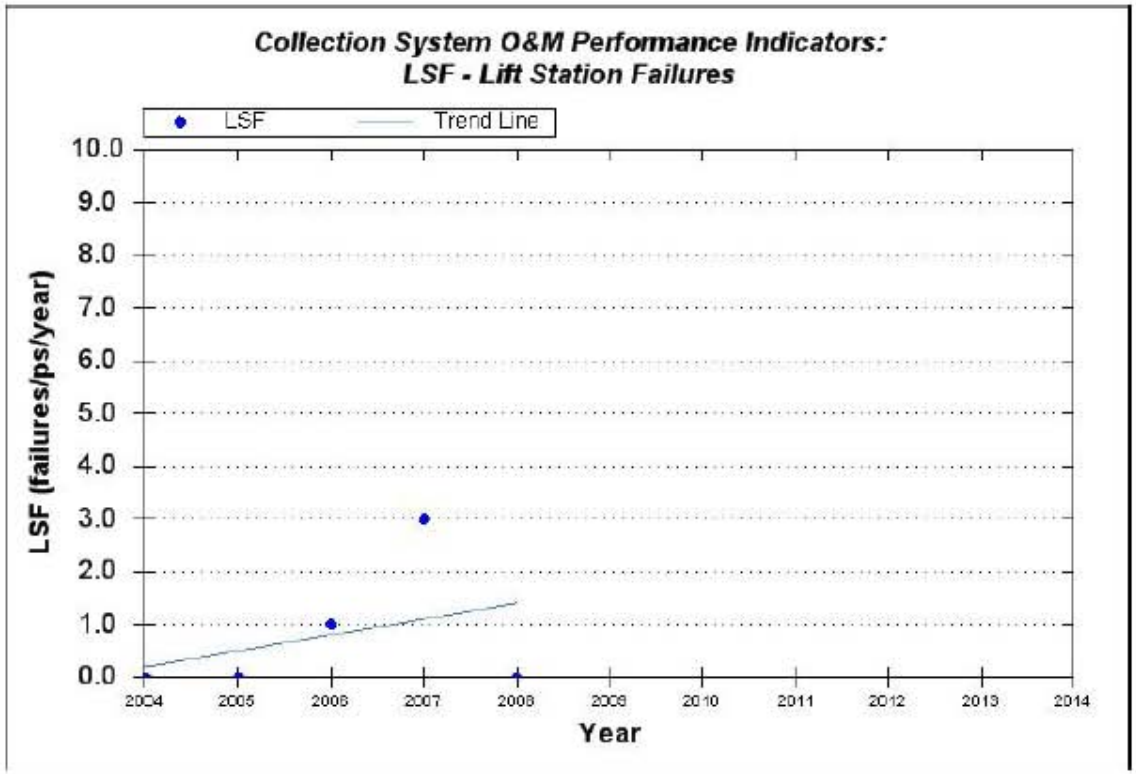
**6.** Was infiltration/inflow (I/I) significant in your community last year?

CMAR1011PIGraph.PDF - Microsoft Internet Explorer provided by Wisconsin DNR

Select 61% Sign

Pages Attachments Comments

Facility: Blanchardville Wastewater Treatment Facility
Years of CMAR Data: 2004 - 2008
Linear Equation used for Trend Line: LSF: y = 0.000822 x + 0.22

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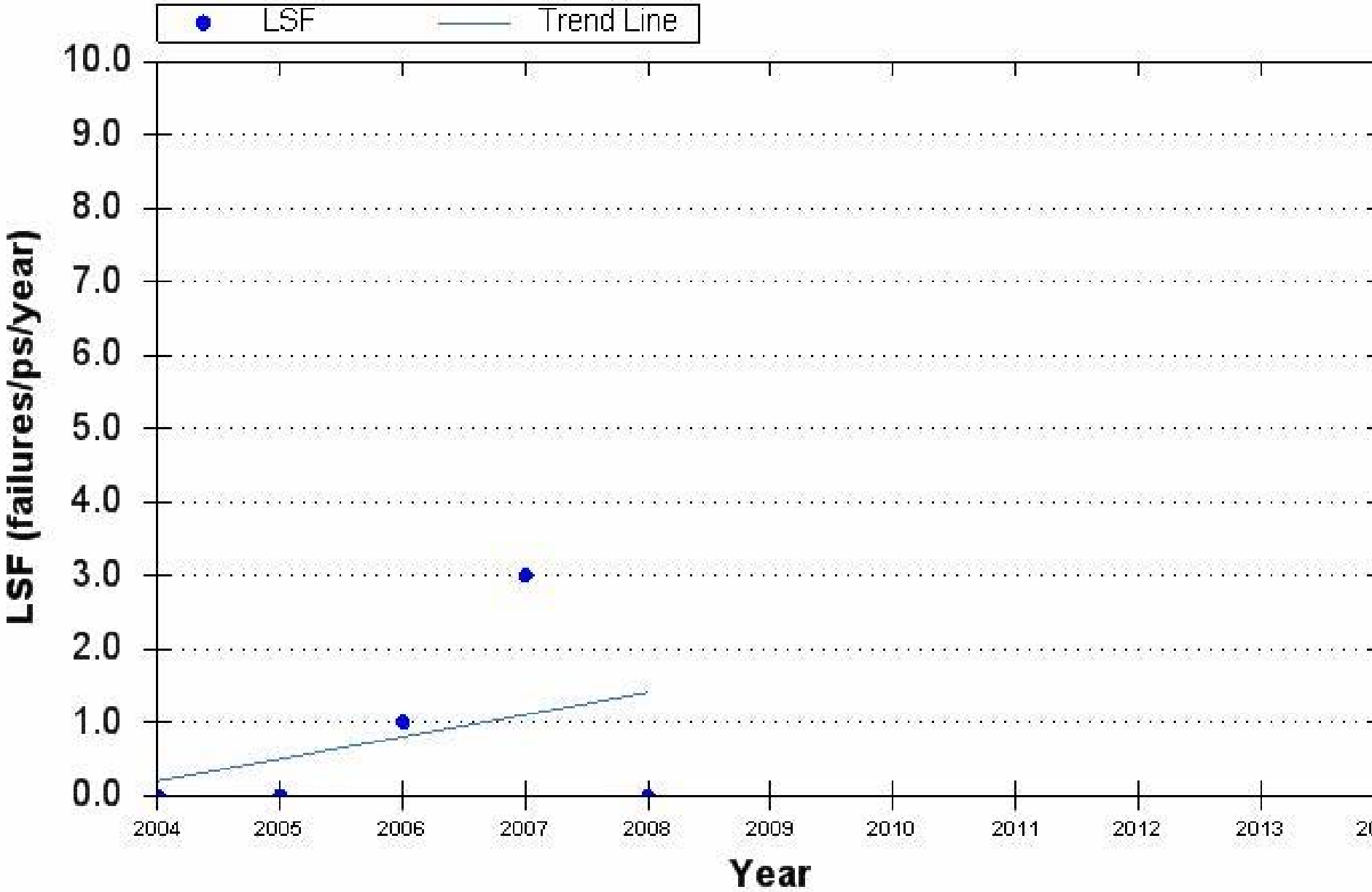
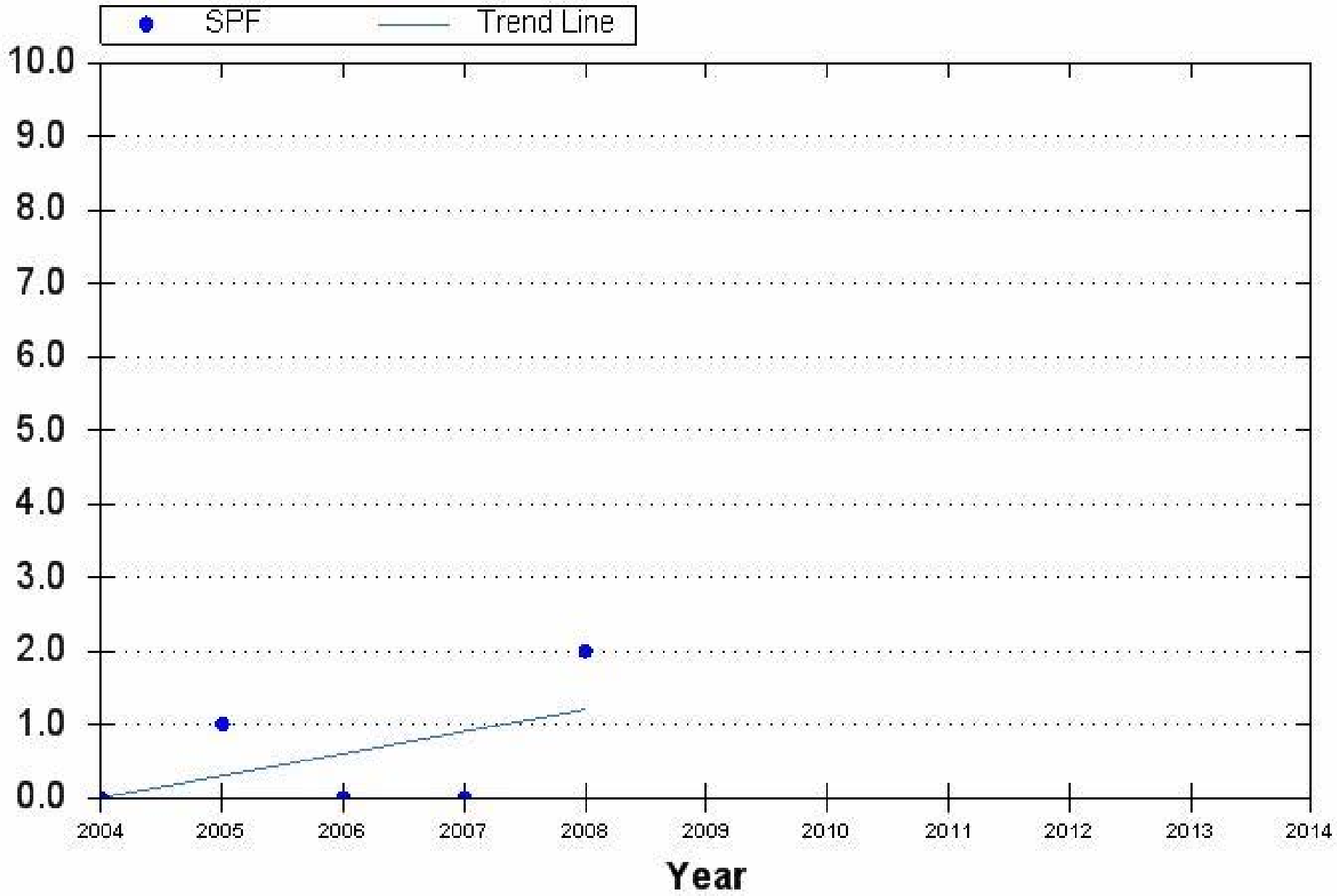
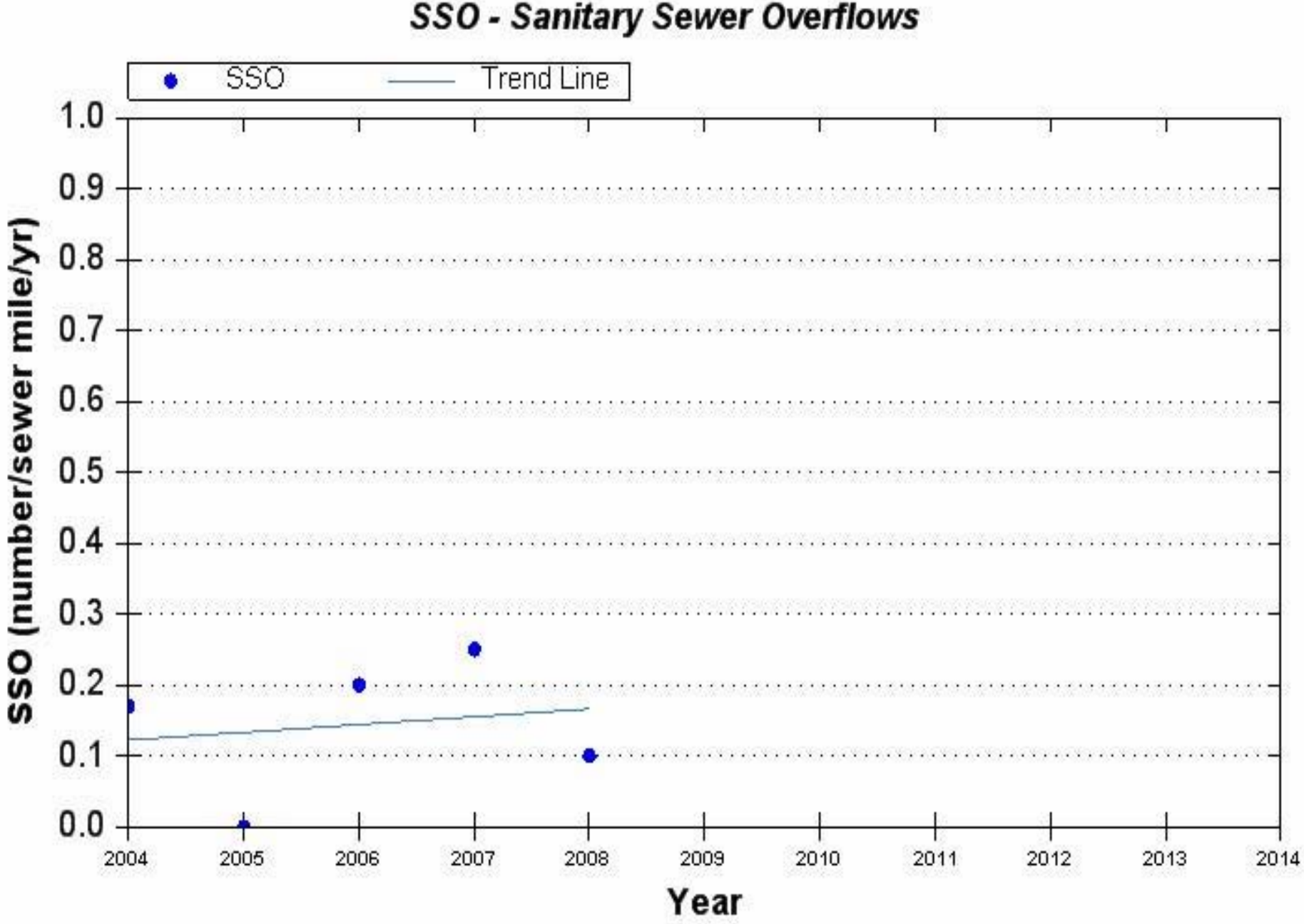
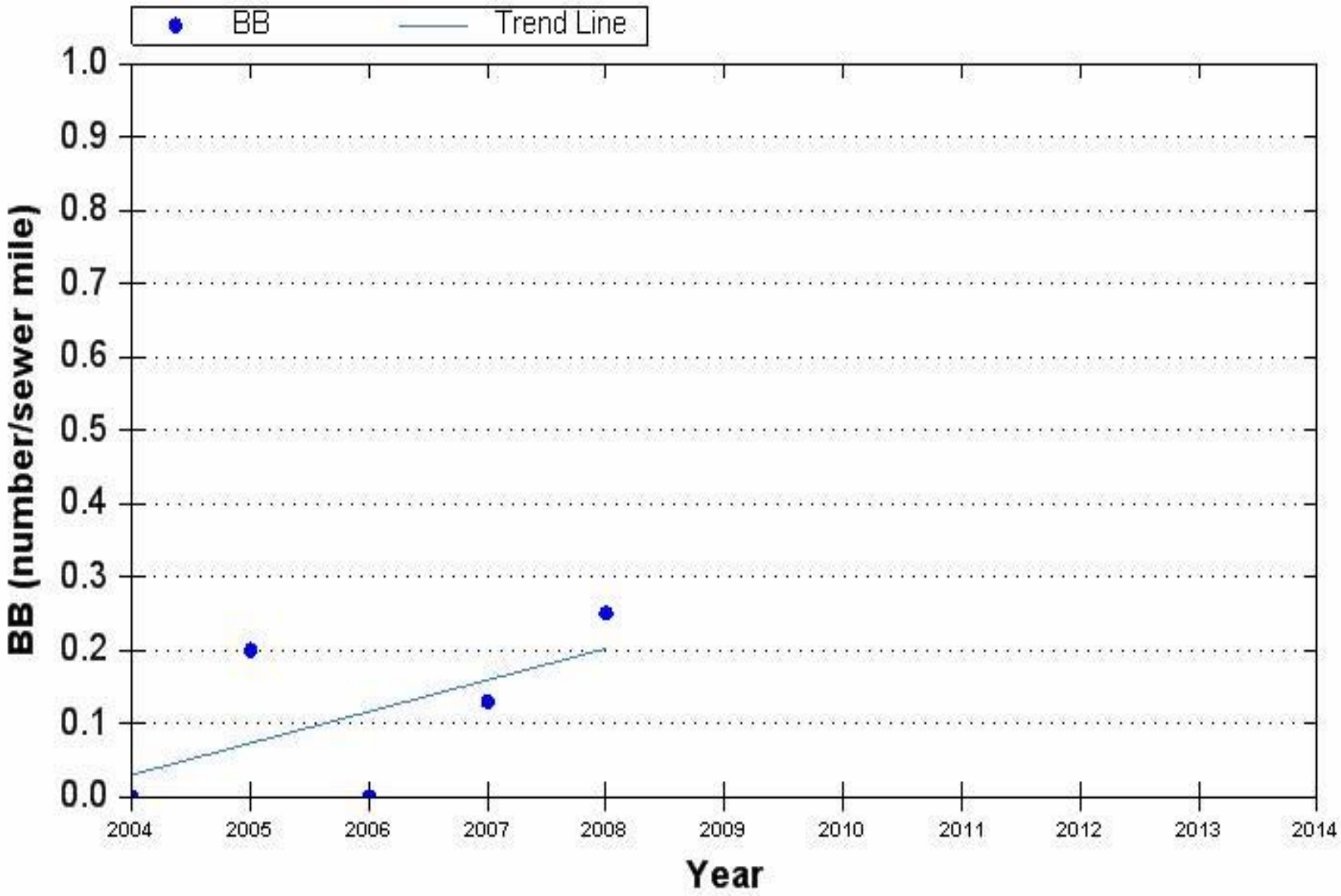
# Collection System O&M Performance Indicators:
# LSF - Lift Station Failures

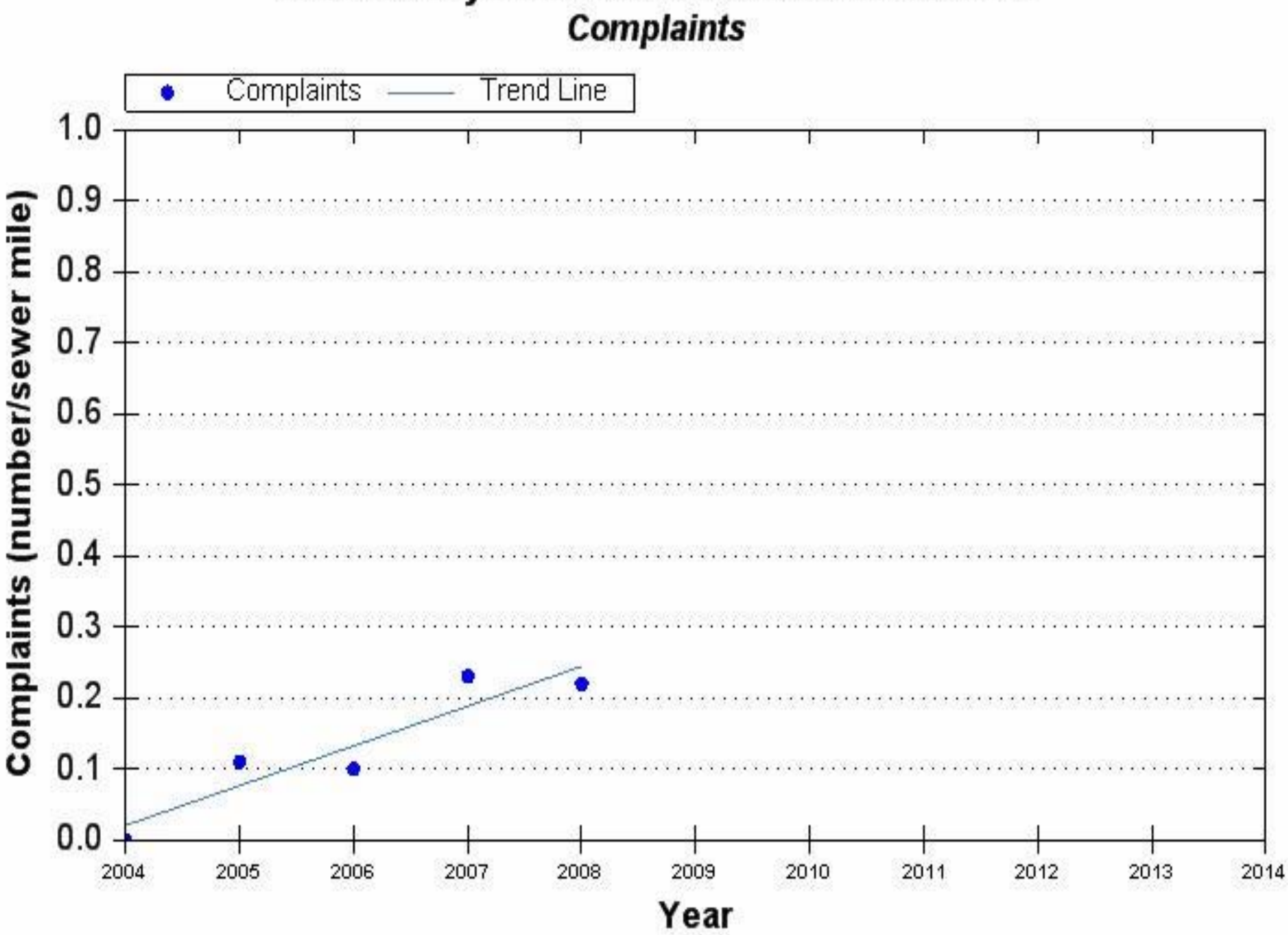


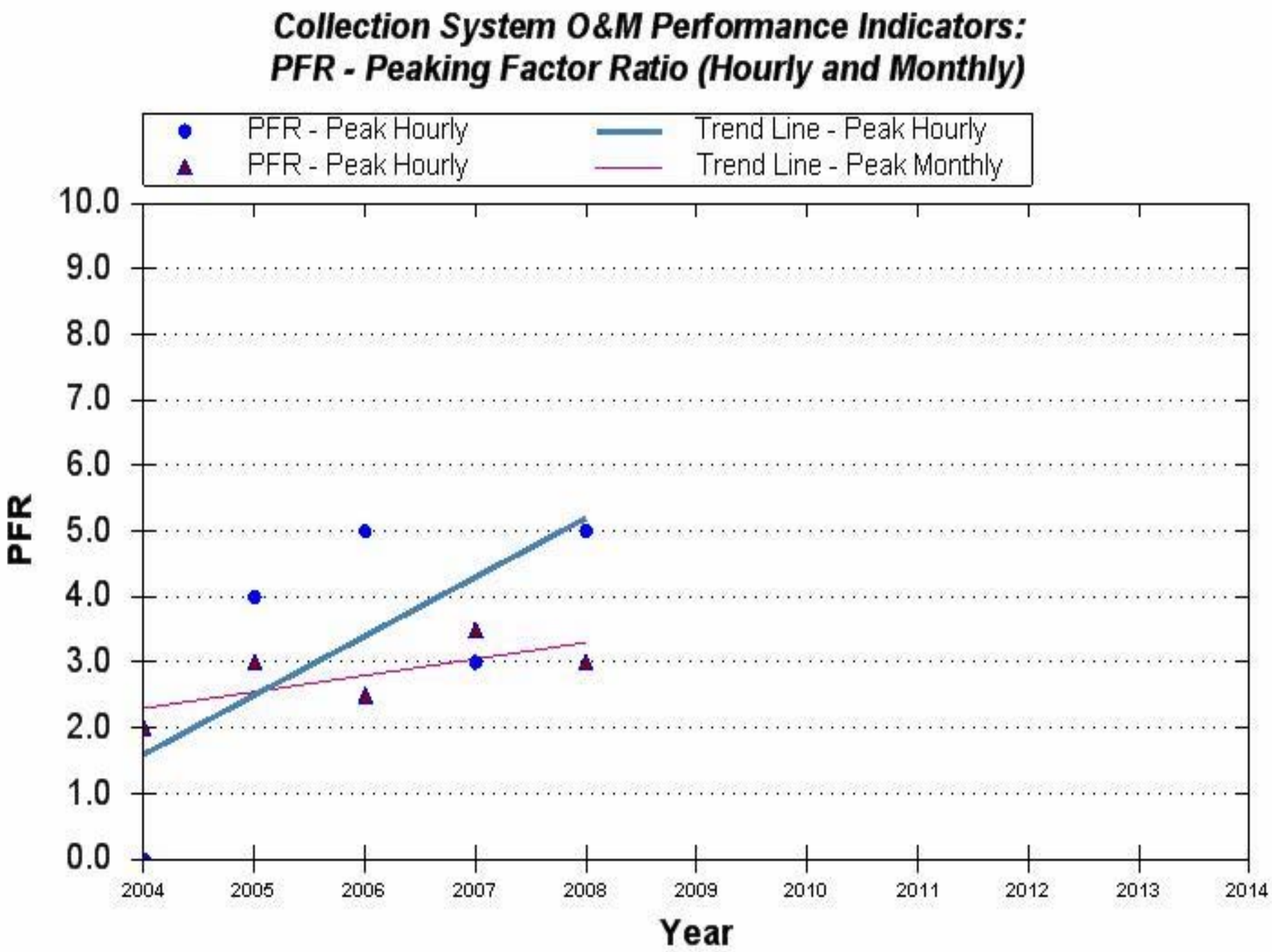
# *Collection System O&M Performance Indicators:*
# *SPF - Sewer Pipe Failures*




Collection System O&M Performance Indicators:
SSO - Sanitary Sewer Overflows
SSO
Trend Line
SSO (number/sewer mile/yr)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

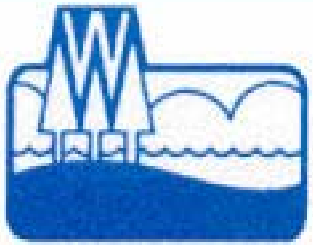

Collection System O&M Performance Indicators:
BB - Basement Backups
BB
Trend Line
BB (number/sewer mile)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year


Collection System O&M Performance Indicators:
Complaints
Complaints
Trend Line
Complaints (number/sewer mile)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year


Collection System O&M Performance Indicators:
PFR - Peaking Factor Ratio (Hourly and Monthly)
PFR - Peak Hourly
PFR - Peak Hourly
Trend Line - Peak Hourly
Trend Line - Peak Monthly
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
PFR
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

# Collection System Information & Education Sources

- Water Environment Federation
- University of California - Sacramento Training Manuals
- UW-Madison Professional Development Classes
- WRWA
- WWOA
- DNR



State of Wisconsin
Department **of Natural Resources**

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