

**Collections  
and Lift Station  
Maintenance: Reducing  
the Risks for Sanitary  
Sewer Overflows  
November 17, 2022**



# Objective of Webinar

- Proper Operation and Maintenance of the collection system
- Proper Operation and Maintenance of lift stations
- Preventative Maintenance
- Inflow and Infiltration investigation
- Developing an Emergency Response Plan



# Rural Water Association

- National Rural Water Association has over 31,000 utility system members
- Provides training and technical assistance in every aspect of the water and wastewater utilities
- All 50 states have a rural water association
- Emergency Response



# Expectations

- Wastewater collection utilities are required to be operational 24 hours a day and 365 days a year
- This is why utilities need to have a program to follow and develop a plan for normal operations and emergency situations



# Existing Programs

- USEPA and wastewater industry organizations and have developed tools to help reduce risks and identify areas that need attention with the intent of reducing the frequency and volumes of abnormal events (Sanitary Sewer Overflows) SSOs



# Basic Elements of CMOM

- Capacity
- Management
- Operation
- Maintenance

# CMOM Program

- Voluntary program established by EPA
  - For domestic wastewater collections systems
  - Based on the philosophy that it is better to take a proactive approach to collection system management, operation, and maintenance rather than waiting for problems to occur

# Basic Concepts of CMOM

- Poorly designed, built, managed, operated and/or maintained collection/transmission systems pose risks to public health and the environment
- Risks arise from SSOs which are the result of
  - Blockages
  - Structural, mechanical, or electrical failures
  - Collapsed or broken sewer pipes
  - Insufficient conveyance capacity
  - Excessive infiltration and inflow
  - Vandalism
  - Flushable wipes



# Objectives of CMOM

- Risks can be minimized by
  - Proactively preventing SSOs, and
  - Should they occur, having a plan to respond promptly
- CMOM provides tools to help utilities ensure collection systems are
  - Properly managed, operated, and maintained
  - Adequate capacity is available
  - Appropriate rehabilitation is provided

# How do you develop a CMOM program?

- Guidance and checklist for developing a program are located at
  - [http://www.epa.gov/npdes/pubs/cmom\\_guide\\_for\\_collection\\_systems.pdf](http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf)
- The guidance and checklist
  - Establishes criteria to evaluate the condition of domestic wastewater
  - Uses a three tiered approach
    - Examining records
    - Interviewing staff
    - Conducting field investigations

# Who should use CMOM?

- Applicable to Utilities that own or operate domestic wastewater collection systems
  - Small, medium, and large systems
  - Publicly and privately owned systems
  - Regional and satellite systems
- Operators may find the guidance and checklist useful in reducing the occurrence of SSOs

# Management

- Organizational structure
- Training
- Internal communication
- Customer service
- Management information system
- SSO notification program
- Legal authority

# Operation

- Budgeting
- Monitoring
- Hydrogen sulfide monitoring and control
- Safety
- Emergency preparedness and response
- Modeling
- Mapping
- New construction
- Pump stations

# Maintenance

- Maintenance budgeting
- Planned and unplanned maintenance
- Maintenance scheduling
- Sewer cleaning
- Air release valves
- Parts and equipment inventory
- Critical pipe sizes and repair parts need to be kept onsite

# Maintenance

- Air release valves are often forgotten about until the lift stations can not pump into the force main due to the pressure.
- Recently I have seen more and more operational issues from ARVs

# ARV Maintenance

ARV program will help any collection system. Air builds up within a collection system can cause lift station pumps to run longer increasing costs. H<sub>2</sub>S, when mixed with sewage drives the pH down within the system and can lead to crown corrosion on the force main as well as manholes and influent structures and treatment plant issues.



# Capacity Evaluation

- Internal TV inspection
- Survey and rehabilitation
- Sewer cleaning
- Flow monitoring
- Smoke testing and dyed water flooding
- Manhole inspection





# Smoke Blower



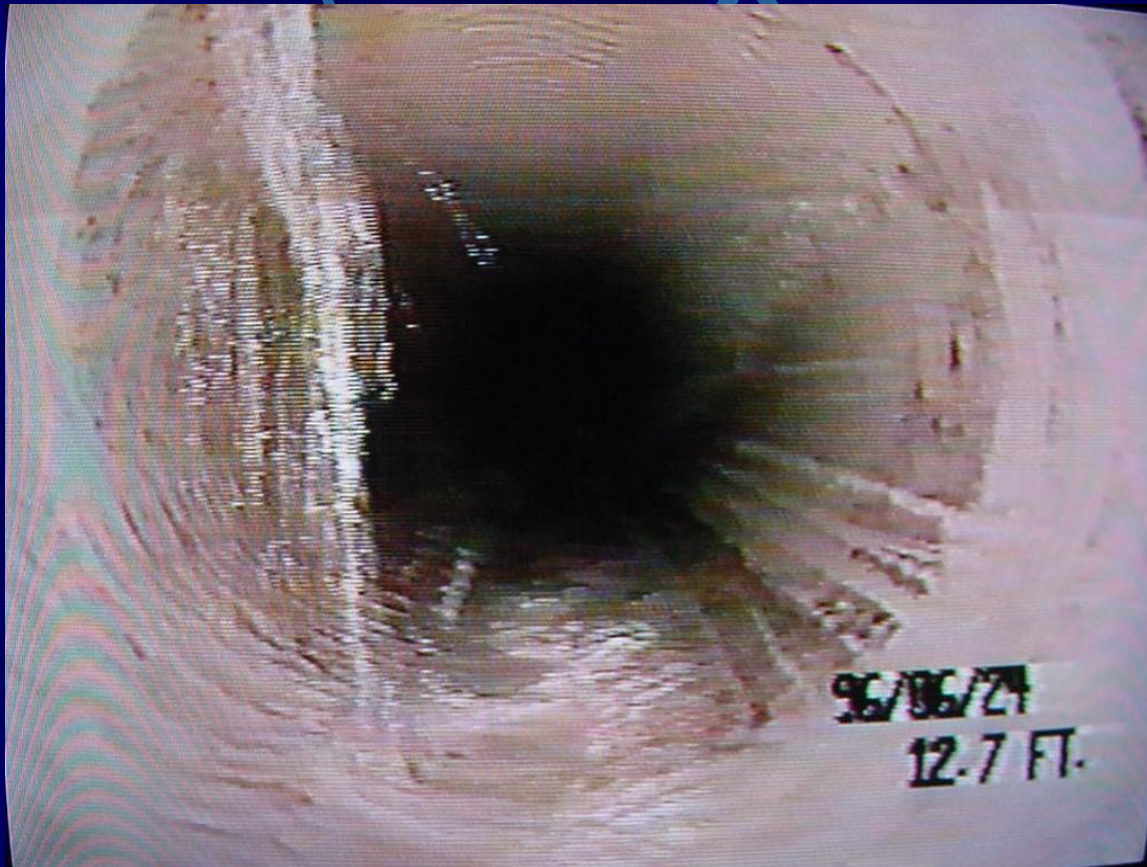
# Smoke testing



# Inflow from manhole



# Infiltration









# Rehabilitation

- Manhole repairs
- Mainline sewers



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Commercial

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# Lift Station wet well





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# Storm Surge Damage





# Grease Blockage



# Model CMOM Plan

- Objective – proper operation and maintenance of sanitary sewer systems (collection systems) to reduce numbers and volumes of sanitary sewer overflows (SSOs)
- Major requirements
  - Implement sewer system management plan
  - Report all SSOs to the SSO database
  - Private lateral spills are voluntarily reported

# Sanitary Sewer Overflow SSO

- a.k.a. spill
- Any overflow, spill, release, discharge, or diversion of untreated or partially treated wastewater from a sanitary sewer system, Including:
  - Overflows that reach waters of the US
  - Overflows that don't reach waters of the US
  - Backups into structures on private property if failure point is within publicly owned portion of sanitary sewer system

# Sanitary Sewer

- a.k.a. collection system
- Any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headworks used to collect and convey wastewater to a publicly owned treatment facility.

# Mandatory Elements of a Management Plan

- Operation and Maintenance Plan:
  - describes maintenance activities, rehab plan, staff and training required
- Design and Performance Plan:
  - Identify design and construction standards for new sewers and inspection standards
- Overflow Emergency Response Plan:
  - Describes procedures for SSO response, investigation, reporting and remediation
- Fats, Oils and Grease (FOG) Plan:
  - Describes FOG source control

# Mandatory Elements of a Management Plan (continued)

- Capacity Assurance Plan:
  - describe plan to evaluate collection system hydraulic capacity and address deficiencies contributing to SSOs
- Program Maintenance, Monitoring and Modification Plan:
  - Identify performance measures and use to make improvements to plan or processes
- Audit Plan :
  - specify internal auditing procedure to evaluate Plan effectiveness
- Communication Plan:
  - describes public and media information and input process

# SS System Inventory

- Population served
- Annual O&M and capital expenditure budgets
- Experience and staff capabilities
- Miles, type and age pipe
- Identification of Areas of Past Rehabilitation
- Annual inspection, cleaning program and grouting program(s)

# Spill Identification and Evaluation

- Location, date/time
- Volume spilled, recovered, reached surface water
- Cause
- Response activities and corrective actions employed
- Regulatory Report Filed



# What information does a permittee provide when reporting a spill?

- Name, address, and phone number of person reporting the spill.
- Name, address, and telephone number of permittee or responsible party for the discharge.
- Date and time of the discharge and status of discharge (ongoing or ceased).
- Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater).
- Estimated amount of the discharge.
- Location or address of the discharge.
- Source and cause of the discharge.

# What information does a permittee provide when reporting a spill?

- Whether the discharge was contained on-site, and any cleanup actions taken to date.
- Description of area affected by the discharge, including name of water body affected, if any.
- Other persons or agencies contacted.
- Provide as much information as possible!

# Lift Station Plan

## Lift stations O&M and Emergency Response Plan

For Public Wastewater / Collection Systems  
Per Chapter 62-664.500 F.A.C. Operation and Maintenance and  
Disaster Specific Preparedness / Response Plan

System: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
Contact: \_\_\_\_\_  
E-mail: \_\_\_\_\_  
Number Connections: \_\_\_\_\_  
WWTP: \_\_\_\_\_  
County: \_\_\_\_\_

Date: \_\_\_\_\_

FRWA Staff



For more information contact the Association at the following contact:

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# Florida DEP'S State Watch Office

- **Where does a spill get reported?**  
If the spill is less than 1,000 gallons, it should be reported by the facility directly to the appropriate District Office or delegated local program. If the spill is 1,000 gallons or more, or where the public health or the environment may be endangered, it should be reported by the facility to the State Watch Office's toll-free number 1-800-320-0519. Notice of Public Pollution

# **FDEP State Watch Office**

**1-800-320-0519**

- **What happens after a spill gets reported to the State Watch Office?**

The operator contacts FDEP's Bureau of Emergency Response (BER), the affected county's Emergency Management, and the FDOH. The BER then passes the information to the District's Wastewater program for follow-up. The required written follow-up report should be submitted to the District Office by the permittee within 5 days of the time the permittee became aware of the spill.

# Classification of SSOs

- Category 1 (greater threat – more data required)
- $\geq 1,000$  gal; or  
Discharged to a surface water and/or drainage channel drainpipe that was not fully captured and returned to the sanitary sewer system
- Category 2 (lesser threat – less data required)
- All other discharges of sewage resulting from a sanitary sewer failure.



# **Employee Safety training**

# **Critical Safety Elements in SS Maintenance**

- **Lock-out/Tagout for Electric, Water and Pneumatic Systems**
- **Confined Space Permitting and Training**
- **Electrical Permitting and Focus on De-Energizing Electrical Equipment**
- **Site Location and Arc Flash Awareness**
- **Fall Protection**
- **Overhead and Mounted Crane Safety**



# Definition of Maintenance Categories and Acceptable Ranges in %, for a PM Program

- Predictive Maintenance (~ 60%)
  - Vibration Monitoring - Infrared Heat Monitoring
  - Electrical Monitoring (Volts and Amps)
  - Flows & Pressure Monitoring - Laser Alignment
  - Wear/Corrosion Monitoring - Ultrasonic Testing
- Preventative Maintenance (~ 40%)
  - Performed on Regular Schedule
  - Performed by Hours of Use
- Planned Maintenance (> 80%)
  - Performed based on History
  - Performed based on Performance Drop
- Breakdown Maintenance (< 20%)

3% to 10% of original Equipment cost is spent on Maintenance in US

# Preventative Maintenance

- SCADA daily reports and alarms
- Weekly inspection
- Monthly visual inspection
- Semi- annual maintenance
- General Preventative Maintenance

# Information in Real Time



Truck Mounted PC

Instantaneous Access to  
historical information

Instantaneous updating of  
maintenance records

Access to acceptable operating  
parameters

- Four ways sewage can leave station
- Normal line power (on grid)
- Back up generator or Generator/VFD
- Emergency By-pass pump
- Tanker truck



# Storm Damage



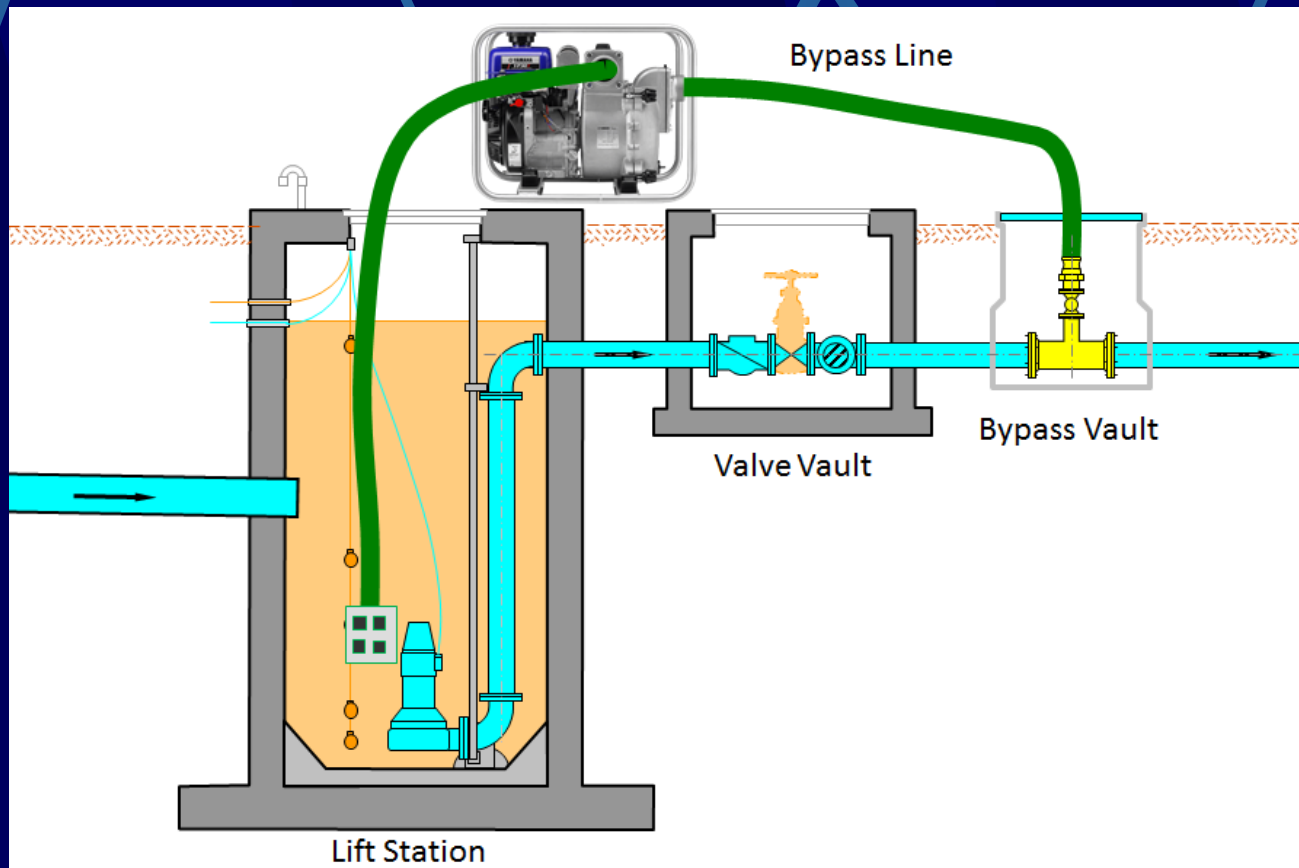
# Generator



# By-Pass pumps



# By-Pass Pump around setup





# Vacuum Trailer





# **Guidelines for Lift Station Maintenance**

- 1. Wet wells should be pumped out and cleaned at least twice a year, or more often if necessary, to prevent solids and grease build-up. Build-up of solids can create odors and damage the pump.**
- 2. Inspection of submersible pumps should be performed quarterly. inspection of the impeller should be performed quarterly or when motor hours are not within 10% of each other. The inspections would assure that the impeller is free of debris.**
- 3. Inspection of the check valves should be performed at least twice a year to insure proper working order and to prevent backflow from the force main to the wet well.**

# **Guidelines for Lift Station Maintenance**

- 4. Cleaning and inspections of floats four times a year assure proper performance. The buildup of grease prevents floats from working properly.**
- 5. Inspection of the light and alarm systems should be performed weekly. An alarm system in working order can alert you to problems immediately.**

# **Guidelines for Lift Station Maintenance (continued)**

- 6. Installation of hour meters on each motor will give accurate record of how often each motor is cycling. A logbook of motor hours, dates and maintenance performed should be kept.**
- 7. Amp readings should be taken at least once a month. If the amp readings do not meet the manufacturer's specifications, it is an indication that rags or debris could be lodged in the impeller**
- 8. A semi-annual inspection of all electrical motor control equipment to find poor connections and worn parts should be performed.**

# Employee Maintenance Training

- Maintenance crew certification on electrical testing equipment
- Hands on training through in-house and Rural Water Associations
- Electrical Training Lock out/Tag out
- Motor and Pump Training
- Solid State and VFD controls
- Motor controls, PLC'S, monitoring and control equipment

# Maintenance Considerations

- Pumps and Motors
- Control panels
- Monitoring and Control Equipment
- Check valves
- Wet wells

# Maintenance Considerations

- Air release valves
- Structural and Grounds
- Compressors and Venting Systems
- Corrosion and Odor Control systems
- Generator maintenance and Diesel fuel treatment
- SCADA



# Written SOPs

## Emergency Procedures for Power Outage and Bypass Pumping

### Power Outage to lift station:

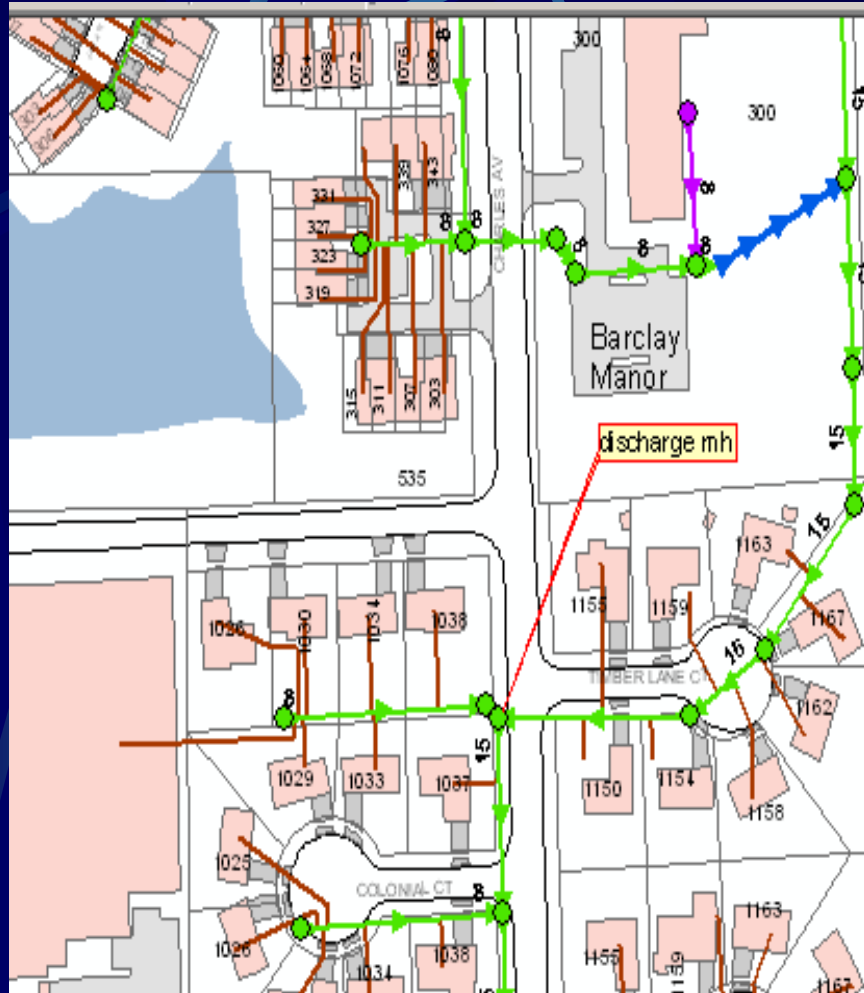
### Bypass Pumping:

If emergency generator is unable to provide power to the station. Then bypass pumping becomes 2<sup>nd</sup> options.

Then following procedure is to take place:

Make sure all employees have their PPE on them (Hard hat, safety glasses, safety boots, safety vest, gloves, and confine space gear, to perform the following task.

# Documented Emergency Response at Critical Locations





# Sanitary Sewer Overflow Response Plan



**System Name:** \_\_\_\_\_

**GMS ID:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**City/State/Zip:** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_

**Fax:** \_\_\_\_\_

**Email:** \_\_\_\_\_



## **FLORIDA RURAL WATER ASSOCIATION**

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# **Dangers in Lift Stations**









**Questions?**

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