Measuring Up: Investigating Collection System Odor and Corrosion Issues

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Overview

- Operation & Maintenance Requirements
- Strategies
- Monitoring Programs
  - What?
  - When?
  - Where?
  - How (much)?
Operation & Maintenance

- Regulatory
  - EPA CMOM Guide – Hydrogen Sulfide Monitoring, Condition Assessment, Safety
  - TCEQ – Chapter 112, Nuisance Complaints
- Identify Problem Areas
- Develop Targeted Solutions & Strategies
  - Measureable Results
Odor & Corrosion Indicators

- Odor Complaints
- Biogenic Corrosion
- Hydrogen Sulfide
  - Baseline Condition
  - System Characterization
- Data Driven Decision Making
Comprehensive Strategy

- Identify Source & Cause
  - Sulfide Generation
  - \( \text{H}_2\text{S} \) Release
- Establish Control Points & Objectives
  - Odor vs. Corrosion
- Collect What is Required
  - Targeted
  - Goal Based
Hot Spot Analysis

- Definable Locations
  - Sulfide Production
  - Sulfide Release
  - Headspace
  - Pressurization

- Prioritized List of Odor & Corrosion Issues

- Data Refinement
  - Asset Inventory
Monitoring Program

- Establish Objectives
  - Parameters
  - Locations
- Characterize Hot Spots
  - Dissolved Sulfide
  - Hydrogen Sulfide
  - Differential Pressure
  - Condition Assessment
- Screening Level
  - Establish Trends
Odalog Continuous H₂S Monitor
Pressure Monitoring

- Pressure differential between sewer headspace and atmosphere
- Differential pressure reflects sewer ventilation dynamics
- Monitors record pressure in the range of +/- 2.0 inH2O
Differential Pressure Data
Gastec Tubes

- Accurate grab sampling method for gas phase compounds
  - Ammonia
  - Mercaptans
  - Reduced Sulfur Compounds
  - Amines
  - VOCs
Wastewater Chemistry

- Dissolved Sulfide
- Sulfate*
- DO/ORP
- BOD\(_5\)*
- Wastewater Temperature
- pH

*Typically Laboratory Analysis
Data Precision & Accuracy
Biogenic Corrosion

- Anaerobic Bacteria
  - Hydrogen Sulfide
  - Sulfuric Acid
- Surface pH
  - pH < 7
- Corrosion Product
- Pictures
  - Trends
Condition Assessment

- CCTV
- Manned Entry
- Acoustic Technologies
- $5 to $15 per foot
- Visual Observations
  - “Free”
- Reduce the length of a representative sample size
# Condition Rating System

<table>
<thead>
<tr>
<th>Condition Rating</th>
<th>Description</th>
<th>Representative Photograph</th>
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</table>
| **Level 1**      | None/Minimal Damage to Concrete  
Hardness: No Loss  
Surface Profile: No Loss  
Cracking: Shrinkage Cracks  
Spalling: None  
Reinforcing Steel (Rebar): Not Exposed or Damaged | ![Representative Photograph](image1) |
| **Level 2**      | Damage to Concrete Mortar  
Hardness: Damage to Concrete Mortar  
Surface Profile: Some Loss  
Cracking: Thumbnail Sized Cracks of Minimal Frequency  
Spalling: Shallow Spalling of Minimal Frequency, Related Rebar Damage  
Reinforcing Steel (Rebar): May Be Exposed but Not Damaged | ![Representative Photograph](image2) |
| **Level 3**      | Loss of Concrete Mortar/Damage to Rebar  
Hardness: Complete Loss  
Surface Profile: Large Diameter Exposed Aggregate  
Cracking: ¼-inch to ½-inch Cracks, Moderate Frequency  
Spalling: Deep Spalling of Moderate Frequency, Related Rebar Damage  
Reinforcing Steel (Rebar): Exposed and Damaged, Can Be Rehabilitated | ![Representative Photograph](image3) |
| **Level 4**      | Rebar Severely Corroded/Significant Damage to Structure  
Hardness: Complete Loss  
Surface Profile: Large Diameter Exposed Aggregate  
Cracking: ½-inch Cracks or Greater, High Frequency  
Spalling: Deep Spalling at High Frequency, Related Rebar Damage  
Reinforcing Steel (Rebar): Damaged or Consumed, Loss of Structural Integrity | ![Representative Photograph](image4) |
Social Media

- Collect Odor Complaint Data
- Crowdsourcing of Hot Spot Analysis
- Improve Public Outreach
- Not Always Reliable
- Public Record
Systematic Approach

- Comprehensive
  - Identify Objectives
  - Minimize Costs
- Prioritization
  - Hot Spot Analysis
- Measurable
  - Monitoring Programs
- Cohesive Strategy
  - Proactive Solutions
Questions?

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