Asset Management Regulations are Coming
Are you ready?
August 29, 2018
Agenda for Asset Management

- Overview
- Drivers in the US
- Regulations / Senate Bill 2
- Implementation Steps
- Questions & Discussion
Asset Management Overview

Chapter 1
Asset Management Definition Adapted from USEPA...

Targets the acceptable level of risk to the organization

Delivers service levels customers desire and regulators require

Applies to the entire portfolio of infrastructure assets at all levels of the organization

Seeks to minimize total costs of acquiring, operating, maintaining, and renewing assets

Works within an environment of limited resources
Asset Management Evolution: Two Widely Recognized Frameworks

2004
- British Standard PAS55-1

2006
- IIMM International Infrastructure Management Manual
- USEPA Best Practice Guide
- IWA Aquamark Benchmark

2009
- EPA/WERF/WaterRF
  AM Framework

2010
- WERF SIMPLEx Tools

2011
- IIMM International Infrastructure Management Manual Update

2012
- IWA Aquamark Benchmark Update

2014
- FHWA TAMP Guide

2015
- British Standard PAS55-1 to be withdrawn

2016
- ISO 55000 AM Standard
  International Organization for Standardization

2018
- SB2
  Ohio EPA AM Requirements
- IDEM AM Requirements
EPA / WERF / WaterRF Framework

1. What is the current state of my assets?
   - System layout
   - Data hierarchy
   - Standards inventory
   - Develop asset registry
   - Condition assessment
   - Protocol
   - Rating methodologies
   - Assess Condition and failure modes
   - Determine residual life

2. What is the required LOS?
   - Expected life tables, decay curves
   - Determine life cycle and replacement costs
   - Valuation, life cycle costing
   - Demand analysis
   - Balanced scorecard
   - Performance metric
   - Set target Levels of Service (LoS)

3. Which assets are critical?
   - Determine Asset Risk
   - Failure mode and effects analysis
   - Business Risk
   - Desktop / Interviews
   - Optimize Capital Investment
   - Confidence level rating
   - Strategic validation
   - Optimized decision making

4. What are my best CIP and O&M strategies?
   - Optimize O&M Investment
   - Root cause analysis
   - Reliability centered and Predictive maintenance
   - Optimized decision-making
   - Determine Funding Strategy
   - Renewal annuity

5. What is my best funding strategy?
   - Determine Funding Strategy
   - Build AM Plan
   - Asset management plan
   - Policies and strategies
   - Annual budget

1. What is the current state of my assets?
2. What is the required LOS?
3. Which assets are critical?
4. What are my best CIP and O&M strategies?
5. What is my best funding strategy?
WERF’s SIMPLE Knowledge Base Provides Extensive Tools Including SAM GAP
WERF SAM-GAP Has 150 Statements

- The SAM-GAP assessment tool takes the form of a detailed and comprehensive multiple-choice questionnaire.
Asset Management Drivers in the US

Chapter 2
Typical Drivers in the US are Evolving...

**Capital Budgets**
- “Wish list”
- Unaffordable Capital Budgets

**State/Federal Requirements**
- NPDES permits and consent decrees
- SRF loans

**Bond Rating**
- Rating agencies starting to look for it

**Technology Issues**
- Incomplete data sets
- Poor hierarchies
- Lack of value
Asset Management Trend for the US

- US EPA mandating asset management plans through administrative orders
- Several states are promoting asset management requirements
  - Permits
  - SRF funding
  - Principal forgiveness
  - Grants
Asset Management Regulations

Chapter 3
State Asset Management Plan Requirements

New Jersey (Required for Drinking and Clean Water)

Municipal Sewage System Asset Management (MSSAM) Guide

Stormwater, Asset Management, and Wastewater (SAW) Program

AMP Required to Receive State Revolving Funding
Ohio EPA Asset Management Plan Requirements (Senate Bill 2)

- An Inventory and Evaluation of all Assets
- Operation and Maintenance Programs
- An Emergency Preparedness and Contingency Planning Program
- Criteria and Timelines for Infrastructure Rehabilitation and Replacement
- Approved Capacity Projections and Capital Improvement Planning
- A Long-Term Funding Strategy to Support Asset Management Plan Implementation

Public Water System Plan Deadline is October 2018
Draft Asset Management Rules

- To mesh asset management rules with OEPA existing capability rules.
- Rules to address the managerial, technical and financial capability of all water systems
- Requires a written asset management program available for inspection on-site
- October Requirements
  - Valve Exercising Program
  - Contingency Plan
  - Roadmap to Compliance
- OEPA AM website
  - [http://epa.ohio.gov/ddagw/pws.aspx#1790210209-resources](http://epa.ohio.gov/ddagw/pws.aspx#1790210209-resources)
Managerial Capability

1. Ownership Accountability
2. Brief Non-Technical Description
3. Operating Plan
4. Written Demonstration of Addressing Complaints & Violations
5. Inventory of Contracts
6. Purchasing Procedures
Technical Capability

1. Map of water source, treatment, storage and distribution
2. Inventory of assets
3. Evaluation of assets (condition, maintenance, repair, criticality)
4. Ranking of assets
Technical Capability cont...

1. Operation and Maintenance Programs
2. Adequate Maintenance Log
3. Emergency and contingency planning
4. Approved capacity projections
Financial Capability
Rehabilitation & Replacement - Capital Improvement Plan

• Criteria and timeline for rehabilitation and replacement
  • What are the costs of rehabilitation, repair and replacement of critical assets?
• Capital Improvement Plan
  • Project description, cost, funding sources
Financial Capability
Long-Term Funding Plan

- Funding for CIP and Operations
- Reserve Funds
- Is What We Charge for Water Sustainable For Our System’s Long-Term Needs?
- Do We Have Enough Funding to Maintain Our Assets for Our Required Level of Service?
Ohio AWWA Asset Management Committee

- Reviewed SB2 language with Ohio EPA
- Hosted small utility AMP webinar
- Hosted annual conference AM track
- Hosted 2016 OneWater workshop
- Authored Ohio Section Newsletter articles
- Hosted 2018 workshop on AMP components
- Host a Resource Page
Asset Management Program Implementation

Chapter 5
### Implementation Steps

- Develop Valve Exercising SOP
- Verify Compliance with OAC 3745-85-01 Contingency Plan
- Develop Roadmap for SB2 Compliance

#### City of 2018 Emergency Water Plan:
**Compliance to OAC 3745-85-01**

This chapter provides the location of OAC requirements in the plan, following the new OAC language as of December 2018. (To view the new OAC language, utilize the review tab and display the mark up.)

<table>
<thead>
<tr>
<th>Contingency Plans (OAC 3745-85-03)</th>
<th>ERP Citation(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Except as otherwise noted, the definitions in new 3745-85-03 of the Administrative Cost shall apply to this chapter.</td>
<td>Entire Plan</td>
</tr>
<tr>
<td>(B) Each community water system and wholesale system shall prepare and maintain a written contingency plan. When routine methods of delivery or treatment are compromised, the contingency plan shall provide for the protection of public health to the extent possible, through actions including but not limited to the notification of users, including the direct notification of critical users, the provision of alternate sources of water and the restoration of service.</td>
<td>Page 1-1</td>
</tr>
<tr>
<td>(C) Location of copies of the contingency plan.</td>
<td>Page 1-1</td>
</tr>
<tr>
<td>(1) One copy of the contingency plan shall be kept at an accessible, secure location at the water treatment plant, and be available to the operator of record or any designated staff. If there is no plant, the operator of record shall keep a copy of the plan in an accessible, secure location. This copy of the contingency plan shall be available onsite for twenty-four hour inspection by representatives of the director or emergency response personnel.</td>
<td>Need to verify location</td>
</tr>
<tr>
<td>(2) One copy shall be kept in the public water system administrator’s office, if applicable.</td>
<td>Page 1-1</td>
</tr>
<tr>
<td>(3) Public water systems serving a population of more than two hundred fifty shall also supply a copy of the plan to the county emergency management agency (EMA).</td>
<td>Page 1-1</td>
</tr>
<tr>
<td>(4) Within five days of a request by the Ohio EPA, a copy of the contingency plan shall be submitted in a format acceptable to the Ohio EPA.</td>
<td>Recommend to explicitly state in plan</td>
</tr>
<tr>
<td>(5) Contents of contingency plan. The contingency plan shall contain the following:</td>
<td>Appendix G Recommend adding overview maps</td>
</tr>
<tr>
<td>(A) A map of the distribution system, detailed locations for each valve in the system, including references that will aid in location of valves, and map of the wet first, surface water intakes and emergency connections as applicable.</td>
<td></td>
</tr>
</tbody>
</table>

#### City of Water Asset Management Roadmap

<table>
<thead>
<tr>
<th>Project</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**Resources**

- Day/Shift Hours
- Ongoing Maintenance
- Outage & Recovery

**Compliance**

- Day/Shift Hours
- Ongoing Maintenance
- Outage & Recovery

**Contingency Plan**

- Day/Shift Hours
- Ongoing Maintenance
- Outage & Recovery
Asset Management for Capital Planning

Levels of Service Based on Customer and Stakeholder Expectations

Risk Management Based on Likelihood and Consequence of Failure

CIP Using Life Cycle Cost, Business Cases and Prioritization

= Asset Management Plan
Level of Service

What Do My Stakeholders and Customers Demand?

What Do Regulators Require?

What is My Actual Performance?

What are the Physical Capabilities of my Assets?

Quantity, Quality and Reliability

Ability to Measure Success
## Service Levels Build Transparency and Stakeholder Relationships

<table>
<thead>
<tr>
<th>Service Level</th>
<th>Water</th>
<th>Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reliability</strong></td>
<td>• water main breaks</td>
<td>• sewer blockages / collapses</td>
</tr>
<tr>
<td></td>
<td>• Non-revenue water</td>
<td>• SSOS / CSOs</td>
</tr>
<tr>
<td></td>
<td>• worst served customers</td>
<td>• spills / backups</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>• customer complaints</td>
<td>• odor complaints from pump stations and WWTPs</td>
</tr>
<tr>
<td></td>
<td>(pressure, taste/odor, color)</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Service</strong></td>
<td>• outage response</td>
<td>• event response</td>
</tr>
<tr>
<td></td>
<td>• call center performance</td>
<td>• call center performance</td>
</tr>
<tr>
<td><strong>Regulatory</strong></td>
<td>• water quality compliance</td>
<td>• discharge permit compliance</td>
</tr>
</tbody>
</table>

**SB2 Metrics**

(a) Operating ratio.
(b) Operating cost to produce water per service connection.
(c) Breaks per ten miles of distribution pipe.
(d) Non-revenue water (percentage loss).
(e) Maintenance tasks per year (planned vs. unplanned) on vertical assets.
(f) One additional customer service metric to be tracked shall be determined by the water system.
# Sample Service Level and Supporting Maintenance Performance Measures

## Strategic Plan Elements

<table>
<thead>
<tr>
<th></th>
<th>LOS Category and Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Water Distribution</strong></td>
</tr>
<tr>
<td></td>
<td>• LOS X1 Breaks / Leaks Per 10 Miles</td>
</tr>
<tr>
<td></td>
<td>• LOS X2 Inadequate Water Pressure Events</td>
</tr>
<tr>
<td></td>
<td>• LOS X3 Worst Served Customers</td>
</tr>
<tr>
<td></td>
<td>• LOS X4 Event Response Time</td>
</tr>
<tr>
<td>2</td>
<td>Provide high quality service and effective response</td>
</tr>
</tbody>
</table>

## Sample Performance Measures

**Distribution Operations and Maintenance**
- Out of service hydrants repaired within target date
- Percentage of valves inspected per month
- Ratio of PM/CM work orders
- Work order completion ratio
- Average backlog (days) for PM repair work orders
Leading Practice Asset Management Should Be Risked-Based

- **Probability of Failure**
  - Asset conditions and performance standards

- **Consequence of Failure**
  - TBL Criteria
    - Economic
    - Environmental
    - Social

- **Condition Score** × **Consequence Score** × **Redundancy Factor** = **Asset Risk Score**

![Risk Matrix Diagram]

- Increasing Risk
- Excellent to Poor Consequence

- Highest
- Lowest

Diagram explains the calculation of asset risk score based on probability of failure, consequence of failure, and redundancy factor.
### Risk-Based Approach and CIP Planning Evaluates All Potential Failure Modes

<table>
<thead>
<tr>
<th>Condition Type</th>
<th>Failure Mode</th>
<th>Typical Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td>Capacity</td>
<td>Test or Desktop</td>
</tr>
<tr>
<td></td>
<td>Level of Service</td>
<td>Desktop</td>
</tr>
<tr>
<td></td>
<td>Efficiency</td>
<td>Desktop</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td>Mortality</td>
<td>Test, Visual, Desktop</td>
</tr>
</tbody>
</table>
Consequence of Failure: Evaluate by Triple Bottom Line (TBL) Analysis (Desktop or GIS)

ECONOMIC

SOCIAL

ENVIRONMENTAL
Risk Assessment Balances Capital with Maintenance
Steps to Bundle, Validate and Prioritize CIP

Assess and Analyze Asset Data and Establish Policies and Procedures

Conduct Asset Inventory and Condition Assessment

Develop 5/20 Year Capital Improvement Plan (CIP)

Analyze and Review Financial and Rate Implications

**Capital Improvement Plan Overview By Project Type 2007-2010 (Non-Encumbered Costs)**

<table>
<thead>
<tr>
<th>Project Number</th>
<th>District</th>
<th>Project Name</th>
<th>Priority</th>
<th>Project Type</th>
<th>Estimated Annual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>Southtowns Wet Well and ORF Improvements</td>
<td>High</td>
<td>Growth / Augmentation</td>
<td>$ -</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>Aurora N/Aurora S Pump Station Improvements</td>
<td>Med High</td>
<td>Growth / Renewal</td>
<td>$ -</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Kennedy PS Replacement</td>
<td>Med High</td>
<td>Growth / Renewal</td>
<td>$ -</td>
</tr>
</tbody>
</table>

**Projected Savings**

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated Annual Expenditure</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>24 Southtowns Wet Well and ORF Improvements</td>
<td>$ -</td>
</tr>
<tr>
<td>8 Aurora N/Aurora S Pump Station Improvements</td>
<td>$ -</td>
</tr>
<tr>
<td>42 Kennedy PS Replacement</td>
<td>$ -</td>
</tr>
</tbody>
</table>

**Total**

| Total - All Projects | $ 7,700,000 | $ 4,600,000 | $ 9,645,000 | $ 3,280,000 | $ 65,252,000 |

**Notes**

- Estimated Annual Expenditure includes both capital and operating costs.
- Priority levels are as follows: Low, Med, High, and Med High.
- Project types include: Growth / Augmentation, Growth / Renewal, and Renewal.
- The capital improvement plan addresses various types of projects, including collection system improvements, pump station replacements, and other enhancement projects.

**Probability of Failure**

- Probabilities are categorized as Low, Med, and High.
- The plan considers the probability of failure for each project to prioritize them accordingly.

**Impact / Alignment**

- The plan also evaluates the alignment with financial and strategic goals, considering both enhancement and growth projects.

**Consequence of Failure**

- The consequences of failure are assessed for each project, ranging from low to high impact.

**Project Impact**

- The plan considers the impact of each project on the overall system's performance and reliability.

**Financial and Rate Implications**

- The plan analyzes the financial implications of each project, including both short-term and long-term costs.

**Estimated Annual Expenditure**

- The estimated annual expenditure for each project is calculated based on the project's priority, type, and expected impact.

**Projected Savings**

- The plan projects potential savings from implementing these capital improvement projects, estimated at $65,252,000.

**Total**

- The total projected savings across all projects is $65,252,000.
Projects Can Be Validated and Prioritized Through Defined Criteria

- Physical condition
- Performance condition
- Strategic plan alignment
- Regulatory / environmental
- Service level / reliability
- O&M and safety
- Public benefit
- Financial
- Efficiency / energy
- Community / growth
Sustainable Financial Projections

- Capital Prioritization
- Affordability Analysis
- Funding Options
Program Implementation Outcomes

- Data driven decisions
- Identify the right projects for limited funding
- Establish funding levels to maintain risk

**Quantitative**
- Return on Investment
  - Quick Wins
  - Capital vs. Maintenance
- Failure Incidents

**Qualitative**
- Public Perception
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Ohio AWWA Asset Management Committee Past-Chair
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