Developing Asset Management Plans for Water and Sewer Utilities

Julie Wandling and April Storm, Tetra Tech, Inc., March 26, 2015, WV Expo 2015
Course Outline

- Objectives
- Overview
- Benefits
- Hurdles
- Guidance
- Elements
- Updating Asset Management Plans
- Common Pitfalls
- Solutions
Focus:

- Asset Management Plan (AMP) required for loan recipients

By the end of the day:

- AM Tools that are available
- Methods, and Approaches
- Elements needed to develop AMP
- Solutions to common pitfalls
USEPA contracted Tetra Tech to develop and maintain CUPSS Training:

- Drinking Water Systems
- Public Service Commission- PSD Board Members
- WV Rural Water Circuit Rider Training
- WV Rural Water Association 28th Training and Technical Conference
- Sustainable Pittsburgh’s 5th Annual Sustainability Conference

USEPA Collaboration:

- CUPSS Community Call Webinar
- USEPA Asset Management Workshop
  - USEPA Reference Guide for Asset Management Tools

Experienced in developing AMP for Drinking Water Systems
What is Asset Management?

USEPA defines it as “A process for maintaining a desired level of customer service at the best appropriate cost.”

Source: EPA Power Point Presentation. CUPSS And US: Getting Started with CUPSS
How will an Asset Management Plan Benefit Me?

- Define your level of service
- Produce a maintenance schedule
- Determine full lifecycle cost
- Manage risks
- Make investment decisions
Let’s Break it Down

- Supports your utility as a customer service business
- Saves staff time
- Boosts utility efficiency
- Backs up your budget talks
- Gives you confidence in telling your story

Source: EPA Power Point Presentation. CUPSS And US: Getting Started with CUPSS
Where do you start?

Aging Infrastructure

CUPSS, Work Order, O&M, and Financial Softwares, Guidance, GIS, and CAD

Environmental and Regulations Concerns

Limited Funding
Hurdles

- Uniform Rating System
- Supplements CUP$$ Program
- USEPA AM Framework
- Living Document
WVBPH AM Guidance Document

- Required elements
- Suggested Timeline
- Three Part Guidance:
  - Mixture of guidance,
  - Utility self-assessments,
  - Tables,
  - Worksheets, and
  - Templates

All resources can be downloaded at:
http://www.wvdhhr.org/oehs/eed/i&cd/Asset_management.asp
Getting Started

- Asset Management Team
  - Go to people for Operations, Maintenance, Finances, and Political Leaders

- Develop a mission statement
  - Overarching mission

- Collect general Utility information
Asset Management Team

Chief Operator, General Manager, & Board Official

AM Lead

Professional Service Provider, & City Recorder

Recorder

Operator, Office Manager, & Secretary

AM Data Development Coordinator

Treasurer, City Clerk, & Accountant

Financial Lead
Develop a Level of Service (LOS) Statement

- Defines major goals:

- Identifies objectives
  - Sets performance targets: short and long term

- Measures and tracks progress towards obtaining goals

- Identifies deficiencies

Additional tools and resources are available

Source: USEPA, Fundamentals of Asset Management Session 5-Set Target Level of Service (PDF) (28 pp, 381K)
Develop Inventory

Asset Registry Plan
Conditions Assessment Protocol
Lifecycle Costs

Inventory

ARP
CAP
LCC
Asset Registry Plan

Define an Asset
- Determine the minimum level of inventory

Systematic Inventory Plan
- Builds Inventory List
- Grouping assets with similar attributes
- Asset Name V/S Asset ID
- Asset IDs: Includes Crosswalk Tables
- Methods
- CUPSS Asset Name for Tracking

Additional tools and resources are available
Conditions Assessment Protocol (CAP)

- **Written protocol**
  - Guides Staff in consistently tracking and reporting the state of an asset
  - Prioritizes O&M schedule

- **Performed during routine inspections and emergency repairs**

Additional tools and resources are available
# Condition Assessment/Condition Rating

## Use Years in service

<table>
<thead>
<tr>
<th>Distress Mode</th>
<th>Rating 5</th>
<th>Rating 4</th>
<th>Rating 3</th>
<th>Rating 2</th>
<th>Rating 1</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Years in service</td>
<td>&lt; 3 years</td>
<td>3 &lt; 6 years</td>
<td>6 &lt; 9 years</td>
<td>9 &lt; 15 years</td>
<td>&gt; 15 years</td>
<td>4</td>
</tr>
</tbody>
</table>

## Accuracy

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Condition Assessment</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
<td>No slowdown detected</td>
<td>Slight decrease in average demand</td>
<td>4</td>
</tr>
<tr>
<td>Noticeable decrease in average demand</td>
<td>Considerable decrease in average demand</td>
<td>4</td>
</tr>
<tr>
<td>Meter register does not move between monthly readings</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

## Leaks

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Condition Assessment</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No visible water in meter pit or in meter</td>
<td>Slight condensation on glass</td>
<td>5</td>
</tr>
<tr>
<td>Moderate water in meter pit and/or water behind glass</td>
<td>Considerable water in meter pit and/or water behind glass</td>
<td>5</td>
</tr>
<tr>
<td>Major water in meter pit and/or water behind glass, visibly leaking from meter setter</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### Percent Reliability

$$\text{Percent Reliability} = \left( \frac{\text{Total Score}}{\text{Highest Score Possible}} \right) \times 100.$$ 

<table>
<thead>
<tr>
<th>Reliability Range</th>
<th>(CUPSS) Condition Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20%</td>
<td>Very Poor</td>
</tr>
<tr>
<td>21-40%</td>
<td>Poor</td>
</tr>
<tr>
<td>41-60%</td>
<td>Fair</td>
</tr>
<tr>
<td>61-80%</td>
<td>Good</td>
</tr>
<tr>
<td>81-100%</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

### Total Score

<table>
<thead>
<tr>
<th>Total Score</th>
<th>14</th>
</tr>
</thead>
</table>

### % Reliability

<table>
<thead>
<tr>
<th>% Reliability</th>
<th>93</th>
</tr>
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</table>

Additional tools and resources are available
Asset Redundancy, Status, and Capacity

Redundancy - Think about if you have replacement parts or another asset that can provide function.

Asset Status - This is whether or not the asset is presently in use, or not.

Asset Capacity - Is the asset oversized, fullsized, or undersized?
Consequence of Failure (CoF)

Items to consider when calculating

- Spill, Flood, Odor
- Water or Effluent Quality
- Regulatory Compliance
- Loss of Service to Customers
- Equipment and Safety
- Economic Impact

<table>
<thead>
<tr>
<th>CoF</th>
<th>Value</th>
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<tbody>
<tr>
<td>Insignificant</td>
<td>2</td>
</tr>
<tr>
<td>Minor</td>
<td>4</td>
</tr>
<tr>
<td>Moderate</td>
<td>6</td>
</tr>
<tr>
<td>Major</td>
<td>8</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>10</td>
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</table>
Expected Useful Life

- Industry standards
- Revise due to system’s history or knowledge of Utility
- Only use one year

<table>
<thead>
<tr>
<th>Asset</th>
<th>Expected Useful Life (years)</th>
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</thead>
<tbody>
<tr>
<td>Intake Structures</td>
<td>45</td>
</tr>
<tr>
<td>Wells and Springs</td>
<td>35</td>
</tr>
<tr>
<td>Galleries and Tunnels</td>
<td>40</td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>60</td>
</tr>
<tr>
<td>Pumps</td>
<td>15</td>
</tr>
<tr>
<td>Transmission Mains</td>
<td>40</td>
</tr>
<tr>
<td>Distribution Pipes</td>
<td>40</td>
</tr>
<tr>
<td>Valves</td>
<td>40</td>
</tr>
<tr>
<td>Blow-off Valves</td>
<td>40</td>
</tr>
<tr>
<td>Backflow Prevention</td>
<td>40</td>
</tr>
<tr>
<td>Meters</td>
<td>15</td>
</tr>
<tr>
<td>Service Lines</td>
<td>50</td>
</tr>
<tr>
<td>Hydrants</td>
<td>60</td>
</tr>
</tbody>
</table>
Assess the remaining useful life of assets

Use expected useful life tables

Know/Estimate when your assets were installed
“Chance an asset will fail based on the remaining useful life and redundancy.”

<table>
<thead>
<tr>
<th>General Redundancy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>Asset cannot be out of service without loss of function of the system, no backup asset available</td>
</tr>
<tr>
<td>50%</td>
<td>Alternative asset(s) provide half of the asset’s functioning capability</td>
</tr>
<tr>
<td>100%</td>
<td>Alternative asset(s) provide all of the asset’s functioning capability</td>
</tr>
<tr>
<td>200%</td>
<td>Alternative asset(s) provide double the asset’s functioning capability</td>
</tr>
</tbody>
</table>
Determining Business Risk “Criticality”

Criticality = CoF X PoF

- Identify and prioritize critical assets first
  - Not all assets fail at the same time
  - Not all assets have the same likelihood of failure
Lifecycle & Replacement Costs

**Life cycle cost** = original cost
- salvage value
+ operating costs
+ maintenance costs
+ renewal costs
+ decommissioning costs

Additional tools and resources are available
Optimize Your O&M Investment

Action Plan

Plan

LOS

Schedule

Evaluate

Execute

Source: USEPA, Fundamentals of Asset Management Session 7-Optimize (O&M) Investment (PDF) (39 pp, 924K)
Studies show, “Planned maintenance costs one-third less than Unplanned maintenance for the same task” and “by following the manufacturer’s recommendations the useful life of equipment can be increased 2-3 times.”
Capital Investment Plan (CIP)

- **Risks**
  - Poor Condition
  - High Business Risk
  - Poor Performance Scores
  - Poor Reliability Scores
  - Low Remaining Useful Life
  - No Redundancy
  - Imminent Major Failure Mode

- **Validation and Prioritization**
  - "Why?"
  - "Confidence Level?"

- **Funding Strategies**
  - "What funding?"

- **Action Plan**

- **Major Failure Modes**
  - Capacity
  - LOS
  - Mortality
  - Efficiency

- **Initial Projects Lists**
  - "Identification"
Long Term Funding Plan

- Includes Investments:
  - Capital
  - Maintenance
  - Operation

- Accounts:
  - Full economic costs
  - Addresses LOS
  - Business Risks

- Incorporates:
  - Raising rates
  - Creating a dedicated reserve
  - Acquiring grants and loans
  - Short and long term targets
Action Plan

- **Address:**
  - Objectives and targets
  - Capital Investment/Improvement Plan
  - Special issues (financial, environmental, and regulatory/compliance)
  - Deficiencies in LOS
  - Deficiencies from Sanitary Survey’s
  - Schedule to review and update the plan annually

- **Tips:**
  - Goals can be changed, added, removed, and adjusted as needed
  - Large issues or goals may need interim timeframes to keep momentum
Completion of Your Asset Management Plan

AM Team | LOS | Inventory | ARP | CAP
---|---|---|---|---
Critical Assets | O&M | CIP | LTFP | Action Plan
Update your AMP

- When:
  - Annually
  - Assets are renewed or replaced

- Reevaluate:
  - AM Team
  - Level of Service
  - Asset Registry Plan
  - Condition Ranking Charts
  - Remaining Useful Life
  - Lifecycle Costs
  - Condition Assessment Protocol
  - O&M Strategies
  - Long Term Funding Plan
  - Action Plan

- Resource:
  - System's Guide to Maintaining your Asset Management Plan
Staffing Pitfalls

- Turn over in staff
  - AM Team Members
- Short staffing
- Appropriate leads managing tasks
- Staff knowledge/skill, resources, and time
- Stakeholder buy in
  - Leaders who have authority to make decisions in support AM Program
- Communication
- Lack of control over outside organizations
AM Tool Pitfalls

- AM Tools and processes that are best suited for Utility
- Version Control
- Appropriate level of detail
- Overwhelmed with information
Solutions

- Assign and delegate tasks to appropriate staff
- Know your needs: Knowledge of staff skills, time, and resources
- Provide AM Training
- Understanding your stakeholders
- Keep communication open and inform Leaders of AM progress
- Formal written agreements for task/timeframes
- Evaluate and research tools
- Organize/manage AM information
- Take it one step at a time
<table>
<thead>
<tr>
<th>Department</th>
<th>Contact</th>
<th>Phone Number</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permits</td>
<td>Bill Herold</td>
<td>(304) 356-4312</td>
<td><a href="mailto:William.S.Herold@wv.gov">William.S.Herold@wv.gov</a></td>
</tr>
<tr>
<td>District Offices</td>
<td>J.D. Douglas</td>
<td>(304) 356-4306</td>
<td><a href="mailto:J.D.Douglas@wv.gov">J.D.Douglas@wv.gov</a></td>
</tr>
<tr>
<td>WVDWTRF</td>
<td>Bob DeCrease</td>
<td>(304) 356-4301</td>
<td><a href="mailto:Robert.W.DeCrease@wv.gov">Robert.W.DeCrease@wv.gov</a></td>
</tr>
<tr>
<td>CCRs</td>
<td>Dan Parker</td>
<td>(304) 356-4300</td>
<td><a href="mailto:Daniel.A.Parker@wv.gov">Daniel.A.Parker@wv.gov</a></td>
</tr>
<tr>
<td>Operator Training</td>
<td>Dawn Newell</td>
<td>(304) 356-4337</td>
<td><a href="mailto:Dawn.A.Newell@wv.gov">Dawn.A.Newell@wv.gov</a></td>
</tr>
<tr>
<td>Source Water</td>
<td>Bill Toomey</td>
<td>(304) 356-4298</td>
<td><a href="mailto:William.J.Toomey@wv.gov">William.J.Toomey@wv.gov</a></td>
</tr>
<tr>
<td>Capacity Development</td>
<td>Michelle Cochran</td>
<td>(304) 356-4299</td>
<td><a href="mailto:Michelle.L.Cochran@wv.gov">Michelle.L.Cochran@wv.gov</a></td>
</tr>
<tr>
<td>Asset Management</td>
<td>Kate Hatfield</td>
<td>(304) 356-4280</td>
<td><a href="mailto:Kate.M.Hatfield@wv.gov">Kate.M.Hatfield@wv.gov</a></td>
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## Sources

Contact

Julie Wandling
Consultant, Tetra Tech Inc.
Phone: (304) 414-0054 ext. 102
Email: julie.wandling@tetratech.com

April Newell Storm
Consultant, Tetra Tech Inc.
Phone: 304-414-0054 ext. 105
Email: april.n.storm@tetratech.com

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