

# Reference Guide For Asset Management Inventory and Risk Analysis

*Prepared by the Southwest Environmental Finance Center*

Document's Intended Use: This document provides suggestions on the type of information to be collected in the field, in the office and electrical data (where applicable) by asset category when completing an asset inventory. For each asset category, following the inventory table, there is a table providing suggestions for factors that could be considered when defining what impacts Probability of Failure and Consequence of Failure when determining an asset's criticality (or risk). The lists provided are not intended to be all inclusive nor do they purposefully exclude any items. Certainly you will come up with other things that are important to your utility. This guide is intended to help you get started.

# Inventory - Hydrants

## (Fire, Flush, Flow Test)

### Field Data

- Asset Size - diameter and/or flow rate, number and size of ports
- Asset Location
- Condition - visible inspection, then update as needed with maintenance history, age
- Redundancy - is another hydrant accessible if this hydrant fails?
- Model Number - if visible on hydrant, if not research further in office\*
- Serial Number - for new hydrants - warranty use
- Manufacturer - if visible on hydrant, if not research further in office\*
- Operational - is this hydrant operational? is this hydrant used for fire and flushing or fire only?

### Office Data

- Useful Life (if unknown an estimate is 50 years)
- Installation Date\*
- Supplier Name & Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended O&M
- Maintenance completed regularly (exercised/flushed)?
- Design Specifications followed?\*

\*Data may not be available for all hydrants – record what is available

# Risk - Hydrants

## (Fire, Flush, Flow Test)

### Probability of Failure

- Age
- Condition - rusting, corrosion, leaking seal?
- Frequency of Use - is it opened at least annually as part of a flushing or testing program?
- Routine maintenance completed?
- Pipe size connected to - less than 6 inch may cavitate
- Tools needed to open readily available to fire department and water department?

### Consequence of Failure

- Inability to fight a fire - loss of property, loss of life
- Inability to properly flush system - health concerns
- Water damage to nearby structures
- Level of Service Failures

# Inventory - Meters (Commercial, Master, Residential, Source, Well)

## Field Data

- Asset Size
- Asset Location
- Condition - gallons flowed, visible inspection, then update as needed with maintenance history, age
- Redundancy - are spare meters/parts always available for repair/replacement
- Model Number - if visible, if not research further in office\*
- Serial Number - if not tied to address in billing or other records
- Manufacturer - if visible, if not research further in office\*
- Operational - is this meter operational?

## Office Data

- Useful Life (if unknown an estimate is 15 years)
- Installation Date\*
- Supplier Name and Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended O&M
- Maintenance recorded - primarily for larger commercial and master meters
- Design Specifications followed?\*

\*Data may not be available for all meters – record what is available

# Risk - Meters (Commercial, Master, Residential, Source, Well)

## Probability of Failure

- Properly sized (meter size not always equal to pipe size)
- Properly installed (distance to elbows, tees, etc.)
- Age
- Condition
- Clogging issues
- Air in lines
- Maintenance History

## Consequence of Failure

- Impacts to revenue (typically meters fail by under-reading = lost revenue)
- Inability to understand water loss
- Level of Service Failures
- Cost of the failure

# Inventory - Pipe (Asbestos Concrete (AC), Cast Iron, Concrete, Ductile Iron (DI), Polyvinyl Chloride (PVC), Steel, Transmission Main)

## Field Data\*\*

- Asset Size
- Asset Location
- Condition - visible inspection, update as needed with maintenance history, age
- Redundancy - can water still reach all customers if this pipe fails?
- Model Number
- Manufacturer
- Operational - is this pipe in use or valved off?

## Office Data

- Useful Life (estimates vary by pipe type, 50 - 80 years)
- Installation Date\*
- Supplier Name and Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended Installation and Operation (pressure not exceeding rating)
- Maintenance records - break records
- Design Specifications followed?\*

\*Data may not be available for every pipe. \*\*Data collected from maps/records & confirmed when pipe is exposed

# Risk - Pipe (Asbestos Concrete (AC), Cast Iron, Concrete, Ductile Iron (DI), Polyvinyl Chloride (PVC), Steel, Transmission Main)

## Probability of Failure

- Age
- Condition
- Bedding
- Vibration
- Temperature change
- Depth of Bury
- Soil corrosivity
- Electrolisis

## Consequence of Failure

- Water Loss
- Damage to structures (buildings, pavement, etc.)
- Damage to environment (sink holes, chlorinated water entering a natural waterway, etc.)
- Revenue Loss
- Level of Service Failures
- Cost of the failure
- Number and type of customers impacted

# Inventory - Pumps (Booster, Chemical, Metering, Pressure, Transfer, Well)

| Field Data   | Office Data   | Electrical Data   |
|--|---|---|
| <ul style="list-style-type: none"> <li>•Asset Size - diameter and/or flow rate</li> <li>•Asset Location</li> <li>•Condition - visible inspection, then update as needed with maintenance history, age</li> <li>•Redundancy - Spare pump/parts always available if this pump fails?</li> <li>•Model Number - if visible, if not research further in office*</li> <li>•Serial Number - if visible, if not research further in office*</li> <li>•Manufacturer - if visible, if not research further in office*</li> <li>•Operational - is this pump operational?</li> </ul> | <ul style="list-style-type: none"> <li>•Useful Life (estimates vary by pump type, 5 - 15 years)</li> <li>•Installation Date*</li> <li>•Supplier Name &amp; Phone*</li> <li>•Under Warranty</li> <li>•Warranty Expiration Date</li> <li>•Manufacturer's Recommended O&amp;M</li> <li>•Maintenance completed regularly?</li> <li>•Design Specifications followed?*</li> </ul> | <ul style="list-style-type: none"> <li>•Variable Speed?</li> <li>•Nameplate Horsepower (used to calculate power consumption)</li> <li>•Measured power consumption per month or year*</li> <li>•Average run time (used to calculate annual hours of operation)</li> <li>•Hours of operation per year*</li> <li>•Peak Energy Demand*</li> </ul> |

\*Data may not be available for all pumps – record what is available

# Risk - Pumps (Booster, Chemical, Metering, Pressure, Transfer, Well)

| Probability of Failure  | Consequence of Failure   |
|---|--|
| <ul style="list-style-type: none"> <li>• Age</li> <li>• Condition</li> <li>• Maintenance History - routine maintenance performed? Correct lubricants used? etc.</li> <li>• Installation - vibration concerns, alignment concerns</li> <li>• Running as designed - on the pump curve</li> <li>• Properly sized?</li> </ul> | <ul style="list-style-type: none"> <li>• Level of Service Failures</li> <li>• Health concerns</li> <li>• Inability to provide water</li> <li>• Time to repair may be lengthy - spare parts on hand?</li> <li>• Cost of the failure</li> <li>• Number and type of customers impacted</li> </ul> |

# Inventory - Sources

## (Intake Structure, Springs, Well Casing)

### Field Data

- Asset Size - diameter and/or flow rate
- Asset Location
- Condition - visible inspection, then update as needed with maintenance history, age\*
- Redundancy - is another source accessible if this source becomes unavailable?
- Model Number - if visible, may not apply to all source assets\*
- Serial Number - if visible, may not apply to all source assets\*
- Manufacturer - if visible, if not research further in office\*
- Operational - is this source in use?

### Office Data

- Useful Life (varies with type, 20 - 50 years)
- Installation Date\*
- Supplier Name & Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended O&M
- Maintenance records\*
- Design Specifications followed?\*

\*Data may not be available for all sources – record what is available

# Risk - Sources

## (Intake Structure, Springs, Well Casing)

### Probability of Failure

- Age
- Condition
- Maintenance History
- Installation
- Clogging

### Consequence of Failure

- Level of Service Failures
- Health concerns
- Inability to provide water
- Time to repair may be lengthy - spare parts on hand?
- Cost of the failure

# Inventory - Storage Tanks/Structures

## (Concrete, Earthen Basin, Fiberglass, Metal, Plastic/Polymer)

### Field Data

- Asset Size - diameter and/or capacity
- Asset Location
- Condition - visible inspection, then update as needed with maintenance history, age
- Redundancy - is another storage asset available if this one becomes unavailable?
- Model Number - if visible, may not apply to all storage\*
- Serial Number - if visible, may not apply to all storage\*
- Manufacturer - if visible, if not research further in office\*
- Operational - is this storage tank in use?

### Office Data

- Useful Life (if unknown an estimate is 50 years)
- Installation Date\*
- Supplier Name & Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended O&M
- Maintenance completed regularly (inspected, painted, cleaned)?
- Design Specifications followed?\*

\*Data may not be available for all sources – record what is available

# Risk - Storage Tanks/Structures

## (Concrete, Earthen Basin, Fiberglass, Metal, Plastic/Polymer)

### Probability of Failure

- Age
- Condition
- Inspection and Maintenance History
- Location / elevation
- Size
- Exposure to corrosive or damaging elements - sun for plastic tanks, chlorine for metal tanks, etc.

### Consequence of Failure

- Level of Service Failures
- Health concerns
- Inability to provide water or sufficient pressure
- Time to repair
- Cost of the failure
- Environmental concerns
- Flooding/washout concerns

## Inventory - Treatment

(Chlorination System, Contamination Removal, Disinfection System, Filtration, Ozonation System, Sedimentation System, Ultraviolet System)

| Field Data   | Office Data   | Electrical Data   |
|--|---|---|
| <ul style="list-style-type: none"> <li>• Asset Size - diameter, capacity and/or flow rate</li> <li>• Asset Location</li> <li>• Condition - visible inspection, then update as needed with maintenance history, age</li> <li>• Redundancy - can the water continue treatment if this asset becomes unavailable?</li> <li>• Model Numbers - if visible, if not research further in office*</li> <li>• Serial Numbers - if visible, if not research further in office*</li> <li>• Manufacturer - if visible, if not research further in office*</li> <li>• Operational - is treatment unit in use?</li> </ul> | <ul style="list-style-type: none"> <li>• Useful Life (varies by type, 10-30 years)</li> <li>• Installation Date*</li> <li>• Supplier Name &amp; Phone*</li> <li>• Under Warranty</li> <li>• Warranty Expiration Date</li> <li>• Manufacturer's Recommended O&amp;M</li> <li>• Maintenance completed regularly?</li> <li>• Design Specifications followed?*</li> </ul> | <ul style="list-style-type: none"> <li>• Variable Speed?</li> <li>• Nameplate Horsepower (used to calculate power consumption)</li> <li>• Measured power consumption per month or year*</li> <li>• Average run time (used to calculate annual hours of operation)</li> <li>• Hours of operation per year*</li> <li>• Peak Energy Demand*</li> </ul> |

\*Data may not be available for all sources – record what is available

## Risk - Treatment

(Chlorination System, Contamination Removal, Disinfection System, Filtration, Ozonation System, Sedimentation System, Ultraviolet System)

| Probability of Failure   | Consequence of Failure   |
|--|--|
| <ul style="list-style-type: none"> <li>• Age</li> <li>• Condition</li> <li>• Maintenance History</li> <li>• Frequency of Inspection</li> <li>• Standard Operating Procedures developed and followed</li> <li>• Chemical supplies on-hand and ability to obtain in timely manner</li> </ul> | <ul style="list-style-type: none"> <li>• Health Concerns</li> <li>• Inconvenience to customers - boil water notices</li> <li>• Time to repair</li> <li>• Spare parts availability</li> </ul> |



# Inventory - Valves

(Air Release (ARV), Air Vacuum, Ball, Butterfly, Check, Gate, Pressure Relief (PRV))

## Field Data

- Asset Size - diameter, flow rate or settings
- Asset Location
- Condition - visible inspection if possible, use maintenance and age data also\*
- Redundancy - will water service continue normally if this valve becomes unavailable?
- Model Number - if visible, if not research further in office\*
- Serial Number - if visible, if not research further in office\*
- Manufacturer - if visible, if not research further in office\*
- Operational - is this valve operational? Distribution system valves may need more than yes/or no answer - 100% flow stoppage, allows break to be repaired, etc.

## Office Data

- Useful Life (if unknown an estimate is 15 years for check valve, 20 for all others)
- Installation Date\*
- Supplier Name & Phone\*
- Under Warranty
- Warranty Expiration Date
- Manufacturer's Recommended O&M
- Maintenance completed regularly (exercised, cleaned)?
- Design Specifications followed?\*

\*Data may not be available for all sources – record what is available

# Risk - Valves

(Air Release (ARV), Air Vacuum, Ball, Butterfly, Check, Gate, Pressure Relief (PRV))

## Probability of Failure

- Age
- Condition
- Maintenance History (exercised regularly, pressure gauges inspected regularly, etc.)
- Clogging
- Water Hammer

## Consequence of Failure

- Backflow concerns
- Pressure concerns
- Health concerns
- Level of Service Failures
- Maintenance concerns