

Oregon's Best Management Practices for Pressure Loss

PNWS-AWWA Pre-Conference

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May 7, 2014

Outline

- Background on the development of the Best Management Practices (BMP)
- Overview of the BMP
- Regulatory considerations regarding pressure loss
- Q/A

Why develop BMPs?

Anecdotal experiences showed a wide range of practices by individual water utilities with respect to:

- repair practices
- restoring service
- scope and manner of notifying users, and
- interaction with county and state programs

What is the purpose?

Better identify and agree upon
best management practices
to protect public health
during water service outages.

Guidelines, not requirements

Who developed the BMP?

Drinking Water Advisory Committee

BMP subcommittee (Jan 2008):

- Todd Heidgerken (Large Systems)
- Mike Kurtz (Special Districts)
- Steve Weaver (League of Oregon Cities)
- John McEvoy (County Health)
- Ed Butts (OR Assoc. of Water Utilities)
- Bob Fuller (Engineering Companies)
- Brian Stahl (PNWS-AWWA)
- Dave Leland (DWS)

What was considered?

- Subcommittee charge:
 - Prepare guidelines describing best practices
 - Recognize that there will be different scenarios therefore provide flexibility in which best practices should be used
 - Reach out to utilities to encourage incorporation of best practices into regular operations



Development process

- Water main repair BMP tackled first
 - Most commonly occurring service interruption
 - Greatest interest to local utilities
- Used available literature (AWWA Standards)
- Subcommittee met face-to-face and by conference calls over 9 months
- Input solicited from water utility organizations throughout BMP development
- DWAC approved water main repair BMPs in October 2008, published in Fall 2008 PIPELINE

Other Pressure Loss Events

- Pump Station Failure
- Water Storage Outage
- Source water outage
- Electrical / SCADA malfunction

BMP Repair Scenarios

- Make repair while maintaining positive pressure (best)
- Make repair without pressure using BMPs (desirable)
- Make repair without BMPs (least desirable)



Make repair under positive pressure



BEST!!!

Leaks or breaks repaired with clamping devices while mains remain full of water, under positive pressure, present little likelihood of contamination and require no additional precautions or practices

BMP Elements

- Prepare for repair or cutting in
- Notify users to take protective action, if applicable
- Consult with state program, if applicable
- Conduct repair or cutting in
- Flush
- Verify water safety
- Notify users water is safe, if applicable



Make repair w/o pressure using BMP

Desirable

Water mains that are completely depressurized in order to be cut into or to repair leaks or breaks are susceptible to contamination. Following all the BMPs listed provides public health protection when repairs must be made under these conditions.

Oregon Drinking Water Program Best Management Practices for Cutting Into or Repairing Existing Water Mains

Repair Scenarios:

1. Make repair while maintaining positive pressure - *Best*
2. Make repair without pressure using best management practices - *desirable*
3. Make repair without pressure without using best management practices - *least desirable*

1) Make repair while maintaining positive pressure:

Leaks or breaks repaired with clamping devices while mains remain full of water under positive pressure present little likelihood of contamination and require no additional precautions or practices.

2) When water mains must be partially or wholly dewatered to make repairs, the following practices apply:

Water mains that are completely depressurized in order to be cut into or to repair leaks or breaks are susceptible to contamination. Following all of the best management practices listed below provides public health protection when repairs must be made under these conditions.

Preparation for Repair:

- Throttle down main line valve(s) to reduce flow yet maintain positive pressure
- Isolate mainline by shutting off customer services at the meters
- Excavate below the main creating a sump and dewater
- Isolate mainline by shutting down mainline valve(s)
- Notify customers of outage when practical
- Notify customer service staff in case of customer calls

Repair Process:

- Treat exterior of exposed pipe with hypochlorite solution (account for control of residual chlorine in discharged water)
- Disinfect all repair items, piping and appurtenances per AWWA C651 Standard
- Conduct the repair with disinfected parts

Preparation for Cutting Into

- Isolate mainline by shutting off customer services at the meters
- Excavate below the main creating a sump and dewater
- Isolate mainline by shutting down mainline valve(s)
- Notify customers of outage when practical
- Notify customer service staff in case of customer calls

Preparation for the repair

- Throttle down main line valves to reduce flow yet maintain positive pressure
- Isolate mainline by shutting off customer services at the meters
- Excavate below the main creating a sump and dewater
- Isolate mainline by shutting down mainline valves
- Notify customers of outage when practical
- Notify customer service staff in case of customer calls

Repair Process

- Treat exterior of exposed pipe with hypochlorite solution (account for control of residual chlorine in discharged water)
- Initiate the cut in procedure by removing existing pipe and dewatering the remaining pipe
- Disinfect all repair items, piping and appurtenances per AWWA C651 Standard
- Complete the cut in procedure with disinfected parts

Post cutting into & repair activities

- Repressurize the main by opening mainline valve(s) and check for leaks
- Flush the line through a fire hydrant or blowoff. Flush in a direction to best clear the main of any debris / sediment, until air is gone and water flows clear.
- For water systems that apply and maintain a chlorine residual, check the chlorine residual at a point downstream of the main break. Residual should be consistent (not lower) with surrounding area.
- Collect a coliform bacteria sample per AWWA C651 Standard to provide a record of repair procedure effectiveness. Mark as a "special sample" and retain in utility records for 2 years.

Post cutting into & repair activities (cont.)

- Restore all valves to their normal operating positions
- Open customer services and operate the outdoor hose bib to remove air and turbid water. If no outside bib is accessible, leave instructions for customer on flushing.
- If the post-repair coliform sample result shows the presence of coliforms, resample per coliform sampling procedures. If second sample results show presence of coliforms, contact state drinking water program to consult on corrective action

Make repair w/o pressure or BMP



Least Desirable!

Water mains that are completely depressurized in order to be cut into or to repair leaks or breaks are susceptible to contamination. When all the BMPs listed can not be followed, additional measures to protect the health of affected customers are necessary.

In addition to the “desirable” repair activities...

- Notify affected customers to take personal protection action (do not use water, boil water, or use bottled water). Include media notice if affected area is extensive.
- Notify state drinking water program
- Conduct the repair and flush water main
- Flush customer services to remove air and turbid water.
- Collect a coliform bacteria sample to demonstrate water safety. Obtain coliform-absent result before proceeding.
- Notify users that water is safe to use

Regulatory Considerations

- Public health risk = potential for backflow, backsiphonage, and/or infiltration of contaminants.
- Oregon Administrative Rules:
 - Pressure of at least 20 psi must be maintained at all connections at all times.
 - Tier 1 public notification required for situations with significant potential to have serious human health effects as a result of a short-term exposure.
 - Standards for construction of new mains and repair of existing mains, including flushing and disinfection practices per AWWA Standards.

Public Notice

- Guidelines vs Requirements
- Format: up to the water supplier
 - Mandatory language NOT required but may be used
- If there a risk of contaminated water, be very clear:
 - Boil your water or use bottled water
 - Communicate timeframes or process
 - Once service is restored, customer should flush out their plumbing

Regulatory Tools

- **DWAC BMP:**
<http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Pages/management.aspx>
- **OHA Drinking Water Services Public Notice Template:**
<http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Pages/publicnotices.aspx>
- **EPA:** <http://www2.epa.gov/region8-waterops/emergencies-and-security-loss-pressure>
- **CDC:**
<http://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/>

WRF Study: Effective Microbial Control Strategies

- There is a lack of a technical basis and risk management structure for assessing the effectiveness of mitigations such as flushing and disinfection
- Lab studies were conducted to evaluate pathogen removal efficacies by flushing and disinfection
- A microbial risk model was developed to evaluate customer's infection risks after a main break and depressurization event
- Main breaks were placed into four categories based on risk. Specific actions were outlined commensurate with risk
- Application of an enhanced pressure monitoring program augment the assessment of main break risks
- The incentive to reduce the number of boil water advisories would propel utilities to better implement main break and pressure monitoring protocols

Questions???



Thank you!!!

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