



Main Breaks & Cross Connections PARTICIPANT HANDOUT

Overview:

This lesson focuses on main breaks and cross connections, describes how these events can compromise water quality in the distribution system and provides solutions to the most common challenges from the field.

Learning Objectives:

At the completion of this lesson, participants should have the ability to:

- Be able to preserve water quality when responding to a water main break
- Describe the difference between proactive and reactive responses
- Be able to describe what a cross connection is and recognize a cross connection
- Be able to describe the seriousness of cross-connections, and importance of cross-connection control
- Describe requirements for cross-connection control
- Be able to outline the emergency response in the event of a backflow

Key Concepts:

Recommended Response in Case of Main Break

- Notify State
 - State will assist with proper public notification
- Repair pipe
- Disinfect Pipe
- Take Coliform sample
 - If possible pipe should remain out of service until Coliform results confirm there is no contamination
- Return to service
- Notify State

Corrective Measures

- Reactive
 - Flushing (after break)
 - Disinfection
- Make sure **ALL** valves are opened after disinfection
 - It usually takes 3 or more valves to shut off a break, but only 1 to put the line back into service.
- Long-term - Asset Management
 - Buried pipes are the most costly assets of most water utilities
 - The rate of pipe failure is greater than the pipe renewal rate in most utilities

Notes:

4-Step Process

1. **Flush the line** to remove any particulates
 - More effective than burning with chlorine
 - Velocity > 2.5 fps
 - Flush at least 2x the volume of the pipe
2. **Chlorinate**
 - Should target a dose of 50 mg/L
 - A 5 mg/L residual should remain after 24 hrs
 - A higher chlorine dose can be used in exchange for a shorter contact time
 - Do not use dry chlorine (HTH) as granules may not fully dissolve
3. Flush to **remove chlorinated water** (minimum two full pipe volumes)
 - Chlorinated water must be dechlorinated prior to discharge in some areas
4. **Refill the line** and perform coliform sampling
 - If results are negative the line is ready to be returned to service
 - If results are positive, repeat from step 2
 - If positive results continue, pigging or additional flushing may be necessary

Notes:

What to do in case of a backflow event?

1. Stop the pressure differential that caused backflow of contamination, if possible
2. Identify and remove the cross connections
3. Contact state/ primacy regulatory agency
4. If harmful contaminants are suspected, provide immediate notice to the affected customers
5. Develop and carryout a plan for systematic flushing of the system
6. Continue to sample within and outside the suspected contaminated area

Additional Resources:

- RCAP's Resource Library: www.rcap.org
- USEPA Cross-Connection Control Manual
 - <http://www.epa.gov/safewater/crossconnectioncontrol/pdfs/crossconnection.pdf>
- USEPA Cross-Connection Control: A Best Practices Guide
 - http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_crossconnectioncontrol.pdf
- ASSE Series 5000, USC's FCCC & HR's "*Manual of Cross-Connection Control*", or UFL's TREEO's "*Backflow Prevention – Theory and Practice*"