Put A 'Stop' To Water-Main-Repair Shutdowns And Boil-Water Notices

For most water or wastewater system operators, engineers, and repair crews, the only thing worse than facing a 24"-main emergency repair is facing an even larger one. To those who have never performed an emergency line stop and bypass, the idea of completing repairs with no service outage, no long-term shutdown, and no 'boil water' notice is almost beyond belief. To those who have, it's a sigh of relief (Figure 1).

Figure 1. Bypassing the shortest length of pipeline needed to repair the original problem isolated between the line-stop fixtures minimizes the number of service connections that need to be disrupted for the duration of the repair effort.

Who Should Investigate Emergency Line-Stop-And-Bypass Options

One of the best features of line-stop technology is that it is very inclusive with respect to utility size, pipe size, previous engineering experience, or pipeline material. Because of the specialized equipment and expertise involved, virtually all line-stop applications are handled by specialty contractors, making the technology equally accessible to all utilities. Here are several scenarios where emergency line stops have proved their value:

- **Systems With Older Or 'At-Risk' Infrastructure.** Older infrastructure is found at the core of most larger cities, in smaller East Coast and Midwest towns, and in post-WWII suburbs. Other at-risk infrastructure is in geographic locations where shifting or corrosive soil conditions exacerbate the frequency of leak problems or where utilities raise line pressure to meet increased demand.

- **Malfunctioning Valves.** When valves seize due to lack of use and utility crews are unable to shut down water flow near the leak location, line stops can minimize the segment of infrastructure that needs to be isolated for the repair.

- **Utilities With Limited Repair Workforces Or Experience.** Line-stop contractors are an equal-opportunity alternative for all utilities — even those that have limited labor pools or experience due to utility size or turnover.

- **Contract Engineering Firms.** The advantages of line-stop-and-bypass techniques make reduced repair costs, streamlined

processes, and improved customer satisfaction attractive selling points for contract engineers bidding to oversee these types of repairs (Figure 2).

Five Ways To Overcome Fear With Logic

Because of the high stakes involved, the fear of working on large water mains is not uncommon. Fortunately, the core concept of line stopping should be familiar to anyone who has been involved with hot-tapping for new water-service lines or valves. This brief animation — from initial leak discovery to final repair — shows how the process works on lines from 6" to 96".

As with any purchase or process, comparing the cost benefits of the new alternative against those of current practices can be an important motivating factor. Here are five good reasons to dismiss excuses that might otherwise discourage water and wastewater utilities from exploring the advantages of line-stop-and-bypass procedures for their larger service mains:

1. **Revenue Loss.** Every hour that water is not passing through customer meters, the utility is losing revenue. Line-stop-and-bypass technology helps minimize revenue loss.

2. **Service Disruptions.** The ripple effect of financial impacts and physical inconveniences from service disruptions to industrial operations, hospitals, and other large customers can exceed the cost of repairs and loss of billing. Using line stops to minimize the length of pipeline needing to be isolated reduces the number of customers impacted.

3. **Stress.** Utility repair crews feel the stress of the situation every minute that water is spewing out of a leak. Line-stop-and-bypass solutions that allow water flow to be re-routed around problem areas quickly relieve many hidden stresses, complications, and costs related to rush repairs.

4. **Logistics.** Mapping out logistical efforts for emergency line-stop events, even before a problem crops up, makes it easier to achieve the financial and practical benefits of the process. Know the options, classify resources according to a range of needs, and cultivate relationships with qualified suppliers.

   Advance planning is also more productive for anticipated repair situations, such as a non-functional valve that needs to be replaced even though no leak is involved. It enables operators to evaluate the most cost-effective alternatives, double-check engineering calculations, choose the most favorable scheduling and pricing, and eliminate surprises.

5. **Timing.** The larger the repair or maintenance effort, the more complex it typically is in terms of:

   - **Immediate Repair Time.** The time it takes to isolate leaks can be shortened by using emergency line stops near the source of the leak. The ability to work through peak demand hours eliminates many logistical and overtime costs associated with planned nighttime shutdowns.

   - **Total Time Out Of Service.** Using line-stop fittings to create a bypass keeps water and revenue flowing even if delivery of large or complex replacement valves or fittings is delayed (Figure 3).

(Photo courtesy of Rangeline)

Figure 2. Depending on the circumstances of the application, the temporary bypass can be run above ground or below. Note the concrete pad below the line-stop fitting, used to support the fitting during the installation process.

Preparation Is Key

For decision-makers who want the business, customer-service, and logistical advantages that line stopping and bypassing have to offer, here are three key areas to research:

- **Planning — Consult With People In The Know.** Talking with trusted colleagues is a good way for new line-stop users to become familiar with decision-making considerations. That can be a neighboring utility, a state or national association, or current trusted suppliers who also sell line-stop fittings in sizes to fit the largest mains in the system.

- **Products — Pipe, Component, And Design Considerations.** Each type of pipe — cast iron, ductile iron, concrete cylinder pipe, asbestos cement, C900 PVC, etc. — can have different installation considerations (e.g., while many pipe styles can be tested up to 150 psi, concrete-cylinder pipe should be tested at only 10 psi above the internal pressure of the filled pipeline, to avoid crushing it).

  Carbon-steel or stainless-steel line-stop components and shop-coat or epoxy-coat finishes on line-stop fittings should be

matched to soil conditions of the surrounding area (e.g., corrosive soil, stray currents, saltwater intrusion, etc.).

In wastewater applications, sewage is generally pumped around the line stops used to isolate a broken main. If the line is a force main near a pumping station or requires the line-stop-and-bypass approach, however, it is important to engineer the bypass piping appropriately. Confirm that the increased resistance of added twists and turns will not exceed the pump's optimum flow range or compromise flow rate beyond acceptable levels.

- **Professionals — Identify Qualified Line-Stop Contractors.** After gaining a good idea of the components and considerations for a planned project, research potential line-stop contractors with the appropriate equipment, skills, and experience in those types of projects. Remember, as pipe diameter increases in size, the number of qualified contractors with appropriately sized equipment decreases. Be sure to discuss:
  - **line-stop designs** best suited to each application's line size, flow rate, and line pressure. The larger the pipe diameter, the more critical the design of the sleeve and line-stop components. Even if pipeline pressure is reduced to 40 psi, the amount of force over a 60", 72", or 96" main will be extreme and require specially designed concrete blocking to support the sleeve in place.
  - **how to cope with sediment** or build-up on the pipe interior, especially if the system has had historical problems with those issues, and
  - **logistical issues**, such as special material requirements and how long the bypass will need to be in place. ■

Figure 3. Once the pipe repair is completed and the bypass line removed, all that will be buried underground is the line-stop fitting with a plug (shown in black) that gets topped and protected by a blind flange.