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A-GRAM

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TARGET AUDIENCE:
Environmental, Operations, & Engineering Flights

UNIDIRECTIONAL WATER MAIN FLUSHING

SYNOPSIS:

Unidirectional Flushing (UF) of water mains is a procedure that greatly increases the effectiveness of flushing and can significantly improve water quality in systems where water quality problems are caused by the distribution system itself.

WHY FLUSH WATER MAINS?

The buildup of sediments, deposits, corrosion byproducts, biofilm, and other debris in water distribution systems can significantly degrade water quality. Problems this can create include: low chlorine residuals, brown water, positive bacteria counts, poor taste, bad odor, and other complications. Conventional flushing procedures are explained in Chapter 7 of Military Handbook 1164. However, conventional flushing is not very effective at removing these contaminants because water velocity in the mains is only 2 to 3 feet per second. When hydrants are flushed in a looped system, the water flows to the hydrant from multiple pipes and directions, making it very difficult to achieve the water velocity required to scour and remove deposits.

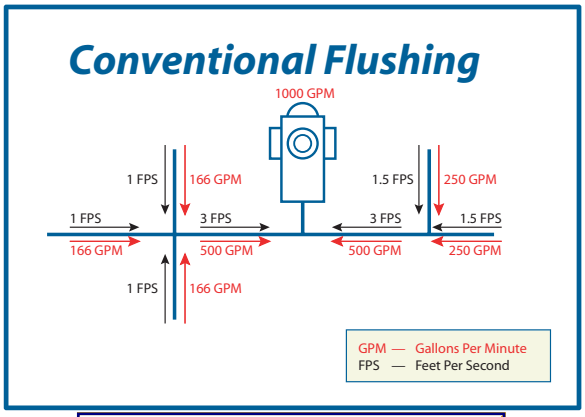
UNIDIRECTIONAL FLUSHING

Unidirectional means "one direction." UF involves closing some distribution system valves so that when you flush, the water only flows in one direction, causing the velocity to exceed the 5 to 6 feet per second necessary to scour deposits and debris from the mains.

UF requires planning to determine which valves to close, which hydrants to open, and the sequence of operation. For small sections of the distribution system, the planning process can be fairly simple; however, for a complete base system, it can be complex. Having a hydraulic model of the base water system can greatly simplify the planning process.

FLUSHING TIPS

Because UF is so effective in removing deposits, the water will become temporarily discolored. In many cases this discoloration can be very dark, particularly when UF is first implemented. Doing the flushing at night when water use is low can minimize complaints. Inform residents in advance to expect some discoloration of the water. Because UF requires the closing and opening of numerous valves, test the operation of valves before implementing UF and replace any valves not functioning properly. Also, it is important to open and close valves slowly to avoid water hammer and the damage it can cause.



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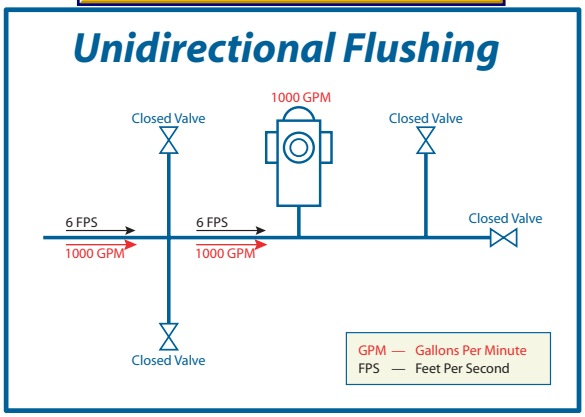

CONCLUSION

UF is a very effective tool for treating water quality problems caused by the distribution system itself. An effective program can reduce deposits to a point where they no longer affect water quality. Proper planning of a UF program is critical to its success. Determining the proper sequence of opening and closing valves and hydrants is the heart of the planning process.

For more information see the following article or contact our POC, Mr. Michael Clawson.

"Unidirectional Flushing: A Powerful Tool," *AWWA Journal,* Vol 91, Issue 7, July 1999.