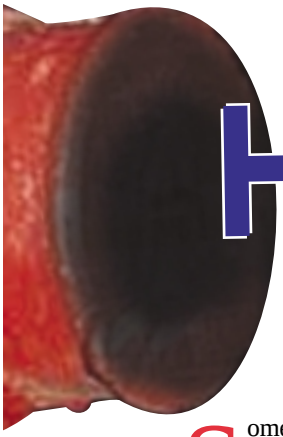
By Jay B. Shah, David Lakin, S.P. Singh, Suresh Raval and Michael Grimes



Hydrant Flushing *Improves Water Quality*

Sometimes something as simple as hydrant flushing can make a big difference to water quality. The water distribution system of the City of Clawson (Mich.) is a part of the Southeastern Oakland County Water Authority (SOCWA). SOCWA purchases water from Detroit Water and Sewerage Department (DWSD) and distributes water to the City of Clawson and other member communities. The water distribution system of the city is approximately 40 to 70 years old. It consists of 257,702 lineal feet of cast iron pipe ranging in size from 6″ to 16″ in diameter.

The City of Clawson has been experiencing low pressure, rusty water, water main breaks and a reduced fire fighting ability in various parts of the system. Spalding DeDecker Associates recently completed a physical and modeling evaluation of this water supply system. Hydrant flow testing was an integral part of the physical evaluation.

The hydrant flow tests were conducted in two steps. In the first step, the residents were informed about these tests through local newspapers and television advertisements. In addition, flyers were distributed the day before to remind residents that they might have discolored water on the following day. They also were advised to flush their taps until the water ran clean during testing day. On the day these tests were conducted, many residents came out of their homes out of curiosity to observe the testing.

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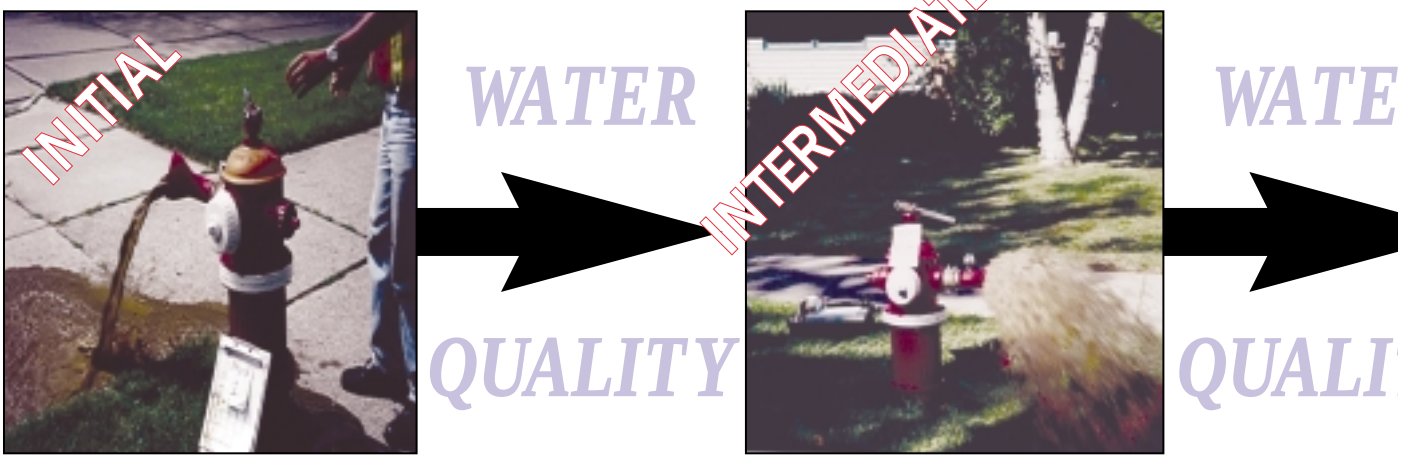
Before installation of the pressure gauges and the diffuser, the hydrants were flushed until clean water started running out of the hydrants. The change in water quality during the flushing of the hydrants is shown below. These pictures show the initial, intermediate and final water quality. The color of the initial flush of water varied from dark brown to brown then changing to light brown after 2 to 5 minutes, and then finally changing to clean white after 5 to 10 minutes of flushing.

The residents observing the tests were somewhat concerned after seeing the initial flushed water quality. However, they were satisfied after observing the final flushed water that was running clean. The residents observed that the water quality in regard to color, odor and taste improved dramatically after flushing of the hydrants. At the completion of the testing program, it was recommended that the City introduce a program of regularly flushing the fire hydrants at least twice in a year to improve and maintain water quality.

Unidirectional Flushing

Through unidirectional flushing (UF), naturally occurring sand, sediments, non-solidified deposits, loose corrosion by-products and other debris can be removed from a water supply system. This flushing is accomplished by opening each fire hydrant in the system under controlled conditions. This exercise flushes pockets of stagnated water out of the water supply system and improves the water quality not only in regard to color, odor and taste but also removes harmful constituents from the water supply.



Unidirectional flushing is the most effective and economical solution to cleanse the distribution system and to improve and maintain water quality. By closing the valves and creating a dead end in the opposite direction of main flow and opening the fire hydrants, a velocity of 5 ft/s to 6 ft/s is created that is required to remove sediments and contaminants.

The implementation of UF requires planning in advance to identify valves to be closed, hydrants to be opened, and most important, the sequence of operation of the valves and hydrants. To maximize the velocity created when a hydrant is opened and minimize the chances of dirty water reaching a customer, each flushing step must be configured to ensure that water entering the main being flushed flows only from mains that have already been flushed clean. This type of flushing program usually should start upstream of the water supply system and proceed downstream in an outwardly direction. Organizing a flushing program for a smaller system that is branched like a tree can be relatively simple. However, a hydraulic model could be used to simulate the results of a flushing program for a complicated system that is based on a street grid or is well looped.

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