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THE UNHEALTHY RELATIONSHIP BETWEEN PRIVATE FIRE SYSTEMS, MUNICIPAL WATER SYSTEMS, AND PRESSURE SURGES

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Protecting Water Systems Against Surges Caused By Private Fire Systems

- 1. Understand what causes pressure surges and their potential for failure.
- 2. Evaluate the potential for pressure surge and identify surge control strategy.
- 3. Require necessary surge control equipment.

Defining a Pressure Surge (transient or waterhammer)

A temporary increase or decrease in system pressure caused by a rapid change in flow rate.



Pressure Surges Can be Caused by Numerous Routine System Operations



Hydraulic Transient Event



Pressure Surge Can Result in System Failures



Case Study Background



Main Break During Testing Of Fire Pump



Fire Pump Operation Can Produce Surge in Municipal System and Result in System Failure



Proper Evaluation Can Identify the Need for Surge Control



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Modeling Evaluation to Assess Surge During Pump Test

Pump Shutdown: 1,500 gpm to 0 gpm in 2 sec.



Identify and Evaluate Other Surge-Causing Operations

Pump Startup: 0 gpm to 1,200 gpm in 2 sec.



<u>Proper</u> Surge Control Equipment Can <u>Control</u> Pressure Surge

For "normal" system operations

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- Variable-Speed Drive Pumps
- Pump Control Valves
- Slow Operating of Valves and Hydrants

For "emergency" system operations

- Surge Relief Valves
- Surge Anticipator Valves
- Surge Tanks
- Air Valves

Surge Relief Valve Minimizes Surge During Shutdown



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Surge Relief Valve Dampens Surge but Does <u>Not Control Low Pressure Surge On Startup</u>



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Surge Tank Can Control Surge On Shutdown



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Surge Tank Can Control Surge On Startup

Startup - no surge control



Startup with 6" Surge Relief Valve

Time (sec.)

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ressure (psi)



Pump Startup with Surge Tank

Recommend 1,500 Gal Surge Tank to Control Surge and Minimize System Failure



Proper Consideration of Private Fire Pump Surge Can Protect Mun System Against Failure

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- 3. Require necessary surge control equipment.



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