Wildfire Best Practices for Water Systems

When a wildfire happens, in special circumstances, water system piping and infrastructure may be contaminated with benzene and other volatile organic chemicals (VOCs). This type of contamination appears to occur when several factors line up:

- Depressurization coupled with open or burned water lines.
- Entry of smoke into open water lines.
- Heating and burning of plastics and synthetic distribution materials.
- The timing of the above factors.

If contamination is suspected, water systems should immediately unidirectionally flush their water lines as soon as possible. Multiple cycles or continual unidirectional flushing is strongly encouraged.

There is generally no way to tell where contamination occurs without performing specialized VOC testing. Each situation is unique and should be evaluated individually. If water systems are faced with wildfires, consider the following four scenarios to determine how to respond:

Structure loss (or physical damage) with depressurization: This unique situation requires extra caution. Water systems experiencing this may be at risk of VOC contamination and should immediately unidirectionally flush their water system when repressurizing and refilling water lines (to limit potential contaminant migration). A Do Not Drink-Do Not Boil notice should be issued until repeated sampling indicates that the system is free of contaminants. The system should sample for coliform bacteria, disinfectant residual, physical parameters, and nitrate. In addition, VOC testing using Method 524.2 is highly recommended.

Structure loss (or physical damage) with pressure maintained: Damage to water system components could cause localized contamination. Physically damaged system components should be immediately isolated and replaced (when possible); unidirectionally flushed (multiple cycles preferred); and assessed on a case by case basis as to whether VOC sampling should be performed.

No structure loss (or physical damage) with depressurization: Contaminants could have entered empty water lines through tanks, cross-connections, or unidentified leaks (ex. smoke, ash, auxiliary water supplies, groundwater contaminants, etc.). The system should immediately unidirectionally flush upon repressurization (multiple cycles preferred), assess the system, and perform necessary water quality sampling, including coliform bacteria, disinfectant residual, physical parameters, and nitrate.

No structure loss (or physical damage) with pressure maintained: If normal operations were maintained and no physical damage occurred, it is unlikely the water system was contaminated. If the water system was unattended for some period (e.g., under evacuation), it may be advisable to collect baseline water quality samples (coliform bacteria, disinfectant residual, physical parameters) – these samples could help to identify any unanticipated problems.

Note: Even without pressure loss, if there is physical damage to any water system components, the water system may wish to sample for VOCs. Experimental data has shown that heating and burning of plastics can contribute to VOC contamination. Pipelines or water system components that are heated or physically damaged by fire should be removed and replaced as soon as possible. Unidirectional flushing is encouraged as much as possible in all circumstances.

Sampling: If contamination is possible, design a representative sampling plan to perform an initial investigation. Water mains, appurtenances, and service lines should be evaluated. When depressurization occurs, service lines serving destroyed structures should be either sampled for VOCs (until determined to be free of contaminants) or replaced. The sampling plan should be adjusted as results come in.

Conducting Specialized VOC Sampling: VOC sampling following a wildfire requires a specialized method of VOC sampling. It takes time for contaminants to desorb from the pipes and dissolve back into water, so a period of stagnation (no movement or flow of water) is needed. Experimental data shows that 72 hours is the optimal stagnation time; however, 24 or 48 hours may be used as an initial indicator.

Instructions for Specialized VOC Sampling: Use an Environmental Laboratory Accreditation Program-certified laboratory for VOC analysis (Method 524.2). If water is chlorinated, discuss with the laboratory using a dechlorinating agent (ascorbic acid preferred). Perform at least one round of unidirectional flushing prior to collecting samples. Stagnate water for an appropriate amount of time. When collecting the VOC sample, discard enough water to avoid sampling fittings, gaskets, etc. by discarding at least 1 cup of water. Take care to fill the vial using a low flow of water, and do not to overfill the sample vial, so chemicals inside the vial don’t spill out.