

Post-wildfire VOC sampling guidance for public water systems

Oregon Drinking Water Services
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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.
- Timing of the above factors

If contamination is suspected, water systems should immediately unidirectionally flush their water lines as soon as possible. Unidirectional flushing is where flushing begins at the source (well, treatment plants, etc.) and is flushed downstream through the distribution system “chasing” the bad water out with good water to the ends of the distribution system and out any dead-end lines. Multiple cycles or continual unidirectional flushing is strongly encouraged.

Customers should also be advised to flush their household plumbing in a similar “unidirectional” manner, including all sinks, outside hose bibs/faucets, and showers (VOC’s can be dispersed in the air during showering).

There is generally no way to tell where contamination occurs without performing VOC testing. Each situation is unique and should be evaluated individually. If water systems are faced with direct impact from 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, and disinfectant residual. In addition, VOC testing using Method 524.2 is highly recommended. See below for sampling details. Physically damaged system components should be immediately isolated and replaced, when possible.

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 issue a boil water advisory and immediately unidirectionally flush upon repressurization (multiple cycles

preferred), assess the system, and perform necessary water quality sampling, including coliform bacteria, disinfectant residual and physical parameters such as pH and temperature. Customers should be advised to flush their household plumbing once results show an absence of coliforms.

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, however, consider the need to meet fire flows and/or consult with the local fire department when scheduling repairs. Unidirectional flushing is encouraged as much as possible in all circumstances.

Sample plan: If contamination is possible, design a representative sampling plan to perform an initial investigation. DWS can assist. 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 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. Community systems serving less than 3,300 people that are not able to fund these analytical costs may be able to utilize the Oregon DEQ lab for analysis using method 524.2 at no cost. Contact your drinking water regulator to inquire about lab support.

Instructions for Specialized VOC Sampling:

- 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 a screening sample to determine if VOC contamination has entered the distribution system (just as the system is initially repressurized), flush the sample point for a few minutes until the water becomes cold or reaches a steady temperature prior to collecting the sample so that it represents water from the distribution system piping.
- When collecting a sample to determine if an individual service line (PWS side) is contaminated with VOCs, flush enough water to avoid sampling fittings, gaskets, etc. by discarding at least 1 cup of water prior to collecting the sample. Samples can be taken directly from the meter. 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.

For technical assistance or any questions related to post-fire impacts or operations, contact your drinking water regulator or Drinking Water Services phone duty at 971-673-0405.