



What Water Treatment Professionals need to know about Wildfires

About this document

This document is intended to help Water Treatment Professionals understand how wildfires can impact water quality, to help them better serve customers who live in impacted areas.

Specific treatment technologies and treatment strategies are not discussed in this document. Water Treatment Professionals can access in-depth training on treatment technologies and strategies through WQA's Training programs and through the WQA Knowledge Base.

Why would wildfires impact water quality?

One way that wildfires can impact water quality is through direct impacts on water sources. For example, if a municipality is drawing their source water from a stream or a lake, wildfires in the region can change the quality of the source water. Ash can increase the alkalinity of the source water and raise the pH. Runoff from the fire may contain contaminants such as metals or organic matter. Organic matter raises the Total Organic Carbon (TOC) content, which increases chlorine demand, and can lead to higher levels of disinfection byproducts in chlorinated sources.

When homes and buildings on a municipal water supply are destroyed by a wildfire, pipes and plumbing systems can be compromised. Under the right conditions these compromised pipes can have a negative pressure variance which causes soot, ash and chemicals from the burning building to be drawn back up the line and into the broader distribution system for the municipality. This can result in extremely high levels of volatile organic compounds (VOCs) in the drinking water once the municipal system is brought back online. After the Tubbs fire in 2017 researchers found benzene at levels as high as 40,000 ug/L, and after the Camp Fire in 2018 researchers found benzene at levels exceeding 2000 ug/L.

A third way that wildfires can impact drinking water is through thermal degradation of plastic pipes. Intense heating of the soil and the environment can initiate thermal degradation of plastic pipes, even if they are protected under a layer of soil. As the pipes degrade, they can leach harmful chemicals into the drinking water. Chlorine used to disinfect the drinking water can further react with the degradation products, changing the contamination profile.

How could this impact customers?

Water treatment professionals should always be mindful of any changes to the water chemistry in their service area, but especially after a wildfire. For example, consider the potential impact that an increase in pH and alkalinity may have on treatment strategies.

Higher levels of TOC in the water can result in increased levels of disinfection byproducts. This can occur, for example, if the municipality increases the chlorine dose to compensate for higher chlorine demand,



2375 Cabot Drive
Lisle, Illinois 60532-3696 USA
Phone 630-505-0160
Fax 630-505-9637
www.wqa.org



or as a proactive measure to counter any undetected leaks which may have developed during the fire. Increased TOC levels can also interfere with some treatment strategies.

Severe health risks are associated with elevated VOC levels in drinking water, including cancer and/or damage to the liver, kidneys, spleen, stomach, nervous system, circulatory system, immune system, and/or reproductive, cardiovascular and respiratory problems. Children may be especially vulnerable.

The importance of testing for VOCs

It is essential to test the drinking water for VOCs after a wildfire before making any treatment decisions. High concentrations of VOCs may be very localized within the distribution system after a wildfire. Some houses may be severely impacted, while others nearby are unaffected.

Water treatment professionals should also be aware that in some cases the VOC levels may be so high that the water is essentially untreatable. In those cases, the only safe solution for the customer is bottled water until the high concentrations of VOCs can be flushed from the distribution system, or the degrading pipes replaced.

Once the VOC levels are known, water treatment professionals can make better informed decisions on what maintenance should be performed while bringing water treatment systems back online. For example, consider replacing all the POU cartridges, and/or doing regeneration/backflush cycle on the POE equipment.

How do you test water for VOCs?

This is a very common test and most certified drinking water laboratories can provide VOC testing.

- You can also search for certified laboratories on EPA's website (<https://www.epa.gov/dwlabcert/contact-information-certification-programs-and-certified-laboratories-drinking-water>).

Sampling requires a special bottle, which the laboratory will provide. For accurate results, use the provided bottle and carefully follow the laboratory's sampling instructions.

Can water with high levels of VOCs be used for bathing, showering and washing clothes?

High levels of VOCs in drinking water can pose both an ingestion risk and an inhalation risk. Boiling the water to remove the VOCs is not safe because it increases the risk of inhalation.

Line Breaks and Microbial Contamination

It is common for communities to issue Boil Water Alerts after wildfires because of water line breaks and loss of pressure during the fire. These conditions can allow microbial contaminants to enter the lines. Boiling the water kills microbial contaminants. Again, it is prudent to perform a VOC test after a wildfire



before assuming it is safe to boil the water. Bottled water is also a useful interim solution for customers during a Boil Water Alert.

In cases where there has been microbial contamination, it will be necessary to disinfect water treatment equipment after a wildfire. Water Treatment Professionals should follow the manufacturer's instructions on how to sanitize water treatment equipment or, where manufacturer instructions are not available, refer to WQA's "[Guidance for Sanitizing Residential Water Treatment Systems](#)."

References

1. Proctor CR; Lee J; Yu D; Shah AD; Whelton AJ; *Wildfire caused widespread drinking water distribution network contamination*, AWWA Wat. Sci 2020; e1183. 10.1002/aws2.1183.
2. Chong NS; Abdulramoni S; Patterson D; Brown H, Releases of fire-derived contaminants from water pipes made of polyvinyl chloride polymer, *Toxics*, 2019, 7(4), 57–70. (10.3390/toxics7040057)
3. Isaacson KP; Proctor CR; Wang E; Edwards EY; Noh Y; Shah AD; Whelton AJ, Drinking water contamination from the thermal degradation of plastics: Implications for wildfire and structure fire response, *Environmental Science: Water Research Technology*, 2021, 7, 274–284.
4. Draper WM, Li N, Solomon GM, Heaney YC, Crenshaw RB, Hinrichs RL, Chandrasena REP. Organic Chemical Contaminants in Water System Infrastructure Following Wildfire. *ACS ES T Water*. 2022 Feb 11;2(2):357-366. doi: 10.1021/acsestwater.1c00401. Epub 2022 Feb 1. PMID: 35647583; PMCID: PMC9135032.

Other Resources

1. [Purdue University Center for Plumbing Safety; Response and Recovery to Wildfire Caused Drinking Water Contamination - Center for Plumbing Safety - Purdue University](#)
2. [US EPA Wildfires and Water Quality Research; Wildfires and Water Quality Research | US EPA](#)
3. [WQA Guidance for Sanitizing Residential Water Treatment Systems](#)

About WQA

This material is provided by the Water Quality Association, the recognized resource and advocate for the betterment of water quality. WQA represents more than 2,500 member companies around the world in the residential, commercial, and industrial water treatment industry. For more information, visit the website: wqa.org.