

PPI RECOMMENDATION I

Guidance on Restoring Potable Water Piping Systems Post-Urban-Wildland Wildfires

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PPI recognizes the devastation on lives and property associated with urban-wildland interface wildfires. This document provides PPI's recommendations specifically associated with re-establishing potable water services following such a wildfire. Guidance from water utilities and local authorities having jurisdiction should also be obtained and followed.

Above Ground and Indoor Piping

Potable water piping systems and components that have been exposed directly to high heat or flames should be replaced. This recommendation applies to all piping materials, including metallic piping. Regardless of the material, the long-term functional capability may be compromised. If in doubt, replace it.

Below Ground Piping

Wildfires are typically fast-moving fires that consume combustible materials at and above the surface of the ground. Studies of wildfires in forested areas as well as in urban-wildland interface areas show that heat penetration into the ground is very limitedⁱⁱⁱ. Ground temperatures reached are moderate and unlikely to affect piping at burial depths of 12 inches (30 cm) or more. Typical practice is to bury piping 3 ft. (1 m) or deeper, depending on geographical location.

PPI recommends:

- Any piping or component buried less than 12 inches (30 cm) as well as piping transitioning out of the ground should be examined and considered for replacement.
- Any piping or components showing direct heat exposure, as evidenced by melting, distortion, leaks, or smoke staining, should be replaced.

These recommendations apply to all piping materials, including metallic piping. Regardless of the material, the long-term functional capability may be compromised. If in doubt, replace it.

Potable Water Supply Contamination

In recent years, there have been several communities across North America that have reported contamination of the underground water distribution system with combustion products, benzene, and other volatile organic compounds (VOC) following urban-wildland interface wildfires. These contaminants are a result of the combustion of structures and their various contents and materials, vehicles, commonly found outdoor materials, and elements of natural surroundings^{iii,iv}. The entry of these contaminants into the potable water system has been associated with negative pressure

ⁱ Preisler, H.K., Haase, S.M. & Sackett, S.S. Modeling and risk assessment for soil temperatures beneath prescribed forest fires. *Environmental and Ecological Statistics* 7, 239–254 (2000). <https://doi.org/10.1023/A:1009615032159>

ⁱⁱ Richter, E.G., Fischer, E.C., Metz, A. et al. Simulation of Heat Transfer Through Soil for the Investigation of Wildfire Impacts on Buried Pipelines. *Fire Technol* 58, 1889–1915 (2022). <https://doi.org/10.1007/s10694-022-01232-3>.

ⁱⁱⁱ https://19january2017snapshot.epa.gov/burnwise/wood-smoke-and-your-health_.html

^{iv} Paul M Lemieux, Christopher C Lutes, Dawn A Santoianni, Emissions of organic air toxics from open burning: a comprehensive review, *Progress in Energy and Combustion Science*, Volume 30, Issue 1, 2004, Pages 1-32, ISSN 0360-1285, <https://doi.org/10.1016/j.pecs.2003.08.001>.

events within the piping network in which toxic smoke and debris were pulled into the empty pipes. The negative pressure is caused by the intense consumption of water by firefighting efforts. The type of smoke and debris is known to be highly toxic.

This contamination has been found in water mains, distribution, and service lines made of both metal and plastic piping materials.

Remediation

When attempting to remediate contaminated water mains and service lines, consider the following:

- Flushing the water mains can be effective at reducing contamination and the VOC levels to within acceptable limits. Guidance of the water utility and local authorities should be followed.
- After a fire event, if a structure is reoccupied or service is restored to any occupiable structure, water should be tested for contaminants as recommended by the water utility or local authorities. Testing should be done on a structure-by-structure basis, as contamination may appear unexpectedly within an area and may not be associated with damage to the particular structure.
- Flushing of small diameter service lines may not be effective or economical. In such cases, it is recommended to replace the service lines and components (e.g., water meter, valves, etc.) regardless of material. All service lines should be properly buried.

Conclusion

In the event of urban-wildland interface wildfires with negative pressure events and subsequent contamination of the buried potable water main piping (regardless of piping material), water mains should be flushed until water tests confirm that contaminant levels are in conformance with all federal and state drinking water requirements before supplying water to buildings. Utilities and customers should consider replacing damaged and/or contaminated water service lines with new pipes when flushing does not appear to be practical or effective in eliminating contamination.

For more information on PPI's findings from investigating the Paradise, California wildfire, see PPI Technical Report - [TR-51 - Investigation of Benzene in Drinking Water Following the "Camp Fire" in Paradise, CA](#).

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