

**PPI Observations About the
Tragic Wildfire and Damage to the Water System in Santa Rosa
July 6, 2018**

PPI and its member companies have been monitoring the issues faced by Santa Rosa, California following the tragic Tubbs wildfire. With over 140,000 acres burned in the region, it is somewhat of a miracle that so many people survived the devastation to homes, offices, automobiles, and almost everything else we take for granted when just living normal lives.

We have never observed a similar phenomenon occurring in water distribution systems, and have not previously assessed the performance of water distribution systems in the presence of wildfires. PPI has the following observations about the damage to the Santa Rosa Water System following the Tubbs fire:

- The City of Santa Rosa Water Department cited many potential sources of the contamination, and specifically noted that burning or melting of plastic pipes as a primary source of the observed contamination. Although the plastic pipe in the system may have burned or melted, we do not believe that the specific contaminants that have been detected in the water system originated from the burning or melting of polyethylene pipe. The City water department indicated that their water system used polyethylene only in service lines, which constitute a minor component of water distribution systems.
- The City cited one reference in its [technical memorandum dated March 22, 2018](#) indicating that benzene, one contaminant that was observed in their testing, could have been formed from the pyrolysis of polyethylene. The conditions of that study could not have been achieved during the Tubbs wildfire. At typical dwelling fire conditions of 1000°F and in the presence of oxygen, pyrolysis will not occur; instead, combustion of polyethylene will occur. Significantly different contaminants (primarily carbon dioxide and water) would be formed from the combustion of polyethylene piping products including PE service lines, crosslinked polyethylene plumbing, telecommunications conduit, and corrugated polyethylene drainage pipe.
- In 1996, the Society of the Plastics Industry (SPI) published a [study](#) looking at the “Emission Factors for Polyethylene Processing” which assessed the emitted substances released when polyethylene was in a molten (melted) state. This study demonstrated that no aromatic substances, such as benzene, are generated when polyethylene is in a melted state.

- The introduction of ash, soot, and other wildfire combustion byproducts certainly could have been back siphoned into the water system service lines and mains from severed dwelling connections during the fire. In our view, the introduction of these combustion byproducts into the water system is the likely source of the contamination and not burning or melting of the polyethylene pipe. This phenomenon would likely have occurred for any water system that experienced the significant damage as that was observed in Santa Rosa.
- Because water distribution systems involve a number of different materials and appurtenances, a comprehensive study of how to design systems to address the observed problems would be best conducted with either the American Water Works Association (AWWA) or the Water Research Foundation (WRF). PPI and its members participate in the AWWA and WRF and research and standards development activities, and we encourage the entire water industry to study this issue.
- The permeation of polyethylene and other piping materials has been widely studied; however, the focus of this work is permeation of organic compounds from contaminated soils. (See, e.g., [Indiana University – Purdue University Indianapolis, School of Engineering and Technology Assessment and Calculation of BTEX Permeation through HDPE Water Pipe](#) (July 10, 2012); [AWWA Research Foundation \(AWWARF\), Impact of Hydrocarbons on PE/PVC Pipes and Pipe Gaskets](#) (2007)). The published studies demonstrate that all piping systems appear to have some potential for contamination from external agents through permeation of gaskets, jointed connections or permeation through the pipe wall. In Santa Rosa, combustion byproducts that were back siphoned into the intact service lines and mains could have permeated the pipe wall to some extent and are now being slowly released into water that subsequently fills these damaged pipes.

PPI would be pleased to serve as a technical resource for the City of Santa Rosa as the City assesses the situation, designs and rebuilds the replacement system for the Fountaingrove neighborhood.