CONCURRENT SESSION 3 – CHEMICAL AGENT SAMPLING & ANALYSIS METHODS

Benzene Contamination of Drinking Water Systems following Wildfires: Remediation Research and Decision Support

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In recent years, several drinking water systems in California have experienced benzene contamination following wildfires. Examples of affected systems include Santa Rosa (2017-2018), Paradise (2018-2019), and Riverside Grove (2020). The source of the benzene has not yet been definitively characterized. However, current research is shedding light on the interactions of the benzene with surviving infrastructure, and the implications for sampling and decontamination. Since benzene is soluble in polyethylene, high-density polyethylene service lines and polyethylene premise plumbing pipes can act as reservoirs for benzene contamination. The relatively slow transport of benzene through pipe walls brings several complications for decontamination and sampling which are not widely understood.

Using a combination of numerical modeling, laboratory experiments, and pipes harvested from affected areas, the work presented here seeks to answer several questions about sampling strategies and selection of remediation methods. Samples may be collected many weeks or months after the contamination or following flushing, and the reported concentrations will only represent what is in the water, not necessarily what is in the pipes. Further, communities may wish to understand how likely a building will be to exceeding a certain threshold of benzene or under what conditions. This presentation will include information from studies that can be used to help estimate the duration and cost of flushing programs given a specific contamination timeline and concentration measurements.

This presentation will also introduce a decision support tool for selection of remediation technologies most suited to a contaminated system's specific conditions and the contaminant of concern, in this case benzene. Technology selection often involves balancing competing priorities. Multi-Criteria Decision Analysis (MCDA) is a promising approach that has been used extensively in other industries but not yet in drinking water system remediation. This paper discusses development of a computer-based tool that allows practitioners to leverage the Analytical Hierarchy Process (AHP), a well-established method of MCDA, to select remediation technologies based on their effectiveness and their compatibility with the practitioner's project objectives.

Because the use of plastic pipes is increasing, and severe wildfires are expected to continue, the topics in this presentation are expected to become increasingly important for decision-makers.