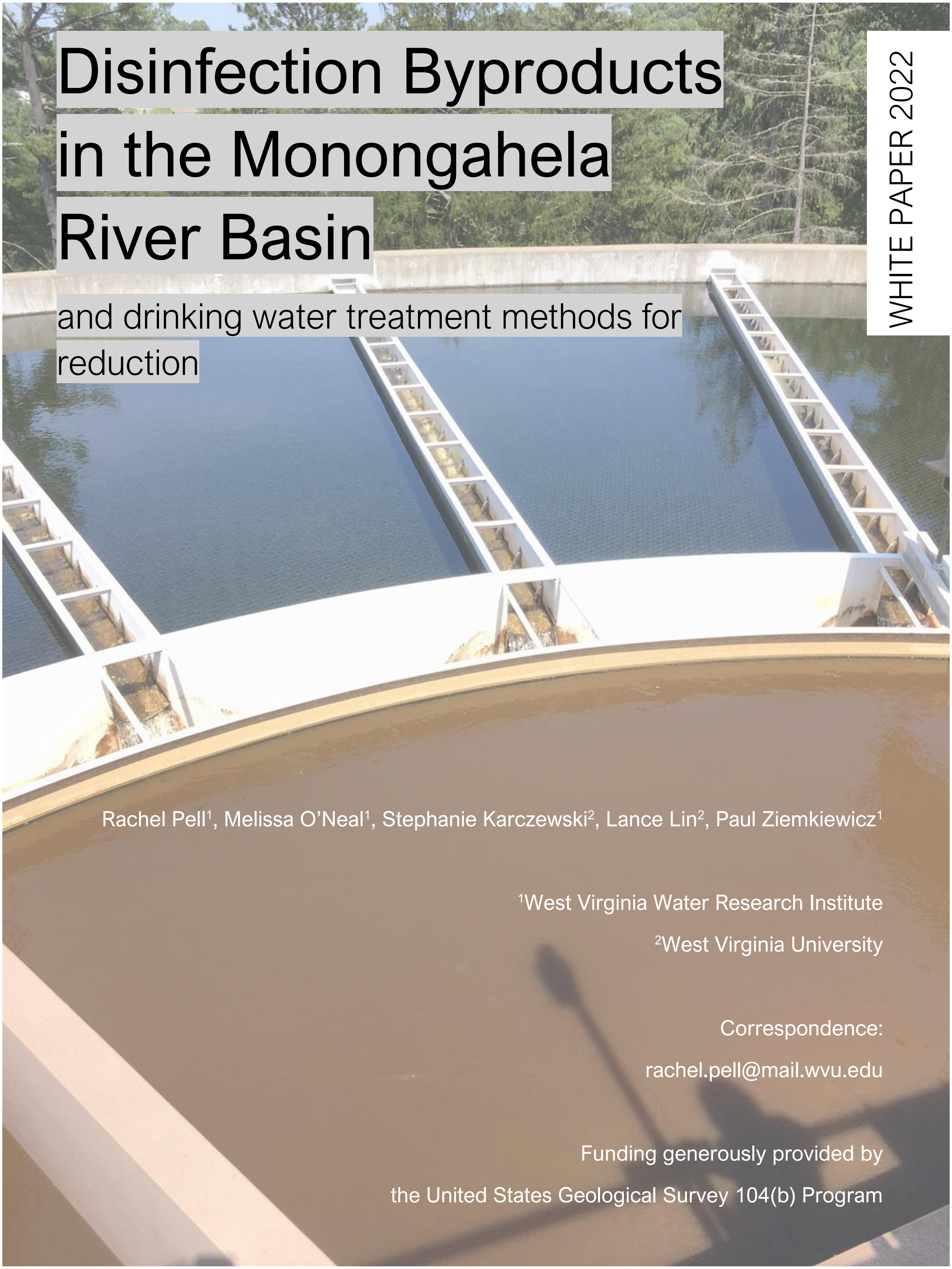

WHITE PAPER 2022

Disinfection Byproducts in the Monongahela River Basin

and drinking water treatment methods for reduction

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Summary

In this study, we sought to identify knowledge gaps in research and resources associated with the formation of disinfection byproducts (DBPs). To accomplish this, we conducted a literature review, toured water treatment facilities, reviewed data, and convened water operators, state and federal agencies, and researchers in a series of virtual meetings. We included small rural facilities and large urban facilities within northern West Virginia and southwestern Pennsylvania. Here we make recommendations for future research and management.

Regional focus on a global issue

DBPs are substances that form during the disinfection process in drinking water as a result of the interaction between a disinfectant and naturally occurring organic matter in the source water. The presence of chloride and bromide in source water can contribute to higher levels of DBPs in drinking water [1], [2].

DBPs include two major groups, trihalomethanes (THMs) and haloacetic acids (HAAs). DBPs in drinking water have been linked to serious health risks including birth defects and cancer in humans [3] – [8]. The Stage 1 and Stage 2 Disinfectant/Disinfectant Byproduct rule sets the maximum contaminant level for total trihalomethane (TTHM) at 0.08 mg/L and 5 major haloacetic acids (HAA5) at 0.06 mg/L [9]. Figure 1 shows the regulated DBPs.

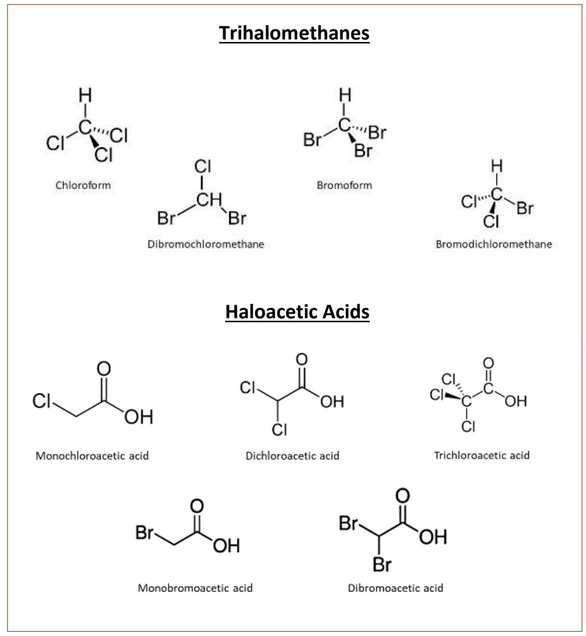

Figure 1: Regulated trihalomethanes and haloacetic acids.

Collaborating facilities

The following drinking water facilities participated in the study either through interviews, tours, and/or sharing data (Figure 2).

Morgantown Utility Board
~10.5 million gallons per day

Municipal Authority of Westmoreland County: McKeesport Plant
~7 million gallons per day

City of Fairmont
~5 million gallons per day

Preston County Public Service District 1
~400,000 gallons per day

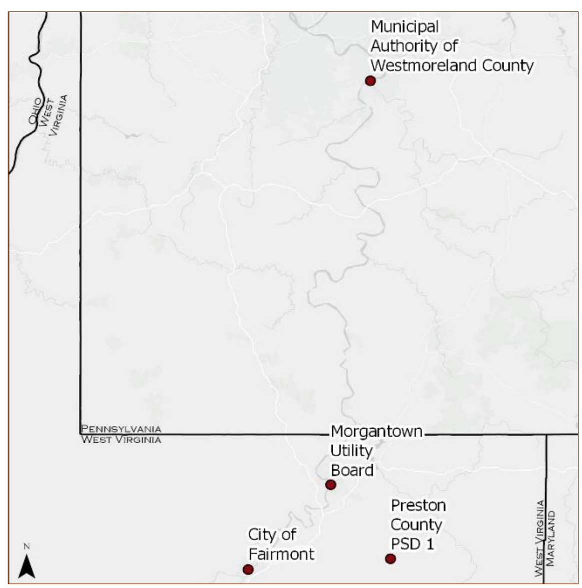

Figure 2: Drinking water facilities that participated in the study.

Key Findings

- Generally, disinfection byproduct issues appear to be more common in small, rural systems and consecutive systems. Research in this area is also limited.
- Haloacetic acid issues are similarly as prolific as THM issues.
- On average, facilities showed 22% brominated THMs and <2% brominated HAA5s.

Significance

- Regional research efforts would be best focused on the distribution system, including tank mixing methods, chlorine booster stations, and optimization of flushing.
- Future studies should consider the management of THMs and HAAs concurrently.
- Studies should focus on DBPs produced through the chlorination process while continuing to monitor potential bromide contamination in source water.

Implication for policy

Additional funding and technical support are needed to aid facilities in the implementation of alternative treatment methods and additional measures within the distribution system to minimize the formation of DBPs. This is especially vital for smaller, more rural drinking water facilities.

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