*Supplementary Information*

# Peracetic Acid to Reduce Disinfection By-product Formation in Drinking Water

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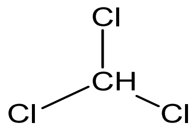
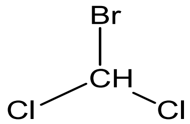
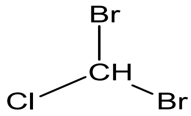
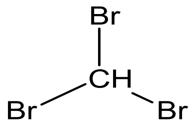
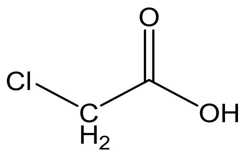
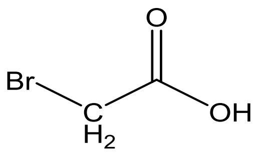
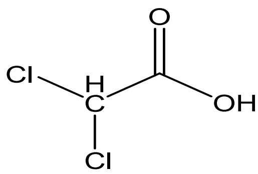
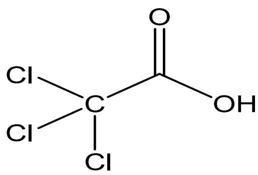
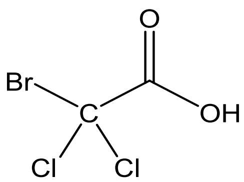
**Summary**

8 pages including 5 figures and 3 tables

## 1. DBPs monitored

**Table S1:** List of DBPs monitored for each of the four waters

| Group | Compounds | Chemical Structure | Retention time in GC-ECD (in mins) |
|---|---|---|---|
| Trihalomethanes (THMs) | Trichloromethane (TCM) |  | 3.24 |
| | Bromodichloromethane (BDCM) |  | 4.72 |
| | Dibromochloromethane (DBCM) |  | 8.26 |
| | Tribromomethane (TBM) |  | 14.24 |
| Haloacetic acids (HAAs) | Monochloroacetic acid (MCAA) |  | 8.20 |
| | Monobromoacetic acid (MBAA) |  | 9.98 |
| | Dichloroacetic acid (DCAA) |  | 10.94 |
| | Trichloroacetic acid (TCAA) |  | 16.65 |
| | Bromodichloroacetic acid (BDCAA) |  | 23.04 |
| Adsorbable organic halides | N/A | N/A | N/A |

(AOX)

## 2. Text S1. Role of PAA versus $H_2O_2$

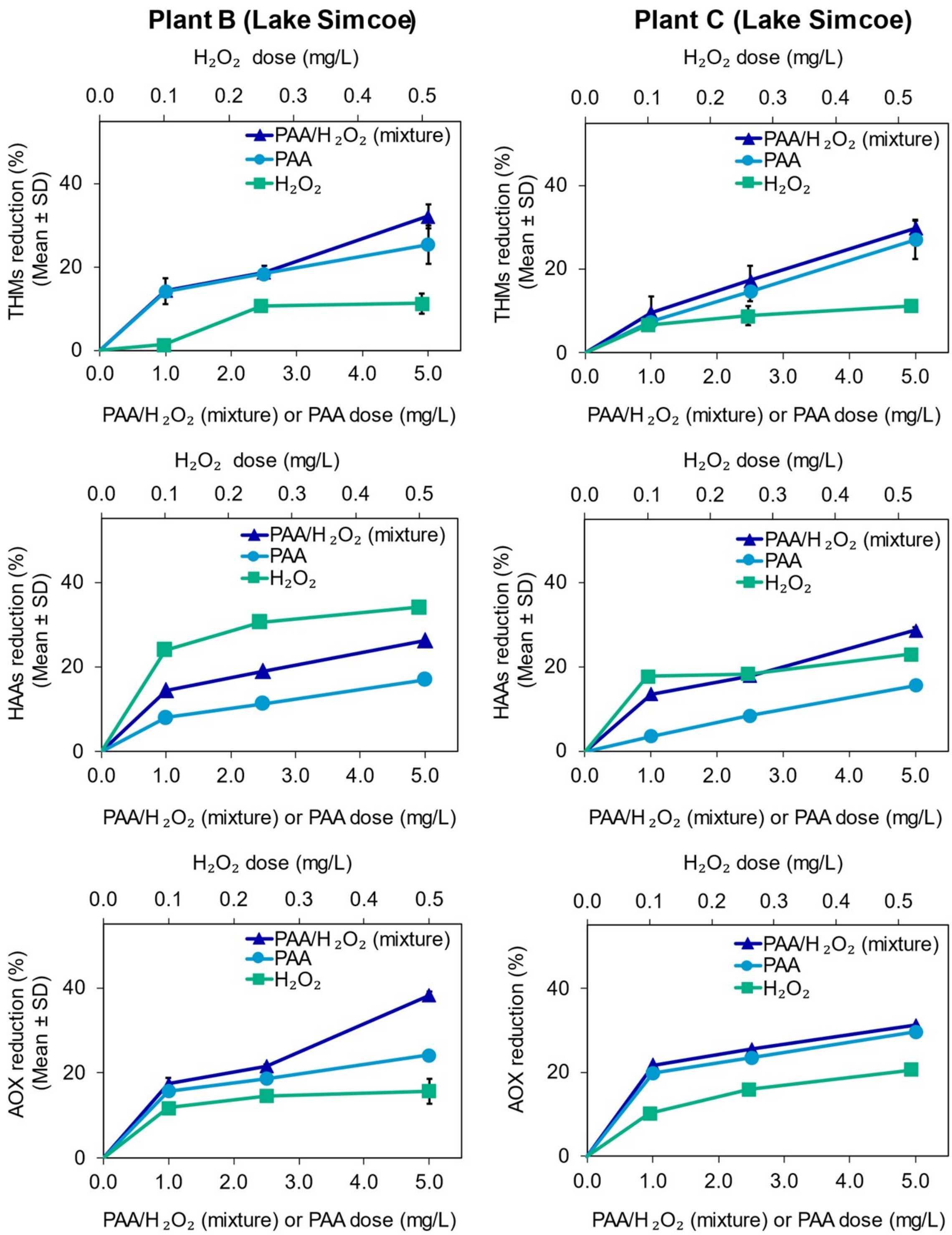


**Figure S1:** Role of PAA and $H_2O_2$ on the reduction of THM, HAA and AOX formation potential for Plant B (Lake Simcoe) and Plant C (Lake Simcoe).

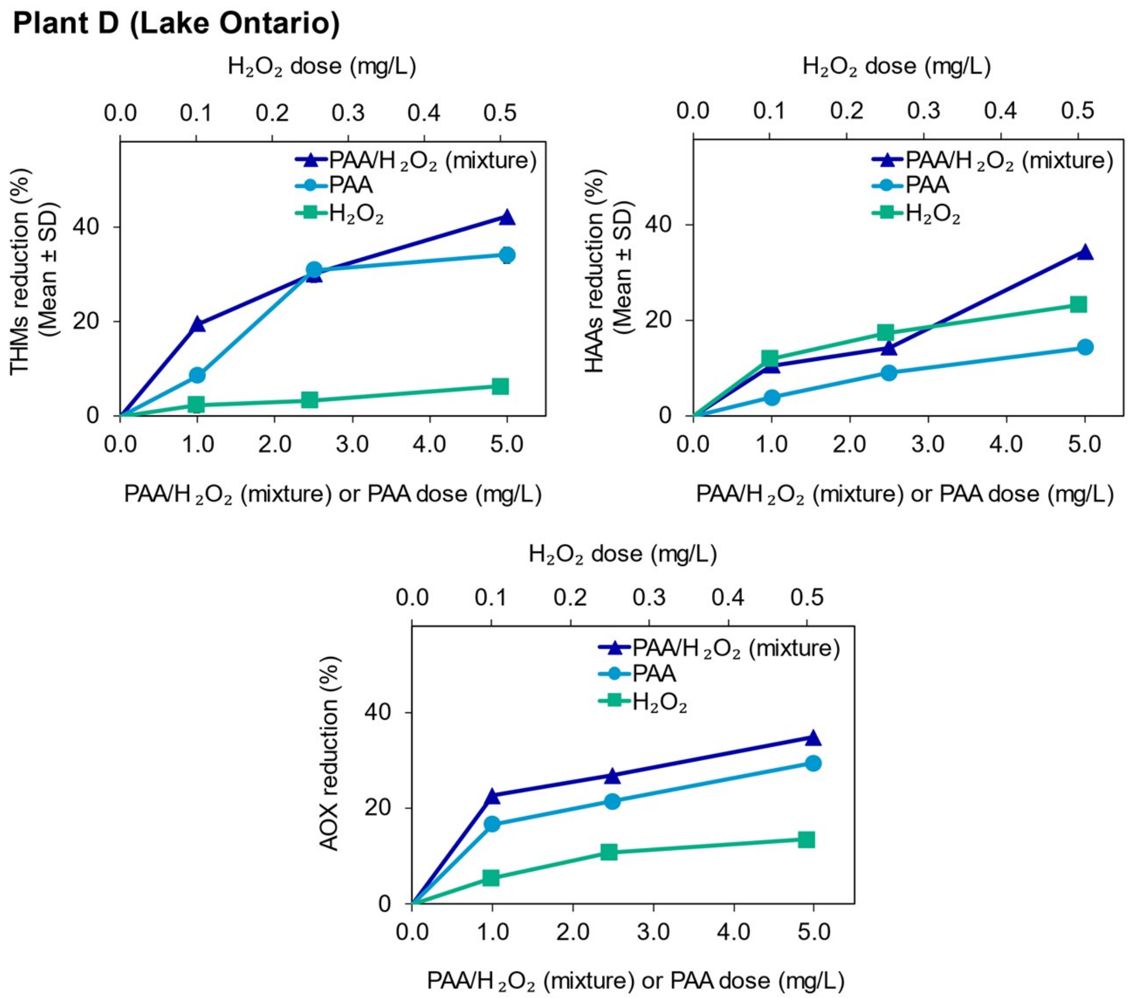



**Figure S2:** Role of PAA and $H_2O_2$ on the reduction of THM, HAA and AOX formation potential for Plant D (Lake Ontario). The error bars indicate the 95% confidence intervals based on the Student's t-distribution.

## 3. Text S2. Effect of pH

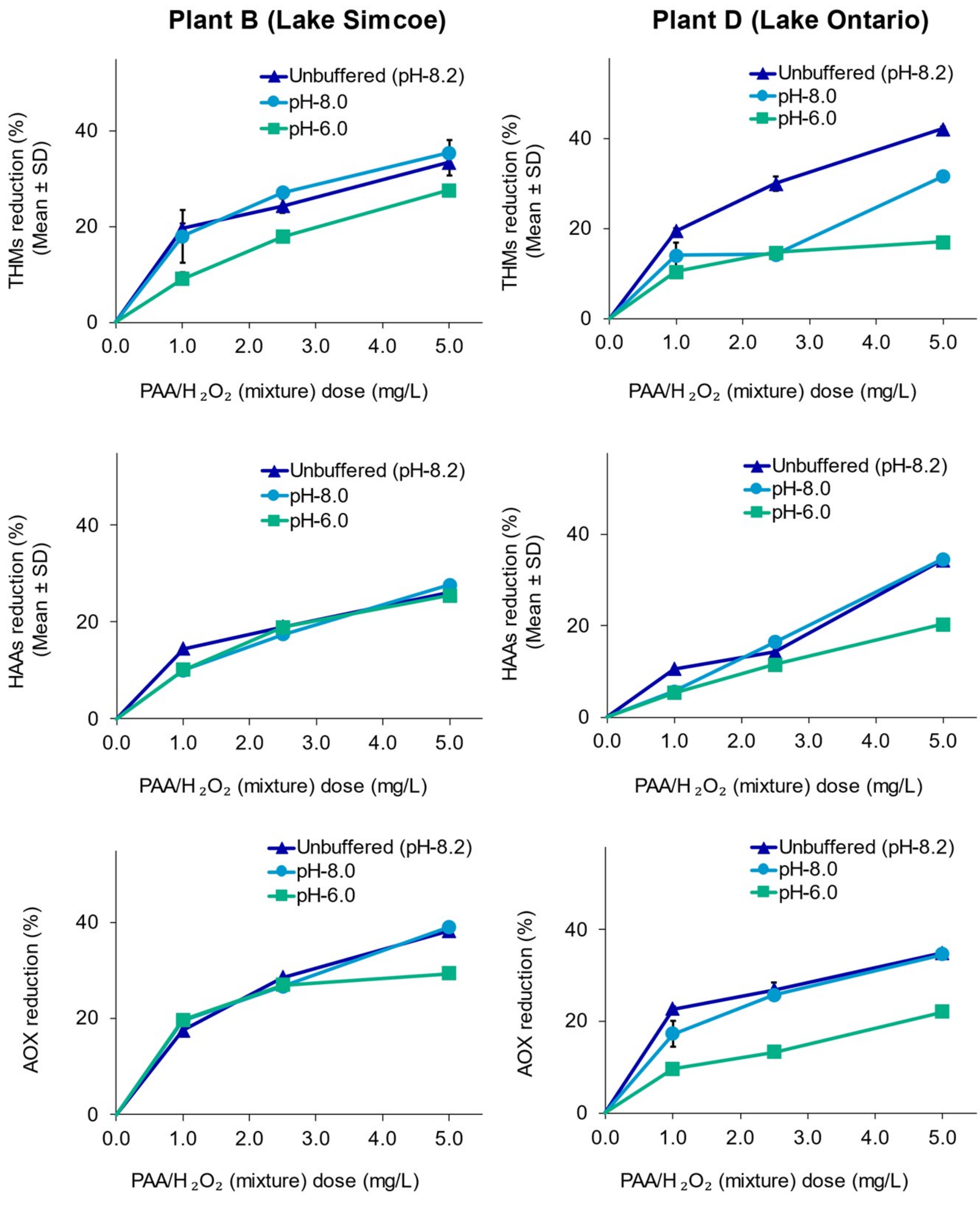



**Figure S3:** Comparison of DBP reduction (%) across different pH conditions for Plant B (Lake Simcoe) and Plant D (Lake Ontario).

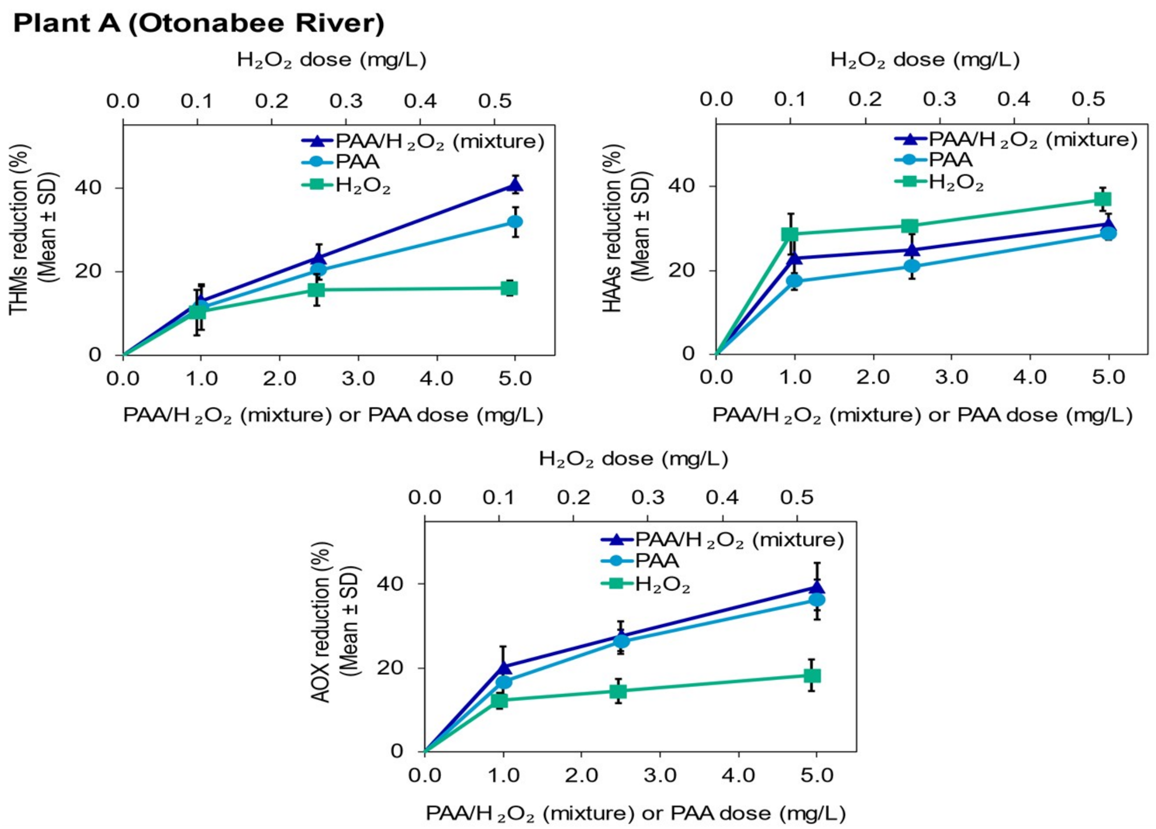



**Figure S4:** Comparison of DBP reduction (%) across different pH conditions for Plant A (Otonabee River) under the conditions tested. The error bars indicate the 95% confidence intervals based on the Student's t-distribution.

## 4. Text S3. Applying PAA/$H_2O_2$ (mixture) post-filter

**Table S2:** Filtered water quality parameters collected from Plant A (Otonabee River) and Plant B (Lake Simcoe)

| Parameter | Plant A (Otonabee River) | Plant B (Lake Simcoe) |
|---|---|---|
| pH | 7.1-7.3 | 7.2-7.4 |
| Dissolved organic carbon (mg/L) | 2.9-2.94 | 3.22-3.28 |
| Turbidity (NTU) | 0.054 | 0.064 |
| $UV_{254}$ ($cm^{-1}$) | 0.064 | 0.036 |
| Treatment type | Conventional | Microfiltration |

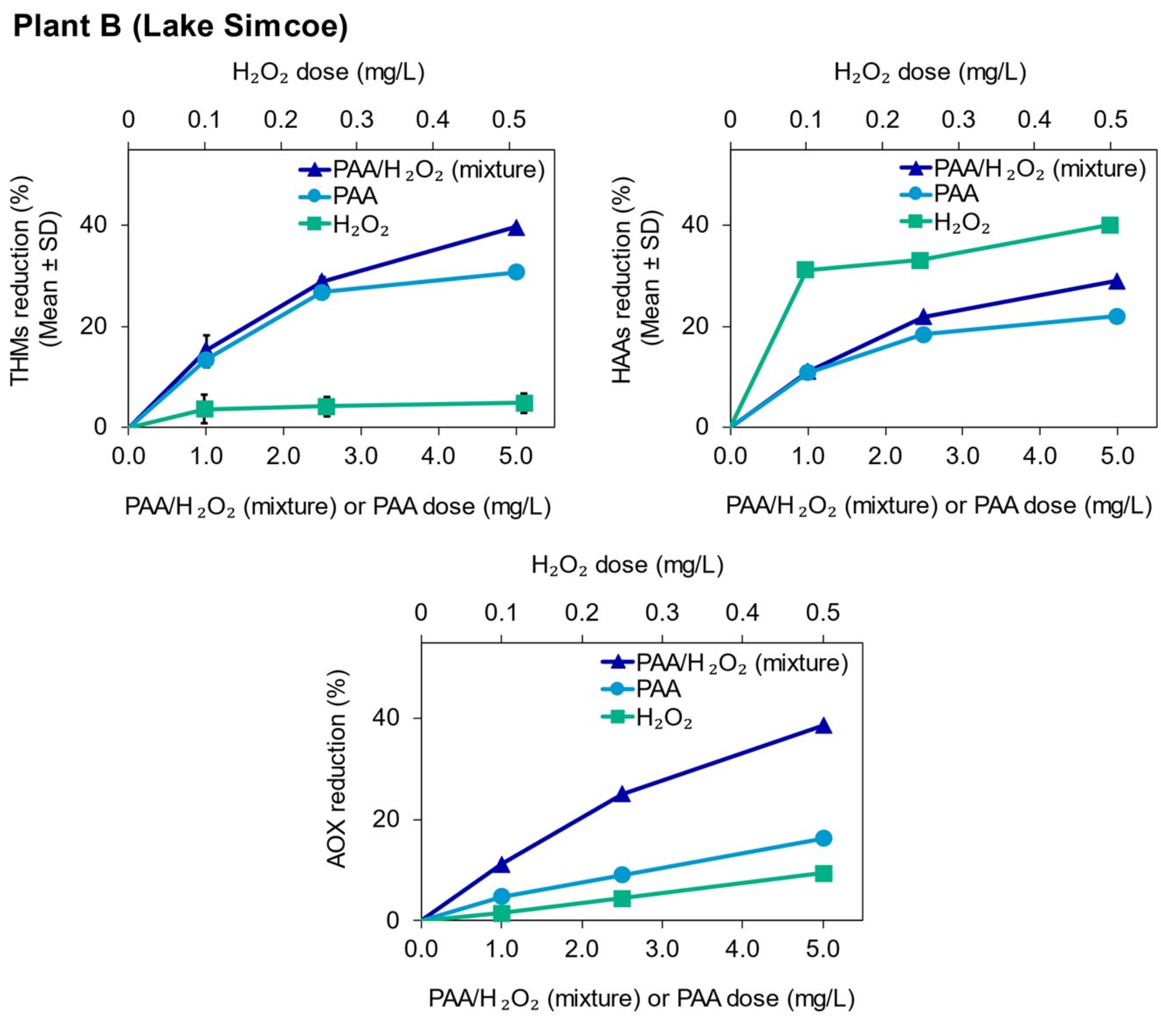



**Figure S5:** Impact of 15-minute $PAA/H_2O_2$ (mixture) treatment on the DBP formation potential (THMs, HAAs and AOX) of filtered water collected from Plant B (Lake Simcoe). The error bars indicate the 95% confidence intervals based on the Student's t-distribution.

## 5. Effect of PAA/$H_2O_2$ (mixture), PAA, and $H_2O_2$ on pH

**Table S3:** Effect of PAA/$H_2O_2$ (mixture), PAA and $H_2O_2$ doses on the pH of different source waters

| Oxidant | Dose (mg/L) | Plant B (Lake Simcoe) | Plant C (Lake Simcoe) | Plant D (Lake Ontario) |
|---|---|---|---|---|
| Raw water[1] | N/A | 8.20 | 8.22 | 8.20 |
| | 1.0 | 8.04 | 8.02 | 7.98 |
| PAA/$H_2O_2$ | 2.5 | 7.86 | 7.78 | 7.76 |
| | 5.0 | 7.70 | 7.62 | 7.52 |
| | 1.0 | 8.02 | 8.04 | 7.94 |
| PAA | 2.5 | 7.88 | 7.82 | 7.78 |
| | 5.0 | 7.72 | 7.64 | 7.60 |
| | 0.1 | 8.18 | 8.22 | 8.18 |
| $H_2O_2$ | 0.25 | 8.18 | 8.18 | 8.16 |
| | 0.5 | 8.16 | 8.18 | 8.16 |

[1]Raw water pH without addition of any oxidants