# WATER SYSTEMS, DISINFECTION BYPRODUCTS, AND THE USE OF MONOCHLORAMINE

## 9) How do the kinds and concentrations of disinfection byproducts formed by monochloramine compare to those formed by chlorine?

***Water treated with chlorine and monochloramine contains different types and concentrations of disinfection byproducts.***

- Compared to chlorine, water treated with monochloramine contains fewer regulated disinfection byproducts that have been linked to human health problems.
- The formation of disinfection byproducts is influenced by source water type and the type of disinfectant used.
- Formation can vary daily with the amount of natural organic matter in the water, temperature, rainfall, and distance from the treatment plant or other factors influencing water chemistry. [1]

***Compared to chlorine, water treated with monochloramine contains lower concentrations of regulated disinfection byproducts.***[2]

- Compared to water treated with chlorine, water treated with monochloramine contains lower concentrations of the two major types of *regulated* disinfection byproducts.[2]
- Compared to water treated with chlorine, water treated with monochloramine contains lower concentrations of *regulated* disinfection byproducts linked to bladder cancer.
- Regardless of the disinfectant used, the types and concentrations of disinfection byproducts vary from each utility and also from day to day.

***Compared to water treated with chlorine, water treated with monochloramine may contain higher concentrations of unregulated disinfection byproducts.*** [3]

- EPA scientists are currently studying the *unregulated* disinfection byproducts[3] that form in water treated with monochloramine.
- Compared to water treated with chlorine, water treated with monochloramine may contain different *unregulated* disinfection byproducts than chlorinated water.
- EPA and other organizations continue to conduct research on *unregulated* disinfection byproducts.[3]

*Additional Supporting Information:*

1. Water chemistry describes the chemical properties of water such as pH, hardness, and alkalinity. Changes in water chemistry can cause subsequent changes to the physical (e.g., taste and odor) and biological (e.g., biofilm formation and nitrification) properties of water.
2. TTHM and HAA5 are the regulated disinfection byproduct groups that form at lower concentrations with monochloramine. See question 7 for more information about TTHM and HAA5.
3. Examples of these unregulated disinfection byproducts include nitrosamines (including nitrosodimethylamine, NDMA), iodo-trihalomethanes, and iodo-acids. See question 7 for additional detail on disinfection byproducts. Specific information on NDMA can be found at http://www.epa.gov/tio/download/contaminantfocus/epa542f07006.pdf. See question 19 for additional information on disinfection byproduct research.