



Raymond Holle

My most vivid memory concerning water is not so much a memory as it is something I experience every day. Last August, I began researching at the University of North Dakota's Environmental Research Laboratory. Through this work on water quality, I developed a fascination with the chemistry and logistics of water treatment. This experience has also opened the door to meaningful opportunities in the world of water through leadership roles, independent research projects, and the opportunity to present at research conferences.

Through connections formed in the laboratory, I became the Vice President and Outreach Committee Chair of the University of North Dakota's newly established American Water Works Association (AWWA) student chapter. As UND AWWA's Vice President, I have organized community events aiming to connect the youth of the Grand Forks community with science, such as Family Science Night, where we hosted interactive games and experiments, and the UND AWWA Children's Poster Contest, where we collaborated with schools in Grand Forks, connecting children to the importance of water by encouraging them to submit posters related to the prompt: "Why is water important?" By reaching young learners, my goal is to instill a strong sense of appreciation for clean and accessible water and to make my mark in the development and inspiration of the next generation of researchers, engineers, and technicians.

In the laboratory, my research focuses on the development and application of activated carbon derived from soybean hulls for the adsorption of carcinogenic PFAS compounds in water. This approach exemplifies biowaste recycling: soybean hulls are abundant waste products in soybean processing, and this technology valuably repurposes them for water treatment. My secondary project involves the design, assembly, and use of an ultraviolet reactor for the study of the degradation of organic contaminants. I have tested a range of photocatalysts in this reactor and evaluated their performance. I have presented my findings in these projects at the Red River Valley American Chemistry Society Conference, winning the Undergraduate Choice Award. And at the NDSU Soybean Symposium, winning 1st place in the poster competition.

Through these projects, I have developed a strong and lasting connection to the field of water treatment. In just my freshman year of post-secondary education, I have already begun to realize how I can make a meaningful contribution to scientific and technological advancement through my dedication to water treatment. I am motivated to continue to research and make an impact on water quality.

I plan to continue my research at UND's Environmental Research Laboratory. In addition to my current projects, future projects I have planned include a project focused on optical fiber technology for water treatment. Certain conventional disinfection methods can produce harmful disinfection by-products (DBPs). Optical fiber technology offers a promising alternative: a method of disinfection that does not produce DBPs and additionally offers the ability to degrade DBPs when they are formed. I have also submitted a proposal to NASA for an interdisciplinary biological project investigating the disinfection of E. coli through silver nanoparticle disinfection and optical fiber technology for application on the International Space Station.

My goal is to advance the scientific understanding of these topics and improve the practical application of these technologies. Through my work in research and leadership in AWWA, I am excited to continue to meaningfully contribute to the science and community awareness of water quality. These experiences have made me realize not just how important water quality truly is, but also what I can do to make a difference to make potable water cleaner and more accessible.