

My Spaceship Earth: A structural engineer's path to nuclear

By *Christine Roy*



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While flipping through the course catalog at the University of Massachusetts–Amherst, I read that civil engineers can design amusement park rides. I was instantly inspired and chose my major because I wanted to design something for Walt Disney World. After college, I started my dream job at Simpson Gumpertz & Heger, which is famous for designing Spaceship Earth at Epcot Center, a celebration of human innovation, communication, and the progress of civilization. This was a win.

My introduction to nuclear

During my first two years at SGH, I experienced all aspects of working in the Engineering Mechanics & Infrastructure group, from analyzing structural failures to studying pipelines and modeling antennas. In 2006, I worked on my first nuclear facility. It consisted of structural analysis and design of the Integrated Waste Treatment Unit at Idaho National Laboratory.

The team for this project grew very large and helped expand our nuclear capabilities at SGH. From that point, my niche became nuclear. There was so much to learn in the beginning, including how to perform seismic soil-structure interaction analysis and all the different code requirements for nuclear structures, among other things.

Giving back to the industry

As I worked on nuclear facilities at SGH, I began exploring how I could get involved in the industry. I attended multiple U.S. Women in Nuclear conferences beginning in 2014 for networking, professional development, and the opportunity to visit nuclear power stations across the country.

My involvement with the American Nuclear Society Northeastern Section (ANS-NE) began in 2018, when I began hosting networking and professional development meetings at SGH, which I continue to

this day. ANS-NE's mission is to provide a forum for professional and public exchange of information regarding nuclear-related science and engineering topics. I served as ANS-NE secretary for three years, followed by chair for three years, and am currently a director on the executive committee. During my time on the board, ANS-NE received the Membership Improvement Award (2021) and the Local Section Meritorious Award for Best Public Information and Education (2023).

I met Grace Stanke—a nuclear engineer, public speaker, and former Miss America—at the U.S. Women in Nuclear Conference in 2023, where she gave a keynote address, and I invited her to SGH for a tour of our Applied Science & Research Center and to speak at a September 2024 ANS-NE event. Grace gave a compelling talk during which she shared how she looks to connect with the next generation to help them find their passion while being an advocate for nuclear energy. The event was a big success with record attendance.

Teaching future nuclear engineers

ANS-NE is dedicated to educational outreach to teach children about nuclear energy. I had the opportunity to present to my daughter's Girl Scout troop and a classroom



Stanke and Roy. (Photo: Christine Roy)

of students ages 7–17 about structural engineering and various energy sources, including fossil fuels, wind, and nuclear. Students learned the pros and cons of each energy type and selected an energy source for their future city.

In addition, ANS-NE holds professional development events that give professionals, students, and the public an opportunity for networking, knowledge sharing, and advocacy. The group hosts an annual student event where four graduate students from local universities share their nuclear research, and each receives a \$250 scholarship. ANS-NE also hosts tours, such as a tour of Commonwealth Fusion Systems at Devens, Mass. My SGH colleague Michael Mudlock and I spoke at an ANS-NE event in January 2022 about our nuclear work at SGH.

A shared responsibility for innovation

I continue to work on a variety of nuclear projects, mostly at INL, including seismic analysis, structural retrofit, and design. One of the most recent projects is the National Reactor Innovation Center Demonstration of Microreactor Experiments (NRIC DOME) at INL, the world's first-ever microreactor test bed. We performed structural analysis and design modifications to the existing 1964 reinforced concrete and a steel vessel structure to repurpose it and ensure it meets current design standards. Key analyses included pressure, temperature, nozzle, internal missile, and seismic soil-structure interaction. We are currently assisting with construction support.

The theme of Disney's Spaceship Earth reflects the idea that Earth is like a shared vessel traveling through space, and humanity has the collective responsibility to care for and sustain it. To me, the NRIC DOME is like Spaceship Earth—advanced nuclear technologies will be tested in this facility to bring clean, carbon-free energy to disaster relief



Hosting a classroom of teachers and young students at Simpson Gumpertz & Heger. (Photo: Christine Roy)



The National Reactor Innovation Center's Demonstration of Microreactor Experiments (NRIC DOME) microreactor test bed at INL. (Photo: DOE)

areas, remote places, and into space.

I never knew I would fall into the nuclear field when I began my studies in civil engineering, but I'm thankful for this profession that is making a difference in the lives of so many people so that we may have reliable, carbon-free baseload power for years to come. And it has its own form of "pixie dust," as well. ☒

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