

## Nuclear

### Clients

University of Virginia,  
Georgia Institute of Technology,  
University of Michigan

### Location

Charlottesville Virginia, USA,  
Atlanta Georgia, USA,  
Ann Arbor Michigan, USA

*"CH2M HILL has our full recommendation as a company who delivers on their commitments and is fully qualified to assist you in your endeavor. When your project is over, you will either be at odds with your contractor or be thankful that you selected CH2M HILL."*

Dr. Rodney Ice  
Principal research scientist and  
safety officer, Georgia Institute of  
Technology

## Research Reactor Decommissioning

### Project Description

CH2M HILL has provided characterization and decommissioning on several research reactors for institutions including the University of Virginia, the Georgia Institute of Technology (Georgia Tech) and the University of Michigan.

### University of Virginia

CH2M HILL is the decontamination and decommissioning (D&D) contractor for the two nuclear research reactors at the University of Virginia. The Cooperatively Assembled Virginia Low-Intensity Educational Reactor (CAVALIER) was a low enrichment, light water moderated reactor with a maximum power of 100 watts. The University of Virginia reactor (UVAR) was a low enrichment, light-water moderated and cooled reactor that had a maximum power output of 2 megawatts (MW) and had operated in excess of 2,500 MW-days. The CAVALIER and UVAR reactors were shut down in 1988 and 1998, respectively, and the reactor fuel was transferred to offsite locations. They were decommissioned to achieve Nuclear Regulatory Commission (NRC) license release for unrestricted use. The University plans to refurbish the facility to be used for other engineering research and instruction.

A unique approach using divers in the pool was employed for decommissioning the UVAR reactor, to minimize both the schedule and dose. Using hydraulic shears and other cutting tools, the divers segmented and packaged the components in the pool. An overhead crane was used to assist in loading the irradiated components into a steel liner. A vacuum filtration system was used during pool cutting operations to prevent water clarity problems from developing.

In order to minimize waste and provide the most economical solution for the university, we decontaminated structures and equipment where feasible, using techniques such as hydrolazing. We also characterized the materials for free release of demolition debris where practical.

### Georgia Tech

The Georgia Tech Research Reactor (GTRR) was a 5-MW heavy-water-cooled nuclear reactor located on the Georgia Tech campus in downtown Atlanta, Georgia. In 1997, the Institute resolved to decommission its research reactor, which it had operated for more than 30 years. Georgia Tech notified the Nuclear Regulatory Commission (NRC) of their intent to decommission the GTRR, and in November 1999 began the dismantlement process.

As Executive Engineer, CH2M HILL guided the D&D process—both technically and from a regulatory perspective—to control delivery of the project to the client. CH2M HILL managed facility and reactor characterization, process equipment removal, reactor vessel removal and packaging, and biological shield removal and disposal. CH2M HILL



contributions were focused on meeting the customer's project requirements, while addressing NRC requirements and public safety concerns/issues. Our customer focus involved proactive project management and helping Georgia Tech, one of the premier engineering-education institutions in the world, capitalize on the educational opportunities associated with nuclear engineering, radiological safety, and D&D construction activities.

At project's end, CH2M HILL and Georgia Tech established a landmark educational opportunity—a fully decommissioned nuclear research reactor. The project has provided and will continue to provide future engineering and construction students with unique educational experiences and will provide engineering professionals with opportunities for continuing education.

### **University of Michigan Research Reactor**



CH2M HILL provided characterization of the Ford Nuclear Reactor (FNR) and the surrounding grounds at the University of Michigan, as well as the plan for decommissioning the reactor. Following this, we were selected by the university to implement the decommissioning plan.

University of Michigan's Ford Nuclear Reactor (FNR) was a two-megawatt open-pool research reactor built in 1955. The FNR was used by the University, the federal government, and by private industry for research and educational purposes. The University chose to pursue the closure of the reactor because of operating costs and reduction in potential users of the reactor.

The overall objective of the characterization process was to maximize the use of historical information and data and optimize the collection of follow-on characterization data. Although characterization is normally done on a shut down reactor, the characterization phase for the FNR took place while the reactor was still operational. To safely perform characterization activities on an operational reactor, CH2M HILL put additional safety measures in place, including requiring two types of dosimetry for personnel working near the reactor. Several reactor areas directly above the reactor pool had to be characterized; personnel working above the reactor pool were required to wear full body harnesses as well as personal floatation devices, and water rescue equipment was nearby.

From a characterization standpoint, the CH2M HILL team had to account for radiation fields that were present during reactor operations and those that would be present after reactor operations. A shielded and unshielded measurement process was used to understand what radiation fields were a direct result of reactor operations versus those expected after reactor operations.

The University of Michigan subsequently contracted CH2M HILL to prepare the research reactor decommissioning plan, and in a following competitive bid, selected CH2M HILL to implement the decommissioning program. CH2M HILL will segment the highly activated reactor components, package the materials for shipment, and transport the materials to the appropriate disposal facilities. The remainder of the facility will either be removed or decontaminated. Final surveys will be performed and a Final Status Release



Report will be presented to the NRC in anticipation of release from the operating license.