





Oak Ridge's Changing Skyline

The decommissioning of ORNL's aging research reactors is clearing the stage for future missions at the site.

By Carol Hendrycks

An aerial photograph of Oak Ridge National Laboratory's "Reactor Hill," with, from left to right, reactor buildings 3042, 3005, and 3010. The DOE and its contractors are removing these excess contaminated facilities to eliminate risks and clear land for future research missions. (Photos: UCOR)

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The Bulk Shielding Reactor was constructed in 1950 to lead groundbreaking aircraft radiation protection research as part of the federal government's Aircraft Nuclear Propulsion Program. The core structure was suspended from a movable bridge that spanned a 20-foot by 40-foot pool. A second bridge was available as a working platform and to hold special equipment.



To prepare the 3010 Bulk Shielding Reactor building for demolition, the 27-foot-deep reactor pool inside the building was filled with a concrete mixture.



Workers remove materials and complete characterization at the 3005 Low Intensity Testing Reactor building. The reactor operated from 1951 to 1968 as a water-moderated and -cooled reactor that used enriched uranium as fuel and beryllium as a reflector. It became world-famous when, for the first time, a photographer captured the blue glow caused by Cherenkov radiation in the pool above the reactor. That photo appeared on the cover of the October 1951 issue of *Scientific American*.

The Department of Energy and its environmental cleanup contractor United Cleanup Oak Ridge (UCOR) are poised to meet critical milestones as they continue to move to the next generation of cleanup at Oak Ridge National Laboratory in Tennessee. On ORNL's main campus, crews on "Reactor Hill"—so named because of the four remaining reactor facilities on that hillside—and at the Experimental Gas-Cooled Reactor (EGCR) just east of the campus continue rigorous schedules as they enter a new phase of progress in the cleanup program.

The ORNL campus skyline will change dramatically this year with demolition of the 3010 Bulk Shielding Reactor complex and the 3005 Low Intensity Test Reactor facility. Safely removing these and other highly contaminated facilities will make way for expanding future missions at one of the nation's leading research and development sites.

"We have been working toward the demolition plan of 3010 and 3005 since 2018," said Kent Ridenour, UCOR's ORNL reactors project manager. "To finally see the end in sight is impressive knowing the accomplishments and the challenges we faced over the last four years, but the craft crews and support groups worked together to make it possible."

The 3010 Bulk Shielding Reactor complex was built in the

1950s for radiation shielding studies as part of the Aircraft Nuclear Propulsion Program. Crews have just completed filling the 27-foot-deep reactor pool with a concrete mixture, permanently entombing the pool as workers prepare to demolish the building.

Other final deactivation activities include asbestos removal on the degasification tank and pipes on the outside perimeter of the complex. Once this work is completed, crews will begin demo site preparations and mobilizing equipment. Demolition is planned for early fall.

Next door to Building 3010 stands the ORNL 3005 Low Intensity Test Reactor (LITR). It started operation as a 500-kW training reactor in 1951 and reached its final 3,000-kW level as a test reactor in 1953. It was shut down in 1968. Crews have completed characterization of the facility using a gamma camera lowered into the reactor to measure the levels of radiation. Other pre-demolition activities are underway to prepare this structure for teardown later in the fall.

Nearby is the Oak Ridge Research Reactor, known as Building 3042. Constructed in 1955, this isotope production and irradiation facility operated from 1958 through 1987 and was defueled in 1989. Upon discovering a slow seep from the reactor pool, workers removed highly irradiated components

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The Oak Ridge Research Reactor (Building 3042), was constructed as a three-story building with a basement in 1955 and completed in 1958. Among the many uses of the 30-MW reactor were neutron scattering research, fundamental investigations of the behavior of metals and ceramics under radiation, and the testing of materials for reactor fuel elements and for fusion devices. It also became the major world supplier of radioisotopes.

along with the pool water and sprayed the pool walls with a nonhazardous fixative to prevent contamination migration.

Today, crews are back at the 3042 Building site working on the next phase of deactivation—refilling the pool with approximately 116,000 gallons of demineralized water and inspecting the facility’s existing crane, which will be used to remove the concrete shield caps and any remaining items in the reactor pool. Hazardous waste, including pipes and fixtures along the walls, will be removed from inside and outside the structure. The demolition date will be determined once these activities have been finalized.

East of the main ORNL central campus is the EGCR. Construction of this facility began in the late 1950s but was halted in 1966 when it was approximately 95 percent complete. The reactor never went operational. The facility is an eight-level, 107,922 square-foot-building constructed of steel and concrete, 114 feet in diameter and 216 feet high with approximately 50 feet below grade.

In the past six months, crews prepped the building for installation of a lift system, the Transport Platform Car System (TPCS). The TPCS will be used to mobilize both personnel and equipment into and out of the facility as well as aid in deactivation activities, which include universal/hazardous waste removal and asbestos abatement.

This system was previously used to support deactivation activities at the Biology Complex at Oak Ridge’s Y-12 National Security Complex. Reusing the equipment avoided the cost of purchasing a new system. This project involved erecting and mounting a 110-foot mast with a large platform cart to the outside of the structure and required coordinated efforts among specialty trades, including iron workers, welders, laborers, carpenters, and the help of an 80-ton crane.

The TPCS will be put in service once crews begin deactivation on the upper levels of the EGCR. Remaining work consists of characterization, universal/hazardous waste removal, piping and equipment removal, asbestos abatement, and filling underground tunnels with a concrete mixture to seal off experimental cells. Much additional work will be required before EGCR can be demolished.

Each reactor poses unique challenges and pushes the workforce to be even more innovative in identifying technology solutions, broadening perspectives, and strengthening problem solving. Cleanup activities are focused on eliminating some the most contaminated structures in the world while modernizing and adapting others to make way for new missions and support a new era of scientific discovery. ☒

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The Transport Platform Car System is erected at Oak Ridge's eight-story Experimental Gas-Cooled Reactor building. The system will be used to move crews and equipment into and out of the facility during deactivation and demolition. The reactor, which was never completed, was intended to be a prototype for the Tennessee Valley Authority's nuclear power generation. The facility later housed ORNL's fuel recycle division.



The TPCS tower units are secured together and set for final inspections.

