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SRNL Specially Invented Grout Aids SRS Reactor Closure



Aerial photograph shows P Reactor at SRS undergoing roof modifications as part of its in-place decommissioning.

AIKEN, S.C. – A combination of teamwork and cutting-edge science is responsible for the unique flowable and self-leveling cement slurry that on November 22 completely filled the P Reactor vessel at the Savannah River Site (SRS). This American Recovery and Reinvestment Act project utilized the technical expertise of the U.S. Department of Energy's (DOE) Savannah River National Laboratory (SRNL) to invent the slurry.

"The aggressive deactivation and decommissioning schedule of this project required a multidisciplinary approach involving our national laboratory's world-class expertise and innovation," said Dr. David Moody, DOE's Savannah River Operations Office Manager. "This important Recovery Act closure project is providing a final end state for this Cold War production reactor that served the Nation. The *in-situ*, or in-place deactivation and decommissioning of the SRS P and R Reactors is precedent-setting in the nuclear industry."

Dr. Christine Langton, SRNL's advisory scientist on the P Reactor Closure Project, said, "the P Reactor vessel grout differs from standard Portland

cement grout technology used in roads, sidewalks and cement blocks in that it is a less basic material, making it chemically compatible with the 16-foot-diameter reactor vessel's hundreds of 20-foot-tall aluminum sleeve housings that were previously used to house reactor fuel rods."

"Traditional grout with a higher pH would cause the housings to corrode. The grout for the P Reactor vessel was developed with a pH of 9 ½, and utilizes a calcium sulfo-aluminate cement designed at SRNL," Langton added.

"Equally important was that the grout flow fluidly through the constrictive vessel configuration dictated by the former fuel sleeve housings. We addressed the unique challenges of grouting a reactor vessel by designing the grout to be flowable, self-leveling, nonsegregating and compatible with the reactor vessel materials of construction," Langton said.

One hundred and twenty cubic yards of the cement slurry, the approximate volume of large at-home swimming pool, was poured into the reactor vessel over two days. The next step in the reactor closure will be to place a concrete cap over the vessel, while also grouting the below-grade portions of the reactor building, sealing all openings and installing multiple sloped roofs.

R Reactor, which is identical to P Reactor in size and appearance, has stainless steel fuel housings and will be filled with a special Portland cement-based grout designed by SRNL.

Additional information on the Department of Energy's Office of Environmental Management and the Savannah River Site can be found at <http://www.em.doe.gov> or <http://www.srs.gov>. For more information about the SRS Recovery Act Project, please visit www.srs.gov/recovery.