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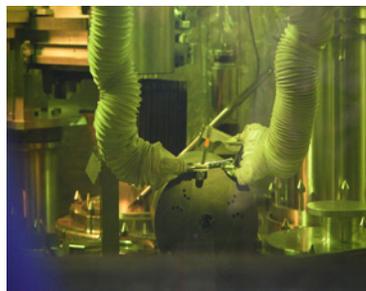
Innovation Reduces Worker Radiation Exposure During Maintenance of Equipment Used in Tritium Extraction Process

AIKEN, S.C. (September 8, 2021) – Savannah River Nuclear Solutions (SRNS) operators successfully executed an innovative idea that reduced radiation exposure to workers, who were performing cutter head maintenance in Savannah River Site’s (SRS) Tritium Extraction Facility (TEF). SRS is committed to safely executing its missions in support of the nation’s nuclear deterrent and utilizes radiological safety practices designed to incorporate As Low As Reasonably Achievable (ALARA) principles of time, distance and shielding.

A cutter head is part of the Breaching Tool Robot used to remove the top of tritium-producing burnable absorber rods (TPBARs), allowing tritium to be extracted from the rods when they are heated in a furnace during the extraction process. Ultimately, the tritium is loaded into containers, called reservoirs, and shipped to the Department of Defense, where they are installed in weapons.

“TPBARs come from an active reactor and are radioactive upon arrival at SRS,” said Joey Huckabee, SRNS TEF Facility Manager. “Consequently, each time the cutter head is used on a TPBAR, it builds up a dose rate, complicating the refurbishing process. The cutter head requires refurbishing after a number of uses to ensure proper operation and to remove grit buildup caused by the cutting process. Commitment to ALARA principles while performing cutter head maintenance is vital to ensuring worker safety and health. Time should be minimized, distance should be maximized, and shielding should be used while working on it.”

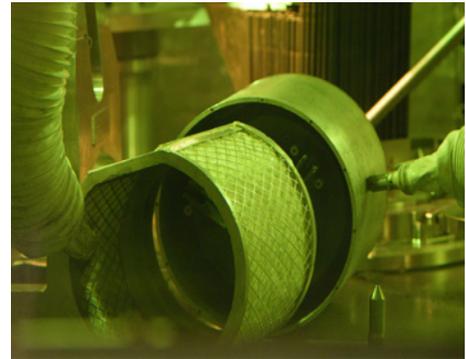
To reduce exposure levels, an experienced crane operator shared an innovative idea to do the initial cutter head disassembly remotely inside the Target Rod Prep (TRP) module, an enclosed space that protects workers from radiation. All previous cutter head refurbishments were completed inside Hot Maintenance, where personnel conduct maintenance on equipment exposed to radiation.



Operators use manipulators and basic hand tools to conduct initial disassembly of the cutter head inside the TRP module. Lead-plated glass provides radiation shielding. Photography was taken prior to the latest COVID-19 guidelines reinstating mask requirements for vaccinated employees.

This idea worked brilliantly and resulted in a 27% total dose reduction to workers and 22% reduction in the time required to refurbish the cutter head. This proved to be an excellent example of real-world application of ALARA principles.

“Operators used remote manipulators to maneuver basic hand tools and remove thirty screws from the cutter head’s bottom plate,” Huckabee said. “That took several days of tedious work, but afterward, they were able to remotely remove the cutter head’s filter, which contained a large portion of the radiation dose. The grit is also highly radioactive, so operators used remote manipulators to clean the accessible areas of the cutter head to remove as much as possible. These steps were critical to reducing worker exposure levels and time required to do the subsequent Hot Maintenance refurbishment.”



Manipulators remotely remove the cutter head filter which contains much of the radioactive grit.

After remotely lifting the cutter head out of the TRP module and placing it in Hot Maintenance, mechanics, engineering, and radiation protection personnel entered. Wearing personal protective equipment, they completely disassembled, inspected, cleaned, greased, and reassembled it. They tested the refurbished cutter head to ensure it operated properly before they returned it to service.

“While the NNSA’s tritium extraction mission already implements a multitude of safety procedures, we are committed to continually evaluating and refining our practices,” said Jason Armstrong, National Nuclear Security Administration (NNSA) Savannah River Field Office Manager. “Innovations such as this show the NNSA’s commitment along with our contract partners to continue to execute our critical national security mission as safely and efficiently as possible.”

SRNS Senior Vice President – NNSA Operations and Programs Mark Davis said, “We are committed to ensuring our country’s national security needs are met, so it’s vital that the equipment we use to provide the tritium needed for our nation’s nuclear deterrent is properly functioning. As the backbone of deterrence in support of peace, worker safety and health are vital to ensuring continued mission success. I’m proud to work with a team who embraces innovative ideas to meet the complex challenges we face.”

Established by Congress in 2000, NNSA is a semi-autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; works to reduce the global danger from weapons of mass destruction; provides the U.S. Navy with safe and militarily effective nuclear propulsion; and responds to nuclear and radiological emergencies in the U.S. and abroad.

Savannah River Nuclear Solutions, a Fluor-led company with Newport News Nuclear and Honeywell, is responsible for the management and operations of the Department of Energy’s Savannah River Site: located near Aiken, South Carolina.

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