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Orano Finishes Segmentation and Packaging of Crystal River Unit 3 Reactor within Two Years on Accelerated Decommissioning Timeline

Using patented Optimized Segmentation process, entire reactor cut apart and packaged into only four transport and two storage containers, while achieving an outstanding safety record and no regulatory issues.

BETHESDA, Md., December 6, 2023 – After separating and removing the Crystal River Unit 3's primary cooling system's large components in 2021, Orano recently completed the segmentation, packaging, and removal of the 35-foot nuclear reactor vessel and its internal components in less than two years. This latest milestone represents the fulfillment of Orano's responsibilities as part of the CR3 accelerated decommissioning project with NorthStar. Both stages were completed safely and without a single lost-time accident.

By applying its patented Optimized Segmentation process to the reactor structures, Orano significantly reduced the amount of segmentation work, accelerated the removal from the reactor containment building, and achieved project completion well within the six-year contract schedule. Orano's three-year performance included all planning, engineering, procurement, and testing, along with the multi-stage segmentation and removal.

Orano completed the final stage in October with the segmentation, packaging, and transfer out of the reactor building of the bottom section of the three-piece partitioned reactor vessel, followed by a cleanup of the emptied reactor cavity, and the demobilization of equipment and staff from the reactor building.

"This outstanding performance at CR3 by our experienced U.S. ODS team follows a no less outstanding performance at Vermont Yankee," said Dr. Pierre Marty, Executive VP of Orano DS International Operations and CEO of Orano GmbH. "Orano's reliable, high-quality execution directly relates to our teams' long experience decommissioning several German sites, including the ongoing successful conclusion of the RPV-internals decommissioning at Brunsbüttel, an 800MW BWR reactor. At Orano DS, we share our experiences and best practices across all of our projects to always provide our customers with the accumulated benefits of our lessons learned."

"As seen at CR3, Orano's commitment to our customers for 'Decom done right' delivers on three performance goals," said James Seals, U.S. President of Orano Decommissioning Services, "an outstanding safety and compliance record, reduced project risk through quality execution, and applying innovation to achieve significant cost savings."

The traditional segmentation of a similar reactor into many small pieces would require about 80 shipments to a disposal site. Orano's innovative and efficient Optimized Segmentation of the CR3 reactor required only four large packages for shipment and disposal: three Class A industrial-type containers and one Class C Type B container. Two canisters of Greater-Than-Class-C waste were added to the existing onsite used nuclear fuel dry storage facility until an offsite location is available.

In performing the Optimized Segmentation process, the Orano team first cut up the reactor vessel internals underwater and categorized them based on radioactivity, with the Greater-than-Class-C waste separated and packaged for long-term storage onsite. The team then

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precisely packed the remaining low-level radioactive waste back into the reactor vessel in a way that optimized transportation and disposal cost-effectiveness.

Once the reactor vessel was repacked and drained—still in its original vertical orientation in the reactor vessel cavity—it was filled with an engineered grout developed by Orano that hardened and transformed the reactor vessel and internals into a single, solid mass. To separate this monolith into three pieces, the Orano team used diamond wire sawing to horizontally cut straight through the steel reactor vessel, solidified grout, and internals.

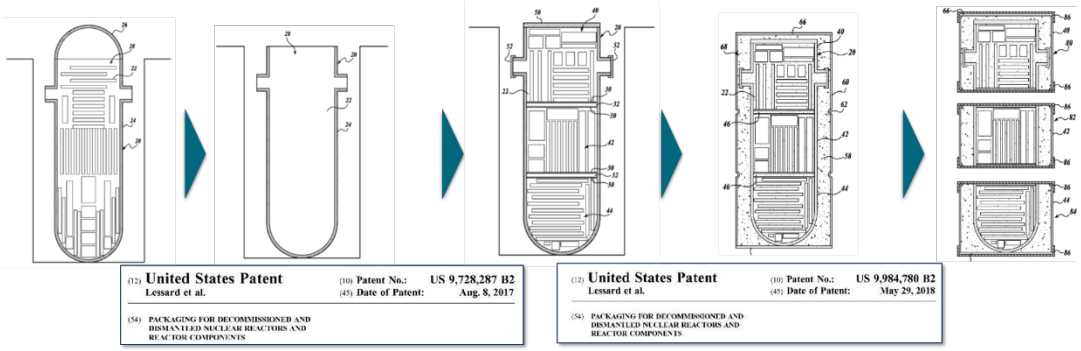
The three large, segmented pieces were lifted out of the reactor vessel cavity and transferred into Orano-designed custom-built packages, which the team also filled with grout to immobilize the contents before welding shut in preparation for shipment to disposal.

The 860 MWe Crystal River Unit 3 Babcock and Wilcox Pressurized Water Reactor was commissioned in 1976 and operated for 33 years in Citrus County, Florida. On Oct. 1, 2020, Accelerated Decommissioning Partners, a joint venture formed in 2017 between NorthStar Group Services and Orano USA, completed a transaction in 2020 with CR3 owner Duke Energy to immediately begin decontamination and dismantlement of CR3, nearly 50 years sooner than originally planned for 2067.

Now that the cooling system, reactor vessel, and vessel internals have been removed, the CR3 reactor building has been turned over to NorthStar for demolition.

WHITE PAPER: Details about Orano's patented Optimized Segmentation process and its implementation available here.

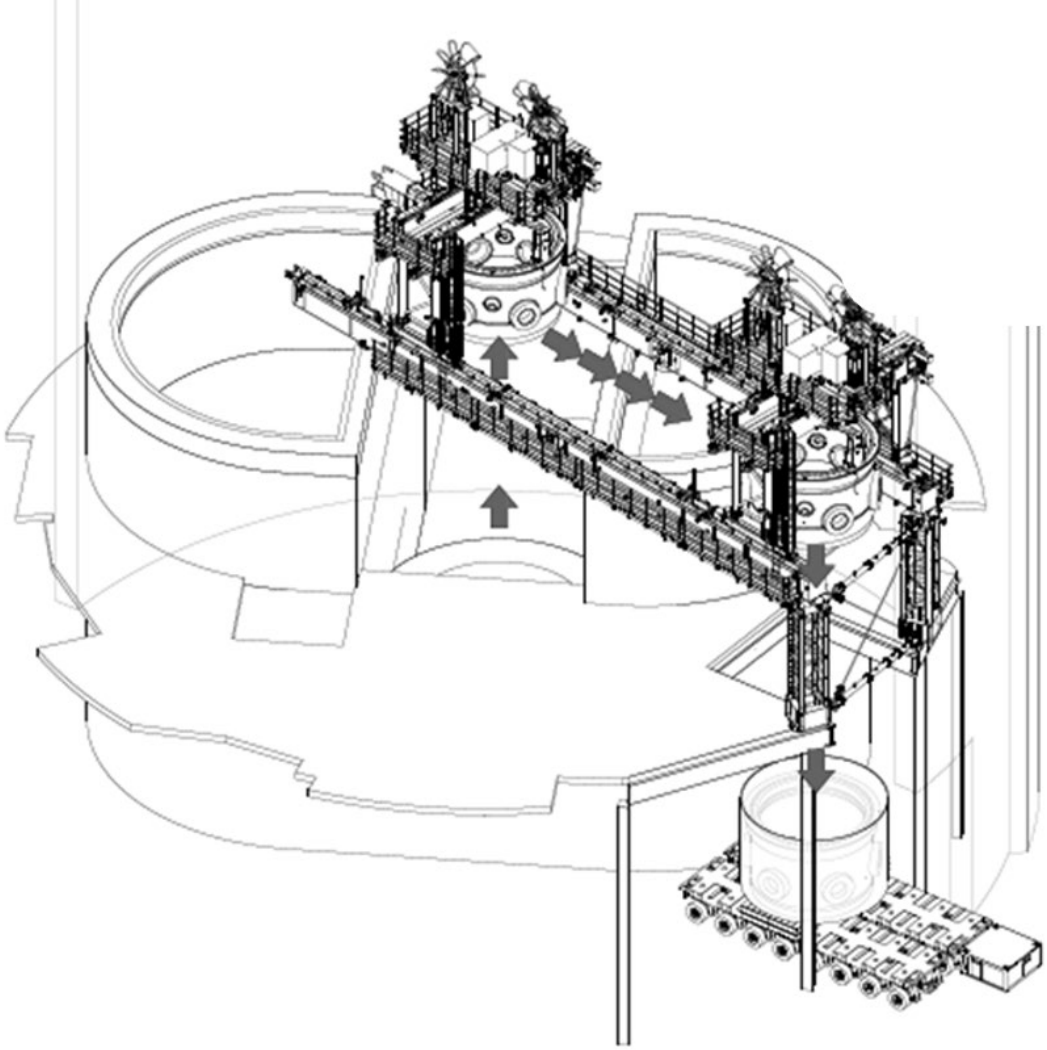
Orano's patented Optimized Segmentation process uses the emptied reactor vessel as a shielded container for repacking cut-up components and then segmenting into three pieces.



The CR3 reactor vessel and internals repackaged and immobilized by grout were segmented into three pieces using horizontal diamond wire cutting.

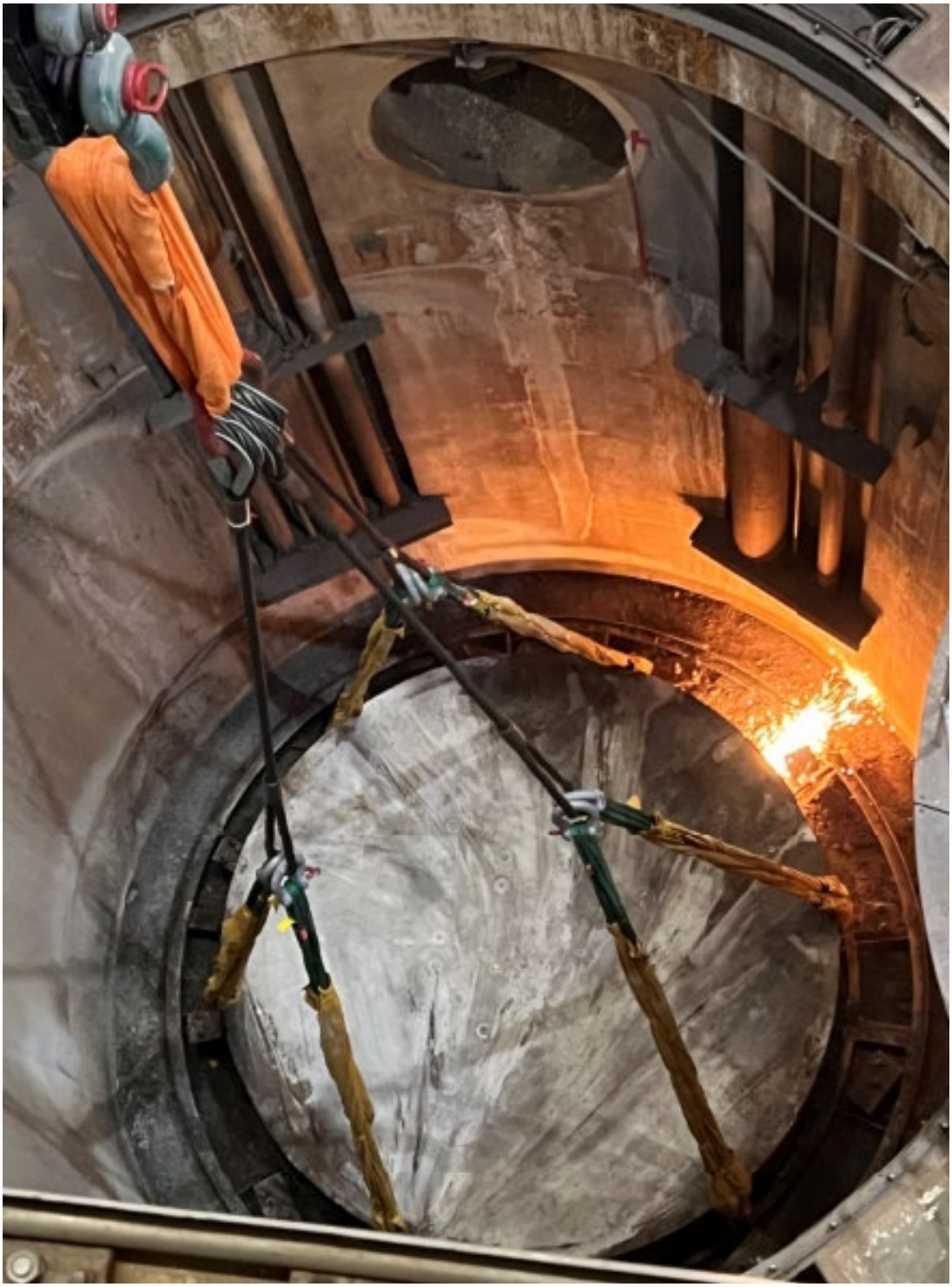



The Mammoet stand jack system lifted, transferred, and then lowered the segmented reactor vessel pieces into customized transport and disposal packages on the ground level for removal from the reactor building.



Top piece of the segmented CR3 reactor vessel being lifted and transferred out of the reactor cavity.

A few final cuts free the bottom piece of the segmented CR3 reactor vessel filled with hardened grout and internals.



Looking down into the emptied reactor vessel cavity at Crystal River 3.

About Orano USA: Orano USA is a key nuclear supplier of materials and services to the U.S. nuclear industry and the federal government, ranging from supplying nuclear fuel materials and in-house engineering to field service capabilities and applying decades of reactor decommissioning experience in dismantling, packaging, and transporting waste. Orano USA also provides the full suite of technologies and services for managing used nuclear fuel. Orano USA, through its subsidiary Orano Med in Texas, is developing cancer treatments using targeted radio-immunotherapy.

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