N119. EPRI-Sponsored Technology Easing CRDM Change-Out Job At BWRs

Changing out control rod drive mechanisms (CRDMs) is one of the hardest, dirtiest jobs in the industry, but improvements are being made. The biggest improvement has come in the technology of CRDM handling and exchange tools. The EPRI-sponsored "CRDM Handling System" provides major advantages over original plant equipment.

When the prototype CRDM Handling System was demonstrated at Commonwealth Edison's Quad Cities-1 and -2 in 1986, it showed that individual CRDM change-outs could be accomplished in 30 minutes with an estimated 50% reduction in dose exposure. Subsequent experience has confirmed that in a 10-hour shift, as many as 11 CRDMs can be changed out, approximately twice the previous number. Officials at Nebraska Public Power District's Cooper Station expect the system, which sells for about $100,000, to pay for itself in two outages. The Cooper plant changed out 17 CRDMs in 462.49 hours at a cost of 6.598 rem. In 1990, using the CRDM Handling System, workers changed out 12 CRDMs in 169.68 hours at a cost of 2.205 rem. Besides dose savings, there are cost savings associated with the elimination of processing contract employees. Cooper now does the job largely in-house. There are advantages in reduction of dose, there are fewer people required for the job, and it is safer.

The CRDM Handling System consists of a winch cart and transport carriage which are coupled together to facilitate transfer through the drywell CRDM removal hatch and positioning the existing CRDM transfer cart tracks. The system carries the CRDM into and out of containment; upends the CRDM when it is removed and installed, and raises and lowers the CRDM into and out of the CRDM housing. The system replaces a David Round Winch system, supplied by NSSS vendor General Electric to all U.S. BWRs as part of the plant's original equipment. The David Round system requires three workers instead of two; two on the under-vessel platform and one below. Operators have to be constantly careful not to snag their protective clothing on exposed hoist cables and to stay alert to the possibility of a cable breaking.

The electrical winch system will often fail if water gets into the controls. Other problems include: hoist cable breakage due to high stall torques of the electric motors; difficulty with reeving the cables and rigging the hoist systems under the vessel; and difficulties with maintenance of the hoist cart since it is not easily removed from the under-vessel gallery.

The CRDM change-out job is on the critical path during an outage and delays or problems tend to prolong the outage as other jobs have to wait for CRDM change-out completion.

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