

N307. Installing Nozzle Dams 100% Remotely

Remote installation of nozzle dams in PWR steam generators is now a well established technique, with substantial man-rem savings.

Nozzle dams are used to isolate the primary channel head of a steam generator from the primary loop during refueling outages. This allows work to be carried out in parallel on the steam generator primary side and on the refueling canal - with consequent savings in outage duration.

The nozzle dam can be installed using either Brand's ROMA (Remotely Operated Manipulator Arm) robot or Westinghouse's ROSA III robotic system, promising significant reductions in personnel exposure. With the ROMA option, a multi-purpose delivery system, with winch and three remotely operated cameras and halogen lights, positions the ROMA six-axis hydraulic robot arm inside the steam generator. The operator then installs the entire nozzle dam remotely from the control center. He uses a remote master controller, which is a scale replica of the ROMA arm.

Field experience to date with ROMA for nozzle dam operations is as follows: 1990 - Catawba 2 (nozzle dam removal), 1991 - Salem (nozzle dam installation and remote welding), Trojan (nozzle dam installation, removal and remote welding), Catawba 2 (nozzle dam installation and removal), Catawba 1 (nozzle dam installation and remote welding).

The first application of ROSA III - the universal robotic steam generator maintenance tool - for installation and removal of the Brand nozzle dam was at Farley 1 in autumn of 1992.

With the ever increasing emphasis on dose reduction and the need to eliminate manned channel head entry, remote installation of nozzle dams is set to become the industry norm in the coming years.

For more, "Installing Nozzle Dams 100% Remotely," *Nuclear Engineering International*, pp. 17-19, March 1994.