

## Palisades Steam Generator Replacement Project

The NOVA Award was presented to the Palisades Steam Generator Replacement Project for innovation in replacing steam generators in an operational nuclear power plant.



When steam generators required replacement at the Palisades Nuclear Power Plant in Covert, Michigan, Consumers Power Company needed to find an innovative way to manage the mammoth project.

The usual procedure for replacing steam generators in nuclear reactors is to cut them apart and remove them through an equipment hatch. At Palisades, however, the hatch was unusually small and the generators were especially large-20 feet wide, 60 feet long, and more than 450 tons.

Consumers Power teamed with Bechtel Construction Company to devise a new solution for replacing generators. Each generator at Palisades was removed as a single unit through a 20' x 26' hole created in the reactor wall. Approved by the NRC, this was the first breach of an operational nuclear plant's post-tensioned, pre-stressed containment structure in the United States.

The opening in the reactor wall was created with a unique combination of cutting techniques that included the use of chipping instruments, circular saws, coring tools, and diamond wire saws.

Narrow groove welding performed by remote-controlled, video-monitored welding machines was used for in-situ fabrication of heavy-wall pipe for the new steam generators. This was the first time in the United States that narrow groove welding was used on carbon steel pipe with internal stainless steel lining.

The Palisades project also featured the first domestic use of an optical templating system to identify and control cutting and machining locations on the generators.

Precision measurement and cutting techniques were critical to creating this opening in the heavily-reinforced containment structure. The 450-ton steam generators were then carefully extracted through the opening, which was later restored.

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