



New fueling machine ram seals, developed through COG Joint Projects & Services, have been deployed at NB Power's Point Lepreau (above) and OPG's Pickering Nuclear (below). The new seals help to reduce maintenance and increase equipment reliability. Images: NB Power and OPG

Innovations improve performance life of critical plant components

Working through COG, members are leveraging the shared results of research and joint projects to strengthen plant performance



Equipment reliability (ER) is fundamental to safety and economic performance.

By deploying research and tools developed through a CANDU Owners Group (COG) joint project, Pickering Nuclear and Point Lepreau, have strengthened performance in fueling machine ram seals. The results have improved equipment reliability and reduced maintenance effort at the plants.

At Darlington Nuclear, collaborative research between COG and Electric Power Research Institute (EPRI) has been applied to validate fitness for service of steam generators allowing operators to get a longer operating life from the components.

New ram seals improve performance life

Fuel machine ram seals are performing better and reducing maintenance thanks to innovative work through COG's Joint Projects & Services (JP&S) area.

In 2015, New Brunswick Power (NB Power) requested COG initiate a joint project to develop, design and qualify a reliable ram seal with improved performance life and endurance. The new seal would replace the existing version (OEM 'Type 3' FM) and supply sufficient quantities to participating plants, Point Lepreau and Ontario Power Generation's (OPG) Pickering Nuclear.

The first phase of the joint project involved development and qualification testing of the new ram seal which simulated station fueling operational and maintenance cycles. This process took place between 2016-2018 to ensure the new seals demonstrated the reliability needed by the COG members.

During project development, qualification testing demonstrated the new Type 4 seal could hit its mission target of 3,000 fueling cycles without failure. The new seals were developed in part by COG supplier participant, BWXT Canada, with support from EagleBurgmann Canada. Following the successful completion of the tests, NB Power and OPG authorized COG to procure the new Type 4 seals for deployment.

In 2019, the first batches of seals were completed and the upgraded Type 4 seals were shipped, installed and began fueling at Point Lepreau and Pickering.

Both Point Lepreau and Pickering have been fueling with the new seals for the past year and they have shown good performance to date. Importantly, they have performed beyond the point where the Type 3 seals had a high failure rate. Station OPEX showed that failure of Type 3 seals typically occurred after 500 fueling cycles. This is considered the true test of endurance.

The final project milestone will be to achieve no seal failures between fueling machine rebuilds (2,000 cycles).



A 145-tonne steam generator. Image: Bruce Power



New fueling machine ram seals were developed through a COG joint project that tested for long-lasting performance before they were put into service at two COG member plants.

Steam generator fitness for service analysis ensures safety and reliability

Steam generator analysis is critical to enabling CANDU plants to operate safely, efficiently and without interruption.

As CANDU reactors age, fitness-for-service assessments of critical components like steam generators (SGs) are required for continued long-term operation.

COG research, in collaboration with the Electric Power Research Institute (EPRI), has been focused on analysis of the SGs and to provide assurance these units can be operated safely and reliably.

There is also a regulatory need to provide evidence that inspection and data analysis tools are delivering accurate results and information. Steam generator research has looked at the condition of the SG tubes along with development of better inspection tools and methods to make fitness-for-service assessments more efficient and cost effective.

A COG R&D work package analyzed an SG tube from Darlington Unit 4. The tube had been in service for 26 years and was examined for degradation. The examination confirmed the good health of the Darlington tube and supported continued safe and efficient operation of the steam generator.

As well, other COG R&D work has included research into ultrasonic inspection tools, magnetic biasing array probes and faster manual techniques for SG inspection. Developing new inspection probes could be beneficial to SG flaw detection and sizing performance.

Development of these new inspection tools could prove directly beneficial for the pre-emptive condition assessment of SG tubes and decrease risk of forced outages.