Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Questions from External Advisory Committee to Ontario Power Generation

In the Matter of

Request for authorization to return Pickering Nuclear Generating Station Unit 5 to service, following its current forced outage

Public Hearing - Hearing in writing based on written submissions

October 2021

Questions du Comité consultatif Externe à Ontario Power Generation

À l'égard de

Demande concernant l'autorisation de la remise en service de la tranche 5 de la centrale nucléaire de Pickering à la fin de son arrêt prévu actuel

Audience Publique - Audience fondée sur des mémoires

Octobre 2021

Canada

EAC Comments

- We find the arguments for re-start approval for P5 to be compelling.

- The end-of-life levels of Rolled Joint Heq at Pickering are projected to be well below the 120 ppm projected for Darlington and measurements (scrape and removed tubes show consistently lower values). Temperatures at Pickering are significantly lower and an Arrhenius-controlled corrosion reaction rate or diffusion rate would be expected to be halved for a 10 degree C temperature difference.

- Given the lower operating neutron flux, plus lower pressure and temperature in Pickering channels it is expected that lower PT circumferential creep would occur, resulting in lower flow bypassing. In turn, there would be less circumferential redistribution of Heq in the outlet rolled joint region of Pickering channels.

- The OPG answers to the CNSC staff questions are more realistic than some of the discussions at the earlier meetings. They acknowledge that debris frets can be formed even in unlikely locations. However their number is few (based on all the inspections carried out by the Canadian licensees) and their depth and shape are not crack-like.

- The assertion that the number of debris frets in Pickering B is small is a bit of a stretch. Typically, Pickering B has more fretting indications than any other OPG units for historical reasons (related to debris produced during initial fuelling of the reactors after hot conditioning). Some of these flaws have historically caused Pickering B units to be cycle-limited (a cycle is unit heat up or cool-down). The cycle limits were cleared before I retired in 2016

- Re-inspections have historically very seldom (if ever) shown debris frets to grow between inspections. This makes sense as the fuel is removed for inspections to be performed. It is highly unlikely that another piece of debris would be located at exactly the same location and propagate the fret (this not the case for bearing pad frets where coincident location of bearing pads from different bundles have been been observed)

- No crack has ever been found to have developed from a fretting flaw (anywhere in the Canadian fleet to our knowledge). This is why the first line of defence against pressure tube rupture is “there are no active cracking mechanisms”. Leak-before-break and fracture protection are defence-in-depth barriers should a cracking mechanism unexpectedly develop.

Specific commentary on the CNSC staff CMD.

While we agree with the overall conclusion of recommending restart, the assessment "muddies the water" on flaws of concern.

- while the order quotes any flaw deeper than 0.15 mm as being of concern, a flaw 0.17 mm is described as a "very small" flaw. It is excluded from the statistical analysis, even though its origin is unknown.

- this suggests that the criterion of >0.15 mm is really "shorthand" for " flaws that are not very small", where the attributes of a "very small flaw" are not specified

- Subjectivity in the criterion is not ideal.