Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 23-H103.10A

File/dossier : 6.01.07
Date : 2023-07-14
Edocs: 7089902

Supplementary Information

Written submission from the External Advisory Committee

In the Matter of

Bruce Power Inc.
Bruce Nuclear Generating Stations A and B

Application to amend the power reactor operating licence for the Bruce Nuclear Generating Stations (NGS) A and B

Hearing in writing based on written submissions

April 2023

Renseignements supplémentaires

Mémoire du Comité consultatif externe

À l'égard de

Bruce Power Inc.
Centrales nucléaires de Bruce-A et B

Demande visant à modifier son permis d'exploitation d'un réacteur de puissance pour les centrales nucléaires de Bruce-A et B

Audience par écrit fondée sur des mémoires

Avril 2023

Canada

Correspondence between Commission Registry and EAC Regarding CMD 23-H103

Below is relevant email correspondence between the Commission Registry and the External Advisory Committee (EAC) on Pressure Tubes regarding Bruce Power's application for a licence amendment (CMD 23-H103). The Commission directed the Registry to obtain the following from the EAC:

1. Clarification on comments made in EAC's submission (CMD 23-H013.10); and
2. the EAC's views on responses from Bruce Power (CMD 23-H103.1A) and CNSC staff (CMD 23-H103.A) on questions issued by the Commission (CMD 23-H103Q).

With respect to the first, the EAC identified one supplemental question for the Commission's consideration (see EAC response, June 15, 2023).

With respect to the second, the EAC confirmed that it had no further comments on the responses to questions (see EAC response, July 11, 2023).

Question for EAC (June 5, 2023 [1]):

The Commission requests a response by **June 16, 2023** on whether you have any further questions or comments pertaining to Bruce Power's reference material.

In addition, the Commission requests clarification regarding your recommendation #3:

2.3. The technical document cited in Ref 4 of CMD 23-H103.1 is critical to the issue at the inlet of the pressure tubes. As has been done in previous instances in which complex technical reports were highly risk-significant, an independent review by a technical expert elsewhere in the industry and totally unaffiliated with this project would provide an important additional level of assurance. In the past, the industry has commissioned the work using an independent technical expert endorsed by the CNSC.

Can you:

- explain the basis of this recommendation
- clarify the timing of the suggested independent review (i.e. do you intend that it be done at this time or in the future)?
- Provide examples of similar independent reviews

EAC Response (June 6, 2023 [2]):

Let me elaborate on our Recommendation #3.

The comment is based on my experience in OPG during the years from 2000 to 2015. My organization led the investigation of the feeder issue, and from 2008-2015 the Fuel Channel work in OPG and in COG. There were several instances when we received a report from our internal work or from COG that presented a complex piece of work whose outcome was highly risk-significant. In order to increase our confidence in the results, we would commission an external world-class expert to review the work. We did not have such world-class expertise available internally, and any internal capability would have played some role in the work as it was progressing...therefore they could not carry out an independent review.

Examples where we have done this included:

- the advanced elastic/plastic stress analysis methodologies which were used to establish the minimum required thicknesses of feeder elbows thinned by Flow Accelerated Corrosion.
- the models of the fracture toughness of pressure tube material as a function of temperature and [Heq]
- the methodology for developing probabilistic assessment methodologies to satisfy the Leak before Break requirements in the CSA standard.

There were times when we knew that we would want such an additional review, and the cost (generally $20 -50K) and time would be included in the project plan from the outset.

We also knew that the CNSC staff were interested in such a detailed review. To make sure that both sides had confidence in the review, OPG or COG would suggest a short list of world-class experts who could review the work. CNSC staff were asked to review the names and select the one that CNSC had the greatest confidence in . If CNSC had no confidence in any of the names, additional possible reviewers were identified until one was identified who was satisfactory to the licensees and the CNSC staff.

The suggestion of an external review was made for a report that we felt may contain ground-breaking methodologies. Not having seen the report, it is hard for us to be certain if this report merits it. The recommendation was made to remind the Commission members that this option exists when totally new methodologies are being proposed by the licensees.

Let me know if this response provides the information you require.

Question for EAC (June 8, 2023 [3]):

Thank you for the information. As noted below, it would also be appreciated If you could clarify the timing of the suggested independent review (i.e. do you intend to recommend that it be done at this time or as an option to be explored in the future).

EAC Response (June 15, 2023) [4]:

This message has two purposes:

1. to respond to your request that we "clarify the timing of the suggested independent review (i.e. do you intend to recommend that it be done at this time or as an option to be explored in the future)"[Ref:your e-mail to me of June 8, 2023].
2. to submit an additional question for Bruce Power

1) In the EAC document which is the subject of the question, we wrote that it seemed to us from the work attributed to Ref 4 (and Ref 4A which is identical to it) that the *"...technical document cited in Ref 4 of CMD 23-H103.1 is critical to the issue ..."*

However, the Ref 4 document that you sent to us recently (thank you) states the following in the executive summary. The "*... focus of the evaluation was on the high levels of Heq at the blip and the potential impact on the hydrided region at the tip of a postulated axial blunt flaw. It was not intended to establish a comprehensive industry methodology for simulating the distribution of Heq in the entire rolled joint region. R&D work to predict the levels of Heq in the entire rolled joint region is ongoing. The simulation results of the through-wall distribution of Heq at the blip are not intended to be used in an evaluation of other surveillance pressure tubes or in a fitness-for-service evaluation."*

The yellow highlighted area (my highlighting) explains that this document presents indicative results of the assessment of the hydrogen distribution. It is not intended to establish a new comprehensive industry methodology for simulating the distribution of Heq in the rolled joint. It is not definitive nor to be used in a fitness-for-service evaluation, as stated in the green highlighted area.

Given the preliminary nature of this report, there is no reason to subject it to close technical scrutiny by an industry expert. It is still a work-in-progress.

We suggest, however, that when the work is more advanced and that a resulting report ***does*** propose a new methodology that is applicable industry-wide, this report should be reviewed by an independent expert before it accepted as an industry standard methodology by the CNSC .

I hope this answers your question adequately. Let me know if you have any follow-up questions.

2) **Question for Bruce Power**
As noted in the green highlighted area, the new methodology (is) "*not intended to be used in an evaluation of other surveillance pressure tubes or in a fitness-for-service evaluation.*

However, the text of *CMD 23-H103.1 Attachment A* states "...Pressure Tube Fitness for Service Requirements for Pressure Tubes with High [H]eq in Regions of Interest near the Inlet and Outlet Rolled Joints For the Inlet Rolled Joint Region of Interest: Bruce Power shall follow the requirements of N285.4 and N285.8 to demonstrate fitness for service in the inlet region of interest. This is based on the Finite Element Diffusion Analysis of High Hydrogen Level in Rolled Joint Region with Postulated Flaw (Reference A4) results which demonstrate that..."

A reader of the two documents may be puzzled: the green sentence in the Ref 4A report states that application of this methodology is not appropriate to establish Fitness for Service. The blue sentence in the request for a license condition change says that Fitness for Service will be based on the work in Reference 4A .

Can Bruce Power (and the CNSC staff who reviewed this work) please explain how these two statements are consistent with each other.

Question for EAC (June 23, 2023 [5]):

The Registry has received the responses to the CMDQ that the Commission issued to obtain responses to your questions. Please let me know if you have any additional comments.

Note: Reminder email sent on July 10, 2023[6]

EAC Response (July 11, 2023 [7]):

> Mark and I have reviewed the responses from the CNSC staff and from Bruce Power to our questions concerning the Bruce Power License Amendment application. We have no questions or comments on the responses we received.
>
> We still await a response to our additional question sent to you in our June 15, 2023, e-mail. The question was on the qualification of the Finite Element Diffusion Analysis methodology for Fitness for Service Assessments.

REFERENCES

[1] Email from M. Young (CNSC) to P. Spekkens and M. Daymond (EAC), "RE: EAC Report on Review and Assessment CMD Materials", June 5, 2023 (e-Doc 7089897).

[2] Email from P. Spekkens (EAC) to M. Young (CNSC), "RE: EAC Report on Review and Assessment CMD Materials", June 6, 2023 (e-Doc 7089897).

[3] Email from M. Young (CNSC) to P. Spekkens and M. Daymond (EAC), "RE: EAC Report on Review and Assessment CMD Materials", June 8, 2023 (e-Doc 7089897).

[4] Email from P. Spekkens (EAC) to M. Young (CNSC), "Reply to Michael Young and a question for Bruce Power", June 15, 2023 (e-Doc 7085376)

[5] Email from M. Young (CNSC) to P. Spekkens and M. Daymond (EAC), "RE: Reply to Michael Young and a question for Bruce Power", June 23, 2023 (e-Doc 7085376)

[6] Email from M. Young (CNSC) to P. Spekkens and M. Daymond (EAC), "Seeking comments on responses to questions concerning Bruce Power licence amendment application", July 10, 2023 (e-Doc 7085376)

[7] Email from P. Spekkens (EAC) to M. Young (CNSC), "No comments on responses to questions concerning Bruce Power licence amendment application", July 11, 2023 (e-Doc 7085376)