

RS-13-261

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October 24, 2013

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Supplemental Response to NRC HELB Audit Request for Information
Supporting Request for License Amendment Regarding Measurement
Uncertainty Recapture Power Uprate

References:

1. Letter from Craig Lambert (Exelon Generation Company, LLC) to U. S. NRC, "Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated June 23, 2011 [ML111790030]
2. Letter from J. S. Wiebe (U. S. NRC) to M. J. Pacilio (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Units 1 and 2 - Request for Additional Information and Suspension of Review of License Amendment Request for Power Uprate (TAC Nos. ME6587, ME6588, ME6589, and ME6590)," dated December 6, 2012 [ML12271A308]
3. Letter from David M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "Additional Information Supporting Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated July 5, 2013 [RS 13-189] [ML13186A178]
4. E-Mail from J. S. Wiebe (U. S. NRC) to Leslie E. Holden (Exelon Generation Company, LLC), "B/B HELB Dampers and Jet Impingement," dated September 26, 2013
5. Letter from David M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "Supplemental Response to NRC HELB Audit Request for Information Supporting Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated October 8, 2013 [RS 13-242]

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Facility Operating License Nos. NPF-72, NPF-77, NPF-37 and NPF-66 for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, respectively. Specifically, the

proposed changes revise the Operating License and Technical Specifications to implement an increase in rated thermal power of approximately 1.63% based on increased feedwater flow measurement accuracy.

In Reference 2, the NRC requested additional information (RAI) pertaining to the Turbine Building (TB) High Energy Line Break (HELB) analysis and an audit to complete their detailed review of the power uprate. The response to this RAI was provided in Reference 3. On July 17 and 18, 2013 the NRC conducted the audit. In References 4 and 5 NRC requested and EGC provided additional information regarding the assumed Turbine Building HELB break locations.

During a call on October 2, 2013 between EGC (David Gullott, et.al.) and the NRC (Joel Wiebe, et.al.), EGC also discussed the results of physical testing and comparative analysis that further supports the acceptability of utilizing a lumped volume approach for the TB HELB environmental analysis. Additional information pertaining to this analysis and testing is provided in Attachment to this letter.

Please note, while this comparative analysis confirms the applicability of the GOTHIC modeling approach used to resolve the TB HELB non-conformances, it was performed independently of the TB HELB resolution efforts. The TB HELB engineering design analyses that resolve the non-conformances are stand alone analyses that do not reference or rely on the comparative analysis discussed in the Attachment to this letter (i.e., the comparative analysis is not part of the Braidwood and Byron design basis).

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Furthermore, the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Leslie E. Holden at (630) 657-3316.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 24th day of October 2013.

Respectfully,



David M. Gullott
Manager - Licensing

Attachment: Supplemental Response to NRC Request for Additional Information
(Non-Proprietary)

ATTACHMENT

**SUPPLEMENTAL RESPONSE TO
NRC REQUEST FOR ADDITIONAL INFORMATION**

October 24, 2013

(NON-PROPRIETARY)

Supplement to Response:

As discussed during a call on October 2, 2013, between EGC (David Gullott, et.al.) and the NRC (Joel Wiebe, et.al.), Exelon Generation Company, LLC (EGC), is providing supplemental information regarding a comparative analysis performed by EGC to further theoretically support the acceptability of the lumped modeling approach for the Turbine Building (TB) High Energy Line Break (HELB) environmental analysis. This comparative analysis was performed independently of the TB HELB resolution efforts and is not referenced or relied on as part of the TB HELB design basis. This information supplements the information provided in Reference A1-1.

EGC prepared GOTHIC models of the Marviken Test #5¹ configuration utilizing a lumped approach consistent with the TB HELB analysis, and utilizing other approaches involving flow path inertia, 0.001 second break opening time and sub-division of the break volume. The results of these models were then compared to the Marviken empirical static pressure data (Reference A1-2). The Test #5 configuration is considered to be comparable to the configuration of the Braidwood and Byron TB.

During Marviken Test #5, the static pressure in the compartment where the HELB was released increased in pressure steadily to a peak pressure within seconds. This testing indicated that there was no fast localized shock wave pressure immediately after the simulated break. In addition, the farthest pressure sensing instrument (located < ten (10) pipe diameters from the exit of the break) showed nearly full attenuation of the local static pressure to very near the bulk compartment pressure during the testing.

The data curve from the Marviken Test #5 more closely aligns with the shape of the curve using the lumped GOTHIC approach (consistent with the TB HELB analysis), in that there is no initial pressure pulse. The GOTHIC lumped volume approach predicts pressure rise rate values that are conservative to those seen in Marviken Test #5. However, applying the approach involving flow path inertia, 0.001 second break opening time and sub-division of the compartment break volume in the GOTHIC model results in a localized pressure pulse that was not observed during the Marviken Test #5, even though the data acquisition was instrumented in such a manner that it should have been able to detect a pulse of this type.

EGC has concluded the GOTHIC lumped model approach, consistent with the TB HELB analysis, is conservative and consistent with the empirical test data, and the test data does not support the apparent pressure wave phenomena predicted with other GOTHIC modeling approaches. This further validates the acceptability of the GOTHIC lumped volume approach to resolve the Braidwood and Byron TB HELB non-conformances.

¹ *Marviken Test #5 was a rapid blowdown of a steam vessel that was initially at 5MPa. The steam was released through a small (< 300 mm) diameter pipe into a large scale containment compartment. The test was focused on jet impingement, but included axial and radial pressure distributions applicable for the purpose of HELB compartment pressure validation.*

References

- A1-1 Letter from David M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "Supplemental Response to NRC HELB Audit Request for Information Supporting Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated October 8, 2013 [RS 13-242]
- A1-2 Studsvik Report MXD-205, March 1981, "Interim Report Results From Test 5; The Marviken Full Scale Jet Impingement Tests Fourth Series"