Exelon Generation®

Byron Generating Station

4450 North German Church Rd
Byron, IL 61010-9794

www.exeloncorp.com

February 27, 2015

LTR: BYRON 2015-0026
File: 1.10.0101 (5A.101)

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

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: Response to Request for Additional Information (RAI) Regarding Pressure and Temperature Limits Reports (PTLRs), Byron Station, Units 1 and 2

References:
(1) Letter from F. A. Kearney (Exelon Generation Company, LLC) to U. S. NRC, "Pressure and Temperature Limits Report (PTLR) for Measurement Uncertainty Recapture (MUR) Power Uprate, Byron Station, Units 1 and 2" dated February 13, 2014

(2) E-mail from J. S. Wiebe (U. S. NRC) to S. Gackstetter (Exelon Generation Company, LLC), "RAI Regarding Pressure and Temperature Limits Reports (PTLRs), Byron Station, Units 1 and 2," dated January 29, 2015

In Reference 1, Exelon Generation Company, LLC, (EGC) provided the document "Pressure and Temperature Limits Report (PTLR) for Measurement Uncertainty Recapture (MUR) Power Uprate, Byron Station, Units 1 and 2" to the Nuclear Regulatory Commission (NRC) in accordance with Technical Specifications 5.5.6 for Byron Station, Units 1 and 2.

In Reference 2, the NRC requested that EGC provide additional information to complete their review of the subject PTLR document (i.e., Reference 1). The NRC requested that EGC provide the requested information to the NRC on or before March 2, 2015.

The response to this request is provided in Attachment 1 to this letter. This letter contains no new regulatory commitments.

Should you have any questions concerning this matter, please contact Douglas Spitzer, Byron Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,

Faber A. Kearney
Site Vice President
Byron Generating Station

Attachment 1: Response to Request for Additional Information

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Byron Station

ATTACHMENT 1
Response to Request for Additional Information

Regulatory Basis

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix G requires that pressure-temperature (P-T) limits be developed to bound all ferritic materials in the reactor vessel (RV). Further, Sections I and IV.A of 10 CFR Part 50, Appendix G specify that all ferritic reactor coolant pressure boundary (RCPB) components outside of the RV must meet the applicable requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section III, "Rules for Construction of Nuclear Facility Components."

As clarified in Regulatory Information Summary (RIS) 2014-11, "Information on Licensing Applications for Fracture Toughness Requirements for Ferritic Reactor Coolant Pressure Boundary Components" (ADAMS Accession No. ML14149A165), reactor vessel materials with the highest reference temperature may not always produce the most limiting P-T limits because the consideration of stress levels from structural discontinuities (such as nozzles) may produce a lower allowable pressure.

Request for Additional Information (RAI):

Describe how the P-T limit curves for Byron Units 1 and 2 consider all ferritic pressure boundary components of the reactor vessel that are predicted to experience a neutron fluence exposure greater than $1x10^{17}$ n/cm2 [n/cm^2] (E > 1 MeV) at the end of the licensed operating period.

If the current P-T limit curves do not consider all ferritic pressure boundary components of the reactor vessel that are predicted to experience a neutron fluence exposure greater than $1x10^{17}$ n/cm^2 (E > 1 MeV) at the end of the licensed operating period, provide appropriately revised P-T limit curves to the NRC as required by Technical Specification 5.6.6.

Response to RAI:

The P-T limit curves submitted in Reference 1 for Byron Units 1 and 2 incorporate all reactor vessel materials predicted to achieve projected neutron fluence values greater than $1x10^{17}$ n/cm^2 (E > 1 MeV) prior to the end of the applicability term of the curves. As documented in Reference 1, the Byron Unit 1 P-T limit curves are applicable through 32 effective full power years (EFPY) and the Byron Unit 2 P-T limit curves are applicable through 30.5 EFPY.

The P-T limit curves contained in Reference 1 used fluence values calculated as part of the Measurement Uncertainty Recapture (MUR) power uprate evaluation. The neutron fluence values calculated at 32 EFPY for Byron Units 1 and 2 are summarized in Tables 1 and 2 of this Attachment, respectively. As shown in Tables 1 and 2, the materials predicted to achieve projected neutron fluence values greater than $1x10^{17}$ n/cm^2 at 32 EFPY include the nozzle shell, intermediate shell and lower shell forgings, as well as the nozzle shell to intermediate shell forging circumferential welds and the intermediate to lower shell forging circumferential welds at Byron Units 1 and 2. These materials have been included in the P-T limit curve assessment submitted in Reference 1.

ATTACHMENT 1
Response to Request for Additional Information

Table 1
Byron Unit 1 Calculated Neutron Fluence Projections at the Reactor Vessel Clad/Base Metal Interface at 32 EFPY

Reactor Vessel Material	Fluence (n/cm^2, E > 1.0 MeV)
Outlet Nozzle to Nozzle Shell Welds (Lowest Extent)	5.08E+16
Inlet Nozzle to Nozzle Shell Welds (Lowest Extent)	6.70E+16
Nozzle Shell Forging	5.98E+18
Nozzle Shell to Intermediate Shell Forging Circumferential Weld	5.98E+18
Intermediate Shell Forging	1.77E+19
Intermediate to Lower Shell Forging Circumferential Weld	1.72E+19
Lower Shell Forging	1.77E+19
Lower Shell Forging to Bottom Head Ring Circumferential Weld	1.72E+15

Table 2
Byron Unit 2 Calculated Neutron Fluence Projections at the Reactor Vessel Clad/Base Metal Interface at 32 EFPY [(a)]

Reactor Vessel Material	Fluence (n/cm^2, E > 1.0 MeV)
Outlet Nozzle to Nozzle Shell Welds (Lowest Extent)	4.49E+16
Inlet Nozzle to Nozzle Shell Welds (Lowest Extent)	5.92E+16
Nozzle Shell Forging	5.49E+18
Nozzle Shell to Intermediate Shell Forging Circumferential Weld	5.49E+18
Intermediate Shell Forging	1.76E+19
Intermediate to Lower Shell Forging Circumferential Weld	1.70E+19
Lower Shell Forging	1.76E+19
Lower Shell Forging to Bottom Head Ring Circumferential Weld	1.59E+15

Note:

(a) Although the Byron Unit 2 P-T limit curves are only applicable through 30.5 EFPY, the 32 EFPY neutron fluence values can conservatively be used to determine the extent of the $1x10^{17}$ n/cm^2 fluence threshold.

References:

(1) Letter from F. A. Kearney (Exelon Generation Company, LLC) to U. S. NRC, "Pressure and Temperature Limits Report (PTLR) for Measurement Uncertainty Recapture (MUR) Power Uprate, Byron Station, Units 1 and 2," dated February 13, 2014 (ADAMS Accession No. ML14044A019).