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January 5, 2018
L-17-375

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

SUBJECT:
Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Response to Request for Additional Information Regarding Request 1-TYP-4-BA-01 to Extend the Inservice Inspection Interval for Certain Reactor Vessel Welds (EPID: L-2017-LLR-0131)

By letter dated October 24, 2017 (Accession Number ML17297A318), FirstEnergy Nuclear Operating Company (FENOC) requested Nuclear Regulatory Commission (NRC) approval to extend the inservice inspection interval from 10 to 20 years for certain reactor vessel welds at Beaver Valley Power Station, Unit No. 1.

By e-mail dated December 18, 2017, the NRC requested additional information to complete its review of the FENOC request. The FENOC response to the NRC request for information is attached to this letter.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 315-6810.

Sincerely,

Richard D. Bologna

Attachment:
Response to Request for Additional Information Regarding Request 1-TYP-4-BA-01 to Extend the Inservice Inspection Interval for Certain Reactor Vessel Welds

cc:
NRC Region I Administrator
NRC Resident Inspector
NRC Project Manager
Director BRP/DEP
Site BRP/DEP Representative

The NRC staff's requests for additional information are provided below in bold text, followed by the FENOC response.

Request for Additional Information (RAI) -1

Table 1A of Request 1-TYP-4-BA-01, reported significantly lower unirradiated nil-ductility transition reference temperature (RT_{NDT}) values for reactor pressure vessel beltline plates (B6607-1, B6607-2, B6903-1, and B7203-2) for Beaver Valley Power Station, Unit No.1 than the corresponding current-license-basis values in the license renewal application dated August 27, 2007 (ADAMS Accession No. ML072470493). The NRC staff found that the Charpy test data supporting the proposed unirradiated RT_{NDT} values for these plates were reported in a separate October 6, 2017, submittal (ADAMS Accession No. ML17284A195). This separate submittal requests approval of modified pressurized thermal shock (PTS) reference temperature (RT_{PTS}) values and reactor vessel surveillance capsule withdrawal schedule. The NRC staff examined the Charpy test data in the October 6, 2017, submittal and found that they are not entirely consistent with the test data provided to the NRC in the July 8, 1992, response to Generic Letter (GL) 92-01, "Reactor Vessel Structural Integrity" (NRC Microfilm Address 62405: 317-358):

- **The response to GL 92-01 reported no Charpy test data at 70°F for Plates B6607-1, B6607-2, and B7203-2, while the October 6, 2017, submittal reported Charpy test data for them.**
- **The response to GL 92-01 reported that the Charpy energy values at 210°F for Plate B6903-1 were 82 ft-lbs, 82.5 ft-lbs, and 83 ft-lbs, while the October 6, 2017, submittal reported 75 ft-lbs.**

Please clarify.

RAI-1, Bullet 1 Response:

Consistent with industry practice, room temperature (RT) is taken to be equal to 70 degrees Fahrenheit (°F). Unirradiated room temperature Charpy test data for plate B6607-1 was provided in Table 2 (Page 6) of the July 8, 1992 response to Generic Letter (GL) 92-01. Unirradiated room temperature Charpy test data for plates B6607-2 and B7203-2 was provided in Tables 3 and 4 (Attachment, pages 2 and 3 of 6), respectively, of a July 6, 2015 submittal (Accession No. ML15187A260) that provided clarification for the original GL 92-01 response.

The room temperature charpy test data provided in the GL 92-01 response letters for plates B6607-1, B6607-2, and B7203-2, is consistent with that reported in the October 6, 2017 submittal.

RAI-1, Bullet 2 Response:

Table 10 of the July 8, 1992 response to GL 92-01 provided information regarding the unirradiated Charpy test data for plate B6903-1. At a temperature of 210°F, Table 10 identifies four Charpy test data sets for plate B6903-1, and lists the associated energy values as 82 foot-pounds (ft-lbs), 82.5 ft-lbs, 83 ft-lbs, and 75 ft-lbs.

In accordance with ASME Code, Section III, Subarticle NB-2331, "Material for Vessels," Paragraph (a)(4), the 75 ft-lbs Charpy energy value reported in the October 6, 2017 submittal was used as one of the minimum data points to develop the Charpy V-notch curve for plate B6903-1.

RAI - 2

In Section 5 of Request 1-TYP-4-BA-01, under "Proposed Alternative and Basis for Use," it was stated that the the projected number of reactor coolant system heatup/cooldown cycles for 60 years of operation is 175 transients, and the number of heatup and cooldown design occurrences are 139 as listed in UFSAR Table 4.1-10, "Summary of Reactor Coolant System Design Transients." (ADAMS Accession No. ML17117A442). The NRC staff found that the projected number of heatup and cooldown transients is 200 in the license renewal application dated August 27, 2007, and is different from the value of 175 in the licensee's submittal dated October 24, 2017. Please clarify the discrepancy.

Response:

The discrepancy is identified as 200 heatup and cooldown transient cycles (hereafter referred to as cycles) projected in the license renewal application submitted in 2007 versus 175 cycles projected in the 2017 submittal.

The 2017 submittal was based in part on a 2009 transient reconstitution that corrected overcounted transient errors in the analysis used for the 2007 license renewal application, and accounts for the actual number of cycles that have occurred since 2009. The 2009 transient reconstitution accounted for actual cycles, projected two cycles per year except for the last 10 years of operation, and projected four cycles per year for the final 10 years of operation.

Reliable operation of Beaver Valley Power Station, Unit No. 1, (BVPS-1) has shown that predicting two cycles per year has been conservative. During the 13-year period of 2004 to 2016, there were a total of 12 heatup transients. One hundred and seventeen (117) actual heatup transients were counted through 2016. Adding 117 cycles to the

projected number of cycles (two cycles per year for nine years and increasing to four cycles per year for the final 10 years) predicts 175 cycles at 60 years.

Please also clarify why the projected number of 175 or 200 is adequate, considering that the projected transient cycles will exceed the design occurrences of 139.

Response:

The current projection for 60 years of operation is 175 cycles. Reliable plant operation is expected to continue to reduce this projection. If BVPS-1 were to only shutdown during planned refueling outages, the final total number of cycles would be 129.

Updated Final Safety Analysis Report (UFSAR) Table 4.1-10, "Summary of Reactor Coolant System Design Transients," Note 6, states that the analysis to address the effect of environmental fatigue for the pressurizer surge line to hot leg nozzle has assumed 139 plant heatup and cooldown events, and that this analytical limit is tracked as part of the Metal Fatigue Program described in UFSAR Section 16.1.27, "Metal Fatigue of Reactor Coolant Pressure Boundary Program." The analytical limit for the other reactor coolant system components is 200 events.

The Metal Fatigue Program described in Section 16.1.27 of the UFSAR uses preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the reactor coolant pressure boundary. The preventive measures consist of monitoring and tracking thermal and pressure transients (including plant heatup and cooldown transients) for reactor coolant system components to prevent the fatigue design limit from being exceeded. Prior to exceeding the fatigue design limit, the program triggers preventive actions and corrective actions, as applicable.