From: Wiebe, Joel
Sent: Wednesday, December 30, 2020 12:21 PM
To: 'Henderson, Phillip A:(Exelon Nuclear)'
Subject: Request for Additional Information Regarding Relief Requests Braidwood I4R-11 and Byron I4R-18

REQUEST FOR ADDITIONAL INFORMATION
OFFICE OF NUCLEAR REACTOR REGULATION

Exelon Generation Co., LLC

Dockets:
05000454-PWR-Byron 1,
05000456-PWR-Braidwood 1,
05000455-PWR-Byron 2,
05000457-PWR-Braidwood 2

EPIDS: L-2020-LLR-0099 and L-2020-LLR-0100

Questions

Question Number: 55

The request for relief for Containment Unbonded Post-Tensioning System Inservice Inspection Requirements in Accordance with 10 CFR 50.55a(z)(1), Section 4, Reason for Request, states "ASME Section XI, Subsection IWL requires periodic visual examination and physical testing of Containment Building concrete as well as physical testing of post-tensioning systems."

The staff finds that ASME Section XI, Subsection IWL does not require periodic physical testing of Containment Building concrete. Describe what kind of physical testing of concrete is required and whether it has been performed. If yes, where are the test results documented.

Question Number: 56
Deleted

Question Number: 57

PART B - CONTAINMENT DESCRIPTION, ISI PROGRAM, and SUMMARY of PROPOSED PROGRAM CHANGES, Containment ISI Program Summary Description, states "Also, limited scope visual examinations that addressed Unit 2 water intrusion issues were performed at Byron in 1987 and 1988. Limited scope visual examinations that addressed Unit 1 and Unit 2 water intrusion issues were performed at Braidwood in June – August 1987 and October - November 1990."

Describe how the water intruded into the containment buildings and the results of these limited scope visual examinations activities.

Question Number: 58

The licensee states the following:

1. "Byron and Braidwood have completed nine and eight, respectively, pre-stressing system surveillances on each unit. These were based on Regulatory Guide 1.35 or 10CFR50.55a / ASME Section XI Subsection IWL,"
2. "the Regulatory Guide 1.35 requires "Examination sample size - six dome, five vertical, and ten hoop tendons,"
3. "Regulatory Guide 1.35 was withdrawn in August 2015 following the incorporation, by reference, of ASME Section XI, Subsection IWL into NRC Regulation 10CFR50.55a," and
4. "the examination intervals and wire testing addressed in the 1973 original issue of Regulatory Guide 1.35 are now, 45 years later, still incorporated effectively unchanged into the current edition of ASME Section XI, Subsection IWL."

Based on the above, provide responses to the following questions:

1. Byron Unit 1, the sample sizes for dome tendons are five for years 1 and 5, and three for years 10, 20, and 30 (see Bryon Table 7), for vertical tendons are six for years 1 and 5, and three for years 10, 20, and 30 (see Table 5), and for hoop tendons are ten for year 1, eight for year 5, and four for years 10, 20, and 30 (see Bryon Table 3). Provide an explanation for those sample sizes that are less than that of the current edition of ASME Section XI, Subsection IWL.
2. Byron Unit 2, the sample sizes for dome tendons are five for years 1 (see Bryon Table 8), three for years 10, 20, and 30 (see Bryon Table 8), for vertical tendons are eight for year 1, six for year 5, and four for years 15, 25, and 35 (see Bryon Table 6), and for hoop tendons are twelves for year 1, ten for year 5, and five for years 15, 25, and 35 (see Bryon Table 4). Provide an explanation for those sample sizes that are less than that of the current edition of ASME Section XI, Subsection IWL.
3. Braidwood Unit 1, the sample sizes for dome tendons are four for years 1, seven for years 5, three for years 10 and 20, and four for year 30 (see Braidwood Table 7), for vertical tendons are six for years 1 and 5, and three for years 10, four for year 20, and three for year 30 (see Braidwood Table 5), and for hoop tendons are nine for year 1, eight for year 5, and four for years 10, five for year 20, and four for year 30 (see Braidwood Table 3). Provide an explanation for those sample sizes that are less than that of the current edition of ASME Section XI, Subsection IWL.
4. Braidwood Unit 2, the sample sizes for dome tendons are five for years 1 and 5, and three for years 15 and 25 (see Braidwood Table 8), for vertical tendons are six for years 1 and 5, and three for year 10, four for year 20, and three for year 30 (see Braidwood Table 5), and for hoop tendons are nine for year 1, eight for year 5, and four for year 10, five for year 20, and four for year 30 (see Braidwood Table 3). Provide an explanation for those sample sizes that are less than that of the current edition of ASME Section XI, Subsection IWL.
5. There are ten numerical values listed in Table 3 for Unit 1 year 1 hoop tendon forces, but only seven forces are plotted in figure 1. There are 8 numerical values listed in Table 3 for Unit 1 year 5 for hoop tendon forces, but only four are plotted in figure 1. Provide an explanation for the discrepancy.

Question Number: 59

The licensee developed and proposed formulas indicating that the pre-stressing forces in the cylinder both in the hoop and vertical directions and in the dome of the containments have been

decreasing gradually with time. The formulas predict that the pre-stressing forces will remain above the required minimum magnitudes for the next ten years. This is the main argument used by the licensee to extend the ASME Code's five year surveillance intervals to ten years. However, the prestressing forces in the following figures do not match the licensee's formula predicted. The prestressing forces in the following figures have been decreased or increased or flattened at different time intervals, sometimes sharply and other times gradually, with no predictable trends (increase or decrease or flat) and magnitudes from time to time. Therefore, the use of the formulas to predict the future prestressing lost in the containment as the justification for extending the ASME Code's five-year surveillance intervals to ten-year intervals may not be valid.

Figure 1 - Byron Unit 1 Hoop Tendon Force Trend & LCL / 1 - 30 Year Surveillance Results indicate that the prestressing force is decreased from year 1 to year 5 and decreased more to year 10, but then is reversed to increase from year 10 to year 29 and is decreased again to year 30.

Figure 8 - Byron Unit 1 Vertical Tendon Force Trend & LCL / 5 - 30 Year Surveillance Results indicate that the prestressing force is increased from year 5 to year 10 and then flattened to year 20 and then decreased from year 20 to year 30.

Figure 10 - Byron Unit 2 Vertical Tendon Force Trend & LCL / 1 - 35 Year Surveillance Results indicate that the prestressing force is decreased sharply from year 1 to year 5 and then flattened to year 15 and then another sharply decreased to year 25 and then slightly increased to year 35.

Figure 13 - Byron Unit 1 Dome Tendon Force Trend & LCL / 1 - 30 Year Surveillance Results indicate that the prestressing force is decreased sharply from year 1 to year 5 and then increased from year 5 to year 10 and then decreased to year 20 and then increased slightly to year 30.

Figure 16 - Braidwood Unit 2 Dome Tendon Force Trend & LCL / 1 - 35 Year Surveillance Results indicates that the prestressing force is reduced from year 1 to year 5 and is increased from year 5 upward through years 15 and 25.

Figure 17 - Byron Unit 2 Dome Tendon Force Trend & LCL / 5 - 35 Year Surveillance Results indicates that the prestressing force is increased from year 5 to year 15 and then decreased from year 15 to year 25 and 35.
Provide an explanation for such irregular phenomena of prestressing loss or gain with time in containments. Also provide additional justification why it is acceptable to extend the surveillance intervals from the ASME Code's five year surveillance intervals to the proposed ten year intervals.

Question Number: 60

PART C - BACKGROUND OF CURRENT ISI REQUIREMENTS AND BASIS FOR PROPOSED ALTERNATIVES, Basis for Proposed Alternatives / Relief from 10CFR50.55a and IWL Requirements, Section 4.2 System Hardware Condition History, states two conditions, "A number of wires were severely corroded and found to be no longer effective as pre-stressing elements," and "A unique combination of steel chemistry and high hardness led to the failure of anchor heads in both units of a two-unit plant. Several failures have occurred at random times over the past four decades."

Were any one of the conditions identified during the containment in-service inspection (CISI) activities? Have any of these conditions occurred at the Byron or Braidwood plant? If yes, describe in detail how the condition was identified and resolved.

Question Number: 61

Surveillance records indicate that some tendons in Byron and Braidwood have exceeded the free water limit of 0.2 liters as the licensee stated. For examples, Byron, Unit 1, had 0.5 liters of free water for tendon H27BA at Buttress A during the July 1986 surveillance, Unit 2 had 7.7 liters of free water for tendon H7FE at Buttress E, 6.6 liters of free water for tendon H2FF at Buttress F, and 6.1 liters of free water for tendon H3FE at Buttress E during the September 2019 surveillance. Braidwood, Unit 1, had 3.2 liters of free water for tendon H1AC at buttress C, and Unit 2, had 17.2 liters of free water for tendon H5FE at buttress F, during the July 1986 surveillance. Although all sample analyses have shown the free water to be alkaline or neutral with pH of 7 or greater and, therefore, noncorrosive, there is no guarantee that condition will always be the case in the future. The significant amount of free water found during the most recent September 2019 surveillance for Byron Unit 2 should be a concern. The licensee proposed a program to alleviate that concern of extending the surveillance interval from five years to ten years.
Page 69 of the Byron/Braidwood Technical Report states "Also, an augmented surveillance program of limited intermediate examinations to monitor free water19 conditions, as well as the condition of the dome coatings and dome drainage, will be initiated." Footnote 19 states "It has been reasonably assumed that water intruding into the lower hoop tendon ductwork is ground water. The validity of this assumption will be checked by a water chemist or other qualified professional. It is expected that this evaluation will be based on the quantitative analysis of a water sample collected at a tendon anchorage (see the following paragraphs) and a ground water sample collected at a location as specified by the chemist."

Provide an explanation of the augmented surveillance program to monitor the free water conditions, as well as the condition of the dome coatings and dome drainage. Footnote 19 states "this evaluation will be based on the quantitative analysis of a water sample collected at a tendon anchorage (see the following paragraphs)." However, there are no paragraphs in the text because that is the end of the chapter.

Provide the missing text as stated.

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