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Subject: [External_Sender] SSW Tendon AMP
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In response to the NRC staff request during the March 7, 2022 Oconee SLRA - Public Meeting, the following responses address the three questions:

NRC Question 1

Why is it appropriate to reduce the testing of the horizontal tendons from 3 tendons to 1 tendon?

Duke Energy Response 1

ONS will continue to perform lift-off testing on three horizontal tendons, as well as the previously described programmatic enhancement item of adding lift-off testing to one vertical and one diagonal tendon. A new program enhancement will be provided in a SLRA Supplement that will be submitted by no later than March 25, 2022. This new programmatic enhancement increases the number of tendons which undergo lift-off testing by 66% per inspection every other refueling outage.

NRC Question 2

Why is one tendon appropriate for each sample size (one horizontal, one vertical, and one diagonal) for lift-off testing?

Duke Energy Response 2

For the Subsequent Period of Extended Operation (SPEO), ONS will perform lift-off testing on three horizontal tendons, one diagonal tendon, and one vertical tendon every other refueling outage. Testing of these tendons represents a sample size of approximately 6% of the horizontal tendons, 13% of the vertical tendons, and 6% of the diagonal tendons.

As further insights, it is recognized that the Secondary Shield Wall Tendon Aging Management Program, though not under the purview of ASME Section XI, can be informed by section IWL-2500 which provides guidance on Tendon Selection Examination Requirements for Unbonded Post-Tensioning Systems. Table IWL-2521-1 provides guidance on the percentage of tendons to be tested after the 10th year of service as 2% of all tendons of each type. The above listed percentages representing each Secondary Shield Wall tendon group (horizontal, vertical, and diagonal) are greater than the ASME guidance of 2%.

In addition, Table IWL-2521-1 also provides a value for the minimum number of required tendons to be tested per subgroup after 10 years of service. These minimum numbers are provided for containment structures with very large number of unbonded tendons. The code guidance parallel does not extend to a structure like the Secondary Shield Wall with a significantly smaller number of tendons.

NRC Question 3

Provide technical justification for going from random tendons to common tendons for lift-off testing?

Duke Energy Response 3

The Secondary Shield Wall Tendon Aging Management Program's tendon lift-off testing methods have varied since the program's inception in the early 1980's. Some tendons have previously been shimmed post-testing to re-establish their tension and some tendons have previously discovered broken wires. Performing lift off testing, for the purpose of projecting tendon losses between testing intervals, cannot be best done randomly but rather requires informed decisions made by the responsible engineer. Consistently testing a tendon with all 90 wires that has not been shimmed (Optimal Case) will allow for data regression to project future losses and will best represent the aging effects of the tendon and, therefore the group. A common tendon will be controlled such that it will not be shimmed or de-tensioned to ensure it remains as a "control" for the population of tendons in the major grouping.

The common tendon concept would be to pull the same five tendons each time (common tendons). The geometry and layout of each tendon within their respective major tendon groups is nearly identical. All tendons were originally uniformly tensioned and there is no expected major difference between tendons within each major tendon group. There are also physical restrictions for accessing all of the secondary shield wall tendons. These interferences include cable trays, piping, structural steel, and other obstructions that prevent being able to place the hydraulic ram needed to perform the lift-off test. The common tendon approach will ensure collection of consistent data is obtained for trending of the prestressing losses.

In addition to the tendon testing and to complete the picture for the Secondary Shield Wall Tendon Aging Management Program, during the SPEO, ONS will add an additional visual inspections on both ends of five (5) randomly selected tendons during the alternate outages from the lift-off tendon testing. This program enhancement was provided by Duke Energy Letter dated February 14, 2022, Subsequent License Renewal Application Responses to NRC Request for Additional Information Set 2, RAI B4.1-1.