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NRC staff actions were taken in accordance with:

- The Memorandum of Understanding Between US NRC and Federal Energy Regulatory Commission (FERC) Regarding Treatment of Critical Energy/Electric Infrastructure Information found at: https://www.nrc.gov/reading-rm/doc-collections/memo-understanding/2024/index.html.
- The FERC definition of CEII found at: https://www.ferc.gov/ceii, and, https://www.ferc.gov/enforcement-legal/ceii/designation-incoming-dam-safety-documents.

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October 5, 2006

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Subject: Duke Power Company LLC d/b/a/ Duke Energy Carolinas, LLC
Oconee Nuclear Site, Units 1, 2, and 3
Docket Numbers 50-269, 50-270, and 50-287
Response to Preliminary White Finding

Reference: Oconee Nuclear Station - NRC Inspection Report
05000269/2006016, 05000270/2006016 and 05000287/2006016
Preliminary White Finding, dated August 31, 2006

Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke) received the referenced inspection report on August 31, 2006. The report identifies the performance deficiency as a failure to effectively control maintenance activities, and therefore assess and manage risk, associated with removing an access cover on the south wall of the Standby Shutdown Facility (SSF). The report further lists two apparent violations: (1) failure to provide adequate procedures to control maintenance activities that could affect safety related equipment, and (2) failure to assess and manage the increase in risk from external floods.

Duke believes that a performance deficiency did not exist as stated in the above referenced inspection report. Duke's investigation has revealed that the access cover on the SSF is located at a height which would not have subjected the SSF to an increase in risk from an external flood. Additionally, Duke believes that the results of the SDP Phase 3 evaluation, the conclusions of which are inappropriately based on qualitative factors resulting in a proposed White finding, should support a conclusion that the resulting safety significance was actually very low (Green). The Attachments to this letter provide details supporting these points.

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If you have any questions or require additional information, please contact Noel Clarkson, of Oconee Regulatory Compliance, at 864-882-1313

Very truly yours,

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NRC Inspection Report 05000269/2006016, 05000270/2006016 and 05000287/2006016, dated August 31, 2006, identified a preliminary white finding associated the failure to maintain control of a Standby Shutdown Facility (SSF) flood protection barrier. The performance deficiency was identified as a failure to effectively control maintenance activities, and therefore assess and manage risk, associated with removing an access cover on the south wall of the SSF.

Background

The SSF is designed to maintain the reactor in a safe shutdown condition for a period of 72 hours following 10CFR50 Appendix R, turbine building flood, sabotage and station blackout events. As stated in the Updated Final Safety Analysis Report (UFSAR), as a Probabilistic Risk Assessment (PRA) enhancement, the SSF is provided with a [redacted] external flood wall which is equipped with a water tight door near the south entrance of the SSF. Additionally, the UFSAR states that maximum expected water level, caused by a break of the non-seismic Condenser Circulating Water system piping, located in the Turbine Building, will be below the elevation of the grade level of the entrance to the SSF.

Flood walls were not part of the original SSF structure upon completion in the 1983 time frame. Flood walls were added to both the north and south entrances of the SSF in 1988 as a result of insights from an NSAC-60 relative to externally initiated flooding events. In 1983, an internal Duke study was completed which calculated a flood height of [redacted] above grade in the Oconee yard. This evaluation is referred to as a "best estimate" calculation because it assumed many inputs to be at their nominal values. The use of this "best estimate" method of evaluation is in accordance with EPRI PSA Applications Guide, EPRI TR-105396, and the ASME Standard for PRA. Both the north and south SSF flood walls were designed to this flood height ([redacted]), resulting in the construction of a [redacted] wall at the south end of the SSF, and a [redacted] wall at the north end of the SSF. A passage way, with a water tight flood door is installed in the [redacted] wall at the south end of the SSF. The affect of the flood wall on reducing the scope of Jocassee floods that can flood the SSF is reflected in the PRA model.

In 1992, Duke's hydro department conducted an inundation study of Duke dams in response to the Federal Energy Regulatory Commission (FERC) Emergency Action Plan Requirement. This evaluation used many conservative, worst case assumptions. The results of this study showed that flood heights in the Oconee yard could reach a level as high as [redacted] above grade. The PRA group investigated the differences between the FERC study results and the results from the original "best estimate" calculation. The FERC study used different computer models with many different input assumptions. A qualitative evaluation of the differences resulted in an engineering judgment that 80% of the Jocassee floods would not fail the SSF due to the flood wall. The percentage of the Jocassee floods that were assumed to overtop the wall and fail the SSF, was 20%.

Subsequent to the original construction of both flood walls, a variation notice (VN-6095) was created in March 1992 to make a 4½ inch x 7¼ inch opening for access purposes. The VN specified that the bottom of the access cover be located no lower than [redacted] above grade (mean sea level elevation 800 feet, 8½ inches). Documentation exists that supports the deliberate placement of the access opening at a height that would not impact the design function of the flood wall. Attachment 2 provides a graphical representation of the access cover and SSF flood walls.

From August 2003 until August 2005, temporary cables were routed through a 4½ inch x 7¼ inch access cover on the south wall of the SSF.

<u>Discussion</u>
The routing of cables through the access cover on the south wall of the SSF did not constitute a performance deficiency. The basis for this is:

- NRC Inspection Manual Chapter 0612 defines a Performance Deficiency as: An issue that is the result of a licensee not meeting a requirement or standard where the cause was reasonably within the licensee's ability to foresee and correct, and which should have been prevented.

- The best estimate calculation performed in 1983 established a worst case flood height of [redacted] above grade. The bottom of the 4½ inch x 7¼ access port opening is located at [redacted] above grade in the Oconee yard. A flood of this height ([redacted]) would not have entered the SSF.

- In 1999, the Maintenance Rule Expert Panel concluded that the SSF wall should be classified as being of low safety significance. This conclusion was based on the fact that the probability of a Jocassee flood is low, the probability of wall failure is negligible and the likelihood that a breach in the water tight doorway, which is the major opening, would be immediately recognizable. The focus of the evaluation was on the water tight door located at the south end of the SSF.

  Regulatory Guide 1.182 endorses the NUMARC 93-01 as an acceptable means of meeting the requirements of 10CFR50.65(a)(4). Section 11.3.3 of NUMARC 93-01 (Scope of Assessment for Power Operating Conditions) states that " *the (a)(4) assessment scope may be limited to the following scope of SSCs:*
  1) *Those SSCs included in the scope of the plant's level one, internal events PSA, and;*
  2) *SSCs in addition to the above that have been determined to be high safety significant (risk significant) through the process described in Section 9.3 of this document.*"

  Section 9.3 specifically deals with how to determine which SSCs are high safety significant. Since a failure of the SSF wall was not in the PRA and the wall was not considered high safety significant by the MR expert panel at that time, the wall is not required by the regulation to be included in the plant's (a)(4) risk assessment. Even if a failure of the wall were modeled, it would not meet the numerical criteria to be categorized as being of high safety significance.

- In October of 2005, using the knowledge that maintenance activities could potentially degrade the SSF wall (a passive civil feature), the Maintenance Rule Expert Panel chose to re-categorize the SSF wall as being of high safety significance. This is an example of the Maintenance Rule Expert Panel making a conservative categorization based on the recognition that our processes allowed the SSF wall to be breached for an extended period of time. Categorizing the SSF wall as high safety significant places it under the 10CFR50.65(a)(4) process that requires a risk assessment for planned maintenance. Duke believes that both the 1999 and 2005 decisions, by the Maintenance Rule Expert Panel, were proper given the state of knowledge at the time. The SSF wall was not identified as "risk important" during the time period which the cover was removed. 10CFR50.65(a)(4) only requires evaluation of risk important structures, systems or components. Consequently, risk was assessed and managed in accordance with the categorization in place at the time of the event.

A performance deficiency did not exist as Duke met the requirement for flood height determination, Duke controlled the SSF wall such that an opening was not created below the calculated flood height and risk was managed in accordance with 10CFR50.54(a)(4) using the knowledge available at the time.

The results reached by the Nuclear Regulatory Commission (NRC) Phase 3 risk analysis should have resulted in a finding of low safety significance. The basis for this is:

- The assumed distribution of floods above or below the wall is unchanged regardless of whether flood protection existed at [redacted] or at [redacted] above grade.
    - Given the qualitative nature of the evaluation which established the probability that the SSF flood wall would be ineffective, the estimated percentage of floods which would allow water to enter the SSF is unaffected by a change of a few inches in the height of the wall. From the flood studies that have been performed to date, it is obvious that flood levels are possible over a wide range. This wide range is dependent upon the initial conditions, the modeling assumptions, and the specific dam failure mechanisms. The process employed in estimating the fraction of floods that would exceed the flood wall height was a qualitative consideration of the factors that were inputs into estimating the flood level

in the studies performed. The original analysis that was conducted for the PRA was considered to have employed "best estimate" assumptions. Several cases were evaluated by varying the timing of the failure. The worst case of the "best estimate" analyses resulted in a flood height of [redacted] above grade. The evaluation is referred to as "best estimate" as the evaluation assumes many inputs to be at their nominal values (e.g., Keowee lake level and Jocassee lake level). The later FERC study used of a number of conservative assumptions and arrived at higher estimated flood levels.

- The Oconee PRA uses a value of 0.2 as the split fraction (or percentage) for floods resulting from a random failure of the Jocassee dam that produces a flood level greater than the height of the SSF wall. The NRC Phase 3 risk analysis modifies this split fraction based on the hole location at [redacted] above grade. If the split fraction were modified based on hole elevation relative to the wall height, as was done in the Phase 3 risk analysis, then there are several corrections that should be incorporated. Overall, these corrections yield lower risk results.

  The actual elevation of the bottom of the hole is [redacted] and the top of the north wall is at an elevation of [redacted] above grade. Using a linear interpolation, there is a "degradation" of [redacted] rather than the 22.5% value stated in the NRC Phase 3 analysis. The NRC Phase 3 calculation used a value of [redacted] in the denominator of this calculation. However, the SSF floor is actually 1 foot above grade which results in a value of "4" in the denominator of this calculation. Therefore, the first foot of the flood wall does not provide any additional flood protection.

  This recalculated degradation is also applied to the seismic calculation. The flood frequency used by NRC, 1.3E-05/yr, has been updated in the latest Duke model. Three dam failures in 222,080 dam-years result in an increased initiating event frequency of 1.4E-05/yr. The overall SSF failure probability is 0.17 per Duke's latest model.

  Finally, NRC analysis applies a 0.8 factor to the "seismic dam" case that should not be applied. This factor was included in the NRC analysis to account for the success of the SSF. However, the referenced cutset values already include the effects of SSF success and failure.

Making all of these changes and performing a recalculation using the same approach as in the NRC Phase 3 analysis, results in a change in risk (delta) of approximately 1.2E-06/yr. Approximately half the risk is due to random failures and half is due to seismic failures. The seismic experts who participated in Duke's internal Seismic PRA Assessment have stated that there are significant conservatisms in Duke's Jocassee dam fragility values. The following table demonstrates how the seismic CDF varies with improved fragility values.

Fragility	Delta CDF (seismic)
0.49 (base)	5E-07
0.55	3E-07
0.60	3E-07
0.65	1E-07
0.70	1E-07

The delta core damage frequency (CDF) from seismic events decreases from 5E-07 to 1E-07 depending on the fragility value used. As Duke has previously communicated, a contractor is currently performing this analysis and expects to complete the work by the end of the year. Therefore, if any significant conservatism exists in the seismic fragilities, then the seismic contribution of this risk will be significantly lower. Thus, the overall risk will be dominated by random failures and will be less than 1E-06.

- *Notwithstanding the discussion above, the use of quantitative analysis for a* Phase 3 evaluation of this type of issue is inappropriate. The NRC inspection report acknowledges that there are large uncertainties in the quantitative analysis.

    - The techniques applied in the external flood and seismic event analyses of the Oconee PRA were developed during or prior to the IPE and IPEEE submittals. The state of knowledge for these analyses (e.g., initiating event frequency estimation) is significantly more uncertain than that of the internal events analysis. The objectives were more closely aligned with those of the IPE and IPEEE, that is, the identification of severe accident vulnerabilities. The techniques applied to the external flood and seismic analyses were never intended to be able to resolve changes in CDF in the range of 1E-06. It is inappropriate to conclude from these models that a reduction of the effective height of the wall around the SSF of a few inches would increase the CDF by more than 1E-06.

- A qualitative assessment of this issue is more appropriate.

- Duke believes a fuller, more comprehensive, qualitative assessment, including the following points, would result in the conclusion that this issue is of very low risk significance. It is known that the probability of a flood itself is low, approximately in the low E-05 range. The bottom of the hole is at an elevation of [redacted] above grade, while the wall normally provides protection up to [redacted] above grade. Therefore, for the full spectrum of floods (from no flooding in the yard to those floods which exceed the wall by many feet) only those floods whose height that falls within a specific 3½ inch window will add any additional risk to ONS. Defense in depth is maintained for all but a very small fraction of potential floods. Given that this analysis is for a flood of billions of gallons of water spread out over miles of river channel, and knowing the large uncertainties and conservatisms that are part of the inputs, the loss of flood protection for a small 3 ½" window can qualitatively be categorized as of very low risk significance.

Conclusion

A performance deficiency did not exist regarding control of the access cover plate. The SSF wall breach was managed in accordance with 10CFR50.65(a)(4), and the predicted flood height would not have exceeded the lower level of the SSF wall breach. The risk analysis demonstrates that this issue is of very low safety significance (Green). This is based on the small window of opportunity (3½ inch) in which a flood would have to occur. Given the large uncertainty in the flooding analysis and this small window of opportunity, this should be categorized as being of very low risk significance.

[redacted]