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January 14, 2011

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

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Station (ONS), Units 1, 2 and 3
Renewed Facility Operating Licenses Numbers DPR-38, -47, -55;
Docket Number 50-269, 50-270 and 50-287;
Response to Request for Additional Information Regarding License Amendment Request to Relocate Specific Surveillance Frequency Requirements to a Licensee Controlled Program
License Amendment Request (LAR) No. 2009-10, Supplement 1

On March 17, 2010, Duke Energy Carolinas, LLC (Duke Energy) submitted a LAR requesting Nuclear Regulatory Commission (NRC) review and approval to relocate specific surveillance frequencies to a licensee-controlled program. The LAR adopts Technical Specification Task Force (TSTF)-425, Revision 3, and would modify ONS technical specifications by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04–10, "Risk-Informed Technical Specification Initiative 5B, Risk-Informed Method for Control of Surveillance Frequencies." The NRC electronically transmitted a Request for Addition Information (RAI) to Duke Energy on November 12, 2010. The Enclosure provides Duke Energy's response.

If there are any questions regarding this submittal, please contact Boyd Shingleton of the ONS Regulatory Compliance Group at (864) 885-4716.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 14, 2011.

Sincerely,

T P Gillespie

T. Preston Gillespie, Jr., Vice President
Oconee Nuclear Station

A001
NRR

Enclosure:

Duke Energy Response to NRC Request for Additional Information

Attachment:

Revised TABLE 2-1, Status of Identified Gaps to Capability Category II of the ASME PRA Standard Through Addenda RA-Sc-2007

cc w/Enclosure:

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ENCLOSURE

Duke Energy Response to NRC Request for Additional Information

Enclosure
Duke Energy Response to NRC Request for Additional Information

RAI 1

NEI 04-10 industry guidance document states in Step 12-A4 that the cumulative change for all surveillance test interval (STI) changes remains below 1E-05/yr core damage frequency (CDF) and 1E-06/yr large early release frequency (LERF). In addition, the total CDF must be reasonably shown to be less than 1E-04/yr and the total LERF must reasonably shown to be less than 1E-05/yr. Please explain how Oconee meets the associated NEI 04-10 guidance.

Duke Energy Response to RAI 1

The Oconee Probabilistic Risk Assessment (PRA) is a full scope PRA, including both internal and external events (i.e., external flood, seismic, fire, high winds [tornado]). In the current PRA model of record for Oconee, the total CDF is less than 1E-04/yr and the total LERF is less than 1E-05/yr.

Industry guidance document Nuclear Energy Institute (NEI) 04-10 discusses Regulatory Guide (RG) 1.174 guidelines in Steps 12-A3 and 12-A4. In Step 12-A3, the total CDF and LERF changes from the individual Surveillance Test Interval (STI) change being assessed are compared to RG 1.174 limits for CDF and LERF changes; namely, CDF increase < 1E-06/yr and LERF increase < 1E-07/yr. If the RG 1.174 limits for CDF and LERF changes are not met for any individual STI change, then either the process ends or a revised STI is considered for re-evaluation until the limits are met.

In Step 12-A4, the cumulative CDF and LERF changes from all of the individual STI changes are compared to the RG 1.174 limits for CDF and LERF changes and must be below 1E-05/yr for CDF and below 1E-06/yr for LERF. Additionally, the total CDF must be reasonably shown to be less than 1E-04/yr when using the 1E-05/yr ΔCDF criterion and the total LERF must be reasonably shown to be less than 1E-05/yr when using the 1E-06/yr ΔLERF criterion. If the RG 1.174 limits for CDF and LERF changes are not met, the process ends or a revised STI is considered for re-evaluation until the cumulative limits are met.

The Duke Energy plant program for control of surveillance frequency changes has been explicitly developed in accordance with the NEI 04-10 industry guidance document and contains the same requirements, RG 1.174 limits, and restrictions as set forth in NEI 04-10 regarding individual STI and cumulative STI changes. Should the Oconee model of record not meet required limits for total CDF and LERF, or should RG 1.174 limits, as stated in NEI 04-10, be exceeded for individual or cumulative STI changes, actions will be taken as noted above in accordance with NEI 04-10 guidance. Additionally, since the plant program for control of surveillance frequency changes is directly based on NEI 04-10, should any part of the process not meet a requirement of the NEI 04-10 methodology, action will be taken consistent with that described in NEI 04-10. In this manner, Oconee meets the associated NEI 04-10 guidance.

RAI 2

Table 2-1 of Attachment 2 identifies specific unresolved "gaps" of the Oconee Nuclear Station probabilistic risk assessment (PRA) internal events model to meeting the American Society of

Mechanical Engineers PRA standard Capability Category II supporting requirements. In the column labeled "Importance to 5b Application", the licensee asserts, for some specific supporting requirements which are not met at Capability Category II, that:

i) Certain gaps will be assessed on a case-by-case basis
ii) The gap has no or minimal impact on surveillance test exceptions.

Asserting that certain gaps are to be assessed on a case-by-case basis is inconsistent with Nuclear Energy Institute (NEI) 04-10, Revision 1, which specifically requires Capability Category II. Further, NEI 04-10, requires all gaps to Capability Category II to be accessed via sensitivity studies. This position was accepted by the staff in its safety evaluation of NEI 04-10 Revision 1. Therefore, notwithstanding the assertions in Table 2-1 regarding Capability Category I, each supporting requirement not meeting Capability Category II must be further evaluated by sensitivity studies when applying the internal events PRA model for this application.

With regard to item ii above, the gaps cannot be dispositioned a priori, since this would also conflict with NEI 04-10 which did not identify any supporting requirements that were not required for this application. Again, such gaps must be evaluated by sensitivity studies for each surveillance frequency change.

The licensee is therefore requested to confirm that their plant program for control of surveillance frequencies includes a requirement to assess all open gaps to Capability Category II of the standard via sensitivity studies for each application of the NEI 04-10 methodology, and does not rely upon any a priori assessment of the relevance of the supporting requirement.

Duke Energy Response to RAI 2

All open gaps to Capability Category II of the standard will be addressed via sensitivity studies for each application of the NEI 04-10 methodology, and will not rely upon any *a priori* assessment of the relevance of the supporting requirement. The Duke Energy plant program for control of surveillances has been revised to clarify the requirement to assess all open gaps to Capability Category II of the standard via sensitivity studies for each application of the NEI 04-10 methodology, and does not rely upon any a priori assessment of the relevance of the supporting requirement.

Table 2-1 has been revised to remove wording that indicated gaps will be assessed on a case-by-case basis or that gaps have no or minimal impact on the surveillance frequency change. The revised table is provided in the Attachment to this Enclosure.

RAI 3

Table 2-1, Attachment 2 of the McGuire and Catawba Surveillance Frequency Risk-Informed Change submittals identifies gap #14 as having initiating event supporting requirement deficiencies to the model. The Oconee submittal assumes these supporting requirements are Capability Category II by not being placed in Table 2-1. Since PRA models for all three plants are very similar, please confirm to the staff that initiating event supporting requirements for the Oconee PRA are Capability Category II and provide dispositions if they are not Capability Category II.

Duke Energy Response to RAI 3

Gap #14 from Table 2-1, Attachment 2 of the McGuire and Catawba Surveillance Frequency Risk-Informed Change submittals is not applicable to Oconee since the Oconee Initiating Events analysis has been revised to meet the ASME PRA Standard initiating event supporting requirements at the Capability Category II level.

ATTACHMENT

Revised Table 2-1

Status of Identified Gaps to Capability Category II
of the ASME PRA Standard
Through Addenda RA-Sc-2007

Revised Table 2-1
Status of Identified Gaps to Capability Category II
of the ASME PRA Standard
Through Addenda RA-Sc-2007

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #1	Accident sequence notebooks and system model notebooks should document the phenomenological conditions created by the accident sequence progression.	AS-B3	Open. Phenomenological effects are considered in the model, although these considerations are not always documented.	For each surveillance frequency change evaluation, any phenomenological conditions created by the accident sequence progression will be identified, included and documented in the analysis.
Gap #2	Revise the data calc. to group standby and operating component data. Group components by service condition to the extent supported by the data.	DA-B1	Open. Partitioning the failure rates represents a refinement to the data analysis process. Previously, generic data sources often did not provide standby and operating failure rates. NUREG/CR-6928 does provide more of this data, and will be used going forward.	Each surveillance frequency change evaluation will include sensitivity studies to consider the impact of grouping data into operating vs. standby failure rates and by service condition.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #3	Enhance the documentation to include a discussion of the specific checks performed on the Bayesian-updated data, as required by this SR.	DA-D4	Open. As part of the Bayesian update process, checks are performed to assure that the posterior distribution is reasonable given the prior distribution and plant experience. These checks need to be formally documented.	Each surveillance frequency change evaluation will verify that the Bayesian update process produces a reasonable posterior distribution. (See the example tests in DA-D4.)
Gap #4	Provide documentation of the comparison of the component boundaries assumed for the generic common cause failure (CCF) estimates to those assumed in the PRA to ensure that these boundaries are consistent.	DA-D6	Open. Generic CCF probabilities are considered for applicability to the plant. CCF probabilities are consistent with plant experience and component boundaries, although the CCF documentation needs to be enhanced to discuss component boundaries.	Each surveillance frequency change evaluation will ensure that CCF probabilities are consistent with component boundaries and plant experience.
Gap #5	Enhance the human reliability analysis (HRA) to consider the potential for calibration errors.	HR-A2	Open. Based on evaluations using the EPRI HRA calculator, calibration errors that result in failure of a single channel are expected to fall in the low 10^{-3} range. Relative to post-initiator HEPs, equipment random failure rates and maintenance unavailability, calibration HEPs are not expected to contribute significantly to overall equipment unavailability.	Each surveillance frequency change evaluation will identify and consider the impact that equipment calibration errors could have on the results and conclusions.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #6	Identify maintenance and calibration activities that could simultaneously affect equipment in either different trains of a redundant system or diverse systems.	HR-A3	Open. Based on evaluations using the EPRI HRA calculator, calibration errors that result in failure of multiple channels are expected to fall in the low 10^{-5} range (or smaller). Relative to post-initiator HEPs, latent human error probabilities, equipment random failure rates and maintenance unavailability, calibration HEPs and misalignment of multiple trains of equipment are not expected to contribute significantly to overall equipment unavailability.	Each surveillance frequency change evaluation will identify any work practices that could simultaneously affect equipment in either different trains of a redundant system or diverse systems.
Gap #7	Develop mean values for pre-initiator HEPs.	HR-D6	Open. Pre-initiator HEPs are generally set to relatively high screening values, which bound the mean values. Even so, pre-initiator HEPs are not significant contributors to risk.	Each surveillance frequency change evaluation will use mean values for pre-initiator HEPs.
Gap #8	Document in more detail the influence of performance shaping factors on execution human error probabilities.	HR-G3	Open. Performance shaping factors are accounted for in the development of human error probabilities, although detailed documentation is not always available for every HRA input.	Each surveillance frequency change evaluation will use HEP values that have been quantified with consideration of plant-specific and scenario-specific performance shaping factors.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #9	Enhance HRA documentation of the time available to complete actions.	HR-G4	Open. T/H analyses, simulator runs and operator interviews are used in developing the time available to complete operator actions. The time at which the cue to take action is received is specified in the HEP quantification. However, the HRA documentation needs to be enhanced to provide a traceable path to all analysis inputs.	Each surveillance frequency change evaluation will use HEP events with time available inputs based on plant-specific thermal/hydraulic analyses or simulations.
Gap #10	Document a review of the HFEs and their final HEPs relative to each other to confirm their reasonableness given the scenario context, plant history, procedures, operational practices, and experience.	HR-G6	Open. HFEs are reviewed by knowledgeable site personnel to assure high quality. However, this review needs to be better documented.	For each surveillance frequency change evaluation, post-initiator HEPs will be reviewed against each other to check their reasonableness given the scenario context, plant procedures, operating practices and experience.
Gap #11	Develop mean values for post-initiator HEPs.	HR-G9	Open. The use of mean values for HEPs instead of lower probability median values can affect the PRA results.	Each surveillance frequency change evaluation will use mean values for post-initiator HEPs.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #12	Develop more detailed documentation of operator cues, relevant performance shaping factors, and availability of sufficient manpower to perform the action.	HR-H2	Open. Operator recovery actions are credited only if they are feasible, as determined by the procedural guidance, cues, performance shaping factors and available manpower. As noted for HR-G3, -G4, and -G6 above, the documentation of these considerations needs to be enhanced.	Each surveillance frequency change evaluation will credit operator actions only if they are feasible, as determined by the procedural guidance, cues, performance shaping factors and available manpower.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #13	Various enhancements to the internal flood analysis: • Identify the release characteristic and capacity associated with each flood source. • Discuss flood mitigative features. • Address the potential for spray, jet impingement, and pipe whip failures. • Provide more analysis of flood propagation flowpaths. Address potential structural failure of doors or walls due to flooding loads and the potential for barrier unavailability. • Address potential indirect effects. • If additional human error failure events are required to support quantification of flood scenarios, perform HRA in accordance with the applicable HRA SRs. • For all human events in the internal flood scenarios, include scenario-specific impacts on the performance shaping factors identified in supporting requirement IF-E5a. • Enhance the documentation to address all of the SR details.	IF-B3 IF-C2c IF-C3 IF-C3b IF-E5 IF-E5a IF-E6b IF-F2	Open.	A plan and schedule are in place for addressing internal flood issues related to the PRA Standard for ONS. In the interim, for each surveillance frequency change, we will evaluate all SRs not meeting CCII with sensitivity studies and refer to the updated MNS flood analyses for insights.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #14	Explicitly model RCS depressurization for small LOCAs and perform the dependency analysis on the HEPs.	LE-C6	Open. This issue affects certain small LOCAs. However, since the small LOCA contribution to LERF is small, there is no significant impact on the PRA results.	Each surveillance frequency change evaluation will include a sensitivity study to assess the importance of explicitly modeling RCS depressurization for small LOCAs.
Gap #15	Various enhancements to the LERF documentation.	LE-G3 LE-G5 LE-G6	Open.	Each surveillance frequency change evaluation will document: • the relative contribution of contributors to LERF and any limitations in the LERF analysis that would impact the 5b evaluation • the use of the quantitative definition for *significant accident progression sequence* provided in the "Acronyms and Definitions" section of the PRA Standard.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #16	Perform and document a comparison of PRA results with similar plants and identify causes for significant differences. Identify the contributors to LERF and characterize the LERF uncertainties consistent with the applicable ASME Standard requirements.	LE-F3 QU-D3	Open. Comparisons performed for the Mitigating System Performance Index and other programs help identify causes for significant differences. However, to fully meet this SR, the model quantification documentation needs to be enhanced to provide a results comparison.	Each surveillance frequency change evaluation will perform and document a comparison of CDF and LERF results with those of similar plants.
Gap #17	Perform and document sensitivity analyses to determine the impact of the assumptions and sources of model uncertainty on the results.	LE-F2 LE-G4 QU-E4	Open. This is addressed with each Surveillance Test Interval assessment.	Each surveillance frequency change evaluation will include sensitivity analyses to determine the impact of the assumptions and sources of model uncertainty on the 5b analysis results.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #18	Expand the documentation of the PRA model results to address all required items.	QU-F2 QU-F6	Open. These SRs pertain to the model quantification documentation.	Each surveillance frequency change evaluation will document: • the model integration process, recovery analysis, and uncertainty and sensitivity analyses • the use of definitions for *significant basic event*, *significant cutset*, and *significant accident sequence* provided in the "Acronyms and Definitions" section of the PRA Standard.
Gap #19	Provide evidence that an acceptability review of the T/H analyses is performed.	SC-B5	Open. Oconee success criteria are consistent with those of sister plants included in the PWROG PSA database. However, to fully meet this SR, the success criteria documentation needs to be enhanced to include a results comparison.	Each surveillance frequency change evaluation will check and ensure the reasonableness and acceptability of the T/H analyses results used to support the success criteria.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #20	Expand the documentation of the success criteria development to address all required items.	SC-C1 SC-C2	Open. These SRs pertain to the success criteria documentation.	Each surveillance frequency change evaluation will ensure that: • success criteria are documented in a manner that facilitates the 5b application, model upgrades and peer review • the processes used to develop overall PRA success criteria and supporting engineering bases, including inputs, methods and results are documented.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #21	Enhance the system documentation to include an up-to-date system walkdown checklist and system engineer review for each system.	SY-A4	Open. To support system model development, walkdowns and plant personnel interviews were performed. However, documentation of an up-to-date system walkdown is not included with each system notebook.	Workplace procedure XSAA-115, *PRA Modeling Guidelines,* has been revised to require documentation of a system walkdown and system engineer interview. A plan and schedule for updating the system models with the revised guidance is in place. Until each system notebook is updated, the impact of this gap will be evaluated for each surveillance frequency change.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #22	Enhance the systems analysis documentation to discuss component boundaries.	SY-A8	Open. Basic event component boundaries utilized in the systems analysis are consistent with those in the data analysis. In addition, component boundaries are consistent with those defined in the generic failure rate source documents, such as NUREG/CR-6928. Dependencies among components, such as interlocks, are explicitly modeled, consistent with the PRA Modeling Guidelines workplace procedure. There is no evidence of a technical problem with component boundaries, just a need to improve the documentation.	Each surveillance frequency change evaluation will use definitions for SSC boundary, unavailability boundary, failure mode, and success criteria consistently across the systems and data analyses.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #23	Provide quantitative evaluations for screening.	SY-A14	Open. There is no evidence of a technical problem associated with the screening of components or component failure modes, just a need to document a quantitative screening. It is expected that conversion to a more quantitative approach would not change decisions about whether or not to exclude components or failure modes. A review of our qualitative screening process confirms this expectation. For example, transfer failure events for motor-operated valves (MOVs) with 24 hr exposure times may not be modeled unless probabilistically significant with respect to logically equivalent basic events. For Oconee, the MOV transfers failure probability is less than 1% of the MOV fails to open on demand probability. In cases like this, not including the relatively low probability failure mode in the PRA model does not have an appreciable impact on the results.	For each surveillance frequency change, the component and failure mode screening performed in the systems analysis will be verified to meet the quantitative requirements provided in SY-A14.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #24	Per Duke's PRA modeling guidelines, ensure that a walkdown/system engineer interview checklist is included in each system notebook. Based on the results of the system walkdown, summarize in the system write-up any possible spatial dependencies or environmental hazards that may impact multiple systems or redundant components in the same system.	SY-B8	Open. As noted for SY-A4, walkdowns (which look for spatial and environmental hazards) have been performed, although up-to-date walkdown documentation is not included with each system notebook.	The impact of this gap will be evaluated for each surveillance frequency change. See Gap #21.
Gap #25	Document a consideration of potential SSC failures due to adverse environmental conditions.	SY-B15	Open. The impact of adverse environmental conditions on SSC reliability is considered but is not always documented. However, there is no evidence of a technical problem associated with components that may be required to operate in conditions beyond their environmental qualification, just a need to improve the documentation.	For each surveillance frequency change, potential SSC failures due to adverse environmental conditions will be identified, included and documented in the analysis.

Title	Description of Gap	Applicable SRs	Current Status / Comment	Importance to 5b Application
Gap #26	Enhance system model documentation to comply with all ASME PRA Standard requirements.	SY-C2	Open. This SR pertains to the systems analysis documentation.	Workplace procedure XSAA-115, *PRA Modeling Guidelines*, has been revised to provide guidance on meeting the Standard's supporting requirements. A plan and schedule for updating the system models with the revised guidance is in place. Until each system notebook is updated, the impact of this gap will be evaluated for each surveillance frequency change.