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November 16, 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
Proposed License Amendment Request to Revise the Updated Final Safety Analysis Report (UFSAR) Related to Auxiliary Building Sprinkler Systems Seismic Evaluation; License Amendment Request No. 2006-10

Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke) hereby submits a license amendment request (LAR) for the Oconee Nuclear Station Renewed Facility Operating License (FOL) pursuant to 10 CFR 50.90. Duke proposes to amend its commitments for Auxiliary Building Water Level (Flood) and revise the Updated Final Safety Analysis Report (UFSAR) to describe the flood protection measures for the Auxiliary Building. A markup of the UFSAR revision is enclosed as Attachment 1, which will be submitted per 10CFR50.71(e) subsequent to NRC approval of this change.

Proposed changes from the current licensing basis for auxiliary building flooding were discussed with the NRC in a meeting on October 5, 2004. Subsequent to the meeting a realistic seismic analysis of the Auxiliary Building sprinkler piping systems (two sprinkler systems in unit 1 and one each in units 2 and 3) has been completed which demonstrates that these non-seismic self-actuating sprinkler systems will not fail during a Maximum Hypothetical Earthquake (MHE). This LAR requests NRC approval of the evaluation because its use in establishing design basis or in the safety analyses would result in a departure from a method of evaluation described in the UFSAR. The approach is consistent with that approved by the NRC for use in demonstrating the pressure boundary integrity of non-seismic piping systems as part of leakage control system (LCS) and alternative source term (AST) submittals for boiling water reactor (BWR) stations. NRC approval of Duke's realistic seismic evaluation will permit elimination of the Auxiliary Building sprinkler systems from consideration as a source of flooding.

As a result of the walkdowns by the Seismic Review Team (SRT), which were part of the seismic evaluation, minor modifications are being tracked by the corrective action program. No commitments are being made as a result of this change. Duke requests approval of this LAR by

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September 1, 2007 and that the amendment become effective upon issuance, with implementation following completion of modifications.

In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, these proposed changes to the license basis have been reviewed and approved by the Plant Operations Review Committee and Nuclear Safety Review Board. Additionally, a copy of this license amendment request is being sent to the State of South Carolina in accordance with 10 CFR 50.91 requirements.

Inquiries on this proposed amendment request should be directed to Reené Gambrell of the Oconee Regulatory Compliance Group at (864) 885-3364.

Sincerely,

Bruce Hamilton

B. H. Hamilton, Vice President
Oconee Nuclear Site

Enclosures:

1. Notarized Affidavit
2. Evaluation of Proposed Change

Attachments:

1. Updated Final Safety Analysis Report – Mark Up

bc w/enclosures and attachments:

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AFFIDAVIT

B. H. Hamilton, being duly sworn, states that he is Vice President, Oconee Nuclear Site, Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this revision to the Renewed Facility Operating License Nos. DPR-38, DPR-47, and DPR-55; and that all statements and matters set forth herein are true and correct to the best of his knowledge.

Bruce Hamilton

B. H. Hamilton, Vice President
Oconee Nuclear Site

Subscribed and sworn to before me this 16 day of November, 2006

Sheila A Smith
Notary Public

My Commission Expires:

6-12-2013
Date

SEAL

ENCLOSURE 1

NOTARIZED AFFIDAVIT

ENCLOSURE 2

EVALUATION OF PROPOSED CHANGE

Subject: License Amendment Request to Revise the Updated Final Safety Analysis Report (UFSAR) Related to Auxiliary Building Sprinkler Systems Seismic Evaluation

1.0 DESCRIPTION

This request proposes to clarify the current licensing basis and revise the Updated Final Safety Analysis Report (UFSAR) as appropriate to describe the flood protection measures for the Auxiliary Building. Changes from the current licensing basis were discussed with the NRC in a meeting on October 5, 2004 (see NRC accession Nos. ML042920363 and ML042930203). Subsequent to that meeting a realistic seismic analysis of the Auxiliary Building sprinkler piping systems (two sprinkler systems in unit 1 and one each in units 2 and 3) has been completed. The analysis demonstrates that, on completion of the minor modifications, which are being tracked by the corrective action program, these non-seismic self-actuating sprinkler systems will not fail during a Maximum Hypothetical Earthquake (MHE) and can be eliminated from consideration as a source of flooding in the Auxiliary Building. Duke requests NRC approval of the seismic evaluation.

2.0 PROPOSED CHANGE

This change proposes to revise the UFSAR as described below.

UFSAR Section, 3.4.1.1.1, Current Flood Protection Measures for the Turbine and Auxiliary Buildings

UFSAR Section 3.4.1.1.1 is being revised to reflect the following:

> The Auxiliary Building could be subject to flooding from a single break in any one of three non-seismic sources: the high pressure service water system (source for fire protection), the non-seismic portions of the low pressure service water system (service for ventilation cooling water), and the plant drinking water system. The high pressure service water unit 1, 2, and 3 hatch and unit 1 drumming station sprinkler systems are not considered flood sources based on the results of realistic seismic analyses that demonstrate the pipes and supports will not fail during a seismic event. The remaining portions of the non-seismic high pressure service water system, the non-seismic portions of the low pressure service water system and the plant drinking water system are isolated or flow limited to allow operators sufficient time to identify and isolate the source. Operator actions are directed by abnormal operating procedures. Operator response times were tested to ensure flood mitigation can occur before safety related equipment is adversely affected. Flooding by these sources will be detected through the procedural response to a seismic event or high level alarm sensors (non-seismic) in the auxiliary building sumps.

3.0 BACKGROUND

Oconee's current licensing basis for Auxiliary Building flooding was established by Duke's October 24, 1972, response to an Atomic Energy Commission (AEC) letter dated September 26, 1972. The AEC letter requested that Oconee perform the following:

> "Review Oconee Nuclear Station Units 1, 2, and 3 to determine whether the failure of any non-category I (seismic) equipment, particularly in the circulating water system and fire protection, could result in a condition, such as flooding or the release of chemicals, that might potentially adversely affect the performance of safety-related equipment required for safe shutdown of the facilities or to limit the consequences of an accident. The integrity of the barriers to protect critical equipment from potentially damaging conditions should be assumed only when the barrier has been specifically designed for such conditions. If your review determines that safety-related equipment could be adversely affected, provide your plans and schedules for corrective action."

Oconee responded on October 24, 1972, as follows with regard to the Auxiliary Building:

> "...The Auxiliary Building could be subject to flooding from two sources: the fire protection system and the ventilation cooling water system. The fire protection system does not constitute a threat due to the fact that the headers inside the auxiliary building will be empty and dry except when manually energized to fight a fire. The possibility of flooding from the ventilation cooling water system is reduced by flow limiting valves installed in all non-category I supply lines entering the auxiliary building larger than 3" in diameter. The maximum flow which can flood the building from a single rupture is 1140 gpm. Without taking credit for auxiliary building sump pumps, over 10 minutes is available for corrective action before safety-related equipment would be affected. Flooding by this source will be detected by high level alarm sensors in the auxiliary building sumps and necessary action taken by the operator to isolate the line rupture."

The AEC accepted Duke's response as noted in Section 7.1.8 of the Units 2 and 3 Safety Evaluation Report (SER) dated July 6, 1973.

This License Amendment Request (LAR) provides clarification of Duke's commitment for flood protection measures for the Auxiliary Building in a revision of the UFSAR and proposes to change the licensing commitment to exclude the unit 1, 2, and 3 hatch and unit 1 drumming station sprinkler systems as possible/credible Auxiliary Building flood sources based on the results of realistic seismic analysis. This piping was evaluated for the Oconee MHE using linear elastic response spectrum dynamic analysis and realistic acceptance criteria. The approach is consistent with that approved by the NRC for use in demonstrating the pressure boundary integrity of non-qualified piping systems as part of leakage control system (LCS) and alternative source term (AST) submittals for boiling water reactor (BWR) stations.

4.0 TECHNICAL ANALYSIS

4.1 Summary of the Evaluation

A seismic verification was performed of the Oconee Units 1, 2 and 3 Auxiliary Building sprinkler system piping and pipe supports. The seismic verification of the piping was performed to ensure that it does not become an Auxiliary Building flooding source as a result of an MHE at Oconee. The piping is not safety related and not required to function during or after an earthquake.

The acceptance criteria used were consistent with the approach used to demonstrate pressure boundary integrity of non-seismic piping systems as part of LCS and AST submittals for BWR stations (References 1 and 2). Engineers familiar with seismic analysis and verification techniques performed a seismic verification walkdown of the sprinkler system piping to identify potential seismic vulnerabilities. The piping was then analyzed for the Oconee MHE earthquake using linear elastic response spectrum dynamic analysis and realistic damping factors and acceptance criteria consistent with References 1 and 2. Pipe supports were analyzed for the reaction loads using linear elastic analysis.

The sprinkler system piping is not safety related and was not designed to plant piping seismic design basis requirements. The seismic verification review included a walkdown evaluation and analytical review of the piping and supports. The intent of the walkdown was to identify specific design conditions that might be associated with poor piping and/or component seismic performance. The walkdown was focused toward identification of the following:

- Piping, pipe support and equipment seismic vulnerabilities, such as excessive span, heavy unsupported components, non-ductile piping or support material, high localized stresses, severe corrosion, and poor anchorage.

- Seismic interaction caused by failure and falling or by displacement and proximity impact.

- Differential displacement and anchor displacement of structures, equipment and piping.
- Seismic verification of boundary components.
- Valve attributes

The results of the walkdown and analytical review are that the evaluated Auxiliary Building piping systems and supports are seismically adequate provided minor modifications are installed to limit piping displacements in selected locations. These modifications are being tracked by the corrective action program. The modified piping systems will have sufficient seismic margin to maintain pressure integrity during and following a MHE seismic event.

4.2 Realistic Seismic Analysis Details

The Oconee sprinkler piping is not safety related and, therefore, is not subject to the Oconee piping licensing basis seismic requirements. The analysis criteria used are intended to provide a more realistic yet conservative assessment of the likelihood of piping failure due to the MHE than is possible with the licensing basis seismic criteria. The methods used in the analysis are similar to those used to demonstrate pressure boundary integrity of non-seismic piping systems as part of the LCS and AST submittals for BWR stations (References 1 and 2).

The seismic input was determined using current licensing basis 5% damped in-structure response spectra curves. The piping was analyzed to the three directions of earthquake motion acting simultaneously. Seismic modal responses are combined by Square-Root-Sum-of-the-Squares (SRSS) and seismic directional responses are combined by SRSS. Modes are calculated out to 33 Hz with missing mass correction applied for participation mass above 33 Hz. The piping was evaluated using the AutoPIPE computer program, Version 6.20.09.

Piping analysis was performed using ANSI B31.1 code requirements (Reference 6) and the B31.1 Equation 12 allowable stress limit equivalent to the ASME III Level D stress limit of 3.0 S_h (material allowable stress at maximum operating temperature, as listed in B31.1). The maximum design pressure was 150 psig, and the design temperature was 100°F. A stress intensification factor of 2.3 was applied where threaded fittings were located. Since threaded fittings are also not considered ductile, K_μ (inelastic energy absorption factor) was taken as 1.0. The piping material and welded fittings (for pipe 2 ½" and larger in diameter) are black carbon steel Schedule 40 wall thickness and conservatively assumed for analysis as ASTM A53 material with S_h allowable of allowable of 12 ksi.

The threaded fittings (for pipe 2" and smaller in diameter) are specified on the drawings to be 150# malleable iron. This was assumed to be ASTM A47 material based on a review of ASME B31.1-2001, Table 126.1. The allowable stress value was set equal to the lowest value obtained from the criteria in appendix P, Table P-1 of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, 2004, based on Section 102.3.1 (C) of the B31.1 Code. The allowable stress from Table P-1 is equal to 2/3 of the minimum yield strength or 1/5 of the minimum tensile strength whichever is lower. Since the fittings are castings, the allowable stress was also multiplied by a casting quality factor of .8 per Section 102.4.6 of ASME B31.1-2001. ASTM A47 material has a minimum tensile strength of 50 ksi and minimum yield strength of 32.5 ksi. Therefore, the allowable stress for the threaded fittings (S_h) was set equal to 8 ksi. This allowable stress governs the analysis and was conservatively used for all piping 2" and smaller in the model.

4.3 Piping Analysis Criteria

The unit 1, 2, and 3 hatch and the drumming sprinkler pipe systems are evaluated using linear elastic response spectrum dynamic analysis. All four sprinkler systems were modeled. Seismic input is based on the plant MHE using 5% damping and SRSS modal combination. Piping analysis is performed using ANSI B31.1 code requirements (Reference 6) and using a B31.1 Equation 12 allowable stress limit equivalent to the ASME III Level D stress limit of $3S_h$ (material allowable stress at maximum operating temperature, as listed in B31.1), but not exceeding $2S_y$.

Piping moments are computed for deadweight and seismic loading. The moments are evaluated using the following equation:

$$\frac{P_N D_O}{2t_n} + \frac{0.75i}{Z}\left(M_A + K_\mu M_B\right) \leq 3S_h, 2S_y$$

Where i = stress intensification factor from Appendix D to ASME B31.1
P_N = normal operating pressure
D_O = pipe outside diameter
t_n = pipe nominal thickness
Z = pipe section modulus
M_A = resultant moment due to weight and other sustained loads
K_μ = inelastic energy absorption factor
M_B = resultant moment due to seismic loads (inertia loads and seismic anchor movement loads are combined by SRSS)
S_h = basic material allowable stress at temperature (from ASME B31.1)

S_y = material yield stress at temperature

A stress intensity factor of 2.3 was applied for threaded fittings. Since threaded joints are not considered ductile, K_μ was taken as 1.0.

4.4 Basis for Piping Analysis Criteria

The Oconee sprinkler piping is not safety related and, therefore, is not subject to the Oconee piping licensing basis seismic requirements. The realistic analysis criteria specified herein are intended to provide a more realistic yet still conservative assessment of the likelihood of piping failure due to the Oconee MHE than is possible with the licensing basis criteria. The key attributes of the realistic criteria are the use of 5% damping for the piping and the use of the lesser of $3S_h$ or $2S_y$ as the stress intensity limit. Other aspects of the realistic analysis are consistent with the Oconee licensing basis criteria.

The combination of seismic demand based on a linear elastic analysis using the 5% damped Oconee licensing basis response spectra and capacity based on a maximum stress intensity of $3S_h$, not exceeding $2S_y$, is a realistic yet conservative criterion for assessing the capability of the sprinkler piping to maintain pressure integrity during the MHE. This is consistent with criteria employed for evaluating seismic capability of non-safety piping in BWR power plants of similar vintage to Oconee in alternative source term leakage pathway evaluations. As discussed in Reference 7, "limiting the range of applied stress to less than $2S_y$ will ensure no significant membrane stress rupture will occur and accumulated cyclic damage will be elastic. In addition, given the limited number of strong motion cycles during a design-basis SSE [Oconee MHE] event, only elastic cycling below the $2S_y$ limit will occur." This ensures that "a fatigue failure from a postulated MHE event will not occur."

Experience from previous earthquakes demonstrates that piping systems have performed well even if not designed and constructed to nuclear power plant (or any other) seismic criteria. This has been extensively documented in Volume 2 of Reference 12, Appendix D of Reference 1, Reference 13, Reference 14, and Volume 2 of Reference 5.

In addition, several analytical studies that compare piping analysis results to the observed piping performance in actual earthquakes and shake table tests contain information relevant to the Oconee realistic analysis criteria.

In Reference 8, four piping systems varying in pipe size from 1.5-inch to 12-inch, from the El Centro Steam Plant, were analyzed for the effects of the 1979 Imperial Valley Earthquake. None of the four systems showed any damage or loss of functional capability following the earthquake. The input to the analyses was in-structure response spectra generated from ground motion recordings at the site. Two methods of analysis were used: (1) "standard" analysis (broadened floor response spectra, 2% piping damping); and (2) "best estimate" analysis (no peak broadening, 5% piping damping).

Piping stresses were calculated using the following equation:

$$s = \frac{PD_O}{2t} + \frac{.75i(M_A + M_B)}{Z}$$

The piping stress results for the best estimate analyses are shown below.

El Centro Steam Plant Piping Results				
Line No.	Size (in)	$3S_h$ (ksi)	Best Estimate Stress (ksi)	Demand/ Capacity Ratio
110 SD	8	45	36	0.8
106 SJA	2	45	77	1.7
106 SJA	8-12	45	40	0.9
116 SJA	1.5-2	45	34	0.75
102 SH	6-8	45	40	0.9

The best estimate analyses used the same criteria as the Oconee realistic analysis (i.e., 5% damping, $3S_h$ stress intensity limit). The non-Oconee lines analyzed (see above) are close to or over the stress intensity limit. The '106 SJA' 2-inch branch line has calculated stresses of 1.7 times the limit, yet no earthquake effect observed. This indicates that use of 5% damping and $3S_h$ stress intensity limit yields conservative results.

The investigators in Reference 8 were able to determine benchmark displacements in the field for small bore line 116 SJA. The displacements computed for the best estimate case (5% damping) were much higher than the observed displacements. Reanalysis for 10% damping still produced displacements about twice the observed displacements.

This result is consistent with the results reported in References 10 and 11. In Reference 10, elastic analysis predictions of moment and displacement in a piping system using different damping values were compared to the moment and displacement recorded during a shake table test. Predictions based on 5% damping were significantly greater than recorded values in every case. Reference 11 reported damping observed in high level shake table tests of five piping systems exceeded 5% in every case.

Reference 15 (the results of which were used in Reference 1) reports the results of analyses of 10 piping systems from two facilities that experienced strong-motion earthquakes: El Centro Steam Plant (7 analyses) and California Federal Service Center (3 analyses). The systems analyzed included small and large bore piping; threaded, socket welded and butt welded joints; and a variety of supports including rod hangers, U-bolts, rigid stops and snubbers. Only one of the lines, designated CF1, failed in the earthquake. This line is a fire protection line with threaded joints. Failure was caused by excessive deflection of the main header and restraint of the branch risers.

The analyses used in-structure response spectra computed using earthquake records from the site and building models prepared by others. The El Centro building model was from Reference 9. The Cal Fed building model was from the building upgrade project carried out following the earthquake. Standard response spectrum analysis techniques were used, and 5% damping was assumed for the piping. Initial analyses used envelope spectra for all support points. If the high stress location was at a lower elevation, the analysis was rerun with the lower elevation spectra to obtain a more realistic result.

Piping stresses were computed as:

$$s = \frac{PD_0}{2t} + \frac{.75i(M_A + M_B)}{Z}$$

The results are presented below:

El Centro Steam Plant and California Federal Service Center Results				
Line	Joint Types	Size Range (in)	Max. Stress (ksi)	Performance
CF1	Threaded	1-6	200	Damaged
CF2	Threaded	1-4	45	Not Damaged
CF3	Threaded	1-4	122	Not Damaged
EC1	Threaded	¾	120	Not Damaged
EC2	Socket weld	¾	110	Not Damaged
EC3	Socket weld	¾-1.5	52	Not Damaged
EC4	Threaded	1	52	Not Damaged
EC5	Socket/butt weld	6-8	53	Not Damaged
EC6	Butt weld	2.5-12	173	Not Damaged
EC7	Butt weld	12-18	22	Not Damaged

The lines of interest in the table above are the five lines with threaded connections. The CF lines are normal fire protection lines, and the fittings would be of malleable iron. The EC lines were not fire protection lines. ECI was stainless steel, primarily socket welded, with a threaded connection at a pump. EC4 was a schedule 160 branch line off the 12-inch boiler feedwater line. This branch would not have malleable iron fittings, and the stresses were low due to U-bolt restraints on the line.

Line CFl has very high computed stresses (about 8 times the $3S_h$ stress intensity limit of 24 ksi for malleable iron), and it failed during the earthquake. The lines CF2 and CF3 had stresses roughly 2 times and 3.5 times the $3S_h$ stress intensity limit. These lines were not damaged during the earthquake. Lines EC1 and EC4 had stresses of 2.7 and 1.2 times the $3S_h$ stress intensity limit for stainless and carbon steel, respectively. The results indicate that the Oconee realistic criteria are conservative.

Finally, Reference 16 reported the results of shake table tests of a piping assembly with a threaded fitting. The testing consisted of triaxial seismic tests of four 2-inch diameter, carbon steel piping specimens, each 8 feet long with attached weights at mid-span, supported at the ends with pipe straps, and pressurized to 100 psi. In the center of the span was a malleable iron threaded coupling. The specified input was a broad banded, 5% damped required SSE response spectrum of 15g from 4.5 to 16 Hz and 7g ZPA. The specimens were subjected to five OBEs prior to the final SSE test. The test response spectrum exceeded the required response spectrum in each case. In all four specimens, the piping retained pressure integrity throughout the test, and no damage of any kind was observed.

A comparative piping analysis has been performed for the test configuration. The analysis used as input the required response spectrum for the test, and 5% damping for the piping. Modes and directions were combined by SRSS. Stresses were computed as:

$$S = \frac{PD_0}{2t} + \frac{.75i(M_A + M_B)}{Z}$$

The maximum computed stress was 37 ksi at the threaded fitting. This is 1.5 times the $3S_h$ stress intensity limit of 24 ksi for malleable iron. This indicates that the Oconee realistic analysis criteria are conservative.

The studies summarized above correlate seismic analyses, using the same realistic criteria as applied to the Oconee sprinkler systems, to actual earthquake performance and to shake table testing. In each case, the realistic piping analysis results exceeded the stress intensity limit of the criteria. This shows that the analysis criteria, while more realistic than the Oconee licensing basis criteria for safety related piping systems, still provides a margin of safety against failure.

4.5 Pipe Support Analysis Criteria

The pipe supports were evaluated using linear elastic analysis. Analysis methods are consistent with the SQUG Generic Implementation Procedure, (GIP) (Reference 3). The seismic response was determined using the SRSS of the components from the three directions of earthquake motion as applicable. Concrete expansion anchors and welded connections were evaluated using allowable stresses from Appendix C of the GIP. Allowable stresses for structural members are determined (per Reference 2, Section C.6.5) in accordance with AISC Part 2 (Reference 4). Normal allowable stresses for structural members are increased by 1.7 for seismic loads. Load capacities for U-bolts are taken from Section 4.0 of Reference 5. Capacities equal to 1.67 times the rated value were used for standard pipe support components loaded in tension, bending or shear. Supports with short rod hangers are evaluated for fatigue using criteria in Section 8.3.5 of the GIP (Reference 2). Minimum concrete strength was conservatively taken as 3000 psi. In accordance with Section 4.4.3 of the GIP, seismic demand for the support evaluation was taken as the support reaction loads from the piping analysis times a factor of conservatism of 1.25. The results of the analysis show that the Oconee Auxiliary Building sprinkler pipe supports meet the analysis criteria.

4.6 Conclusion

The unit 1, 2 and 3 hatch and unit 1 drumming system piping in the Auxiliary Building has been evaluated using a realistic seismic methodology. The results of analysis indicate that, upon completion of the minor modifications, which are being tracked by the corrective action program, this piping will not break during a seismic event and therefore need not be considered a source of flooding in the Auxiliary Building.

5.0 REGULATORY SAFETY ANALYSIS

5.1 <u>No Significant Hazards Consideration</u>

Pursuant to 10 CFR 50.91, Duke has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1) Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. This License Amendment Request (LAR) proposes the use of a realistic seismic evaluation of the Auxiliary Building sprinkler system (high pressure service water) piping which demonstrates that these non-Category I (non-seismic) self-actuating sprinkler systems will not fail during a Maximum Hypothetical Earthquake (MHE) and clarifies Duke's commitment toward Auxiliary Building flood protection measures in the Updated Final Safety Analysis Report (UFSAR). The proposed change does not affect any Chapter 15 accident analyses. Operation in accordance with the amendment authorizing this change would not involve any accident initiation sequences or change the consequences of any accident analyzed. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2) Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   No. This LAR proposes the use of a realistic seismic evaluation of the Auxiliary Building sprinkler system (high pressure service water) piping which demonstrates that these non-Category I (non-seismic) self-actuating sprinkler systems will not fail during a MHE and clarifies Duke's commitment toward Auxiliary Building flood protection measures in the UFSAR. Operation in accordance with this proposed amendment will not result in a change in the parameters governing plant operation and will not generate any new accident initiators. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3) Does the proposed change involve a significant reduction in a margin of safety?

   No. This LAR proposes the use of a realistic seismic evaluation of the Auxiliary Building sprinkler system (high pressure service water) piping, which demonstrates that these non-Category I (non-seismic) self-actuating sprinkler systems will not fail during a MHE and clarifies Duke's commitment toward Auxiliary Building flood protection measures in the UFSAR. Operation in accordance with this proposed amendment will not result in a change in the parameters governing plant operation and will not affect any Chapter 15 accident analyses. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Duke concludes that this proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

Following NRC approval of the analysis which shows the Auxiliary Building sprinkler systems will not fail catastrophically during an MHE and the completion of modifications, Duke's revised UFSAR commitments for flood protection measures in the Auxiliary Building will meet the intent of the AEC's request dated September 26, 1972.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. General Electric Nuclear Energy, "BWROG Report for Increasing MSIV Leakage Rate Limits and Elimination of Leakage Control Systems," NEDC 31858P, Rev. 2, September 1993.

2. U.S. Nuclear Regulatory Commission Safety Evaluation of GE Topical Report NEDC-31858, Revision 2, "BWROG Report for Increasing MSIV Leakage Rate Limits and Elimination of Leakage Control Systems," March 3, 1999.

3. Seismic Qualification Utility Group (SQUG), "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment," Revision 2 Corrected February 14, 1992.

4. American Institute of Steel Construction (AISC), "Manual of Steel Construction," Eighth Edition, 1978.

5. Baughman, P.D., et al., "Experience-Based Seismic Verification Guidelines for Piping Systems, Experience-Based Seismic Verification Guidelines for Piping Systems," Volume 1 (Seismic Review Procedure) and Volume 2, "Performance of Piping Systems in Strong-Motion Earthquakes," EPRl 1012023, June 2005.

6. ASME B31.1-2001, "Power Piping, ASME Code for Pressure Piping, B31" 2001.

7. NRC Safety Evaluation approving the Alternative Source Term, Amendment No. 223 to Facility Operating License No. DPR-28, Docket No. 50-271 for Vermont Yankee Nuclear Power Station, dated March 29, 2005.

8. EQE Inc., "An Evaluation of the Performance of Piping Systems in Past Strong Motion Earthquakes," prepared for KWU, October 1983.

9. Murray, R.C., et al., "Equipment Response at the El Centro Steam Plant During the October 15, 1979 Imperial Valley Earthquake," NUREG/CR-1665, October 1980.

10. Tagart, S., et al., "Piping and Fitting Dynamic Reliability Program," Seminar on Piping Seismic Research Results, EPRI, October 1989.

11. Namita, Y., et al., "Seismic Proving Test of Eroded Piping," SMiRT 17, August 2003.

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13. EQE International, "Supplemental Earthquake Performance Data," prepared for General Electric Nuclear Energy, submitted to USNRC for Hatch Unit 2 LCS License Amendment, December 1993.

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15. Campbell, R.D., et al., "Response Predictions for Piping Systems Which Have Experienced Strong Motion Earthquakes," PVP-Volume 210-1, ASME 1991.

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ATTACHMENT 1

UPDATED FINAL SAFETY ANALYSIS REPORT MARK-UP

UFSAR Revision

A. Insert the following statement at the location shown on the red-marked copy of UFSAR Section 3.4.1.1.1:

The Auxiliary Building could be subject to flooding from a single break in any one of three non-seismic sources: the high pressure service water system (source for fire protection), the non-seismic portions of the low pressure service water system (the ventilation cooling water), and the plant drinking water system. The high pressure service water unit 1, 2, and 3 hatch and unit 1 drumming station sprinkler systems are not considered flood sources based on the results of realistic seismic analyses that demonstrate the pipes and supports will not fail during a seismic event. The remaining portions of the non-seismic high pressure service water system, the non-seismic portions of the low pressure service water system and the plant drinking water system are isolated or flow limited to allow operators sufficient time to identify and isolate the source. Operator actions are directed by abnormal operating procedures. Operator response times were tested to ensure flood mitigation can occur before safety related equipment is adversely affected. Flooding by these sources will be detected through the procedural response to a seismic event or high level alarm sensors (non-seismic) in the auxiliary building sumps.

A push button in each control room provides capability to close the Condenser Circulating Water (CCW) pump discharge valves to protect against CCW siphoning into the turbine building basement. This flood mitigation station modification has been installed pursuant to the recommendations made in the Oconee Probabilistic Risk Assessment Study.

It is desirable to allow a limited amount of backflow from the CCW discharge through the condensate coolers during a flood to provide suction for Low Pressure Service Water (LPSW) pumps and the Standby Shutdown Facility Auxiliary Service Water (SSF ASW) pump. Temperature control valves 2CCW-84 and 3CCW-84 have had their air supplies disconnected and clamps have been installed on the ~~valves, effectively failing them in the open position (See Figure 9-9).~~

Insert for UFSAR Section 3.4.1.1.1

~~3.4.1.1.2 Flood Protection Measures Inside Containment~~

The primary means for detecting leakage in the Reactor Building is the level indication for the normal sump. This indication has a range of 0-to-30 inches, with a statalarm occurring at 15 inches increasing level and a computer alarm at approximately 22 inches. These alarms would alert the operators in the control room such that appropriate actions could be taken. In addition to the alarms, sump level is input to the plant computer and is logged to the alarm log. Level is also recorded on a trend recorder in each control room. Safety related redundant level transmitters with a range of 3 inches to 24 inches are also provided in the normal sump. Both transmitter levels are indicated in the control room on receiver gauges and one train is recorded. Thus, the operators have several methods for monitoring changes in sump level.

The sump fill rate is routinely measured to determine leakage rate. The sump capacity is 15 gallons per inch of height and each graduation on the indicator level indicates 1.5 gallons of leakage into the sump. A 1 gal/min leak would therefore be detectable within less than 10 minutes.

In addition to the normal sump level, indication of the emergency sump level is also provided by redundant safety related systems with a range of 0 to 3 feet. Both trains of instrumentation are indicated on receiver gauges in the control room and one train is recorded. This indication can be used in conjunction with the normal sump level indication to detect abnormal leakage in the Reactor Building. Two additional trains of containment level transmitters are installed in each Reactor Building to provide wide range level indication and recording with a range of 0 to 15 feet.

The normal sump is routinely pumped to the miscellaneous waste holdup tanks whenever the alarm point (15 inches) is reached. Pumping of the sump water is started manually, but terminates automatically when the sump level has dropped to 6 inches (which clears the statalarm). Each time the sump is pumped, it is recorded in the Unit Reactor Operator's Log Book. During pumping, a decreasing sump level indication and/or increasing miscellaneous waste holdup tank level indication can be used to verify flow from the normal sump. The flow rate from the sump can be determined using the rate of change in sump level.

In order to provide periodic monitoring of sump levels, the recording of normal and emergency sump levels is done daily. Daily monitoring of level indications is useful in confirming that level instrumentation are operable, while verifying the sump pumps are operable and maintaining the sump level at or below the alarm point. Calibration of the normal and emergency sump indications is performed during refueling.

In the event of increased leakage to the Reactor Building, sampling may be performed to determine the origin of the leakage (e.g., LPSW, feedwater, component cooling, or RC system).

Leakage from the LPSW system in containment can also be detected by the monitoring of other parameters. For example, the inlet and outlet LPSW flows for each Reactor Building Cooling Unit (RBCU) are monitored for any differences which could be indicative of a cooler leak. If a flow difference