January 7, 2008

Mr. Robert J. Duncan II
Vice President
Carolina Power & Light Company
P.O. Box 165, Mail Zone 1
New Hill, NC 27562

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1, LICENSE RENEWAL APPLICATION

Dear Mr. Duncan:

By letter dated November 14, 2006, Carolina Power & Light Company submitted an application pursuant to 10 CFR Part 54, to renew the operating license for Shearon Harris Nuclear Power Plant, Unit 1, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

These requests for additional information were discussed with Roger Stewart, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-3137 or e-mail MLH5@nrc.gov.

Sincerely,

/RA/

Maurice Heath, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure:
Requests for Additional Information

cc w/encl: See next page

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Maurice Heath, Project Manager
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DATE	12/27/07	12/28/07	01/07/08

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Letter to R. Duncan From M. Heath Dated January 7, 2008

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1, LICENSE RENEWAL APPLICATION

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Shearon Harris Nuclear Power Plant, Unit 1

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SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION (RAI)

RAI 3.2-1: The staff has the following questions in regard to using the Water Chemistry Control Program and/or the One-Time Inspection Program to manage aging effects in the emergency safety feature components.

A. Provide your basis for referencing generic aging lessons learned (GALL) Volume 2 aging management review (AMR) Item V.A-27 in lieu of AMR Item V.C-4 for stainless steel containment isolation piping and component that are exposed to treated water, as referenced in Table 3.2.2-1 of the license renewal application (LRA). In particular, provide your basis for why a One-Time Inspection Program should not be coupled to the Water Chemistry Program to manage loss of material due crevice corrosion and pitting corrosion in these components, as in recommended in AMR Item V.C-4 of the GALL Report, Volume 2.

B. Provide your basis for crediting a One-Time Inspection Program alone to manage loss of material due to pitting and crevice corrosion for emergency safety feature tank items referencing LRA Item 3.2.1-7. Also, provide why the Water Chemistry Program is also not credited for these tanks, particularly when Carolina Power and Light Company (CP&L) is relying on plant-specific chemistry procedures to sample and test the water inventory in these tanks.

C. Provide your basis why those Type 2 Table AMRs in LRA 3.2.2-1 and the AMR discussion in LRA Section 3.2.2.2.8.2 for steel containment isolation piping, piping components, and piping elements referencing LRA AMR Item 3.2.1-15 have not been aligned to GALL AMR Item V.C-6. Specifically provide your basis why your further evaluation basis for these AMRs have not credited both the One-Time Inspection Program and the Water Chemistry Program to manage loss of material due to general, pitting, and crevice corrosion in the surfaces of the containment isolation piping, piping components, and piping elements that are exposed to a treated water environment.

RAI 3.2-2: Provide your basis for concluding the emergency safety feature systems do not include stainless steel components that are exposed to or subject to internal condensation (as stated in discussion columns of LRA Item 3.2.1-8).

RAI 3.4-1: Provide your basis why a one-time examination is adequate to manage loss of material for the following piping, piping components, and piping elements in lieu of a inspection-based program that credits periodic inspections of the components:

- those in the steam generator chemical addition system whose inside surfaces are exposed to a treated water (inside) environment.

RAI 3.4-2: The LRA credits the External Surfaces Monitoring Program to manage cracking and changes in material properties for the following elastomeric components:

- piping, piping components, and piping elements in the main steam system whose outside surfaces are exposed to an air - indoor (outside) environment.

ENCLOSURE

- piping, piping components, and piping elements in the feedwater system whose outside surfaces are exposed to an air - indoor (outside) environment.

The "parameters monitored" program element in GALL aging management program (AMP) XI.M36, "External Surfaces Monitoring," does not mention that the program monitors for cracking or changes in material properties of elastomeric components. The GALL program only calls for simple visual examinations (VT-2 or VT-3) of the external surfaces of piping to look for leakage, loss of material due to corrosion, signs of corrosion in insulation materials, or degraded coatings. The visual examinations cannot be credited for cracking unless they are specified as enhanced VT-1 visual techniques. Nor can these visual examinations directly monitor for changes in the material properties of the elastomers. Some sort of analysis would have to be performed to define those material properties that could be affected by the air - indoor (outside) environment and an inspection method would need to be credited that is related back to the appropriate material property analysis and is capable of detecting and sizing a flaw or crack in the elastomeric materials prior to a component failure.

A. For these elastomeric components, identify all material properties that may be impacted by the exposure to the air indoor (outside) environment. Clarify whether an applicable material property analysis has been performed to demonstrate how these components will behave in the air - indoor (outside) environment through the period of extended operation and how the inspections credited in the External Surfaces Monitoring Program will be sufficient to manage applicable aging effects prior to a component failure, after taking into account the limiting material property or properties of the elastomeric materials. If an applicable material property analysis has not been performed to date, provide your basis why the inspections credited under the External Surfaces Monitoring Program are considered to be capable of managing aging (e.g., cracking or loss of material) and the changes in the impacted material properties without tying the inspection techniques to an applicable material property analysis for the properties that may be impacted during period of extended operation.

B. Justify how the External Surfaces Monitoring Program can be credited to manage cracking in these elastomeric components without crediting at least an enhanced VT-1 visual examination of elastomeric materials.

RAI 3.4-3: The LRA credits the External Surfaces Monitoring Program to manage cracking and changes in material properties for the following thermoplastic (including polyvinyl chloride) components:

- those in the main steam system whose outside surfaces are exposed to a radiation (ultraviolet, outside) environment.

- those in the secondary sampling system whose outside surfaces are exposed to a radiation (ultraviolet, outside) environment.

The "parameters monitored" program element in GALL AMP XI.M36, "External Surfaces Monitoring," does not mention that the program monitors for cracking or changes in material properties of thermoplastic components. The GALL program only calls for simple visual examinations (VT-2 or VT-3) of the external surfaces of piping to look for leakage, loss of

material due to corrosion, signs of corrosion in insulation materials, or degraded coatings. The visual examinations cannot be credited for cracking unless they are specified as enhanced VT-1 visual techniques. Nor can these visual examinations directly monitor for changes in the material properties of the thermoplastic materials. Some sort of analysis would have to be performed to define those material properties that could be affected by the radiation (ultraviolet) (outside) environment and an inspection method would need to be credited that is related back to the appropriate material property analysis and is capable of detecting and sizing a flaw or crack in the thermoplastic materials prior to a component failure.

A. For these thermoplastic components, identify all material properties that may be impacted by the exposure to the radiation (ultraviolet) (outside) environment. Clarify whether an applicable material property analysis has been performed to demonstrate how these components will behave in the radiation (ultraviolet) (outside) environment through the period of extended operation and how the inspections credited in the External Surfaces Monitoring Program will be sufficient to manage applicable aging effects prior to a component failure, after taking into account the limiting material property or properties of the thermoplastic materials. If an applicable material property analysis have not been performed to date, provide your basis why the inspections credited under the External Surfaces Monitoring Program are considered to be capable of managing aging (e.g., cracking or loss of material) and the changes in the impacted material properties without tying the inspection techniques to an applicable material property analysis for the properties that may be impacted during period of extended operation.

B. Justify how the External Surfaces Monitoring Program can be credited to manage cracking in these thermoplastic components without crediting at least an enhanced VT-1 visual examination of the thermoplastic materials.

RAI 3.4-4: LRA Table 3.4.2-3 includes an AMR (annotated by Footnote F on LRA page 3.4-44) on exposure of thermoplastic piping, piping components, and piping elements in the main steam line to an oil or organic hydraulic fluid (inside) environment. In this AMR, CP&L concludes that there are not any aging effects requiring management. In his Textbook *Fundamental Principles of Polymeric Materials* (Copyright 1993, John Smiley and Sons), Dr. Stephen L. Rosen (Ph.D) discusses the principle of "like dissolves like" and identifies that polar solvents will dissolve polar polymeric materials and non-polar solvents will dissolve non-polar polymeric materials. Clarify what type of thermoplastic materials are used to define the commodity group in this AMR and what type of oils and hydraulic fluids are used to define the environmental conditions for this AMR. Clarify whether these thermoplastic materials are considered to be polar or non-polar polymeric materials and whether the oils and hydraullic fluids are considered to be polar or non-polar solvents. Consistent with these responses, provide your basis on whether or not loss of material from dissolving is considered to be an aging effect requiring management for the surfaces of the thermoplastic piping, piping components, and piping elements that are exposed to the oil or hydraulic fluid (inside) environment.

RAI 3.4-5: LRA Table 3.4.2-3 includes an AMR (annotated by Footnote J on LRA page 3.4-44) on exposure of elastomeric piping, piping components, and piping elements in the main steam line to an oil or organic hydraulic fluid (inside) environment. In this AMR, CP&L concludes that there are not any aging effects requiring management.

A. Clarify what type of elastomeric materials are used to define the commodity group in this AMR and what type of oils and hydraulic fluids are used to define the environmental conditions for this AMR. Clarify whether these elastomeric materials are considered to be polar or non-polar polymeric materials and whether the oils and hydraullic fluids are considered to be polar or non-polar solvents. Consistent with these responses, provide your basis on whether or not loss of material from dissolving is considered to be an aging effect requiring management for the surfaces of the elastomeric piping, piping components, and piping elements that are exposed to the oil or hydraulic fluid (inside) environment.

B. The "parameters monitored" program element in GALL AMP XI.M32, "One-Time Inspection," does not mention that the program monitors changes in material properties of elastomeric components. Define all material properties that may be impacted in the elastomeric materials under exposure to the oil or hydraulic fluid environment and whether an appropriate materials property analysis has been performed to define how the material properties will change and the elastomeric components will behave during the period of extended operation. If such an analysis has been performed, provide your basis why the One-Time Inspection Program is considered to be a valid program to manage the changes in material properties of the elastomeric piping, piping components, and piping elements, after taking into account the limiting material property or properties for the elastomeric materials. If an applicable material property analysis has not been performed to date, provide your basis why the One-Time Inspection Program is considered to be capable of managing the changes in the impacted material properties without defining an appropriate inspection technique that ties the inspection method back to an applicable material property analysis for the properties that may be impacted during period of extended operation. (RAI 3.4-5 is continue on next page)

C. Justify how the One-Time Inspection Program can be credited to manage cracking in these elastomeric components without crediting at least an enhanced VT-1 visual examination of the elastomeric materials.

RAI 3.4-6: LRA Table 3.4.2-6 includes an AMR (annotated by Footnote F on LRA page 3.4-54) on exposure of nickel-based alloy piping, piping components, and piping elements in the feedwater system under exposure to a treated water (inside) environment. In this AMR, CP&L identified that cracking due to thermal fatigue is an applicable aging effect requiring management (AERM) and credited the time-limited aging analysis (TLAA) on metal fatigue to manage this aging effect. CP&L's TLAA on metal fatigue, as discussed and evaluated in Section 4.3 of the LRA, is predicated on preventing the initiation of a fatigue induced flaw, and thus cannot be used to manage a fatigue-induced flaw that is already postulated on already exists in the stated piping components. In addition, industry experience has demonstrated that nickel-based alloy materials in pressurized-water reactor designs are susceptible crack initiation and growth by stress corrosion cracking (SCC).

A. For the stated AMR on LRA page 3.4-54, clarify whether the AMR has postulated the occurrence of a fatigue-induced crack of the applicable nickel-based alloy piping, piping components, or piping elements or whether Shearon Harris Nuclear Power Plant (HNP) has relevant operating experience regarding fatigue-initiated cracking in the nickel-alloy piping components of the feedwater system. If so, justify the basis for crediting the

TLAA on metal fatigue as the basis for managing fatigue induced cracking in these components.

B. Clarify whether cracking from SCC is an applicable AERM for these nickel-alloy piping components, and if so, whether fatigue-induced flaw growth of an SCC-initiated crack is an aging effect requiring management during the period of extended operation. If so, justify the basis for crediting the TLAA on metal fatigue as the basis for managing fatigue-induced crack growth of an SCC-initiated crack in these components.

RAI 3.4-7: LRA Table 3.4.2-6 includes an AMR (annotated with Footnote J on LRA page 3.4-53) on elastomeric piping, piping components, and piping elements that are exposed to an air/gas (dry) (inside) environment. CP&L has used conformance with the guidelines of NEI Document No. NEI-95-10, Revision 6, as a basis for concluding that there are not any applicable aging effects for these elastomeric piping components. Conformance with the industry guidance in NEI 95-10, Revision 6, does not necessarily provide an sufficient technical basis to conclude that aging effects are not applicable to these elastomeric feedwater system components because this is not consistent with guidance in the GALL Report, Volume 2. In particular, GALL Report, Volume 2, Table IX.F, "Selected Definitions and Use of Terms for Describing and Standardizing AGING MECHANISMS," identifies that the following degradation mechanisms may be applicable to elastomeric materials, including rubbers: (1) cracking, (2) crazing, (3) fatigue breakdown, (4) abrasion, (5) chemical attacks, (6) weathering, and (&) elastomeric hardening. The staff is of the opinion that some of the aging effects identified in GALL Table IX.F for "elastomeric degradation" may be applicable to these elastomerics, particular if the dry air/gas environments are subject to a varied temperature range. Provide your basis for not crediting at least a One-Time Inspection to confirm that the aging effects for "elastomer degradation" in GALL Table IX.F are not applicable to these elastomeric piping components.

RAI 3.4-8: LRA Table 3.4.2-10 and Table 3.4.2-11 each include two AMRs (annotated with Footnote F on LRA page 3.4-67) on thermoplastic components in the condensate storage tank and in the secondary sampling system that are exposed to treated water (inside) and air/gas (wetted) (outside) environments. In these AMRs, CP&L does not identify any aging effects requiring management for the component/material/environment combinations and does not credit any AMPs for aging management. GALL Report, Volume 2, Table IX.F, "Selected Definitions and Use of Terms for Describing and Standardizing AGING MECHANISMS," identifies that thermoplastic materials may be subject to thermal degradation and/or thermoxidative degradation aging effects/mechanisms, including: (1) increased tensile strengths/hardening due to cross-linking, (2) loss of flexibility, (3) chain depolymeration, (4) crystallization, (5) decomposition/chemical reaction. The staff is of the opinion that some of the aging effects identified in GALL Table IX.F for "elastomeric degradation" may be applicable to these thermoplastic materials, particular if the environments are subject to a varied temperature range. Provide your basis for not crediting at least a One-Time Inspection on the inside and outside surfaces of the thermoplastic components in condensate storage tank and secondary sampling systems to confirm that the aging effects referenced in GALL Table IX.F for thermoplastic materials are not applicable to them.

RAI 3.4-9: The LRA aligns a number of Type 2 AMR items for steel steam generator system components, as provided in LRA Table 3.1.2-6, and an number of Type 2 AMR items for steel auxilliary system components, as provided in the LRA Tables designated as 3.3.2-X, to steam and power conversion system AMR Item 3.4.1-04 in the LRA, and has credited the One-Time Inspection Program and the Water Chemistry Program to manage loss of material due to general, pitting, and crevice corrosion in these components. Provide your basis for aligning these Type 2 steam generator system and auxiliary system AMR Items to LRA AMR Item 3.4.1-04, which is a steam and power conversion system AMR item. Justify why it is acceptable to credit to the One-Time Inspection Program and the Water Chemistry program to manage loss of material due to general, pitting, and crevice in these components in lieu of crediting an AMP that implements periodic inspections of the components.

RAI 3.4-10: The staff has additional questions on why steel extraction steam system components have not been aligned to AMR Item 2 in the GALL Report, Volume 1, and whether there are any steel heat exchangers in the steam and power conversion system that align to AMR Item 3 in the GALL Report, Volume 1, Table 4.

A. LRA AMR Item 3.4.1-2 states that AMR Item 2 in Table 4 of the GALL Report, Volume 1, is not applicable to the HNP extraction steam system because the system is not within the scope of license renewal. Table VIII.C of the GALL Report, Volume 2, identifies that the extraction steam systems is a steam and power conversion system that may be within the scope of license renewal and recommends that the components in this system be subject to an AMR. Provide your basis why the extraction steam system is not within the scope of license renewal and why the extraction steam piping, piping components, and piping elements made from steel materials (i.e., carbon steel, low-alloy steel, or cast iron materials) would not be subject to the loss of material effect discussed in AMR Item 2 of GALL Report Volume 2, Table 4.

B. LRA AMR Item 3.4.1-3 states that AMR Item 3 in Table 4 of the GALL Report, Volume 1, which pertains to loss of material due to general pitting, and crevice corrosion in steel heat exchanger components in the condensate system and the steam generator blowdown system, is not applicable to HNP because the portions of these systems that are within the scope of license renewal do not include heat exchanger components. Clarify whether the condensate or steam generator blowdown systems included any steel heat exchangers that are within the scope of license renewal under the specific scoping criteria of 10 CFR 54.4(a)(2), and if so, to provide a basis why these heat exchangers would not be within the scope of AMR Item 3 in the GALL Report, Volume 1.

RAI 3.4-11: The LRA has aligned a number of the AMR items on cracking due stress corrosion cracking of stainless steel auxiliary system components, as provided in the Type 2 LRA Tables designated as 3.3.2-X (X being an integer defined in the LRA) to LRA AMR Item 3.4.1-14 and has credited the One-Time Inspection Program and the Water Chemistry Program to manage cracking due to stress corrosion cracking in these components. Provide your basis for aligning these Type 2 auxiliary system AMR items to LRA AMR Item 3.4.1-4, which is a steam and power conversion system AMR item, and justify why it is acceptable to credit to the One-Time Inspection Program and the Water Chemistry program to manage cracking due to stress

corrosion cracking of stainless steel auxiliary system components in lieu of crediting an AMP that implements periodic inspections of the components.

RAI 3.4-12: The LRA has aligned the Type 2 AMR item on loss of material due to general, pitting, and crevice corrosion for the copper alloy piping, piping components, and piping elements in the boron thermal regeneration and demineralized water systems (i.e., auxiliary system components) to LRA AMR Item 3.4.1-15, which is a steam and power conversion system AMR. The Type 2 AMRs on loss of material due to general, pitting, and crevice corrosion in the stainless steel piping, piping components, and piping elements in the demineralized water, radiation monitoring, radwaste sampling, and refueling systems (i.e., auxiliary system components), and the stainless steel steam generator instrument manifolds and valves and miscellaneous stainless steel non-pressure boundary components in the steam generator system to LRA AMR Item 3.4.1-16. The LRA credits the One-Time Inspection Program and the Water Chemistry Program to manage loss of material in these auxiliary system and steam generator system components. Provide your basis for aligning the Type 2 AMR items on loss of material of the copper alloy piping components in the boron thermal regeneration and demineralized water systems to LRA AMR 3.4-1-15, and the stainless steel piping components in the radiation monitoring, radwaste sampling, and refueling systems, and the stainless steel steam generator instrument manifolds and valves and miscellaneous stainless steel non-pressure boundary components in the steam generator system to LRA AMR Item 3.4.1-16. Provide your basis why it is acceptable for the applicant to credit the One-Time Inspection Program and the Water Chemistry Program to manage loss of material due to general, pitting, or crevice corrosion in these components in lieu of performing periodic inspections of the components.