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December 10, 2008

10CFR52.79

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

**SHEARON HARRIS NUCLEAR POWER PLANT, UNITS 2 AND 3
DOCKET NOS. 52-022 AND 52-023
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 035 RELATED TO
OFFSITE POWER SYSTEM**

Reference: Letter from Tanya Simms (NRC) to James Scarola (PEC), dated October 24, 2008,
"Request for Additional Information Letter No. 035 Related to SRP Section 08.02
for the Harris Units 2 and 3 Combined License Application"

Ladies and Gentlemen:

Progress Energy Carolinas, Inc. (PEC) hereby submits our response to the Nuclear Regulatory Commission's (NRC) request for additional information provided in the referenced letter.

A response to each NRC request is addressed in the enclosure. The enclosure also identifies changes that will be made in a future revision of the Shearon Harris Nuclear Power Plant Units 2 and 3 application.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (919) 546-6107.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 10, 2008.

Sincerely,

A handwritten signature in black ink, appearing to read "Garry D. Miller".

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosure

cc : U.S. NRC Director, Office of New Reactors/NRLPO
U.S. NRC Office of Nuclear Reactor Regulation/NRLPO
U.S. NRC Region II, Regional Administrator
U.S. NRC Resident Inspector, SHNPP Unit 1
Mr. Manny Comar, U.S. NRC Project Manager

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MFO

**Shearon Harris Nuclear Power Plant Units 2 and 3
Response to NRC Request for Additional Information Letter No. 035 Related to
SRP Section 08.02 for the Combined License Application, dated October 24, 2008**

<u>NRC RAI #</u>	<u>Progress Energy RAI #</u>	<u>Progress Energy Response</u>
08.02-5	H-0255	Response enclosed – see following pages
08.02-6	H-0256	Response enclosed – see following pages
08.02-7	H-0257	Response enclosed – see following pages
08.02-8	H-0258	Response enclosed – see following pages
08.02-9	H-0259	Response enclosed – see following pages
08.02-10	H-0260	Response enclosed – see following pages
08.02-11	H-0261	Response enclosed – see following pages

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-5

Text of NRC RAI:

RAI - SRP 8.2- EEB-08

Section 8.2.1.2.1 of the applicant's FSAR states in part that "[t]ransformer protection consists of two different high speed schemes." Describe the high speed transformer protection schemes provided for HAR.

PGN RAI ID #: H-0255

PGN Response to NRC RAI:

The HAR switchyards do not include any additional transformers - they are part of the AP1000 standard plant and their protection is addressed in the DCD (see Figures 8.2-201 and 8.2-202). This sentence will be deleted from the FSAR.

Associated HAR COL Application Revisions:

The following change will be made to the HAR FSAR in a future amendment:

Delete the second sentence in the first paragraph on page 8.2-8 (Subsection 8.2.1.2.1).
"Transformer protection consists of two different high speed schemes."

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-6

Text of NRC RAI:

RAI - SRP 8.2- EEB-9

Section 8.2-1 of the applicant's FSAR states that, "Both the HAR 2 and HAR 3 switchyards have multiple off-site power sources from the transmission network ... The off-site sources have sufficient capacity and capability to support start-up, normal running, generator / turbine trip, and normal shutdown for HAR 2 and HAR 3." Not included in the list of functions is power used during abnormal operation or accident conditions. Standard Review Plan (SRP, NUREG-0800) Section 8.2 states that "[t]he offsite power system is referred to in industry standards and regulatory guides as the 'preferred power system.'" The NRC staff believes that offsite power system should be the preferred source of power for HAR Units 2 and 3, and that it should have sufficient capacity and capability to power safety in order to satisfy the requirements of 10 C.F.R. Part 50, Appendix A, General Design Criterion (GDC) 17. Please clarify the above statement to comply with the SRP, or demonstrate compliance with GDC 17.

PGN RAI ID #: H-0256

PGN Response to NRC RAI:

It is recognized extensively throughout the FSER (NUREG-1793) that there is no requirement for functionality of the offsite power to accomplish safe shutdown of the AP1000. Section 8.2.3.2 of the NRC FSER for the AP1000 addresses the AP1000 partial exemption from GDC 17 and states "The AP1000 design does not rely on power from the offsite system to accomplish safety functions, and therefore, the underlying purpose of the rule is met without the need for two independent offsite circuits."

The transmission lines and switchyards are designed so that the full output of the units can be carried out to the network and the capacity is more than sufficient for any incoming power requirements for normal and abnormal conditions. The AP 1000 passive plant design does not require an off-site source for accident conditions.

Associated HAR COL Application Revisions:

The following changes will be made to the HAR FSAR in a future amendment:

1. The second sentence in the sixth paragraph on page 8.2-2 (Subsection 8.2.1) from:

The off-site sources have sufficient capacity and capability to support start-up, normal running, generator / turbine trip, and normal shutdown for HAR 2 and HAR 3.

To read:

The off-site sources have sufficient capacity and capability to support normal and abnormal conditions for HAR 2 and HAR 3. The AP 1000 passive plant design does not require an off-site source for accident conditions.

2. The third sentence in the second paragraph on page 8.2-4 (Subsection 8.2.1.1.3) from:

Each of the unit's transmission lines has sufficient capacity and capability from the transmission network to power the HAR house loads under normal running, normal shut down, turbine trip event, cooldown and normal starting.

To read:

Each of the unit's transmission lines has sufficient capacity and capability from the transmission network to power the HAR house loads under normal and abnormal conditions. The AP 1000 passive plant design does not require an off-site source for accident conditions.

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-7

Text of NRC RAI:

RAI - SRP 8.2- EEB-10

Section 8.2-1 of the applicant's FSAR states that "[t]he HAR 2 and HAR 3 related transmission structures and support structures and systems are designed to withstand standard loading conditions for the HAR site as provided in DCD Section 8.2." Please provide the standard loading conditions that these structures and systems are designed to withstand.

PGN RAI ID #: H-0257

PGN Response to NRC RAI:

The transmission structures and support structures and systems are designed to withstand the standard loading conditions provided in ANSI C2-1997, National Electric Safety Code per DCD Reference Section 8.2.6, item 1.

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-8

Text of NRC RAI:

RAI-SRP 8.2-EEB-11

Per the application's FSAR in Section 8.2.1, HAR Unit 2 and the existing Shearon Harris Nuclear Power Plant (HNP) share a switchyard. Please provide the following additional information:

- a) What is the worst sustained undervoltage condition in the onsite distribution system at HAR Unit 2 that was found to occur with a severely degraded 230kV offsite system, simultaneous with a concurrent loss-of-coolant accident on HNP and unit trip on HAR Unit 2.
- b) Describe how the requirements of General Design Criterion 5 of 10 C.F.R. Part 50, Appendix A are satisfied with respect to the common switchyard for HNP and HAR 2.
- c) Will there be any impact on HAR 2 as a result of minimum, maximum or degraded common switchyard voltage? Please provide details.

PGN RAI ID #: H-0258

PGN Response to NRC RAI:

- a) A scenario consisting of 1) a "severely degraded 230 kV offsite system" and 2) a LOCA on existing Harris Unit 1 and 3) a trip on Harris Unit 2 which all occur simultaneously is not considered to be a credible scenario. This was not analyzed by PEC. PEC did analyze trips of Harris 2 with and without Harris Unit 1 being on line. For these cases, adequate switchyard voltage was maintained.
- b) The common switchyard should not be viewed as a finite resource that would in some way have to be "split" between two nuclear units. Instead, the additional local generation provided by Harris Unit 2 will provide improved voltage support at this location. During a trip of one unit, the other unit would be a local resource, responding to maintain the switchyard voltage. If one unit was already shutdown (in an outage for example), the auxiliary load of the shutdown unit would not adversely impact the ability of the transmission system/switchyard to provide adequate voltage for a trip on the other unit.
- c) There will be no adverse impact on either Harris Unit 1 or Unit 2 as a result of having a common switchyard. The transmission system has been designed to maintain adequate voltage to the Harris Unit 1 & 2 switchyard with 1) both units on line, 2) both units off line and 3) either unit shutdown. This design includes maintaining the switchyard voltage above 95 % of the nominal 230 kV. Under normal operating conditions the switchyard voltage would typically be in the range of 100-102 % of nominal (230 to 235 kV).

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-9

Text of NRC RAI:

RAI-SRP 8.2-EEB-12

Section 8.2.1.1.4 of the applicant's FSAR at 8.2-6 states that "the TSO [Transmission System Operator] also use monitoring/predictive analysis computer programs that can predict HAR switchyard voltages expected to occur upon realization of any one of a number of possible losses to the grid, including a trip of the HAR generator, a trip of another large generator, or the loss of an important transmission line."

Standard Review Plan (SRP, NUREG-0800) Section 8.2.III.F states that "[t]he results of the grid stability analysis must show that loss of the largest single supply to the grid does not result in the complete loss of preferred power. The analysis should consider the loss, through a single event, of the largest capacity being supplied to the grid, removal of the largest load from the grid, or loss of the most critical transmission line." Describe how your design satisfies the SRP, or justify an alternative.

PGN RAI ID #: H-0259

PGN Response to NRC RAI:

The PEC analysis, via a combination of power flow and dynamics computer simulations, demonstrates that adequate offsite power capacity and capability will be available at the Harris Units 1 & 2 switchyard and Harris Unit 3 switchyard following the loss of the largest generator on the PEC system. Presently, this would be PEC's Brunswick Nuclear Unit 1, located on the southern coast of North Carolina. However, similar analysis was also performed to consider the loss of any of the Harris units (existing Unit 1 or proposed Units 2 or 3). Note that PEC interprets "adequate offsite power capacity and capability" to include having adequate post-trip voltage support for the Harris Units.

Similar analysis would apply to the loss of the most critical transmission line. Generally, this would be one of the lines terminating in either the Harris Units 1 & 2 switchyard or the Harris Unit 3 switchyard.

PEC did not specifically analyze the loss of the largest load. Loss of an individual load on the PEC system would have a negligible impact on the Harris switchyards.

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-10

Text of NRC RAI:

RAI-SRP 8.2-EEB-13

Section 8.2.1.1.4 of the applicant's FSAR, "Transmission System Provider/Operator (TSP/TSO)," discusses the interfaces between HAR and PEC's Transmission Operations and Planning Department through a formal interface agreement between the two entities. It states that "HAR operators are directed to notify the TSO of any plant activity that may impact generation capability. The TSO is also required to monitor system conditions to ensure adequate voltage is maintained to support HAR, and promptly notify the HAR operators of existing, or anticipated conditions which would result in inadequate voltage support." As offsite power is shared between the existing Harris Nuclear Plant and HAR Unit 2, how is the above notification coordinated between the system operator and the operators of HNP and HAR Unit 2? In addition, does the interface agreement require that the operators be notified of periods when the system operator is unable to determine if offsite power voltage and capacity is inadequate?

PGN RAI ID #: H-0260

PGN Response to NRC RAI:

The PEC System Operator would notify both Harris Unit 1 and Harris Unit 2 plant operators regarding offsite power issues. Where coordination of actions is required, the PEC System Operator would facilitate this coordination. This is presently our practice for the existing Brunswick Unit 1 and Unit 2 nuclear units, which share a common plant control room, and for other PEC multi-unit sites where separate plant control rooms exist.

The existing interface agreement requires notification to the Nuclear Plant Operator when the System Operator is unable to determine the adequacy of offsite power. This requirement would also be applied to Harris Units 2 and 3.

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

None.

kNRC Letter No.: HAR-RAI-LTR-035

NRC Letter Date: October 24, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 08.02-11

Text of NRC RAI:

RAI-SRP 8.2-EEB-14

It is not clear from the information provided in the FSAR how the power, control and instrumentation cables are routed from the switchyard to the reserve auxiliary transformers (RATs). If the routing of the cables from the switchyard to the RATs is underground, provide the design features and/or in-situ monitoring programs that will be implemented to avoid or arrest the degradation of cable insulation from the effects of moisture.

PGN RAI ID #: H-0261

PGN Response to NRC RAI:

Power, control and instrumentation cables that are routed underground from the AP1000 power block to the switchyard will have a moisture / water resistant jacket per ICEA S-73-532. Manholes for duct bank access that are below the ground water level will have sump pumps.

It should be noted that the high voltage cables between the AP1000 power block and the switchyard are routed overhead.

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

None.