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October 28, 2008

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC.
William States Lee III Nuclear Station - Docket Nos. 52-018 and 52-019
AP1000 Combined License Application for the William States Lee III Nuclear Station Units 1 and 2
Response to Request for Additional Information (RAI No. 714)
Ltr # WLG2008.10-18

Reference: Letter from Tanya Simms (NRC) to Peter Hastings (Duke Energy), *Request For Additional Information Letter No. 022 Related To SRP Section 9.2.1 for the William States Lee III Units 1 And 2 Combined License Application*, dated September 23, 2008.

This letter provides the Duke Energy response to the Nuclear Regulatory Commission's requests for additional information (RAIs) included in the referenced letter.

Responses to the NRC information requests described in the referenced letter are addressed in separate enclosures, which also identify associated changes, when appropriate, that will be made in a future revision of the Final Safety Analysis Report for the Lee Nuclear Station.

If you have any questions or need any additional information, please contact Peter S. Hastings, Nuclear Plant Development Licensing Manager, at (980)373-7820.

Bryan J. Dolan
Vice President
Nuclear Plant Development

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NRO

Enclosures:

1) Duke Energy Response to Request for Additional Information Letter 022, RAI 09.02.01-001
2) Duke Energy Response to Request for Additional Information Letter 022, RAI 09.02.01-002
3) Duke Energy Response to Request for Additional Information Letter 022, RAI 09.02.01-003
4) Duke Energy Response to Request for Additional Information Letter 022, RAI 09.02.01-004

AFFIDAVIT OF Bryan J. Dolan

Bryan J. Dolan, being duly sworn, states that he is Vice President, Nuclear Plant Development, 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 supplement to the combined license application for the William States Lee III Nuclear Station and that all the matter and facts set forth herein are true and correct to the best of his knowledge.

Bryan J. Dolan

Subscribed and sworn to me on October 28, 2008

Elaine Falcone
Notary Public

My commission expires: Feb 07, 2011

SEAL

xc (w/o enclosures):

Michael Johnson, Director, Office of New Reactors
Gary Holahan, Deputy Director, Office of New Reactors
David Matthews, Director, Division of New Reactor Licensing
Scott Flanders, Director, Site and Environmental Reviews
Glenn Tracy, Director, Division of Construction Inspection and Operational Programs
Charles Ader, Director, Division of Safety Systems and Risk Assessment
Michael Mayfield, Director, Division of Engineering
Luis Reyes, Regional Administrator, Region II
Loren Plisco, Deputy Regional Administrator, Region II
Thomas Bergman, Deputy Division Director, DNRL
Stephanie Coffin, Branch Chief, DNRL

xc (w/ enclosures):

Brian Hughes, Senior Project Manager, DNRL
Tanya Simms, Project Manager, DNRL

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 022

NRC Technical Review Branch: Balance of Plant Branch 1 (SBPA)

Reference NRC RAI Number(s): 09.02.01-001

NRC RAI:

In order for the staff to confirm compliance with GDC 4 and proper implementation of policy considerations relative to regulatory treatment of non-safety systems (RTNSS), additional information is needed to identify and address the potential effects of raw water system (RWS)-related failures on safety-related and RTNSS equipment. The staff also requests that the applicant establish plant-specific inspection, test, analyses, and acceptance criteria (ITAAC); initial test program provisions; technical specifications, and availability controls for the RWS as appropriate. The applicant should provide any markups of the Final Safety Analysis Report (FSAR) and other parts of the application as applicable to facilitate the staff's evaluation.

Duke Energy Response:

As indicated in FSAR Subsection 9.2.11.1.1, the RWS serves no safety-related function and has no identified RTNSS (Regulatory Treatment of Non-Safety Systems) functions. Failure of the RWS or its components does not affect the ability of safety-related systems to perform their intended function. There are no features or functions of this system credited for mitigation of design basis events. RWS is not credited for long term decay heat removal in the FSAR. Safety-related long term decay heat removal for the AP1000 is achieved through passive plant features only.

The RTNSS is not relevant to RWS and, therefore, measures for assuring the functional capability of the RWS over time do not apply.

Licensing Basis and Design Criteria for RWS are as follows:

1. As stated in NUREG-1793 (FSER), Section 22.5, Westinghouse used the process described in WCAP-15985, Revision 2, dated August 2003 to determine which non-safety-related systems in the AP1000 should be subject to regulatory treatment and under what conditions that treatment should apply. As described by the AP1000 DCD (and approved by the NRC) the RWS was not identified as a system requiring regulatory treatment. Therefore, no additional evaluation of the RWS is required.
2. In addition, as stated in the AP1000 DCD, Tier 1, Section 4.0, no Tier 1 interfaces were identified for any systems outside the design certification scope of the AP1000 standard plant design. Therefore, the RWS does not require special treatment. Also, Revision 16 of the Tier 2 DCD, Table 3.2-3, sheet 29 of 65 identifies the raw water system as Class E. Per DCD Table 3.2-1, systems identified as Class E (Other) have no special design requirements.

ITAAC:

Per FSAR Subsection 14.3.2.3.3, this site-specific system (i.e., RWS) does not meet the ITAAC selection criteria. ITAAC screening was performed for the RWS and it was concluded that ITAAC is not applicable as indicated in FSAR Table 14.3-201.

Initial Test Program Provisions:

Initial test requirements for the RWS are included in FSAR Section 14.2.9.4.24. The raw water system component and integrated system performance is observed to verify that the system functions as described in FSAR Subsection 9.2.11 and in applicable design specifications. The individual component and integrated system tests include:

1. Operation of the system pumps, traveling screens, automatic strainers, and valves is verified.
2. Operation of the system instrumentation, controls, actuation signals, alarms, and interlocks is verified.
3. Operation of heat tracing on system piping is verified.

Technical Specifications:

No specific Technical Specifications are required for the RWS and none are applicable. Technical Specifications for the AP1000 are provided in FSAR Chapter 16, DCD Section 16.1 and were evaluated by the NRC in the FSER (NUREG-1793), Chapter 16.

Availability Controls:

There are no availability controls for the RWS and they are not required, based on the RTNSS evaluation in NUREG-1793 (FSER), Chapter 22 and WCAP-15985, Rev 2. Also, FSAR Chapter 16 and DCD Chapter 16 do not identify any availability requirements for RWS.

Standard Review Plan Requirements

The scope of SRP Section 9.2.1 Service Water System (SWS) review is not applicable to RWS for the following reasons:

1. RWS does not supply essential cooling water to safety related equipment.
2. There is no safety related function associated with the RWS and it does not have equipment required to prevent or mitigate the consequences of postulated accidents.

The scope of SRP Section 9.2.5 Ultimate Heat Sink (UHS) review is not applicable to the RWS for the following reasons:

1. RWS water supply is not credited as a water source required for dissipating reactor decay heat and essential station heat loads. Therefore, the RWS is not part of the UHS.
2. There is no safety related function associated with the RWS.

System Description

FSAR 9.2.11.1.2 provides a list of functions supported by the RWS.

RWS Interface with SWS

As described in FSAR 9.2.11, the RWS provides normal make-up to the SWS cooling towers to replace inventory lost to evaporation, drift and blowdown. The RWS ensures a high level of reliability for the make-up function through a design that utilizes diversity in water sources, delivery equipment and power supplies.

The standard plant design of the Service Water System includes water inventory to assure operation without normal make-up. As discussed in AP1000 DCD section 9.2.1.2.2 and depicted on DCD Figure 9.2.1-1 and Figure 9.5.1-1, sheet 1, SWS inventory is stored in the upper portion of the secondary fire water tank, and in the SWS cooling tower basin. As described in Westinghouse RAI-SRP9.2.1-SBPA-03, these sources support a minimum of 24 hours of decay heat removal operation without the availability of the normal make-up supply from RWS.

As shown on FSAR Figure 2.4.1-202, the maximum make-up requirement for the service water systems in both units is 1660 gpm (830 gpm per unit, including a blowdown flow of 205 gpm per unit). This flow represents a design maximum as it would occur immediately after a simultaneous shutdown of both units, when the maximum SWS heat load is encountered. The flow rate is very conservative as the decay heat load decreases during cooldown with an accompanying decrease in make-up requirements.

The RWS design for the Lee Nuclear Station has diverse water sources to supplement the capacity of the AP1000 design. The RWS supplies normal make-up to the SWS cooling towers by way of the clarified water subsystem consisting of a clarifier subsystem and the clarified water storage tank that is common for both units.

The RWS uses a clarification system to remove suspended solids from the raw water supplied to the site (FSAR 9.2.11.2.1). As shown on Figure 2.4.1-202, the clarified water subsystem supplies a design flow of 2740 gpm to the clarified water storage tank, which readily accommodates the 1660 gpm peak SWS cooling tower make-up requirements for a simultaneous shutdown of both units. Should the clarifier subsystem be out of service, the 2.7 million gallon clarified water storage tank provides a substantial reserve for supplying SWS make-up requirements while the clarifier is returned to service.

An additional RWS water source available for make-up to the SWS cooling towers is Make-Up Pond A. As described in FSAR 2.4.1.2.2.6, this pond is maintained at normal operating level through the transfer of water from the Broad River and has a usable storage volume of approximately 1200 acre-feet (390 million gallons).

As an operational convenience, the Lee Nuclear Station will likely utilize the inventory in the secondary fire water tanks only after the clarified water storage tank inventory has been depleted. If the clarified water storage tank and secondary fire water tanks have been depleted, the RWS is designed to supply make-up to the SWS cooling towers directly from Make-Up Pond A (Ref. FSAR Figure 9.2-202 and 9.2-205). The usable volume of water in the pond will support peak heat removal by the SWS cooling towers for a period of several months. This heat load is based on the removal of decay heat from the reactor core. The peak heat load occurs when the reactor

is shutdown and decreases rapidly with time resulting in a very conservative estimate. Make-up Pond A is refilled from the Broad River via the river water intake structure.

The RWS design for the Lee Nuclear Station has diversity in delivery equipment and power supplies to ensure the availability of the SWS cooling towers. The clarified water storage tank is equipped with (2) clarified water supply pumps per unit. Each pump has a design flow rate of 1500 gpm to accommodate make-up demands with a single pump per unit. The clarified water supply pumps are powered from the Unit 1 and 2 main AC power systems through load centers that are backed by the onsite standby diesel generators (Ref. FSAR 9.2.11.2.2).

The intake on Make-Up Pond A is equipped with (3) raw water pumps per unit. Each pump has a design flow rate of 20,000 gpm. As shown on DCD Figure 8.3.1-1, the pumps are powered by the main AC power systems in each unit. One pump for each unit is backed by an onsite standby diesel generator.

The RWS is designed with sufficient component redundancy to address normal and extended make-up requirements for the SWS cooling towers. The designs for both the clarified water supply pumps and the raw water pumps incorporate standby pumps to facilitate a response to a component failure. The pump design flows are substantially larger than the peak make-up demands for the SWS cooling towers to provide margin. In the case of the secondary fire water tank, makeup water is provided through gravity feed. In the case of the clarified water storage tank and Make-Up pond A, each source is equipped with pumps powered by the onsite standby diesel generators to ensure make-up flow can be maintained to the SWS cooling towers during a loss of preferred power to the station.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 022

NRC Technical Review Branch: Balance of Plant Branch 1 (SBPA)

Reference NRC RAI Number(s): 09.02.01-002

NRC RAI:

Section 9.2.11 of the FSAR generally discusses the raw water system (RWS) and contingencies that exist for providing makeup for the service water system (SWS) cooling tower basins. Provide a clearly defined RWS design basis for assuring the defense-in-depth and RTNSS capabilities for the most limiting situations, and describe measures for assuring the functional capability of the RWS over time. For example, describe the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two Bellefonte units. Describe net positive suction head criteria, materials considerations, and industry operating experience. Describe any design provisions and measures being implemented to resolve vulnerabilities and degradation mechanisms, to confirm the adequacy of design, and to assure the functional capability of the RWS over time; include consideration of plant-specific ITAAC, the initial test program, technical specifications, and availability controls as appropriate. Fully describe the RWS design basis and address those review considerations specified by Section III of SRP Sections 9.2.1 and 9.2.5 that are relevant for assuring the functional capability of the RWS over time, or explain why this is not necessary. Additional guidance for addressing these SRP areas of review is provided in Sections C.I.9.2.1 and C.I.9.2.5 of Regulatory Guide (RG) 1.206. Provide markups of the FSAR and other parts of the application, as applicable, to facilitate the staff's evaluation.

Duke Energy Response:

The response to NRC RAI 09.02.01-01 (this letter) includes the response to this request for additional information.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 022

NRC Technical Review Branch: Balance of Plant Branch 1 (SBPA)

Reference NRC RAI Number(s): 09.02.01-003

NRC RAI:

As specified by 10 CFR 20.1406, combined operating license (COL) applicants are required to describe how facility design and procedures for operation will minimize the generation of radioactive waste and contamination of the facility and environment, and facilitate eventual plant decommissioning. Although the RWS has no interconnections with any systems that contain radioactive fluids, industry experience has shown that this alone may not be sufficient to prevent the RWS from becoming contaminated. For example, unplanned leaks or release of contaminated fluids as a result of component failures or transport, drainage problems in contaminated areas, and the migration of contamination through soils and other porous barriers over time have caused systems and areas of the plant that are not directly connected with contaminated systems to become contaminated. Therefore, additional information is needed to describe design provisions and other measures that will be implemented to satisfy the requirements specified by 10 CFR 20.1406 requirements, including measures that will be implemented to monitor the RWS for contamination and corrective actions that will be taken to eliminate any radioactive contamination that is identified. RG 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," provides guidance that may be used for addressing the requirements specified by 10 CFR 20.1406.

Duke Energy Response:

As described in FSAR Subsection 9.2.11, the Raw Water System (RWS) provides river water for makeup to the mechanical draft Circulating Water System (CWS) and Service Water System (SWS) cooling tower basins and feeds the demineralized water treatment (DTS) system. The RWS also provides the backup supply of raw water to the fire water storage tanks and an alternate supply of water for the turbine building closed cooling system heat exchangers.

Potential failures of the plant systems causing external and internal flooding are described in DCD Section 3.4. Potential sources that could transport contaminants to the RWS are monitored as described in DCD Section 11.5 as restated below, in part:

The radiation monitoring system (RMS) provides plant effluent monitoring, process fluid monitoring, airborne monitoring, and continuous indication of the radiation environment in plant areas where such information is needed. The RMS is designed to support with the requirements of 10 CFR 20.

Compliance with 10 CFR 20.1406:

In support of Combined License Application pre-application activities, Westinghouse has submitted to the NRC the report, AP1000 Standard Combined License Technical Report APP-GW-GLN-098, Revision 0, "Compliance with 10 CFR 20.1406", dated April 10, 2007. This report summarizes the design approach and features incorporated into the AP1000 standard plant design that demonstrate compliance with 10 CFR 20.1406. The plant features described in this report will minimize contamination and radioactive waste generation for the AP1000 design.

Groundwater Transport:

Groundwater in the areas surrounding Lee Units 1 and 2 has preferential movement in the northward direction as it moves toward the Broad River. The RWS river intake delivers water from the Broad River to Make-Up Pond A within a piping corridor located east of the preferential groundwater flow path at a distance ranging from approximately 600 feet to 2150 feet. The piping is positioned above the water table, and when the system is in operation, operates under positive pressure.

The RWS piping corridor from Make-Up Pond A supplies water to the plant to compensate for normal evaporative losses as well as supplying the demineralized water treatment system. The piping is positioned above the water table, and when the system is in operation, operates under positive pressure.

The RWS piping corridor from Make-Up Pond A has the capability to transfer water to Make-Up Pond B and, similarly, Make-Up Pond B has the capability to transfer water to Make-Up Pond A. These systems are positioned up gradient (south) of the reactor area and are also above the water table.

Groundwater transport from Units 1 and 2 is discussed in Duke's response to the NRC Environmental Hydrology RAI-7, dated September 7, 2008 which evaluates alternative groundwater pathways from postulated release areas. A similar response will be provided in the Duke Energy response to NRC RAI 2.4.13-003 which will show that the RWS piping is not routed in the direction of the preferential pathway of the movement of groundwater from the Units 1 and 2 towards the Broad River. Therefore, groundwater is an unlikely source of contamination of the RWS.

Groundwater Monitoring Program:

As addressed in Westinghouse Technical Report APP-GW-GLN-098, a groundwater monitoring program beyond the normal radioactive effluent monitoring program will be developed. FSAR Subsection 12AA.5.4.13 lists locations of areas to be monitored for the AP1000 design and states a groundwater monitoring program will be developed.

Areas of the site to be specifically considered in this groundwater monitoring program are:

- West of the auxiliary building in the area of the fuel transfer canal.

- West and south of the radwaste building.
- East of the auxiliary building rail bay and the radwaste building truck doors

Groundwater Monitoring Program implementation considerations and Record of Operational Events of Interest for Decommissioning are also described in FSAR Subsections 12AA.5.4.13 and 12AA.5.4.14. Based on the above monitoring program, unplanned leakage or release of contaminated fluids impacting groundwater will be detected.

The Duke Energy response to NRC RAI No. 2.4.12-014 will provide an enhanced discussion of the ground water monitoring program that will include the use of near field and far field wells designed to detect groundwater contamination at its source and in the event that it would move offsite. Early detection of groundwater contamination is an important factor in minimizing its potential impact.

Surface Water:

The Lee Nuclear Station discharge is located downstream of the intake minimizing the likelihood of contamination of the RWS from a transport pathway through surface water. The site is in close proximity to three water bodies: Broad River, Make-Up Pond A, and Make-Up Pond B. Based on the volume, flow rates, and utilization of these water sources precludes the potential for these water sources to be a conduit for contamination of the RWS from groundwater.

Monitoring of Raw Water System:

The RWS has no interconnection with any system that contains potentially radioactive fluids as indicated in FSAR Subsection 9.2.11.1.1. While in service, the RWS operates at a higher system pressure than those systems that it directly interfaces with and therefore in-leakage is not feasible. The interfacing systems are the SWS, CWS and DTS during plant operations. The fire water storage tank and turbine building closed cooling water system do not have any interfaces with radioactive systems and are isolated by normally closed valves from the RWS. Therefore, the likelihood that the RWS would become contaminated through a system interface is minimal. Duke Energy considered the incorporation of a radiation monitor for the RWS and concluded that it would be an ineffective early indicator of contamination based on the flow rates and uses of the system.

Conclusion:

The potential to contaminate the RWS from system interfaces, surface water sources, and groundwater sources has been considered. Duke Energy considers the likelihood of RWS contamination to be low. Duke Energy has proposed a groundwater monitoring program for the Lee Nuclear Station which will provide for early detection of groundwater contamination and its mitigation prior to any impact on the RWS.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:
None

Attachments:
None

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 022

NRC Technical Review Branch: Balance of Plant Branch 1 (SBPA)

Reference NRC RAI Number(s): 09.02.01-004

NRC RAI:

Section 9.2.11.2 of the Lee FSAR indicates that the circulating water system (CWS) uses natural draft cooling towers, whereas Section 10.4.5.2 indicates that the CWS uses three mechanical draft-cooling towers. Therefore, the FSAR needs to be revised to resolve this inconsistency.

Duke Energy Response:

Lee FSAR Section 10.4.5.2 correctly indicates that the CWS uses three mechanical draft-cooling towers. Therefore, FSAR Section 9.2.11.2.1 is incorrect and will be revised to resolve any inconsistency as indicated in the FSAR mark up included as Attachment 1. This change will be incorporated into the next revision of the Final Safety Analysis Report.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Section 9.2.11.2.1

Attachment:

1) Markup of FSAR Section 9.2.11.2.1

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 09.02.01-004

COLA Part 2, FSAR Chapter 9, Section 9.2.11.2.1 revision

COLA Part 2, FSAR Chapter 9, Section 9.2.11.2.1, sixth paragraph will be revised as follows:

Six raw water pumps, located at the Make-Up Pond A intake structure, forward the water to the CWS ~~natural~~ mechanical draft cooling towers of Units 1 and 2, and to the clarified water subsystem for pre-treatment. Each pump is sized to supply 50 percent of the maximum raw water needs for one unit.