SummerRAIsPEm Resource

From: Tanya Simms
Sent: Tuesday, January 27, 2009 12:24 PM
To: SummerRAIsPEm Resource
Subject: Request for Additional Information Letter No. 027 Related to SRP Section 09.02.01 for the Virgil C. Summer Nuclear Station Units 2 and 3 Combined License Application
Attachments: SUM-RAI-LTR-027.doc

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January 27, 2009

Mr. Alfred M. Paglia
Manager, Nuclear Licensing
MC P40
South Carolina Electric & Gas Company
PO Box 88
Jenkinsville, SC 29065

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 027 RELATED TO SRP SECTION 09.02.01 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION

Dear Mr. Paglia:

By letter dated March 27, 2008, South Carolina Electric & Gas Company submitted its application to the U. S. Nuclear Regulatory Commission (NRC) for a combined license (COL) for two AP1000 advance passive pressurized water reactors pursuant to 10 CFR Part 52. The NRC staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter.

To support the review schedule, you are requested to respond within 45 days of the date of this letter. If changes are needed to the final safety analysis report, the staff requests that the RAI response include the proposed wording changes.

If you have any questions or comments concerning this matter, you may contact me at 301-415-1387 or you may contact Ravindra Joshi the lead project manager for the Virgil C. Summer Nuclear Station combined license at 301-415-6191.

Sincerely,

/**RA**/

Tanya Simms, Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-027
52-028

Enclosure:
Request for Additional Information

CC: see next page

If you have any questions or comments concerning this matter, you may contact me at 301-415-1387 or you may contact Ravindra Joshi the lead project manager for the Virgil C. Summer Nuclear Station combined license at 301-415-6191.

Sincerely,

/**RA**/

Tanya Simms, Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-027
52-028
eRAI Tracking No. 1770

Enclosure:
Request for Additional Information

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DATE	12/09/08	1/05/09	1/13/09	1/27/09

*Approval captured electronically in the electronic RAI system.

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Request for Additional Information No. 1770 Revision 0
Virgil C. Summer Nuclear Station, Units 2 and 3
South Carolina Electric and Gas Company
Docket No. 52-027 and 52-028
SRP Section: 09.02.01 - Station Service Water System
Application Section: 9.2.11 Raw Water System

QUESTIONS from Balance of Plant Branch 1 (SBPA)

09.02.01-2

In accordance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2, “Design Bases for Protection Against Natural Phenomena,” GDC 4, "Environmental and Dynamic Effects Design Bases," and NRC policy considerations for passive plant designs, the staff confirms that raw water system (RWS) failures will not adversely affect SSCs that are safety-related or designated as Regulatory Treatment of Non-Safety Systems (RTNSS), impact the control room, or result in excessive releases of radioactivity to the environment. Although Final Safety Analysis Report (FSAR) Section 9.2.11.1.1, “Safety Design Basis,” states that failures of the RWS will not affect the ability of safety-related systems to perform their intended functions, more detailed information is needed to adequately describe the consequences of RWS failures and to explain why safety-related structures, systems, and components (SSCs) are not affected. Likewise, additional information is needed to explain why a failure of the RWS will not adversely affect RTNSS systems and components or impact the control room, or result in an unacceptable release of radioactive material to the environment. Because the applicant did not adequately address these considerations, the staff is unable to confirm compliance with GDC 2, GDC 4, and NRC policy considerations that apply to passive plant designs. Therefore, FSAR Section 9.2.11 needs to be revised to address the impact of RWS failures accordingly, including development of plant-specific inspections, tests, analyses, and acceptance criteria; test program provisions; Technical Specifications; and availability controls as appropriate.

09.02.01-3

The raw water system (RWS) is relied upon for achieving and maintaining cold shutdown conditions which is necessary for satisfying Technical Specification requirements. In accordance with NRC policy considerations for passive plant designs, non-safety related active systems that are relied upon for achieving and maintaining cold shutdown conditions (i.e., transitioning from Mode 4 to Mode 5) should be highly reliable and able to accommodate single active failures without a loss of the cooldown capability that is needed. The staff found that Section 9.2.11 of the Final Safety Analysis Report (FSAR) does not provide a clearly defined design basis with respect to the RWS cooldown function, and the reliability and capability of the RWS to perform this function for the most limiting situations were not adequately described and addressed. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two V.C. Summer units were not described. Also, the suitability of RWS materials for the plant-specific application and measures

being implemented to resolve vulnerabilities and degradation mechanisms to assure RWS functionality over time were not addressed. Consequently, Section 9.2.11 of the FSAR needs to be revised to properly describe and address the RWS design bases in this regard and to include design specifications that are necessary to ensure the reliability and capability of the RWS to perform its cooldown function. The following guidance is generally applicable and should be considered as appropriate when revising the FSAR in response to this question:

a. The design bases should specifically recognize and describe cold shutdown functions that are credited, and applicable design considerations that pertain to these functions should be specified, such as reliability, redundancy, backup power, etc. Other parts of the DCD should not be referred to in lieu of providing a complete description of the design-bases in FSAR Section 9.2.11.

b. The system description should explain how the applicable design-bases considerations referred to in (a) are satisfied. For example:

- the minimum required system functional capability and the bases for this determination should be described (note that a minimum of seven days worth of on-site water inventory should be available for reactor decay heat removal and spent fuel cooling);
- the description should explain how design-bases considerations are satisfied;
- the guidance in SRP Sections 9.2.1 and 9.2.5 that are relevant for ensuring the capability and reliability of the RWS to perform its design-bases functions should be considered and addressed as appropriate (materials considerations, net positive suction head, waterhammer, etc.);
- operating experience considerations that pertain to the capability and reliability of the system to perform its design-bases functions needs to be addressed (note that the relevance of operating experience is independent of safety classification considerations);
- in order to demonstrate adequate reliability, the system design should include (among other things) the capability of all necessary components (pumps, valves, strainers, instrumentation and controls, etc.) to function during a loss of off-site power and redundancy for single active failure vulnerabilities;
- dual-unit considerations need to be addressed.

c. Major components and features that are important to ensure the capability and reliability of the system to perform its cooldown function should be described. Applicable industry codes and quality group designations that are commensurate with plant-specific RWS reliability considerations should be specified and reflected in Chapter 3, “Design of Structures, Components, Equipment, and Systems.” Note that this may be different from what is specified for the standard plant design since it was based solely on regulatory treatment of non-safety systems considerations and did not include consideration of the cooldown function.

d. System design parameters that are important for performing the cold shutdown function should be specified, such as water inventory, flow rate, nominal pipe sizes, limiting flow velocities, and design temperatures and pressures.

e. The RWS operating modes for performing its cold shutdown function should be described, such as interlocks, protective features, and automatic actuation.

f. Limitations on the capability of the RWS to perform its cold shutdown function should be described, such as minimum required water inventory and temperature restrictions that apply.

g. Instrumentation (e.g., indication, controls, interlocks and alarms) that are relied upon by plant operators in the main control room and at the remote shutdown panels for performing cooldown functions should be described.

h. System diagrams should show division designations, flow paths, major components and features, nominal pipe sizes, and instrumentation that is relied upon to ensure proper operation of the system by operators in the main control room and at the remote shutdown panels.

i. The more important periodic inspections that will be completed and specified frequencies for ensuring the capability and reliability of the system should be described. For example, design provisions and actions that will be implemented to periodically assess the condition of buried or otherwise inaccessible piping and components should be described.

j. The more important periodic tests that will be completed and specified frequencies for ensuring the capability and reliability of the system should be described. For example, periodic testing of pumps, valves, self-cleaning strainers, and vacuum breakers should be described.

k. Based on the FSAR description, plant-specific ITAAC should be established that are appropriate and sufficient for verifying that the RWS is constructed as designed.

l. The initial test program should test all modes of RWS operation that are credited for performing its cooldown function and confirm acceptable performance for the most limiting assumptions. For example, confirmation that net positive suction head requirements are satisfied for minimum pump suction head and maximum water temperature conditions with all pumps running at full flow, and that waterhammer will not occur during situations when voiding is most likely to occur should be specified. It should be clear from the information provided in Section 9.2.11 what constitutes acceptable performance.

09.02.01-4

The staff noted that while the service water system (SWS) is designated for regulatory treatment of non-safety systems (RTNSS) during reduced reactor inventory conditions, the raw water system (RWS) is evidently not needed to support the SWS cooling function during this condition because RWS is not designated for RTNSS. However, there is no explanation in Section 9.2.11 as to why this is the case. Also, because the SWS cooling tower basins are very limited in their capacity, it isn't clear why RWS makeup is not required for this situation. Consequently, Section 9.2.11 needs to be revised to explain why RWS makeup is not needed during reduced reactor inventory conditions and in particular, to describe controls that will be implemented to ensure that SWS makeup assumptions are valid for this situation.

09.02.01-5

As specified by 10 CFR 20.1406, 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, 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.