Tennessee Valley Authority, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

September 2, 2008

10 CFR 52.79

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

In the Matter of) Docket No. 52-014 and 52-015
Tennessee Valley Authority)

BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – STATION SERVICE WATER SYSTEM

Reference: Letter from Brian C. Anderson (NRC) to Andrea L. Sterdis (TVA), Request for Additional Information Letter No. 086 Related to SRP Section 09.02.01 for the Bellefonte Units 3 and 4 Combined License Application, dated July 21, 2008

This letter provides the Tennessee Valley Authority's (TVA) response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) items included in the reference letter.

A response to each NRC request in the subject letter is addressed in the enclosure which does not identify any associated changes to be made in a future revision of the BLN application.

If you should have any questions, please contact Phillip Ray at 1101 Market Street, LP5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7030, or via email at pmray@tva.gov.

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

Executed on this 2nd day of Sep, 2008.

Andrea L. Sterdis
Manager, New Nuclear Licensing and Industry Affairs
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Enclosure
cc: See Page 2

D085
NRO

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Enclosure
TVA letter dated September 2, 2008
RAI Responses

Responses to NRC Request for Additional Information letter No. 086 dated July 21, 2008
(8 pages, including this list)

Subject: Station Service Water System in the Final Safety Analysis Report

RAI Number	Date of TVA Response
09.02.01-02	This letter – see following pages
09.02.01-03	This letter – see following pages
09.02.01-04	This letter – see following pages

Associated Additional Attachments / Enclosures	Pages Included
None	

Enclosure
TVA letter dated September 2, 2008
RAI Responses

NRC Letter Dated: July 21, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 09.02.01-02

To address compliance with General Design Criteria (GDC) 4, "Environmental and Dynamic Effects Design Bases" and considerations relative to regulatory treatment of non-safety systems (RTNSS), identify and address the potential effects of raw water system (RWS)-related failures on safety-related and RTNSS equipment. Establish plant-specific inspection, test, analyses, and acceptance criteria (ITAAC); initial test program provisions; technical specifications, and availability controls for the RWS as appropriate, or explain why they are not necessary. Provide any markups of the Final Safety Analysis Report (FSAR) and other parts of the application, as applicable, to facilitate the staff's evaluation.

BLN RAI ID: 956

BLN RESPONSE:

The function and design of the raw water system (RWS) is described as follows.

As described in FSAR Subsection 9.2.11, the RWS provides river water to the natural draft and mechanical draft cooling tower basins to makeup for evaporation, drift and blowdown losses and feeds the demineralized water treatment system. The RWS also provides the backup supply of raw water to the fire water storage tanks and provides an alternate supply of water for cooling of the turbine building closed cooling system heat exchangers. RWS also provide an alternate dilution source for radwaste discharge when the Circulating Water System (CWS) is not available.

As indicated in FSAR Subsection 9.2.11.1.1, the RWS serves no safety-related function; therefore, it has no nuclear safety design basis. 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 following explanation is provided to show the regulatory treatment of non-safety systems (RTNSS) is not relevant to RWS and therefore, measures for assuring the functional capability of the RWS over time do not apply.

Regulatory Design Basis and Design Criteria for RWS are as follows:

1. As stated in NUREG-1793, 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. The RWS was previously evaluated by Westinghouse, and 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, Tier 2 DCD Revision 16, 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, which 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:

a. Operation of the system pumps, traveling screens, automatic strainers, and valves is verified.

b. Operation of the system instrumentation, controls, actuation signals, alarms, and interlocks is verified.

c. 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 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 FSER Chapter 22 and WCAP-15985, Rev 2. Also, FSAR Chapter 16 and DCD Chapter 16 do not identify any availability requirements for RWS.

Conclusion

The above description provides the RWS design basis. As discussed above, RTNSS capabilities are not required for RWS and therefore, measures for assuring the functional capability of the RWS over time are not applicable.

This response is PLANT SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

No COLA revisions have been identified associated with this response.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated September 2, 2008
RAI Responses

NRC Letter Dated: July 21, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 09.02.01-03

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.

BLN RAI ID: 1005

BLN RESPONSE:

The response to NRC RAI No. 09.02.01-02 (this letter) provides the basis for the Raw Water System (RWS) design and concludes that plant-specific ITAAC, the initial test program, technical specifications, and availability controls are not applicable to the RWS.

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

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 due to the following.

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.

Conclusion

The response to NRC RAI 09.02.01-02 provides the RWS design basis. As explained in this response, RTNSS capabilities are not required for the RWS and therefore, measures for assuring the functional capability of the RWS over time are not applicable to the RWS. As indicated, SRP Sections 9.2.1 and 9.2.5 are not applicable to the RWS.

This response is expected to be STANDARD for the S-COLAs.

ASSOCIATED BLN COL APPLICATION REVISIONS:

No COLA revisions have been identified associated with this response.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

NRC Letter Dated: July 21, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 09.02.01-04

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 raw water system (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. Regulatory Guide (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.

BLN RAI ID: 1006

BLN RESPONSE:

As described in FSAR Subsection 9.2.11, the Raw Water System (RWS) provides river water for makeup to the natural draft Circulating Water System (CWS) and mechanical draft Service Water System (SWS) cooling tower basins and feeds the demineralized water treatment 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 is described in DCD Section 3.4, and potential sources that could transport contaminants to the RWS are monitored per DCD Section 11.5 and as described below.

As described in DCD Section 11.5, 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 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 from the Unit 3 area does not travel in the direction of the RWS and therefore would not be a concern. This is also discussed in TVA response to NRC RAI No. 02.04.12-07 as follows:

"Further analysis determined a groundwater divide exists between Unit 4 and the intake structure which effectively prevents groundwater from Unit 4 to travel to the intake structure (see also the TVA to NRC Letter dated June 12, 2008; Response to NRC Information Needs – Hydrology, Item H-8 (ML 081760091), and TVA to NRC Letter dated July 23, 2008; NRC Hydrology Related Site Visit Trip Report)."

Groundwater transport from Unit 4 to the RWS trench (formerly the Unit 1 and 2 essential raw cooling water system (ERCW) trench) is discussed in a response to the NRC Environmental Hydrology Audit, Item H-8, which states that liquids released in the vicinity of Unit 4 will travel vertically to the groundwater surface (below the level of the RWS piping) then travel with groundwater.

The assessment states that the groundwater in the vicinity of Unit 4 will not migrate far enough towards the Intake Channel to impact the BLN Units 1 and 2 ERCW (i.e., the BLN Units 3 and 4 RWS) trench, thus, any contamination released from Unit 4 will not come in contact with the underground portions of the RWS piping. Therefore, contamination of RWS is not expected from potential groundwater contamination.

Groundwater Monitoring Program:

In accordance with 10 CFR 20.1406 and as covered 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 (listed below) 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; and

– 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 Subsection 12AA.5.4.13.

Based on the above monitoring program, unplanned leakage or release of contaminated fluids will be detected and not result in contamination of the RWS system.

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 and shown in FSAR Figure 9.2-201, Sheets 1 and 2. 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 and the CWS during plant operations. The fire water storage tank, demineralized water treatment 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.

Conclusion

Groundwater pathways for a potential radiological release will have a monitoring program established and provide little chance of groundwater coming in contact with the RWS. Because buried RWS piping is located above groundwater pathways, the possibility of contaminating the RWS is remote. RWS operating pressure is above SWS and CWS pressures; therefore, only in-leakage into those systems is credible.

Based on the data provided, the direct monitoring of the RWS system for contamination is not required.

This response is PLANT SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

No COLA revisions have been identified associated with this response.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None