



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

July 23, 2008

10 CFR 52.79

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

In the Matter of)
Tennessee Valley Authority)

Docket No. 52-014 and 52-015

**BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR
ADDITIONAL INFORMATION – TURBINE MISSILES**

Reference: Letter from Ravindra G. Joshi (NRC) to Andrea L. Sterdis (TVA), Request for
Additional Information Letter No. 053 Related to SRP Section 03.05.01.03 for
the Bellefonte Units 3 and 4 Combined License Application, dated June 27, 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 also
identifies any associated changes that will 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 23rd day of July, 2008.

Jack A. Bailey
Vice President, Nuclear Generation Development

Enclosure

cc: See Page 2

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MRO

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cc: (Enclosures)

J. P. Berger, EDF
E. Cummins, Westinghouse
S. P. Frantz, Morgan Lewis
M.W. Gettler, FP&L
R. C. Grumbir, NuStart
P. S. Hastings, NuStart
P. Hinnenkamp, Entergy
R. G. Joshi, NRC/HQ
M.C. Kray, NuStart
D. Lindgren, Westinghouse
G. D. Miller, PG&N
M. C. Nolan, Duke Energy
N. T. Simms, Duke Energy
G. A. Zinke, NuStart

cc: (w/o Enclosure)

B. C. Anderson, NRC/HQ
M.M. Comar, NRC/HQ
B. Hughes, NRC/HQ
R. H. Kitchen, PGN
M.C. Kray, NuStart
A.M. Monroe, SCE&G
C. R. Pierce, SNC
R. Reister, DOE/PM
L. Reyes, NRC/RII
T. Simms, NRC/HQ
J. M. Sebrosky, NRC/HQ

Enclosure
TVA letter dated July 23, 2008
RAI Responses

Responses to NRC Request for Additional Information letter No. 053 dated June 27, 2008
(4 pages, including this list)

Subject: Turbine Missiles

<u>RAI Number</u>	<u>Date of TVA Response</u>
03.05.01.03-01	This letter – see following pages

Attachments / Enclosures

None

Pages Included

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TVA letter dated July 23, 2008
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NRC Letter Dated: June 27, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 03.05.01.03-01

The Bellefonte COL incorporates by reference Section 3.5.1.3 of the AP1000 DCD, with standard supplemental information (STD SUP 3.5-1). STD SUP 3.5-1 states, "the potential for a turbine missile from another AP1000 plant in close proximity has been considered. As noted in DCD Subsection 10.2.2, the probability of generation of a turbine missile is less than 1×10^{-5} per year. Given this generation probability and the protection provided by the reinforced concrete shield building and auxiliary building walls, roofs, and floors, the guidance of Regulatory Guide 1.115 is satisfied for two AP1000 plants side and [sic] side". In order to complete the staff's review, the NRC staff requests additional information:

- a) Given that Bellefonte Units 3 and 4 will be side by side, is each turbine orientated favorably with respect to the other plant's safety-related SSCs (i.e., Bellefonte Unit 3 turbine favorably orientated to Bellefonte Unit 4 safety-related SSCs, and vice versa)? Provide details such as turbine orientation, angles with respect to SSCs, path of missiles trajectory and distances. Will some of the nuclear island and SSCs such as the boric acid storage tank depicted in Figure 1.2-2 of the AP1000 DCD and Figure 1.1-202 of the Bellefonte COL be within this missile strike zone defined in RG 1.115? The orientation (favorable or unfavorable) of the turbine as defined in RG 1.115 should be specified in this standard supplemental information.
- b) According to SRP Section 3.5.1.3, the probability of generating a turbine missile should be less than 10^{-4} per year for a favorably oriented turbine. Explain the use of 10^{-5} per year if the two turbines are considered favorably oriented with respect to each other.
- c) Based on your response to (a) and (b) above, discuss the need for an ITAAC that verifies the orientation of the turbine building to the nuclear island of the respective unit and to the co-located unit's nuclear island and safety-related SSCs is in accordance with Figure 1.1-202 of the Bellefonte COL. This ITAAC will confirm that the turbine building is orientated in the position denoted by the AP1000 DCD and the Bellefonte COL to ensure that safety-related SSCs are protected against turbine missiles as required by GDC 4 to 10 CFR Part 50.
- d) Discuss how the reinforced concrete shield building and auxiliary buildings walls, roofs, and floors provide protection from turbine missiles with respect to satisfying Regulatory Position 3 of RG 1.115.

BLN RAI ID: 0631

BLN RESPONSE:

a) The individual AP1000 turbine is oriented favorably (i.e., perpendicular) to its unit's associated safety-related SSCs, but with two or more AP1000 units situated side-by-side, the turbines are situated such that the nuclear island containing the safety-related SSCs of the other unit are situated unfavorably (i.e., parallel and within the angles and path of missile trajectory shown in Regulatory Guide 1.115). However, as explained below, the unfavorable orientation has been considered, and the acceptance criteria identified in SRP 3.5.1.3 is met with this side-by-side orientation.

Although not a part of the evaluation, the distance between the units for the side-by-side arrangement (shown in COLA Part 2, FSAR Figure 1.1-202) is identified in FSAR Subsection 1.10.1. Note that the boric acid storage tank identified in the question is not a safety-related SSC in the AP1000 design. As indicated in the AP1000 DCD Section 1.2, "All safety-related structures, systems, and components are located on the nuclear island and are to be included in the design certification" and "The site-specific structures located off the nuclear island are neither safety-related nor seismic Category I."

b) As stated in the COLA FSAR 3.5.1.3 and in DCD Subsection 10.2.2, the probability of generation of a turbine missile (or P1 as identified in SRP 3.5.1.3) is less than 1×10^{-5} per year. This design-related probability meets the criteria identified in SRP 3.5.1.3 for either a favorable or unfavorable turbine orientation. When this P1 value is used with the favorable orientation P2xP3 product value of 10^{-3} , the result is a P4 value that meets the SRP 3.5.1.3 acceptance criterion of less than 10^{-7} per year per plant. Similarly, when this P1 value is used with the unfavorable orientation P2xP3 product value of 10^{-2} , the result is a P4 value that also meets the SRP 3.5.1.3 acceptance criterion of less than 10^{-7} per year per plant. Thus, the orientation of the side-by-side AP1000 turbines is not pertinent to meeting the turbine missile generation acceptance criterion.

c) An ITAAC that verifies the favorable orientation of the turbine building to the nuclear island of the respective unit is already included in the AP1000 DCD information as Tier 1 Table 3.3-6, item #12. An ITAAC that verifies the orientation of the turbine building to the nuclear island of the co-located unit's nuclear island and safety-related SSCs is not necessary since, as explained above, compliance with the acceptance criterion of SRP 3.5.1.3 is not dependent on the orientation.

d) The text of the FSAR Subsection 3.5.1.3 will be revised to clarify that the protection provided by the reinforced concrete shield building and auxiliary building walls, roofs, and floors, is additional conservative protection beyond that necessary to show compliance with the guidance of Regulatory Guide 1.115 and the SRP acceptance criterion.

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

Enclosure
TVA letter dated July 23, 2008
RAI Responses

ASSOCIATED BLN COL APPLICATION REVISIONS:

COLA Part 2, FSAR Chapter 3, Section 3.5.1.3 (associated with STD SUP 3.5-1), will be revised from:

The potential for a turbine missile from another AP1000 plant in close proximity has been considered. As noted in DCD Subsection 10.2.2, the probability of generation of a turbine missile is less than 1×10^{-5} per year. Given this generation probability and the protection provided by the reinforced concrete shield building and auxiliary building walls, roofs, and floors, the guidance of Regulatory Guide 1.115 is satisfied for two AP1000 plants side and side.

To read:

The potential for a turbine missile from another AP1000 plant in close proximity has been considered. As noted in DCD Subsection 10.2.2, the probability of generation of a turbine missile (or P1 as identified in SRP 3.5.1.3) is less than 1×10^{-5} per year. This missile generation probability (P1) combined with an unfavorable orientation P2xP3 conservative product value of 10^{-2} (from SRP 3.5.1.3) results in a probability of unacceptable damage from turbine missiles (or P4 value) of less than 10^{-7} per year per plant which meets the SRP 3.5.1.3 acceptance criterion and the guidance of Regulatory Guide 1.115. Thus, neither the orientation of the side-by-side AP1000 turbines nor the separation distance is pertinent to meeting the turbine missile generation acceptance criterion. In addition, the reinforced concrete shield building and auxiliary building walls, roofs, and floors, provide further conservative, inherent protection of the safety-related SSCs from a turbine missile.

ATTACHMENTS/ENCLOSURES:

None