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U.S. Nuclear Regulatory Commission
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Your ref: Project Number 740
Our ref: DCP/NRC1991

September 7, 2007

Subject: AP1000 COL Responses to Requests for Additional Information (TR #35)

In support of Combined License application pre-application activities, Westinghouse is submitting a response to NRC request for additional information (RAI) on AP1000 Standard Combined License Technical Report 35, APP-GW-GLN-010, Rev. 0, AP1000 Steam Generator Description Changes. This RAI response is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in the response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

A revised response is provided for RAI-TR35-001. Revision 0 of RAI-TR35-001 was submitted under Westinghouse letter DCP/NRC1923 date June 7, 2007. This revised response completes all requests received to date for Technical Report 35.

Pursuant to 10 CFR 50.30(b), the response to request for additional information on Technical Report 35 is submitted as Enclosure 1 under the attached Oath of Affirmation.

Questions or requests for additional information related to the content and preparation of these responses should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Martin D Bartley FOR

A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

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D063
D079
NRO

/Attachment

1. "Oath of Affirmation," dated September 7, 2007

/Enclosure

1. Response to Request for Additional Information on Technical Report No. 35

cc:	D. Jaffe	-	U.S. NRC	1E	1A
	E. McKenna	-	U.S. NRC	1E	1A
	G. Curtis	-	TVA	1E	1A
	P. Hastings	-	Duke Power	1E	1A
	C. Ionescu	-	Progress Energy	1E	1A
	A. Monroe	-	SCANA	1E	1A
	M. Moran	-	Florida Power & Light	1E	1A
	C. Pierce	-	Southern Company	1E	1A
	E. Schmiech	-	Westinghouse	1E	1A
	G. Zinke	-	NuStart/Entergy	1E	1A
	M. Laubach	-	Westinghouse	1E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
NuStart Bellefonte COL Project	)
NRC Project Number 740	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs & Standardization, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

W. E. Cummins
Vice President
Regulatory Affairs & Standardization

Subscribed and sworn to
before me this 7th day
of September 2007.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Patricia S. Aston, Notary Public
Murrysville Boro, Westmoreland County
My Commission Expires July 11, 2011
Member, Pennsylvania Association of Notaries

Notary Public

ENCLOSURE 1

Response to Request for Additional Information on Technical Report No. 35

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR35-001
Revision: 1

Question:

On page 3 of your technical report, you stated that although you intend to achieve full depth expansion in the tubesheet, you plan to remove the requirement of achieving this by hydraulic expansion. Residual stresses resulting from the expansion method will affect the susceptibility of the tubes to develop degradation (e.g., stress corrosion cracking). As currently proposed, there is no mention of the expansion method to be employed nor the criteria to be used for selecting this method. Please discuss how the expansion method will be chosen and your plans to incorporate such information in the design control document (DCD).

In addition, in Section 5.4.2.2 of Revision 15 of the mark-up, you stated: *"Residual stresses smaller than from other expansion methods result from this process..."* Since as currently proposed there is no expansion method specified, please discuss your plans to modify this sentence.

Westinghouse Response:

The intent of the change is to remove potentially misleading wording from the DCD. Westinghouse's expansion process utilized on recent replacement steam generators begins with a non-hydraulic 'tack' expansion to hold the tubes in place during welding of the tubes to the tubesheet. Once welding is complete Westinghouse has expanded the tube hydraulically from the primary surface to the secondary surface. Hydraulic expansion provides the best residual stress profile of all currently known processes, most importantly at the secondary face of the tubesheet. However, inherent to the hydraulic expansion process, a small crevice remains at the secondary side of the tubesheet. Westinghouse and SG fabricators strive to minimize this crevice, but it can not be eliminated.

However, some recent non-Westinghouse replacement steam generators in the US utilized a slightly different hydraulic expansion process. Whereas Westinghouse hydraulically expanded from the primary to the secondary face of the tubesheet, some fabricators hydraulically expand only from the tack expansion to the secondary face of the tubesheet. The fabricators then mechanically expand the short distance, approximately 1 to 2 inches, from the primary face to the hydraulically expanded section. Initial reports provided to Westinghouse indicate that similar residual stress levels result from this process. This process still utilizes hydraulic expansion for the majority of the tubesheet thickness and, most importantly, at the tubesheet secondary surface.

Westinghouse does not wish to preclude slight variances of the hydraulic expansion process as used by different fabricators. Westinghouse is willing to consider minor variances from each

fabricator if they provide extensive and thorough test data showing acceptable residual stresses in the tubes. The wording in this section was proposed to be changed to permit future consideration of these minor variations.

The sentence starting, "Residual stresses smaller than from other expansion methods...," should have been modified as well. "Residual stresses shall be minimized through the expansion process and by tight control of the pre-expansion clearance between the tube and tubesheet hole."

Revision 1 of this response provides an additional revision of the DCD at the request of the NRC to note that method by which the tubes are expanded into the tubesheet is determined based on consideration of the residual stresses

Reference:

None

Design Control Document (DCD) Revision:

The following is the change originally proposed in Revision 0 of this response to Revision 15 of the DCD.

Section 5.4.2.2 (*Ninth Paragraph*)
The tubes are fabricated of nickel-chromium-iron Alloy 690. The tubes undergo thermal treatment following tube-forming operations. The tubes are tack-expanded, welded, and ~~hydraulically~~ expanded over the full depth of the tubesheet. ~~Westinghouse has used this practice in F-type steam generators. It~~Full Depth expansion was selected because of its capability to minimize secondary water access to the tube-to-tube-sheet crevice. ~~Residual stresses smaller than from other expansion methods result from this process and are minimized by tight control of the pre-expansion clearance between the tube and tubesheet hole.~~ Residual stresses shall be minimized through the expansion process and by tight control of the pre-expansion clearance between the tube and tubesheet hole.

The following changes are proposed to the text in Section 5.4.2.2, ninth paragraph of Revision 16 of the DCD.

The tubes are fabricated of nickel-chromium-iron Alloy 690. The tubes undergo thermal treatment following tube-forming operations. The tubes are tack-expanded, welded, and expanded over the full depth of the tubesheet. Full depth expansion was selected because of its capability to minimize secondary water access to the tube-to-tube-sheet crevice. The method by which the tubes are expanded into the tubesheet is determined based on consideration of the residual stresses and the resultant susceptibility of

the tube to degradation. Residual stresses ~~smaller than from other expansion methods result from this process and are minimized by~~ (and the expanded tube's susceptibility to degradation) are limited, in part, through tight control of the pre-expansion clearance between the tube and tubesheet hole.

PRA Revision:
None

Technical Report (TR) Revision:
None