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Your ref: Project Number 740  
Our ref: DCP/NRC2018

October 5, 2007

Subject: AP1000 COL Response to Requests for Additional Information (TR 34)

In support of Combined License application pre-application activities, Westinghouse is submitting responses to the NRC requests for additional information (RAIs) on AP1000 Standard Combined License Technical Report 34, APP-GW-GLN-016, AP1000 Licensing Design Change Document for Generic Reactor Coolant Pump. These RAI responses are submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in the responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

Responses are provided for RAI-TR34-SRSB-01 and -02, transmitted in an email from Dave Jaffe to Sam Adams dated September 11, 2007 and for RAI-TR34-EMB2-05 through -07, transmitted in an email from Dave Jaffe to Sam Adams dated September 4, 2007. These responses complete all requests received to date for Technical Report 34. A response to RAI-TR34-CPN-01 was submitted under Westinghouse letter DCP/NRC2008 dated September 28, 2007. Responses to RAI-TR34-001 through -007 were submitted under Westinghouse letter DCP/NRC1926 dated June 7, 2007.

Pursuant to 10 CFR 50.30(b), the responses to the requests for additional information on Technical Report 34 are 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,

A handwritten signature in black ink, appearing to read 'Andrew Sterdis'.

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

/Attachment

1. "Oath of Affirmation," dated October 5, 2007

/Enclosure

1. Responses to Requests for Additional Information on Technical Report No. 34

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
	A. Preston	- Westinghouse	1E	1A

ATTACHMENT 1

“Oath of Affirmation”

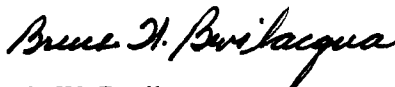
ATTACHMENT 1

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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

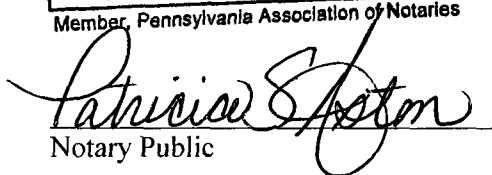
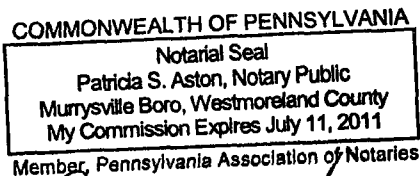
APPLICATION FOR REVIEW OF  
"AP1000 GENERAL COMBINED LICENSE INFORMATION"  
FOR COL APPLICATION PRE-APPLICATION REVIEW

B. W. Bevilacqua, being duly sworn, states that he is Vice President, New Plants Engineering, 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.



B. W. Bevilacqua  
Vice President  
New Plants Engineering

Subscribed and sworn to  
before me this *5th* day  
of October 2007.



Notary Public

ENCLOSURE 1

Responses to Requests for Additional Information on Technical Report No. 34

# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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RAI Response Number: RAI-TR34-SRSB-01  
Revision: 0

### **Question:**

TR34 stated that the reactor coolant pump is a single stage, high inertia, centrifugal sealless pump of either canned motor or wet winding design. The response to RAI-TR34-1 stated that the reactor coolant pump design and licensing basis for the standard AP1000 plant is the canned motor coolant pump. The response regarding operating experience and the structural analysis summary described in the report AP1000 RCP-06-09 are based on canned motor pump design. Also, the report AP1000 RCP-06-009, "Structural Analysis Summary for AP1000 Reactor Coolant Pump High Inertia Flywheel," dated October 19, 2006, was based on a canned motor RCP. The response to TR34-4 stated that "if a COL applicant specifies the use of the wet winding motor sealless pump design, a similar report [to AP1000 RCP-06-09] will be generated and submitted to the NRC..."

Therefore, the staff evaluation of TR34 will be limited to the canned motor sealless pump. The applicant is requested to identify a COL Information item that, if wet winding sealless pumps are used, COL applicants must submit detailed design information for the NRC staff review and approval.

### **Westinghouse Response:**

The AP1000 standard design uses the canned motor reactor coolant pump. For an applicant to use the wet winding sealless reactor coolant pump, Reference 10 of Section 5.4.16 and Figure 5.4-1 of the DCD would need to be changed in the FSAR to incorporate the wet winding sealless design. This change would be a departure from the DCD and would open licensing review of the design change. Westinghouse does not see a need to identify new COL item specific to an alternate reactor coolant pump design. Westinghouse agrees that detailed design information on a wet winding sealless reactor coolant pump design is required by the NRC should a COL applicant select the wet winding sealless pump.

### **Design Control Document (DCD) Revision:**

None

### **PRA Revision:**

None

### **Technical Report (TR) Revision:**

None



# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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RAI Response Number: RAI-TR34-SRSB-02  
Revision: 0

### **Question:**

The response to RAI-TR34-2 indicated that one or more heat exchanger vendors have submitted preliminary and proprietary design proposals that meet the specification, and consequently, the design details are not available to provide responses concerning the external heat exchanger. It also indicated the RCP auxiliary impeller design is not finalized, and may require that the annular ring that extends the diameter of the radial holes be shrink-fitted to the rotor shaft to increase the auxiliary impeller flow capacity if RCP testing indicates insufficient actual bearing water flow rate to satisfy design requirements. Therefore, RAI-34-02 is still open. The applicant is requested to submit the detailed response to this RAI when the final RCP design and calculations are complete.

### **Westinghouse Response:**

RAI-TR34-2 does not indicate that the RCP auxiliary impeller has not been designed. To clarify, RAI-TR34-2 was intended to state that the auxiliary impeller has been designed for an Euler head rise of 240 ft at 1782 rpm. Prototype RCP testing in the future (to begin July 30, 2009) will verify that the actual bearing water flow rate is sufficient to satisfy design requirements. If an unpredicted difference occurs between the calculated bearing water flow rate and the measured test value, an easily implemented design change of adding an annular ring to the rotor shaft may be implemented to increase auxiliary impeller flow capacity.

The RCP design specification defines external heat exchanger design requirements which are passed to the external heat exchanger supplier. The requirements imposed allow for finalization of the design of both components in parallel. Detailed design information for the external heat exchanger will be provided to the NRC in the external heat exchanger generic design report which is scheduled for completion, March 31, 2008. Also, each pump will be performance tested with the heat exchanger intended for field use prior to shipment. Production testing will provide a component by component verification that design goals are met.

### **Design Control Document (DCD) Revision:**

None

### **PRA Revision:**

None

### **Technical Report (TR) Revision:**

None



# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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RAI Response Number: RAI-TR34-EMB2-05  
Revision: 0

### **Question:**

The responses to RAIs-TR34-5, -6, and -7 are incomplete. As a result of design change for Reactor Coolant Pump (RCP), Westinghouse stated, in its June 7, 2007, responses, that work is currently in progress to update the reactor coolant system loop configuration, and analyses are not final. Also, the design calculations for the adequacy of the RCP external heat exchanger are also incomplete (work is currently in progress). Therefore, RAIs TR34-5, -6 and -7 are still open. The applicant is requested to submit the detailed responses to those RAIs, item by item, when the final design calculations are complete.

### **Westinghouse Response:**

Impacted COL generic reports will be reconciled per the design changes to the reactor coolant pump described in TR34, these reports include the design summary reports for the reactor coolant pump, steam generator and reactor coolant loop piping.

Detailed design information for the reactor coolant loop piping is provided in APP-RCS-PLR-050, Revision 1, AP1000 Reactor Coolant Loop (RCL): Piping Qualification, which was stated to be available for NRC audit per Westinghouse correspondence letter, DCP/NRC1893, AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-013, Revision 1. Work is in progress to update the reactor coolant loop piping analysis to reflect recent design changes identified in TR34 and updates to the seismic response spectra. The scheduled completion date is February 28, 2008. Since the reactor coolant loop analysis is tracked separately from the reactor coolant pump, there is no need to keep open reactor coolant pump RAI-TR34-005 until the loop analysis is completed.

The reactor coolant pumps are supported from the steam generator by the weld between the reactor coolant pump suction nozzles and steam generator channel head. Detailed design information for the steam generator channel head is provided in APP-MB01-Z0R-100, Revision 0, "AP1000 Steam Generator Summary Design Report" which was stated to be available for NRC audit per Westinghouse correspondence letter, DCP/NRC1907, AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-056, Revision 0. Conservative nozzle design loads were provided from the reactor coolant loop piping analysis to be used in the analysis of the steam generator. If loads defined in the future revision of the reactor coolant loop piping analysis are not bounded by the design loads previously provided from APP-RCS-PLR-050, Revision 1, AP1000 Reactor Coolant Loop (RCL): Piping Qualification, the steam generator analysis will be reconciled and a revision to APP-GW-GLR-056 will be issued to the NRC. Since the reactor coolant loop analysis is tracked separately from the reactor coolant pump and steam



# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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generator, there is no need to keep open reactor coolant pump RAI-TR34-005 until the loop analysis is completed.

Detailed design information for the reactor coolant pump casing and main closure, including qualification of the pump casing to steam generator channel head weld, is provided in APP-MP01-GLR-004, Revision 0, "Interim Casing and Main Closure Pressure Boundary Components, for the AP1000 Reactor Coolant Pump" which was stated to be available for NRC audit per Westinghouse correspondence letter, DCP/NRC1872, AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-052, Revision 0. This report provides information consistent with the RCP design described in TR34. Following completion of the reactor coolant loop piping analysis, a revision to the Casing and Main Closure Pressure Boundary Components Report will be issued. The scheduled completion date for the Final Casing and Main Closure Pressure Boundary Components Report is March, 31, 2008.

It is understood that RAI-TR34-006 will remain open to track the completion of the casing design.

**Design Control Document (DCD) Revision:**

None

**PRA Revision:**

None

**Technical Report (TR) Revision:**

None

# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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RAI Response Number: RAI-TR34-EMB2-06  
Revision: 0

### **Question:**

The responses to RAIs-TR34-5, -6, and -7 are incomplete. As a result of design change for Reactor Coolant Pump (RCP), Westinghouse stated, in its June 7, 2007, responses, that work is currently in progress to update the reactor coolant system loop configuration, and analyses are not final. Also, the design calculations for the adequacy of the RCP external heat exchanger are also incomplete (work is currently in progress). Therefore, RAIs TR34-5, -6 and -7 are still open. The applicant is requested to submit the detailed responses to those RAIs, item by item, when the final design calculations are complete.

### **Westinghouse Response:**

Detailed design information for the reactor coolant pump casing and main closure is provided in APP-MP01-GLR-004, Revision 0, "Interim Casing and Main Closure Pressure Boundary Components, for the AP 1000 Reactor Coolant Pump" which was stated to be available for NRC audit per Westinghouse correspondence letter, DCP/NRC1872, AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-052, Revision 0. A final revision of this report will be issued following the completion of the updated loop piping analysis and reconciliation of any revised loads relative to the current reactor coolant loop pump analyses. The final casing and main closure report is scheduled for completion March 31, 2008. See also the response to RAI-TR34-EMB2-05.

**Design Control Document (DCD) Revision:**  
None

**PRA Revision:**  
None

**Technical Report (TR) Revision:**  
None

# AP1000 TECHNICAL REPORT REVIEW

## Response to Request For Additional Information (RAI)

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RAI Response Number: RAI-TR34-EMB2-07  
Revision: 0

### **Question:**

The responses to RAIs-TR34-5, -6, and -7 are incomplete. As a result of design change for Reactor Coolant Pump (RCP), Westinghouse stated, in its June 7, 2007, responses, that work is currently in progress to update the reactor coolant system loop configuration, and analyses are not final. Also, the design calculations for the adequacy of the RCP external heat exchanger are also incomplete (work is currently in progress). Therefore, RAIs TR34-5, -6 and -7 are still open. The applicant is requested to submit the detailed responses to those RAIs, item by item, when the final design calculations are complete.

### **Westinghouse Response:**

Detailed design information for the reactor coolant pump external heat exchanger design and associated class 1 piping will be contained in the external heat exchanger generic design report and the Stator Cooling Jacket, Class1 Piping & Supports Generic Design Report (both scheduled for completion March 31, 2008).

It is understood that RAI-TR34-007 will remain open to track the completion of the external heat exchanger design.

### **Design Control Document (DCD) Revision:**

None

### **PRA Revision:**

None

### **Technical Report (TR) Revision:**

None