

July 7, 2015

Richard M. Paese, Acting Manager,
AP1000 Licensing and Inspection Support
Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF WESTINGHOUSE
ELECTRIC COMPANY REPORT NUMBER 99900404/2015-206

Dear Mr. Paese:

On June 10 to June 11, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Westinghouse Electric Company (WEC) facility in Rockville, MD. The purpose of this limited-scope inspection was to assess WEC's compliance with the provisions of selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities."

This inspection evaluated aspects of the WEC's corrective action program and design controls associated with the high confidence of low probability of failure values used in the Design Control Document and Shield Building Report. The enclosed report presents the results of this inspection.

During this inspection, the NRC staff evaluated implementation of WEC's corrective action and design control programs as it relates to the development of the AP1000 shield building. The NRC inspectors did not identify any findings of significance. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance program.

Within the scope of this inspection, no violations or nonconformances were identified.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's Rules of Practice, a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system, Agencywide Documents Access and Management System, which is accessible from the NRC Web site at <http://www.nrc.gov/readingrm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for

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withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

Kerri A. Kavanagh, Chief **/RA/**
Quality Assurance Vendor Inspection Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99900404

Enclosures:

1. Inspection Report No. 99900404/2015-206
and Attachment

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NRO-002

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DATE	06/30/2015	06/30/2015	07/07/2015

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**U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS
VENDOR INSPECTION REPORT**

Docket No.: 99900404

Report No.: 99900404/2015-206

Vendor: Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

Vendor Contact: Richard M. Paese, Acting Manager,
AP1000 Licensing and Inspection Support
Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066
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Nuclear Industry Activity: Westinghouse Electric Company, LLC, located at 1000
Westinghouse Drive, Cranberry Township, PA 16066, whose
scope of supply includes but not limited to safety-related design of
the shield building to the current US AP1000 plants under
construction.

Inspection Dates: June 10 - 11, 2015

Inspection Team Leader: Paul Prescott, NRO/DCIP/QVIB

Inspectors: Aaron Armstrong, NRO/DCIP/QVIB

Approved by: Kerri A. Kavanagh, Chief
Quality Assurance Vendor Inspection Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Enclosure

EXECUTIVE SUMMARY

Westinghouse Electric Company
99900404/2015-206

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this vendor inspection to verify that Westinghouse Electric Company, LLC (hereafter referred to as WEC), implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." The inspectors conducted this inspection at the WEC facility in Rockville, MD, on June 10-11, 2015.

This inspection specifically evaluated aspects of the WEC's corrective action program and design controls associated with the high confidence of low probability of failure (HCLPF) values used in the Design Control Document (DCD) and Shield Building Report.

The following regulation served as the bases for this NRC inspection:

- Appendix B to 10 CFR Part 50

The inspectors used Inspection Procedure 43002, "Routine Inspections of Nuclear Vendors," dated July 15, 2013.

The information below summarizes the results of this inspection.

Corrective Actions Associated with the HCLPF Values used in the DCD and Shield Building Report

The inspectors determined that WEC's implementation of their policies and procedures for the corrective actions associated with the HCLPF values used in the DCD and Shield Building Report satisfy the regulatory requirements set forth in Criterion XVI, "Corrective Action," and Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 and the associated quality assurance programmatic controls described in the Westinghouse AP1000 "Design Certification Document," Revision 19, Chapter 17, "Quality Assurance." No findings of significance were identified.

REPORT DETAILS

1. Corrective Actions Associated with the HCLPF Values used in the AP1000 DCD and Shield Building Report

a. Inspection Scope

The NRC inspection team reviewed WEC's policies and procedures that govern the implementation of the corrective action and design control programs to verify compliance with requirements in Criterion XVI, "Corrective Action," and Criterion III, "Design Control," of Appendix B to 10 CFR Part 50.

The NRC inspection team focused on verifying adequate corrective action and design implementation controls associated with the HCLPF¹ values used in the AP1000 DCD and Shield Building Report.

Specifically, the inspectors reviewed WEC's procedures, controlling guidance documents and interviewed WEC personnel responsible for evaluating the seismic margin HCLPF values of the shield building. The NRC inspection team also reviewed WEC's proposed causal factors and corrective actions for the difference in the HCLPF values for the Shield Building in Table 19.55-1 of the AP1000 DCD and those in the latest seismic margin calculation or the latest design report for the Shield Building.

b. Observations and Findings

The NRC inspection team evaluated the associated corrective actions for Corrective Action Program and Learning system (CAPAL) Number 100013160, "AP1000 DCD Revision 19, Table 19.55-1 Discrepancies in Shield Building HCLPF Values." The CAPAL identified that the NRC staff noted that WEC had not re-evaluated the HCLPF values consistent with the Shield Building re-analysis results that were documented in Appendix L of Document No. APP-1200-S3R-003, Revision 4, "Design Report for the AP1000 Enhanced Shield Building," dated June 2011. These values differed from those documented in Table 19.55-1 of the Design Control Document, Revision 19, "AP1000 Design Control Document," Chapter 19, "Probabilistic Risk Analysis," Section 19.55, "Seismic Margin Analysis."

In response, WEC updated the calculations in Engineering & Design Coordination Report (E&DCR) No. APP-PRA-GEF-005, Revision 0, "Update Calc APP-PRA-GSR-002, Revision 7 with the new Shield Building HCLPF Values," dated June 9, 2015. The E&DCR calculations used updated design information which considered thermal and seismic loads. The thermal loading that was applied to the Shield Building is the temperature difference between the outside and inside surfaces. WEC's subject matter experts (SMEs) determined that due to the outside air being drawn by passive containment, cooling air flow provides no significant thermal loads. However, WEC determined that the thermal and seismic loads in these regions are acceptable when compared to the American Concrete Institute (ACI) design code requirements.

¹ HCLPF is an earthquake magnitude at which a structure, system, or component is predicted with 95% confidence to have a failure probability of 5% or less.

WEC's analysis showed that the additional demands produced by the thermal loading do not have a significant influence on the structural characteristics. The calculation shows that the plastic collapse strength of the structure remains the same. Although the yield varies slightly from the calculations without thermal load and the updated calculations with thermal load, the structural collapse strength remains essentially unchanged.

The NRC inspection team noted that the revised calculations performed in the E&DCR will be used to update the next revision of Document No. APP-PRA-GSR-002, (Revision 8), "AP1000 Seismic Margin HCLPF Calculations." In discussions with WEC's SMEs, the DCD Table 19.55-1 will not be updated to reflect the new values. The change in values was not considered significant enough to warrant a revision to the DCD.

The NRC inspection team noted CAPAL 100013160 stated that the variance in the updated HCLPF values does not affect the probabilistic risk assessment (PRA) conclusion in Document No. APP-PRA-GSC-027, Revision 2, "AP1000 PRA-Based Seismic Margin Assessment Update," dated February 8, 2011. This is because there are other more dominant initiating event HCLPFs. For the structural (gross structural collapse) initiating event, other buildings are also more dominant.

No findings of significance were identified in this area.

c. Conclusion

The inspectors concluded that WEC's implementation of their policies and procedures for the corrective actions associated with the HCLPF values used in the DCD and Sield Building report were consistent with the regulatory requirements set forth in Criterion XVI, "Corrective Action," and Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 and the associated quality assurance programmatic controls described in the Westinghouse AP1000 "Design Certification Document," Revision 19, Chapter 17, "Quality Assurance." No issues of significance were identified.

6. Entrance and Exit Meetings

On June 10, 2015, the inspectors presented the inspection scope during an entrance meeting with Mr. David Paese, Acting Manager, AP1000 Licensing and Inspection Support, of WEC, and other WEC personnel. On June 11, 2015, the inspectors presented the inspection results during an exit meeting with Mr. David Paese, Acting Manager, AP1000 Licensing and Inspection Support, and other WEC personnel.

ATTACHMENT

1. PERSONS CONTACTED AND NRC STAFF INVOLVED:

Name	Affiliation	Entrance	Exit	Interviewed
Paul Prescott	NRC	X	X	
Aaron Armstrong	NRC	X	X	
Ronald Wessel	WEC	X	X	X
Jill Watson	WEC	X		X
William LaPay	WEC	X	X	
Richard Paese	WEC	X	X	
Jie Jennifer Zhang	WEC	X		X
Keith Coogler	WEC			X

2. INSPECTION PROCEDURES USED:

IP 43002, "Routine Inspections of Nuclear Vendors," dated July 15, 2013

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED:

Item Number	Status	Type	Description	Applicable ITAAC
N/A				

4. INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA:

COL #	DCD#	Design Commitment	Component/Activity
N/A			

5. DOCUMENTS REVIEWED:

WEC Procedures and Documents

- WEC 3.2.6, Revision 2, "Design Analysis," dated May 28, 2015
- WEC 16.2, Revision 8, "Westinghouse Corrective Action Program," dated April 21, 2015
- WEC 3.4.1, Revision 3, "Change Control for the AP1000 Plant Program," dated October 31, 2013
- WEC 3.3.3, Revision 2, "Design Verification," dated May 7, 2015
- Document No. APP-GW-GAP-420, Revision 8 "Engineering and Design Coordination Report," dated August 28, 2013

- Document No. APP-1200-S3R-003, Revision 4, "Design Report for the AP1000 Enhanced Shield Building," dated June 2011
- Document No. APP-PRA-GSR-002, Revision 7, "AP1000 Seismic Margin HCLPF Calculations," dated June 6, 2011
- Document No. APP-PRA-GSC-027, Revision 2, "AP1000 PRA-Based Seismic Margin Assessment Update," dated February 8, 2011
- Engineering & Design Coordination Report No. APP-PRA-GEF-005, Revision 0, "Update Calc APP-PRA-GSR-002, Revision 7 with the new Shield Building HCLPF Values," dated June 9, 2015

Corrective Action Documents

- CAPAL 100013160, "AP1000 DCC Revision 19 Table 19.55-1 Discrepancy in Shield Building HCLPF Values," dated August 27, 2014 (in-process)

Miscellaneous Documents

- EPRI NP-6041-SL, Revision 1, "A Methodology for Assessment of Nuclear Power Plants Seismic Margin," Electric Power Research Institute, dated 1998
- NEI 07-13, Revision 8P "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Nuclear Energy Institute, dated April 2011
- Design Control Document, Revision 19, "AP1000 Design Control Document," Chapter 19, "Probabilistic Risk Analysis," Section 19.55, "Seismic Margin Analysis,"

6. ACRONYMS USED:

ACI	American Concrete Institute
ADAMS	Agencywide Documents Access and Management System
CAPAL	Corrective Action Program and Learning system
CFR	<i>Code of Federal Regulations</i>
DCD	Design Control Document
DCIP	Division of Construction Inspection and Operational Programs
E&DCR	Engineering & Design Coordination Report
EPRI	Electric Power Research Institute
HCLPF	High Confidence of Low Probability of Failure
IP	Inspection Procedure
NEI	Nuclear Energy Institute
NON	Notice of Nonconformance
NOV	Notice of Violation
NRC	(U.S.) Nuclear Regulatory Commission
NRO	Office of New Reactors
SME	Subject Matter Expert
WEC	Westinghouse Electric Company