February 26, 2010

MEMORANDUM TO: Eileen M. McKenna, Chief
AP1000 Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

FROM: William C. Gleaves, Sr. Project Manager
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Division of New Reactor Licensing
Office of New Reactors

SUBJECT: SUMMARY OF A CATEGORY 1 PUBLIC MEETING HELD WITH WESTINGHOUSE ELECTRIC COMPANY REGARDING THE PROPOSED AP1000 SHIELD BUILDING DESIGN METHODOLOGY, HELD IN ROCKVILLE, MARYLAND ON DECEMBER 21-22, 2009

The U.S. Nuclear Regulatory Commission (NRC) held a closed meeting on December 21-22, 2009, at the NRC headquarters building in Rockville, Maryland. The NRC's Office of New Reactors (NRO) staff as well as staff from NRC Region II, Office of the General Council, and NRC contractors met with Westinghouse Electric Company (Westinghouse) staff, their contractors, and other Westinghouse stakeholders, to review the state of issues with the proposed AP1000 design submitted as part of their design certification amendment (DCA). Specifically, the participants discussed the technical issues related to the AP1000 proposed shield building design methodology. The discussions at the meeting were focused on the NRC's October 15, 2009, letter to Westinghouse stating the status of the shield building review and detailing issues identified in the course of that review.

The purpose of this meeting summary is to briefly describe the meeting, identify its participants, and to delineate the results. This meeting was noticed as a closed meeting in which the entire meeting would be proprietary and therefore closed to the public. There were approximately 38 persons in attendance at the meeting location, and approximately 10 persons attending by conference call. The meeting was delayed by weather on December 21, 2009, and started at 10:15 a.m. EST and ended at 3:35 p.m. on December 22, 2009.

Enclosed with this memorandum are the following: 1) meeting attendee list, 2) meeting teleconference list, 3) non-proprietary versions of the proprietary technical presentation slides, and 4) proprietary technical presentation slides discussed in the meeting

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Discussion

This meeting was another in a series of follow-up meetings to the NRC's letter to Westinghouse, dated October 15, 2009. The purpose of the meeting was to discuss Westinghouse's actions related to the issues identified in the letter. Specifically, the actions taken by Westinghouse and the progress made in addressing the NRC review issues with the AP1000 shield building.

The meeting began with comments by the NRC staff regarding the need to better understand the Westinghouse integrated methodology for analysis, testing and design of the shield building. The Westinghouse AP1000 Engineering Manager kicked off Westinghouse's presentations with general remarks and then transitioned to presenting Westinghouse's AP1000 shield building analysis and testing plan. Westinghouse clarified its focus for the meeting which was to layout the design process by identifying its analyses that would be benchmarked, defining tests and acceptance criteria, refining its seismic loads analyses and providing insight to the NRC on the status of ongoing work.

Subsequently, Westinghouse's contractor from Purdue University presented proprietary slides detailing the testing plans. The NRC staff raised a number of questions throughout the two days of presentations on testing.

Conclusion

The staff summarized the meeting by saying that the high-level overview of the proposed analysis approach (levels 1, 2 & 3) and the use of testing to benchmark the design is a reasonable approach. The testing approach of in-plane shear without tension also seemed reasonable. However, the staff delineated the following concerns:

1) Because the shield building is a seismic Category I structure, which based on ACI 318-09 is classified as an earthquake resistant structure and thus requires ductility, the NRC staff asked WEC how they intend to address ductility in the SC since the proposed test methods may not show ductility.

2) A test crosswalk (matrix) is needed to clarify the purpose of the proposed tests, the analysis level associated with the test, and whether WEC believes the test is confirmatory or benchmark (along with what analyses are to be benchmarked),

3) The NRC staff asked WEC to describe the cyclic and displacement controlled test method and the loading protocol (number of cycles and cycled at what stress levels) for the out-of-plane shear tests and stated that the proposed #6 stirrups spaced at 6 inches for use at higher shear stress areas should also be tested for its shear strength in order to ensure that the provided shear strength would be greater than the corresponding shear stress.

4) In order to be efficient and effective in our review, the NRC staff requests WEC to address the quality assurance process for use of computer codes such as ANSYS, LS-DYNA, and ABACUS. WEC was further requested to address which codes will generate QA records and which will not,

5) The staff stated that WEC should thoroughly address thermal effects (solar and construction heat) for the SC module regarding concrete cracking and steel fatigue issues, and should specifically address the stress in the anchorage area between the steel roof beams and the walls due to thermal growth or contraction of the steel beams,

6) The NRC staff also stated that WEC should address cyclic loading both in its analysis and testing with proper justification for the method chosen. The staff stated that, with regard to the in-plane shear test, the proposed test method is unacceptable due to the restraint of the boundary beams to the specimen, and will support a conference call, if needed, to discuss the details of the test.

7) Finally, the staff stated that it does not agree with the loading protocol (number of cycles and cycled at what stress levels) proposed by the WEC for the out-of plane shear tests because the specimens would be cycled at stress levels that would be too low. WEC agreed to discuss the issue in the next meeting.

Docket No. 52-006

Enclosures:
As stated

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NAME	RButler	BGleaves	EMcKenna
DATE	2/24/2010	2/26/2010	2/26/2010

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AP1000 Shield Building Closed Meeting
Public Meeting Attendance List
December 21-22, 2009

Name	Organization
James Beall	NRC
David Jaffe	NRC
Laura Dudes	NRC
Brian Thomas	NRC
Pravin Patel	NRC
John Ma	NRC
Eileen McKenna	NRC
Billy Gleaves	NRC
Bret Tegeler	NRC
Syed Ali	NRC
Ann Hodgdon	NRC
Chunlin Hou	NRC
Paul Kallan	NRC
Sunwoo Park	NRC
Jerry Chuang	NRC
Hernando Candra	NRC
Y.L. Mo	NRC/Consultant (University of Houston)
Thomas T.C. Hsu	NRC/Consultant (University of Houston)
Mike Corletti	Westinghouse
Ed Cummins	Westinghouse
Bruce Bevilacqua	Westinghouse
Rob Sisk	Westinghouse
Scott Altmayer	Westinghouse
John DeBlasio	Westinghouse
Penny Toniolo	Westinghouse
Charles Brinkman	Westinghouse
Mike Melton	Westinghouse
Leonardo Tunon-Sanjur	Westinghouse
Nicholas Brown	Westinghouse
Bob Kennedy	Westinghouse/consultant (SAAC)
Sanj Malushte	Westinghouse/consultant (Bechtel)
Amit Varma	Westinghouse/consultant (Purdue)
John McConaghy	Duke Energy
Eddie R Grant	NuStart
Don Moore	Southern Nuclear
Charles Pierce	Southern Nuclear
Christopher T Keenan	PGN
Xiaozhong Zhang	SNPEC (China)

Enclosure 1

AP1000 Shield Building Closed Meeting
Public Meeting Teleconference List
December 21-22, 2009

Joe Braverman	NRC/Consultant (Brookhaven National Laboratory)
Rich Morante	NRC/Consultant (Brookhaven National Laboratory)
Jinsuo Nie	NRC/Consultant (Brookhaven National Laboratory)
Jerry Hajjar	NRC/Consultant
Mr. Jirsa	NRC/Consultant
Frank Veccio	NRC/Consultant
Bob Whorton	SCE&G/SCANA
Ray Marsley	FPL
Jamin Seat	NRC Region II
Mr. Silka	Westinghouse

Westinghouse's Non-Proprietary Technical Presentation Slides

Adams Accession Number		**Presentation Title**
ML093640996		Enclosure 4, "AP1000 Shield Building Design" (Non-Proprietary version)
ML093640997		Enclosure 6, "AP1000 Testing Matrix" (Non-Proprietary version)
ML093640998		Enclosure 8, "AP1000 Test Summary: Out of Plane, Behavioral, Anchorage" (Non-Proprietary version)
ML093640999		Enclosure 10, "In-Plane Test" (Non-Proprietary version)
ML093641000		Enclosure 12, "AP1000 Shield Building Design – Part B" (Non-Proprietary version)
ML100050189		Letter to NRC, dated 12/30/09, "AP1000 Shield Building – In-Plane Behavior of Concrete Filled Steel (CFS) Elements"
ML100050190		Enclosure 1 to 12/30/09 WESTINGHOUSE letter, "In-Plane Behavior of Concrete Filled Steel (CFS) Elements" Presentation (Copyright)
ML100080056		Letter to NRC, dated 1/5/2010, "AP1000 Shield Building - Benchmarking, Analysis, Testing and Design Overview (Results)"
ML100080057		Enclosure 4 to 1/5/2010 WESTINGHOUSE letter, "Experimental Results and Benchmarked Analyses" (Non-Proprietary version)

Westinghouse's Proprietary Technical Presentation Slides

Adams Accession Number		**Presentation Title**
ML093641002		Enclosure 3, "AP1000 Shield Building Design" (Proprietary)
ML093641003		Enclosure 5, "AP1000 Testing Matrix" (Proprietary)
ML093641004		Enclosure 7, "AP1000 Test Summary: Out of Plane, Behavioral, Anchorage" (Proprietary)
ML093641005		Enclosure 9, "In-Plane Test" (Proprietary)
ML093641006		Enclosure 11, "AP1000 Shield Building Design – Part B" (Proprietary)
ML100080058		Enclosure 3 to 1/5/2010 WESTINGHOUSE letter, "Experimental Results and Benchmarked Analyses" (Proprietary)