November 24, 2003

MEMORANDUM TO: Laura A. Dudes, Section Chief
New Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs, NRR
Office of Nuclear Reactor Regulation

FROM: John P. Segala, Senior Project Manager ***/RA/***
New Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs, NRR
Office of Nuclear Reactor Regulation

SUBJECT: AUGUST 11, 2003, AP1000 TELEPHONE CONFERENCE CALL SUMMARY

On Monday, August 11, 2003, a telephone conference call was held with Westinghouse Electric Company (Westinghouse) representatives and Nuclear Regulatory Commission (NRC) staff to discuss fire protection issues. The NRC staff specifically discussed the Westinghouse response to draft safety evaluation report (DSER) open items (OIs) 9.5.1-1 and 9.5.1-2. Westinghouse submitted responses to these open items on July 3, 2003 (ADAMS Accession No. ML031920202). A list of call participants is included in Attachment 1. Attachment 2 contains the NRC staff's comments on Westinghouse's response to OI 9.5.1-2 that was sent to Mr. Michael Corletti of Westinghouse via electronic mail on August 8, 2003, and was used to facilitate discussions during the telephone conference call.

The following is a brief summary of the discussions regarding identified topics:

OI 9.5.1-1:

This OI is related to the use of a concrete/steel composite material, instead of concrete or masonry, for fire barriers in stairwells serving as access or egress routes.

The NRC staff requested that Westinghouse make the Underwriters Laboratory, Inc. (UL) test report for the AP1000 base concrete/steel composite material (from DuraSystems Barriers, Inc.) available for the staff to audit. Westinghouse agreed to make test report available for the staff to audit at Westinghouse's Washington Operations office in Rockville, MD.

OI 9.5.1-2:

This OI is related to the applicability of the fire-induced vulnerability evaluation (FIVE) methodology to model fires within containment.

The NRC staff stated that the FIVE methodology is a screening tool which may only be used for a simple compartment geometry fire hazards analysis. Westinghouse stated that the FIVE methodology was not used in the fire hazards analysis documented in AP1000 Appendix 9A to justify compliance with the regulatory requirements. Further, Westinghouse stated that they used a deterministic approach to establish AP1000 fire protection requirements. This information provided by Westinghouse clarified the staff's concern.

Docket No. 52-006

Attachments: As stated

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Distribution:
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RNRP R/F
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NIqbal
SWeerakkody

ACCESSION NUMBER: ML033080008

OFFICE	RNRP:PM	SPLB:SC	RNRP:SC
NAME	JSegala	SWeerakkody	LDudes
DATE	11/5/03	11/7/03	11/14/03

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AUGUST 11, 2003
TELEPHONE CONFERENCE CALLS SUMMARY
LIST OF PARTICIPANTS

Nuclear Regulatory Commission	Westinghouse
N. Iqbal	M. Corletti
J. Segala	J. Winters
	T. Johnson
	E. Cummins

Attachment 1

NUCLEAR REGULATORY COMMISSION STAFF COMMENTS
ON WESTINGHOUSE'S RESPONSE TO DSER OPEN ITEM 9.5.1-2
THAT WAS SENT TO WESTINGHOUSE TO FACILITATE DISCUSSIONS
DURING THE CALL HELD ON AUGUST 11, 2003

DSER Open Item 9.5.1-2

By the letter dated July 3, 2003, the applicant responded to DSER Open Item 9.5.1-2 concerning the Electric Power Research Institute (EPRI) Fire-Induced Vulnerability Evaluation (FIVE) methodology used to model fires within containment. The applicant stated in its response that, "Westinghouse believes that our licensing submittals related to fire protection have satisfied the written regulatory requirements and guidance for Design Certification. Westinghouse has provided fire hazards analysis in DCD Appendix 9A that demonstrates that AP1000 complies with or requests exemptions from the requirements BTP CMEB 9.5-1. AP1000, like the Design Certified AP600, has used a deterministic-based approach for the fire evaluation described in Chapter 9 of the AP1000 Design Control Documents (DCD). NFPA 805 clearly indicates that the designer may use either the deterministic or the probabilistic method for the fire evaluation. No regulation has changed since the Certification of AP600 and fire protection design is unchanged from AP600....."

The staff reviewed Westinghouse's response to Open Item 9.5.1-2 and noted that Westinghouse justified its response relying on the AP600 Design Certification. The AP1000 design is a stand alone design and the analysis and technical justifications to support the fire protection design should not be based upon the AP600 approval. Furthermore, the staff disagrees with Westinghouse that the FIVE methodology is an acceptable methodology for probabilistic analysis in accordance with National Fire Protection Association (NFPA) 805, "Performance-Based Standard For Fire Protection For Light Water Reactor Electric Generating Plants." NFPA 805 Appendix C refers to FIVE, however Appendix C is not a part of the requirements of the NFPA 805 standard, since it is included for information purposes only. Further, Section 1.1, "Scope," of NFPA 805 states that, "this standard specifies the minimum fire protection requirements for existing light water nuclear power plants." The AP1000 is a new design. The staff agrees with the applicant's clarification that they are in compliance with Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1 "Guidelines for Fire Protection for Nuclear Power Plants." BTP CMEB 9.5-1 provides guidelines acceptable to the NRC staff for implementing General Design Criterion (GDC) 3, "Fire protection," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, in the development of a fire protection program for nuclear power plants (NPPs). BTP CMEB 9.5-1 does not state that the staff approved FIVE as a fire modeling tool. It does, however, require evaluation of potential fire hazards in NPPs for IPEEE evaluations.

Westinghouse chose to use the FIVE methodology for the fire hazard analysis (FHA) inside the containment instead of using a more realistic computer fire modeling. The use of the FIVE methodology to examine a fire scenario in large open areas, such as the containment, is not appropriate, and as such exceeds its limitations. This limitation is clearly identified in the instruction guide for FIVE. For example, the redundant cable trays of safe shutdown equipment within the containment might be exposed to the fire plume and be susceptible to damage by a hot gas layer. Zone or computational fluid dynamics (CFD) computer codes provide a

comprehensive tool to examine the fire scenario that involve natural and mechanical ventilation and smoke spread from one zone to other zone, which could potentially damage additional equipment.

U.S. commercial nuclear utilities developed FIVE (in response to NRC Generic Letter 88-20, Supplement 4, and NUREG-1407) to perform individual plant examination external events (IPEEEs) to address the fire portion of the IPEEE. By the letter dated August 21, 1991, the NRC approved the use of the FIVE methodology for IPEEE evaluations only. The Commission has not yet endorsed the use of the results of the FIVE methodology as a part of plant specific licensing actions.

Screening calculations are often done in support of PRA analyses and specific plant change evaluations. They are intended to provide a first order of approximation. The FIVE methodology may be used for a simple compartment geometry FHA where no compartment effects (natural or mechanical ventilation) are important, while only localized fire effects are of interest. For complex geometry where compartment effects on hot gas layer temperature or oxygen depletion are important, zone or CFD computer codes should be used for the FHA. Unique or complex compartment and/or fuel geometry typical of a NPP can exceed the limitation of the FIVE methodology. The interaction with and effects of adjacent compartments on the fire environment can not be evaluated with FIVE since the screening tool is limited to a single compartment.

Although NFPA 805 applies to existing NPPs, Section 2.4.1.2.1, contains reasonable guidance that only fire models acceptable to the NRC [Authority Having Jurisdiction (AHJ)] shall be used in fire modeling calculations. Further, NFPA 805, Sections 2.4.1.2.2 and 2.4.1.2.3, state that the fire models shall only be applied within the limitations of that fire model, and shall be verified and validated.

Based on information which demonstrates that the FIVE methodology is not acceptable for certain areas (such as containment), the staff does not have reasonable assurance that the fire PRA developed for the containment is accurate. Therefore, staff is requesting Westinghouse to use a fire model in accordance with the NFPA 805, Section 2.4.1 for the containment FHA, in order to obtain useful and realistic results.

AP 1000

cc:

Mr. W. Edward Cummins
AP600 and AP1000 Projects
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

Mr. H. A. Sepp
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230

Lynn Connor
Doc-Search Associates
2211 SW 1ST Ave - #1502
Portland, OR 97201

Barton Z. Cowan, Esq.
Eckert Seamans Cherin & Mellott, LLC
600 Grant Street 44th Floor
Pittsburgh, PA 15219

Mr. Ed Rodwell, Manager
Advanced Nuclear Plants' Systems
Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94304-1395

Charles Brinkman, Director
Washington Operations
Westinghouse Electric Company
12300 Twinbrook Parkway, Suite 330
Rockville, MD 20852

Mr. R. Simard
Nuclear Energy Institute
1776 I Street NW
Suite 400
Washington, DC 20006

Mr. Thomas P. Miller
U.S. Department of Energy
Headquarters - Germantown
19901 Germantown Road
Germantown, MD 20874-1290

Mr. David Lochbaum
Nuclear Safety Engineer
Union of Concerned Scientists
1707 H Street NW, Suite 600
Washington, DC 20006-3919

Mr. Paul Gunter
Nuclear Information & Resource Service
1424 16th Street, NW., Suite 404
Washington, DC 20036

Mr. Tom Clements
6703 Guide Avenue
Takoma Park, MD 20912

Mr. James Riccio
Greenpeace
702 H Street, NW, Suite 300
Washington, DC 20001

Mr. James F. Mallay, Director
Regulatory Affairs
FRAMATOME, ANP
3315 Old Forest Road
Lynchburg, VA 24501

Mr. Ed Wallace, General Manager
Projects
PBMR Pty LTD
PO Box 9396
Centurion 0046
Republic of South Africa

Mr. Vince Langman
Licensing Manager
Atomic Energy of Canada Limited
2251 Speakman Drive
Mississauga, Ontario
Canada L5K 1B2

Mr. Gary Wright, Manager
Office of Nuclear Facility Safety
Illinois Department of Nuclear Safety
1035 Outer Park Drive
Springfield, IL 62704

Dr. Gail H. Marcus
U.S. Department of Energy
Room 5A-143
1000 Independence Ave., SW
Washington, DC 20585

Mr. Paul Leventhal
Nuclear Control Institute
1000 Connecticut Avenue, NW
Suite 410
Washington, DC 20036

Mr. Jack W. Roe
SCIENTECH, INC.
910 Clopper Road
Gaithersburg, MD 20878

Patricia Campbell
Winston & Strawn
1400 L Street, NW
Washington, DC 20005

Mr. David Ritter
Research Associate on Nuclear Energy
Public Citizens Critical Mass Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

Mr. Ronald P. Vijuk
Manager of Passive Plant Engineering
AP1000 Project
Westinghouse Electric Company
P. O. Box 355
Pittsburgh, PA 15230-0355