

June 4, 2003

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

Dear Mr. Cummins:

As you are aware, the U. S. Nuclear Regulatory Commission (NRC) staff is preparing the draft safety evaluation report (DSER) for the AP1000 design certification application submitted by Westinghouse Electric Company (Westinghouse) on March 28, 2002. The staff expects to issue the DSER in June, 2003. As of this date, the staff has identified five potential open items for DSER Chapter 9, "Auxiliary Systems" which are enclosed for your information. Please note that the staff's review of the application will continue during preparation of the DSER, which may result in changes to the potential open items identified in the enclosure, or the addition of other open items.

Three of the potential open items in the enclosure are new issues. The other two potential open items in the enclosure have the original request for additional information (RAI) number included for reference. If the staff cannot resolve the potential open items before the issuance of the DSER, these items will be issued as DSER open items and be tracked with a corresponding open item number.

Previously, Westinghouse committed to provide responses to all identified open items within 9 weeks after the issuance of the DSER. The staff will be prepared to review your responses to the open items and have conference calls and meetings with your staff, as appropriate, after the DSER is issued. If Westinghouse chooses to address some or all of these open items before the issuance of the DSER, the staff may not have sufficient time to evaluate every response to the potential open items that Westinghouse submits to the NRC and make changes to the DSER before the scheduled DSER issuance in June, 2003.

Please contact one of the following members of the AP1000 project management team if you have any questions or comments concerning this matter: Mr. John Segala (Lead Project Manager) at (301) 415-1858 or [jps1@nrc.gov](mailto:jps1@nrc.gov), Mr. Joseph Colaccino at (301) 415-2752 or [jxc1@nrc.gov](mailto:jxc1@nrc.gov), or Ms. Joelle Starefos at (301) 415-8488 or [jls1@nrc.gov](mailto:jls1@nrc.gov).

Sincerely,

/RA/

James E. Lyons, Director  
New Reactor Licensing Project Office  
Office of Nuclear Reactor Regulation

Docket No. 52-006

Enclosure: As stated

cc: See next page

June 4, 2003

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

Dear Mr. Cummins:

As you are aware, the U. S. Nuclear Regulatory Commission (NRC) staff is preparing the draft safety evaluation report (DSER) for the AP1000 design certification application submitted by Westinghouse Electric Company (Westinghouse) on March 28, 2002. The staff expects to issue the DSER in June, 2003. As of this date, the staff has identified five potential open items for DSER Chapter 9, "Auxiliary Systems" which are enclosed for your information. Please note that the staff's review of the application will continue during preparation of the DSER, which may result in changes to the potential open items identified in the enclosure, or the addition of other open items.

Three of the potential open items in the enclosure are new issues. The other two potential open items in the enclosure have the original request for additional information (RAI) number included for reference. If the staff cannot resolve the potential open items before the issuance of the DSER, these items will be issued as DSER open items and be tracked with a corresponding open item number.

Previously, Westinghouse committed to provide responses to all identified open items within 9 weeks after the issuance of the DSER. The staff will be prepared to review your responses to the open items and have conference calls and meetings with your staff, as appropriate, after the DSER is issued. If Westinghouse chooses to address some or all of these open items before the issuance of the DSER, the staff may not have sufficient time to evaluate every response to the potential open items that Westinghouse submits to the NRC and make changes to the DSER before the scheduled DSER issuance in June, 2003.

Please contact one of the following members of the AP1000 project management team if you have any questions or comments concerning this matter: Mr. John Segala (Lead Project Manager) at (301) 415-1858 or jps1@nrc.gov, Mr. Joseph Colaccino at (301) 415-2752 or jxc1@nrc.gov, or Ms. Joelle Starefos at (301) 415-8488 or jls1@nrc.gov.

Sincerely,

/RA/

James E. Lyons, Director  
New Reactor Licensing Project Office  
Office of Nuclear Reactor Regulation

Docket No. 52-006

Enclosure: As stated  
cc: See next page

Distribution:

Hard Copy JLyons  
MGamberoni JColaccino  
JSegala NRLPO R/F  
PUBLIC  
JStarefos

E-Mail  
SCollins  
RBorchardt  
ACRS  
AP1000 reviewers  
OGC  
SBlack  
GTracy  
RBarret  
BBoger  
DMatthews

AP1000SCs  
AP1000BCs

ADAMS ACCESSION NUMBER: ML031470812

OFFICE	PM:NRLPO	DD:NRLPO	D:NRLPO
NAME	JSegala	MGamberoni	JLyons
DATE	05/28/03	06/2/03	06/3/03

OFFICIAL RECORD COPY

**Westinghouse AP1000  
Draft Safety Evaluation Report  
Potential Open Items  
Chapter 9  
Auxiliary Systems**

Open Item Number: 9.5.1-1

Original RAI(s): 280.001

Summary of Issue: Personnel access and egress routes are provided for each fire area. Stairwells outside containment, serving as access or egress routes, are enclosed in gypsum towers, with a minimum fire resistance rating of two hours. The stairwells are equipped with self-closing doors, with a fire resistance rating of one and a half hours. The NRC staff previously granted Deviation 9.5.1-2 for the use of gypsum stair towers in lieu of concrete or masonry for the AP600 in NUREG 1512, on the basis that there were no missile hazards in the vicinity of the subject stairwells.

Following the events of September 11, 2001, the Federal Emergency Management Agency (FEMA) issued report FEMA 403, "World Trade Center Building Performance Study: Data Collection, Preliminary Observations and Recommendations," dated May 2002. Based on the performance of the gypsum stairwell enclosures in the World Trade Center following the aircraft impacts, Section 8.2.2.1 of the FEMA report recommends the use of impact-resistant enclosures around egress paths, such as stairwells.

In light of this information, the staff has re-considered its previous acceptance of gypsum stairwell enclosures in lieu of the concrete or masonry enclosure which is specified in BTP CMEB 9.5-1. In RAI 280.001, the staff requested an evaluation of the stairwells that have not been enclosed in masonry or concrete towers with a minimum fire rating of 2 hours as specified in Regulatory Position C.5.a.6. of CMEB 9.5.1. In addition, the staff requested that Westinghouse provide a revision to the DCD to incorporate the original BTP guidance for the use of concrete or masonry enclosures. The staff reviewed the applicant's revised response and determined that the resolution of this issue is inadequate for the following three reasons:

- In place of the gypsum, Westinghouse proposed installation of a fire barrier material noted as a "concrete/steel composite material." This material would be installed throughout the auxiliary, turbine, and annex buildings to enclose stairwells, as shown in the revision to Item 55 in DCD Tier 2 Table 9.5.1-1. The applicant has not demonstrated that the as-built configuration would meet the applicable regulations (GDC 3, "Fire Protection,"

Enclosure

and BTP CMBE 9.5-1). The use of the concrete/steel composite material is inadequate for the following reasons:

- No documentation or test reports were submitted to verify the rating of the fire barrier. The documentation should demonstrate that this composite material withstood a standard fire exposure as specified in NFPA 251, "Tests of Fire Endurance of Building Construction and Materials," also known as ASTM E119, "Standard Test Method of Fire Tests of Building Construction and Materials." For additional guidance, see Section 3.1.6 of GL 86-10, "Implementation of Fire Protection Requirements."
- Section 3.2 of GL 86-10 provides additional guidance on Fire Barrier Qualification. It does not appear from the information submitted by Westinghouse, that this guidance was evaluated to demonstrate that the composite barrier material provided an equivalent level of safety to concrete or masonry. For example, information pertaining to the following for the fire barrier material were not discussed in the Westinghouse RAI response in regards to:
  - Deviations between the field installation and the tested configuration.
  - ASTM E-119 acceptance criteria (hose stream tests results, temperatures on the unexposed side of the barrier, no passage of flames or ignition to unexposed side, etc.)

On this basis, the staff does not agree that Westinghouse has demonstrated that the performance of the composite steel/concrete barrier provides an equivalent level of safety to that provided by meeting BTP CMEB 9.5-1.

- Failure to provide adequate protection for stairwells S03 & S06 in accordance with BTP CMEB 9.5-1.

The BTP requires that stairwells outside of primary containment serving as escape routes, access for firefighting or, access routes to areas containing equipment necessary for safe shutdown, be enclosed in concrete or masonry. In the auxiliary building, stairwell S03 provides an entry point to S06 (PCS Valve Room). The PCS system is identified in DCD Tier 2 Section 6.2.2.2.2 as a safety-related system. Stairwells S03 and S06 are located above ground, have no adjacent structures which would provide a shield or additional protection for either stair tower, and have no alternate stairwells for personnel to travel in the event that either S03 or S06 is impacted by an external missile. The applicant

revised Item 55 in DCD Tier 2 Table 9.5.1-1 to state that, "There is little need for access to this room (PCS Valve Room). Protection of these stairwells by concrete or masonry walls is not required." The staff disagrees with this statement.

In the event of an external missile which impacts either stairwell, plant personnel located in plant areas served by these stairwells, would not have an alternate escape route to compensate for the lack of structural protection in stairwells S03 and S06. These stairwells are the primary escape routes and have not been protected in accordance with BTP CMEB 9.5-1.

- For those stairwells where concrete is partially installed on the exterior walls, the applicant stated that the thickness of the concrete varies between 0.61 to 0.91 m (2 to 3 ft) thick. For installation of the composite steel/concrete barrier on the interior walls of these stairwells, the thickness was noted as 20.3 cm (8 in). No analysis was presented to demonstrate from a structural design, that 20.3 cm (8 in) of the composite material would provide an equivalent level of structural integrity to 0.61 to 0.91 m (2 to 3 ft) thickness of concrete. On this basis, the staff does not agree that Westinghouse has demonstrated that the performance of the composite steel/concrete barrier provides an equivalent level of safety to that provided by meeting BTP CMEB 9.5-1.

Therefore, this item is unresolved until further clarification is provided by Westinghouse.

Open Item Number: 9.5.1-2

Original RAI(s): 280.011

Summary of Issue: In RAI 280.011, the NRC staff raised a concern that 41 percent of the total fire induced core damage frequency (CDF) is assigned to containment. The containment fire is such a large contributor, and there are areas in containment which exist where redundant safe shutdown components required following a fire have not been separated by complete fire barriers. Therefore, the NRC staff requested that the applicant perform a mathematical fire model in accordance with NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." The fire model should demonstrate that a fire would be confined to the zone of origin such that redundant components remain free of fire damage. The applicant selected the fire-induced vulnerability evaluation (FIVE) methodology (EPRI TR-100370, "Fire-Induced Vulnerability Evaluation," issued April 1992), which is not a mathematical fire model. FIVE was approved by the NRC in the early 1990's primarily as a tool to provide a qualitative assessment of fire risk for the individual plant examination of external events (IPEEE) to perform fire probabilistic

risk assessments (PRAs). The FIVE methodology is limited in that large open areas, such as those in containment, are not capable of being realistically modeled. Therefore, the NRC staff expressed concern that the FIVE methodology was not appropriate to model fires within containment.

The applicant responded to the RAI and stated that NFPA 805 permits the use of the FIVE methodology. The staff responded that Appendix C Section C.2.2., "Fire Model Features and Limitation" of NFPA 805 specifically states that the limitations of each fire model should be taken into consideration, in order to produce reliable results, that will be useful in decision making. This section specifically states that *"Some models may not be appropriate for certain conditions and can produce erroneous results if applied incorrectly."* The intent of the Appendix C, Table C.2.2.(b), is to enable the user to select the appropriate model for a particular fire area, in order to obtain useful estimates to best approximate the conditions within an enclosure as a result of an internal fire. In addition, NFPA 805 states that the fire model shall be acceptable by the authority having jurisdiction (AHJ). In this case, the AHJ is the NRC. The use of the FIVE methodology has not been accepted outside of the IPEEEs at the NRC. The staff does not agree that the use of FIVE is an appropriate choice to model a fire within containment. Therefore, this item is unresolved.

Open Item Number: 9.5.2-1

Original RAI(s): None

Summary of Issue: 10 CFR 73.55 (e) (f) discusses that placement of backup power supplies for certain communication systems be in vital areas. This has not been addressed in the DCD. Therefore, this is Open Item 9.5.2-1.

Open Item Number: 9.5.2-2

Original RAI(s): None

Summary of Issue: 10 CFR 73.55 (g) mentions testing requirements for certain communication systems. This has not been addressed in the DCD. Therefore, this is Open Item 9.5.2-2.

Open Item Number: 9.5.2-3

Original RAI(s): None

Summary of Issue: SRP Section 9.5.2 provides reviewer guidance on the design of communication systems (i.e intra-plant and plant to offsite). Part of that guidance states, "Communications system will be protected from EMI/RFI effects of other plant equipment and there will be adequate testing and

field measurements where necessary to demonstrate effective communications." In addition, SRP Section 9.5.2 discusses the need for communication equipment to provide effective communication during the "full spectrum of ...conditions ...under maximum potential noise levels."

The staff believes the DCD has not sufficiently covered communication testing for plant startup and operations in sufficient detail to facilitate understanding of how effective communications will be demonstrated including EMI/RFI effects on the equipment. The staff also believe the DCD has not sufficiently addressed how effective communications will be sustained for maximum potential noise levels. Therefore, this is Open Item 9.5.2-3.



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 1<sup>ST</sup> Ave - #1502  
Portland, OR 97201

Barton Z. Cowan, Esq.  
Eckert Seamans Cherin & Mellott, LLC  
600 Grant Street 44<sup>th</sup> 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  
Project Management  
Lake Buena Vista Bldg., 3<sup>rd</sup> Floor  
1267 Gordon Hood Avenue  
Centurion 0046  
Republic of South Africa  
PO Box 9396 Centurion 0046

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. Edwin Lyman  
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. Michael M. Corletti  
Passive Plant Projects & Development  
AP600 & AP1000 Projects  
Westinghouse Electric Company  
P. O. Box 355  
Pittsburgh, PA 15230-0355