February 28, 2008

Mr. W. E. Cummins, Vice President
Regulatory Affairs and Standardization
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

SUBJECT: PIPING DESIGN ACCEPTANCE CRITERIA

Dear Mr. Cummins:

The purpose of this letter is to respond to Westinghouse Electric Company's (Westinghouse) proposal as part of Revision 16 to the AP1000 Design Control Document (DCD) to resolve piping design acceptance criteria (DAC), and thus remove Tables 1-1 and 1-2 from the DCD, as part of the design certification amendment. This letter documents staff positions about acceptable means to resolve piping DAC, as well as other approaches to deal with DAC that are available.

Over the last several months, (see Westinghouse letters of April 20, August 21, and December 12, 2007, and U.S. Nuclear Regulatory Commission (NRC) letters of August 20, 2007 and meeting summary for October 11, 2007 meeting) the NRC and Westinghouse have exchanged correspondence regarding what constitutes sufficient piping design information to demonstrate implementation of the piping design, such that the DAC could be resolved as part of the proposed AP1000 certified design amendment. More recently, Westinghouse sent a letter dated January 11, 2008, proposing to reinstate the two tables in the DCD since the current status of the detailed safety-related piping design was not sufficient to support resolution of the DAC at this time.

In order to resolve piping DAC in particular at the design certification stage (pursuant to Title 10, Code of Federal Regulations, Part 52, Section 52.63 (a)(1)(iv)), the staff has determined that a graded approach, which takes into account the insights obtained from the AP1000 Design Certification probabilistic risk assessment, can be used to adequately demonstrate all aspects of the piping design. The staff determined that the risk significant packages (a total of 49 packages, listed in Enclosure 1) plus the remainder of one system (in the case of the reactor coolant system, 10 additional packages) provide a graded approach for NRC staff approval of implementation of the piping DAC. A successful audit of an NRC-selected sample of this completed portion of the design would allow staff to develop a safety evaluation to address American Society of Mechanical Engineers Class 1, 2, and 3 piping. This would form the basis to resolve piping DAC in the amendment.

The staff remains ready to conduct an audit of a model “complete” piping package to achieve mutual understanding of what constitutes a complete design package that could support resolution of piping DAC in this manner.

As further discussed in Enclosure 2, there are various options for resolution of any given DAC; some of these options would result in resolution prior to licensing or during construction. Option A in Enclosure 2 is the only process for resolution of DAC that provides finality for all combined Operation License applications.

Finally, as discussed in more detail in Enclosure 3, there are also options available to reformulate current piping DAC into a form that would be more amenable to resolution as the design information is completed.

In conclusion, the staff requests that if Westinghouse desires to resolve DAC as part of the amendment, that they contact us when their piping analyses are at a stage that they can satisfy the staff position described in this letter. If a different approach (such as those discussed in Enclosure 3) is contemplated, the staff is prepared to meet with Westinghouse when requested to discuss these options in more detail.

Sincerely,

/RA/

David B. Matthews, Director
Division of New Reactor Licensing
Office of New Reactors

Enclosures:
1. Risk Significant AP1000 Piping Packages
2. Process options for DAC resolution
3. Means for reformulation or partial closure

cc: See next page

The staff remains ready to conduct an audit of a model "complete" piping package to achieve mutual understanding of what constitutes a complete design package that could support resolution of piping DAC.

As further discussed in Enclosure 2, there are various options for resolution of any given DAC; some of these options would result in resolution prior to licensing or during construction. Option A in Enclosure 2 is the only process for resolution of DAC that provides finality for all combined Operation License applications.

Finally, as discussed in more detail in Enclosure 3, there are also options available to reformulate current piping DAC into a form that would be more amenable to resolution as the design information is completed.

In conclusion, the staff requests that if Westinghouse desires to resolve DAC as part of the amendment, that they contact us when their piping analyses are at a stage that they can satisfy the staff position described in this letter. If a different approach (such as those discussed in Enclosure 3) is contemplated, the staff is prepared to meet with Westinghouse when requested to discuss these options in more detail.

Sincerely,

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RISK SIGNIFICANT AP1000 PIPING PACKAGES

ASME CLASS 1 PIPE INSIDE CONTAINMENT

APP-PXS-PLR-010	Direct Vessel Injection, Core Makeup Tank Discharge, Normal Residual Heat Removal Discharge, In-Containment Refueling Water Storage Tank Gravity Injection, and Containment Recirculation Lines Train A (8, 6, 1)
APP-PXS-PLR-020	Direct Vessel Injection, Core Makeup Tank Discharge, Normal Residual Heat Removal Discharge, In-Containment Refueling Water Storage Tank Gravity Injection, and Containment Recirculation Lines Train B (8, 6, 1)
APP-PXS-PLR-030	ADS Stage 4 Loop 1 and PRHR HX Inlet Isolation (18, 14, 12)
APP-PXS-PLR-040	PRHR HX Return Loop 1 (14)
APP-PXS-PLR-050	Core Makeup Tank Supply Train A (8)
APP-PXS-PLR-060	Core Makeup Tank Supply Train B (8)
APP-RCS-PLR-010	ADS Stage 1, 2, and 3 and Pressurizer Safety Valve Inlets (14, 8, 6, 4)
APP-RCS-PLR-020	Pressurizer Spray, Auxiliary Spray, CVS Letdown, CVS Charging (4, 3,2)
APP-RCS-PLR-030	ADS Stage 4 Loop 2 (18, 14)
APP-RCS-PLR-040	Pressurizer Surge line Loop 1 (18)
APP-RCS-PLR-050	Primary Loop (22, 31)
APP-RNS-PLR-010	Normal Residual Heat Removal Suction Loop 2 (20, 12, 10)

TABLE A-2 ASME CLASS 2/3 PIPE INSIDE CONTAINMENT

APP-CCS-PLR-040	Component Cooling from Penetration C01 IRC (10*)
APP-CCS-PLR-050	Component Cooling from Penetration C02 IRC (10,1*)
APP-CVS-PLR-090	CVS Makeup from Penetration C03 IRC 3 (1*)
APP-CVS-PLR-100	CVS Letdown from Penetration 002 IRC 2
APP-PXS-PLR-050	Core Makeup Tank Supply Train A (1)
APP-PXS-PLR-060	Core Makeup Tank Supply Train B (1)
APP-PXS-PLR-620	ACC-A/B3 Makeup (1)
APP-PXS-PLR-***	Cross Connection for Containment Recirculation Screens A/B (6)
APP-RCS-PLR-010	ADS Stage 1, 2, and 3 and Pressurizer Safety Valve Inlets (3, 1)
APP-RNS-PLR-010	Normal Residual Heat Removal Suction Loop 2 (10, 3, 1)
APP-SFS-PLR-600	SFS from Penetration C01 (4)
APP-SGS-PLR-010	Feedwater to SG 01 (20)
APP-SGS-PLR-020	Feedwater to SG 02 (20)
APP-SGS-PLR-030	Main Steam to SG 01 (38,1)
APP-SGS-PLR-040	Main Steam to SG 02 (38,1)
APP-SGS-PLR-070	SG 01 Blowdown to Penetration C03A (4, 1)
APP-SGS-PLR-080	SG 02 Blowdown to Penetration C03B (4, 1)
APP-SGS-PLR-310	SG 01 Startup Feed Water from Penetration C05A (6)
APP-SGS-PLR-320	SG 02 Startup Feed Water from Penetration C05B (6)
APP-VWS-PLR-500	VWS Supply from Containment Penetration C02 (8, 1)
APP-VWS-PLR-530	VWS Return to Containment Penetration C01 (8)

Note: *** indicates that the analysis package number has not been assigned

TABLE A-3 ASME CLASS 2/3 PIPE OUTSIDE CONTAINMENT

APP-CCS-PLR-810	Component Cooling from Penetration C01 ORC (10, 1)
APP-CCS-PLR-820	Component Cooling from Penetration C02 ORC (10)
APP-CVS-PLR-530	CVS Makeup from Penetration C03 ORC (3)
APP-PCS-PLR-100	PCS Recirculation, DWS Supply, and FPS Supply (6,4,3,2,1)
APP-PCS-PLR-***	Recirculation Line Embedded Pipe (4)
APP-RNS-PLR-100	From Spent Fuel to RNS and PCCWST Drain (8, 2,1)
APP-RNS-PLR-170	Normal RHR to Heat Exchangers and Pumps from Containment Penetrations C01 and C02 (10, 8, 6, 4, 3,1)
APP-SFS-PLR-350	Spent Fuel Cooling Module R3-65 (6, 4, 2, 1)
APP-SGS-PLR-010	Feedwater to SG 01 (20, 1)
APP-SGS-PLR-020	Feedwater to SG 02 (20, 1)
APP-SGS-PLR-030	Main Steam to SG 01 (38, 24, 12, 10, 8, 6,3,2, 1)
APP-SGS-PLR-040	Main Steam to SG 02 (38, 24, 12, 10, 8,6, 3,2, 1)
APP-SGS-PLR-110	SG 01 Startup Feed Water to Penetration C05A (6)
APP-SGS-PLR-120	SG 02 Startup Feed Water to Penetration C05B (6)
APP-VBS-PLR-***	Nonradioactive Vent Return from Main Control Room (28,1)
APP-VBS-PLR-***	Nonradioactive Vent Supply to Main Control Room (28,16,1)
APP-VWS-PLR-910	VWS Supply to Containment Penetration C02 (8)
APP-VWS-PLR-920	VWS Return from Containment Penetration C01 (8, 1)

PROCESS OPTIONS FOR DAC RESOLUTION

Option A: Resolve through design certification process (e.g., amendment)

- DC applicant submits the design information that demonstrates the acceptance criteria of the DAC are met
- NRC staff documents its review in a DC safety evaluation
- Design certification rule (as issued or amended) no longer contains this DAC

Option B: Resolve as part of the combined license (COL) review (before license is issued)

- COL applicant submits the design information that demonstrates the acceptance criteria
- Staff documents review in COL safety evaluation; the DAC is resolved for that COL
- To extent design information is standard, subsequent COLs may be able to include same information in their application and staff SER could reflect “R-COL” review for these subsequent applications
- DC rule is unchanged

Option C: Resolve after license is issued (like other ITAAC)

- COL holder develops the design information to demonstrate that the acceptance criteria are met and provide notification to NRC when complete
- Staff inspects the information and documents its results in inspection reports
- DC rule is unchanged

MEANS FOR REFORMULATION OR PARTIAL CLOSURE OF PIPING DAC

The staff recognizes that the current form of the piping Design Acceptance Criteria for the AP1000, which includes one statement covering design reports for all American Society of Mechanical Engineers ASME Class 1, 2 and 3 piping, poses challenges for an applicant or combined operating license holder to complete. The staff believes there are means available to reformulate this DAC to make them more straightforward to resolve in the future.

For example, in place of the existing piping DAC, there could instead be design Inspections Tests Analysis and Acceptance Criteria for each of the systems currently addressed under DAC to allow inspection of the piping design, similar to the ITAAC for as-built reconciliation. This would allow an applicant to resolve the DAC in portions as the design is completed.

Alternatively, an applicant could complete the (ASME) Class 1 piping packages and the associated DAC could be resolved as part of the amendment for Class 1. Under this approach, in addition to the Class 1 packages, the staff would require the completion of all packages for one complete system (the reactor coolant system was used as an example by the staff) to allow the staff to review the implementation of each aspect of the DAC. Upon successful audit (through sampling) of these packages, a safety evaluation could be written for the ASME Class 1 portion of the piping design, which would allow closure of the ASME Class 1 portion of the piping DAC in the AP1000 design certification amendment. The ASME Class 2 and 3 portion of piping DAC would remain in effect, either in their current form, but only for ASME Class 2 and 3 piping, or the DAC for those piping classes could be rewritten as system-based design ITAAC as discussed above; it would be necessary to have design ITAAC for all systems for which DAC is unresolved.

In addition to system-based design ITAAC, in any reformulation of the existing DCD information, the staff may decide to designate other parts of Tables 1-1 and Table 1-2 as Tier 2* information, and also that discussion on how these ITAAC will be resolved should be added to the DCD.

DC Westinghouse - AP1000 Mailing List (Revised 1/3/08)

cc:

Mr. Glenn H. Archinoff
AECL Technologies
481 North Frederick Avenue
Suite 405
Gaithersburg, MD 20877

Ms. Michele Boyd
Legislative Director
Energy Program
Public Citizens Critical Mass Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

W. Craig Conklin, Director
Chemical and Nuclear Preparedness &
Protection Division (CNPPD)
Office of Infrastructure Protection
Department of Homeland Security
Washington, DC 20528

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

Mr. Marvin Fertel
Senior Vice President
and Chief Nuclear Officer
Nuclear Energy Institute
1776 I Street, NW
Suite 400
Washington, DC 20006-3708

Mr. Ray Ganthner
AREVA, Framatome ANP, Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

Mr. Jay M. Gutierrez
Morgan, Lewis & Bockius, LLP
1111 Keystone State Avenue, NW
Washington, DC 20004

Ms. Sophie Gutner
P.O. Box 4646
Glen Allen, VA 23058

Mr. Ronald Kinney
South Carolina DHEC
2600 Bull Street
Columbia, SC 29201

Ms. Marilyn Kray
President
NuStart Energy Development, LLC
200 Exelon Way, KSA3-N
Kennett Square, PA 19348

Dr. Regis A. Matzie
Senior Vice President and
Chief Technology Officer
Westinghouse Electric Company
20 International Drive
Windsor, CT 06095

Vanessa E. Quinn, Acting Director
Technological Hazards Division
National Preparedness Directorate
Federal Emergency Management Agency
500 C Street, NW
Washington, DC 20472

Mr. Ed Wallace
General Manager - Projects
PBMR Pty LTD
P. O. Box 9396
Centurion 0046
Republic of South Africa

Mr. Gary Wright, Director
Division of Nuclear Facility Safety
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Email

amonroe@scana.com (Amy Monroe)
APAGLIA@Scana.com (Al Paglia)
APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
bennettS2@bv.com (Steve A. Bennett)
bob.brown@ge.com (Robert E. Brown)
BrinkmCB@westinghouse.com (Charles Brinkman)
Carellmd@westinghouse.com (Mario D. Carelli)
chris.maslak@ge.com (Chris Maslak)
cristina.Ionescu@pgnmail.com (Christina Ionescu)
crpierce@southernco.com (C.R. Pierce)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
dlochbaum@UCSUSA.org (David Lochbaum)
eddie.grant@excelservices.com (Eddie Grant)
erg-xl@cox.net (Eddie R. Grant)
frankq@hursttech.com (Frank Quinn)
garry.miller@pgnmail.com (Garry D. Miller)
gcesare@enercon.com (Guy Cesare)
greshaja@westinghouse.com (James Gresham)
gwcurtis2@tva.gov (G. W. Curtis)
gzinke@entergy.com (George Alan Zinke)
ian.c.rickard@us.westinghouse.com (Ian C. Richard)
james.beard@gene.ge.com (James Beard)
jcurtiss@winston.com (Jim Curtiss)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
jim.riccio@wdc.greenpeace.org (James Riccio)
jim@ncwarn.org (Jim Warren)
JJNesrsta@cpsenergy.com (James J. Nesrsta)
john.o'neil@pillsburylaw.com (John O'Neil)
Joseph.savage@ge.com (Joseph Savage)
Joseph_Hegner@dom.com (Joseph Hegner)
junichi_uchiyama@mnes-us.com (Junichi Uchiyama)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
lindg1da@westinghouse.com (Don Lindgren)
Margaret.Bennet@dom.com (Margaret Bennet)
maria.webb@pillsburylaw.com (Maria Webb)
mark.beaumont@wsms.com (Mark Beaumont)
matias.travieso-diaz@pillsburylaw.com (Matias Travieso-Diaz)
maurerbf@westinghouse.com (Brad Mauer)
media@nei.org (Scott Peterson)
mike_moran@fpl.com (Mike Moran)
mwetterhahn@winston.com (M. Wetterhahn)
nirsnet@nirs.org (Michael Mariotte)

patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
Paul@beyondnuclear.org (Paul Gunter)
pshastings@duke-energy.com (Peter Hastings)
rclary@scana.com (Ronald Clary)
rgrumbir@charter.net (Richard Grumbir)
RJB@NEI.org (Russell Bell)
RKTemple@cpsenergy.com (R.K. Temple)
robert.kitchen@pgnmail.com (Robert H. Kitchen)
roberta.swain@ge.com (Roberta Swain)
ronald.hagen@eia.doe.gov (Ronald Hagen)
sandra.sloan@areva.com (Sandra Sloan)
sfrantz@morganlewis.com (Stephen P. Frantz)
sterdia@westinghouse.com (Andrea Sterdis)
steven.hucik@ge.com (Steven Hucik)
Tansel.Selekler@nuclear.energy.gov (Tansel Selekler)
tom.miller@hq.doe.gov (Tom Miller)
tomccall@southernco.com (Tom McCallum)
trsmith@winston.com (Tyson Smith)
VictorB@bv.com (Bill Victor)
vijukrp@westinghouse.com (Ronald P. Vijuk)
waraksre@westinghouse.com (Rosemarie E. Waraks)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)