May 25, 2007

Ms. Andrea Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization
Westinghouse Electric Company
Nuclear Power Plants
P.O. Box 355
Pittsburgh, PA 15230-0355

SUBJECT: WESTINGHOUSE AP1000 COMBINED LICENSE (COL) PRE-APPLICATION TECHNICAL REPORT 57 - REQUEST FOR ADDITIONAL INFORMATION (TAC NO. MD5168)

Dear Ms. Sterdis:

By letter dated April 5, 2007 (DCP/NRC1847), you submitted AP1000 Technical Report 57, "Nuclear Island: Evaluation of Critical Sections". The Nuclear Regulatory Commission staff has reviewed the application and has determined that additional information is required. Our questions are provided in the Enclosure. We discussed these issues with your staff on May 8, 2007. Your staff indicated that you would attempt to provide your response within 30 days from the date of this letter.

Please contact me at (301) 415-2304, if you have any questions on these issues.

Sincerely,

/RA/

Michael J. Miernicki, Project Manager
AP1000 Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

Project No.: 740

Enclosure:
Request for Additional Information

cc w/encl: See next page

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OFFICE	DNRL/NWE1:LA	DNRL/NWE1:PM	DE/SEB1:BC	DNRL/NWE2:BC
NAME	KGoldstein	MMiernicki	BThomas	EMcKenna
DATE	5/23/07	5/23/07	5/23/07	5/25/07

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REQUEST FOR ADDITIONAL INFORMATION

APP-GW-GLR-045, AP1000 TECHNICAL REPORT 57, REV.0,

"NUCLEAR ISLAND: EVALUATION OF CRITICAL SECTIONS"

TR57-1 Section 2.1 (page 6) states "However, Containment Interior Structure critical sections only includes; south west wall of the refueling cavity, south wall of west steam generator cavity, north east wall of the In-containment Refueling Water Storage Tank (IRWST), IRWST circular steel wall, and column supporting operating floor."

The staff is unclear about how your "critical section" is defined and selected, and, therefore, requests that you provide the definition for critical sections and criteria for selecting them.

TR57-2 Section 2.1.1 (page 6) states "For large loads, the moment of inertia is that of the cracked section transformed to concrete."

The staff does not understand the meaning of the above statement and requests that you clarify it.

TR57-3 Section 2.1.1 (page 7) states "Concrete-filled structural wall modules are designed as reinforced concrete structures in accordance with requirement of [American Concrete Institute] ACI-349."

The staff does not believe that ACI-349 addresses or provides design methods or requirements for the type of a structure with steel plates at the exterior faces and concrete filled in between, and, therefore, requests clarification on the above statement by citing the relevant ACI-349 code sections. If you agree with the staff that ACI-349 is not applicable to this type of structure, state your design methodology and the basis which supports the development of the methodology. If the methodology was derived from, or verified by, physical test data, submit the test and test data.

TR57-4 Section 2.1.2 (page 7) states "The other walls have stainless steel on one face and carbon steel on the other."

The staff requests that you briefly describe the design methodology for these walls subjected to in-plane and out-of-plane bending moments and shear forces, and torsion generated in the wall due to the non-symmetrical resistance force provided by the stainless steel on one face and the carbon steel on the other face.

TR57-5 On the IRWST design, Section 2.1.2 (page 7) states "The wall is evaluated as vertical and horizontal beams."

The staff did not see the description of IRWST design, and, therefore, requests that you describe how the IRWST was designed and justify the use of a one-dimensional beam design for a three-dimensional IRWST.

TR57-6 Section 2..2 (page 8) states “Adjoining buildings, such as the radwaste building, turbine building, and annex building are structurally separated from the nuclear island structures by a 2-inch gap at and below the grade. A 4-inch minimum gap is provided above grade.”

The staff requests that you clarify the apparent inconsistency between your statements of the 2-inch gap at the grade and the minimum 4-inch gap above the grade because one inch above the grade is considered as above grade.

TR57-7 Section 2..2.2.1 (page 16) states “Interior shear walls, however, are discontinuous in both vertical and horizontal directions.”

The staff’s understanding of walls are always standing in the vertical direction and does not understand your statement on shear walls in the horizontal directions. Therefore, the staff requests that you clarify the above statement.

TR57-8 On the composite floor slab design, Section 2..2.2.2 (page 18) states “Shear connectors are also designed.”

The staff is unclear which code or standard the shear connectors are designed against, and, therefore, requests that you provide the code or standard.

TR57-9 Under Section 2..2.2.2 (page 18), composite structures, it is stated “The global in-plane and out-of-plane forces are obtained from the equivalent static analysis of the 3D finite element model of the auxiliary and shield buildings.”

The staff understands the term “static analysis of the 3D finite element model”, but does not understand what the “equivalent static analysis of the 3D finite element model” is, and, therefore, requests that you describe the analysis method.

TR57-10 Section 2..2.2.5 (page 20) states “The structural wall modules are anchored to the concrete base by reinforcing steel dowels or other types of connections embedded in the reinforced concrete below.”

The staff did not see an anchorage design criteria or a sample detail drawing about the anchorage of the wall modules to the concrete floor or foundation below. Based on your description, the staff assumes that the exterior ½" thick steel walls are not anchored to the concrete, but the vertical reinforcing steel dowels, as defined in ACI codes, act as an anchorage for the wall modules to the concrete floor slab or foundation below. Since the steel walls, not the vertical reinforcing steel bars, provide the primary tensile force to form a resistant bending moment in a shear wall, the tensile force from steel walls is first transferred through horizontal metal studs to concrete that bonded to the studs and then from the concrete through bond to the vertical steel reinforcing

dowels into the concrete floor slab or foundation below. The staff questions the effectiveness of such a complicated force transfer mechanism, and, therefore, requests that you provide a criteria for the design of the anchorage and a sample detail drawing for the anchorage.

TR57-11 Section 2.2.4.1 (page 23) states “The analyses used the detailed model of the nuclear island (NI05).”

The report does not describe what NI05 stands for, whether it is a computer code or a mathematical model or something else, and, therefore, the staff requests that you clarify what it is.

TR57-12 The staff performed a comparisons for a few sample detail drawings between Technical Report 57 and corresponding drawings in the Design Control Document (DCD) and found that the area of steel reinforcing bars in Technical Report 57 is substantially less than that in the DCD. For example, there are only two layers of #11 @ 6" (6.24 square inch per linear foot) near the inside face of the wall in Fig. 2.2-9 (page 49) vs. four layers of #11 @ 4" (18.72 square inch per linear foot) in DCD. In another example, the horizontal steel reinforcing bars are #6 @12" (0.44 square inch per linear foot) at both top and bottom of the slab in Fig. 2.2-11 (page 52) vs. #11 @ 12" (1.56 square inch per linear foot) at both top and bottom of the slab in the DCD. Since the design in Technical Report 57 envelopes all soil sites including the rock site and the design in DCD, and only includes the rock site, the area of steel in Technical Report 57 drawings should always be greater than or equal to that in DCD. Therefore, the staff requests that you resolve this apparent discrepancy.

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

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

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

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

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

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

Winston & Strawn
1400 L. Street, NW - 12th Floor
Washington, DC 20005-3502

Email
amonroe@scana.com (Amy Monroe)
APAGLIA@Scana.com (Al Paglia)
APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
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)
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@mhi.co.jp (Junichi Uchiyama)
KSutton@morganlewis.com (Kathryn M. Sutton)
lindg1da@westinghouse.com (Don Lindgren)
lynchs@gao.gov (Sarah Lynch - Meeting Notices Only)
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)
mwl@nei.org (Melanie Lyons)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
Petrovb@westinghouse.com (Bojan Petrovic)
PGunter@NIRS.org (Paul Gunter)

pshastings@duke-energy.com (Peter Hastings)
rclary@scana.com (Ronald Clary)
rgrumbir@comcast.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)
tom.miller@nuclear.energy.gov (Thomas P. Miller)
tomccall@southernco.com (Tom C. Call)
trsmith@winston.com (Tyson Smith)
vijukrp@westinghouse.com (Ronald P. Vijuk)
waraksre@westinghouse.com (Rosemarie E. Waraks)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)