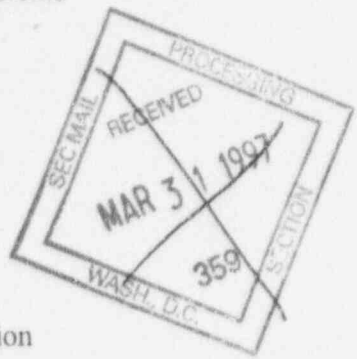
Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355



NSD-NRC-97-5039
DCP/NRC0786
Docket No.: STN-52-003

March 25, 1997

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: T. R. QUAY

SUBJECT: AP600 DESIGN CERTIFICATION; FORMAL NOTIFICATION OF RESOLUTION OF ITEMS ASSOCIATED WITH SECTION 3.10

References: SECY-97-051, "Schedule for the Staff's Review of the AP600 Design Certification Application," dated February 26, 1997, forwarded by NRC letter "Westinghouse's Support of the Nuclear Regulatory Commission Review of the AP600 Design Certification Review," dated March 6, 1997.

Dear Mr. Quay:

This letter is to formally consolidate responses and resolutions of items associated with SSAR Section 3.10 and to confirm completion of submittal of final documentation related to SSAR Section 3.10 for our application for AP600 Design Certification. The Reference includes a milestone "Applicant Submits Final SSAR Revision & Documentation" by May 1997. Westinghouse interprets this to require NRC acknowledgement of receipt of final documentation supporting our application for AP600 Design Certification. To support this milestone, NRC and Westinghouse maintain a detailed activity plan which provides schedule goals for most SSAR/FSER sections and related activities, such as, the PRA, code validation, and ITAACs. In this detail activity plan, Westinghouse application input and NRC internal FSER input for Section 3.10 of the SSAR has a schedule goal of March 15, 1997. NRC and Westinghouse also maintains a joint open item tracking system to informally monitor the status and history of open items (DSER, RAI, meeting, and other) associated with our application.

NRC has requested that, although most items have been discussed and resolved using SSAR and RAI markups followed by formal revisions, Westinghouse consolidate their remaining resolutions into a single, formal response. Attachment 1 to this letter provides a chronology for each item discussed. Westinghouse believes it has submitted resolution for all items for SSAR Section 3.10. Attachment 2 provides formalized copies resubmitting the resolving documentation for items not acknowledged by NRC. Note that some responses were provided 5 months ago. NRC is requested to acknowledge receipt of this information by directing Westinghouse to change the "NRC Status" to "Action N" or "Resolved".

E004

Based upon a review of the information provided for Section 3.10 of the SSAR and a review of the related open item entries in our informal tracking system, Westinghouse confirms its completion of the submittal of information to support this portion of our application. Any additional questions or requests for additional information on Section 3.10 of the SSAR which require formal response must be received by Westinghouse by May 9, 1997 in order to support the May 1997 milestone in SECY-97-051.

If you have any comments or questions on this letter please contact J. W. Winters (412-374-5290) or D. A. Lindgren (412-374-4856).

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

jml

Attachment 1: Chronology for Section 3.10 Open Items
Attachment 2: Section 3.10 Open Resolving Documentation

cc: D. Jackson, NRC
N. J. Liparulo, Westinghouse (w/o Attachments)
T. T. Martin, NRC (w/o Attachments)

Attachment 1 to NSD-NRC-97-5039

Chronology for Open Items Associated with Section 3.10

Open Item Number	NRC Status	Response Vehicle	Response Date	Appendix 2 Page
813	Action W	NSD-NRC-97-4989	2/19/97	1, 4, 5 & 6
814	Action W	NSD-NRC-97-5028	3/19/97	2, 7, 8 & 9
815	Resolved			2
816	Resolved			2
817	Resolved			2
1808	Resolved			3
1809	Action N	NSD-NRC-96-4806	9/5/96	3 &
1810	Action N	NSD-NRC-96-4806	9/5/96	3 & 10
1811	Action N	NSD-NRC-96-4806	9/5/96	3 & 11

Attachment 2 to NSD-NRC-97-5039

Resolving Documentation for Open Items
Associated With Section 3.10

AP600 Open Item Tracking System Database: Executive Summary

Date: 3/25/97

Selection: [DSER Section] like '3.10*' Sorted by Item #

Item No.	Branch	DSER Section/ Question	Type	Title/Description Detail Status	Resp Engineer	(W) Status	NRC Status	Letter No. /	Date
813	NRR/EMEB	3.10.1	DSER-OI		Miller	Confirm-N	Action W	NSD-NRC-96-4841	

Westinghouse should revise the SSAR and WCAP-13054 to state that the COL applicant will submit all seismic experience data information to the staff for review and approval before including it in the equipment qualification file.

Resolved - SSAR subsections 3.10.1.1 and 3.10.6 address the requirement for the COL applicant to supply seismic experience data to the NRC for approval. SSAR Appendix 3D is consistent with this approach. This item will be closed upon issue of this same approach in WCAP - 13054.
Action W - The SSAR should be revised to state that the COL applicant will submit all of the information described in the DSER to the staff for review and approval prior to including this information in the equipment qualification file. In addition, WCAP 13054 should be revised to delete the exception to the applicable portion of SRP 3.10.
Per DCP/NRC0590, WCAP-13054 was updated to reflect COL responsibility related to SRP 3.10.
Criteria 1. This item remains open pending resolution of a related SSAR comment received in an 8/20/96 letter from Jackson to Liparulo, Followon Questions and Staf Update to DSER Open Items Regarding the W AP600 Advanced Reactor Design.
Action - W - 8/20/96 - Revision 5 to the SSAR revised Section 10.2 to respond to this issue. This revision is identical to the response to Q210.81. In Section 3.10 of the DSER, dated November, 1994, the staff stated that this response was not completely acceptable, and identified this issue as a DSER Open Item. The SSAR should be revised to state that the COL applicant will submit all of the information described in the DSER to the staff for review and approval prior to including this information in the equipment qualification file. In addition, WCAP 13054 should be revised to delete the exception to the applicable portion of SRP 3.10.
Action W - SSAR 3.10.6 will be revised to indicate that the COL item is addressed as part of the aplication.
Resolved - See response in Letter NSD-NRC-96-4841, dated October 14, 1996. Subsection 3.10.6 of SSAR will be revised.
Confirm-N - Subsection 3.10.6 Revision 10 addressed this issue.

Action W- Revision 10 to SSAR Section 3.10.6 states that the COL applicant, as a part of the Combined License application, will identify equipment qualified based on experience and include details of the methodology and the corresponding experience data. This agrees with the staff's request on this item, and is acceptable. However, the exception to SRP 3.10 in Revision 2 to WCAP-13054 contains statements which either need to be deleted or clarified. The first two sentences imply that IEEE 344-1987 is acceptable relative to the use of experience data. Regulatory Guide (RG) 1.100, Revision 2 states that this method of qualification in IEEE 344-1987 will be evaluated by the staff on a case-by-case basis. It appears to the staff that the exception in the WCAP is relative to RG 1.100, Revision 2. These two sentences should be revised to reflect the position in RG 1.100, Rev. 2. In addition, the discussion relative to Generic Issue A-46 is not applicable to new plants. The staff's position is that A-46 is only used for verification of equipment in operating plants, and is not acceptable for qualification of equipment in advanced light water reactors (ALWRs). This discussion should either be deleted or revised.

Action W - In a letter from McIntyre to Quay dated October 14, 1996, Westinghouse proposed a revision to SSAR Section 3.10.6 which states that the COL applicant, as a part of the Combined License application, will identify equipment qualified based on experience and include details of the methodology and the corresponding experience data. This agrees with the staff's request on this item, and is acceptable. However, the exception to SRP 3.10 in Revision 2 to WCAP 13054 contains statements which either need to be deleted or clarified. The first two sentences imply that IEEE 344-1987 is acceptable relative to the use of experience data. RG 1.100, Revision 2 states that this method of qualification in IEEE 344-1987 will be evaluated by the staff on a case-by-case basis. It appears to the staff that the exception in the WCAP is relative to RG 1.100, Revision 2. These two sentences should be revised to reflect the position in RG 1.100, Rev. 2. In addition, the discussion relative to Generic Issue A-46 is not applicable to new plants. The staff's position is that A-46 is only used for verification of equipment in operating plants, and is not acceptable for qualification of equipment in ALWRs. This discussion should either be deleted or revised.
Closed - Response provided in NSD-NRC-97-4989 of 2/19/97.

1000

Item No	Branch	DSER Section/ Question	Type	Title/Description / Detail Status	Resp Engineer	(W) Status	NRC Status	Letter No. /	Date
814	NRR/EMEB	3.10.2	DSER-OI		SSARREV/Vock	Confrm-W	Action W	NSD-NRC-96-4841	

In addition to revising WCAP-13054, Westinghouse should revise Section 3.9.3 or 3.10 of the SSAR to describe the methodology used in the AP600 design to analyze the feedwater line valve disks when they are subjected to dynamic loads from a LOCA. (RAI210.85)

Closed - Added a statement as follows to SSAR Rev. 7 "Valve discs are evaluated for maximum design line pressure and maximum differential pressure resulting from plant operating, transient, and accident conditions. Valve operating conditions are included as part of the valve design specification and are used to evaluate the valve disc."
Action W - the SSAR should be revised to describe the methodology used in the AP600 design to analyze the feedwater line valve disks when they are subjected to dynamic loads due to a LOCA. In addition, as requested in the DSER, WCAP 13054 should be revised to delete an exception to SRP, Section 3.10.II.1.a(14)(b).
Action W - Include information in the SSAR on the method of analysis of dynamic effects.
Resolved - See response in Letter NSD-NRC-96-4841, dated October 14, 1996. Valves are analyzed using equivalent static loads. SSAR 3.10.2.2 will be revised.
Action W - Additional information is required on the method used to determine the equivalent static load.
Action W - In a letter from McIntyre to Quay dated October 14, 1996, Westinghouse responded to this item by proposing a revision to the fourth paragraph of SSAR, Subsection 3.10.2.2 to state that feedwater line valve disks are evaluated for the effect of dynamic loads of pipe breaks by considering the effect of an equivalent differential pressure. This does not appear to address the staff's concerns. The staff considers equivalent differential pressure as being a static load. The SSAR should be revised to describe the methodology used in the AP600 design to analyze the dynamic closure of feedwater line valve disks when they are subjected to dynamic loads due to a pipe break.
Action W - In Revision 10 to the SSAR, Westinghouse responded to this item by revising the fourth paragraph of Subsection 3.10.2.2 to state that feedwater line valve disks are evaluated for the effect of dynamic loads of pipe breaks by considering the effect of an equivalent differential pressure. This does not appear to address the staff's concerns. The staff considers equivalent differential pressure as being a static load. The SSAR should be revised to describe the methodology used in the AP600 design to analyze the dynamic closure of feedwater line valve disks when they are subjected to dynamic loads due to a pipe break.
Confirm-W - Response and SSAR markup of subsection 3.10.2.2 provided in Letter NSD-NRC-97-5028, Dated March 19, 1997.

815	NRR/EMEB	3.10.3	DSER-OI		13054	Closed	Resolved	NSD-NRC-96-4806	

Westinghouse should revise Section 3.9.3 or 3.10.2.2 of the SSAR to provide the identified commitment. (RAI210.87)

Action W - Westinghouse will add a statement as follows to SSAR and WCAP-13054 "The qualification program for valves that are part of the reactor coolant pressure boundary shall include testing or analysis that demonstate that these valves will not experience leakage beyond the criteria when subjected to design loading." This statement will be added to Section 3.10.2.2 in paragraph 2 and comments to Section 3.10 in WCAP-13054.
Closed - Response provided by WCAP-13054 transmitted by letter NSD-NRC-96-4806 dated September 5, 1996. See response in Letter NSD-NRC-96-4841, dated October 14, 1996.

Resolved - Revision 5 to the SSAR revised Subsection 3.10.2.2 to provide an acceptable response to this item. In addition, WCAP 13054, Revision 2 revised page 3-68 to provide an acceptable comment. Therefore, this item is resolved.

816	NRR/EMEB	3.10.4	DSER-OI		Lindgren	Closed	Resolved	NSD-NRC-96-4806	

Westinghouse should acceptably address issues raised in Q210.93.
(IEEE-323-1983, DSER text states that response to 210.93 is not acceptable.)

Action W - Delete reference to 1983 revision of IEEE standard. Revise WCAP-13054.
Closed - See response in Letter NSD-NRC-96-4841, dated October 14, 1996.

Resolved - Revision 5 to the SSAR revised Appendix 3D to commit to the staff's position to use IEEE 323-1974 rather than the 1983 Edition. Revision 2 of WCAP 13054 revised the "exception" to SRP 3.10.II.1.c to "acceptable." Therefore, this item is resolved.

817	NRR/EMEB	3.10.5	DSER-OI		Miller	Closed	Resolved		

Westinghouse [illegible] ise Section 3.10 and Attachment E of Appendix 3D of the SSAR to include the identified commitments, if they have not yet been provided in the [illegible].

Closed - Revision 7 of the SSAR includes the information requested by the NRC.

2000

AP600 Open Item Tracking System Database: Executive Summary

Date: 3/25/97

Selection: [DSER Section] like '3.10*' Sorted by Item #

Item No	Branch	DSER Section/ Question	Type	Title/Description Detail Status	Resp Engineer	(W) Status	NRC Status	Letter No. /	Date
1808	NRR/EMEB	3.10.1	DSER-CN		Lindgren/Miller	Closed	Resolved		
				3.10-1 In the January 14, 1993 response to Q210.7, Westinghouse proposed to revise Sections 3D.4.1.2, E.4.4, E.5.1, and E.5.2.4 in Appendix 3D of the SSAR to agree with staff positions related to seismic qualification of equipment.					
				Closed - The SSAR revision from the response to RAI 210.7 was incorporated in to Appendix 3D.					
1809	NRR/EMEB	3.10.2	DSER-CN		13054	Closed	Action N	NSD-NRC-96-4806	
				3.10-2 Westinghouse should revise WCAP-13054 to remove the exception.					
				Action W - Westinghouse will revise WCAP-13054 to remove the exception as stated in response to RAI 210.82. Closed - Revision 2 of WCAP-13054 was transmitted by letter NSD-NRC-96-4806 dated September 5, 1996. Action N - Based upon E-Mail "AP600 OITS" from Scaletti on 2/26/97.					
1810	NRR/EMEB	3.10.3	DSER-CN		13054	Closed	Action N	NSD-NRC-96-4806	
				3.10-3 Westinghouse should revise WCAP-13054 to remove the exception.					
				Action W - Westinghouse will revise WCAP-13054 to remove the exception as promised in RAI 210.82. Closed - WCAP-13054 Revision 2 transmitted by letter NSD-NRC-96-4806 dated September 5, 1996. Action N - Based upon E-Mail "AP600 OITS" from Scaletti on 2/26/97.					
1811	NRR/EMEB	3.10.4	DSER-CN		13054	Closed	Action N	NSD-NRC-96-4806	
				3.10-4 Westinghouse should revise the SSAR and WCAP-13054 as noted in Section 3.10 of this report.					
				Action W - Westinghouse will revise WCAP-13054 to remove the exception as promised in RAI 210.88. Westinghouse will incorporate the SSAR revision from the response to RAI 210.86. Closed - WCAP-13054 Rev. 2 transmitted by letter NSD-NRC-96-4806 dated Septembe: 5, 1996 revise the position on criteria 5c. Action N - Based upon E-Mail "AP600 OITS" from Scaletti on 2/26/97.					

0003

Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

NSD-NRC-97-4989
DCP/NRC0743
Docket No.: STN-52-003

February 19, 1997

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

TO: T. R. QUAY

SUBJECT: RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION AND OPEN ITEMS ASSOCIATED WITH SSAR CHAPTER 3

Dear Mr. Quay:

In a letter dated February 7, 1997, the NRC provided additional requests for additional information and updates of status for several areas being reviewed by ECGB and EMEB for AP600. Attachment 1 to this letter provides information and responses to a number of these items. Many of the items are resolved and do not require a response. The responses to other items will be provided later. The responses are grouped by the enclosures of the NRC letter. Also attached are markups of SSAR revisions that will resolve a number of these items. These changes will be included in Revision 11 of the SSAR.

The resolution of the items addressed in the attachment will permit the NRC staff to provide input to the FSER for a number of the subsections.

If you have any questions please contact D. A. Lindgren at (412) 374-4856.

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

jml

Attachments

cc: D. Jackson, NRC (w/attachments)

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23. Open Item 3.9.3.3-2 (OITS 793) - Anchor Bolts for Pipe Supports
Action W

In a letter from McIntyre to Quay dated October 23, 1996, Westinghouse responded to this item by referencing Revision 9 to SSAR Subsection 3.9.3.4. Revisions 9 and 10 contain no change to this portion of Subsection 3.9.3.4. It still commits only to the baseplate flexibility requirements of IE Bulletin 79-02 and is silent on the factors of safety for concrete expansion anchor bolts. Since the factor of safety issue is being evaluated by the staff under DSER Open Item 3.8.4.2-2, Subsection 3.9.3.4 should contain a reference to the applicable portion of SSAR Subsection 3.8.4 for information relative to these factors of safety.

Westinghouse Response

Supplemental requirements for fastening anchor bolts to concrete are provided in subsection 3.8.4.5.1. reference to these requirements will be added to subsection 3.9.3.4. A markup of this addition is attached.

24. Open Item 3.10-1 (OITS 813) - Use of Seismic Experience Data
Action W

Revision 10 to SSAR Section 3.10.6 states that the COL applicant, as a part of the Combined License application, will identify equipment qualified based on experience and include details of the methodology and the corresponding experience data. This agrees with the staff's request on this item, and is acceptable. However, the exception to SRP 3.10 in Revision 2 to WCAP-13054 contains statements which either need to be deleted or clarified. The first two sentences imply that IEEE 344-1987 is acceptable relative to the use of experience data. Regulatory Guide (RG) 1.100, Revision 2 states that this method of qualification in IEEE 344-1987 will be evaluated by the staff on a case-by-case basis. It appears to the staff that the exception in the WCAP is relative to RG 1.100, Revision 2. These two sentences should be revised to reflect the position in RG 1.100, Rev. 2. In addition, the discussion relative to Generic Issue A-46 is not applicable to new plants. The staff's position is that A-46 is only used for verification of equipment in operating plants, and is not acceptable for qualification of equipment in advanced light water reactors (ALWRs). This discussion should either be deleted or revised.

Westinghouse Response

The discussion in WCAP-13054 on the Criteria 1 for SRP 3.10 will be revised to clarify that the exception is to the revision on Regulatory Guide 1.100 and IEEE 344 and that the AP600 is in conformance with Regulatory Guide 1.100, Revision 2. The requirement that the combined license applicant identify use of experience based data for equipment qualification and the methodology used is included in subsection 3.10.6. A draft markup of the exception in WCAP-13054 is attached.

Criteria Section	Referenced Criteria	AP600 Position	Comments/Summary of Exceptions
2.	ASME XI Section IWV	Exception	The IWV Section of the ASME Section XI has been replaced by ANSI/ASME-OM Part 10. The AP600 valve test program will meet the requirements of OM-10 and incorporate appropriate requirements from NRC Generic Letter 89-10. Generic Letter 89-04 will also be reviewed for applicable guidance. See SSAR Table 3.9-16 for a description of AP600 Inservice Test Requirements.
3.	ASME XI	Acceptable	

OI 3.10-1

SRP § 3.10 - Seismic and Dynamic Qualification of Mechanical and Electrical Equipment (Rev. 2, 7/81)

9006

1.	IEEE 344-1975 R.G. 1.100, REV. 1 ~~10 CFR Part 100~~ ~~GDC 1, 2, 4~~	Exception	SRP 3.10 ~~EXCEPT~~ REFERENCES REG. GUIDE 1.100, REV. 1 WHICH ENDORSES IEEE 344-1987 The AP600 references qualification standards IEEE 323-1974 and IEEE 344-1987. As noted in IEEE 344-1987, safety related equipment may be qualified based on new testing and/or analysis or based on properly documented past test and experience data (Section 9.0 of IEEE 344-1987). The concept of using properly documented experience data is cost effective as evidenced by its proposed use in the resolution of the A-46 problem (NUREG-1030). The choice of qualification method is based upon many factors including practicality, complexity of the equipment, economics, and availability of previous qualification and experience data. If experience data is used, the COL applicant will identify the specific equipment and include details of the methodology and the corresponding experience data for each piece of equipment. Structural integrity and pressure retaining capability will be demonstrated by analysis using appropriate design codes such as the codes issued by the American Institute of Steel Construction (AISC) and American Society of Mechanical Engineers Boiler and Pressure Vessel Code (Section III).

REGULATORY GUIDE 1.100, REVISION 2, DATED JUNE 1988 ACCEPTS USE OF IEEE 344-1987

Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

NSD-NRC-97-5028
DCP/NRC0775
Docket No.: STN-52-003

March 19, 1997

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: T. Quay

SUBJECT: Valve Qualification Responses

Dear Mr. Quay:

Attached are a number of responses to DSER open items and RAI responses on valve design, qualification, and testing. Also attached is a revision of SSAR Section 5.4.8 to implement the commitments. Although most of the SSAR changes are included in Chapter 5, most of these items were identified as DSER subsection 3.9.6 items. This letter completes the Westinghouse responses and will permit NRC staff and consultants to prepare the FSER input on valve qualification and inservice testing. The items included in this response are as follows:

Open Item Tracking System #	DSER #
798, 800, 810, 811	3.9.6.2-1, 3.9.6.2-3, 3.9.6.5-1, 3.9.6.5-2
801	3.9.6.2-4
814	3.10-2
5000	RAI 210.229

The status of these items will be Confirm-W pending the formal SSAR revision and revision of WCAP13559.

0065H

Open Item 3.10-2 (OITS 814) - Dynamic Analysis of Valve Disks

In Revision 10 to the SSAR, Westinghouse responded to this item by revising the fourth paragraph of Subsection 3.10.2.2 to state that feedwater line valve disks are evaluated for the effect of dynamic loads of pipe breaks by considering the effect of an equivalent differential pressure. This does not appear to address the staff's concerns. The staff considers equivalent differential pressure as being a static load. The SSAR should be revised to describe the methodology used in the AP600 design to analyze the dynamic closure of feedwater line valve disks when they are subjected to dynamic loads due to a pipe break.

Westinghouse Response

The loadings associated with feedwater line break are inputs (peak system pressure and temperature) derived from transient analysis. The prediction of system peak pressure resulting from check valve closure is typically developed by transient analysis computer codes. See References 1 through 6 for additional information on estimating the peak pressures in piping systems under water hammer conditions. The computer codes typically are based on wave mechanics which takes into account the system arrangement and the valve closing dynamics during the transient. The analysis performed is valve and system specific.

The peak pressure resulting from feedline break event and subsequent check valve closure are used to perform stress analysis to assure that the valve disc meets the ASME Code Service D limits.

The valve disc is a pressure retaining part. Valve discs, therefore, are designed and qualified to meet the ASME stress allowables for both the design and faulted conditions such as feedwater line break event.

For the design conditions (design pressure and temperature), the disc primary membrane stress shall not exceed the ASME Code allowable stress intensity for the disc material and the primary bending stress intensity shall not exceed 1.5 times the stress intensity of the material at the design temperature.

For the faulted condition (feedwater line break), the rules of Appendix F are used to evaluate the loadings on the disc.

The fourth paragraph of SSAR subsection 3.10.2.2 will be revised as follows.

> The safety-related valves are subjected to a series of tests before service and during the plant life. Before installation, the following tests are performed: body hydrostatic test to ASME Code, Section III, requirements, back-seat and main seat leakage tests, disc hydrostatic tests, and operational tests to verify that the valve opens and closes. For the qualification of motor operators for environmental conditions, see Section 3.11. After installation, the valves undergo system level hydrostatic tests, construction acceptance tests, and preoperational tests. Where applicable, periodic in-service inspections and operations are performed in situ to verify the functional capability of the valve. On active valves, an analysis of the extended structure is performed for static equivalent seismic safe shutdown earthquake loads applied at the center of gravity of the extended structure. The maximum stress limits used for active Class 1, 2, and 3

valves are compared to acceptable standards in the ASME Code. Valve discs are evaluated for maximum design line pressure and maximum differential pressure resulting from plant operating, transient, and accident conditions. Feedwater line valve discs are evaluated, using appropriate ASME Code, Section III limits, for the effect of dynamic loads by considering the effect of an equivalent differential pressure. The equivalent differential pressure is developed from a transient analysis based on wave mechanics that includes consideration of system arrangement and valve closing dynamics. Valve operating conditions are included as part of the valve design specification and are used to evaluate the valve disc. Additional information is provided on the controlled-closure, feedwater check valve in subsection 10.4.7.2.2.

References

1. Ezekoye, L. I., Predicting Maximum Closing Surge Pressures Induced by Externally Actuated Valves, ASME PVP 80-C2/PVP-142, May 1, 1980.

2. Kirik, K. L., and Gradle, R. J., A Model for Check Valve/Feedwater System Waterhammer Analysis, ASME PVP 80-C2/PVP-27, May 1, 1980.

3. Parmarkian, J., Waterhammer Analysis, Dover Publications, 1963.

4. Streeter, V. L., and Wylie, E. B., Hydraulic Transients, McGraw-Hill, New York, 1967.

5. Ezekiel, D. D., and Paynter, H. M., Computer Representations of Engineering Systems Involving Fluid Transients, Transactions of the ASME, Paper No. 56-A-120, August 6, 1956.

6. Gwinn, J. M., Swing Check Valves Under Trip Loads, ASME 74-PVP-51, March 1, 1975.

Criteria Section	Referenced Criteria	AP600 Position	Comments/Summary of Exceptions
			For equipment that must perform a safety related function, the recommendations concerning methods to be employed for seismic qualification of electrical and mechanical equipment are contained in Regulatory Guide 1.100, Rev. 2, "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants," which endorses IEEE 344-1987, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," for the qualification of both electrical and mechanical equipment. The AP600 will meet these requirements by either type testing, analysis, or a combination of both.
1.a.(1)		Acceptable	
1.a.(2)		Acceptable	
1.a.(3)		Acceptable	
1.a.(4)		Acceptable	
1.a.(5)		Acceptable	
1.a.(6)		Acceptable	
1.a.(7)		Acceptable	
1.a.(8)		Acceptable	
1.a.(9)		Acceptable	

0010

Criteria Section	Referenced Criteria	AP600 Position	Comments/Summary of Exceptions
vi		Acceptable	
vii		Acceptable	
viii		Exception	If dynamic analysis is performed, closely spaced modes will be combined by Westinghouse as described in position on SRP 3.7.2, Criteria Section 3.7.
1.b		Acceptable	
1.c		Acceptable	
2.		N/A	Only applies to plants with a construction permit application docketed prior to October 27, 1972.
3.		N/A	Not part of the design process.
4.	GDC 14, 30	Acceptable	The qualification program for valves that are part of the reactor coolant pressure boundary shall include testing or analysis that demonstrate that these valves will not experience leakage beyond the design criteria when subjected to design loading.
5.a		Acceptable	
5.b		Acceptable	
5.c		Acceptable	Seismic qualification of equipment is documented in test reports, analysis reports, calculation notes, etc. contained in Westinghouse files. The Combined License applicant is responsible for the maintenance of the equipment qualification file during the equipment selection and procurement phase.

0011