

**Enclosure 3**  
**Staff Responses to Public Comments on Draft Regulatory Guide DG-1163**  
**(Proposed Revision 3 of Regulatory Guide 1.20)**

Comments			NRC Comment Resolution
Originator	DG-1163 Section	Specific Comments	
NEI 12-21-2006 (ML063620434)	A, B, C.2	Sections A, B, and C.2, and the Regulatory Analysis indicate that this guidance has been expanded from just the reactor internals to include “steam dryers and other main steam system components” such as steam generators for the PWRs. This significant expansion of the scope has been justified with just two sentences in the Regulatory Analysis, Section 1, second paragraph. The “operating experience” discussed in Section B seems to address only BWRs. More justification (with specific references to the mentioned “operating experience” and “studies”) is needed for this scope expansion beyond the reactor internals, particularly for the expansion to the PWR steam generators and other main steam system components. Omit the expansion.	Before replacing their steam dryers and installing acoustic side branches, Quad Cities Units 1 and 2 experienced repeated structural damage to their steam dryers and steam line components as a result of extended power uprate operation. Other boiling-water reactor (BWR) licensees planning power uprates have predicted high pressure loading on their steam dryers and have modified or replaced their steam dryers. In addition to BWR plants, the pressurized-water reactor (PWR) at the Palo Verde plant experienced degradation from excess vibration that had characteristics similar to those of the phenomenon affecting the BWR plants. Revision 3 to Regulatory Guide 1.20 has not modified the guidance in Revision 2. However, Revision 3 has included additional guidance based on lessons learned from the steam dryer failures. The staff has modified the language in Revision 3 to reflect the comment that the guide includes helpful information on the assessment of plant components outside of the reactor vessel.

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Originator	DG-1163 Section	Specific Comments	
NEI 12-21-2006	2.0	Section 2.0 requires detailed analysis of all steam system components for both new applicants and licensees desiring to uprate. The option of online monitoring during power ascension (vs. detailed preanalysis) should be provided to assess potential high-vibration conditions for readily accessible components outside the reactor vessel. Such components include SRVs, ERVs, attached small bore piping, etc.	The staff prepared Revision 3 to Regulatory Guide 1.20 based on lessons learned from plant operating experience and evaluations of submitted analyses. Applicants and licensees may propose alternatives to the guidance in this document.
NEI 12-21-2006	2.1	Several considerations for the use of the acoustic circuit model appear to reveal Continuum Dynamics, Inc. (CDI) proprietary information. The document should be reviewed by CDI to ensure that proprietary information is deleted.	The staff considered the information in this guide to have been discussed at public meetings. The staff provided this guide to CDI for its review, and the company made no requests for deletions.
NEI 12-21-2006	C.2	Section C.2 has been expanded from "vibration analysis" to "vibration and fatigue analysis" or "vibration and stress analysis." There appears to be no discussion of this expansion in the Regulatory Analysis. The need for this additional analysis should be adequately justified. Omit the expansion.	The staff used the terms "fatigue" and "stress analysis" to clarify the scope of the vibration analysis.

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NEI 12-21-2006	C.2.2	Section C.2.2, last paragraph, appears to request implementation of a “new” operational program. This is another scope expansion, from startup testing guidance to guidance for continuing operation. There appears to be no discussion of this expansion in the Regulatory Analysis. The need for this additional program should be adequately justified. Omit the expansion.	Plant operating experience, such as from the Quad Cities and Dresden nuclear power plants, has shown that adverse flow effects might not appear for an extended period of time following initial startup or power ascension. Therefore, it would be beneficial to maintain the program for monitoring potential adverse flow effects (such as flow-excited acoustic or structural resonances) on plant systems and components for a sufficient time period to verify that adverse flow effects are not occurring at new nuclear power plants or those implementing a power uprate. This program should include monitoring of plant data, performance of walkdowns, and inspection of components during power ascension and operation under full licensed power conditions. The program should also include inspections and walkdowns that will be performed during refueling outages and extended shutdowns with ALARA consideration. The extent and duration of this program following startup and power ascension would be determined by the licensee based on the review of operating experience at its plant and other nuclear power plants. The regulatory guide has been clarified in response to this comment.

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NEI 12-21-2006	C.2.4 C.2.5	<p>Sections C.2.4 (1) and C.2.5 (5) request the submittal of preliminary raw, unevaluated information. This should be revised to make the preliminary information available to inspectors on site rather than a docketed submittal.</p> <p>C.2.4 A summary of the results should be in the form of preliminary and final reports: (1) The preliminary report...for evaluating such data. This preliminary report should be made available to the NRC for onsite review. (2) If the results of the comprehensive vibration assessment program are acceptable, the final report should be submitted to the NRC and should include the following information....</p>	Revision 3 to Regulatory Guide 1.20 does not include any change from Revision 2 regarding submittal of preliminary and final reports to the U.S. Nuclear Regulatory Commission (NRC).

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NEI 12-21-2006	C.2.5	<p>Section C.2.5 states, "A schedule for the vibration assessment program should be established and submitted to the NRC (1) ... Part 50, (2) during the review of the design certification document (DCD) for standard design certification applications under 10 CFR Part 52, or (3) as part of the application for COL applications under 10 CFR Part 52 that do not reference a standard design." It is inappropriate for the DCD to make schedule commitments for startup and operational programs that may be very different for the first plant of the design than for the 20th plant of the same design. The schedule information should be left to the COL applicant who references the DCD.</p> <p>Proposal:            "A schedule for the vibration assessment program should be established and submitted to the NRC (1) ... Part 50, (2) during the review of the design certification document (DCD) for standard design certification applications under 10 CFR Part 52, or (3) as part of the application for COL applications under 10 CFR Part 52 that do not reference a standard design."</p>	The staff agrees with the comment.

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NEI 12-21-2006	C.2.5	Sections C.2.5 (3) and (4) both state that information "will be submitted" to the NRC for review. The regulation that requires these submittals should be referenced. Alternatively, if no regulation exists which requires the submittal of these documents, the appropriate language for this guidance document is "should be submitted" to the NRC for review.  Proposal: "should be submitted"	The staff agrees with the comment.
NEI 12-21-2006	General	The document is focused almost exclusively on BWRs.  Suggest a more balanced treatment of BWRs and PWRs, splitting them into two sections or two documents.	The staff will consider the comment in a future revision.
NEI 12-21-2006	General	Specific statements within the document are inappropriate regarding PWR reactor vessel internals (e.g., the last paragraph in Section 2.1, third from the last paragraph in Section 2).	The staff has modified the language in Revision 3 to Regulatory Guide 1.20 to reflect that the guide includes helpful information for plant components outside of the reactor vessel.

Comments			NRC Comment Resolution
Originator	DG-1163 Section	Specific Comments	
NEI 12-21-2006	General	Measurements of steam generator dryers and the main steam line might not be fully adequate unless the full steam flow were occurring. This is not the case during hot functional testing, when most of the PWR internals testing is carried out.	The guide includes recommendations for monitoring up to full-flow conditions.
NEI 12-21-2006	General	The need to account for "bias and random uncertainties" is repeated numerous times throughout the document.  Suggest a single separate section discussing the need to account for uncertainties.	The staff agrees with the comment. The staff has included a new paragraph in Section B.
NEI 12-21-2006	Discussion	Only flow-induced excitations are mentioned in the discussion. RCP-induced vibrations should also be considered.	The staff agrees with the comment. The staff has included additional discussion in Section B.
NEI 12-21-2006	Discussion	In the discussion, it seems to suggest that analysis results be used to select transducer locations. This instrumentation location should be clarified to address the implementation of a changed component design.	The staff agrees with the comment. The staff has included additional discussion in Section B.

Comments			NRC Comment Resolution
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NEI 12-21-2006	Discussion	Figure 1—It has been the position that testing of one component change in one program and another component change in another program could be used to justify no testing in a subsequent unit that incorporated both changes. This should be incorporated into the guidelines.	Figure 1 has not changed from Revision 2.
NEI 12-21-2006	Discussion	Definition of “Flow excited resonances” — Does this refer to Helmholtz resonators, excitation of acoustic modes by turbulence, or some other phenomena?	This discussion applies to excitation of acoustic modes of resonance.
NEI 12-21-2006	Discussion	Clarification of information on what assessments should be made or examples of “small adverse flow effect to magnify substantially” are requested.	An example is the severe acoustic excitation within the Quad Cities steam system when flow was increased by 16% for extended power uprate operation. Applicants and licensees may determine the need for detailed evaluations based on analysis results and available industry experience.
NEI 12-21-2006	Discussion	Clarification of the intent/meaning of hydrodynamic loading (flow-induced vibration) is requested.	The staff deleted the parenthetical note as unnecessary to the sentence.
NEI 12-21-2006	Introduction	A notation of the PWR Regulatory Guide for Preoperational and Startup Testing corresponding to the BWR Regulatory Guide 1.68.1 should be included.	There is no corresponding PWR regulatory guide.



Comments			NRC Comment Resolution
Originator	DG-1163 Section	Specific Comments	
NEI 12-21-2006	1	The terms "limited in-service operation" and "insufficient operating history" should be defined. It also should provide guidance in defining the term "insufficient."	The staff did not change this section from Revision 2 to Regulatory Guide 1.20.
NEI 12-21-2006	2	Under item 3, add a clarification or examples of the statement "with an acoustic and/or structural resonance (sometimes called self excitation)."	The staff agrees with the comment.
NEI 12-21-2006	2	The second and third paragraphs of Section 2.2 seem to apply only to BWRs. This and other areas of the draft are unclear relative to their application to BWRs or both PWRs and BWRs.	The staff agrees with the comment. The staff has clarified the regulatory guide language.
NEI 12-21-2006	2	The new addition, item (f), to this draft might be improved by a definition of "bias errors."	The staff agrees with the comment. The staff has added examples to the regulatory guide.

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NEI 12-21-2006	2.2	<p>Clear differentiation is needed between requirements for “new applicants” versus “current licensees planning to uprate.” For example, it is not clear if an instrumented steam dryer test is required for licensees wishing to uprate.</p> <p>Suggest separate sections covering requirements for new applicants and current licensees.</p>	The staff clarified the regulatory guide language to indicate that BWR licensees planning a power uprate may use plant instrumentation to evaluate steam dryer pressure loading and stress rather than installing steam dryer instrumentation where justified. The next regulatory guide revision may provide separate sections.
NEI 12-21-2006	2.3	<p>Inspection requirements do not recognize current industry inspection guidance (i.e., BWRVIP I&amp;E Guidelines). BWRVIP I&amp;E Guidelines should be referenced as acceptable inspection scope.</p>	The Boiling Water Reactor Vessel and Internals Project (BWRVIP) has not responded to the NRC staff comments on guidelines.
NEI 12-21-2006	C	<p>Multiple definitions are presented for the various design types (Prototype, Valid Prototype, Limited Valid Prototype, etc.). These definitions are almost indistinguishable.</p> <p>Suggest reducing number of design type variations and clarifying definitions.</p>	The definitions have not changed from Revision 2 to Regulatory Guide 1.20.

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NEI 12-21-2006	C.2.1(2)	Change the words "all natural frequencies" to "all significant natural frequencies."	The staff agrees with the comment.
NEI 12-21-2006	C.2.2(2)(a)	This implies that measurements are required during initial startup of PWRs during power ascension. Is this a correct interpretation? Note that RVI tests are performed during hot functional.	The monitoring program should include power ascension.
NEI 12-21-2006	C.2.4(2)(b)	Does this imply that extensive pressure measurements are required?	Sufficient measurements are needed to validate the analytical technique for applicable components and over the frequency range of interest.
NEI 12-21-2006	C.2.5	Section C.2.5 (5) uses the language "will be presented" to the NRC. This unfamiliar term should be revised to be consistent with the language resulting from the above comments on submittal of the reports.  Proposal: "should be submitted"	The staff agrees with the comment.
NEI 12-21-2006	C.3.1.1 and 3.2.1	Some applicants have utilized previously obtained nondomestic test information in accordance with Revision 2 of this guide for other applications. We request changes to this section in order to allow the continued use of this nondomestic test information.	Experience has shown that nondomestic test information is not sufficiently reliable to reference directly in the regulatory guide. Applicants and licensees may propose alternatives to the regulatory guide.

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NEI 12-21-2006	Backfit Analysis	The Backfit Analysis states, "Applicants and licensees may continue to use the original version of this regulatory guide if they so chose." This statement is confusing for applicants. More explanation is needed on how an applicant would not be evaluated against the criteria in this updated regulatory guide.	The staff has deleted this sentence.
BWROG 12-19-2006 (ML063560067)	2.1(3)(c)(a)	This section indicates that no acoustic sources should exist between measurement locations. This is a consideration in current modeling practices using two measurement locations on a steam line to imply the acoustic response at the nozzle. If three locations were measured, it would potentially be acceptable to have a source between measurement points. This option should be provided.	An applicant or licensee may propose an alternative to the approach in the regulatory guide.
BWROG 12-19-2006	2.1(3)(c)(e)	This refers to the "chimney." It is not clear what is intended by this term. Is this the steam separator tubes?	The staff has modified the regulatory guide to refer to steam dryer.

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TXU, Structural Integrity Associates, Sargent & Lundy (ML070110428)	C.2.2	The regulatory guide suggests the use of strain gauges to obtain dynamic pressure measurements in piping. Strain gauges are difficult to install and typically result in large personnel radiation exposure, and the strains of interest are typically below the noise threshold, based on the large strains that exist in an operating high-temperature piping system, so their accuracy is limited in this environment. Dynamic pressure transducers are the most effective means of obtaining accurate pressure measurements; however, utilities have been hesitant to use them because the typically used double isolation can not be achieved when installing pressure transducers close to the header piping. The NRC should recognize that installing pressure transducers does not pose a safety threat from the potential failure of the transducer installation. This is because of the very small leakage that would result in the unlikely event of a failure. Allowing for at least a temporary exception to the double isolation requirement for pressure transducer test installations would result in significantly better data and would avoid unnecessary radiation exposure to the installers.	The regulatory guide is not prescriptive as to the techniques to be used for obtaining dynamic pressure measurements. The guide suggests strain gauges because some licensees have used them for this purpose. If licensees can provide supporting studies, such as Electric Power Research Institute documents, showing no other deleterious effects, they may use other measurement techniques.

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BWROG 12-19-2006	2.2 (third paragraph)	This discussion involves instrumented dryers. Fully instrumenting a steam dryer for an EPU test program does not seem justified for an EPU licensee where strain gauge data should suffice. Prior discussions with the staff indicated that this only applies to new plants. This should be clarified so there is no confusion.	The staff has clarified the regulatory guide language as previously noted.
TXU, Structural Integrity Associates, Sargent & Lundy	C.2.1	The draft regulations emphasize testing; however, proven design techniques are available to reduce vortex shedding effects at side branches and avoid resonance. These design techniques, such as using larger branch openings with rounded edges and a smooth transition down the required branch size, along with keeping the branch line as short as possible, should be emphasized for new designs.	Other design techniques would be acceptable provided that appropriate documented evidence supports them.
TXU, Structural Integrity Associates, Sargent & Lundy	A,B	The ASME Operating and Maintenance Standard OM-3 already addresses piping vibration testing, and it has been used for the preoperational and startup testing of numerous nuclear power plants. This document should be referenced and utilized as part of the NRC guidance.	Section 3.9.2 of the Standard Review Plan (NUREG-0800) references OM-3, which addresses piping vibration testing. Regulatory Guide 1.20 primarily addresses vibration assessment of reactor internals. Therefore, the guide does not reference OM-3.

Comments			NRC Comment Resolution
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W 12-20-2006 (ML070160430)	General	Westinghouse recommends that the guidance for BWRs and PWRs reactor vessel internal components be separated into two separate documents or separated within one document.	The staff will consider the comment in a future revision.
W 12-20-2006	General	Specific statements within the document are inappropriate regarding PWR reactor vessel internals (e.g., the last paragraph in Section 2.1, third from the last paragraph in Section 2).	The staff has modified the language in Revision 3 to Regulatory Guide 1.20 to reflect that the guide includes helpful information for plant components outside of the reactor vessel.
W 12-20-2006	General	Measurements of steam generator dryers and the main steam line might not be fully adequate unless the full steam flow were occurring. This is not the case during hot functional testing, when most of the PWR internals testing is carried out.	The guide includes recommendations for monitoring up to full-flow conditions.
W 12-20-2006	Discussion	Only flow-induced excitations are mentioned in the discussion. RCP-induced vibrations should also be considered.	The staff agrees with the comment. The staff has included additional discussion in Section B.
W 12-20-2006	Discussion	In the discussion, it seems to suggest that analysis results be used to select transducer locations. This instrumentation location should be clarified to address the implementation of a changed component design.	The staff agrees with the comment. The staff has included additional discussion in Section B.

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W 12-20-2006	Discussion	Figure 1—It has been the position of Westinghouse that testing of one component change in one program and another component change in another program could be used to justify no testing in a subsequent unit that incorporated both changes. This should be incorporated into the guidelines.	Figure 1 has not changed from Revision 2.
W 12-20-2006	Discussion	Westinghouse believes that the determination of relative motions from inspection results is limited in value. An example of the application might be useful.	This language has not changed from Revision 2.
W 12-20-2006	Discussion	Definition of “Flow excited resonances” — Does this refer to Helmholtz resonators, excitation of acoustic modes by turbulence, or some other phenomena?	This discussion applies to excitation of acoustic modes of resonance.
W 12-20-2006	Discussion	Clarification of information on what assessments should be made or examples of “small adverse flow effect to magnify substantially” is requested.	An example is the severe acoustic excitation within the Quad Cities steam system when flow was increased by 16% for extended power uprate operation. Applicants and licensees may determine the need for detailed evaluations based on analysis results and available industry experience.
W 12-20-2006	Discussion	Clarification of the intent/meaning of hydrodynamic loading (flow-induced vibration) is requested.	The staff deleted the parenthetical note as unnecessary to the sentence.



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W 12-20-2006	Introduction	A notation of the PWR Regulatory Guide for Preoperational and Startup Testing corresponding to the BWR Regulatory Guide 1.68.1 should be included.	There is no corresponding PWR regulatory guide.
W 12-20-2006	1	The terms "limited in-service operation" and "insufficient operating history" should be defined. It also should provide guidance in defining the term "insufficient."	The staff did not change this section from Revision 2 to Regulatory Guide 1.20.
W 12-20-2006	2	Under item 3, add a clarification or examples of the statement "with an acoustic and/or structural resonance (sometimes called self excitation)."	The staff agrees with the comment. The staff has clarified the regulatory guide language.
W 12-20-2006	2	The second and third paragraphs of Section 2.2 seem to apply only to BWRs. This and other areas of the draft are unclear relative to their application to BWRs or both PWRs and BWRs. Westinghouse suggests that one guide be written for BWRs and one for PWRs, or that separate sections of the guide be written for BWRs and PWRs.	The staff agrees with the comment that the guidance was not clear. The staff has clarified the regulatory guide language.
W 12-20-2006	2	The new addition, item (f), to this draft might be improved by a definition of "bias errors."	The staff agrees with the comment. The staff has added examples to the regulatory guide.

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W 12-20-2006	C.2.1(2)	Change the words "all natural frequencies" to "all significant natural frequencies."	The staff agrees with the comment.
W 12-20-2006	C.2.1(2)	The RG states that any attempt to specify damping coefficients greater than 1% for frequencies greater than seismic frequencies should be strongly substantiated with measurements. Westinghouse recommends that this statement be clarified to apply to "structural damping coefficients" that appears to be the intent. Other damping contributions (e.g., two-phase, viscous) may be significant in some flow regimes and design configurations.	The staff agrees with this comment. The RG has been modified to include the word "structural" prior to "damping coefficients" in the referenced sentence.
W 12-20-2006	C.2.2(2)(a)	This implies that measurements are required during initial startup of PWRs during power ascension. Is this a correct interpretation? Note that RVI tests are performed during hot functional.	The monitoring program should include power ascension.
W 12-20-2006	C.2.4(2)(b)	Does this imply that extensive pressure measurements are required?	Sufficient measurements are needed to validate the analytical technique for applicable components and over the frequency range of interest.

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W 12-20-2006	C.3.1.1 and 3.2.1	Westinghouse has a utilized previously obtained nondomestic test information in accordance with Revision 2 of this guide for other applications. Westinghouse requests changes to this section in order to allow the continued use of this nondomestic test information.	Experience has shown that nondomestic test information is not sufficiently reliable to reference directly in the regulatory guide. Applicants and licensees may propose alternatives to the regulatory guide.