# REQUEST FOR ADDITIONAL INFORMATION 209-1803 REVISION 1

2/25/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 03.09.03 - ASME Code Class 1, 2, and 3 Components
Application Section: Section 3.9.3

QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

03.09.03-1

To ensure that ASME components meet the service level stress and functionality requirements, the ASME Code, Section III, NCA-3000 requires that design specifications and corresponding design reports be prepared for ASME Code, Section III, Class 1, 2, and 3 components. In DCD Tier 2 (Rev. 1) Section 3.9.3, MHI states that the design specifications for ASME Code, Section III, Class 1, 2, and 3 components, supports, and appurtenances are prepared under administrative procedures that meet or exceed the ASME Code, Section III rules. The ASME Code also requires a design report for safety-related components, to demonstrate that the component design meets the requirements of the relevant ASME design specification and the applicable ASME Code, Section III requirements. MHI states that the licensee, or the licensee's authorized agent, is responsible for developing design specifications and design reports in accordance with the responsibilities outlined under the ASME Code, Section III rules. In order for the staff to reach a reasonable assurance finding based on the requirements of 10 CFR 52.47, however, certain information is required during the NRC review of the design certification application. The staff requests that MHI commit to provide the certified design specifications of risk-significant mechanical components, as a minimum, for NRC audit. This is to ensure that the components are ready for procurement, and to verify that the DCD design methodologies and criteria are adequately reflected in the associated component design specifications. As for the design reports, the staff requests that MHI discuss in the DCD its plan and schedule of making the design reports of US-APWR major mechanical components available for NRC audit, e.g., through an ITTAC, to ensure that MHI has established a procedure for verifying the completion of the US-APWR component design.

03.09.03-2

In DCD Tier 2 (Rev. 1) Section 3.9.3.1, MHI states, "This subsection establishes the criteria for the selection and definition of design limits and loading combinations associated with normal operation, postulated accident, and specified seismic and other transient events for the design of other safety-related ASME Code, Section III components." It is not clear what MHI means by stating that this section is applicable to OTHER safety-related components. The staff requests that MHI address the following:

(a) Clarify what other safety-related components are referenced in the above statement.

(b) Clarify if the design of Quality Group D (per RG 1.26: for systems not part of the RCPB, but may contain radioactive materials) components satisfy the ASME B31.1 or any other industry Code/Standard requirements.

03.09.03-3

In DCD Tier 2 (Rev. 1) Section 3.9.3.1, MHI states that the number of cycles for seismic events considered is based on equivalent of usage factor where 300 cycles at 1/3 SSE stress range equals the same usage factor as 20 cycles of SSE stress range, consistent with Appendix D of IEEE Standard 344-2004. MHI made a reference to Reference 3.9-34 for the guidance. The staff requests MHI to clarify the following in regard to the SSE loading consideration:

(a) There appears to be a typographical error at the end of section 3.9.3.1 on page 3.9-33. There, the reference is made to reference number 3.9-33 when it should be 3.9-34.

(b) There appears to be typographical errors in parentheses in the third sentence in Note 3 on page 3.9-34.

(c) Note 3 on DCD page 3.9-34 states that in certain cases for non-standard SSCs, the 1/3 SSE may be adjusted higher for plant specific site as justified for site-specific design as permitted by SECY 93-087. Clarify what non-standard SSCs at US-APWR perform safety-related functions and explain why the use of an adjusted higher than 1/3 plant-specific SSE is limited to non-standard SSCs per SECY 93-087.

03.09.03-4

In DCD Tier 2 (Rev. 1) Section 3.9.3.1.1, MHI states that due to the low probability of occurrence of a SSE (less than 10% of plant operation time), the SSE is analyzed in combination with only those operating modes that occur greater than 10 percent of the time. One of the conditions for combining SSE with other transient loads assumed that a simultaneous loss of offsite power (LOOP) and a single failure of a safety-related system occur as a result of an SSE event. The staff requests that MHI clarify certain aspects of these criteria:

(a) Provide the technical basis for combining SSE with only those operating modes that occur greater than 10% of the <u>plant</u> operation time.

(b) The staff noted that an occurrence of a SSE is measured with respect to plant operation time, while a system transient is measured with respect to its system operating time. Since the system operating time may not be the same as the plant operating time for all safety-related systems, clarify how the SSE during operational modes occurring less than <u>10% of plant operation time</u> correlate to <u>the system operating mode that occurs greater than 10 percent of the time of the system operating mode.</u>

(c) In accordance with RG 1.53, the safety systems must perform all safety functions required for a design basis event in the presence of any single detectable failure within the safety system. The second bullet on DCD page 3.9-34 states that for combining SSE with other transient loads, it is assumed that a simultaneous loss of offsite power

(LOOP) and a single failure of a safety-related system occur as a result of an SSE event. Clarify the meaning of a single failure of a safety-related system in the light of RG 1.53 definition of a single failure within the safety system.

(d) The third bullet on DCD page 3.9-34 states that the SSE duration is considered as 22 seconds. Explain how this SSE duration of 22 seconds is established for US-APWR.

(e) On DCD page 3.9-35 it is stated that in order to assure an adequate safe-shutdown margin, the SSE loads are combined concurrently with several specific loads based on past precedents and regulatory guidelines. Examples of these past precedent and regulatory guideline loading conditions include (i) SSE is combined with postulated pipe rupture loads, (ii) SSE is combined with containment design pressures, and (iii) Polar crane and associated rigging equipment are qualified to withstand an SSE event. Note that for Service Level D, SRP Section 3.9.3, Table 1 requires that SSE should be combined with LOCA (e.g., pipe break loads), irrespective of their occurrence frequency in a plant life. Since the three cases cited in the DCD are considered as examples of past precedence and regulatory guidelines loading conditions, discuss if there are other loads that will be included in the US-APWR design.

03.09.03-5

In DCD Tier 2 (Rev. 1) Table 3.9-3, MHI provides the minimum design loading combinations for ASME Code, Section III, Class 1, 2, and 3 and CS systems and components, and in Table 3.9-4 MHI provides the same information for ASME Code, Section III, Class 1, 2, and 3 supports in piping and components. The staff requests MHI to address the following on load combination criteria:

(a) DCD Table 3.9-3 does not address load combinations (if any) associated with test conditions for ASME Code, Section III, Class 1, 2, and 3 and CS systems and components. Provide these load combinations.

(b) Note 3 to DCD Table 3.9-3 and note 2 to DCD Table 3.9-4 state that loadings generated by static displacement of the concrete containment vessel and building settlement are added to the loading combinations for ASME Code, Section III, Class 2 and 3 systems. Explain why this is not applicable to Class 1 systems and components?

(c) Note 4 to DCD Table 3.9-3 states that when determining appropriate load combinations involving external mechanical load (LEM), a determination of the timing sequence and initiating conditions that occur between pressure (PM) and LEM are considered. Also, notes 7, 8 and 9 to Table 3.9-3 and notes 4, 7 and 8 to Table 3.9-4 indicate similar statements. Explain each of these notes in relation to NUREG-0484 requirements for combining two or more dynamic loads.

(d) Note 5 to both DCD Tables 3.9-3 and 3.9-4 states that pressurizer safety valve discharge and associated load is classified under an emergency service condition (i.e., service level C). Provide the technical basis for this load combination limited to service level C loads.

(e) Identify the load in DCD Table 3.9-3 to which note 10 is applicable.

(f) Note 12 to DCD Table 3.9-3 and note 10 to DCD Table 3.9-4 state that if a loading is considered negligible or is non- existent, it is ignored in the service level combinations. Identify these loads and provide the criterion for assessing them to be negligible.

(g) Note 6 to DCD Table 3.9-4 states that SE is self weight excitation of the support caused by seismic building inertial loads. SSEI, SSEA, and SE are combined using absolute summation. Explain and justify all combinations of SSEI, SSEA, and other dynamic loads (LDF) for Level B and Level D service conditions in DCD Table 3.9-4. Clarify if LDF for Level C and Level D service conditions should have been LDFE and LDFF, respectively.

03.09.03-6

In DCD Tier 2 (Rev. 1) Section 3.9.3.1.2, MHI discusses loads for ASME Code, Section III, Class 1, 2, and 3 components, CS, and component supports. Address the following:

(a) Under transient loading resulting from a postulated pipe break, MHI states that asymmetric blowdown load is discussed in DCD Tier 2 (Rev. 1) Section 3.9.2.5. The staff noted that DCD Tier 2 (Rev. 1) Section 3.9.2.5.2 discusses the pipe rupture analysis methodology and acceptance criteria, and uses MULTIFLEX computer code for the blowdown analysis. However, no discussion on the characterization of the asymmetric blowdown load is included. Discuss how the asymmetric blowdown load is characterized and included in the design of ASME Code, Section III, Class 1, 2, and 3 components, CS, and component supports.

(b) The LBB criteria are applied to RCL, specific RCS Class 1 branch lines, and main steam lines of the US-APWR. However, DCD Table 3B-2 lists ten lines subject to LBB evaluation. In addition to the lines identified above, LBB evaluation is also applied to accumulator system lines. Describe the LBB criteria applied to all lines listed in the Table, including the accumulator lines.

(c) Also, in DCD Section 3.9.3.1.4 for RCL piping model it is stated that external loads are applied to the RCS piping for connecting piping that does not meet the LBB criteria. Explain what types of pipe break loads are applied to the RCL piping at the branch connections and how these loads are determined. Also, clarify if only the lines satisfying LBB criteria are modeled as part of the RCL piping model, thus excluding all lines that do not satisfy the LBB criteria.

(d) MHI states that components and piping are evaluated for the dynamic response to transient loads as a static load subject to a dynamic load factor (DLF). Describe and technically justify the DLF to be used in this dynamic analysis.

(e) MHI states that the effects of two additional loading events (RCP locked rotor and heavy lift loads) on safety-related equipment are evaluated for local and global stress effects on a case-by-case basis and are not combined with any other Level C or D service condition. In case of RCP locked rotor, the stresses calculated are evaluated using Level D service limits for the immediately affected components and supports in the affected RCL and using Level B service limits for components in the other RCL. Explain above statements with technical justifications.

03.09.03-7

In DCD Tier 2 (Rev. 1) Section 3.9.3.1.3, MHI provides the loading combinations and stress limits criteria for ASME Code, Section III, Class 1 components and supports and Class CS core support structure. DCD Table 3.9-6 summarizes stress criteria per ASME Code Subarticles applicable to these Class 1 and Class CS components and their supports. Address the following:

(a) Explain why vessel design and pump design do not reference ASME Code, Section III, NB-3300 and NB-3400, respectively.

(b) Explain why valve design criteria for the service level D do not reference NB-3527 in its entirety. Clarify whether this criteria applies to all Class 1 valves, active or not.

03.09.03-8

In DCD Tier 2 (Rev. 1) Section 3.9.3.1.5, MHI provides the loading combinations and stress limits criteria for ASME Code, section III, Class 2 and 3 components and supports. DCD Table 3.9-8 summarizes the stress criteria per ASME Code Subarticles applicable to these Class 2 and 3 components and their supports. Clarify the following:

(a) Article NC-3300 provides criteria for vessel design, while NC-3200 provides an alternative design rules for vessels. DCD Table 3.9-8 for vessels/tanks specifies NC-3217 for the design and service level A condition. The staff noted that there exists no corresponding NC-3317 similar to NC-3217 on design criteria. Discuss the criteria that are used in the design of the US-APWR vessels in accordance with NC-3217 for service level A condition. Also, explain why these criteria are not applicable to other service level conditions for the vessel design.

(b) MHI states that the environmental impact on fatigue of Class 2 and 3 components will follow guidelines established by the NRC at the time of actual analysis. Explain why this should not be a COL information item.

03.09.03-9

MHI states in DCD Tier 2 (Rev. 1) Section 3.9.3.3 that active pumps and valves are required to function under faulted conditions. It further states that DCD Section 3.10 provides the equipment specifications to assess the functional capability of the required components. These criteria and considerations include collapse and deflection limits associated with these components. Discuss (with examples) these criteria associated with the operability assurance of pumps and valves.

03.09.03-10

With regards to pump operability, in DCD Tier 2 (Rev. 1) Section 3.9.3.3.1 MHI provides only definitions of active and inactive pumps. Active pumps are those whose operability is relied upon to perform a safety-related function during transients or events in the respective operating condition categories. The criterion included in this section is the design of these pumps in accordance with ASME Code Section III requirements as outlined in Tables 3.9-6 for Class 1 and 3.9-8 for Class 2/3 pumps.

(a) Since there are Class 1 pumps identified in the DCD Table 3.9-7, clarify why the design criteria for Class 1 pumps are included in DCD Table 3.9-6. (Indicate if these criteria are applied to RCPs or any other Class 1 pumps.)

(b) Discuss how the operability of safety-related pumps is ensured just by satisfying the stress criteria in accordance with ASME Code.

03.09.03-11

With regards to valve operability, in DCD Tier 2 (Rev. 1) Section 3.9.3.3.2 MHI provides definitions of active and inactive valves. Active valves are those whose operability is relied upon to perform a safety-related function during transients or events in the respective operating condition categories. The criteria described in this section include the design of valves in accordance with ASME Code Section III requirements as outlined in Tables 3.9-6 for Class 1 and 3.9-8 for Class 2/3 valves and a series of tests and inspections prior to service as well as during the plant life. Answer the following:

(a) MHI states that the operability qualification of valve motor operator for the environmental conditions is discussed in DCD Tier 2 (Rev. 1) Section 3.11 which addresses equipment qualification of mechanical and electrical components. Discuss details of this process which ensures the operability of all other type of valve operators, including motor, air, and steam operators.

(b) MHI states that in addition to tests and analyses for valve operability, <u>a representative number of valves</u> of each design type are tested for verification of operability during a simulated Level D service condition (SSE event) by demonstrating operational capabilities within the specified limits. Define the criterion for selecting a representative number of valves (i.e., % of the population and the selection process) and discuss the demonstration of operational capabilities within the specified limits. Also, explain how dynamic loads other than SSE are considered (Note that this also applies to the equivalent static load method for the operability demonstration during a Level D service condition stated in DCD page 3.9-43).

(c) It seems that MHI is referencing IEEE Std 344-2004 for the dynamic qualification of valves, specifically for seismic qualification. The staff has approved the use of 1987 version of this IEEE standard in RG 1.100 and SRP Section 3.10. Discuss with technical justification all provisions that are included in the 2004 edition, but are not addressed in the 1987 version of this standard, and will be used in the dynamic qualification procedures for US-APWR components.

03.09.03-12

DCD Tier 2 (Rev. 1) Section 3.9.3.4 states that the maximum calculated static and dynamic deflections of the component at support locations do not exceed the allowable limits specified in the component design specification. But MHI did not discuss how the maximum static and dynamic deflections are combined from multiple loads for the four service level conditions and how the allowable limits are established for the component in its design specification. Discuss details on calculating the component deflections from different load conditions and how the allowable limits for the component support are determined.

03.09.03-13

MHI states in DCD Tier 2 (Rev. 1) Section 3.9.3.4 that in accordance with the ASME Code, Section III, non-mandatory Appendix F, the structural integrity of the seismic Category II pipe supports is ensured so that the SSE would not cause unacceptable structural interaction or failure of seismic Category I SSCs. The support design will follow the intent and general requirement specified in ASME Code, Section III, non-mandatory Appendix F. The staff did not find any details about the design criteria for seismic Category II supports for service level A, B, and C load combinations. Explain why the design of these supports is limited to service level D (faulted) loads only (i.e., ASME Appendix F) and provide details about the overall design criteria for seismic Category II component supports.

03.09.03-14

The staff noted that DCD Tier 2 (Rev. 1) Section 3.9.3.4.2.4 did not provide sufficient information for potential snubber end fitting clearances, mismatch of activation and release rates, and lost motion.

(a) Discuss how the snubber design will account for snubber end fitting clearances, mismatch of activation and release rates, and lost motion.

(b) How each of these elements would affect the calculations of snubber reaction loads and stresses using a linear analysis methodology?

(c) In multiple snubber applications where mismatch of end fitting clearance and lost motion exists, discuss their potential impact on the synchronism of activation level or release rate and, consequently, on the assumption of the load sharing of multiple snubber supports.

03.09.03-15

MHI states, in DCD Tier 2 (Rev. 1) Section 3.9.3.4.2.7, that the support design specification requires snubbers to be designed in accordance with ASME Code, Section III, Subsection NF. The design requirement includes analysis for normal, upset, emergency, and faulted loads. MHI also states that these calculated loads are then compared against the manufacturer's design and/or test capacities to ensure that the stresses are below the ASME Code's allowable limits. The staff, however, found no specific design requirements provided for snubbers.

(a) Provide a detailed discussion on the specific design rules of Subsection NF that applies to snubbers.

(b) Provide a detailed discussion on how the load capacity for design, normal, upset, emergency, and faulted conditions is derived and compared against the vendor's allowables, for both mechanical and hydraulic snubbers. Note that in DCD Section 3.9.3.4.2.2 it is stated that the snubber loading demand calculated for piping must meet the design load capacity. Confirm if this is also applicable to component supports.

03.09.03-16

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.2.7, item 6 states that specific environmental design conditions and snubber functionality is assured under harsh service conditon. Also, under snubber test program MHI states that based on initial in-situ snubber dynamic lock-up testing and thermal motion testing, a comparison of test data with analytical data (force and/or displacement time histories due to earthquakes and/or dynamic transients) assures that the piping or component stress analysis model and as-built snubber configuration performs within the analytical boundaries. However, MHI did not provide a detailed, delineated description of snubber manufacturing, qualification, and installation tests.

(a) Item 6 references to subsection 3.9.3.4.2.5 which addresses design specifications. Explain how this subsection addresses snubber qualification under harsh environment.

(b) Based on initial in-situ snubber dynamic lock-up testing and thermal motion testing, a comparison of test data with analytical data (force and/or displacement time histories due to earthquakes and/or dynamic transients) assures that the piping or component stress analysis model and as-built snubber configuration performs within the analytical boundaries. Clarify how this comparison between the test and analytical data is performed to ensure snubber performance within the analytical boundaries.

(c) Discuss the procedure and scope of manufacturing, qualification and installation test programs, separately, for both the mechanical and hydraulic snubbers of different sizes and manufacturers,

(d) Discuss how the criteria for each pertinent snubber functional parameter are met in the testing,

(e) Provide the codes and standards used for the test programs, and

(f) The reference to ASME Section XI (Reference 3.9-43) indicates no edition/addenda. Provide the ASME Code edition and addenda for Section XI that will be used for the US-APWR design.

03.09.03-17

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.2.6, MHI discusses instruction manual containing complete guidance for testing, maintenance, and repair of snubbers. This manual specifies the required inspection locations and the periods of inspection. Hydraulic snubbers for piping require that a fluid level indicator is equipped to ascertain the level of fluid in the snubber. Snubber thermal movement, clearance, and gaps are periodically verified, including motion measurements, and acceptance criteria assure compliance with ASME Code, Section III, Subsection NF. Clarify why the hydraulic snubbers for piping are equipped with level indicators, but not those used for component supports. Also, clarify if similar instruction manual is developed for mechanical snubbers and discuss its contents.

03.09.03-18

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.5, MHI states that special engineered pipe supports, designed without the use of manufactured standard supports or supplementary steel supports, are used for the US-APWR piping design. They utilize non-standard specialized components and can have both mechanical and structural characteristics. These support types are used generally on systems that have high thermal expansion and require seismic or vibration support to minimize the use of snubbers. The staff noted that MHI did not provide sufficient details regarding the design criteria and dynamic testing of these supports. Answer the following:

(a) Discuss examples of special engineered pipe supports that will be used in the piping design, which will allow high thermal expansion and require seismic or dynamic restraint. Include their mechanical and structural characteristics.

(b) MHI states that the supports for ASME Code, Section III, Class 1, 2, and 3 components including pipe supports satisfy the requirements of the ASME Code, Section III, Subsection NF. Identify and discuss what Subsection NF criteria are applicable to this support class. Provide loads and load combinations specifically applicable to this design.

(c) MHI states that the criteria for Appendix F in ASME Code, Section III, are used for the evaluation of Level D service conditions. When supports for components not built to ASME Code, Section III, criteria are evaluated for the effect of Level D service conditions, the allowable stress levels are based on tests or accepted industry standards comparable to those in Appendix F of ASME Code, Section III. Explain, with examples, what tests or accepted standards will be used that are comparable to Appendix F limits.

(d) It is stated in the DCD that to ensure operability of active equipment, including valves, ASME Code, Section III limits for Level C service loadings are met for the supports of these items. Provide the technical basis for this operability assurance, specifically when seismic loads are included for Level D service loadings.

(e) MHI states that the use of baseplates with concrete expansion anchors is minimized in the US-APWR. Concrete expansion anchors may be used for pipe supports. For these pipe support baseplate designs, the baseplate flexibility requirements of IE Bulletin 79-02, Revision 2, are met by accounting for the baseplate flexibility in the calculation of anchor bolt loads.
(i) Clarify if the design and installation of all anchor bolts will follow ACI 349-2001 subject to conditions and limitations specified in RG 1.199 and IE Bulletin 79-02, Rev. 2. (ii) Discuss design criteria when expansion and undercut anchor bolts will be used for safety-related system components. (iii) Explain why this baseplate design is unique to special engineered pipe supports? Confirm if the baseplate design is also applicable to other ASME Code Class 1, 2, and 3 component supports.

03.09.03-19

MHI also states in DCD Tier 2 (Rev. 1) Section 3.9.3.4.6 that where the design and service stress limits specified in the code do not necessarily provide direction for the proper consideration of operability requirements for conditions which warrant consideration, Section II.3 and Appendix A of SRP 3.9.3, RG 1.124 and RG 1.130 are used for guidance. Where these stress limits apply, the treatment of functional capability, including collapse, deformation and deflection limits are evaluated and appropriate information is developed for inclusion into the design specification. Explain what consideration of operability requirements of component supports is addressed. Also, discuss how the functional capability, including collapse, deformation and deflection limits, is evaluated.

03.09.03-20

MHI states in DCD Tier 2 (Rev. 1) Section 3.9.3.4.6 that ASME Code, Section III component supports are designed, manufactured, installed, and tested in accordance with all applicable codes and standards. Supports include hangers, snubbers, struts, spring hangers, frames, energy absorbers, and limit stops.

(a) Identify codes and standards that are applicable for the design, manufacturing, installation and testing of each type of component supports.

(b) Provide design criteria for energy absorbers and limit stops that will be used for component supports. (Note that DCD Tier 2 (Rev. 1) Section 3.12.6.5 indicates these support types are not used for piping design.)

03.09.03-21

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.6.1, MHI discusses the design methods for Class 1 component supports and includes supports for reactor vessel, steam generators, reactor coolant pumps, and the pressurizer. The structural analysis of these ASME Code, Section III, Class 1 component supports includes the loads, load combinations, and stress allowable limits in accordance with the ASME Code, Section III, Subsection NF and Appendix F. Externally applied loads for each system operating, system transient, and accident condition that are generated from the RCL piping analysis are applied and are appropriately combined with component generated support loads. The combination of loadings considered for each component support uses the criteria in Appendix A, RG 1.124, and RG 1.130. Computerized finite element analysis programs are used to determine the support stresses and reaction loads. Address the following:

(a) Discuss the modeling and analysis methods of supports used for major components (RV, SG, RCP and Pressurizer). Include how the effect of hydrodynamic loads and building settlement loads associated with these components is considered in the design of these supports.

(b) For each component support (RV, SG, RCP and Pressurizer), provide (or refer to appropriate DCD Sections) sketches of its support design, loads and load combinations, applicable stress limit criteria, and codes and regulatory guidance. Include the fatigue evaluation criteria.

(c) Provide design criteria for the Class 1 piping supports, specifically for the RCL.

03.09.03-22

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.6.2, MHI discusses the design criteria (models and methods) for ASME Code Class 2 and 3 component supports. These component supports are generally of linear or plate and shell type; however, standard component supports may be used. Address the following:

(a) It is stated that the analyses or test methods and associated stress or load allowable limits that are used in the evaluation of linear supports for Level D service conditions are those defined in Appendix F of the ASME Code, Section III. Discuss and identify analysis and test methods of Appendix F used for both linear type and plates and shell type component supports.

(b) MHI states that the combination of loadings considered for each component support within a system, including the designation of the appropriate service stress for each loading combination are consistent with the criteria in Appendix A (of SRP Section 3.9.3), RG 1.124 and RG 1.130. Identify any differences between the load combination criteria presented in the DCD and the RGs for the linear type and plates and shell type component supports.

(c) Note that all references to Subsection NF-3320 for load combinations stated in the DCD are related to Class 1 component supports where the DCD Tier 2 (Rev. 1) Section addresses Class 2 and 3 component supports. Also, the reference to NF-3231 does not exist in the Code. Clarify these discrepancies.

(d) MHI states that for active ASME Code, Section III, Class 2 or 3 pumps, support adequacy is proven by satisfying the criteria in DCD Tables 3.9-4 and 3.9-8. In addition to these requirements for meeting stress limits, an evaluation of pump/motor support misalignment is required. Explain what is meant by support misalignment and discuss the evaluation process.

(e) MHI states that active valves are, in general, supported only by the pipe attached to the valve. Exterior supports on the valve are <u>generally</u> not used. Discuss the design criteria for valves where external supports are used.

03.09.03-23

In DCD Tier 2 (Rev. 1) Section 3.9.3.4.7, MHI discusses snubbers used as component supports. Snubbers are generally hydraulic; however, there are mechanical snubbers available that lock-up at equivalent hydraulic velocities. Details of snubber design, testing, operation, maintenance, inspection, and other functional characteristics are presented in DCD Tier 2 (Rev. 1) Section 3.9.3.4.2.

(a) It is stated that there are mechanical snubbers available that lock-up at equivalent hydraulic velocities. Clarify what does this mean. Provide criteria or individual cases when mechanical or hydraulic snubbers are used in the component support design.

(b) MHI also states that with the implementation of LBB criteria and the elimination of the analysis of dynamic effects of pipe breaks detailed in Subsection 3.6.3, the use of snubbers is minimized in these LBB qualified piping systems. Discuss how snubbers are minimized based on the satisfaction of the LBB criteria for a piping system.