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Subject: **Response to NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Numbers 3.2-1 through 3.2-62**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter. This completes GE's response to RAI Letter No. 51.

If you have any questions about the information provided here, please let me know.

Sincerely,

Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

Reference:

1. MFN 06-277, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application,* August 8, 2006

Enclosure:

1. MFN 06-308 – Response to NRC Request for Additional Information Letter No. 51 Related to ESBWR Design Certification Application – Classification of Structures, Systems and Components – RAI Numbers 3.2-1 through 3.2-62

cc:

WD Beckner	USNRC (w/o enclosures)
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eDRFs	0000-0056-7444

Enclosure 1

MFN 06-308

GE Responses to NRC Request for Additional Information Letter No. 51 for the ESBWR Design Certification Application Classification of Structures, Systems and Components RAIs 3.2-1 through 3.2-62

NRC RAI 3.2-1

It should be noted that the current 10 CFR 50.55a rule requires that an ASME Code N-symbol stamp be applied to all ASME Code Class 1, 2, and 3 pressure boundary components. This is contrary to a footnote b to Table 1 included in the currently issued Revision 3 of RG 1.26, which states that such a stamp need not be applied. The staff is currently in the process of revising RG 1.26 to conform to the requirements of 10 CFR 50.55a. Please confirm that all pressure retaining components designed to meet ASME Code requirements for Code Class 1, 2, and 3 components will have the Code N-symbol stamp applied, in accordance with 10 CFR 50.55a.

GE Response

GE confirms that all pressure retaining components designed to meet ASME Code requirements for Code Class 1, 2 and 3 components will meet the requirements of 10 CFR 50.55a and will therefore have the Code N-symbol stamp applied per Table NCA-8100-1 of the ASME Code, Section III, Subsection NCA.

No DCD change will be made in response to this RAI.

NRC RAI 3.2-2

In Section 3.2.2 of the DCD, it is stated that component supports are not within the scope of RG 1.26. However, it is the staff position that both components and component supports are addressed by RG 1.26. Please revise this section accordingly.

GE Response

GE agrees and notes that DCD Subsections 3.2.2.1, 3.2.2.2 and 3.2.2.3 already indicate that component supports are included in the quality group classifications.

The text in DCD Tier 2 Subsection 3.2.2 will be revised to remove component supports from the list of items not covered by RG 1.26.

See attached DCD markup for changes.

NRC RAI 3.2-3

Revise Section 3.2.2.2 Quality Group B discussion

This section provides no discussion of significant safety systems described in RG 1.26 and Standard Review Plan (SRP) 3.2.2 for Quality Group B systems, such as those which provide reactor shutdown, emergency core cooling, post-accident containment heat removal, post-accident fission product removal, or decay heat removal. Please revise the Section 3.2.2.2 discussion to add these important system functions to the Quality Group B description.

GE Response

After reviewing all the RAIs on Section 3.2, GE decided to update Table 3.2-1 in its entirety to replace Safety Designation with Safety Class. This was done because it was not possible to determine from the table the proper Safety Class for components that were assigned a Safety Designation of Q and a Quality Group of "—". This situation arises for non-pressure-retaining components that in GE's viewpoint are not addressed in RG 1.26. Safety class for these types of components was defined in the revised table on the same basis that was applied for the ABWR design certification.

The requested discussion has been added to a new Subsection 3.2.3.2, which discusses the types of functions and systems that are considered to be in Safety Class 2. GE considers Safety Class 2 to be essentially equivalent to Quality Group B for pressure-retaining portions of systems and their supports.

Systems and functions that primarily fall into Safety Class 2 (and Quality Group B) for ESBWR include the Control Rod Drive system, containment isolation functions in various systems, the Gravity-Driven Cooling System (GDCS), the Isolation Condenser System (ICS) and the Passive Containment Cooling System (PCCS).

See the attached DCD markup for details of the changes discussed above.

NRC RAI 3.2-4

Revise Section 3.2.2.3 Quality Group C discussion

This section provides no discussion of significant safety systems described in RG 1.26 and SRP 3.2.2 for Quality Group C systems, such as those which provide cooling water to systems for reactor shutdown, emergency core cooling, post-accident containment heat removal, post-accident fission product removal, decay heat removal, or those containing radioactive waste. Please revise the Section 3.2.2.3 discussion to add these important system functions to the Quality Group C description.

GE Response

The requested discussion has been added to a new Subsection 3.2.3.3, which discusses the types of functions and systems that are considered to be in Safety Class 3. GE considers Safety Class 3 to be essentially equivalent to Quality Group C for pressure-retaining portions of systems and their supports.

Due to the use of passive safety-related systems in the ESBWR design, the functions that fall into Safety Class 3 are primarily process monitoring and I&C systems (like the Reactor Protection System) that provide initiation signals to safety-related components. However, since these are in general not pressure retaining components they are assigned a Quality Group of "—". The ESBWR design does not require cooling water to be provided to safety-related systems for reactor shutdown, emergency core cooling, post-accident containment heat removal, post-accident fission product removal, decay heat removal, or those systems containing radioactive waste during the first 72 hours after an initiating event.

See the attached DCD markup for details of the changes discussed above.

NRC RAI 3.2-5

In Table 3.2-1, there are numerous systems, or portions thereof, which are designated "N" (for non-safety related). However, the system or component description indicates that its function is safety-related. For example, the Table indicates that the Fuel and Auxiliary Pools Cooling System (FAPCS) Isolation Condenser/Primary Containment Cooling Pool cooling piping has a safety designation of N, which is inconsistent with the safety-related function of post-accident containment heat removal. Please revise the Table to ensure that the system safety designations account for all safety-related functions which the systems are required to perform.

GE Response

GE has gone back through Table 3.2-1 and made some adjustments in classifications that were found to be necessary, but for the most part the classifications are correct as they appeared in Revision 1 of the DCD. As indicated above in the response to RAI 3.2-3, the Safety Designation column has been replaced with a Safety Class column for consistency with ABWR. This change to the table eliminates confusion over the proper safety classification of non-pressure retaining components that do not fall into one of the RG 1.26 Quality Group classifications.

In the ESBWR design, systems that in past BWR designs performed safety-related post-accident heat removal functions are now performing only operational or defense-in-depth functions and are not assumed to operate in any safety analysis. The safety-related post-accident containment heat removal system for ESBWR is the Passive Containment Cooling System (PCCS). The safety-related post-accident emergency core cooling systems for ESBWR are the Isolation Condensers, the Gravity-Driven Cooling System (GDCS), the Automatic Depressurization System (ADS) function of the Nuclear Boiler System, and the Standby Liquid Control System. The safety-related Ultimate Heat Sink is the atmosphere, which receives steam by boiling from the IC/PCC pools and Spent Fuel Pool. These safety-related systems do not rely on any cooling water systems or makeup water systems during the first 72 hours after a design basis event.

The Fuel and Auxiliary Pools Cooling System, mentioned as an example in the RAI, is primarily a nonsafety-related system with some safety-related components. It performs the following safety-related functions:

- Providing containment isolation for lines that penetrate containment
- Providing a flow path for makeup water from an outside source to the IC/PCC Pools and Spent Fuel Pool through independent lines.

The containment isolation function is covered by items 1 and 2 in Table 3.2-1, and the safety-related pool makeup water function is covered by item 3. All other functions of the FAPCS (including active pool cooling) are nonsafety-related. Therefore, the FAPCS components described as Safety Class "N" are classified appropriately.

NRC RAI 3.2-6

In Table 3.2-1, there are several items which are designated as either Seismic Category I or II. Consistent with guidance provided in RG 1.29 and SRP 3.2.1, these items should also be designated as Quality Assurance B. Please revise the Table accordingly.

GE Response

The classification system works in the other direction. Safety-related structures, systems and components (SSCs) have a Safety Class of 1, 2 or 3 and are required to be classified as Seismic Category I and Quality Assurance B. Seismic Category I or II SSCs are not required to be safety-related, and the QA requirements of 10 CFR 50 Appendix B only apply to safety-related components. Thus, Quality Assurance E is appropriate for all nonsafety-related SSCs regardless of their seismic classification.

There are a number of examples in existing BWRs, as well as in the ABWR, where SSCs have been assigned a Seismic Category I or II classification while still being nonsafety-related and subject to Quality Assurance E requirements. The ESBWR classifications are thus following the precedent set by earlier BWR designs.

On a case by case basis, certain nonsafety-related components, such as the portions of the Fire Protection System that are considered to be RTNSS, were conservatively assigned by the system designer to a higher seismic category than would otherwise have been required. However, applying more stringent seismic design requirements does not mean that these SSCs are also automatically required to upgrade their Quality Assurance classification.

Some text discussing the assignment of Seismic Category I requirements to certain nonsafety-related equipment will be added in a new DCD Subsection 3.2.3.4. See attached markup for changes.

NRC RAI 3.2-7

The piping and instrument diagrams (P&IDs) which depict the configurations associated with the items listed in Table 3.2-1 are not sufficiently clear in all cases to adequately describe the limits of the applied quality groups, quality assurances, and seismic categories within the various systems. For example, in the Fuel and Auxiliary Pools Cooling System P&ID (Figure 9.1-1), the suppression pool return lines are not clearly identified, and the necessary termination points are not labeled. As another example, a P&ID which depicts the classification boundaries for the main steam and feedwater systems outside containment could not be found. Please provide information on the system P&IDs which clearly identifies system and component classification limits identified in Table 3.2-1. Also, please provide a COL action to provide complete, detailed P&IDs of all plant systems, including unique identification numbers for all system components, to ensure that the final design classifications and the classification boundaries are acceptable.

GE Response

GE agrees that some of the simplified P&IDs do not clearly describe the limits of the applied quality groups, quality assurances and seismic categories within the various systems. These will be corrected as they are discovered and updated in a future revision of the DCD. In the meantime, GE offers to provide NRC with detailed P&IDs in proprietary submittals for any system where questions exist as to the location of the classification boundaries.

Figures showing the classification boundaries for the main steam and feedwater piping outside containment will be added to the DCD as Figures 3.2-1 and 3.2-2. See attached DCD markup for these figures.

GE does not believe the COL action requested by this RAI is necessary. As needed, sufficiently detailed P&IDs will be provided to the NRC by GE under proprietary submittals to resolve any NRC concerns with classification boundaries during the design certification process.

NRC RAI 3.2-8

Table 3.2-1, Component B11, Item 4, provides no quality group designation for the Control Rods. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for reactor shutdown, these should be Quality Group B components. Please revise the Table.

GE Response

GE has not given the Control Rods a Quality Group designation per RG 1.26 because this Regulatory Guide pertains to pressure retaining components. This is consistent with the ABWR DCD, which does not assign a specific Quality Group to the Control Rods. However, GE has now assigned a Safety Class 2 to the Control Rods. This change satisfies the intent of the requested change to the DCD.

Table 3.2-1 will be revised accordingly as shown in the attached markup.

NRC RAI 3.2-9

Table 3.2-1, Component B11, Item 5, provides no quality group designation for the Standby Liquid Control (SLC) system header and spargers. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for reactor shutdown, these should be Quality Group B components. Please revise the Table accordingly.

GE Response

GE has not given the Standby Liquid Control (SLC) system header and spargers a Quality Group designation per RG 1.26 because this Regulatory Guide pertains to pressure retaining components. However, GE has now assigned a Safety Class 2 to these components. This change satisfies the intent of the requested change to the DCD.

Table 3.2-1 will be revised accordingly as shown in the attached markup.

NRC RAI 3.2-10

Table 3.2-1, Component B11, Item 7, provides no quality group designation for these safety-related reactor internals. Consistent with SRP 3.2.2 and RG 1.26 guidance, these should be Quality Group B components, because the components are necessary to maintain core geometry and ensure reactor shutdown. Please revise the Table accordingly.

GE Response

DCD Table 3.2-1 will be revised to add Quality Group B to core support structures consistent with NUREG-0800, SRP 3.2.2, Table 3.2.2-1.

Table 3.2-1 will be revised as shown in the attached markup.

NRC RAI 3.2-11

Table 3.2-1, Component B11, Item 8, provides no quality group designation or specific quality assurance requirement for the nonsafety-related reactor internals. While these components have traditionally been regarded as having no safety function, recent operational experience for BWRs indicates that the structural integrity of these components, primarily steam separators and dryers, is important to ensure that there are no loose parts during normal operation or accident conditions, such that safety-related components are not adversely affected. For example, a steam dryer loose part could adversely affect main steam system integrity or isolation valve capability, which could increase potential offsite doses or could adversely affect other reactor internal components such that reactor shutdown could be impaired. Therefore, consistent with SRP 3.2.2 and RG 1.26 guidance, these components should be at least Quality Group C and Quality Assurance B components. This is also consistent with recently upgraded replacement steam dryers at operating plants. Please revise the Table accordingly or provide a justification for your position.

GE Response

The BWR steam dryers and steam separators have traditionally been classified as nonsafety-related. They are also not pressure retaining components. Therefore, no Quality Group has been assigned in the past. The ESBWR steam dryer and steam separators will utilize ASME, Section III materials and the design, fabrication and inspection will be performed with Subsection NG as a guideline. Since the ESBWR is a new plant, an extensive Flow Induced Vibration (FIV) program will be carried out on the steam dryer using scale models to optimize the design against possible FIV problems and parts coming loose. In regard to the steam separators, operating BWRs have not had problems with loose parts. Therefore, giving these components a Quality Group C and Quality Assurance classification B is not warranted.

No DCD change will be made in response to this RAI.

NRC RAI 3.2-12

In addition to the accumulator, all piping and valves required for performing the nitrogen actuation of the Safety Relief Valves (SRVs), need to be included in Table 3.2-1 Component B21.

GE Response

According to Note (1) of Table 3.2-1, a principal component is defined as an assembly of interconnected components that constitute an identifiable device or piece of equipment. Therefore, this means that the piping and valves that support the actuation of the SRVs are included in the nitrogen accumulator described as Item 4 in Table 3.2-1. The description and classification of Item 4 is consistent with the ABWR certified design and ABWR Design Control Document Tier 2.

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-13

Consistent with SRP 3.2.2 and RG 1.26, a note should be added to Table 3.2-1, Component B21, Item 6, and the appropriate DCD drawings should be revised to state that the seismic restraints must be located inside a Seismic Category I structure.

GE Response

GE will add a note to B21 Item 6 in Table 3.2-1 to clarify that seismic interface restraints are located inside the Seismic Category I building. DCD Figure 5.1-2 shows the components that are inside the Drywell and the components that are outside the Drywell. The seismic interface restraints on Figure 5.1-2 are located outside the Drywell and inside the Reactor Building and Steam Tunnel, which are Seismic Category I structures. Please refer to DCD Figures 3.2-1 and 3.2-2, which are added to provide the details that show the seismic interface restraints inside the Seismic Category I building.

DCD Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-14

Component B21 Item 7 – Main steam lines from seismic restraints to turbine stop valves, existed in Revision 0 of Table 3.2-1, but has been deleted in Revision 1. Consistent with SRP 3.2.2 and RG 1.26 guidance, this portion of the main steam piping should be retained in the Table and categorized at least as Quality Group B, Quality Assurance B, and Seismic Category II.

GE Response

The scope that was previously described under B21 Item 7 is now described under N11 Item 1. Please refer to N11 Turbine Main Steam System in Table 3.2-1.

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-15

Table 3.2-1, Component B21, Item 8: Consistent with SRP 3.2.2 and RG 1.26 guidance, this portion of the feedwater piping should be designated Quality Group B. Please revise Table 3.2-1, Component B21 accordingly.

GE Response

GE will revise Table 3.2-1, Component B21 Item 8 to designate this piping as Quality Group B.

DCD Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-16

In accordance with SRP 3.2.2 and RG 1.26 guidance, the condenser anchorage and piping inlet nozzles to the condenser should be seismically analyzed. Therefore, this portion of the main steam system should be designated at least Quality Group D, Quality Assurance E, and Seismic Category II. Please revise Table 3.2-1, Component B21 accordingly.

GE Response

The Main Condenser has a Nonsafety-related, Non-seismic design classification, but the inlet piping, inlet nozzles and condenser anchorage are seismically analyzed for SSE. Quality Groups and Seismic Classification will be shown on Figure 3.2-1, which will be added to the DCD.

Lines downstream of the seismic restraint are classified as system N11 on the P&ID. Therefore, these items are covered in DCD Table 3.2-1, Section N11, and not B21. Table 3.2-1, Section N11, will be revised in accordance with the attached markup. The wording has been revised to reflect Regulatory Guide 1.29 Section C, specifically item "e", piping 63.5 mm (2.5 inches) and larger will be analyzed to withstand SSE loads.

Figure 3.2-1 will be added to the DCD Section 3.2 as shown in the attached markup.

NRC RAI 3.2-17

In accordance with SRP 3.2.2 and RG 1.26 guidance, the steam lines connected to main steam lines from the power cycle auxiliary equipment including auxiliary steam shut off valves should be Quality Group D. Therefore, this portion of the main steam system should be designated at least Quality Group D, Quality Assurance E, and Seismic Category NS. Please revise Table 3.2-1, Component B21 accordingly.

GE Response

Lines downstream of the seismic restraint shown in Figure 3.2-1 are classified as system N11, N61 or N33 (for example) on the P&ID. Therefore in DCD Table 3.2-1, B21 will not be updated. Quality Group and Seismic Classifications are shown on Figure 3.2-1 for the power cycle auxiliary equipment and shutoff valves.

See attached Figures 3.2-1 and 3.2-2. These Figures will be added to the DCD Section 3.2 as shown in the attached markup.

NRC RAI 3.2-18

Table 3.2-1, Component B21, Item 9: The seismic category of these pipe whip restraints is listed as "NS or I". Pipe whip restraints are designed for concurrent pipe break and seismic loading and should, therefore, be at least Seismic Category II to prevent damage to adjacent safety-related components. Also, the note should be revised to state that the restraints are required, except where a Leak-Before-Break evaluation has been approved by the NRC. Please revise the Table accordingly.

GE Response

GE will change Seismic Category to "I or II". GE will revise note for B21 Item 9 as requested.

DCD Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-19

In Table 3.2-1, Component B21, Item 13, the piping and valves (including supports) for main steam drains beyond the outermost MSIV and downstream of the second isolation valve is designated Quality Group D. However, consistent with SRP 3.2.2 and RG 1.26 guidance, this second drain isolation valve must also be a normally closed valve to define an acceptable transition from the upstream Quality Group B piping to the downstream Quality Group D piping. Please verify that the described second valve is a normally closed valve. Also, this item is designated Seismic Category II, which requires seismic analysis methods which are described in Section 3.7 of the DCD. However, Section 15.4.4.5.2.3 of the DCD refers to earthquake experience data as a basis for seismic structural capability of the main steam lines and drains. Please verify that this item will be analyzed according to methods described in Section 3.7, and revise Section 15.4.4.5.2.3 accordingly.

GE Response

The second isolation valve in the main steam drains beyond the outermost MSIV is a normally closed valve. GE confirms that B21 Item 13 in Table 3.2-1 will be analyzed according to the methods that are described in DCD Section 3.7. The statement in Section 15.4.4.5.2.3 that refers to earthquake experience data is not intended to be the only basis for seismic structural capability of main steam lines and drains. Please refer to the following statement in Section 15.4.4.5.2.3 that confirms that in the case of the ESBWR a dynamic analysis is performed to provide the basis for seismic structural capability of these lines:

"In the case of the ESBWR, further margin for survival can be expected, because the ESBWR lines are designed through dynamic analysis to survive such events, whereas in the case of the actual experience database, the lines shown to survive were designed to lesser standards to meet only normally expected loads."

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-20

Table 3.2-1, Component B21, Item 16 - Other mechanical modules with safety-related function: There is no description of these components in the Table. Each module component should be listed separately. Please revise the Table accordingly.

GE Response

B21 Item 16 is defined as a principal component, which generally is intended to represent those other mechanical assemblies of interconnected components that make up an identifiable device or piece of equipment such as strainers and orifices. This item is consistent with Note (1) of Table 3.2-1, which provides an explanation and definition of mechanical modules. The description of this item is also consistent with the ABWR certified design and ABWR DCD Tier 2. Therefore, no changes are needed to this item.

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-21

Table 3.2-1, Component C12, Item 3: The Table provides no quality group designation for the Hydraulic Control Unit (HCU) and subcomponents. Table footnote (8) states that for the HCU, the quality groups are not considered applicable to the "specialty" subcomponent parts therein. However, consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for reactor shutdown, these should be Quality Group B components. It is the staff position that, because of the safety importance of the reactivity control function, all HCU assemblies and subcomponents, must be designated Quality Group B components. Please revise the Table and footnote (8) accordingly.

GE Response

The HCU classifications specified in Table 3.2-1, including Table footnote (8) relating to quality group, are identical to the HCU classifications that have been well established and accepted for many decades. This includes the entire BWR operating fleet and the ABWR certified design. Previous NRC acceptance of GE's position is evident by the approval of these plant designs. Because the function and design of the ESBWR HCU is the same as the previous designs, GE believes the same classification is appropriate and correct for the ESBWR and consistent with accepted industry practice.

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-22

Table 3.2-1, Component C12, Item 6 and 7: The Table indicates Quality Group D, Quality Assurance E, and Seismic Category NS for the Control Rod Drive pumps and piping which provide makeup injection. This portion of the system provides high pressure makeup flow to the reactor in the event of a loss of normal feedwater. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components designed for reactor shutdown and decay heat removal, this portion of the system should be designated safety-related Quality Group B, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly.

GE Response

The quality group, quality assurance and seismic category classifications are consistent with the classification of the CRD system high pressure makeup function as non-safety related. The response to RAI 4.6-1 provides the background and basis for this classification (see MFN 06-078, dated March 16, 2006).

No DCD changes will be made in response to this RAI.

NRC RAI 3.2-23

Table 3.2-1, Component C12, Item 10: The Table indicates a no quality group, Quality Assurance E, and Seismic Category NS for the Anticipated Transient Without Scram (ATWS) equipment associated with the Alternate Rod Insertion (ARI) equipment. A note indicates the quality assurance meets or exceeds the guidance provided in Generic Letter (GL) 85-06. However, the GL 85-06 guidance was intended for already licensed reactors, not newly designed reactors. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components designed for reactor shutdown, these should be safety-related, Quality Group B, Quality Assurance B, Seismic Category I components. Please revise the Table and associated note accordingly.

GE Response

The ESBWR ARI equipment classifications specified in Table 3.2-1 are identical to the previously approved ABWR certified design, with the exception of seismic category. The ABWR and ESBWR ARI designs follow the NRC approved guidance defined in Appendix A of Licensing Topical Report (LTR) NEDE-31096-P-A, "Anticipated Transients Without Scram – Response to NRC ATWS Rule 10CFR50.62," February 1987. This LTR makes no distinction between already licensed reactors and newly designed reactors for application of Generic Letter (GL) 85-06.

The seismic category classification for the ARI equipment is changed from NS (non-seismic) to Seismic Category II to be consistent with the requirement that non-safety related structures, systems, components and parts remain structurally intact during a seismic event and not degrade the functioning of Seismic Category I structures, systems or components. This is shown in the attached markup of DCD Tier 2 Table 3.2-1.

Because the function and design of the ESBWR ARI are the same as the approved ABWR design and are in conformance with LTR NEDE-31096-P-A, GE believes the same classification is appropriate and correct for the ESBWR and consistent with accepted industry practice.

DCD Tier 2 Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-24

Table 3.2-1, Component D11, Item 3: In the Table, the note for the Process Radiation Monitoring System (PRMS) fission product monitoring system (other portions) states that there are special seismic qualification and other quality assurance requirements. Please provide a description of these requirements. Also, please describe any piping components in this portion of the system and their necessary quality group designations.

GE Response

There are no special seismic qualification and quality assurance requirements applied to Drywell Fission Product Monitoring system. In Table 3.2-1, D11, Item 3, the special requirements specified under column "Notes" were inadvertently specified. This note has been deleted.

The drywell Fission Product Monitoring subsystem piping and valves are specified in Table 3.2-1, Process Radiation Monitoring Systems, D11, Item 2.

The DCD Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-25

Table 3.2-1, Component D21: In the Table, there is no description of any piping components in the Area Radiation Monitoring System (ARMS). Please describe any piping components in this system and their necessary quality group, quality assurance, and seismic category designations.

GE Response

There are no piping, valves, etc. in the Area Radiation Monitoring System and therefore, there are no requirements discussed for this system. Additional description of ARMS is shown in DCD Subsection 7.5.4.

No DCD change will be made in response to this RAI.

NRC RAI 3.2-26

Table 3.2-1, Component E50, Items 2 and 3: The Table provides a Quality Group C designation for the Gravity-Driven Cooling System (GDCS) outside the check valves upstream of the squib valves (second reactor coolant system isolation valves). However, consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for emergency core cooling, these should be Quality Group B components. Please revise the Table accordingly.

GE Response

Quality Group will be changed from C to B for items 2 and 3 in Table 3.2-1 under system E50. The corresponding Safety Class for these components is 2. See attached DCD markup for changes.

NRC RAI 3.2-27

Table 3.2-1, Component E50: On the GDCS P&ID (Figure 5.1-3), there is shown a GDCS pool splash guard, which is not part of the Table. Please revise the Table accordingly.

GE Response

GDCS pool splash guard will be added to Table 3.2-1 as item 5 for system E50. See attached DCD markup for changes.

NRC RAI 3.2-28

Table 3.2-1, Component F16, Item 1: The Table indicates no quality group, Quality Assurance E, and Seismic Category I for the Fuel Storage Facility fuel storage racks - new and spent. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance, these components should be at least Quality Group D and Quality Assurance B. Please revise the Table accordingly.

GE Response

The fuel storage racks are correctly classified as Quality Group "—" and Quality Assurance "E".

The fuel storage racks are nonsafety-related and Seismic Category I. Quality Groups are defined in RG 1.26. RG 1.29 covers seismic classification. In RG 1.26, Groups A to D are for pressure-retaining piping systems and do not specifically address other mechanical components. Additionally, the discussion in Section B of RG 1.26 states this RG applies specifically to "safety-related components containing water, steam or radioactive material". It also states that other systems not specifically covered are to be designed, fabricated, erected, and tested to quality assurance requirements commensurate with the safety function to be performed. In RG 1.29, 10 CFR 50 Appendix B is invoked only for safety-related activities. The fact that the equipment is defined as Seismic Category I in and of itself does not necessarily invoke a higher quality group or quality assurance classification (see response to RAI 3.2-6 for further discussion on this issue). SRPs 9.1.1 [New Fuel Storage] and 9.1.2 [New Fuel Storage] make no reference to specific quality group or quality assurance requirements and make no statements that would require changing either of these classifications. The ESBWR DCD classifications in Table 3.2-1 for these components are consistent with the ABWR DCD, Table 3.2-1.

No DCD changes will be made as a result of this RAI.

NRC RAI 3.2-29

Table 3.2-1, Component F42, Item 1: The Table indicates no quality group, Quality Assurance E, and Seismic Category I for the Fuel Transfer System (FTS) transfer tube assembly from interface with upper fuel pool, through building to lower spent fuel pool terminus equipment, including drain connection. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 regarding Seismic Category I components designed for spent fuel heat removal, these components should be at least Quality Group D and Quality Assurance B. Please revise the Table accordingly or provide a justification for your position.

GE Response

The Inclined Fuel Transfer System (IFTS) is correctly classified as Quality Assurance "E". Its Quality Group classification will be changed from "—"to "D" as shown in the attached DCD markup.

The IFTS is not part of the reactor coolant pressure boundary, nor is it identified in the Quality Group B and C standard definitions. Since it is nonsafety-related, connected to the Reactor Building and Fuel Building and its piping contains radioactive material, it falls into Quality Group D. The IFTS is required to be designed to ASME B31.1 requirements in order to be consistent RG 1.26 and with the earlier BWR/6 IFTS design basis.

Unlike the BWR/6 IFTS, the ESBWR IFTS does not have a portion of the transfer tube that serves as part of the primary reactor containment boundary. Per ANS 57.1, "Design Requirements for Light Water Reactor Fuel Handling Systems," only the boundary portion of the BWR/6 IFTS was defined as Safety Class 2. The remainder was nonsafety-related and was designed and fabricated to commercial codes and standards, see ANS 57.1, Section 6.2. Since the IFTS is designated as "N" or nonsafety-related, the requirements of 10 CFR 50, Appendix B, are not applied. Instead, the IFTS shall be constructed in accordance with a quality assurance program that ensures that the design, construction, and testing requirements are met.

NRC RAI 3.2-30

Table 3.2-1,Component G21, Item 8: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category II designation for the FAPCS inside containment between inboard containment isolation valves and their termination points for the suppression pool return line and drywell spray discharge line. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components designed for post accident containment heat removal, these portions of the system should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

The question summary (referring to lines that serve the GDCS pools) is inconsistent with the full text of the question (which refers to the suppression pool return line and drywell spray discharge line).

The drywell spray discharge and suppression pool return lines are already described as Quality Group C, Seismic I. These lines are rarely used, and do not perform safety-related functions, therefore Quality Assurance E is appropriate. Drywell spray is a defense-in-depth function for ESBWR that is not credited in any safety analysis.

The GDCS pool suction and return lines are described as Quality Group D because they do not meet any of the criteria in Reg Guide 1.26 section C.2. GDCS cooling is not a safety-related function, is not designed for post accident containment heat removal and is not credited in any safety analysis. These lines are rarely used, and do not perform a safety-related function, therefore Quality Assurance E is appropriate.

No changes will be made to the DCD as a result of this RAI.

NRC RAI 3.2-31

Table 3.2-1, Component G21, Item 9: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category II designation for the FAPCS Isolation Condenser/Primary Containment Cooling (IC/PCC) pool cooling and cleanup piping. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components designed for post accident containment heat removal, this piping should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

The active cooling and cleanup loops of the FAPCS do not provide safety related cooling and are not assumed to function in any safety analysis. Instead, this safety-related function is accomplished by allowing the pools to boil for the first 72 hours and by providing independent safety related lines with fill up connections in the yard area that allow makeup water to be added after 72 hours from the Fire Protection System or from other onsite or offsite sources. Allowing the pools to boil and providing makeup water through these connections accomplishes the safety related cooling, and the related components for this are specified in Table 3.2-1 under G21 item 3.

The remaining piping and components related to IC/PCC pool cooling are not safety-related, but provided as defense-in-depth. No credit is taken for cooling the IC/PCC pool in any safety analysis. Therefore their current designation (Quality Group D, Quality Assurance E, and Seismic Category II) is appropriate.

No changes will be made to the DCD as a result of this RAI.

NRC RAI 3.2-32

Table 3.2-1, Component G21, Item 10: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the FAPCS auxiliary pools return lines between isolation valves and terminus points. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components designed for post accident containment heat removal and spent fuel heat removal, these portions of the system should be safety related Quality Group C, quality Assurance B, and Seismic Category I. Also, the pools which are auxiliary pools are not clearly identified on the FAPCS P&ID (Figure 9.1-1). Please revise the Table and P&ID accordingly or provide a justification for your position.

GE Response

The term auxiliary pools refers to the following pools above containment:

- Steam Dryer and Separator Pool
- Reactor Well
- Buffer Pool
- Upper Fuel Transfer Pool

These pools are not specified as "auxiliary pools" in Figure 9.1-1, however they are explicitly defined so in Table 9.1-1.

The piping components located between the isolation valves and termination points for the auxiliary pools do not serve a safety-related function. If available, the FAPCS can provide heat removal for these pools, but it is not a requirement and such a function is not credited in any safety analysis.

Under normal conditions, there is very little (if any) heat being added to these pools. During an outage, the RWCU/SDC system provides shutdown cooling to the reactor to remove decay heat from the spent fuel in the core. Spent fuel is not stored in the auxiliary pools, with the exception of the buffer pool. Heat removal from the buffer pool is not a concern because

- It only holds fuel for a brief period of time
- It cannot hold more than 154 spent fuel assemblies (less than 5% of the maximum capacity of the spent fuel pool).
- It has a larger excess of water inventory than the spent fuel pool (see response to RAI 9.1-9)

Therefore, because the discharge lines to the auxiliary pools do not perform a safety related function, their current classification is appropriate.

No changes will be made to the DCD as a result of this RAI.

NRC RAI 3.2-33

Table 3.2-1, Component G21: On the FAPCS P&ID (Figure 9.1-1), there are shown FAPCS pool vent lines and skimmer lines, which are not part of the Table. Please revise the Table to include these items.

GE Response

The vent line shown on the IC/PCC Pools in Figure 9.1-1 is not part of the FAPCS system. It was included on the diagram to illustrate how the IC/PCC pool performs passive safety related cooling. Item 9 on Table 3.2-1 will be clarified as follows to specify that it only includes components in the active cooling train (not the safety-related emergency makeup lines):

> IC/PCC pools active cooling and cleanup subsystem piping and components.

Item 5 on Table 3.2-1 was intended as a "catch all" for all FAPCS components outside containment. It includes all the components in the active cooling and cleaning trains as well as the skimmer lines for the fuel pools. For clarification, the description of item 5 will be changed to:

> Piping and components outside containment needed for fuel pool cooling, suppression pool cooling, LPCI and drywell spray modes of operation, including skimmer lines and all components in the cooling and cleanup trains.

The skimmer lines for the Auxiliary Pools are not covered by this table, and they need to be added. These can be included under the classification for item 10. The description for item 10 will be changed to:

> Auxiliary pools skimmer lines, and auxiliary pool return lines between isolation valves and terminus points

A DCD markup showing these changes is attached.

NRC RAI 3.2-34

Table 3.2-1, Component G31, Items 3, 4, 5, 6, and 7: The Table indicates Quality Group C and Quality Assurance E for the Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) vessels, heat exchangers carrying reactor water, and other piping between containment isolation valves and shutoff valves at feedwater line connections, and nonregenerative heat exchanger tube side and piping. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components designed for reactor shutdown and decay heat removal, these components should be designated safety-related Quality Group B and Quality Assurance B. Please revise the Table accordingly or provide a justification for your position.

GE Response

The system designed to perform the safety-related shutdown decay heat removal function in ESBWR (a passive plant) is the Isolation Condenser System (ICS), designated as B32 in DCD Tier 2, Table 3.2-1. As per this table, the ICS is designed to Quality Group A and Quality Assurance B for piping and valves (including supports) inside containment between reactor and the containment penetration, and to Quality Group B and Quality Assurance B for the remaining portion of the system. Therefore the ESBWR shutdown decay heat removal system meets the SRP 3.2.2 and regulatory position C.1.b in RG 1.26. The ICS design also meets the NRC position in SECY-94-084 for shutdown decay heat removal. Refer to DCD Tier 2, Sections 5.4.6, 5.4.7 and 5.4.8 for design information for the shutdown decay heat removal systems in ESBWR.

The RWCU/SDC system, as per DCD Tier 2, Section 5.4.8.1.1 does not perform any safety-related function except the containment isolation and detection of pipe break outside the containment. In addition, no credit is taken for the heat removal capability of the RWCU/SDC system in any plant safety analysis. Consequently, its ability to remove decay heat is a defense-in-depth feature of the ESBWR design rather than a safety-related function. This system is designated as G31 in DCD Tier 2, Table 3.2-1. In this table, the system piping and equipment such as pumps, regenerative and non-regenerative (tube side only) heat exchangers, demineralizer vessel are therefore accordingly defined as nonsafety-related with a Quality Group C. Also note that the components performing the safety-related containment isolation function are defined as safety-related with a Quality Group A and Quality Assurance B. The electrical equipment performing the detection of pipe break outside the containment are defined as safety-related with Quality Assurance B.

The above explanation justifies the Quality Group and Quality Assurance designation for RWCU/SDC system components in DCD Tier 2, Table 3.2-1.

No change in DCD will be made.

NRC RAI 3.2-35

Table 3.2-1, Component G31, Item 8: The Table indicates Quality Group D and Quality Assurance E for the RWCU/SDC nonregenerative heat exchanger shell side carrying cooling water. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components providing cooling water for reactor shutdown and decay heat removal, these components should be designated safety-related Quality Group C and Quality Assurance B. Please revise the Table accordingly or provide a justification for your position.

GE Response

As explained in response to RAI 3.2-34, the RWCU/SDC system non-regenerative heat exchanger is nonsafety-related equipment. Therefore, its shell side (cooling water side) is designed to Quality Group D, an acceptable requirement for a nonsafety-related system as per RG 1.26.

No change in DCD will be made.

NRC RAI 3.2-36

Table 3.2-1, Components J11 and J12: The Table indicates no quality group for the Nuclear Fuel and Fuel channels. The staff position is that because of the importance of the fuel and fuel channels in maintaining core geometry to ensure reactor shutdown and reactivity control, they should be designated Quality Group B. To be consistent with this position and with staff reviews of BWR/6 plants, such as Perry and River Bend, and of the Advanced BWR design, please revise the Table accordingly.

GE Response

GE has reviewed the ABWR DCD and the BWR/6 FSARs and determined that the Quality Group listing in Table 3.2-1 is correctly stated as being not applicable because RG 1.26 only directly applies to water- and steam-containing pressure retaining components. The ABWR DCD also shows Quality Group as not applicable for these components. However, we have now included Safety Class in Table 3.2-1 in place of Safety Designation, and have classified the fuel and fuel channels as Safety Class 3, consistent with its classification in the ABWR DCD.

The quality group codes and standards invoked by RG 1.26 and SRP 3.2.2 are not applied to the design of the fuel and fuel channels. The fuel and fuel channels are designed using NRC-approved methodology as described in DCD Chapters 4 and 15 and DCD Tier 2 Reference 15.0-2. A key acceptance criterion for these analyses, which comes from 10 CFR 50.46, requires that a coolable geometry be maintained for the fuel following a loss-of-coolant accident. Thus, the fuel and fuel channels are designed to ensure that core geometry can be assured for reactor shutdown and reactivity control without imposing the quality group classifications of RG 1.26 in their design process.

See the attached DCD markup of Table 3.2-1 for Systems J11 and J12.

NRC RAI 3.2-37

Table 3.2-1, Components K10, K20, and K30: The Table provides a Quality Group D designation for the liquid and solid waste management and offgas systems. Consistent with SRP 3.2.2 and RG 1.26 guidance regarding components which contain radioactive waste, these components should be designated Quality Group C. Please revise the Table accordingly.

GE Response

The ESBWR radwaste systems, like the ABWR, are Quality Group D, per Regulatory Guide 1.26 Table 1 (as modified by Regulatory Guide 1.143, Revision 2, Table 1). Standard Review Plan 3.2.2 Appendix C Note (9) clarifies that Regulatory Guide 1.143 is acceptable regarding Quality Group guidance. DCD Tier 2 Table 3.2-1 will be revised as shown in the attached markup to indicate Quality Group D as defined in Regulatory Guide 1.26 Table 1, but with the additional requirements of Regulatory Guide 1.143 Table 1. This guidance is applicable to ESBWR liquid waste management system, offgas system and solid waste management system components.

NRC RAI 3.2-38

Table 3.2-1, Components K10, K20, and K30: The notes in the Table for the liquid and solid waste management and offgas systems state that a quality assurance program meeting the guidance of NRC RG 1.143 is applied during design and construction. RG 1.143 states that ANSI/ANS 55.6-1993, "Liquid Radioactive Waste Processing System for Pressurized Water Reactors" is an acceptable quality assurance program. Please identify the specific quality assurance program requirements for these components which meets RG 1.143 guidance and revise the Table notes accordingly.

GE Response

The 'Notes' section in Table 3.2-1 will be revised as shown in the attached markup regarding the radioactive waste management systems. Table 3.2-1 will direct the reader to the ESBWR Quality Assurance program described in DCD Chapter 17. The ESBWR Quality Assurance program meets the guidance of Regulatory Guide 1.143 Revision 2.

NRC RAI 3.2-39

Table 3.2-1, Component N32: Footnote (9) specifies the inspection requirements for the Turbine Control System (TCS) components; however, there are several parts of the footnote which do not conform to the guidance provided in SRP 3.2.2. The differences are: (a) The footnote (9) does not specify an edition for the ASME B31.1 Code. The edition of B31.1 is specified in the SRP to be the 1973 edition which makes it clear what the requirements of paragraph 136.4 are, and (b) The reference to the General Electric publication GEZ-4982A in the SRP is replaced in footnote (9) by the document ISO 9001:2000, which has not been reviewed or approved by the NRC for this purpose. Please revise the Table footnote (9) to conform with the SRP 3.2.2 guidance, or provide information to demonstrate that the proposed alternative meets or exceeds the intent of the SRP 3.2.2 guidance.

GE Response

a) Footnote (9) for ASME code for B31.1 is listed as code year 2004 in DCD Table 1.9-22. No DCD update required.

b) See attached proposed changes to DCD Table 3.2-1. The reference to General Electric publication GEZ-4982A will be inserted. The reference to ISO 9001:2000 will be removed.

DCD Table 3.2-1, Note 9a, will be revised as shown in the attached markup.

NRC RAI 3.2-40

Table 3.2-1, Component N37: The Table note for the Turbine Bypass System (TBS) states that only TBS lines equal to or larger than 63.5 mm (2.5 inches) are designed to ASME Section III, Class 2. However, the SRP 3.2.2 guidance states that all piping in the TBS lines up to the turbine bypass valves should be ASME Class 2 (Quality Group B). Beginning at the turbine bypass valve and downstream to the condenser, the line may be Quality Group D, as provided in SRP 3.2.2. Also, since the TBS is seismically analyzed, it should be designated at least as Seismic Category II. Please revise the Table accordingly.

GE Response

The references to 63.5 mm (2.5 inch) will be removed for compliance to Regulatory Guide 1.26, Section C and Table 1. The wording will be revised to reflect Regulatory Guide 1.29 Section C, specifically item "1e", piping 2.5 inches and larger will be analyzed to withstand SSE loads. Quality Group and Seismic Classification will be shown in Figure 3.2-1.

See attached Figures 3.2-1 and 3.2-2. These Figures will be added to the DCD Section 3.2 as shown in the attached markup.

DCD Table 3.2-1 for components in N37 will be revised as noted in the attached markup.

NRC RAI 3.2-41

Table 3.2-1, Component N61: The Table provides a Quality Assurance E and Seismic Category NS designation for the Main Condenser and Auxiliaries. However, the condenser is described in Section 15.4.4.5.2.4 as a Seismic Category II component. Consistent with guidance provided in SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 for main steam leakage control, these components should be designated Quality Assurance B and Seismic Category II. Please revise the Table accordingly.

GE Response

The Condenser has a nonsafety-related, non-seismic design classification, but the Condenser anchorage is seismically analyzed for SSE. Quality Groups and Seismic Classification will be shown on Figure 3.2-1 for clarification. Since Quality Assurance requirements for the Main Condenser is not specifically addressed in the regulation, it will be determined during the detail design phase.

DCD Section 15.4.4.5.2.4 and Table 3.2-1 for components in N61 will be corrected as proposed in the attached markup.

See attached Figures 3.2-1 and 3.2-2. These Figures will be added to the DCD Section 3.2 as shown in the attached markup.

NRC RAI 3.2-42

Consistent with the review of the ABWR, in order to verify that the alternative main steam leakage path will not be adversely affected by non-seismically designed structures, systems, and components, there should be a COL action item to perform a walkdown of the nonseismically designed components in the vicinity of the alternative main steam leakage path components. Please provide a COL action item to address this issue.

GE Response

As stated in DCD Section 15.4.4.5.2.3 Paragraph 5, Point 3, "The main steam lines and drains are enclosed in a shielded corridor that protects them from collateral damage in the event of an SSE. For those portions not enclosed in the steam tunnel complex, an as-built inspection is required to verify that no damage could be expected from other components and structures in a SSE".

A COL holder action item will be added to the DCD Section 10.3.7 where "A plant-specific walk-down of non-seismically designed systems, structures, and components overhead, adjacent to, and attached to the main steam-line leakage path (i.e., the main steam piping, the bypass line, and the main condenser) shall be conducted to confirm, by inspection, that the as-built main steam piping, bypass to the condenser, and the main condenser are not compromised by non-seismically designed systems, structures and components."

DCD Section 10.3.7 will be revised as shown in the attached markup.

NRC RAI 3.2-43

Table 3.2-1, Component P10: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the Makeup Water System (MWS). However, it appears that the system performs a safety-related function of providing cooling water makeup to other systems for decay heat removal, post-accident containment heat removal and spent fuel pool cooling. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance, these components should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

Makeup Water System's safety design basis is addressed in detail in DCD Tier 2 Subsection 9.2.3.1. In the ESBWR design MWS is a non-safety related system and has no safety design basis. Only the portions of MWS that are part of containment penetrations are safety-related. However, the makeup water supply from MWS, including to any safety-related systems, is not essential for achieving safe-shutdown of the plant and has not been credited in any safety analyses.

Although IC/PCC and Spent Fuel Pools receive their makeup water needs from MWS during normal plant operations, they can however depend on Fire Water Storage tank as the source for any emergency makeup water supply when MWS is not available. This pool makeup portion of Fire Protection System is Seismic Category I as noted in Table 3.2-1, U43 Fire Protection System Components and as described in DCD Tier 2 Subsection 9.1.3 (Fuel and Auxiliary Pools Cooling Systems) and Section 9.2.5 (Ultimate Heat Sink).

Also refer to responses to RAI 2.4-23 and 9.1-13 regarding makeup water supply needs of IC/PCC and spent fuel pools.

No changes are needed to the DCD as a result of this RAI.

NRC RAI 3.2-44

Table 3.2-1, Component P25, Item 3: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the Chilled Water System (CWS) other mechanical and electrical modules. A description of each of the modules should be provided in the Table. Also, the system appears to perform safety-related functions such as providing chilled cooling water for the Control Room heating, ventilating, and air conditioning (HVAC) system to maintain Control Room habitability. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance, at least some of these components should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

As indicated in DCD Tier 2 Subsection 9.2.7, the Chilled Water System (CWS) does not perform or ensure any safety-related function.

The CWS is classified as a nonsafety-related system except for its containment isolation functions. Refer to Subsection 6.2.4 for containment isolation valves and to Subsection 7.3.3 for containment isolation instrumentation. Control Room habitability under emergency (for safe-shutdown and post safe-shutdown requirements) is described in DCD Tier 2 Section 6.4. For required emergency duration Control room habitability does not rely on nonsafety-related Control Room HVAC and thus on its nonsafety-related CWS interface system.

The term "All other modules" refers to all other components of CWS located outside the containment pressure boundary and described in DCD Tier 2 Subsection 9.2-7 (Chilled Water System). As used in Table 3.2-1, it means any other system component not specifically listed in the table. Consequently, GE does not believe it is necessary to provide a detailed list of all other system components because that introduces the possibility that the classification list in this table might be incomplete.

No changes are needed to the DCD as a result of this RAI.

NRC RAI 3.2-45

Table 3.2-1, Component P41: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the Plant Service Water System (PSWS). However, the system appears to perform safety-related functions such as providing cooling water to other systems for decay heat removal, post-accident containment heat removal and spent fuel pool cooling. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance, these components should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

The Plant Service Water System (PSWS) does not perform any safety-related function. There is no interface with any safety-related component. For its design basis and system description refer to DCD Tier 2 Subsection 9.2.1. The classification of its system components in Table 3.2-1 Component P41 is therefore consistent with its safety design basis.

During normal plant operations (including during and post safe shutdown events) the decay heat and containment heat are removed by PSWS via Reactor Component Cooling Water System (RCCWS). However, from the standpoint of decay heat and containment heat removal, these systems provide only a defense-in-depth function that is not credited in the safe-shutdown analyses. Instead, when these systems are not available heat is dissipated to the Ultimate Heat Sink (atmosphere) via IC/PCC and spent fuel pools as described in DCD Tier 2 Subsection 9.2.5.

No changes are needed to the DCD as a result of this RAI.

NRC RAI 3.2-46

Table 3.2-1, Components P51 and P52: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the Service Air System (SAS) and Instrument Air System (IAS). However, the containment isolation portions must be safety-related Quality Group B, Quality Assurance B, and Seismic Category I. Also, if there are any plant components which require the SAS or IAS to accomplish a safety function, such as providing motive power for safety-related valve functioning, those portions of the SAS or IAS need to be designated at least Quality Group C, Quality Assurance B, and Seismic Category I, consistent with the safety function designation. Therefore, please provide a more detailed listing of SAS and IAS component items in the Table, indicating which have a safety-related function.

GE Response

SAS has no safety-related functions for ESBWR as indicated in DCD Subsection 9.3.7. Its containment penetration has a normally closed locked valve during plant operations and hence it has no active isolation function.

Air from the IAS is used as motive power to hold open safety-related containment isolation valves outside containment during normal operation. Loss of gas supply from the IAS would result in a loss of air pressure to these valves, which causes the affected safety-related valves to close, thereby completing their safety-related function with no reliance on the IAS. Consequently IAS has no safety-related functions for ESBWR as indicated in DCD Subsection 9.3.6.

During normal operation, nitrogen is used inside containment instead of air for pneumatic valve actuation. The IAS has a locked closed connection to the High Pressure Nitrogen Supply System (HPNSS) that is opened during outages to supply air inside containment for pneumatic valve actuation. However, the containment penetration in this flow path is in a piping section that belongs to the HPNSS.

The IAS is also used to charge accumulators for the Main Steamline Isolation Valves (MSIV) outside containment. These accumulators are sized to perform their safety-related task without relying on IAS to recharge them during an event requiring isolation of Main Steam.

Table 3.2-1 of the DCD will be revised as shown in the attachment.

NRC RAI 3.2-47

Table 3.2-1, Component P54, Items 2 and 4: The Table provides a Quality Group D, Quality Assurance E, and Seismic Category NS designation for the High Pressure Nitrogen Supply System (HPNSS) other nonsafety-related mechanical modules and provides no quality group, Quality Assurance E, and Seismic Category NS for the HPNSS nitrogen storage bottles. If there are any plant components which require the HPNSS to accomplish a safety function, such as providing motive power for safety-related valve functioning, those portions of the HPNSS need to be designated at least Quality Group C, Quality Assurance B, and Seismic Category I, consistent with the safety function designation. Therefore, please provide a more detail listing of HPNSS component items in the Table, indicating which have a safety-related function.

GE Response

The HPNSS has no safety-related functions for ESBWR as indicated in DCD Subsections 9.3.8.1 and 6.2.4.

The HPNSS is classified as a nonsafety-related system except for the containment isolation components as indicated in DCD Table 3.2-1.

Nitrogen from the HPNSS is used as motive power to hold open safety-related containment isolation valves inside containment during normal operation. Loss of gas supply from the HPNSS would result in a loss of gas pressure to these valves, which causes the affected safety-related valves to close, thereby completing their safety-related function with no reliance on the HPNSS.

The HPNSS is also used to charge accumulators for the Automatic Depressurization System (ADS) safety relief valves (SRVs), the Isolation Condenser (IC) steam and condensate line isolation valves and the Main Steamline Isolation Valve (MSIV) inside containment. These accumulators are all sized to perform their safety-related tasks without relying on HPNSS to recharge them during an event requiring actuation of these valves.

No changes are needed to the DCD as a result of this RAI.

NRC RAI 3.2-48

Table 3.2-1, Component T12: In Section 6.2.1.1.2 of the DCD, there are discussed containment vacuum breakers. Consistent with RGs 1.26 and 1.29 and SRPs 3.2.1 and 3.2.2, these components should be included in the Table as Quality Group B, Quality Assurance B, and Seismic Category I components. Please revise the Table accordingly.

GE Response

Comment accepted.

DCD, Tier 2, Table 3.2-1 will be revised by adding vacuum breakers and its instrumentation and vacuum breaker isolation valves as per the attached markup.

NRC RAI 3.2-49

Table 3.2-1, Component T62, Item 1: The Table provides no quality group, Quality Assurance B, and Seismic Category 1 for the Containment Monitoring System (CMS) safety-related portions. However, some portions of the system provide a containment isolation function, and the system also monitors and ensures safety-related functions, such as providing post-accident containment heat removal. Consistent with SRP 3.2.2 and RG 1.26 guidance, the containment isolation portions of the system should be Quality Group B, and the other safety-related portions should be at least Quality Group C. Please revise the Table accordingly.

GE Response

GE's interpretation of Regulatory Guide 1.26 is that Quality Group only applies to pressure retaining components. Therefore, consistent with ABWR classification, instead of Quality Group B and C, these need to be classified as Safety Class 2 and 3.

Table 3.2-1 will be revised as noted in the attached markup.

NRC RAI 3.2-50

Table 3.2-1, Component U31, Items 2 through 5: The Table provides a Seismic Category NS designation for these cranes, hoists, and elevators. However, these are very large massive components which are adjacent to other components performing safety-related functions. Therefore, consistent with SRPs 3.2.1 and RG 1.29 guidance, these components should be designated at least Seismic Category II. Please revise the Table accordingly.

GE Response

Item 2 – The seismic classification for the upper and lower drywell servicing hoists and cranes will be changed to Seismic Category I consistent with their classification in the ABWR. See attached DCD markup.

Item 3 – The seismic classification for the main steam tunnel servicing hoists and cranes will be changed to Seismic Category II as recommended in the RAI. See attached DCD markup.

Item 4 – The hoists and cranes in special service rooms were assigned to the non-seismic category because these rooms are generally not expected to contain safety-related components. The seismic classification in Table 3.2-1 will be changed to "II or NS", and a note will be added to this item to indicate that the seismic classification must be II in any room where these devices could potentially damage safety-related equipment. See attached DCD markup.

Item 5 – As noted in DCD Table 3.2-1 under Systems U71, U73 and U97, all elevators in the Reactor, Control and Fuel Buildings have Seismic Category II elevator shafts. These SC II elevator shafts will prevent any elevator failure from damaging nearby safety-related equipment as a result of an SSE. Consequently, the elevators themselves do not need to be Seismic Category II. The elevators will be designed to comply with local building codes and any applicable standards for elevator design. No change to the DCD is required for this item.

NRC RAI 3.2-51

Table 3.2-1, Component U40: The Table provides a Seismic Category NS for the Reactor Building HVAC (RBHVC). However, some of the system components have a safety-related function of automatically isolating following certain accident scenarios. Section 9.4.6.3 of the DCD states that the RBHVC is designed as Seismic Category II, except for the isolation dampers which are Seismic Category I. Please revise the Table accordingly.

GE Response

GE agrees. See attached markup of DCD Tier 2 Table 3.2-1 for System U40, as well as the response to RAI 3.8-2.

NRC RAI 3.2-52

Table 3.2-1, Component U43: Table 3.2-1 identifies some Fire Protection System (FPS) components as Quality Assurance E and Seismic Category I. Consistent with SRP 3.2.1 and RG 1.29 guidance for Seismic Category I components, these components should be designated Quality Assurance B. Also, please identify in the notes the pertinent portions of 10 CFR 50 Appendix B which are applied for the other Quality Assurance E components. Please revise the Table accordingly.

GE Response

The classification system works in the other direction. Safety-related structures, systems and components (SSCs) have a Safety Class of 1, 2 or 3 and are required to be classified as Seismic Category I and Quality Assurance B. Seismic Category I or II SSCs are not required to be safety-related, and the QA requirements of 10 CFR 50 Appendix B only apply to safety-related components. Thus, Quality Assurance E is appropriate for all nonsafety-related SSCs regardless of their seismic classification.

There are a number of examples in existing BWRs as well as in the ABWR where SSCs have been assigned a Seismic Category I classification while still being nonsafety-related and subject to Quality Assurance E requirements. The ESBWR classifications are thus following the precedent set by earlier BWR designs.

On a case by case basis, certain nonsafety-related components, such as the portions of the Fire Protection System that are considered to be RTNSS, were conservatively assigned to a higher seismic category than would otherwise have been required. However, this does not mean that these SSCs automatically are required an upgrade to their Quality Assurance classification. These Fire Protection System components are also involved in providing makeup water to the IC/PCC and spent fuel pools after 72 hours into an event, which in accordance with SRP 9.1.3 required them to be classified as Seismic Category I.

The specific Fire Protection System components mentioned above are classified as nonsafety-related because their function is not credited in any plant safety analysis. Thus, they are not required to apply Quality Assurance B requirements. As stated in the notes column of Table 3.2-1, a quality assurance program meeting the guidance of NRC Branch Technical Position SPLB 9.5-1 (NUREG-0800) is applied to the fire protection system.

No changes will be made to the DCD as a result of this RAI.

NRC RAI 3.2-53

In Table 3.2-1, Component U43, some FPS components designated as Quality Group D are designed to one of several standards referenced in Table 3.2-3. For example, Table 3.2-1 identifies the fire water storage tank as Quality Group D. Table 3.2-3 provides different standards that could apply or an equivalent evaluation could be used. Please provide the standard or equivalent evaluation which applies in the notes section of Table 3.2-1 for Quality Group D components.

GE Response

The components associated with providing makeup water from FPS were assigned to Quality Group D on the basis that this was a RTNSS function rather than a safety-related function. RG 1.26 indicates that Quality Group C applies to safety-related components. As noted in response to RAI 9.1-12, in accordance with Paragraph II.1.a of SRP 9.1.3, GE will modify the quality group classification for the FPS components supporting the spent fuel pool makeup water function to Quality Group C.

This leaves Items 1, 8 and 12 for the fire protection system as still being assigned to Quality Group D. The standards from Table 3.2-3 that apply to these items can be easily determined without the need for specific notes being added to Table 3.2-1. The non-seismic yard loop piping and valves including supports (Item 1) apply ASME B31.1 for the piping and valves, and applicable manufacturer standards for the supports. For other pumps and motors (Item 8), the pumps apply a combination of ASME Code Section VIII and ASME B31.1 as indicated in Note 2 of Table 3.2-3. The sprinklers (Item 12) are designed to applicable National Fire Protection Association (NFPA) standards.

See attached for DCD markup of Table 3.2-1 Component U43 as a result of this RAI.

NRC RAI 3.2-54

Table 3.2-1, Component U84: In the Table, the service water building structure is designated Quality Assurance E and Seismic Category NS. However, the Plant Service Water System appears to perform safety-related functions, such as providing cooling water to other systems for decay heat removal, post-accident containment heat removal and spent fuel pool cooling. Consistent with SRP 3.2.1 RG 1.29 guidance, this structure should be safety-related Quality Assurance B and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

As stated in DCD Tier 2 Subsection 9.2.1.1 and the response to RAI 3.2-45, the Plant Service Water System (PSWS) performs no safety-related functions. It provides cooling water to systems that perform nonsafety-related decay heat removal as a defense-in-depth measure. Thus, the Service Water Building Structure (U84) is properly classified in Table 3.2-1.

See the response to RAI 3.2-5 for additional information on the safety-related heat removal systems.

No changes will be made to the DCD as a result of this RAI.

NRC RAI 3.2-55

Table 3.2-1, Component W12: In the Table, the Intake and Discharge Structures are designated "Not in Scope" for quality assurance and seismic category. However, some of these structures are necessary for the Plant Service Water System and/or the Ultimate Heat Sink System, which perform safety-related functions, such as providing cooling water to other systems for decay heat removal, post-accident containment heat removal and spent fuel pool cooling. Consistent with SRP 3.2.1 RG 1.29 guidance, some of these structures should be safety-related Quality Assurance B and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

Table 3.2-1 will be revised to include classifications for W12 and all other W and Y systems. See attached DCD markup for details.

The safety-related Ultimate Heat Sink for ESBWR is the atmosphere, which receives steam by boiling from the IC/PCC pools and Spent Fuel Pool. These pools do not rely on any cooling water systems or makeup water systems during the first 72 hours after a design basis event.

As stated in DCD Tier 2 Subsection 9.2.1.1, the Plant Service Water System performs no safety-related functions. It connects to the Intake and Discharge Structures, which serve as a nonsafety-related Normal Power and Auxiliary Heat Sink in the ESBWR design. The intake and discharge structure components do not perform any safety-related functions, and serve only as a defense-in-depth measure for heat removal.

Thus, the classifications for the Plant Service Water System do not require changes. The classification for the Intake and Discharge Structures have been added to the table as nonsafety-related, Quality Assurance E and non-seismic, consistent with the classification of the Plant Service Water System.

NRC RAI 3.2-56

Table 3.2-1, Component Y41: In Section 9.2.9.2 of the DCD, it is stated that the COL applicant will provide the design of the Station Water System to provide makeup for the Cooling Water and Makeup Water systems. Consistent with SRPs 3.2.1 and 3.2.2 and RGs 1.26 and 1.29 guidance regarding components which provide cooling water to other systems for decay heat removal, post-accident containment heat removal, and spent fuel pool cooling, these components should be safety-related Quality Group C, Quality Assurance B, and Seismic Category I. Please revise the Table accordingly or provide a justification for your position.

GE Response

The Station Water System does not provide makeup water to any safety-related components. The cooling and makeup water systems it supports are all defense-in-depth systems in the ESBWR design. Thus, the Station Water System is classified appropriately in Table 3.2-1.

The safety-related Ultimate Heat Sink for ESBWR is the atmosphere, which receives steam by boiling from the IC/PCC pools and Spent Fuel Pool. These pools do not rely on any cooling water systems or makeup water systems during the first 72 hours after a design basis event.

No DCD changes will be made as a result of this RAI.

NRC RAI 3.2-57

Table 3.2-2 Note 1: The note indicates that some pipe whip restraints are Seismic Category NS. However, pipe whip restraints are designed for concurrent pipe break and seismic loading and should, therefore, be at least Seismic Category II. Please revise the Table accordingly.

GE Response

GE agrees. The note in DCD Tier 2 Table 3.2-2 will be modified to eliminate reference to Seismic Category NS for safety-related pipe whip restraints. See attached DCD markup.

NRC RAI 3.2-58

Table 3.2-3 references TEMA C as an acceptable code or industry standard for Quality Group A, B, C, and D pressure vessels and heat exchangers. However, the NRC has not accepted the Tubular Exchanger Manufacturers Association C (TEMA C) standard for satisfying the requirements for Quality Group A, B, C, or D components. Please revise the Table to delete the TEMA C reference or provide information which demonstrates that the TEMA C standard meets or exceeds the requirements for Quality Group A, B, C, or D components.

GE Response

TEMA C was included in the table for consistency with BWR/6 FSARs and the ABWR DCD. It is not meant to imply that TEMA C is an acceptable replacement for the ASME Code requirements. It was meant to say that for heat exchangers, the requirements from both TEMA C and the ASME Code must be taken into account.

A note will been added to DCD Tier 2 Table 3.2-3 to clarify this. See attached DCD markup.

NRC RAI 3.2-59

Table 3.2-3 needs to also include pumps in the table heading with pipes, valves, and piping.

GE Response

GE agrees. Table heading will be changed to be consistent with the ABWR DCD, which titles this column "Pipes, Valves and Pumps." See attached markup of DCD Tier 2 Table 3.2-3.

NRC RAI 3.2-60

Table 3.2-3 needs to include a new column for non-ASME Section III component supports to ensure that the B31.1 or AISC codes are listed for Quality Group D supports.

GE Response

GE agrees to add a companion column for non-ASME Section III component supports that refers to manufacturer's standards such as ASME B31.1 and AISC codes for Quality Group D.

See attached DCD markup for changes.

NRC RAI 3.2-61

Table 3.2-3 needs to include a new column for core support structures and reactor internals to ensure that the ASME Section III Code Article NG is listed for Quality Group B and C components.

GE Response

GE agrees the additional column is appropriate. Consistent with SRP 3.2.2, ASME Section III Code Article NG is only applied to CS components under Quality Group B. A new table row has been added for Quality Group B, ASME Code Class CS components.

Please see the response to RAI 3.2-11 for additional information on the classification of core support structures and reactor internals.

See attached DCD markup for changes.

NRC RAI 3.2-62

Table 3.2-3 incorrectly refers to ASME III Article NB for the design of ASME Class 2 pressure vessels and heat exchangers. The correct reference should be ASME III Article NC. Please revise the Table accordingly.

GE Response

GE agrees. This was an inadvertent typographical error that is now corrected in the attached DCD markup.

3.2 CLASSIFICATION OF STRUCTURES, SYSTEMS AND COMPONENTS

ESBWR structures, systems and components are categorized as safety-related (as defined in 10 CFR 50.2) or nonsafety-related. The safety-related structures, systems and components are those relied upon to remain functional during and following design basis events to ensure:

- The integrity of the reactor coolant pressure boundary (RCPB);
- The capability to shut down the reactor and maintain it in a safe condition; or
- The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the applicable guidelines exposures set forth in 10 CFR 50.34(a)(1) or 10 CFR 100.11.

Safety-related structures, systems and components conform to the quality assurance requirements of Appendix B to 10 CFR 50. Nonsafety-related structures, systems and components have quality assurance requirements applied commensurate with the importance of the item's function. The quality assurance program is described in Chapter 17.

The ESBWR complies with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2, as the safety-related structures, systems and components are designed to withstand the effects of earthquakes without loss of capability to perform their safety-related functions. Specific requirements for seismic design and quality group classifications are identified for these ESBWR items commensurate with their safety classification. Table 3.2-1 identifies these classifications for ESBWR structures, systems and components.

3.2.1 Seismic Classification

The ESBWR meets the acceptance criteria of SRP 3.2.1 (Reference 3.2-1). Structures that must remain integral with systems and components (including their foundations and supports) that must remain functional or retain their pressure integrity in the event of a safe shutdown earthquake (SSE) are designated Seismic Category I. These include safety-related items and fuel storage racks.

The Seismic Category I structures, systems, and components are designed to withstand the appropriate seismic loads (as discussed in Section 3.7) in combination with other appropriate loads without loss of function or pressure integrity. The seismic classifications indicated in Table 3.2-1 are consistent with the guidelines of Regulatory Guide 1.29 (Reference 3.2-2).

Structures, systems and components that perform no safety-related function, but whose structural failure or interaction could degrade the functioning of a Seismic Category I item to an unacceptable level of safety or could result in incapacitating injury to occupants of the Main Control Room, are designated Seismic Category II. These items are designed to structurally withstand the effects of an SSE.

Structures, systems, and components that are not categorized as Seismic Category I or II are designated Seismic Category NS.

3.2.2 System Quality Group Classification

The ESBWR meets the acceptance criteria of SRP 3.2.2 (Reference 3.2-3). NRC Regulatory Guide 1.26 (Reference 3.2-4) describes a quality group classification method for fluid systems

and relates it to industry codes. Items are classified by Quality Group A, B, C or D, as indicated in Table 3.2-3. Table 3.2-3 tabulates the design and fabrication requirements for each quality group, as defined in Regulatory Guide 1.26.

Table 3.2-1 shows the quality group classifications for ESBWR components. Although not within the scope of the regulatory guide, the containment boundaries that are within the scope of ASME Code, Section III, are assigned quality group classifications in accordance with Table 3.2-2.

Due to the use of many passive safety-related systems in ESBWR, the definitions of the Quality Groups provided in Regulatory Guide 1.26 can be somewhat misleading when trying to apply them directly to the ESBWR design. The following definitions in this section, which are based on Section 6 of ANS Standard 58.14, are consistent with the definitions in Regulatory Guide 1.26 but have been modified to more accurately describe their application to the ESBWR design.

3.2.2.1 Quality Group A

Quality Group A (QGA) applies to pressure-retaining portions and supports of mechanical items that form part of the RCPB and whose failure could cause a loss of reactor coolant in excess of the reactor coolant normal makeup capability. These items are designed to meet the ASME Boiler and Pressure Vessel Code, Section III. Remaining portions of the RCPB are classified in accordance with Subsection 3.2.2.2.

3.2.2.2 Quality Group B

Quality Group B (QGB) applies to pressure-retaining portions and supports of containment and other mechanical items, requirements for which are within the scope of ASME Boiler and Pressure Vessel Code, Section III. These items are not assigned to QGA and are relied upon to accomplish one or more of the following safety-related functions:

- Maintain pressure integrity of RCPB items that are not QGA.
- During or following design basis accidents whose consequences could result in potential offsite exposures comparable to the guidelines of 10 CFR 50.34(a)(1). These items include those that:
  - Maintain pressure integrity of the containment, containment isolation, or extension of containment.
  - Maintain pressure integrity of items that are (1) exterior to the containment; (2) communicate with the RCPB or containment interior; and (3) are not isolated normally, cannot be automatically isolated, or are not isolated following design basis accident or anticipated operation occurrence (transient).
  - Maintain pressure integrity of items that provide emergency negative reactivity insertion (scram).

3.2.2.3 Quality Group C

Quality Group C (QGC) applies to pressure-retaining portions and supports of items that are not assigned to QGA or QGB, but (1) are within the scope of the codes and standards defined on Table 3.2-3, and (2) are relied upon to accomplish safety-related functions.

3.2.2.4 Quality Group D

Quality Group D (QGD) applies to pressure-retaining portions and supports of items that are not assigned to QGA or QGB, or QGC but (1) are within the scope of the codes and standards defined on Table 3.2-3, and (2) are subject to one or more significant licensing requirements or commitments. These items include those that:

- Process, extract, encase, or store radioactive waste.
- Monitor radioactive effluents to ensure that release rates or total releases are within limits established for normal operation and design basis transients.
- Resist failure that could prevent any QGA, QGB or QGC items from performing a safety-related function
- Protect items necessary to attain or maintain safe shutdown following fire.

3.2.3 Safety Classification

Safety-related structures, systems, and components of the ESBWR Standard Plant are classified for design requirements as Safety Class 1, Safety Class 2, or Safety Class 3 in accordance with their safety importance. These safety classifications are identified on Table 3.2-1 for principal structures, systems, and components. Components within a system are assigned different safety classes depending upon their differing safety importance; a system may thus have components in more than one safety class. Safety classification for supports within the scope of ASME Code Section III depends upon that of the supported component.

The definitions of the safety classes in this section are based on ANS Standard 58.14 (Reference 3.2-5), and examples of their broad application are given. Because of specific design considerations, these general definitions are subject to interpretation and exceptions. Table 3.2-1 identifies component classifications on a component-by-component basis for primary components.

Minimum design requirements for various safety-related classes are delineated in Tables 3.2-2 and 3.2-3. Where possible, reference is made to accepted industry codes and standards which define design requirements commensurate with the safety-related function(s) to be performed. In cases where industry codes and standards have no specific design requirements, the sections that summarize the requirements to be implemented in the design are indicated.

Structures, systems and components that have no safety-related function are classified as nonsafety-related and designated N.

3.2.3.1 Safety Class 1

Safety Class 1 (SC-1) applies to all components of the reactor coolant pressure boundary (as defined in 10 CFR 50.2), and their supports, whose failure could cause a loss of reactor coolant at a rate in excess of the normal makeup system, and which are within the scope of the ASME Code Section III.

Safety Class 1 structures, systems and components are identified in Table 3.2-1.

3.2.3.2 Safety Class 2

Safety Class 2 (SC-2) applies to pressure-retaining portions, and their supports, of primary containment and to other mechanical equipment, requirements for which are within the scope of the ASME Code Section III, that are not included in SC-1 and are designed and relied upon to accomplish the following safety-related functions:

(1) Provide primary containment radioactive material holdup or isolation;

(2) Provide emergency heat removal for the primary containment atmosphere to an intermediate heat sink, or emergency removal of radioactive material from the primary containment atmosphere;

(3) Introduce emergency negative reactivity to make the reactor subcritical;

(4) Ensure emergency core cooling where the equipment provides coolant directly to the core (e.g., emergency core cooling systems); and

(5) Provide or maintain sufficient reactor coolant inventory for emergency core cooling (e.g., GDCS pools).

Safety Class 2 includes the pressure-retaining portions of the following:

(1) Those control rod drive system components that are necessary for emergency negative reactivity insertion;

(2) Emergency core cooling systems;

(3) Primary containment vessel;

(4) Post-accident containment heat removal systems; and

(5) Pipes having a nominal pipe size of 25 mm (1 inch) or smaller that are part of the reactor coolant pressure boundary.

Safety Class 2 structures, systems, and components are identified in Table 3.2-1.

3.2.3.3 Safety Class 3

Safety Class 3, (SC-3) applies to those structures, systems, and components, not included in SC-1 or –2, that are designed and relied upon to accomplish the following safety-related functions:

(1) Provide for functions defined in SC-1 or –2 by means of equipment, or portions thereof, that is not within the scope of the ASME Code Section III.

(2) Provide secondary containment radioactive material holdup, isolation, or heat removal.

(3) Except for primary containment boundary extension functions, ensure hydrogen concentration control of the primary containment atmosphere to acceptable limits.

(4) Remove radioactive material from the atmosphere of confined spaces outside primary containment (e.g., control room) containing SC-1, -2, or -3 equipment.

(5) Maintain geometry within the reactor to ensure core reactivity control or core cooling capability.

(6) Structurally bear the load or protect SC-1, -2, or -3 equipment in accordance with the requirements.

(7) Provide radiation shielding for the control room or offsite personnel.

(8) Provide inventory of cooling water and shielding for stored spent fuel.

(9) Ensure safety-related functions provided by SC-1, -2, or -3 equipment (e.g., provide heat removal for SC-1, -2, or -3 heat exchangers, provide lubrication of SC 2 or -3 pumps).

(10) Provide actuation or motive power for SC-1, -2, or -3 equipment.

(11) Provide information or controls to ensure capability for manual or automatic actuation of safety-related functions required of SC-1, -2, or -3 equipment.

(12) Supply or process signals or supply power required for SC-1, -2, or -3 equipment to perform their required safety-related functions.

(13) Provide a manual or automatic interlock function to ensure or maintain proper performance of safety-related functions required of SC-1, -2, or -3 equipment.

(14) Provide acceptable environments for SC-1, -2, or -3 equipment and operating personnel.

(15) Monitor plant variables that are identified requiring Category 1 electrical instrumentation in Table 1 of Regulatory Guide 1.97.

Safety Class 3 includes the following:

(1) Reactor protection system

(2) Electrical and instrumentation auxiliaries necessary for operation of the safety-related systems and components.

(3) Systems or components that restrict the rate of insertion of positive reactivity

(4) Initiating systems required to accomplish emergency core cooling, containment isolation and other safety-related functions

(5) Spent fuel pool

(6) Batteries for the onsite emergency electrical system

(7) Emergency equipment area cooling

(8) Compressed gas or hydraulic systems required to provide control or operation of safety-related systems

Safety Class 3 structures, systems and components are identified in Table 3.2-1.

3.2.3.4 NonSafety-Related

Structures, systems and components that do not fall into Safety Classes 1, 2 or 3 are classified as "nonsafety-related," which is abbreviated as "N" in Table 3.2-1.

The design requirements for nonsafety-related equipment are specified by the designer with appropriate consideration of the intended service of the equipment and expected plant and environmental conditions under which it will operate.

Where appropriate, Seismic Category I requirements are specified for nonsafety-related equipment in Table 3.2-1. Generally, design requirements for nonsafety-related equipment are based on applicable industry codes and standards as summarized in Table 3.2-3. Where these are not available, accepted industry or engineering practice is followed.

3.2.4 COL Information

None.

3.2.5 References

3.2-1 USNRC, "Seismic Classification," NUREG-0800, SRP 3.2.1.

3.2-2 USNRC, "Seismic Design Classification," Regulatory Guide 1.29.

3.2-3 USNRC, "System Quality Group Classification." NUREG-0800, SRP 3.2.2.

3.2-4 USNRC, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Regulatory Guide 1.26.

3.2-5 American Nuclear Society, "Safety and Pressure Integrity Classification Criteria for Light Water Reactors," ANS 58.14.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
B NUCLEAR STEAM SUPPLY SYSTEMS						
B11 Reactor Pressure Vessel System						
1. Reactor pressure vessel	1	CV	A	B	I	
2. Reactor vessel appurtenances – reactor coolant pressure boundary (RCPB) portions	1	CV	A	B	I	
3. Control Rod Drive (CRD) housing and in-core housing	1	CV	A	B	I	
4. Control rods	2	CV	—	B	I	
5. Standby Liquid Control (SLC) system header and spargers	2	CV	—	B	I	
6. Reactor vessel support and stabilizer	1	CV	A	B	I	
7. Other safety-related reactor internals, including core support structures (Subsection 3.9.5)	3	CV	B	B	I	
8. Reactor internals – nonsafety-related components (Subsection 3.9.5)	N	CV	—	E	II	
B21 Nuclear Boiler System (NBS)						
1. Level instrumentation condensing chambers	1	CV	A	B	I	
2. Safety relief valves (SRVs) and depressurization valves (DPVs)	1	CV	A	B	I	
3. Safety/relief discharge piping (including supports)	3	CV	C	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
4. Nitrogen accumulators (for ADS and manual actuation of SRVs)	3	CV	C	B	I	
5. Piping and valves (including supports) for main steamlines (MSL) and feedwater (FW) lines up to and including the outermost containment isolation valves	1	CV, RB	A	B	I	
6. Piping (including supports) for MSL from outermost isolation valve to and including seismic interface restraint and FW from outermost isolation valve to and including the shutoff valve	2	RB	B	B	I	Seismic interface restraints are located inside the seismic category I building.
7. Deleted.						
8. Piping and valves (including supports) from FW shutoff valve to the seismic interface restraint	2	RB	B	B	I	
9. Pipe whip restraints – MSL/FW if needed	3	CV, RB	—	B	I or II	**Pipe Whip Restraints** —Pipe Whip Restraints are required on the Main Steam Line (MSL) and Feedwater (FW) piping except where a "Leak-Before-Break" evaluation has been approved by the NRC.
10. Main steam drain piping and valves (including supports) within outermost containment isolation valves	1	CV, RB	A	B	I	(7)
11. RPV head vent piping and valves (including supports) to the main steam line and to the second isolation valve	1	CV	A	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
12. Piping (including supports) for main steam drains beyond outermost MSL isolation valves up to and including second drain isolation valve	N	TB	B	B	II	
13. Piping and valves (including supports) for main steam drains beyond outermost MSL isolation valves downstream of second drain isolation valve	N	TB	D	E	II	
14. Piping (including supports) for instrumentation up to and including first instrument isolation valve	2	CV, RB	B	B	I	(7)
15. Piping and valves (including supports) for instrumentation downstream of first instrument isolation valve	N	CV, RB	D	E	NS	(7)
16. Other mechanical modules with safety-related function	3	CV, RB, CB	—	B	I	
17. Other electrical modules, cable, and instrumentation with safety-related function	3	CV, RB, CB	—	B	I	
B32 Isolation Condenser System (ICS)						
1. Piping and valves (including supports) inside containment between reactor and the containment penetration	1	CV	A	B	I	
2. Isolation condenser and piping outside containment	2	RB	B	B	I	
3. Vent piping and valves (including supports) to suppression pool	2	CV, RB	B	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
4. Electrical modules and cable with safety-related function	3	CV, RB	—	B	I	
C CONTROL AND INSTRUMENT SYSTEMS						
C11 Rod Control and Information System (RC&IS)	N	RB, CB	—	E	NS	
C12 Control Rod Drive System (CRD)						
1. CRD primary pressure boundary	1	CV	A	B	I	
2. CRD internals	3	CV	—	B	I	
3. Hydraulic control unit	2	RB	—	B	I	(8)
4. Piping including supports – insert line	2	CV, RB	B	B	I	
5. High pressure makeup piping including supports, the check valve, and the injection valve at the connection to RWCU/SDC	2	RB	B	B	I	CRD piping classification is consistent with piping to which it connects.
6. Piping and valves with no safety-related function (pump suction, pump discharge, drive header, and other piping not part of hydraulic control unit)	N	RB	D	E	II	(7)
7. CRD water pumps	N	RB	D	E	II	
8. Fine motion drive motor	N	CV	—	E	II	
9. Electrical modules and cable with safety-related function	3	CV, RB, CB	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
10. ATWS equipment associated with the Alternate Rod Insert (ARI) functions	N	RB	—	E	II	**Anticipated Transients Without Scram (ATWS) Equipment** — A quality assurance program that meets or exceeds the guidance of NRC Generic Letter 85-06 is applied to all nonsafety-related ATWS equipment.
C21 Leak Detection and Isolation System (LD&IS)						
1. Electrical modules (temperature sensors, pressure transmitters, etc.) and cable with safety-related function	3	CV, RB, CB	—	B	I	
2. Other electrical modules and cable with no safety-related function	N	CV, RB, CB	—	E	NS	
C31 Feedwater Control System (FWCS)	N	CV, TB, RB, CB, EB	—	E	NS	
C41 Standby Liquid Control (SLC) System						
1. Standby liquid control accumulator including supports	2	RB	B	B	I	
2. Valves – injection	1	RB	A	B	I	
3. Piping and valves (including supports) between injection valves and reactor vessel	1	CV, RB	A	B	I	(7)
4. Piping and valves (including supports) upstream of injection valves and downstream of automatic N_2 makeup valve	2	RB	B	B	I	(7)
5. N_2 gas bottles and associated piping up to automatic N_2 makeup valve	N	RB	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
6. Electrical modules and cable with safety-related function	3	RB, CB	—	B	I	
7. Electrical modules and cable – others	N	RB, CB	—	E	NS	**Anticipated Transients Without Scram (ATWS) Equipment** — A quality assurance program that meets or exceeds the guidance of NRC Generic Letter 85-06 is applied to all nonsafety-related ATWS equipment.
C51 Neutron Monitoring System (NMS)						
1. Detector and tube assembly – primary pressure boundary	2	CV	B	B	I	
2. Detector and tube assembly – internals	3	CV	C	B	I	
3. Electrical modules and cable – SRNM, LPRM, and APRM	3	CV, CB, RB	—	B	I	
C61 Remote Shutdown System (RSS)						
1. Safety-related panels	3	RB	—	B	I	
2. Nonsafety-related panels	N	RB	—	E	II	
C62 Non-Essential DCIS						
1. Electrical modules and cable with no safety-related function	N	RB, CB, RW	—	E	NS	
2. Performance Monitoring and Control Subsystem (PMCS) equipment	N	CB	—	E	NS	
C63 Essential DCIS						
1. Electrical modules and cables with safety-related function	3	RB, CB	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
C71 Reactor Protection System (RPS)	3	CB, TB, RB	—	B	I	
C72 Diverse Instrumentation and Control System	N	CB, RB	—	E	NS	
C74 Safety System Logic and Control (SSLC)	3	RB, CB	—	B	I	
C82 Plant Automation System	N	CB	—	E	NS	
C85 Steam Bypass and Pressure Control (SB&PC) System	N	CB	—	E	NS	
D RADIATION MONITORING SYSTEMS						
D11 Process Radiation Monitoring System (PRMS)						
1. Radiation monitors, sensors, and other electrical modules and cable with safety-related function	3	CV, RB, CB	—	B	I	
2. Fission product monitoring piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
3. Fission product monitoring system (other portions)	N	CV, RB, CB	—	E	NS	
4. Other electrical modules and cable with no safety-related function	N	ALL	—	E	NS	
D21 Area Radiation Monitoring System (ARMS)	N	ALL, except CV	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
E CORE COOLING SYSTEMS						
E50 Gravity-Driven Cooling System (GDCS)						
1. Piping and valves (including supports) connected with the reactor vessel, including the squib valves, and up to and including the check valves upstream of the squib valves	1	CV	A	B	I	
2. Piping and valves (including supports) from the check valves upstream of the squib valves to the suppression pool and GDCS pools	2	CV	B	B	I	
3. Piping and valves (including supports) from the GDCS pools to the lower drywell	2	CV	B	B	I	
4. Electrical modules and cable	3	CV, RB, CB	—	B	I	
5. GDCS pool splash guard	3	CV	C	B	I	
F REACTOR SERVICING EQUIPMENT						
F11 Fuel Servicing Equipment	N	FB, RB	—	E	NS	
F12 Miscellaneous Servicing Equipment	N	FB, RB	—	E	NS	
F13 Reactor Pressure Vessel Servicing Equipment						
1. RPV head holding pedestal	N	RB	—	E	I	
2. All other RPV servicing equipment	N	RB	—	E	NS	
F14 RPV Internal Servicing Equipment	N	RB	—	E	NS	
F15 Refueling Equipment						

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
1. Fuel Handling Machine	N	FB	—	E	II	
2. Refueling Machine	N	RB	—	E	II	
3. Refueling bellows	N	CV	—	E	NS	
F16 Fuel Storage Facility						
1. Fuel storage racks - new and spent	N	RB, FB	—	E	I	
F17 Under-RPV Servicing Equipment	N	CV	—	E	NS	
F21 CRD Maintenance Facility	N	FB	—	E	NS	
F32 Fuel Cask Cleaning Facility	N	RB	—	E	NS	
F41 Plant Startup and Test Equipment	N	CV	—	E	NS	
F42 Fuel Transfer System (FTS)						
1. Transfer tube assembly from interface with upper fuel pool, through building to lower spent fuel pool terminus equipment, including drain connection	N	RB, FB	D	E	I	
2. Remaining equipment	N	RB, FB	—	E	NS	
F43 Loose Parts Monitoring System (LPMS)	N	CV, RB,	—	E	NS	
G DECAY HEAT REMOVAL NETWORK						
G21 Fuel and Auxiliary Pools Cooling System (FAPCS)						
1. Piping and valves including supports between containment isolation valves (including valves) for – Suppression pool return line – GDCS pool suction line – GDCS pool return line	2	CV, RB	B	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
– Drywell spray discharge line						
2. Piping between inboard manual valve and outboard containment isolation valve on suppression pool suction line	2	CV, RB	B	B	I	
3. Independent line (including piping, valves, and supports) for safety-related makeup to IC/PCC and spent fuel pools from piping connections at grade level in reactor yard area and to the fire protection system.	3	OO, RB, FB	C	B	I	
4. GDCS pool interconnecting pipes	3	CV	C	B	I	
5. Piping and components outside containment needed for fuel pool cooling, suppression pool cooling, LPCI and drywell spray modes of operation including skimmer lines and all components in the cooling and cleanup trains.	N	RB, FB	B	E	I	
6. Suppression pool suction line inside containment between inboard manual valve and its termination point (including suction strainers)	N	CV	C	E	I	
7. Piping and valves inside containment between inboard containment isolation valves and their termination points inside containment for: – Suppression pool return line – Drywell spray discharge line	N	CV	C	E	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
8. Piping and valves inside containment between inboard containment isolation valves and their termination points inside containment for: – GDCS pool suction line – GDCS pool return line	N	CV	D	E	II	
9. IC/PCC pools active cooling and cleanup subsystem piping, and components.	N	RB	D	E	II	
10. Auxiliary pools skimmer lines, and auxiliary pool return lines between isolation valves and terminus points	N	RB	D	E	NS	
11. Instrument sensing lines for the following parameters – IC/PCC pool water level – Spent fuel pool level	3	RB	C	B	I	
12. Electrical modules and cables with safety-related function	3	RB, CB, CV, FB	—	B	I	
13. Electrical modules and cables with nonsafety-related function	N	RB, CB, FB	—	E	II	
14. Control and instrumentation required for spent fuel pool cooling, suppression pool cooling, LPCI and drywell spray modes of operation	N	RB, FB, CB	—	E	I	
15. All other controls and instrumentation	N	RB, FB, CB	—	E	II	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
G31 Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) System						
1. Piping including supports and valves within and including outermost containment isolation valves on pump suction	1	CV, RB	A	B	I	(7)
2. Piping including supports and valves from feedwater lines to and including shutoff valves	2	RB	B	B	I	(7) RWCU/SDC piping classification is consistent with piping to which it connects.
3. Vessels including supports (demineralizer)	N	RB	C	E	I	
4. Regenerative heat exchangers (including supports) carrying reactor water	N	RB	C	E	I	
5. Cleanup recirculation pump, motors	N	RB	C	E	I	
6. Other piping including supports and valves between containment isolation valves and shutoff valves at feedwater line connections	N	RB	C	E	I	(7)
7. Nonregenerative heat exchanger tube side and piping (including supports and valves) carrying process water	N	RB	C	E	I	
8. Nonregenerative heat exchanger shell and piping (including supports and valves) carrying cooling water	N	RB	D	E	I	
9. Sample station	N	RB	D	E	I	
10. Electrical modules and cable with safety-related function	3	RB, CB	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
11. Electrical modules and cable with no safety-related function	N	RB, CB	—	E	I	
12. Overboard line piping outside reactor building	N	TB	C	E	II	
H CONTROL PANELS						
H11 Main Control Room Panels						
1. Panels, electrical modules, and cable with safety-related function	3	CB	—	B	I	**Control Panels** — Panels and associated structures that support or house safety-related mechanical or electrical components are safety-related.
2. Panels, electrical modules, and cable with no safety-related function	N	CB	—	E	II	
H12 MCR Back Room Panels						
1. Panels, electrical modules, and cable with safety-related function	3	CB	—	B	I	**Control Panels** — Panels and associated structures that support or house safety-related mechanical or electrical components are safety-related.
2. Panels, electrical modules, and cable with no safety-related function	N	CB	—	E	II	
H14 Radwaste Control Room Panels	N	RW	—	E	NS	**Radwaste Management Systems** – A quality assurance program meeting the guidance of NRC Regulatory Guide 1.143 is applied to radioactive waste management systems during design and construction.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
H21 Local Panels and Racks						
1. Panels, electrical modules, and cable with safety-related function	3	ALL	—	B	I	**Control Panels** – Panels and associated structures that support or house safety-related mechanical or electrical components are safety-related.
2. Panels, electrical modules, and cable with no safety-related function	N	ALL	—	E	NS	
J NUCLEAR FUEL						
J10 Core and Fuel Services	No physical items to be classified					
J11 Nuclear Fuel	3	CV, RB, FB	—	B	I	Nuclear fuel and channels are designed in accordance with NRC-approved methodology as described in chapters 4, 15 and Reference 15.0-2.
J12 Fuel Channel	3	CV, RB, FB	—	B	I	See note for J11.
K RADIOACTIVE WASTE MANAGEMENT SYSTEMS						
K10 Liquid Waste Management System (LWMS)						
1. Mechanical modules (including supports)	N	RB, RW	D (see note)	E	NS	**Radwaste Management Systems** – A quality assurance program meeting the guidance of Regulatory Guide 1.143, as applied to radioactive waste management systems, is described in Chapter 17. The radioactive Waste Management System components conform to Regulatory Guide 1.143 Table 1. For Radwaste processing systems, Regulatory Guide 1.143 Table 1 modifies Regulatory guide 1.26 Table 1 Quality Group D. This modification is acceptable per

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
						Standard Review Plan 3.2.2 Appendix C Note (9). Applicable portions of Regulatory Guide 1.143 Table 1 are reprinted in Chapter 11 Table 11.2-1.
2. Electrical modules and cabling	N	RB, RW	(see note)	E	NS	Same as above.
K20 Solid Waste Management System (SWMS)						
1. Mechanical modules (including supports)	N	RB, RW	D (see note)	E	NS	See note for K10 item 1.
2. Electrical modules and cabling	N	RB, RW	(see note)	E	NS	See note for K10 item 1.
K30 Offgas System (OGS)	N	TB	D (see note)	E	NS	**Offgas System** – See note for K10 item 1.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
N POWER CYCLE SYSTEMS						
N11 Turbine Main Steam System (TMSS)						
1. Turbine Main Steam System (TMSS) consists of the piping (including supports) for the MSL from the seismic interface restraint (or seismic guide) to the turbine stop valves and the connecting branch lines up to and including their isolation valves.	N	TB	B	B	II	**Main Steam Lines** – TMSS lines are designed to ASME Section III Code, Class 2. TMSS piping is not code stamped and does not require ASME authorized inspection. Lines smaller than 63.5 mm (2.5 inches) are NS. Also see Figure 3.2-1.
2. Other mechanical and electrical modules	N	TB	D	E	NS	
N21 Condensate and Feedwater System (C&FS)						Feedwater lines from seismic isolation restraint to last feedwater heater are Quality Group B, Seismic Category II. See Figure 3.2-2.
1. Main feedwater line (FW) beyond seismic interface restraint	N	TB	D	E	NS	
N22 Heater Drain and Vent System (HDVS)	N	TB	—	E	NS	
N25 Condensate Purification System (CPS)	N	TB	—	E	NS	
N31 Main Turbine	N	TB	—	E	NS	
N32 Turbine Control System (TCS)	N	TB	D	E	NS	(9)
N33 Turbine Gland Seal System (TGSS)	N	TB	D	E	NS	
N34 Turbine Lubricating Oil System (TLOS)	N	TB	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
N35 Moisture Separator Reheater (MSR)	N	TB	—	E	NS	
N36 Extraction System	N	TB	—	E	NS	
N37 Turbine Bypass System (TBS)	N	TB	D	E	II	TBS lines are designed to ASME Section III Code, Class 2. TBS piping is not code stamped and does not require ASME authorized inspection. Lines smaller than 63.5 mm (2.5 inches) are NS. Also see Figure 3.2-1.
N39 Turbine Auxiliary Steam System (TASS)	N	TB	—	E	NS	
N41 Generator	N	TB	—	E	NS	
N42 Hydrogen Gas Cooling System (HGCS)	N	TB	—	E	NS	
N43 Generator Cooling System (GCS)	N	TB	—	E	NS	
N44 Generator Sealing Oil System (GSOS)	N	TB	—	E	NS	
N45 Hydrogen and Carbon Dioxide Bulk Storage System	N	OO	—	E	NS	
N51 Exciter	N	TB	—	E	NS	
N61 Main Condenser and Auxiliaries	N	TB	—	E	NS	The main condenser is nonsafety-related, non-seismic design, but the condenser anchorage is seismically analyzed for SSE. Also see Figure 3.2-1.
N71 Circulating Water System (CIRC)	N	TB, OO	D	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
P STATION AUXILIARY SYSTEMS						
P10 Makeup Water System (MWS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Piping and valves inside containment or inside Reactor Building	N	CV, RB	D	E	II	
3. Other mechanical and electrical modules	N	OO, RW, RB, CB, SF	D	E	NS	
P21 Reactor Component Cooling Water System (RCCWS)	N	TB, RB	D	E	NS	
P22 Turbine Component Cooling Water System (TCCWS)	N	TB	D	E	NS	
P25 Chilled Water System (CWS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Piping and valves inside containment	N	CV	D	E	II	
3. Other mechanical and electrical modules	N	TB, RB, CB, FB, EB, RW	D	E	NS	
P30 Condensate Storage and Transfer System (CS&TS)						
1. Mechanical modules, including piping, valves, and condensate storage tank	N	OO, RB, RW, TB	D	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
2. Electrical modules and cable	N	RB	—	E	NS	
P32 Oxygen Injection System (OIS)	N	TB	—	E	NS	
P33 Process Sampling System (PSS)	N	RB, OO, TB, RW	D	E	NS	(7)
P41 Plant Service Water System (PSWS)						
1. Mechanical and electrical modules, including piping and valves (including supports)	N	SF, OO, RB	D	E	NS	
P51 Service Air System (SAS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Other system components	N	ALL	D	E	NS	
P52 Instrument Air System (IAS)	N	ALL	D	E	NS	
P54 High Pressure Nitrogen Supply System (HPNSS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Other nonsafety-related mechanical modules	N	RB	D	E	NS	
3. Other nonsafety-related electrical modules	N	RB, CB	—	E	NS	
4. Nitrogen storage bottles	N	RB	—	E	NS	
P62 Auxiliary Boiler System (ABS)	N	OL	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
P63 Hot Water System (HWS)	N	ALL	—	E	NS	
P73 Hydrogen Water Chemistry System (HWCS)	N	TB	—	E	NS	The ESBWR Standard Plant design includes the capability to connect a Hydrogen Water Chemistry (HWC) System, but the system itself is not part of the ESBWR Standard Plant design.
P74 Zinc Injection System	N	TB	D	E	NS	The ESBWR Standard Plant design includes the capability to connect a Zinc Injection System, but the system itself is not part of the ESBWR Standard Plant design.
R STATION ELECTRICAL SYSTEMS						
R10 Electrical Power Distribution System (EPDS)						
1. Main transformers	N	OO	—	E	NS	
2. Main generators	N	TB	—	E	NS	
3. Unit auxiliary transformers	N	OO	—	E	NS	
4. Isolated phase bus	N	OO, TB	—	E	NS	
5. Non-segregated phase bus	N	OO, EB	—	E	NS	
6. Metal clad switchgear	N	RB, EB, TB, OL	—	E	NS	
7. Power centers	N	RB, EB, FB, TB, OL	—	E	NS	
8. Motor control centers	N	RB, EB, FB, CB, TB, OL	—	E	NS	
9. Cable and supports with safety-related function	3	CV, RB, FB, CB	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
10. Other cable and supports with no safety function	N	CV, CB, RB, EB, TB, OL	—	E	NS	
R11 Medium Voltage Distribution System						
1. Medium voltage components required to protect containment from overpressure during a feedwater line break	3	TB	—	B	I	
2. Other medium voltage components	N	EB	—	E	NS	
R12 Low Voltage Distribution System	N	ALL	—	E	NS	
R13 Uninterruptible AC Power Supply						
1. Electrical modules and cable with safety-related function	3	CV, CB, RB, FB	—	B	I	
2. Other electrical modules and cable with no safety function	N	CV, RB, CB, EB, TB, OL	—	E	NS	
R14 Instrumentation and Control Power Supply						
1. Electrical modules and cable with no safety function	N	EB, CV, CB, RB, TB	—	E	NS	
R15 Lighting and Servicing Power Supply						
1. Lighting	N	ALL	—	E	NS	
2. Emergency lighting in control room	3	CB	—	B	I	
R16 Direct Current Power Supply						
1. Electrical modules and cable with safety-related function	3	RB, CV, CB, TB	—	B	I	
2. Other electrical modules and cable with	N	EB, CV,	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
no safety function		CB, RB, TB, OO				
R21 Standby AC Power Supply	N	EB	—	E	NS	
R31 Raceway System						
1. Conduit, cable trays and supports with safety-related function	3	CV, CB, RB, FB	—	B	I	
2. Other electrical modules with no safety function	N	CV, CB, RB, EB, TB, OL	—	E	NS	
3. Electrical penetrations	3	CV, RB	—	B	I	
R41 Plant Grounding System	3	OO	—	B	I	
R51 Communication System	N	ALL	—	E	NS	
S POWER TRANSMISSION SYSTEMS						
S21 Switch Yard	N	OO	—	E	NS	
T CONTAINMENT AND ENVIRONMENTAL CONTROL SYSTEMS						
T10 Containment System						
1. Upper and lower drywell airlocks and equipment hatches, wetwell access hatch, and safety-related instrumentation	2	CV	B	B	I	
2. Wetwell/drywell vacuum breakers	2	CV	B	B	I	
3. Vacuum Breaker "Closed" Proximity Instrumentation	3	CV	—	B	I	
4. Vacuum Breaker "Open" Proximity Instrumentation.	N	CV	—	E	II	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
5. Vacuum Breaker Isolation Valves	2	CV	B	B	I	
T11 Containment Vessel						
1. Drywell head	2	CV	B	B	I	
2. Reinforced Concrete Containment Vessel (RCCV)	2	CV	B	B	I	
3. Reactor pedestal (Part of RCCV)	2	CV	B	B	I	
4. Portion of basemat under pedestal	2	CV	B	B	I	
T12 Containment Internal Structures						
1. Reactor vessel support brackets and stabilizer support	3	CV	—	B	I	
2. Support structures for safety-related piping, including supports and equipment	3	CV	—	B	I	
3. Reactor shield wall	3	CV	—	B	I	
4. Diaphragm floor	3	CV	—	B	I	
5. GDCS pools	3	CV	—	B	I	
6. Vent Wall	3	CV	—	B	I	
T15 Passive Containment Cooling System (PCCS)	2	CV, RB	B	B	I	
T31 Containment Inerting System						
1. Piping and valves (including supports) forming part of the containment boundary	2	RB	B	B	I	
2. Electrical modules and cables with safety-related function	3	RB, CB	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
3. Other mechanical modules (including nitrogen storage tanks, and vaporizers), piping, valves, and electrical modules and cables with no safety function	N	RB, OO	—	E	NS	
T41 Drywell Cooling System (DCS)	N	CV	—	E	II	
T62 Containment Monitoring System						
1. Safety-related portions of System	2/3	CV, RB, CB	—	B	I	Containment isolation function is safety class 2, rest of safety-related functions are safety class 3.
2. Nonsafety-related portions of system	N	CV, RB, CB	—	E	NS	
T64 Environmental Monitoring System	N	OL	—	E	NS	
U STRUCTURES AND SERVICING SYSTEMS						
U31 Cranes, Hoists, and Elevators						
1. Reactor building cranes, fuel building crane	N	RB, FB	—	E	II	**Cranes** — The reactor building and fuel building cranes are designed to maintain their position and hold up their loads under conditions of an SSE.
2. Upper and lower drywell servicing hoists and cranes	N	CV	—	E	I	
3. Main steam tunnel servicing hoists and cranes	N	OL	—	E	II	
4. Special service rooms hoists and cranes	N	RB, TB, FB, RW	—	E	II or NS	Components must be seismic category II if they can potentially damage safety-related equipment.
5. Elevators	N	RB, TB, FB, CB,	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
		RW				
U36 Electrical Building HVAC	N	EB	—	E	NS	
U37 Service Building HVAC	N	SB	—	E	NS	
U38 Radwaste Building HVAC	N	RW	—	E	NS	
U39 Turbine Building HVAC	N	TB	—	E	NS	
U40 Reactor Building HVAC						
1. Building isolation dampers	3	RB	—	B	I	
2. Controls associated with the isolation dampers	3	RB	—	B	I	
3. Other system components	N	RB	—	E	II	
U41 Other Building HVAC	N	OL	—	E	NS	
U42 Potable Water and Sanitary Waste System	N	CB, SB, EB, RB, OO	—	E	NS	
U43 Fire Protection System (FPS)						
1. Non-seismic yard piping loop and valves including supports	N	OO, OL	D	E	NS	**Fire Protection System** — A quality assurance program meeting the guidance of NRC Branch Technical Position SPLB 9.5-1 (NUREG-0800) is applied to the protection system. Also, special seismic qualification requirements are applied.
2. Seismic category I piping loop and valves including supports	N	OO, RB, CB, FB	C	E	I	Same as above.
3. Fire water storage tank	N	OO	C	E	I	Same as above.
4. Fire pump enclosure	N	OO	—	E	II	Same as above.
5. Seismic category I pump including	N	OO	C	E	I	Same as above.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
diesel-engine drive						
6. Booster pumps	N	RB	C	E	I	Same as above.
7. Motors for seismic category I pumps	N	OO,RB	—	E	I	Same as above.
8. Other pumps and motors	N	OO	D	E	NS	Same as above.
9. Electrical modules and cables for RB preaction sprinklers	N	RB	—	E	NS	Same as above.
10. All other electrical modules and cables	N	ALL	—	E	NS	Same as above.
11. CO_2 actuation modules	N	TB	—	E	NS	Same as above.
12. Sprinklers	N	RB, TB, RW, SB, EB, OL	D	E	NS	Same as above.
13. Foam, preaction or deluge	N	EB, TB, OO	—	E	NS	Same as above.
U44 Sanitary Waste Discharge System	N	CB, SB, EB, RB, OO	—	E	NS	
U50 Equipment and Floor Drain System						
1. Piping and valves forming part of the containment boundary	2	CV, RB	B	B	I	
2. Drain piping and valves including supports	N	ALL	D	E	NS	
3. Other mechanical and electrical modules	N	ALL	—	E	NS	
U65 Other Building Structures						
1. Emergency Breathing Air System building	3	OO	—	B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
2. All other U65 buildings	N	OO, OL	—	E	NS	
U71 Reactor Building Structure	3/N	RB	—	B	I/II	Stair towers and elevator shafts are SC II, rest of building is SC I.
U72 Turbine Building Structure	N	TB	—	E	II	
U73 Control Building Structure	3/N	CB	—	B	I/II	Below grade is SC I and above grade is SC II. Stair towers and elevator shafts are SC II.
U74 Radwaste Building Structure	N	RW	—	E	NS	Radwaste Management Systems – A quality assurance program meeting the guidance of NRC Regulatory Guide 1.143 is applied to radioactive waste management systems during design and construction.
U75 Service Building Structure	N	SB	—	E	NS	
U77 Control Building HVAC						
1. Ducts, valves, and dampers (including supports) supporting safety-related areas	3	CB	—	B	I	
2. Other ducts, valves and dampers (including supports)	N	CB	—	E	NS	
3. Electrical modules and cable with safety-related function	3	CB	—	B	I	
4. Main control room bottled air system	3	CB, OO	—	B	I	
5. Other nonsafety-related equipment	N	CB	—	E	NS	
U78 Cold Machine Shop	N	OO		E	NS	
U80 Electrical Building Structure	N	EB	—	E	NS	
U81 Seismic Monitoring System	N	ALL	—	E	NS	
U84 Service Water Building Structure	N	SF	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
U85 Service Water Building HVAC	N	SF	—	E	NS	
U91 Administration Building Structure	N	OL	—	E	NS	
U93 Training Center	N	OL	—	E	NS	
U95 Hot Machine Shop	N	OO	—	E	NS	
U97 Fuel Building Structure	3/N	FB	—	B	I/II	Main building is SC I. HVAC Penthouse, Stair towers and elevator shafts are SC II.
U98 Fuel Building HVAC						
1. Building isolation dampers	3	FB	—	B	I	
2. Ducting penetrating fuel building boundary	3	FB	—	B	I	
3. Controls associated with the isolation dampers	3	FB	—	B	I	
4. Other system components	N	FB	—	E	II	
U99 Stack	N	OO	—	E	NS	
W INTAKE STRUCTURE AND SERVICING EQUIPMENT						
W12 Intake and Discharge Structures	N	OO	—	E	NS	
W24 Cooling Tower	N	OO	—	E	NS	
W32 Screen Cleaning Facility	N	OO	—	E	NS	
W33 Screens, Racks, and Rakes	N	OO	—	E	NS	
W41 Intake Structure Power Supply	N	OO	—	E	NS	
Y YARD STRUCTURES AND EQUIPMENT						
Y12 Roads and Walkways	N	OO	—	E	NS	
Y21 Tanks and Equipment Pads	N	OO	—	E	NS	Some tanks in the yard area belong to other systems (e.g., fire water storage tank in U43) and

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
						have different classifications.
Y41 Station Water System	N	OO	—	E	NS	
Y46 Cathodic Protection System	N	OO	—	E	NS	
Y47 Meteorological Observation System	N	OO	—	E	NS	
Y51 Yard Miscellaneous Drain System	N	OO	—	E	NS	
Y52 Oil Storage and Transfer System	N	OO	—	E	NS	
Y53 Chemical Storage and Transfer System	N	OO	—	E	NS	
Y71 Piping Duct	N	OL	—	E	NS	Typical classifications for piping ducts in the yard area. Classification of individual piping ducts shall match the classification of the pipe they carry.
Y72 Cable Duct	N	OL	—	E	NS	Typical classifications for cable ducts in the yard area. Classification of individual cable ducts shall match the classification of the cables they carry.
Y86 Site Security	N	ALL	—	E	NS	

Notes:

(1) Principal components: A module is an assembly of interconnected components that constitute an identifiable device or piece of equipment. For example, electrical modules include sensors, power supplies, and signal processors; and mechanical modules include turbines, strainers, and orifices.

(2) Safety Class: 1, 2, 3 or N are designations for safety-related or nonsafety-related as discussed in Subsection 3.2.3.

(3) Location codes:

ALL = All locations

CV	=	Containment Vessel	RW	=	Radwaste Building
CB	=	Control Building	CP	=	Circulating Water Pump House
RB	=	Reactor Building	SF	=	Service Water Building
OO	=	Outdoors Onsite	TB	=	Turbine Building
OL	=	Any Other Location	EB	=	Electrical Building
FB	=	Fuel Building	SB	=	Services Building

(4) Quality group classifications: A, B, C, or D are quality groups defined in Regulatory Guide 1.26, as discussed in Subsection 3.2.2. The principal components are classified, designed, and constructed in accordance with the requirements identified in Tables 3.2-2 and 3.2-3. The designation "—" indicates that the quality groups A through D are not applicable to the associated principal component.

(5) Quality assurance requirements: The designation "B" indicates that the quality assurance requirements of 10 CFR 50, Appendix B, are applied in accordance with the quality assurance program described in Chapter 17. The designation "E" indicates that quality assurance requirements are applied, commensurate with the importance of the item's function.

(6) Seismic category: The designations "I" or "II" indicate that the design requirements of Seismic Category I or II structures and equipment are applied as described in Subsection 3.2.1 and Section 3.7, Seismic Design. Structures and equipment that are not designated "I" or "II" are designated "NS."

(7) Small Piping and Instrument Lines — Lines 25 mm (one inch) and smaller in diameter that are part of the reactor coolant pressure boundary are QGB and meet the requirements of the ASME B&PV Code, Section III, Class 2 and Seismic Category I, with the exceptions noted below:

Instrument lines that are connected to the reactor coolant pressure boundary and are used to actuate or monitor safety-related systems are QGB from the outer isolation valve or the process shutoff valve (root valve) to the sensing instrumentation. Instrument lines that are connected to the reactor coolant pressure boundary and are not used to actuate and monitor safety-related systems are nonsafety-related and Quality Group D from the outer isolation valve or the process shutoff valve (root valve) to the sensing instrumentation. Other instrument lines meet the following requirements:

- Through the root valve: the lines are the same classification as the system to which they are attached.
- Beyond the root valve, if used to actuate a safety-related system: the lines are the same classification as the system to which they are attached.
- Beyond the root valve, if not used to actuate a safety-related system: the lines may be Quality Group D.

Sample lines from the outer isolation valve or the process root valve through the remainder of the sampling system may be Quality Group D.

Safety-related instrument lines comply with the guidance of NRC Regulatory Guide 1.151.

(8) Hydraulic Control Unit for Control Rod Drive System — The hydraulic control unit (HCU) is a factory-assembled, engineered module of valves, tubing, piping, and stored water that controls two control rod drives by the application of pressure and flow to accomplish rapid insertion for reactor scram.

Although the HCU is field installed as a unit and connected to process piping, many of its internal parts differ markedly from process piping and components because of the more complex functions of the HCU. Thus, although the codes and standards invoked by the different quality groups (A, B, C and D) apply to the interfaces between the HCU and its connections to conventional piping components (e.g., pipe nipples, fittings, hand valves, etc.), they are not considered applicable to the specialty parts (e.g., solenoid valves, pneumatic components, and instruments).

However, the design and construction specifications for the HCU do invoke such codes and standards as can be reasonably applied to individual parts in developing required quality levels. For example: (1) all welds are inspected using liquid penetrant, (2) all socket welds are inspected for gaps between the pipe and socket bottom, (3) all welding is performed by qualified welders, and (4) all work is performed in accordance with written procedures. Quality Group D is generally applicable because the codes and standards invoked by that group permit the use of manufacturer's standards and proven design techniques that are not explicitly defined within the codes for Quality Groups A, B or C. This is supplemented by appropriate quality control (QC) techniques.

(9) Turbine Control System — The turbine stop valve is designed to withstand the SSE and maintain its pressure-retaining integrity.

All cast pressure-retaining parts of a size and configuration for which volumetric methods are effective are examined by radiographic methods by qualified personnel. Ultrasonic examination to equivalent standards is used as an alternative to radiographic methods. Examination procedures and acceptance standards are at least equivalent to those defined in Paragraph 136.4, Nonboiler External Piping, ASME B31.1.

The following qualifications are met with respect to the certification requirements:

a. The manufacturer of the turbine stop valves, turbine control valves, turbine bypass valves, and main steam lines from turbine control valve to turbine casing uses quality control procedures at least equivalent to those defined in GE Publication GEZ-4982A, General Electric Large Steam Turbine Generator Quality Control Program.

b. A certification obtained from the manufacturer of these valves and steam lines demonstrates that the quality control program as defined has been accomplished.

The following requirements are applied in addition to the Quality Group D requirements:

a. All longitudinal and circumferential butt weld joints are radiographed (or ultrasonically tested to equivalent standards). Where size or configuration does not permit effective volumetric examination, magnetic particle or liquid penetrant

examination may be substituted. Examination procedures and acceptance standards are at least equivalent to those specified as supplementary types of examinations, Paragraph 136.4 in ASME B31.1.

b. All fillet and socket welds, and all structural attachment welds to pressure-retaining materials are examined by either magnetic particle or liquid penetrant methods. Examination procedures and acceptance standards are at least equivalent to those specified as supplementary types of examinations, Paragraph 136.4 in ASME B31.1.

c. All inspection records are maintained for the life of the plant. These records include data pertaining to qualification of inspection personnel, examination procedures, and examination results.

Table 3.2-2

Minimum Safety Designation Requirements

Minimum Design Requirements					
Safety Class	Quality Group	ASME Section III Code Class	Seismic Category[1]	Electrical Classification[2]	Quality Assurance[4]
1	A	1	I	N/A	10 CFR 50 Appendix B
2	B	2	I	N/A	10 CFR 50 Appendix B
3	C	3	I	Class 1E	10 CFR 50 Appendix B
N	C or D[3]	N	II or NS	Non-Class 1E	—

1 Seismic Category I structures, systems, and components meet the design and analysis requirements of Section 3.7. Some safety-related items (e.g., pipe whip restraints) have no safety-related function in the event of an SSE and are Seismic Category II.

2 Safety-related electrical equipment and instrumentation meet the design requirements of IEEE Class 1E (as well as Seismic Category I). Some nonsafety-related electrical equipment and instrumentation are optionally designed to IEEE Class 1E requirements as noted in Table 3.2-1.

3 Some nonsafety-related structures, systems, and components are optionally designed to Quality Group C or D requirements, as designated in Table 3.2-1. Nonsafety-related structures, systems, and components that are not assigned a quality group are designed to requirements of applicable industry codes and standards (see Subsection 3.2.3.4).

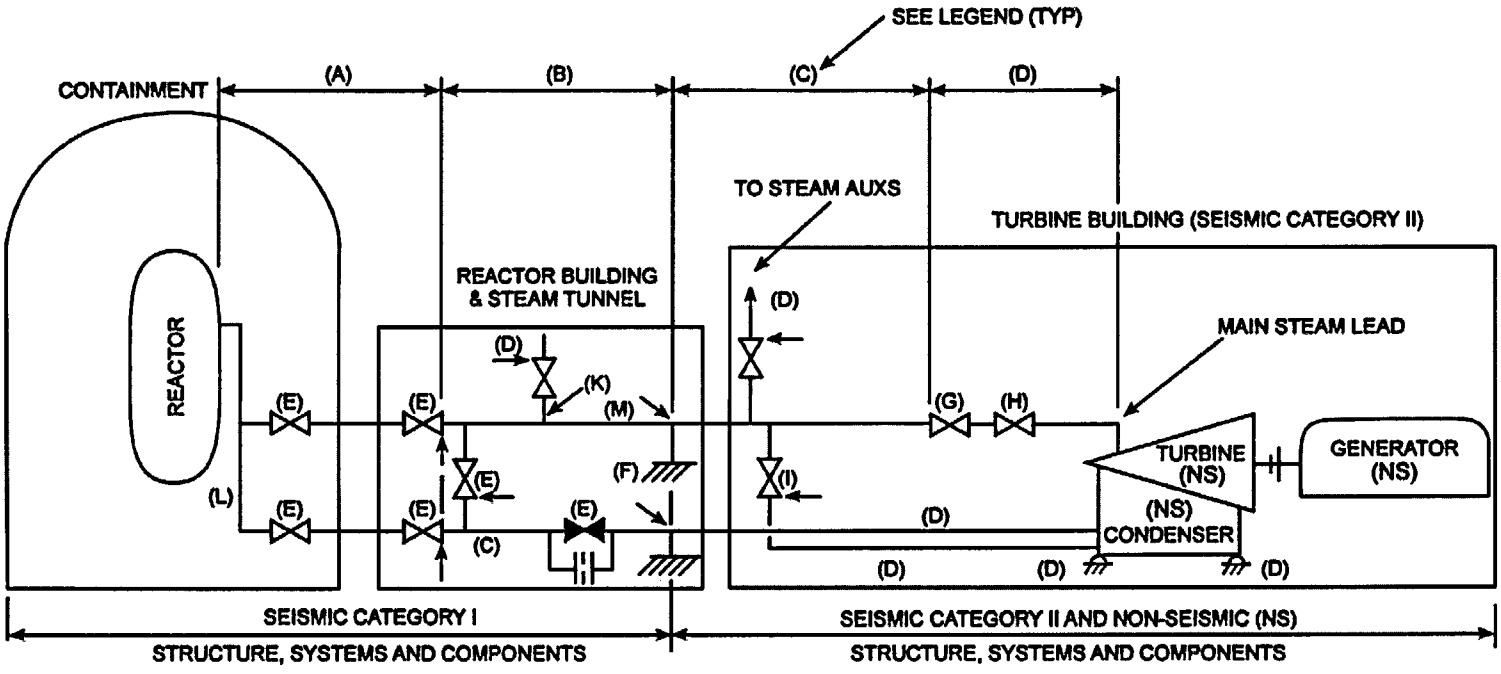
4 Safety-related (Safety Class 1, 2 and 3) structures, systems, and components meet the quality assurance requirements of 10 CFR 50, Appendix B, as described in Chapter 17. Nonsafety-related (N) structures, systems and components meet quality assurance requirements as defined in the quality assurance program. Elements of 10 CFR 50, Appendix B, are generally applied to nonsafety-related equipment commensurate with the importance of the equipment's function.

Table 3.2-3

Quality Group Designations – Codes and Industry Standards

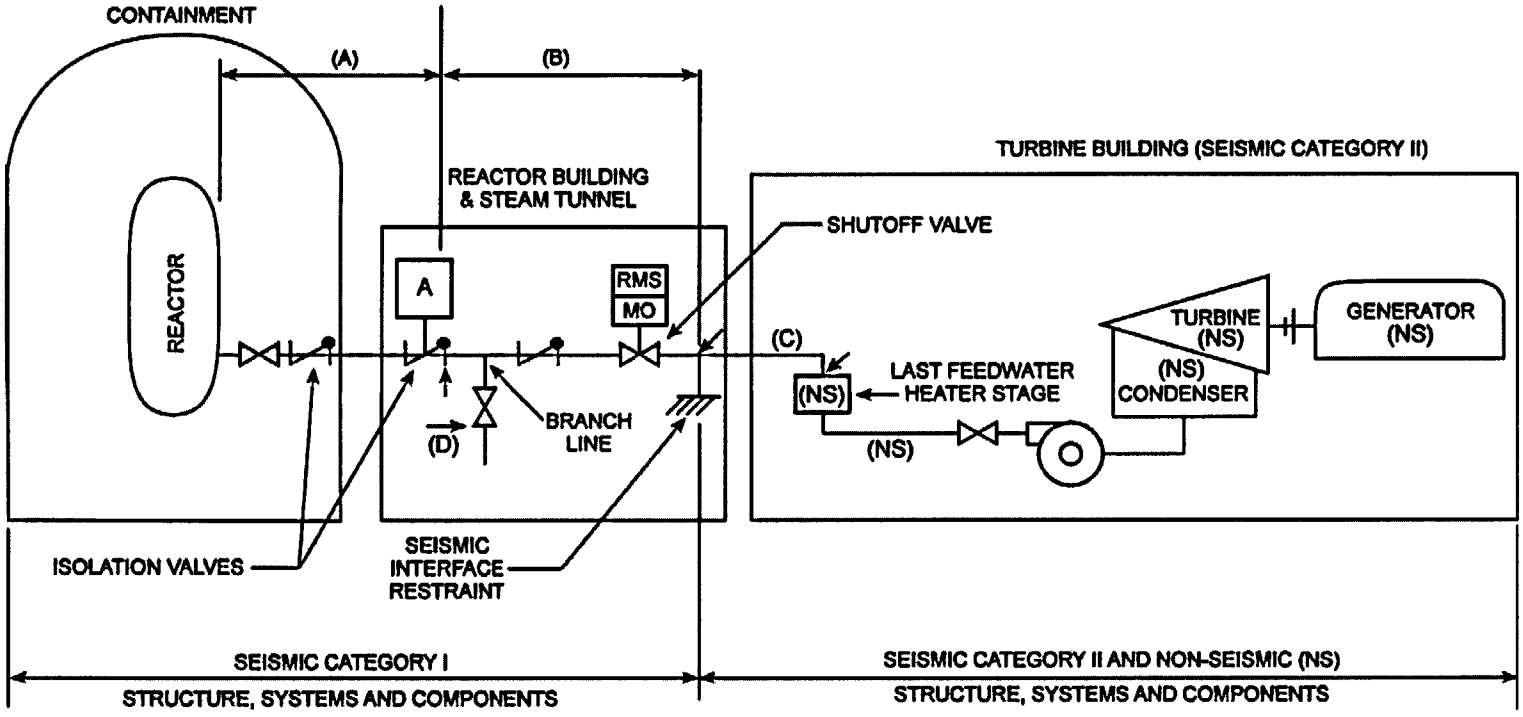
Quality Group Classification	ASME Section III Code Classes	Pressure Vessels and Heat Exchangers[4]	Pipes, Valves, and Pumps	Storage Tanks (0-103 kPaG) 0-15 psig	Storage Tanks Atmospheric	ASME Section III Component Supports	Non-ASME Section III Component Supports	Core Support Structures and Reactor Internals	Containment Boundary
A	1	NCA and NB TEMA C	NCA and NB	—	—	NCA and NF	—	—	—
B	2	NCA and NC TEMA C	NCA and NC	NCA and NC	NCA and NC	NCA and NF	—	—	—
	CC[1] and MC	—	—	—	—	—	—	—	NCA, CC[1], and NE
	CS	—	—	—	—	—	—	NCA and NG	
C	3	NCA and ND TEMA C	NCA and ND	NCA and ND	NCA and ND	NCA and NF	—	—	—
D	—	ASME Sect. VIII Division 1 TEMA C	ASME B31.1 for piping and valves[2]	API-620 or equivalent[3]	API-650 AWWA-D100 ASME B96.1 or equivalent[3]	—	Manufacturer's Standards, e.g., ASME B31.1, AISC	—	—

1. RCCV is designed to Subsection CC in ASME Boiler and Pressure Section III, Division 2.
2. For pumps classified in Quality Group D, the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 is used as a guide in determining the wall thickness for pressure-retaining parts and in sizing the cover bolting.
3. Tanks are designed to meet the intent of API, AWWA, and/or ASME B96.1 standards, as applicable.
4. For heat exchangers, both the ASME Code and TEMA C must be taken into account.



LEGEND:	
A. QUALITY GROUP A B. QUALITY GROUP B C. QUALITY GROUP B, SEISMIC CATEGORY II D. QUALITY GROUP D, SEISMIC CATEGORY II E. ISOLATION VALVE F. SEISMIC INTERFACE RESTRAINT G. TURBINE STOP VALVE H. TURBINE CONTROL VALVE	I. TURBINE BYPASS VALVE J. MAIN STEAM LEAD K. BRANCH LINE L. DRAIN LINE M. STEAM LINE NS NON-SEISMIC ↙ CLASSIFICATION CHANGE

Figure 3.2-1. Quality Group and Seismic Category Classification Applicable to Power Conversion System



Note: See Figure 3.2-1 for Legend.

Figure 3.2-2. Quality Group and Seismic Category Classification Applicable to Feedwater System

a. The performance qualification should require testing of the welds when conditions of accessibility to production welds are less than 30 to 35 cm in any direction from the joint.

b. Re-qualification is required for different accessibility conditions or when other essential variables listed in the Code, Section IX, are changed.

c. The qualification and re-qualification tests required by (a) and (b) above may be waived, provided that the joint is to be 100% radio-graphed or ultrasonically examined after completion of all weld passes. Examination procedures and acceptance standards should meet the requirements of ASME Code Section III. Records of the examination reports and radiographs should be retained and made part of the Quality Assurance documentation of the completed weld.

As alternative method, positions documented in Reference 10.3-1 could be used.

(2) Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants" describes acceptable procedures for cleaning and handling Class 2 components of the steam and feedwater systems. Vented tanks with de-ionized or de-mineralized water are an acceptable source of water for final cleaning or flushing of finished surfaces. The oxygen content of the water in these vented tanks need not be controlled.

(3) Acceptance criteria for nondestructive examination of tubular products are given in ASME Code Section III, Paragraphs NC 2550 through 2570.

10.3.7 COL Information

10.3.7.1 Procedures to Avoid Steam Hammer and Discharge Loads

The COL applicant will provide operating and maintenance procedures that include adequate precautions to avoid steam hammer and discharge loads (Subsection 10.3.3).

10.3.7.2 Conformance with Regulatory Guide 1.71

The COL applicant will provide the integrity of welds in locations of restricted direct physical and visual accessibility.

10.3.7.3 Main Steam Leakage Path

A plant-specific walk-down of non-seismically designed systems, structures, and components overhead, adjacent to, and attached to the main steamline leakage path (i.e., the main steam piping, the bypass line, and the main condenser) shall be conducted to confirm, by inspection, that the as-built main steam piping, bypass to the condenser, and the main condenser are not compromised by non-seismically designed systems, structures and components. This inspection is to meet the intent of DCD Section 15.4.4.5.2.3.

10.3.8 References

10.3-1 GE Nuclear Energy, "GE Nuclear Energy Quality Assurance Program Description," NEDO 11209-04a, Revision 8, March 1989.

15.4.4.5.2.4 Condenser Modeling

The condenser is modeled as detailed in Reference 15.4-4 with specific values used given in Table 15.4-5. The volume is modeled primarily as a stagnant volume assuming the shutdown of all active components. The condenser is used as a mitigative volume based upon the determination that such components, designed to standard engineering practice, are sufficiently strong to withstand SSE conditions due wholly to their design (Reference 15.4-4).

Releases from the condenser/turbine building pathway are assumed via diffuse sources in the Turbine Building. The two major points of release in the Turbine Building are expected to be the truck doors at the far end of the Turbine Building and the Turbine Building vent panels located midway on the Turbine Building on the side away from the Reactor Building. Releases are assumed to be ground level releases.

15.4.4.5.3 Control Room

The control room is physically integrated into the Control Building and is located below grade adjacent to the Reactor, Service, and Turbine Buildings. During a LOCA, exposure to the operators consists of contributions from airborne fission products entrained into the control room ventilation system.

Exposure to the operators from airborne contamination consists almost entirely of radionuclides entrained into the control room environment via the HVAC from the atmosphere. The control room is designed to operate under minimal power and HVAC conditions with air flow into the control room and positive pressure maintained by a redundant bottled air supply system. The system can maintain the control room under positive pressure minimal inleakage conditions for 72 hours prior to requiring recharging. Recharging can be done at the site or bottled air can be trucked into and installed in the air supply bays in the Emergency Breathing Air System Building. The bottled air system is described in Subsection 6.4.3.

In addition to the bottled air system, the HVAC can also operate under positive flow with intake air routed through a single train charcoal adsorber system. For purposes of conservative calculations, it is assumed that for the first 72 hours the control room is maintained under bottled air, transferring over to the HVAC charcoal train after 72 hours. This proves to be the most conservative assumptions, because if the bottled air supply is replenished each 72 hours, the primary mode of introducing radionuclides into the control room, the HVAC system, is not turned on. In the event that the HVAC is unavailable after the initial 72 hours, the bottled air system would be recharged and continue to operate.

Control room dose is based upon fission product releases modeled as described above and the values presented in Table 15.4-8. Operator exposure is also based upon those conditions given in Table 15.4-8. The occupancy factors shown below are derived from RG 1.183.