US-APWR DCD Tier 1 Enhancement Project

Tuesday 3/15 AM Handout 1

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US-APWR DCD Tier 1 Enhancement Effort

The Tier 1 enhancement effort is being performed by a team of MHI/MNES, Luminant, and Dominion personnel. The effort was initiated in June 2010 with the objective of improving the overall quality of Tier 1 and in particular, the inspectability of ITAAC. The proposed Tier 1 changes will facilitate the NRC's review and approval of the DCD and the completion, inspection, and closure of ITAAC. The changes will minimize potential impacts on construction and operations.

The team's Tier 1 review criteria were based on NRC guidance (e.g., SRP 14.3 and RIS 2008-05, Revision 1), recent industry experience from other Design Centers, and engineering judgment. The review resulted in the addition and deletion of ITAAC, the revision of Design Description information to provide an appropriate level of content in a standard format directly incorporating the ITAAC Design Commitments, and various other changes that improve ITAAC clarity and inspectability.

A redline/strikeout version of each Tier 1 section was prepared to identify the proposed changes. A "Basis" document was also prepared for each section, which provides an explanation, or basis for the proposed changes. The Basis documents identify RAI responses altered by the proposed Tier 1 changes. The review team used a consistent methodology in the preparation of the redline/strikeout and Basis documents, including standardized explanations for certain changes.

The redline/strikeout version for each Tier 1 section includes alpha-numeric right margin annotations (RMAs) for the proposed Design Description changes (see Figure 1). Proposed ITAAC changes are referenced by the ITAAC table row number (see Figure 2). An explanation of the changes represented by each RMA or ITAAC table row number is provided in the Basis document by the corresponding item or row numbers (see Figure 3).

Note that these are enhancements and contain no design changes.

Figure 1: Example Design Description Markup

2.5.4 Information Systems Important to Safety

2.5.4.1 Design Description

The PSMS and PCMS provide plant operators with the information systems important to safety for: (1) assessing plant conditions and safety system performance, and making decisions related to plant responses to abnormal events; and (2) preplanned manual operator actions related to accident mitigation. The information systems important to safety also provide the necessary information from which appropriate actions can be taken to mitigate the consequences of the AOOs.

The information important to safety includes the following:

- Post accident monitoring (PAM)
- Bypassed and inoperable status indication (BISI)
- Plant annunciators (alarms)
- Safety parameter displays system (SPDS)
- Information and control for credited manual operator actions

~~The necessary information important to safety is available for the display at the following facilities:~~

- ~~Main control room (MCR)~~
- ~~Remote shutdown room (RSR)~~
- ~~Technical support center (TSC)~~
- ~~Emergency operations facility (EOF)~~

~~Controls for credited manual operator actions are available in the MCR.~~

~~Figure 2.5.4-1 shows the configuration of the PSMS and PCMS for implementation of the information systems important to safety. The PSMS redundancy, independence, testability, qualification, quality and life cycle descriptions of Subsection 2.5.1 are also applicable to the information systems important to safety within the PSMS. The PCMS redundancy, qualification and quality descriptions applicable to the information systems important to safety are as described in Subsection 2.5.5.~~

The PAM variables are identified in Table 2.5.4-1, and the alarms for the credited manual actions are identified in Table 2.5.4-3.

1. PAM variables as identified in Table 2.5.4-1, BISI, SPDS information, and plant alarms for credited manual actions as identified in Table 2.5.4-3, for information systems important to safety, are provided on safety and non-safety HSI equipment at the MCR, RSR, TSC, and EOF, as shown in Figure 2.5.4-1.

2. Deleted.

RMA

A

B

C

D

E

F

G

Figure 2: Example ITAAC Table Markup

Table 2.5.4-2 Information Systems Important to Safety Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. PAM variables as identified in Table 2.5.4-1, BISI, SPDS information, and plant alarms for credited manual actions as identified in Table 2.5.4-3, for information systems important to safety, are provided on safety and non-safety HSI equipment at the MCR, RSR, TSC, and EOF, as shown in Figure 2.5.4-1.~~Information systems important to safety (PAM, BISI, alarms, SPDS) are appropriately displayed and alarmed in the MCR, RSR, TSC and EOF, as appropriate.~~	1. An inspection ~~A test~~ will be performed of the MCR, RSR, TSC and EOF facilities ~~to demonstrate alarm, display and control capabilities~~ for retrievability of alarms and displays for information systems important to safety.	1. Displays for PAM variables identified in Table 2.5.4-1, BISI, SPDS, and plant alarms for credited manual actions as identified in Table 2.5.4-3, for information systems important to safety, can be retrieved on non-safety HSI equipment~~The as-built information systems important to safety (PAM, BISI, alarms, SPDS) are appropriately displayed and alarmed~~ in the as-built MCR, RSR, TSC and EOF, ~~as appropriate~~ as shown in Figure 2.5.4-1. Displays for PAM variables as identified in Table 2.5.4-1 and alarms for credited manual actions as identified in Table 2.5.4-3, for information systems important to safety, can be retrieved on safety HSI equipment in the as-built MCR and RSR, as shown in Figure 2.5.4-1.
2. Deleted.~~Information and controls for credited manual operator actions are provided in the MCR.~~	2. Deleted.~~A test of the as-built PSMS and PCMS will be performed.~~	2. Deleted.~~The information and controls for credited manual operator actions are provided in the as-built MCR.~~
3. The field instrumentation for the PAM variables identified in Table 2.5.4-1 ~~as being~~ that is ~~qualified for~~subjected to a harsh environment ~~is designed to~~ can withstand the environmental conditions that would exist before, during, and following a design basis ~~event~~ accident without loss of safety function for the time required to perform the safety function.	3.i Type tests, ~~and/or analyses,~~ or a combination of type tests and analyses using the design environmental conditions, or under conditions which bound the design environmental conditions, will be performed on the field instrumentation for the PAM variables identified in Table 2.5.4-1~~located in a~~ that is subjected to a harsh environment.	3.i A report exists and ~~The results of the type tests, and/or analyses~~concludes that the field instrumentation for the PAM variables identified in Table 2.5.4-1 ~~as being~~ that is subjected to ~~qualified for~~ a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident~~event~~ without loss of safety function for the time required to perform the safety function.

Section 2.2 is Incomplete.

Pages that have been withheld from Public Disclosure under 10 CFR 2.390 have been deleted from this handout.

2.2 STRUCTURAL AND SYSTEMS ENGINEERING

~~This section addresses four matters related to structural and systems engineering: (1) building structures, (2) protection against hazards, (3) system structural design, and (4) the generic and specific system ITAAC.~~ A

2.2.1 Building Structures Design Description

~~The scope of the US-APWR standard design of the buildings and structures are described in Section 1.2. The~~ US-APWR standard plant ~~safety-related~~ structures are ~~comprised of~~ the reactor building (R/B), ~~that~~ which includes the prestressed concrete containment vessel (PCCV) and ~~the~~ containment internal structure~~s on a common basemat~~, ~~and~~ two power source buildings (PS/Bs), power source fuel storage vaults (PSFSVs), auxiliary building (A/B), turbine building (T/B), access building (AC/B), and essential service water pipe tunnel (ESWPT). The ~~design descriptions of each building and structure are described herein, and its~~ seismic classifications for these structures are provided in Table 2.2-1. B

~~The critical building dimensions are described in Figures 2.2-1 and 2.2-2. The definition of concrete thicknesses, column line locations, floor elevations, and radiation shielding capability for the safety-related structures are provided in Table 2.2-2 and Figures 2.2-3 through 2.2-13.~~ C

~~The safety-related~~Seismic Category I structures are designed and constructed to withstand design-basis loads ~~as specified in the design description~~ without loss of structural integrity ~~and the safety-related functions~~. ~~The d~~Design basis loads are ~~as follows~~: D

- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, ~~and~~ equipment loads, ~~including~~ hydrodynamic loads, temperature, and equipment vibration) E
- External events (including rain, snow, flood, tornado, tornado generated missiles, and earthquake) F
- Internal events (including flood, pipe rupture, equipment failure, and equipment failure generated missiles). G

2.2.1.1 Reactor Building (R/B)

The R/B has five main floors. ~~The building~~ and contains the PCCV near its center. ~~and is~~ The R/B and PCCV are founded on a reinforced concrete common basemat, which is isolated from adjacent A/B, T/B, and PS/B basemats. The outer perimeter of the R/B is rectangular, but its inner perimeter is circular to conform to the cylindrical PCCV. ~~and is~~ The R/B roof, outer walls, and floor slabs are constructed of reinforced concrete ~~walls, floors, and roofs~~. ~~The basemat is a reinforced concrete structure isolated from the adjacent A/B, the PS/Bs, and the T/B.~~ H

~~The R/B consists of the following five areas and is designed according to the following functions:~~ I

- The PCCV ~~facility is comprised of~~ includes the containment vessel, internal structure, and the ~~annulus enclosing the~~ containment penetration area annulus ~~, and~~ to provide~~s~~ an efficient leak-tight barrier and environmental radiation protection under all postulated design basis conditions, including LOCA. ~~The PCCV is a prestressed concrete structure designed to endure the peak pressure for LOCA, and steamline and feedline break conditions.~~ I1 J
- ~~The safety system pump areas are located at the lowest level of the R/B to secure the required net positive suction head. Four redundant safety systems containing radioactive material are located in each zone of the four quadrants surrounding the containment structure. The safety system heat exchangers are located at the floor elevation above the pump room.~~ K
- ~~The fuel storage and handling area is located at the same level of the R/B as the PCCV operating floor, and houses the following facilities:~~ L
  - ~~Fuel handling machine~~
  - ~~Fuel transfer system~~
  - ~~Cask pit with the spent fuel cask handling crane~~
  - ~~New fuel storage pit~~
  - ~~Cask washdown pit~~
  - ~~Spent fuel pit~~
  - ~~Fuel inspection pit~~
- ~~The main steam and feedwater piping areas are located in the R/B, and between the PCCV and the T/B. The piping rooms are located on the top floor of this area where they pass between the PCCV and the T/B.~~ M
- ~~The safety-related electrical area has two floors and is located in the R/B below the main steam and feedwater areas. This area is a non-radioactive zone and is completely separated from the radioactive zones of the R/B. This area houses the following safety-related facilities:~~ N
  - ~~Main control room~~
  - ~~Switchgear and batteries~~
  - ~~I&C cabinet room~~

~~The finished grade level is located at the elevation of 2'-7". The embedment depth of the R/B (from the top of the basemat to the finished grade) is 28'-11".~~ O

2.2.1.2 Prestressed Concrete Containment Vessel (PCCV)

The ~~geometric shape of the~~ PCCV is a vertically oriented cylindrical~~er~~ structure topped by a hemispherical dome. The structural form transitions from a cylinder to a dome P

without the use of a ~~with no~~ ring girder ~~at the dome/cylinder interface~~. The PCCV shell is constructed of reinforced concrete, pre-stressed by use of un-bonded tendons, and has the capacity to accept limiting design basis temperature and pressure loads while retaining design margin to inelastic deformation.

~~The PCCV consists of a prestressed concrete shell containing unbonded tendons and reinforcement steel. Prestressing is obtained through post-tensioning – a method of prestressing in which tendons are tensioned after concrete has hardened. Reinforcing steel is provided overall in the cylinder and dome. Additional reinforcement is provided at discontinuities such as the cylinder-basemat interface, around penetrations and openings, at buttresses, and at other areas.~~ P1 Q

The ~~concrete shell~~ PCCV inner surface is lined with SA-516 grade 60 or equivalent ~~a minimum 1/4-in.~~ carbon steel plate, which ~~that~~ is anchored to the concrete shell and dome by concrete embedments to form ~~provide the required~~ a leaktight pressure boundary ~~leak tightness~~. The liner plate ~~system~~ is not credited ~~designed or considered as a~~ in structural design ~~member in providing for the overall PCCV~~ load capacity calculations~~resistance~~. ~~The liner plate system is attached to the PCCV shell with an anchorage system.~~ R

~~The design pressure is 68 pounds per square inch, gauge (psig). The structural integrity test pressure condition is 1.15 times the design pressure. The accident pressure cited above includes a 10% margin above the accepted peak calculated containment pressure following LOCA, or a steam or feedwater line break. External or internal events such as containment spray actuation may induce a negative pressure on the PCCV. Therefore, in addition to the design-basis accident pressure, the PCCV is designed for an external pressure of 3.9 psig.~~ S T T1

~~During normal operation, a linear temperature gradient across the containment wall thickness develops. After a LOCA, however, the sudden increase in temperature in the liner and adjacent concrete produces a nonlinear transient temperature gradient. The temperature versus time is considered when combining with the accident pressure in the specified load combinations, and the worst-case temperature gradients in the structure are used in the thermal analyses.~~ U

~~The operating-basis earthquake (OBE) sets at maximum 1/3 of the safe-shutdown earthquake (SSE) ground motion. Certain structural elements of the containment are evaluated for fatigue resulting from the one-third of SSE induced stress cycles.~~ V

~~The crane or other attachment loads, hydrodynamic, pressures from soil, and flooding are also investigated in the overall design and also for local effects.~~ W

~~For thermal loads, the effect of concrete cracking is considered in developing the internal forces and moments in the section.~~ X

~~The liner plate is not designed or analyzed as a strength structural element.~~ The minimum concrete design compressive strengths (f'c) for the PCCV and basemat are ~~is~~ 6000 psi~~. The minimum concrete design compressive strength (f'c) for the basemat is~~ and 4000 psi, respectively. Y

~~The steel liner plate is designed as SA-516 grade 60 or equivalent material, 1/4-inch minimum thickness.~~ Z

~~All tendons are un-bonded (un-grouted) and have the capability to be de-tensioned and re-tensioned to a higher value, and have a wire or strand removed after de-tensioning during a tendon surveillance operation.~~ AA

~~The ultimate~~ PCCV internal pressure load capacity calculation for ~~the PCCV~~ is ~~estimated~~ based on the cumulative yield strength of steel structural elements, ~~materials~~ such as concrete reinforcement bars~~rebars,~~ and pre-stressing tendons~~, and liner plate~~. BB

2.2.1.3 Containment Internal Structures

~~Containment~~PCCV internal structures include ~~the PCCV, but not part of the containment pressure boundary,~~ Steel Concrete (SC) modules and provide support ~~of the~~ for reactor coolant system (RCS) components ~~and related piping systems and equipment~~. ~~Steel concrete (~~SC~~)~~ module walls provide radiation shielding as well as sub-compartments within the PCCV. ~~Table 2.2-4 provides the ITAAC requirements and acceptance criteria for the special modular construction techniques to be utilized for the fabrication, shipping, handling, and installation of the SC modules, and the reconciliation of the as-built configuration of the plant with the structural design basis of the licensed facility.~~ CC DD EE

~~The reactor vessel support system consists of eight steel support pads which are integrated with the inlet and outlet nozzle forgings. The support pads are placed on support brackets, which are supported by steel structure around the reactor vessel. The support system is designed for operating and accident load cases caused by seismic and postulated pipe rupture, including LOCA.~~ FF

~~Each steam generator is supported by three lateral supports: 1) an upper lateral support structure, 2) an intermediate lateral support structure and 3) a lower lateral support structure, and support columns.~~ GG

~~The reactor coolant pump support system consists of a lateral support structure, and support columns.~~ HH

~~The pressurizer is supported by an upper support structure and lower support skirt.~~ II

~~The reactor vessel is located at the center of the PCCV. A cylindrical SC module wall referred to as the primary shield wall is connected with the refueling cavity.~~ JJ

~~The primary shield wall also serves as the support point for the reactor vessel. The primary shield wall and other walls inside PCCV are fabricated as SC module walls.~~ KK

~~The secondary shield walls surround the primary loops from the steam generator compartments. These SC module walls also form supports for intermediate floors and the operating floors.~~ LL

~~The refueling cavity is located inside the PCCV, and connects to the fuel transfer tube that penetrates the north end of the PCCV. The walls of the refueling cavity are formed by SC modules lined with stainless steel over the carbon steel plate (Clad steel).~~ MM

~~The refueling water storage pit (RWSP) is located at the lowest level of the PCCV. The RWSP is formed by wall of SC module using clad steel.~~ NN

~~The containment internal structure includes several sub-compartments designed to provide containment, radiation shielding, and protection of safety-related components. These compartments are formed by a series of SC and/or reinforced concrete structures.~~ OO

~~An internal polar crane is supported by the PCCV.~~ PP

~~Structural steel framing within the PCCV is primarily for support of equipment, distribution systems, and access platforms. All structural steel are capable of resisting loads and load combinations to which they may be subjected.~~ QQ

2.2.1.4 Power Source Buildings (PS/Bs)

The ~~seismic Category I~~ two PS/Bs are ~~arranged~~ located immediately adjacent to the R/B. These ~~buildings~~ are freestanding buildings founded on ~~a~~ separate reinforced concrete basemats~~.~~ .~~Each building contains two identical emergency power sources and one alternate ac power source which are separated from each other by a physical barrier. In addition, the safety-related essential chilled water system (ECWS) chillers are also located in these buildings.~~ RR RR1

~~The finished grade level is located at the elevation of 2'-7". The embedment depth of the PS/Bs (from the top of the basemat to the finished grade) is 28'-11".~~ SS

2.2.1.5 Power Source Fuel Storage Vaults (PSFSVs)

The PSFSVs ~~is an underground structure constructed with~~ are reinforced concrete structures~~, and is classified as seismic Category I. The vaults~~ that contain the fuel ~~oil~~ tanks ~~of~~ for the emergency power ~~sources~~ generators. TT

2.2.1.6 Essential Service Water Pipe Tunnel (ESWPT)

The ESWPT is ~~an underground structure constructed with~~ a reinforced concrete structure ~~, and is classified as seismic Category I. Terminating in part under the~~that runs from beneath the T/B to beneath the ultimate heat sink related structure (UHSRS). ~~, t~~The ~~structure~~ ESWPT is isolated from other structures to prevent ~~any~~ seismic structural interaction.~~ The other termination point is located at the ultimate heat sink related structure (UHSRS) that connects to the ultimate heat sink (UHS) water.~~ UU

2.2.1.7 Auxiliary Building (A/B)

The A/B is located immediately adjacent to the R/B~~,~~ and is ~~designed as a seismic Category II structure to assure that there is no negative impact on nearby seismic Category I SSCs. The basemat is~~ founded on a separate reinforced concrete ~~structure independent of the nearby seismic Category I~~ basemat~~s~~. ~~The structure consists of reinforced concrete walls, floors, and roofs.~~ VV

2.2.1.8 Turbine Building (T/B)

The T/B is located adjacent to the R/B~~,~~ and is ~~designed as a seismic Category II structure to assure that there is no negative impact on nearby Category I SSCs. The basemat is~~ founded on a separate reinforced concrete ~~structure independent of the nearby seismic Category I~~ basemat~~s~~. ~~The structure consists of structural steel and supporting reinforced concrete walls, floors, and roofs on a common basemat separated from the turbine generator pedestal.~~ WW

2.2.1.9 Access Building (AC/B)

The AC/B is located adjacent to the A/B. ~~The AC/B houses the access control area, and the chemical sampling and laboratory area.~~ XX

2.2.2 Protection Against Hazards

~~2.2.2.1 External Flooding~~

~~Protection against external flooding is provided to preserve the safe shutdown capability. The main components protected against external flooding are listed in Table 2.2-3. The external walls that are below flood level are adequate thickness to protect against water seepage, and penetrations in the external walls below flood level are provided with flood protection features. Construction joints in the exterior walls and base mats are provided with water stops to prevent seepage of ground water. Additional protection is provided using a waterproofing system applied to below-grade surfaces.~~ YY

~~2.2.2.2 Internal Flooding~~

~~Protection against internal flooding is provided to preserve the safe shutdown capability. The main components protected against internal flooding are listed in Table 2.2-3.~~ ZZ

~~Elevation -26 ft, 4 in. in radiological controlled area (RCA) of the R/B is divided into two~~four ~~areas, by concrete walls and water-tight doors. A water-tight door is provided in each CS/RHR pump room and SIS pump room. And also water-tight doors are provided in doorways between A/B and R/B.~~ AAA

~~Elevation -26 ft, 4 in. in the non-radiological controlled area (NRCA) of the R/B is divided into two areas by concrete walls and water-tight doors installed in the corridor. The two trains of four emergency feedwater pump rooms are isolated by concrete walls and water-tight doors. Water-tight doors are provided in doorways at ground level between the T/B and the R/B.~~ BBB

~~2.2.2.3~~ ~~Fire Barriers~~

~~Redundant safe shutdown components and associated electrical divisions outside the containment and the control room complex are separated by 3-hour rated fire barriers to preserve the capability to safely shut down the plant following a fire. The main components protected against fires are listed in Table 2.2-3. The 3-hour rated fire barriers are placed as required by the fire hazard analysis (FHA). All penetrations and openings through the fire barriers are protected with 3-hour rated components (i.e. fire doors in door openings, fire dampers in ventilation duct openings, and penetration seals).~~ CCC

~~2.2.2.3 Site Parameters~~

~~Section 2.1 contains specific site parameter requirements necessary to meet the engineering and design needs for construction and operation of the US-APWR standard plant. Site bounding parameters, and subsequent engineering design, are chosen to allow construction of the US-APWR within 75% to 80% of the landmass of the conterminous U.S. and includes all possible sites under current consideration. The design of the US-APWR standard plant and the site parameters are robust to meet most conditions expected to be encountered in all possible sites.~~ DDD

~~The COL application and Final Safety Analysis Report (FSAR) are to provide information concerning the geological, seismological, hydrological, environmental, and meteorological characteristics of the site and vicinity, in accordance with present and projected population distribution including land use relative to site activities and controls. The COL application and FSAR are to report on the COL specific site information as compared to the design envelope criteria required for construction and operation of the US-APWR standard plant. Site-specific characteristics that have influenced plant design and operating criteria are discussed to show the adequacy of the site characteristics from a safety viewpoint. Applicable regulatory requirements are to be identified, and discussions of how these regulatory requirements are met for the site envelope characteristics.~~ EEE

2.2.2.~~5~~1 Internally Generated Missiles (Inside and Outside Containment)

~~Factors contributing to~~ One or more of the following methods provide missile protection ~~of potentially targeted~~ for safety-related SSCs ~~are provided by one or more of the following methods~~: FFF

- Locating the system or component in a missile-proof structure
- Separating redundant systems or components ~~for the missile path or range~~
- ~~Providing l~~Local missile shields and barriers ~~for systems and components~~
- Designing the ~~equipment~~ system or component to withstand the impact of the most damaging missile
- ~~Providing design features to p~~Preventing ~~the~~ missile generation ~~of missiles~~
- Favorably ~~O~~orienting missile sources ~~to prevent missiles from striking safety-related equipment~~
- ~~Missile barriers are designed if the ability to achieve and maintain safe shutdown is not determined.~~

~~Table 2.2-4 provides the ITAAC requirements and acceptance criteria for SSCs that require physical missile protection from any credible internal missiles inside and outside the containment.~~ FFF1

2.2.3 System Structural Design

~~The location, safety classification, quality group, seismic classification, and code requirements for systems and components that are important to safety, affect safety and/or support safety functions are provided in the subsections of specific systems. Table 2.2-4 provides the ITAAC requirements and acceptance criteria for SSCs.~~ GGG

2.2.3.1 Piping Systems and Components

HHH

~~Details~~ITAAC for ASME Code, Section III piping systems and components are ~~discussed~~ provided in Section 2.3~~, Piping Systems and Components, for structural information pertaining to piping systems and components~~. This section also describes design considerations and related ITAAC to verify that safety-related SSCs can withstand the dynamic effects of pipe breaks.

III

JJJ

~~2.2.3.2 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment~~

~~The safety-related mechanical and electrical equipment, including instrumentation, and, where applicable, their supports classified as seismic Category I are demonstrated to be capable of performing their intended safety-related functions under the full range of normal and accident loadings, including seismic. This includes equipment in the reactor protection system (RPS), engineered safety feature (ESF), Class 1E electrical equipment, the emergency power system, and all auxiliary safety-related systems and supports.~~

KKK

~~Test and/or Analysis are used for the seismic Category I active mechanical equipment to maintain structural integrity (including pressure retention), and operability. The methods used assure equipment functionality and operability for its intended function under all required plant conditions. Seismic Category I active mechanical equipment is designed to withstand seismic and dynamic loads.~~

LLL

~~Either testing or a combination of test and analysis demonstrates seismic qualification of seismic Category I instrumentation and electrical equipment. Type testing can be utilized on a sample of equipment representing a generic group that are similar in materials, design, and manufacturing and are in accordance with the manufacture's quality control system and specifications for production units. The tested equipment is subjected to environmental and operating cycles that simulate the intended service conditions and safety-related functions for which they are to be qualified.~~

MMM

~~2.2.3.3 Seismic Margin Analysis~~

~~SSCs that require evaluation in the seismic fragilities task of a seismic margin analysis have sufficient seismic margin.~~

NNN

1. The structural configuration of the R/B and each PS/B are as described in the Design Description of Subsection 2.2.1 and in Table 2.2-2, and as shown in Figures 2.2-1 through 2.2-13.

OOO

2. Deleted.

PPP

3. The PCCV retains structural integrity at the design pressure of 68 psig.

QQQ

4.a. The integrated containment system barrier prevents the release of fission products to the atmosphere.

RRR

SSS

4.b. The containment system barrier penetrations prevent the release of fission products to the atmosphere.

5. The PCCV can withstand design-basis loads. TTT

6. The seismic Category I standard plant buildings, other than the PCCV, can withstand design-basis loads. UUU

7. Deleted. VVV

8. Deleted. WWW

9. Divisional flood barriers are provided in the R/B and each PS/B to protect against internal flooding. XXX

10. Water-tight doors are provided in the R/B and each PS/B to protect against internal flooding. YYY

11. Penetrations in the divisional walls of the R/B and the PS/B rooms (other than water-tight doors) that are installed at or below the internal design flood level, are fitted with water-tight seals. ZZZ

12. Safety-related electrical, instrumentation, and control equipment in the R/B and each PS/B is located above the internal design flood level. AAAA

13. For the R/B and each PS/B, external walls below flood level are a minimum of two feet thick to protect against external flooding. BBBB

14. Penetrations in the external flood barrier walls of the R/B and each PS/B, as shown in Figures 2.2-14 through 2.2-25, that are at or below design basis flood level, are fitted with water-tight seals to protect against external flooding. CCCC

15. Deleted. DDDD

16. Deleted. EEEE

17. Redundant safe shutdown components and associated electrical divisions outside the containment and the control room complex are separated by 3-hour rated fire barriers to preserve the capability to safely shutdown the plant following a fire. FFFF

18.a. Penetrations and openings through fire barriers are protected against fire. GGGG

18.b. Ventilation ducts that penetrate fire barriers are protected by fire dampers. GGGG1

19. Deleted. HHHH

20. Deleted. IIII

21. Safety-related SSCs are protected from any credible internal missile sources inside and outside the containment. JJJJ

22. Deleted. KKKK

23. The failure of seismic Category II structures will not impair the ability of safety-related SSCs to perform their safety-related functions. LLLL

24. SSCs that require evaluation in the seismic fragilities task of a seismic margin analysis have high confidence of low probability of failure (HCLPF) values equal to or greater than the review level earthquake. MMMM

2.2.4 Inspection, Tests, Analyses, and Acceptance Criteria

NNNN

~~The ITAAC for structures and systems are divided into building structures, system structural design, and protection against hazards with generic and specific ITAAC. The generic ITAAC apply to the building structures listed in Table 2.2-1 and Figures 2.2-3 through 2.2-13. A specific ITAAC applies to the verification that the failure of the indicated non-seismic and seismic Category II structures will not impair the ability of near-by safety-related SSCs to perform their safety-related functions. The system-specific ITAAC apply to certain parts, sections, or SSCs of specific systems that interact with structures. The ITAAC for specific piping systems and component design are located in their respective piping system sections, such as Section 2.3, and are cross-referenced within the Table 2.2-4. The ITAAC associated with specific external and internal environmental hazards are addressed specifically within Table 2.2-4. The following top-level specific structure and system parameters are included as ITAAC to assure plant safety~~:

- ~~Pressure boundary integrity~~
- ~~Normal loads~~
- ~~Seismic loads~~
- ~~Flood, wind and tornado~~
- ~~Rain and snow~~
- ~~Pipe rupture~~
- ~~Codes and standards~~

Table 2.2-4 describes the ITAAC for structural and systems engineering.

Table 2.2-1 Seismic Classification of Structures (Note 1)

Structure	Seismic Category (Note 1)
Reactor Building (R/B)	I
Prestressed Concrete Containment Vessel (PCCV)	I
Containment Internal Structure	I
Power Source Building (PS/B)	I
Power Source Fuel Storage Vault (PSFSV)	I (Note 2)
Essential Service Water Pipe Tunnel (from/to UHS) (ESWPT)	I (Note 2)
Auxiliary Building (A/B)	II
Turbine Building (T/B)	II
Access Building (AC/B)	NS

NOTES:

1. Seismic Category I (I)
   Seismic Category II (II)
   Non-seismic (NS)

2. Designed to Seismic Category I codes and standards, but final structural design is based on site-specific requirements.

Table 2.2-2 Definition of Wall Thicknesses for ~~Safety-Related~~Seismic Category I Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 1 of 15)

Wall or Section Description	Column Lines[1]	Floor Elevation or Elevation Range[1]	Concrete Thickness[2][3]	Applicable Radiation Shielding Wall (Yes/No)
~~**Prestressed Concrete Containment Vessel**~~				
~~Cylindrical wall of PCCV~~	~~Not Applicable~~	~~From 3'-7" to 153'-9"~~	~~4'-4"~~	~~Yes~~
~~Hemispherical wall of PCCV~~	~~Not Applicable~~	~~From 153'-9" to 232'-0"~~	~~3'-8"~~	~~Yes~~
~~Basemat of PCCV~~	~~Disk--shaped portion within a 74'-7" radius from the center of the PCCV~~	~~From -36'-3" to 1'-11"~~	~~38'-2"~~	~~No~~
~~Basemat of PCCV~~	~~Portion outside a 74'-7" radius from the center of the PCCV~~	~~From -36'-3" to 3'-7"~~	~~39'-10"~~	~~No~~
Containment Internal Structure (Primary Shield Wall, Secondary Shield Wall, Steam Generator Compartments, Pressurizer Compartment, Refueling Water Storage Pit, Refueling Cavity, etc)				
Primary Shield Wall	Not Applicable	From -12'-6" to 35'-11"	9'-2"	Yes
Secondary Shield Wall	Not Applicable	From 3'-7" to 97'-9"	4'-0"	Yes
Secondary Shield Wall	Not Applicable	From 97'-9" to 112'-0"	4'-0"	Yes
Pressurizer Compartment	Not Applicable	From 58'-5" to 112'-4"	4'-0"	Yes
Pressurizer Compartment	Not Applicable	From 112'-4" to 139'-6"	3'-0"	Yes
Refueling Cavity	Not Applicable	From 34'-5" to 76'-5"	4'-8"	Yes
North side of Refueling Cavity	Not Applicable	From 34'-5" to 76'-5"	5'-7"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I ~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 2 of 15)

Wall or Section Description	Column Lines[1]	Floor Elevation or Elevation Range[1]	Concrete Thickness[2][3]	Applicable Radiation Shielding Wall (Yes/No)
Refueling Water Storage Pit Wall	Not Applicable	From 1'-11" to 21'-11"	3'-3"	Yes
North side of floor	Not Applicable	25'-3"	3'-4"	No
South side of floor	Not Applicable	25'-3"	3'-4"	Yes
East side of floor	Not Applicable	25'-3"	4'-3"	No
West side of floor	Not Applicable	25'-3"	4'-3"	No
Floor	Not Applicable	50'-2"	1'-4"	Yes
Floor	Not Applicable	76'-5"	2'-0"	No
Reactor Building				
Fuel Storage and Handling Area (Spent Fuel Pit, New Fuel Pit, Cask Pit, Cask Washdown Pit, Fuel Inspection Pit)				
Column Line AR wall	From 1R to 2aR	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line AR wall	From 2aR to 4R	From -26'-4" to -8'-7"	4'-0"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 3 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line AR wall	From 2aR to 4R	From -8'-7" to 3'-7"	3'-8"	Yes
Column Line AR wall	From 4R to 13'-2" east of 6aR	From -26'-4" to 3'-7"	3'-8"	Yes
Column Line AR wall	From 13'-2" east of 6aR to 8R	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line AR wall	From 8R to 6'-8" east of 8aR	From -26'-4" to 3'-7"	4'-0"	Yes
Column Line AR wall	From 6'-8" east of 8aR to 11R	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line AR wall	From 1R to 2aR	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line AR wall	From 2aR to 4R	From 3'-7" to 25'-3"	3'-8"	Yes
Column Line AR wall	From 4R to 9'-4" east of 6aR	From 3'-7" to 25'-3"	7'-9"	Yes
Column Line AR wall	From 9'-4" east of 6aR to 11R	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line AR wall	From 1R to 2aR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line AR wall	From 2aR to 4R	From 25'-3" to 50'-2"	5'-9"	Yes
Column Line AR wall	From 4R to 5aR	From 30'-1" to 76'-5"	7'-9"	Yes
Column Line AR wall	From 6R to 9'-4" east of 6aR	From 27'-4" to 76'-5"	7'-9"	Yes
Column Line AR wall	From 9'-4" east of 6aR to 11R	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line AR wall	From 1R to 8'-3" east of 2bR	From 50'-2" to 76'-5"	3'-4"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 4 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line AR wall	From 5aR to 6R	From 50'-2" to 76'-5"	7'-9"	Yes
Column Line AR wall	From 9'-4" east of 6aR to 6'-8" east of 8R	From 48'-3" to 76'-5"	6'-10"	Yes
Column Line AR wall	From 6'-8" east of 8R to 11R	From 50'-2" to 76'-5"	3'-4"	Yes
Column Line AR wall	From 1R to 7'-1" east of 2bR	From 76'-5" to 101'-0"	3'-4"	Yes
Column Line AR wall	From 7'-1" east of 2bR to 11R	From 76'-5" to 154'-6"	1'-9"	Yes
Column Line 1R wall	From AR to CR	From -26'-4" to 50'-2"	3'-4"	Yes
Column Line 1R wall	From AR to CR	From 50'-2" to 76'-5"	2'-8"	Yes
Column Line 1R wall	From AR to CR	From 76'-5" to 101'-0"	2'-4"	Yes
Column Line 11R wall	From AR to CR	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line 11R wall	From A2R to CR	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line 11R wall	From AR to CR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line 11R wall	From AR to CR	From 50'-2" to 76'-5"	3'-4"	Yes
Column Line 11R wall	From AR to CR	From 76'-5" to 125'-8"	3'-4"	Yes
Column Line 11R wall	From AR to CR	From 125'-8" to 154'-6"	2'-0"	Yes
Floor	From AR to CR and 1R to 11R	-26'-4"	9'-11"	No

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 5 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Safety System Pumps Areas				
Column Line CR wall	From 1R to 2R	From -26'-4" to -8'-7"	3'-4"	No
Column Line CR wall	From 2R to 4bR	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line CR wall	From 8R to 10R	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line CR wall	From 10R to 11R	From -26'-4" to -8'-7"	3'-4"	No
Column Line CR wall	From 2R to 3'-4" east of 4aR	From 3'-7" to 15'-9"	3'-10"	Yes
Column Line CR wall	From 2R to 3'-4" east of 4aR	From 15'-9" to 25'-3"	3'-2"	Yes
Column Line CR wall	From 3'-4" east of 4aR to 10'-1" east of 8R	From 3'-7" to 25'-3"	3'-2"	Yes
Column Line CR wall	From 10'-1" east of 8R to 11R	From 3'-7" to 25'-3"	3'-10"	Yes
Column Line CR wall	From 1R to 4bR	From 25'-3" to 50'-2"	3'-2"	Yes
Column Line CR wall	From 4bR to 10'-5" east of 4bR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line CR wall	From 10'-5" east of 4bR to 6aR	From 25'-3" to 50'-2"	3'-10"	Yes
Column Line CR wall	From 6aR to 7aR	From 25'-3" to 50'-2"	3'-8"	Yes
Column Line CR wall	From 7aR to 2'-4" east of 8aR	From 25'-3" to 50'-2"	3'-2"	No
Column Line CR wall	From 2'-4" east of 8aR to 11R	From 25'-3" to 50'-2"	2'-0"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 6 of 15)

Wall or Section Description	Column Lines[1]	Floor Elevation or Elevation Range[1]	Concrete Thickness[2]	Applicable Radiation Shielding Wall (Yes/No)
Column Line CR wall	From 1R to 8'-3" east of 2bR	From 50'-2" to 76'-5"	2'-6"	Yes
Column Line CR wall	From 1R to 2R	From 76'-5" to 101'-0"	2'-8"	No
Column Line CR wall	From 3'-9" east of 2bR to 4bR	From 76'-5" to 101'-0"	2'-8"	Yes
Column Line CR wall	From 3'-9" east of 2bR to 4bR	From 101'-0" to 154'-6"	1'-9"	Yes
Column Line CR wall	From 4bR to 11R	From 76'-5" to 154'-6"	1'-9"	Yes
Column Line JR wall	From 1R to 5R	From -26'-4" to 3'-7"	3'-8"	Yes
Column Line JR wall	From 7R to 11R	From -26'-4" to 3'-7"	3'-8"	Yes
Column Line JR wall	From 1R to 11R	From 3'-7" to 26'-11"	3'-8"	Yes
Column Line JR wall	From 1R to 11R	From 26'-11" to 50'-2"	3'-4"	Yes
Column Line JR wall	From 1R to 5R	From 50'-2" to 76'-5"	3'-4"	No
Column Line JR wall	From 5R to 7R	From 50'-2" to 65'-0"	3'-4"	No
Column Line JR wall	From 7R to 11R	From 50'-2" to 76'-5"	3'-4"	No
Column Line JR wall	From 1R to 5R	From 76'-5" to 101'-0"	3'-4"	No
Column Line JR wall	From 7R to 11R	From 76'-5" to 101'-0"	3'-4"	No
Column Line 1R wall	From CR to JR	From -26'-4" to 3'-7"	3'-4"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 7 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 1R wall	From CR to 12'-7" south of D2R	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line 1R wall	From 12'-7" south of D2R to 10'-8" south of GR	From 3'-7" to 17'-8"	3'-4"	Yes
Column Line 1R wall	From 12'-7" south of D2R to 10'-8" south of GR	From 17'-8" to 25'-3"	4'-2"	Yes
Column Line 1R wall	From 10'-8" south of GR to JR	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line 1R wall	From CR to 11'-11" south of D2R	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line 1R wall	From 11'-11" south of D2R to 11'-4" south of GR	From 25'-3" to 42'-4"	3'-4"	Yes
Column Line 1R wall	From 11'-11" south of D2R to 11'-4" south of GR	From 42'-4" to 50'-2"	4'-2"	Yes
Column Line 1R wall	From 10'-8" south of GR to JR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line 1R wall	From CR to 15'-7" south of HR	From 50'-2" to 76'-5"	2'-8"	Yes
Column Line 1R wall	From 15'-7" south of HR to JR	From 50'-2" to 76'-5"	3'-4"	No
Column Line 1R wall	From CR to JR	From 76'-5" to 101'-0"	2'-4"	Yes
Column Line 2R wall	From CR to 8'-7" south of CR	From -26'-4" to -8'-7"	3'-4"	Yes
Column Line 2R wall	From 17'-7" south of CR to 6'-10" south of D2R	From -26'-4" to -8'-7"	2'-8"	Yes
Column Line 2R wall	From 16'-5" south of GR to 15'-7" south of HR	From -26'-4" to -8'-7"	2'-8"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 8 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 2R wall	From 4'-1" south of H1R to JR	From -26'-4" to 3'-7"	5'-0"	Yes
Column Line 2R wall	From CR to 6'-10" south of D2R	From -8'-7" to 3'-7"	3'-4"	Yes
Column Line 2R wall	From 16'-5" south of GR to 4'-1" south of H1R	From -8'-7" to 3'-7"	3'-4"	Yes
Column Line 2R wall	From CR to DR	From 3'-7" to 25'-3"	3'-10"	Yes
Column Line 2R wall	From DR to ER	From 3'-7" to 25'-3"	3'-6"	Yes
Column Line 2R wall	From ER to GR	From 3'-7" to 17'-8"	2'-8"	Yes
Column Line 2R wall	From ER to GR	From 17'-8" to 25'-3"	4'-2"	Yes
Column Line 2R wall	From GR to HR	From 3'-7" to 25'-3"	3'-6"	Yes
Column Line 2R wall	From HR to JR	From 3'-7" to 25'-3"	3'-10"	Yes
Column Line 2R wall	From CR to DR	From 25'-3" to 50'-2"	3'-2"	Yes
Column Line 2R wall	From DR to ER	From 25'-3" to 50'-2"	3'-10"	Yes
Column Line 2R wall	From ER to GR	From 25'-3" to 50'-2"	2'-8"	Yes
Column Line 2R wall	From GR to HR	From 25'-3" to 50'-2"	3'-10"	Yes
Column Line 2R wall	From HR to H1R	From 25'-3" to 50'-2"	2'-8"	No
Column Line 2R wall	From CR to H1R	From 50'-2" to 76'-5"	2'-8"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 9 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 2R wall	From CR to DR	From 76’-5” to 101’-0”	2’-8”	No
Column Line 2R wall	From DR to ER	From 76’-5” to 101’-0”	3’-8”	Yes
Column Line 2R wall	From ER to 9’-5” south of G1R	From 76’-5” to 101’-0”	2’-8”	Yes
Column Line 10R wall	From CR to 8’-7” south of CR	From -26’-4” to -8’-7”	3’-4”	Yes
Column Line 10R wall	From 5-9” south of C1R to 11’-3” south of D1R	From -26’-4” to -8’-7”	2’-8”	Yes
Column Line 10R wall	From 16’-5” south of GR to 13’-7” south of HR	From -26’-4” to -8’-7”	2’-8”	Yes
Column Line 10R wall	From 4’-1“ south of H1R to JR	From -26’-4” to 3’-7”	5’-0”	Yes
Column Line 10R wall	From CR to 11’-3” south of D1R	From -8’-7” to 3’-7”	3’-4”	Yes
Column Line 10R wall	From 16’-5” south of GR to 4’-1” south of H1R	From -8’-7” to 3’-7”	3’-4”	Yes
Column Line 10R wall	From CR to DR	From 3’-7” to 25’-3”	3’-10”	Yes
Column Line 10R wall	From DR to ER	From 3’-7” to 25’-3”	3’-6”	Yes
Column Line 10R wall	From ER to GR	From 3’-7” to 17’-8”	2’-8”	Yes
Column Line 10R wall	From ER to GR	From 17’-8” to 25’-3”	4’-2”	Yes
Column Line 10R wall	From GR to HR	From 3’-7” to 25’-3”	3’-6”	Yes
Column Line 10R wall	From HR to JR	From 3’-7” to 25’-3”	3’-10”	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 10 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 10R wall	From CR to DR	From 25'-3" to 50'-2"	2'-8"	No
Column Line 10R wall	From DR to ER	From 25'-3" to 50'-2"	3'-10"	Yes
Column Line 10R wall	From ER to GR	From 25'-3" to 50'-2"	2'-8"	Yes
Column Line 10R wall	From GR to HR	From 25'-3" to 50'-2"	3'-10"	Yes
Column Line 10R wall	From HR to H1R	From 25'-3" to 50'-2"	2'-8"	No
Column Line 10R wall	From CR to H1R	From 50'-2" to 76'-5"	2'-8"	Yes
Column Line 10R wall	From D1R to ER	From 76'-5" to 112'-0"	2'-8"	No
Column Line 10R wall	From ER to GR	From 76'-5" to 101'-0"	2'-8"	Yes
Column Line 10R wall	From GR to H1R	From 76'-5" to 101'-0"	3'-8"	Yes
Column Line 11R wall	From CR to JR	From -26'-4" to 3'-7"	3'-4"	Yes
Column Line 11R wall	From CR to 17'-0" south of D1R	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line 11R wall	From 17'-0" south of D1R to 10'-8" south of GR	From 3'-7" to 17'-8"	3'-4"	Yes
Column Line 11R wall	From 17'-0" south of D1R to 10'-8" south of GR	From 17'-8" to 25'-3"	4'-2"	Yes
Column Line 11R wall	From 10'-8" south of GR to HR	From 3'-7" to 25'-3"	3'-4"	Yes
Column Line 11R wall	From HR to JR	From 3'-7" to 76'-5"	5'-0"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 11 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 11R wall	From CR to 16'-4" south of D1R	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line 11R wall	From 16'-4" south of D1R to 11-4" south of GR	From 25'-3" to 42'-4"	3'-4"	Yes
Column Line 11R wall	From 16'-4" south of D1R to 11-4" south of GR	From 42'-4" to 50'-2"	4'-2"	Yes
Column Line 11R wall	From 11'-4" south of GR to HR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line 11R wall	From CR to HR	From 50'-2" to 76'-5"	2'-8"	Yes
Column Line 11R wall	From D1R to ER	From 76'-5" to 112'-0"	2'-4"	Yes
Column Line 11R wall	From ER to HR	From 76'-5" to 101'-0"	2'-4"	Yes
Column Line 11R wall	From HR to JR	From 76'-5" to 101'-0"	5'-0"	No
Floor	From CR to JR and 1R to 2R	-26'-4"	9'-11"	No
Floor	From CR to JR and 10R to 11R	-26'-4"	9'-11"	No
Floor	From CR to JR and 1R to 2R	3'-7"	2'-8"	No
Floor	From CR to JR and 10R to 11R	3'-7"	2'-8"	No
Floor	From ER to GR and 1R to 2R	25'-3"	3'-10"	Yes
Floor	From ER to GR and 10R to 11R	25'-3"	3'-10"	Yes
Floor	From ER to GR and 1R to 2R	50'-2"	3'-10"	Yes

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 12 of 15)

Wall or Section Description	Column Lines[1]	Floor Elevation or Elevation Range[1]	Concrete Thickness[2]	Applicable Radiation Shielding Wall (Yes/No)
Floor	From ER to GR and 10R to 11R	50'-2"	3'-10"	Yes
Floor	From CR to GR and 1R to 2R	76'-5"	2'-4"	No
Floor	From GR to HR and 1R to 2R	76'-5"	2'-8"	Yes
Floor	From CR to HR and 10R to 11R	76'-5"	3'-4"	Yes
Floor	From CR to GR and 1R to 2R	101'-0"	1'-3"	Yes
Floor	From 4'-0" south of CR to ER and 10R to 11R	112'-0"	1'-3"	Yes
Non-Radiological Control Area				
Column Line LR wall	From 1R to 11R	From -26'-4" to 3'-7"	3'-8"	No
Column Line LR wall	From 1R to 3aR	From 3'-7" to 26'-11"	3'-8"	No
Column Line LR wall	From 3aR to 8bR	From 3'-7" to 25'-3"	3'-8"	No
Column Line LR wall	From 8bR to 11R	From 3'-7" to 26'-11"	3'-8"	No
Column Line LR wall	From 1R to 3aR	From 26'-11" to 50'-2"	3'-4"	No
Column Line LR wall	From 3aR to 8bR	From 25'-3" to 50'-2"	3'-4"	Yes
Column Line LR wall	From 8bR to 11R	From 26'-11" to 50'-2"	3'-4"	No
Column Line LR wall	From 1R to 5R	From 50'-2" to 76'-5"	3'-4"	No

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I ~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 13 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Column Line LR wall	From 5R to 7R	From 50'-2" to 65'-0"	3'-4"	No
Column Line LR wall	From 7R to 11R	From 50'-2" to 76'-5"	3'-4"	No
Column Line LR wall	From 1R to 5R	From 76'-5" to 115'-6"	3'-4"	No
Column Line LR wall	From 5R to 7R	From 65'-0" to 115'-6"	4'-4"	No
Column Line LR wall	From 7R to 11R	From 76'-5" to 115'-6"	3'-4"	No
Column Line 1R wall	From JR to KR	From -26'-4" to 101'-0"	3'-4"	No
Column Line 1R wall	From KR to LR	From -26'-4" to 115'-6"	3'-4"	No
Column Line 11R wall	From JR to KR	From -26'-4" to 101'-0"	3'-4"	No
Column Line 11R wall	From KR to LR	From -26'-4" to 115'-6"	3'-4"	No
Floor	From JR to LR and 1R to 11R	-26'-4"	9'-11"	No
Floor	From JR to LR and 1R to 11R	3'-7"	4'-0"	No
Floor	From JR to LR and 1R to 3R	26'-11"	2'-4"	No
Floor	From JR to LR and 5R to 7R	25'-3"	3'-4"	Yes
Floor	From JR to LR and 9R to 11R	26'-11"	2'-4"	No
Floor	From JR to LR and 1R to 5R	50'-2"	2'-4"	No

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I ~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 14 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Floor	From JR to LR and 5R to 7R	50’-2”	3’-4”	Yes
Floor	From JR to LR and 7R to 11R	50’-2”	2’-4”	No
Floor	From JR to KR and 1R to 5R	76’-5”	2’-4”	No
Floor	From KR to LR and 1R to 5R	76’-5”	4’-4”	No
Floor	From JR to KR and 7R to 11R	76’-5”	2’-4”	No
Floor	From KR to LR and 7R to 11R	76’-5”	4’-4”	No
Floor	From JR to KR and 1R to 5R	101’-0”	2’-4”	No
Floor	From JR to KR and 7R to 11R	101’-0”	2’-4”	No

Table 2.2-2 Definition of Wall Thicknesses for Seismic Category I ~~Safety-Related~~ Structures: ~~Pre-stressed Concrete Containment Vessel,~~ Containment Internal Structure, Reactor Building, and Power Source Building (Sheet 15 of 15)

Wall or Section Description	Column Lines(1)	Floor Elevation or Elevation Range(1)	Concrete Thickness(2)	Applicable Radiation Shielding Wall (Yes/No)
Power Source Buildings				
Column Line AP wall	From 1P to 5P	From -26'-4" to 3'-7"	2'-8"	No
Column Line CP wall	From 1P to 5P	From -26'-4" to 3'-7"	2'-8"	No
Column Line 1P wall	From AP to CP	From -26'-4" to 3'-7"	2'-8"	No
Column Line 5P wall	From AP to CP	From -26'-4" to 3'-7"	2'-8"	No
Column Line AP wall	From 1P to 5P	From 3'-7" to 39'-6"	1'-9"	No
Column Line CP wall	From 1P to 5P	From 3'-7" to 39'-6"	1'-9"	No
Column Line 1P wall	From AP to CP	From 3'-7" to 39'-6"	1'-9"	No
Column Line 5P wall	From AP to CP	From 3'-7" to 39'-6"	2'-8"	No
Floor	From AP to CP and 1P to 5P	-26'-4"	9'-11"	No
Floor	From AP to CP and 1P to 2P	3'-7"	3'-4"	No
Floor	From AP to CP and 2P to 5P	3'-7"	2'-8"	No
Floor	From AP to CP and 1P to 5P	39'-6"	1'-3"	No

NOTES:

1. The column lines and floor elevations are identified and included on Figures 2.2-3 through 2.2-13 ~~2.2-14~~.
2. ~~These wall thicknesses have a construction tolerance of ± 1 inch, except for exterior walls below grade where the tolerance is +12 inches, - 1 inch.~~
3. For walls that are part of structural modules, the concrete thickness also includes the steel face plates.

Table 2.2-3 Main Components Protected against External Floods, Internal Floods and Internal Fires

Safe Shutdown Function	Main Component
Reactivity Control	Safety injection pump
	Emergency letdown line isolation valve
	Safety depressurization valve
RCS Pressure Control	Pressurizer backup heater
	Safety depressurization valve
Decay Heat Removal and RCS Cooling	Emergency feedwater pump
	Main steam depressurization valve
	Containment spray/Residual heat removal pump
	Containment spray/Residual heat removal heat exchanger
	Component cooling water pump
	Essential service water pump
RCS Inventory Control	Safety injection pump

Table 2.2-4 Structural and Systems Engineering Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The structural configuration~~s~~ of the R/B and each PS/B are as described in the Design Description of Subsection 2.2.1 and in Table 2.2-2, and as shown ~~on~~ in Figures 2.2-1 through 2.2-13.	1. Inspections will be performed to verify that ~~of~~ the as-built ~~structural configurations of the~~ R/B and each PS/B conform to the structural configurations as described in the Design Description of Subsection 2.2.1 and in Table 2.2-2, and as shown in Figures 2.2-1 through 2.2-13~~will be performed~~.	1. The as-built R/B and each PS/B conform to the structural configurations as described in the Design Description of Subsection 2.2.1 and in Table 2.2-2, and as shown ~~on~~ in Figures 2.2-1 through 2.2-13, with the following construction tolerances. 3. Thickness of exterior walls below grade: +12 inches/- 1 inch 4. Thickness of exterior walls above grade, and interior walls: +1/-1 inch 5. Thickness of floors: +1/-1 inch ~~3.~~6. Floor level: +1/-1 inch
2. ~~The ASME Code Section III components and piping retain their pressure boundary integrity at their design pressure.~~ Deleted.	2. ~~A hydrostatic test and preoperational NDE will be performed in conjunction with Section III of the ASME Code.~~ Deleted.	2. ~~The results of the hydrostatic test and preoperational NDE of the as-built components and piping conform to the requirements of the ASME Code, Section III.~~ Deleted.
3. The PCCV retains structural integrity at the design pressure~~s~~ of 68 psig.	3. A structural integrity test (SIT) of the as-built PCCV will be performed in accordance with the Article CC-6000 of ASME code, Section III, Division 2.	3. The ~~result of the structural integrity test (SIT) of the as-built PCCV exists and verifies that the~~ PCCV maintains its structural integrity at a test pressure of greater than or equal to 115% of the design pressure of 68 psig in accordance with the requirements of ASME Code, Section III.
4.a The integrated containment system barrier prevents the release of fission products to the atmosphere.	4.a A containment integrated leak rate test will be performed in accordance with 10 CFR 50, Appendix J, Type A testing.	4.a The containment integrated leak rate ~~test verifies that the leak rate~~ is less than or equal to the allowable leakage rate specified in 10 CFR 50, Appendix J, Type A testing.
4.b The containment system barrier ~~primary reactor containment~~ penetrations prevent the release of fission products to the atmosphere.	4.b ~~A leak rate test~~ Type B testing will be performed for all ~~Type B~~ containment penetrations in accordance with 10 CFR 50, Appendix J~~, Type B tests~~.	4.b The containment penetration leak rates ~~tests verifies that the leak rate is~~ are less than or equal to the allowable leakage rate specified in 10 CFR 50, Appendix J, for Type B testing~~s~~.
5. The PCCV is ~~designed based on the structural~~ can withstand design-basis loads.	5. An analysis will be performed to ~~verify that~~reconcile the as-built PCCV with the structural design-basis loads ~~are reconciled~~.	5. ~~ASME design r~~Reports exist~~s for~~and conclude that the as-built PCCV~~, and concludes the PCCV is designed based on the structural~~ can withstand design-

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
		basis loads.
6. The ~~safety-related~~ seismic Category I standard plant buildings, other than the PCCV, ~~are designed based on the structural~~can withstand design-basis loads.	6. An analysis will be performed to ~~verify that~~reconcile the as-built ~~safety-related~~ seismic Category I standard plant ~~structures~~buildings, other than the PCCV, with the structural design-basis loads ~~are reconciled~~.	6. ~~Design r~~Reports exist ~~for~~ and conclude that the as-built ~~safety-related~~ seismic Category I standard plant buildings, other than the PCCV, ~~and conclude the safety-related standard plant buildings are designed in accordance with structural~~can withstand design-basis loads.
7. ~~The ASME Code, Section III, Class 1 piping systems and components are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads.~~ Deleted.	7. ~~Refer to Table 2.3-2 ITAAC #1.~~ Deleted.	7. ~~Refer to Table 2.3-2 ITAAC #1.~~ Deleted.

Table 2.2-4 Structural and Systems Engineering Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. ~~The ASME Code, Section III, Class 2 or 3 piping systems and components are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads.~~ Deleted.	8. ~~Refer to Table 2.3-2 ITAAC #3.~~ Deleted.	8. ~~Refer to Table 2.3-2 ITAAC #3.~~ Deleted.
9. Divisional flood barriers are provided in the R/B and each PS/B to protect against ~~the~~ internal ~~and external~~ flooding.	9. An inspection will be performed to verify that the as-built divisional flood barriers ~~exist~~ in the R/B and each PS/B exist, as shown on Figures 2.2-14 through 2.2-25.	9. The as-built divisional flood barriers ~~exist at the appropriate locations~~ in the R/B and each PS/B that protect against the internal ~~and external~~ flooding hazard exist, as shown on Figures 2.2-14 through 2.2-25.
10. Water-tight doors are provided in the R/B and each PS/B to protect against ~~the~~ internal ~~and external~~ flooding.	10. An inspection will be performed to verify that ~~of~~ the as-built water- tight doors in the R/B and each PS/B exist, as shown on Figures 2.2-14 through 2.2-25~~will be performed~~.	10. The as-built water-tight doors ~~exist at the appropriate locations~~ in the R/B and each PS/B that protect against ~~the~~ internal ~~and external~~ flooding exist, as shown on Figures 2.2-14 through 2.2-25.
11. Penetrations in the divisional walls of the R/B and ~~each~~ the PS/B rooms~~,~~ (other than~~except for~~ water-tight doors~~,~~) that are installed at or below ~~provided appropriately against~~ the internal flood~~ing~~ level, are fitted with water-tight seals.	11. An inspection will be performed to verify that ~~of~~ the as-built penetrations in the divisional walls of the R/B and the PS/B rooms (other than water-tight doors) that are installed at or below the internal design flood level, as shown in Table 2.2-5, are fitted with water-tight seals~~will be performed~~.	11. The as-built penetrations in the divisional walls of the R/B and ~~each~~ the PS/B rooms (other than water-tight doors) that are installed at or below ~~at an acceptable level above the floor, and are sealed up to~~ the internal ~~and external~~ design flood level~~s~~, as shown in Table 2.2-5, are fitted with water-tight seals.
12. Safety-related electrical, instrumentation, and control equipment ~~are located~~ in the R/B and each PS/B ~~to protect them from~~ is located above the internal design flood level.	12. An inspection will be performed to verify that ~~of~~ the as-built safety-related electrical, instrumentation, and control equipment in the R/B and each PS/B is located above the internal design flood level, as shown in Table 2.2-5~~will be performed~~.	12. The as-built safety-related electrical, instrumentation, and control equipment in the R/B and each PS/B ~~are~~ is located ~~at sufficient height~~ above the ~~floor surface to protect them against the~~ internal design flood level, as shown in Table 2.2-5.
13. For the R/B and each PS/B, external walls ~~thicknesses~~ below flood level are a	13. An inspection will be performed to verify ~~of~~ that the as-built external walls below	13. For the R/B and each PS/B, the as-built external walls below flood level are a minimum of two

minimum of two feet thick to protect against external flooding~~water seepage~~.	flood level ~~thickness~~ for the R/B and each PS/B are a minimum of two feet thick~~will be performed~~.	feet thick to protect against ~~water seepage~~external flooding.
14. Penetrations in the external ~~F~~flood barrier~~s~~ walls of the R/B and each PS/B, as shown in Figures 2.2-14 through 2.2-25, that are ~~installed up to the finished plant grade~~ at or below design basis flood level, are fitted with water-tight seals to protect against ~~water seepage~~external flooding.	14. An ~~I~~inspection~~s~~ will be performed to verify that ~~of the~~ as-built penetrations in the external flood barrier~~s~~ walls of the R/B and each PS/B, as shown in Figures 2.2-14 through 2.2-25, that are at or below design basis flood level, are fitted with water-tight seals~~will be performed~~.	14. The as-built penetrations in the external flood barrier~~s~~ walls of ~~are installed up to the finished plant grade level for~~ the R/B and each PS/B, as shown in Figures 2.2-14 through 2.2-25, that are at or below design basis flood level, are fitted with water-tight seals to protect against ~~water seepage~~external flooding.

Table 2.2-4 Structural and Systems Engineering Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~15. Flood doors and flood barrier penetrations of the R/B and each PS/B are provided with flood protection features.~~ Deleted.	~~15. Inspections of the as-built flood doors and flood barrier penetrations will be performed.~~ Deleted.	~~15. For the R/B and each PS/B, the as-built flood doors and flood barrier penetrations are provided with flood protection features to protect against water seepage.~~ Deleted.
~~16. Penetrations in the external walls of the R/B and each PS/B are provided with flood protection features below flood level.~~ Deleted.	~~16. An inspection will be performed to verify that the flood protection features of the as-built penetrations in the external walls of the R/B and each PS/B exist below flood level.~~ Deleted.	~~16. The as-built penetrations in the external walls of the R/B and each PS/B are provided with flood protection features below flood level.~~ Deleted.
17. Redundant safe shutdown components and associated electrical divisions outside the containment and the control room complex are separated by 3-hour rated fire barriers to preserve the capability to safely shutdown the plant following a fire. ~~The 3-hour rated fire barriers are placed as required by the FHA.~~	17. An inspection will be performed to verify that ~~of~~ the as-built 3-hour rated fire barriers are placed as required by the FHA~~will be performed~~.	17. The as-built 3-hour rated ~~as-built~~ fire barriers are placed as required by the FHA for separation of redundant safe shutdown components and associated electrical divisions outside the containment and the control room complex, and to preserve the capability to safely shutdown the plant following a fire.
18.a. ~~All p~~Penetrations and openings through ~~the~~ fire barriers are protected against fire.	18.a An inspection will be performed to verify that the as-built ~~components are provided to protect the~~ penetrations and openings through fire barriers identified in the FHA are sealed or can be closed with fire rated components consistent with the fire resistance rating of the associated barrier.	18.a. ~~All a~~As-built penetrations and openings through fire barriers identified in the FHA are ~~protected~~ sealed or can be closed with rated components (~~i.~~e.g., fire doors in door openings~~, fire dampers in ventilation duct openings,~~ and penetration seals) consistent with the fire resistance rating of the associated barrier.
18.b. Ventilation ducts that penetrate fire barriers are protected by fire dampers.	18.b. An inspection will be performed to verify that fire dampers are installed in the as-built ventilation ducts that penetrate the fire barriers identified in the FHA.	18.b. Fire dampers are installed in the as-built ventilation ducts that penetrate the fire barriers identified in the FHA.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
19. ~~Safety-related SSCs are designed to withstand the dynamic effects of pipe breaks.~~ Deleted.	19. ~~Refer to Table 2.3-2 ITAAC #4.~~ Deleted.	19. ~~Refer to Table 2.3-2 ITAAC #4.~~ Deleted.
20. ~~The key dimensions of the RV conform with the licensed design and are documented in an as-built report.~~ Deleted.	20. ~~Refer to Section 2.4.1 ITAAC #5.~~ Deleted.	20. ~~Refer to Section 2.4.1 ITAAC #5.~~ Deleted.

Table 2.2-4 Structural and Systems Engineering Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
21. Safety-related SSCs are protected from any credible internal missile sources inside and outside the containment.	21. ~~An i~~Inspections and analyses will be performed to verify that as-built ~~locations of~~ safety-related SSCs are protected from ~~potential impact by~~ credible internal missile~~s~~ sources by the methods described in Section 2.2.2.1.	21. ~~Primary missile protection is provided by locating missile sources behind concrete walls and floors, and/or locating~~A report exists and concludes that as-built safety-related SSCs are protected from ~~outside the zones of~~ credible internal missile ~~strikes~~sources by the methods described in Section 2.2.2.1.
22. ~~Special modular construction techniques adequately address the fabrication, shipping, handling, and installation of the SC modules and reconcile the as-built configuration of the plant with the structural design basis of the licensed facility.~~ Deleted.	22. ~~An inspection will be performed to verify special modular construction techniques adequately address the fabrication, shipping, handling, and installation of the SC modules and reconcile the as-built configuration of the plant with the structural design basis of the licensed facility.~~ Deleted.	22. ~~Fabrication, shipping, handling, and installation of the SC modules are in accordance with governing programs, codes and specifications.~~ Deleted.
23. The ~~F~~failure of ~~non-seismic and~~ seismic Category II structures will not impair the ability of ~~near-by~~ safety-related SSCs to perform their safety-related functions ~~(II/I interactions)~~.	23. Analyses and inspections of the design and as-built configuration ~~will be performed to verify failure~~ of ~~non-seismic and~~ seismic Category II structures will be performed to verify that the failure of these structures will not impair the ability of ~~near-by~~ safety-related SSCs to perform their safety-related functions ~~(II/I interactions)~~.	23. ~~The inspection of~~ A report exists and concludes that the ~~design criteria and~~ failure of as-built ~~plant configuration for non-seismic and~~ seismic Category II structures will not impair the ability of safety-related SSCs to perform their safety-related functions ~~verify the acceptability of II/I interactions~~.
24. SSCs that require evaluation in the seismic fragilities task of a seismic margin analysis have high confidence of low probability of failure (HCLPF) values equal to or greater than the review level earthquake~~sufficient seismic margin~~.	24.i ~~Analysis~~ Analyses will be performed to verify that the SSCs requiring evaluation in the seismic fragilities task of a seismic margin assessment have HCLPF values equal to or greater than the review level earthquake~~on the SSCs to confirm the seismic margin using plant specific in-structure response and the results of stress analyses~~.	24.i Reports exist and conclude that the SSCs evaluated in the seismic fragilities task of the seismic margin assessment have ~~high confidence of low probability of failuer (~~HCLPF~~)~~ values equal to or greater than the review level earthquake ~~for the SSCs have sufficient seismic margin~~.
	24.ii Inspections will be performed on the as-built SSCs.	24.ii The capacities of as-built SSCs (i.e., adequacy of equipment anchorage, functional adequacy

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
		of equipment and physical interactions) are bounded by the as-designed SSC capacities ~~retain the sufficient seismic margin~~.

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 1 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
1	R/B	-26'-4"	FA2-101-01	0.45	-
2	R/B	-26'-4"	FA2-102-01	0.45	-
3	R/B	-26'-4"	FA2-103-01	0.45	-
4	R/B	-26'-4"	FA2-104-01	0.45	-
5	R/B	-26'-4"	FA2-105-01	0.45	-
6	R/B	-26'-4"	FA2-111-01	0.45	-
7	R/B	-26'-4"	FA2-106-01	0.6	-
8	R/B	-26'-4"	FA2-107-01	0.6	-
9	R/B	-26'-4"	FA2-108-01	0.6	-
10	R/B	-26'-4"	FA2-109-01	0.6	-
11	R/B	-26'-4"	FA2-110-01	0.6	-
12	R/B	-26'-4"	FA2-112-01	0.6	-
13	R/B	-26'-4"	FA2-113-04	1.24	-
14	R/B	-26'-4"	FA2-121-01	1.24	-
15	R/B	-26'-4"	FA2-121-02	1.24	-
16	R/B	-26'-4"	FA2-122-01	1.24	-
17	R/B	-26'-4"	FA2-118-01	2.27	-
18	R/B	-26'-4"	FA2-119-01	2.27	-
19	R/B	-26'-4"	FA2-124-01	2.27	-
20	R/B	-26'-4"	FA2-125-01	2.27	-
21	R/B	-26'-4"	FA2-126-01	2.27	-
22	R/B	-26'-4"	FA2-127-01	2.27	-
23	R/B	-26'-4"	FA2-129-01	2.27	-
24	R/B	-26'-4"	FA2-130-01	2.27	-
25	R/B	-26'-4"	FA2-113-01	-	1
26	R/B	-26'-4"	FA2-113-02	-	1
27	R/B	-26'-4"	FA2-113-03	-	1
28	R/B	-26'-4"	FA2-114-01	-	1

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 2 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
29	R/B	-26'-4"	FA2-114-02	-	1
30	R/B	-26'-4"	FA2-114-03	-	1
31	R/B	-26'-4"	FA2-115-01	-	1
32	R/B	-26'-4"	FA2-115-02	-	1
33	R/B	-26'-4"	FA2-115-03	-	1
34	R/B	-26'-4"	FA2-116-01	-	1
35	R/B	-26'-4"	FA2-116-02	-	1
36	R/B	-26'-4"	FA2-116-03	-	1
37	R/B	-26'-4"	FA2-123-02	-	4
38	R/B	-8'-7"	FA2-127-02	0.81	-
39	R/B	-8'-7"	FA2-127-03	0.81	-
40	R/B	-8'-7"	FA2-127-04	0.81	-
41	R/B	-8'-7"	FA2-127-05	0.81	-
42	R/B	-8'-7"	FA2-128-01	0.81	-
43	R/B	-8'-7"	FA2-153-02	0.81	-
44	R/B	-8'-7"	FA2-154-02	1.35	-
45	R/B	-8'-7"	FA2-155-01	1.35	-
46	R/B	-8'-7"	FA2-151-01	-	1
47	R/B	-8'-7"	FA2-152-01	-	1
48	R/B	-8'-7"	FA2-153-01	-	1
49	R/B	-8'-7"	FA2-154-01	-	1
50	R/B	3'-7"	FA2-151-04	0.69	-
51	R/B	3'-7"	FA2-209-01	0.69	-
52	R/B	3'-7"	FA2-209-02	0.69	-
53	R/B	3'-7"	FA2-209-03	0.69	-
54	R/B	3'-7"	FA2-210-10	0.69	-
55	R/B	3'-7"	FA2-211-01	0.69	-
56	R/B	3'-7"	FA2-127-06	0.88	-

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 3 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
57	R/B	3'-7"	FA2-128-02	0.88	-
58	R/B	3'-7"	FA2-128-03	0.88	-
59	R/B	3'-7"	FA2-128-04	0.88	-
60	R/B	3'-7"	FA2-152-04	0.88	-
61	R/B	3'-7"	FA2-212-01	0.88	-
62	R/B	3'-7"	FA2-201-01	3.14	-
63	R/B	3'-7"	FA2-206-01	3.14	-
64	R/B	3'-7"	FA2-151-01	-	1
65	R/B	3'-7"	FA2-151-02	-	1
66	R/B	3'-7"	FA2-151-03	-	1
67	R/B	3'-7"	FA2-152-01	-	1
68	R/B	3'-7"	FA2-152-02	-	1
69	R/B	3'-7"	FA2-152-03	-	1
70	R/B	3'-7"	FA2-153-01	-	1
71	R/B	3'-7"	FA2-153-03	-	1
72	R/B	3'-7"	FA2-153-04	-	1
73	R/B	3'-7"	FA2-154-01	-	1
74	R/B	3'-7"	FA2-154-03	-	1
75	R/B	3'-7"	FA2-154-04	-	1
76	R/B	3'-7"	FA2-202-01	-	1
77	R/B	3'-7"	FA2-203-01	-	1
78	R/B	3'-7"	FA2-204-01	-	1
79	R/B	3'-7"	FA2-205-01	-	1
80	R/B	3'-7"	FA2-207-01	-	4
81	R/B	3'-7"	FA2-208-01	-	4
82	R/B	13'-6"	FA2-127-07	-	2,3
83	R/B	13'-6"	FA2-212-02	-	2,3
84	R/B	25'-3"	FA2-151-05	0.53	-

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 4 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
85	R/B	25'-3"	FA2-151-06	0.53	-
86	R/B	25'-3"	FA2-154-05	0.53	-
87	R/B	25'-3"	FA2-154-06	0.53	-
88	R/B	25'-3"	FA2-209-04	0.53	-
89	R/B	25'-3"	FA2-210-10	0.53	-
90	R/B	25'-3"	FA2-316-01	0.53	-
91	R/B	25'-3"	FA2-319-01	0.53	-
92	R/B	25'-3"	FA2-323-01	0.53	-
93	R/B	25'-3"	FA2-323-02	0.53	-
94	R/B	25'-3"	FA2-127-08	0.69	-
95	R/B	25'-3"	FA2-152-05	0.69	-
96	R/B	25'-3"	FA2-152-06	0.69	-
97	R/B	25'-3"	FA2-153-05	0.69	-
98	R/B	25'-3"	FA2-209-05	0.69	-
99	R/B	25'-3"	FA2-210-12	0.69	-
100	R/B	25'-3"	FA2-317-01	0.69	-
101	R/B	25'-3"	FA2-318-01	0.69	-
102	R/B	25'-3"	FA2-322-01	0.69	-
103	R/B	25'-3"	FA2-321-01	2.85	-
104	R/B	25'-3"	FA2-320-01	3.14	-
105	R/B	25'-3"	FA2-302-01	-	1
106	R/B	25'-3"	FA2-303-01	-	1
107	R/B	25'-3"	FA2-304-01	-	1
108	R/B	25'-3"	FA2-307-01	-	1
109	R/B	25'-3"	FA2-308-01	-	1
110	R/B	25'-3"	FA2-308-02	-	1
111	R/B	25'-3"	FA2-309-01	-	1
112	R/B	25'-3"	FA2-312-01	-	1

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 5 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
113	R/B	25'-3"	FA2-313-01	-	1
114	R/B	25'-3"	FA2-314-01	-	1
115	R/B	25'-3"	FA2-210-11	-	1,2
116	R/B	35'-2"	FA2-210-13	-	1,2
117	R/B	50'-2"	FA2-209-06	0.58	-
118	R/B	50'-2"	FA2-209-07	0.58	-
119	R/B	50'-2"	FA2-210-10	0.58	-
120	R/B	50'-2"	FA2-408-01	0.58	-
121	R/B	50'-2"	FA2-409-01	0.58	-
122	R/B	50'-2"	FA2-416-01	0.58	-
123	R/B	50'-2"	FA2-421-01	0.58	-
124	R/B	50'-2"	FA2-210-14	0.76	-
125	R/B	50'-2"	FA2-410-01	0.76	-
126	R/B	50'-2"	FA2-411-01	0.76	-
127	R/B	50'-2"	FA2-417-01	0.76	-
128	R/B	50'-2"	FA2-418-01	0.76	-
129	R/B	50'-2"	FA2-422-01	0.76	-
130	R/B	50'-2"	FA2-403-01	0.86	-
131	R/B	50'-2"	FA2-404-01	0.86	-
132	R/B	50'-2"	FA2-406-01	0.86	-
133	R/B	50'-2"	FA2-407-03	0.86	-
134	R/B	50'-2"	FA2-413-01	0.86	-
135	R/B	50'-2"	FA2-419-01	0.86	-
136	R/B	50'-2"	FA2-423-01	0.86	-
137	R/B	50'-2"	FA2-401-01	0.87	-
138	R/B	50'-2"	FA2-402-01	0.87	-
139	R/B	50'-2"	FA2-405-01	0.87	-
140	R/B	50'-2"	FA2-412-01	0.87	-

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 6 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
141	R/B	50'-2"	FA2-420-01	0.87	-
142	R/B	50'-2"	FA2-420-02	0.87	-
143	R/B	50'-2"	FA2-414-01	4.51	-
144	R/B	50'-2"	FA2-415-01	4.51	-
145	R/B	76'-5"	FA2-210-15	0.84	-
146	R/B	76'-5"	FA2-210-19	0.84	-
147	R/B	76'-5"	FA2-409-02	0.84	-
148	R/B	76'-5"	FA2-506-01	0.84	-
149	R/B	76'-5"	FA2-210-16	0.99	-
150	R/B	76'-5"	FA2-210-17	0.99	-
151	R/B	76'-5"	FA2-210-18	0.99	-
152	R/B	76'-5"	FA2-210-21	0.99	-
153	R/B	76'-5"	FA2-410-02	0.99	-
154	R/B	76'-5"	FA2-511-01	0.99	-
155	R/B	76'-5"	FA2-505-01	1.24	-
156	R/B	76'-5"	FA2-508-01	1.24	-
157	R/B	76'-5"	FA2-508-02	1.24	-
158	R/B	76'-5"	FA2-509-01	1.24	-
159	R/B	76'-5"	FA2-510-01	1.24	-
160	R/B	76'-5"	FA2-510-02	1.24	-
161	R/B	76'-5"	FA2-507-01	1.5	-
162	R/B	76'-5"	FA2-507-02	1.5	-
163	R/B	76'-5"	FA2-513-01	1.5	-
164	R/B	76'-5"	FA2-502-01	-	1
165	R/B	76'-5"	FA2-503-01	-	1
166	R/B	76'-5"	FA2-504-01	-	1
167	R/B	76'-5"	FA2-501-02	-	5
168	R/B	76'-5"	FA2-512-01	-	5

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 7 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
169	R/B	101'-0"	FA2-601-01	1.71	-
170	R/B	101'-0"	FA2-601-02	1.71	-
171	R/B	101'-0"	FA2-603-01	1.71	-
172	R/B	101'-0"	FA2-602-01	3.08	-
173	R/B	101'-0"	FA2-604-01	3.08	-
174	PS/B	-26'-4"	FA3-101-01	0.45	-
175	PS/B	-26'-4"	FA3-102-01	0.45	-
176	PS/B	-26'-4"	FA3-103-01	0.45	-
177	PS/B	-26'-4"	FA3-104-01	0.45	-
178	PS/B	-26'-4"	FA3-106-01	0.45	-
179	PS/B	-26'-4"	FA3-115-01	0.45	-
180	PS/B	-26'-4"	FA3-116-01	0.45	-
181	PS/B	-26'-4"	FA3-108-01	0.6	-
182	PS/B	-26'-4"	FA3-109-01	0.6	-
183	PS/B	-26'-4"	FA3-110-01	0.6	-
184	PS/B	-26'-4"	FA3-111-01	0.6	-
185	PS/B	-26'-4"	FA3-112-01	0.6	-
186	PS/B	-26'-4"	FA3-120-01	0.6	-
187	PS/B	-26'-4"	FA3-121-01	0.6	-
188	PS/B	-14'-2"	FA3-117-01	-	1
189	PS/B	-14'-2"	FA3-118-01	-	1
190	PS/B	-14'-2"	FA3-122-01	-	1
191	PS/B	-14'-2"	FA3-123-01	-	1
192	PS/B	-14'-2"	FA3-103-02	-	3
193	PS/B	-14'-2"	FA3-104-02	-	3
194	PS/B	-14'-2"	FA3-105-01	-	3
195	PS/B	-14'-2"	FA3-105-02	-	3
196	PS/B	-14'-2"	FA3-105-03	-	3

Table 2.2-5 Internal Flooding Elevation above Floor (Sheet 8 of 8)

	Building	Floor Elevation	Fire Zone No.	Design Flood Level above Floor [ft]	Notes
197	PS/B	-14'-2"	FA3-109-02	-	3
198	PS/B	-14'-2"	FA3-111-02	-	3
199	PS/B	-14'-2"	FA3-113-01	-	3
200	PS/B	-14'-2"	FA3-113-03	-	3
201	PS/B	-14'-2"	FA3-119-01	-	3
202	PS/B	-14'-2"	FA3-124-01	-	3
203	PS/B	-14'-2"	FA3-125-01	-	3
204	PS/B	-14'-2"	FA3-126-01	-	3
205	PS/B	3'-7"	FA3-103-03	-	1
206	PS/B	3'-7"	FA3-104-03	-	1
207	PS/B	3'-7"	FA3-105-02	-	1
208	PS/B	3'-7"	FA3-109-03	-	1
209	PS/B	3'-7"	FA3-111-03	-	1
210	PS/B	3'-7"	FA3-113-02	-	1

Note:

1. This area is protected from flooding by water-tight door.
2. There are no SSCs in this area to be protected from flooding.
3. Water flows down stairs.
4. No water source inside and no pathway of water to the neighboring zones.
5. This area is the emergency water pit and is out of scope of flood protection.

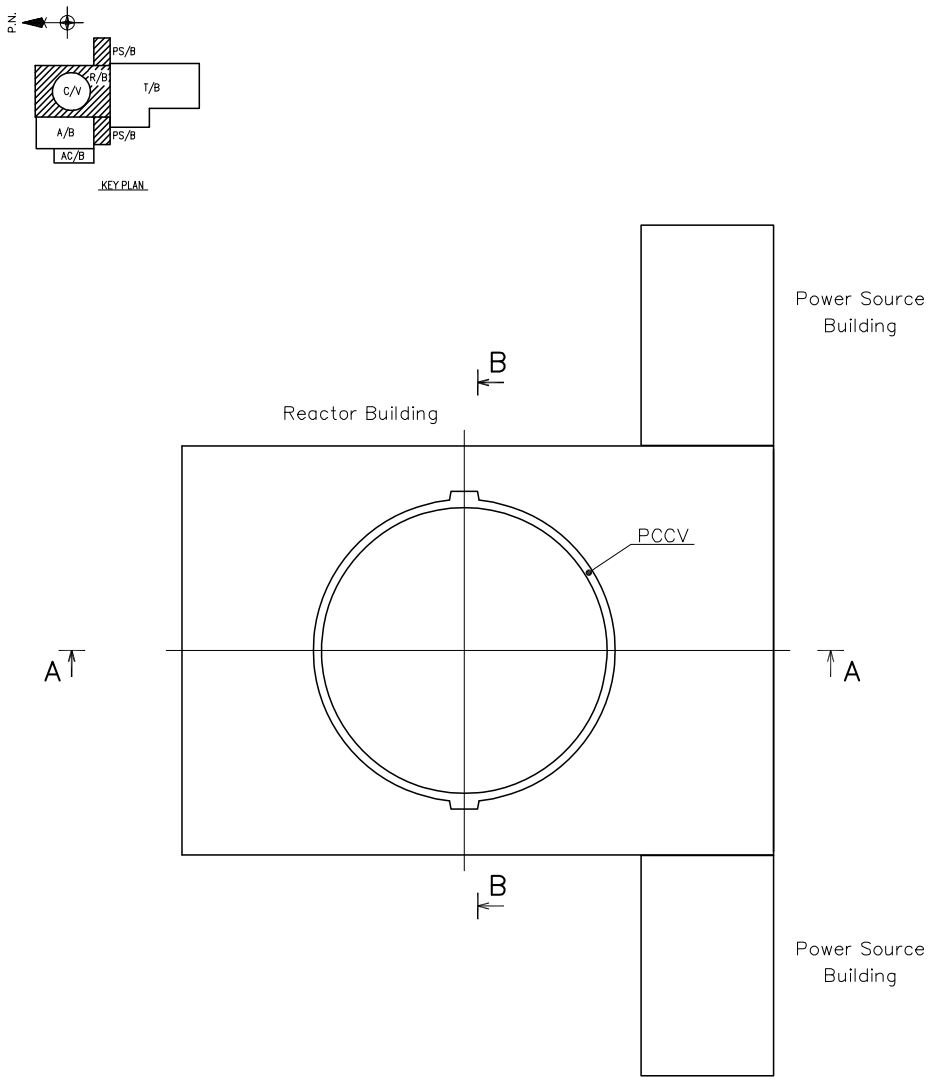
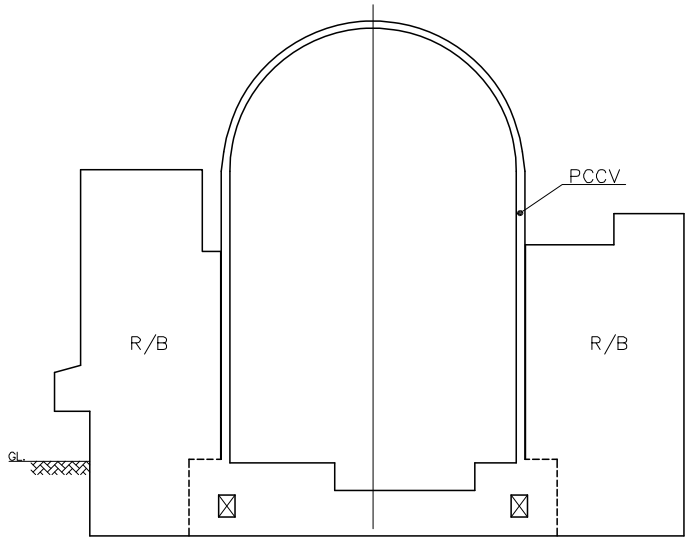
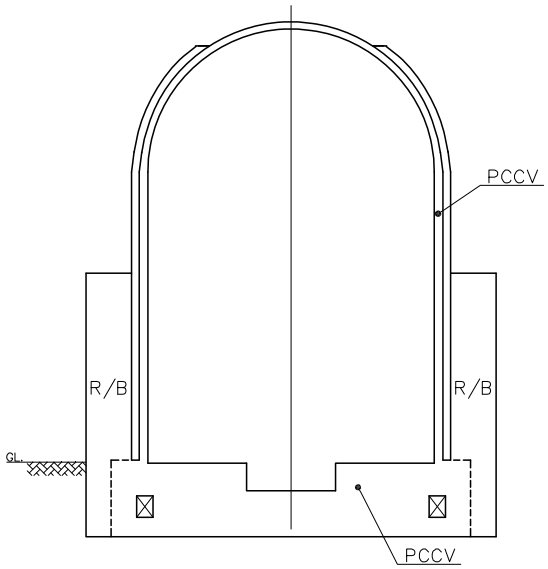


Figure 2.2-1 Critical Building Dimensions of US-APWR (Plan View)



A – A



B – B

Figure 2.2-2 Critical Building Dimensions of US-APWR (Section Views)

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.2

Item No.	Explanation/Basis for Change
Design Description 2.2	
A	Deleted information not appropriate for Tier 1 Design Description.
B	Revised to clarify the scope of standard plant structures, include building names with acronyms, and delete information not appropriate for Tier 1 Design Description.
C	Notes 1 and 2. See Item OOO.
D	Revised to describe the purpose of Seismic Category I structural design.
E	Editorial changes.
F	No change.
G	No change.
H	Revised to provide a more accurate and concise description of the R/B.
I	Deleted information not appropriate for Tier 1 Design Description.
I1	Revised to provide a more accurate and concise description of the PCCV.
J	Text relocated in the DD. See Item P.
K	Notes 1 and 2. See Item OOO.
L	Notes 1 and 2. See Item OOO.
M	Notes 1 and 2. See Item OOO.
N	Notes 1 and 2. See Item OOO.
O	Notes 1 and 2. See Item OOO.
P	Revised and relocated text to provide a more accurate and concise description of the PCCV. See Items J and P1.
P1	Text relocated in the DD. See Item P.
Q	Deleted information not appropriate for Tier 1 Design Description.
R	Revised and relocated text to provide a more concise description of the PCCV liner. See Items Y and Z.
S	Notes 1 and 2. See Item QQQ.
T	Deleted information not appropriate for Tier 1 Design Description.
T1	Revised to delete redundant information. See Sections 2.11.1. and 2.11.3
U	Deleted information not appropriate for Tier 1 Design Description.
V	Deleted information not appropriate for Tier 1 Design Description.
W	Deleted information not appropriate for Tier 1 Design Description.
X	Deleted information not appropriate for Tier 1 Design Description.
Y	Revised and relocated text to provide a more concise description. See Item R.
Z	Text relocated in the DD. See Item R.
AA	Deleted information not appropriate for Tier 1 Design Description.
BB	Revised to provide a more accurate and concise description.
CC	Revised to provide a more precise and concise description of containment internal structures.
DD	Note 1. See item KKKK and ITAAC No. 22. This change alters the response to RAI No. 156-1877, Question 14.3-1 (UAP-HF-09039).
EE	Deleted additional text proposed in the response to RAI No. 596-4669, Question 14.03.02-19 (UAP-HF-10188). The reference to Table 2.4.1-2 is unnecessary.
FF	Deleted information not appropriate for Tier 1 Design Description.

Item No.	Explanation/Basis for Change
GG	Deleted information not appropriate for Tier 1 Design Description.
HH	Deleted information not appropriate for Tier 1 Design Description.
II	Deleted information not appropriate for Tier 1 Design Description.
JJ	Deleted information not appropriate for Tier 1 Design Description.
KK	Deleted information not appropriate for Tier 1 Design Description.
LL	Deleted information not appropriate for Tier 1 Design Description.
MM	Deleted information not appropriate for Tier 1 Design Description.
NN	Notes 1 and 2. See Item OOO.
OO	Deleted information not appropriate for Tier 1 Design Description.
PP	Deleted information not appropriate for Tier 1 Design Description.
QQ	Deleted information not appropriate for Tier 1 Design Description.
RR	Revised to provide a more precise and concise description of the PS/Bs. Seismic classification is addressed in Table 2.2-1.
RR1	Deleted redundant information. Emergency and alternate AC power sources are described in Section 2.6.
SS	Notes 1 and 2. See Item OOO.
TT	Revised to provide a more concise description of the PSFSVs. Seismic classification is addressed in Table 2.2-1.
UU	Revised to provide a more concise description of the ESWPT. Seismic classification is addressed in Table 2.2-1.
VV	Revised to provide a more concise description of the A/B. Seismic classification is addressed in Table 2.2-1.
WW	Revised to provide a more concise description of the T/B. Seismic classification is addressed in Table 2.2-1.
XX	Revised to provide a more concise description of the AC/B.
YY	Notes 1 and 2. See Items XXX, YYY, ZZZ, BBBB, CCCC, DDDD, and EEEE.
ZZ	Notes 1 and 2. See Items XXX, YYY, and ZZZ.
AAA	Deleted information not appropriate for Tier 1 Design Description. This change alters the response to RAI No. 488-3754, Question 14.03.11-40 (UAP-HF-09579).
BBB	Deleted information not appropriate for Tier 1 Design Description. This change alters the response to RAI No. 488-3754, Question 14.03.11-40 (UAP-HF-09579).
CCC	Notes 1 and 2. See Items FFFF, GGGG, and GGGG1.
DDD	Deleted information not appropriate for Tier 1 Design Description.
EEE	Deleted information not appropriate for Tier 1 Design Description.
FFF	Revised to provide a more concise description of missile protection methods.
FFF1	Deleted information not appropriate for Tier 1 Design Description. This change alters the response to RAI No. 127-1641, Question 3.5.1.1-02 (UAP-HF-09023), but does not change the intent of the response.
GGG	Deleted information not appropriate for Tier 1 Design Description.
HHH	No changes.
III	Revised to refer to Section 2.3 for ITAAC for piping systems and components.
JJJ	Revised to refer to Section 2.3 for design information and ITAAC related to the capability of safety-related SSCs with regard to the dynamic effects of pipe breaks.

Item No.	Explanation/Basis for Change
KKK	Deleted information not appropriate for Tier 1 Design Description.
LLL	Deleted information not appropriate for Tier 1 Design Description.
MMM	Deleted information not appropriate for Tier 1 Design Description.
NNN	Notes 1 and 2. See Item MMMM.
OOO	Notes 1 and 2. See Items C, K, L, M, N, O, NN, and SS.
PPP	See ITAAC No. 2.
QQQ	Notes 1 and 2. See Item S.
RRR	Note 1.
SSS	Note 1. See Item J. This change alters the response to RAI No. 50-329, Question 06.02.06-13 (UAP-HF-08182).
TTT	Note 1.
UUU	Note 1.
VVV	See ITAAC No. 7. This change alters the response to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215).
WWW	See ITAAC No. 8. This change alters the responses to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215) and RAI No. 180-1594, Question 3.6.1-5 (UAP-HF-09072).
XXX	Notes 1 and 2. See Items YY and ZZ.
YYY	Notes 1 and 2. See Items YY and ZZ.
ZZZ	Notes 1 and 2. See Items YY and ZZ.
AAAA	Note 1. This change alters the response to RAI No. 190-1764, Question 14.03.02-6 (UAP-HF-09067).
BBBB	Notes 1 and 2. See Item YY.
CCCC	Notes 1 and 2. See Item YY.
DDDD	See ITAAC No. 15.
EEEE	See ITAAC No. 16.
FFFF	Notes 1 and 2. See Item CCC.
GGGG	Notes 1 and 2. See Item CCC.
GGGG1	Notes 1 and 2. See Item CCC.
HHHH	See ITAAC No. 19. This change alters the responses to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215) and RAI No. 180-1594, Question 3.6.1-4 (UAP-HF-09072).
IIII	See ITAAC No. 20. This change alters the response to RAI No. 596-4669, Question 14.03.02-19 (UAP-HF-10188)
JJJJ	Note 1.
KKKK	See ITAAC No. 22.
LLLL	Note 1. This change alters the response to RAI No. 156-1877, Question 14.3-2 (UAP-HF-09039).
MMMM	Notes 1 and 2. See Item NNN.
NNNN	Deleted information not appropriate for Tier 1 Design Description. This change alters the response to RAI No. 156-1877, Question 14.3-2 (UAP-HF-09039).
Table 2.2-1	Note 2 added to Table to indicate that the PSFSVs and ESWPT are designed to Seismic Category I codes and standards, but final structural design is based on site-specific requirements.

Item No.	Explanation/Basis for Change
Table 2.2-2	– Revised title to reflect the intended scope of table (i.e., seismic Category I structures vs. safety-related structures) and to reflect the deletion of PCCV information. – Deleted PCCV information from the table. PCCV parameters are listed in Figure 2.11.1-1. – Revised Note 1 to correct typographical error. – Deleted Note 2 because construction tolerances were added to ITAAC Table 2.2-4.
ITAAC Table 2.2-4	
1.	DC – Revised to be more consistent with the generic functional arrangement ITAAC terminology. ITA – Revised to be more clearly state the intent and scope of the ITA and to comport with the DC. AC – Revised to be more consistent with the generic functional arrangement ITAAC terminology and to provide construction tolerances for walls and floors.
2.	Deleted – Redundant ITAAC that is addressed in Section 2.3. See Item III.
3.	DC – Editorial change. ITA – Revised to more specifically define ASME requirements and scope of test. [RIS 2008-05, page 5, 2nd bullet] AC – Revised to more clearly state the intent of the AC and to include the test pressure tolerance. This change alters the response to RAI No. 452-3297, Question 14.03.02-10 (UAP-HF-09466).
4.a.	DC – Editorial change to improve clarity. AC – Revised to more clearly state the intent of the AC and to include the leakage rate tolerance. This change alters the response to RAI No. 50-329, Question 06.02.06-13 (UAP-HF-08182).
4.b.	DC – Revised to more clearly state the intent of the DC. This change alters the response to RAI No. 50-329, Question 06.02.06-13 (UAP-HF-08182). ITA – Revised to more clearly state the intent of the ITA. This change alters the response to RAI No. 50-329, Question 06.02.06-13 (UAP-HF-08182). AC – Revised to more clearly state the intent of the AC and to include the leakage rate tolerance. This change alters the response to RAI No. 50-329, Question 06.02.06-13 (UAP-HF-08182).

Item No.	Explanation/Basis for Change
5.	DC – Revised to more clearly state the intent of the DC. ITA – Revised to more clearly state the intent of the ITA. AC – Revised to more clearly state the intent of the AC.
6.	DC – Revised to more clearly and accurately state the intent of the DC. ITA – Revised to more clearly and accurately state the intent of the ITA. AC – Revised to more clearly and accurately state the intent of the AC.
7.	Deleted – Redundant reference ITAAC that is addressed in Section 2.3, Table 2.3-2, Item 1. This change alters the response to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215).
8.	Deleted – Redundant reference ITAAC that is addressed in Section 2.3, Table 2.3-2, Item 3. This change alters the responses to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215) and RAI No. 180-1594, Question 3.6.1-5 (UAP-HF-09072).
9.	DC – Revised to more clearly and accurately state the intent of the DC. ITA – Revised to more clearly state the intent and scope of the ITA and to comport with the DC. AC – Revised to more clearly and accurately state the intent of the AC. The changes alter the response to RAI No. 596-4669, Question 14.03.02-15 (UAP-HF-10188) [RIS 2008-05, page 4, 2nd bullet]
10.	DC – Revised to more clearly state the intent and scope of the DC. ITA – Revised to more clearly state the intent and scope of the ITA and to comport with the DC. AC – Revised to more clearly state the intent and scope of the AC and to comport with the DC and ITA. The changes alter the response to RAI No. 596-4669, Question 14.03.02-16 (UAP-HF-10188) [RIS 2008-05, page 4, 2nd bullet]
11.	DC – Revised to more clearly state the intent and scope of the DC. ITA – Revised to more clearly state the intent and scope of the ITA and to comport with the DC. AC – Revised to more clearly state the intent and scope of the AC and to comport with the DC and ITA. The changes alter the response to RAI No. 596-4669, Question 14.03.02-17 (UAP-HF-10188). [RIS 2008-05, page 4, 2nd bullet]

Item No.	Explanation/Basis for Change
12.	DC – Revised to more clearly state the intent of the DC. This change alters the response to RAI No. 190-1764, Question 14.03.02-6 (UAP-HF-09067). ITA – Revised to more clearly state the intent and scope of the ITA and to comport with the AC. AC – Revised to more clearly and accurately state the intent of the AC. The changes alter the response to RAI No. 596-4669, Question 14.03.02-18 (UAP-HF-10188). [RIS 2008-05, page 4, 2nd bullet]
13.	DC – Revised to more clearly state the intent of the DC. ITA – Revised to more clearly state the intent and scope of the ITA and to comport with the AC. AC – Revised to more clearly state the intent of the AC.
14.	DC – Revised to more clearly state the intent and scope of the DC. ITA – Revised to more clearly state the intent and scope of the ITA and comport with the DC. AC – Revised to more clearly state the intent and scope of the AC and comport with the DC and ITA.
15.	Deleted – The scope of this ITAAC is addressed by ITAAC Nos. 10, 11, and 14.
16.	Deleted – The scope of this ITAAC is addressed by ITAAC Nos. 11 and 14. This change alters the response to RAI No. 190-1764, Question 14.03.02-8 (UAP-HF-09067).
17.	DC – Revised to remove the reference to the FHA. ITA – Revised to more clearly state the intent and scope of the ITA and comport with the AC. AC Revised to more clearly state the intent and scope of the AC and comport with the ITA. This change alters the response to RAI No. 452-3297, Question 14.03.02-11 (UAP-HF-09466)

Item No.	Explanation/Basis for Change
18.a.	DC – Editorial changes. ITA – Revised to more clearly state the intent and scope of the ITA and comport with the AC. AC Revised to more clearly state the intent and scope of the AC and comport with the ITA. This change alters the response to RAI No. 30, Question 09.05.01-8 (UAP-HF-08173)
18.b.	ITAAC for fire dampers was relocated from Section 2.7.5.
19.	Deleted – Redundant reference ITAAC that is addressed in Section 2.3, Table 2.3-2, Item 4. This change alters the responses to RAI No. 242-2163, Question 14.03.03-4 (UAP-HF-09215) and RAI No. 180-1594, Question 3.6.1-4 (UAP-HF-09072).
20.	Deleted – Redundant reference ITAAC that is addressed in Section 2.3, Table 2.4-1, Item 5. This change alters the response to RAI No. 596-4669, Question 14.03.02-19 (UAP-HF-10188)
21.	ITA – Revised to reflect the need for both analysis and testing, and to provide a reference to acceptable missile protection methods. This change alters the response to RAI No. 127-1641, Question 3.5.1.1-02 (UAP-HF-09023). AC – Revised to comport with the ITA changes. This change alters the response to RAI No. 127-1641, Question 3.5.1.1-02 (UAP-HF-09023).
22.	Deleted – The configuration aspect is addressed by other ITAAC. The fabrication, shipping, and handling aspects of SC modules are controlled by procedures, purchase orders, and receipt inspections. This change alters the response to RAI No. 156-1877, Question 14.3-1 (UAP-HF-09039).
23.	DC – Revised to more clearly state the intent of the DC. This change alters the response to RAI No. 156-1877, Question 14.3-2 (UAP-HF-09039). ITA – Revised to reflect the need for both analysis and inspection, and to comport with the DC changes. This change alters the response to RAI No. 156-1877, Question 14.3-2 (UAP-HF-09039). AC – Revised to comport with the DC and ITA changes. This change alters the response to RAI No. 156-1877, Question 14.3-2 (UAP-HF-09039).
24.	DC – Revised to more clearly state the intent of the DC. ITA – Revised to more clearly define the scope of the analyses and testing, and to comport with the DC changes. AC – Revised to comport with the DC and ITA changes.
Table 2.2-5	Note 3 – added space between the words “down” and “stairs.” Note 5 – inserted words “the” and “is.”

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.2

Item No.	Explanation/Basis for Change
Figure 2.2-1	Replace with new figure with dimensions removed to include only the necessary attribute for Tier 1.
Figure 2.2-2	Replace with new figure with dimensions removed to include only the necessary attribute for Tier 1.

Note 1: Revised to provide consistency between the Design Description (DD) and the Design Commitment (DC) in the ITAAC table. Revised text to include only the necessary attributes for ITAAC.

Note 2: Text relocated within the DD section to align with the sequence and numbering of the corresponding DC in the ITAAC table.

2.11 CONTAINMENT SYSTEMS

The containment vessel (C/V), commonly referred to as the containment or prestressed concrete containment vessel (PCCV), is addressed in this section, along with the following related systems: A

- The containment isolation system (CIS)
- The containment spray system (CSS)
- The containment hydrogen monitoring and control system (CHS)

2.11.1 Containment Vessel

2.11.1.1 Design Description

~~**System Purpose and Functions**~~

The containment is a safety-related structure~~. T~~ with the primary purpose of ~~the containment is to form~~ providing an essentially leak tight barrier that safely accommodates calculated temperature and pressure conditions resulting from the complete size spectrum of piping breaks, up to and including a double-ended, guillotine type break of a reactor coolant or main steam line. Key containment design and performance characteristics are provided in Table 2.11.1-1. A1 A2

~~**Location and Functional Arrangement**~~

~~The containment is located in the center of the reactor building (R/B). Figures 2.2-1 through 2.2-13 of Section 2.2 and Figure 2.11.1-1 show the containment.~~ B

~~**Key Design Features**~~

~~The geometric shape of the prestressed concrete containment vessel (PCCV) is a vertically oriented cylinder topped by a hemispherical dome with no ring girder at the dome/cylinder interface.~~ C

~~The PCCV consists of a prestressed concrete shell containing unbonded tendons and reinforcement steel. Prestressing is obtained through post-tensioning – a method of prestressing in which tendons are tensioned after concrete has hardened. Reinforcing steel is provided overall in the cylinder and dome. Additional reinforcement is provided at discontinuities, such as the cylinder-basemat interface, around penetrations and openings, at buttresses, and at other areas.~~ D

~~The concrete shell inner surface is lined with a minimum 1/4-in. carbon steel plate that is anchored to the concrete shell and dome to provide the required pressure boundary leak tightness. The liner plate system is not designed or considered as a structural member in providing for the overall PCCV load resistance. The liner plate system is attached to the PCCV shell with an anchorage system.~~ E

~~The PCCV is designed to be compatible with all environmental effects to be experienced during normal reactor operations and to withstand the dynamic effects of postulated accidents. Section 2.2 provides details on the containment design features, including the Containment Internal Structures.~~ F

~~The fundamental design concept of the US-APWR for severe accident termination is reactor cavity flooding and cool down of the molten core by the flooded coolant water.~~ G

~~Reactor cavity flooding to enhance the cool down of the molten core ejected into the reactor cavity is achieved by the CSS, whose operation during a design basis accident is described in Subsection 2.11.3. Drain lines are used to drain spray water, which flows into the SG compartments, to the reactor cavity and cools the molten core. Fire protection system (FPS) water injection may also be used to inject water to the drain lines from the SG compartment to the reactor cavity. The FPS water supply is described in Subsection 2.7.6.9.1.~~ H

~~The geometry of the reactor cavity is designed to assure adequate core debris coolability. Reactor cavity floor area and reactor cavity depth provide enhanced spreading of the debris bed for coolability.~~ I

~~The consequences of a postulated high pressure melt ejection (HPME) severe accident are mitigated by the consideration of reactor cavity geometry and containment layout. The consequences of a postulated HPME are mitigated by a core debris trap in the reactor cavity as well as no direct pathway to the upper compartment. These features prevent entrainment of the molten core to the upper part of the containment and impingement of debris on the containment shell.~~ J

~~Reactor cavity floor concrete is provided to protect against challenge to liner plate melt through.~~ K

~~**Seismic and ASME Code Classifications**~~

~~The PCCV is designed and constructed in accordance with ASME Code, Section III, and the PCCV is classified as seismic Category I structure.~~ L

~~**System Operation**~~

~~The containment itself is passive in nature. The related active functions are performed by other systems, and include containment isolation described in Subsection 2.11.2, actuation of containment spray described in Subsection 2.11.3, and hydrogen monitoring and control described in Subsection 2.11.4.~~ M

~~**Alarms, Displays, and Controls**~~

Instruments are installed to monitor conditions inside the containment and actuate appropriate safety functions when an abnormal condition is sensed. These instruments send information to the protection and safety monitoring system (PSMS), diverse actuation system (DAS), and plant control and monitoring system (PCMS), as described in Section 2.5. ~~These instruments monitor containment pressure, temperature,~~ N N1

~~hydrogen concentration, radioactivity, and air effluent for containment depressurization. Their design features include the following:~~

- ~~Containment pressure activates logic to initiate a variety of engineered safety feature (ESF) functions.~~
- ~~Containment temperature is indicated and alarmed in the main control room (MCR), as well as stored in the process computer.~~
- ~~Hydrogen concentration is continuously indicated in the MCR following a beyond design basis accident.~~
- ~~Containment high range area monitor is alarmed in MCR.~~
- ~~Narrow-range containment pressure is indicated and alarmed in the MCR.~~
- ~~Wide-range containment pressure is indicated in the MCR.~~

~~Logic~~

~~The reactor protection system uses the narrow-range containment pressure transmitters to automatically actuate:~~ O

- ~~Containment spray~~
- ~~Containment isolation~~
- ~~Main steam isolation~~
- ~~Containment ventilation isolation~~

~~Interlocks~~

~~There are no interlocks needed for direct safety functions related to the C/V.~~ P

~~Class 1E Electrical Power Sources and Divisions~~

~~Not applicable.~~ Q

~~Equipment to be Qualified for Harsh Environments~~

~~The PCCV is designed for a harsh environment, with the environmental conditions described in Subsection 2.2.1.~~ R

~~Interface Requirements~~

~~There are no safety-related interfaces with systems outside of the certified design.~~ S

~~Numeric Performance Values~~

~~The PCCV is designed to accommodate conditions during and following postulated accidents, such as the design basis LOCA. This design enables it to perform its basic safety function of containing radioactive fission products that could be released in an accident. Key containment design and performance characteristics are provided in Table 2.11.1-1.~~ T

1.a. Deleted. U

1.b. The PCCV liner is fabricated, installed, and inspected in accordance with ASME Code, Section III requirements. V

1.c. The PCCV liner welds meet ASME Code, Section III requirements for non-destructive examination of welds. W

2. Deleted. X

3. The functional arrangement of the PCCV is as described in the Design Description of Subsection 2.11.1.1 and as shown in Figure 2.11.1-1. Y

4. A set of drain lines from the SG compartments to the reactor cavity exists. Z

5. The reactor cavity includes a core debris trap. AA

6. The reactor cavity floor area and depth facilitate debris spreading and cooling. BB

7. Reactor cavity floor concrete provides protection for the liner plate, which is the pressure boundary between the containment and the environment. CC

2.11.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.11.1-2 describes the ITAAC for the PCCV.

Table 2.11.1-1 Key Containment Design and Performance Characteristics

Characteristic	Value
Containment internal design pressure (psig)	68
Containment design temperature (degrees F)	300
Containment external design pressure (psig)	3.9
Containment free volume (cubic feet)	2,800,000
Containment design leakage rate (%/day)	0.1
Assumed leak rate of containment during LOCA analyses [0-24 hours] (%/day)	0.15

Table 2.11.1-2 Containment Vessel Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a ~~The PCCV pressure boundary is designed to meet ASME Code, Section III requirements.~~ Deleted.	1.a ~~Refer to Table 2.2-4 ITAAC Item 5.~~ Deleted.	1.a ~~Refer to Table 2.2-4 ITAAC Item 5.~~ Deleted.
1.b The PCCV liner is fabricated, installed, and inspected in accordance with ASME Code, Section III requirements.	1.b Inspection of the as-built PCCV liner will be performed.	1.b The ASME Code, Section III data report(s) (certified, when required by ASME Code) and inspection reports (including N-5 Data Reports where applicable) exist and conclude that the as-built PCCV liner was fabricated, installed, and inspected in accordance with ASME Code, Section III requirements.
1.c The PCCV liner welds meet ASME Code, Section III requirements for non-destructive examination of welds.	1.c Inspections of the as-built PCCV liner welds will be performed in accordance with ASME Code, Section III.	1.c The ASME Code, Section III code reports exist and conclude that the ASME Code, Section III requirements are met for non-destructive examination of the as-built PCCV liner welds.
2. ~~The PCCV retains structural integrity at the design pressures of 68 psig.~~ Deleted.	2. ~~Refer to Table 2.2-4 ITAAC Item 3.~~ Deleted	2. ~~Refer to Table 2.2-4 ITAAC Item 3.~~ Deleted.
3. The functional arrangement of the PCCV ~~structural configuration~~ is as described in the Design Description of Subsection 2.11.1.1 ~~shown in Table 2.2-2,~~ and as shown in Figure 2.11.1-1.	3. Inspections of the as-built PCCV will be performed.	3. The as-built PCCV ~~configuration is reconciled with descriptions~~ conforms to the functional arrangement as described in the Design Description of Subsection 2.11.1.1~~in Table 2.2-2,~~ and as shown in Figure 2.11.1-1 with the following dimensional tolerances;~~.~~ D1, R1: +6.0/-6.0 inches H1, H2, H3: +3.0/-3.0 inches H4: +6.0/-6.0 inches t1, t2, t3: +3.0/-3.0 inches
4. A set of drain lines from the SG compartments to the reactor cavity exists.	4. Inspections of the as-built drain lines from the as-built SG compartments to the as-built reactor cavity will be performed.	4. ~~A report exists and concludes that the as-built d~~Drain lines from the as-built SG compartments to the as-built reactor cavity exist.

Table 2.11.1-2 Containment Vessel Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The reactor cavity includes a core debris trap.	5. ~~Inspections~~ An inspection of the as-built reactor cavity will be performed.	5. ~~A report exists and concludes that t~~The as-built reactor cavity includes a core debris trap.
6. The reactor cavity floor area and depth ~~provide enhanced spreading of the~~ facilitate debris spreading and cooling~~bed for coolability~~.	6. Inspections of the as-built reactor cavity floor area and depth will be performed.	6. ~~A report exists and concludes that the sufficient floor area and appropriate depth exists in t~~The as-built reactor cavity floor area and depth are greater than or equal to 972 ft^2 and 20 ft, respectively, to facilitate debris spreading and cooling.
7. Reactor cavity floor concrete ~~is~~ provides~~d~~ ~~to~~ protection ~~against challenge to~~ for the liner plate, which is the pressure boundary between the containment and the environment ~~meltthrough~~.	7. Inspections of the as-built reactor cavity floor concrete will be performed.	7. ~~A report exists and concludes that t~~The as-built reactor cavity ~~includes cavity~~ floor concrete thickness is greater than or equal to 3 ft ~~which is~~ to provide~~d to~~ protection for the ~~against challenge to~~ liner plate ~~meltthrough~~.

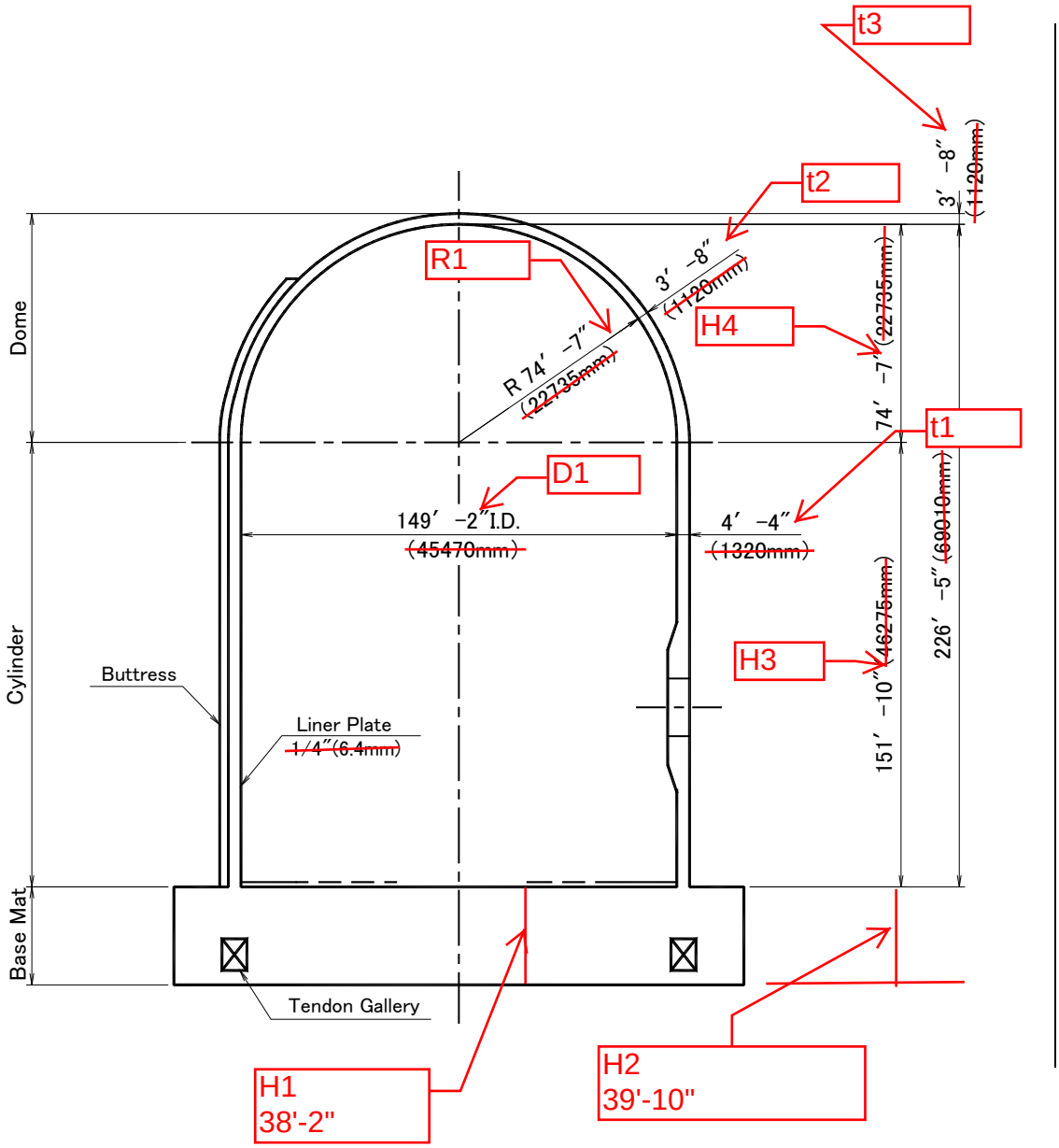


Figure 2.11.1-1 Configuration of Prestressed Concrete Containment Vessel

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.11.1

Item No.	Explanation/Basis for Change
Design Description 2.11.1	
A	Revised to include another common reference to the containment vessel.
A1	Editorial change to improve paragraph structure.
A2	Revised to include a reference to Table 2.11.1-1.
B	Notes 1 and 2. Deleted reference to Section 2.2 because necessary information is included in the revised figure. See item Y and Figure 2.11.1-1.
C	Deleted information not appropriate for Tier 1 Design Description.
D	Deleted information not appropriate for Tier 1 Design Description.
E	Deleted information not appropriate for Tier 1 Design Description.
F	Deleted information not appropriate for Tier 1 Design Description.
G	Deleted information not appropriate for Tier 1 Design Description.
H	Notes 1 and 2. See item Z. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
I	Notes 1 and 2. See item BB. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
J	Notes 1 and 2. See item AA. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
K	Notes 1 and 2. See item CC. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
L	Notes 1 and 2. See items V and W.
M	Deleted information not appropriate for Tier 1 Design Description.
N	Revised to include reference to applicable I&C sections.
N1	Deleted information and revised DD to include reference to applicable I&C sections. See item N.
O	Deleted information and revised DD to include reference to applicable I&C sections. See item N.
P	Deleted negative statement to ensure consistency within Tier 1.
Q	Deleted negative statement to ensure consistency within Tier 1.
R	Deleted reference. Information is discussed in Section 2.2.1.
S	Deleted negative statement to ensure consistency within Tier 1.
T	Deleted information not appropriate for Tier 1 Design Description.
U	Note 1.
V	Notes 1 and 2. See Item L.
W	Notes 1 and 2. See Item L.
X	Note 1.
Y	Notes 1 and 2. See item B.
Z	Notes 1 and 2. See item H.
AA	Notes 1 and 2. See item J.
BB	Notes 1 and 2. See item I.
CC	Notes 1 and 2. See item K.
Table 2.11.1-1	
	No change
ITAAC Table 2.11.1-2	
1.a.	Deleted – Redundant reference ITAAC that is addressed in Section 2.2.4.

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.11.1

Item No.	Explanation/Basis for Change
1.b.	Generic changes made to ASME ITAAC to provide clarity and consistency. [RIS p7, Scope, second bullet] This change alters the response to RAI No. 544-4267, Question 06.01.01-19 (UAP-HF-10114).
1.c.	This ITAAC incorporates the response to RAI No. 544-4267, Question 06.01.01-19 (UAP-HF-10114). Subsequent changes are described below and alter the response to the subject RAI. DC – Revised to be more consistent with the generic ASME ITAAC terminology. This change alters the response to RAI No. 544-4267, Question 06.01.01-19 (UAP-HF-10114). AC – Revised to be more consistent with the generic ASME ITAAC terminology. This change alters the response to RAI No. 544-4267, Question 06.01.01-19 (UAP-HF-10114).
2.	Deleted – Redundant reference ITAAC that is addressed in Section 2.2.4.
3.	DC – Revised to be more consistent with the generic functional arrangement ITAAC terminology. This change alters the response to RAI No. 51, Question 14.03.11-11 (UAP-HF-08183). AC – Revised to be more consistent with the generic functional arrangement ITAAC terminology. This change alters the response to RAI No. 51, Question 14.03.11-11 (UAP-HF-08183).Add dimensional tolerances to clarify the acceptable variation. [RIS 2008-05, page 4, 2nd bullet]
4.	ITA – Revised to more clearly state the intent of the inspections. AC – Revised to comport with ITA. [RIS 2008-05, page 5, 2nd bullet] This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
5.	ITA – Revised to clarify scope. AC – Revised to comport with ITA. [RIS 2008-05, page 5, 2nd bullet] This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
6.	DC – Revised to more clearly state the intent of the Design Commitment and to eliminate subjective terms. [RIS 2008-05, page 4, 2nd bullet] This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198). ITA – Revised to clarify the scope of the inspections. AC – Revised to comport with the DC and ITA, and to provide specific AC values. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
7.	DC – Revised to more clearly state the intent of the Design Commitment and to eliminate subjective terms. [RIS 2008-05, page 4, 2nd bullet] This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198). ITA – Revised to clarify the scope of the inspections. AC – Revised to comport with the DC and ITA, and to provide a specific AC value. This change alters the response to RAI No. 222-1933, Question 14.03.11-21 (UAP-HF-09198).
Figure 2.11.1-1	

Item No.	Explanation/Basis for Change
	Suffix is added on each dimension. The thickness of base mat is provided for completeness. Deleted reference information such as dimensions in metric units and a dimension under liner plate to include only the necessary attributes for ITAAC.

Note 1: Revised to provide consistency between the Design Description (DD) and the Design Commitment (DC) in the ITAAC table. Revised text to include only the necessary attributes for ITAAC.

Note 2: Text relocated within the DD section to align with the sequence and numbering of the corresponding DC in the ITAAC table.

2.3 PIPING SYSTEMS AND COMPONENTS

2.3.1 Design Description

~~This~~ The standard plant design ~~description~~ addresses four areas related to piping systems and components (PSC): (1) piping stress analysis, (2) protection against the dynamic effects of pipe rupture, (3) the leak before break (LBB) aspects of the design of piping systems, and (4) component stress analysis. A

Piping Stress Analysis

Piping and piping supports are analyzed and designed to the requirements of the ASME Code Section III, based on Code classification and ASME Service Level. The requirements of ~~the~~ ASME Code Section III, Subsections NB (Class 1), NC (Class 2), or ND (Class 3) are used in the piping stress ~~qualification~~analysis. Stress analysis of piping and supports considers design basis loads and load combinations applicable to each system. ASME Code Section III, Class 1 piping subject to fatigue analysis is evaluated over the design life of the plant. B C

Table 2.3-3 lists systems that have ASME Code Section III, Class 1, 2 and 3 PSC. D

~~The following are considered in piping system analysis.~~ E

~~Piping modeling technique~~

- ~~Branch lines and instrument connections are decoupled from the analysis model of larger run piping provided that either the ratio of the branch pipe mean diameter to the run pipe mean diameter (D_b/D_r) is less than or equal to 1/3, or the ratio of the moments of inertia of the two lines (I_b/I_r) is less than or equal to 1/25.~~
- ~~In the decoupled piping stress analysis where support is modeled as a restraint versus the integrated analysis, supports are modeled with either calculated actual stiffness of the support structure, or an arbitrarily chosen rigid stiffness.~~

~~Piping stress analysis criteria~~

- ~~The internal design pressure, P, is used in the design and analysis of ASME Code Section III, Class 1, 2 and 3 piping.~~
- ~~The weight of the piping system, its contents, any insulation and in-line equipment, and any other sustained loads identified in the design specification are considered in the piping analysis.~~
- ~~The effect of linear thermal expansion range during various operating modes is considered along with thermal movements of terminal equipment nozzles, anchors, or restraints (thermal anchor movements) corresponding to the operating modes.~~
- ~~The effects of inertial loads and anchor movements due to SSE are considered as service level D loads in the design of piping and piping supports.~~

- ~~The effect of relief/safety valve thrust loads, for open or closed systems, are considered in the design of piping and piping supports.~~ E
- ~~The water hammer phenomenon is set in motion by the rapid actuation of valves or the sudden start or trip of a pump or turbine, and it is analyzed using dynamic analysis methods.~~
- ~~Design basis pipe break (DBPB) loads include the impact of the reactor coolant pressure boundary (RCPB) piping break, main steam and feedwater line breaks except for pipe breaks that meet the LBB criteria (see Subsection 3.6.3) or are located inside the pipe break exclusion area.~~
- ~~ASME Code Section III, Class 1 piping is evaluated for the effects of fatigue caused by various thermal and pressure transients and other cyclic events, including earthquakes and thermal stratifications. The fatigue evaluations consider both air and reactor coolant environments.~~ F
- ~~ASME Code Section III, Class 2 and 3 piping are not explicitly analyzed for calculation of cumulative usage factors. ASME Code Section III, Class 2 and 3 piping are evaluated for the requirements of Section III NC/ND, which allows the reduction of allowable stress for thermal expansion stress ranges based on the number of transient load cycles.~~ G

Protection Against the Dynamic Effects of Piping Rupture

The standard plant is designed for protection against piping failure inside or outside the containment to ~~assure~~ ensure that such a failure would not compromise the functional capability of safety-related systems to ~~restore the plant in the~~achieve and maintain plant safe shutdown condition~~ and maintain it in that condition in the event of such failure~~. The design includes consideration of high-energy and moderate-energy fluid system piping located inside and outside of the containment. The design also protects habitability of the MCR~~ is also protected. In addition~~, and containment penetrations and associated isolation valves against the dynamic effects of piping rupture.~~ are also protected~~. H

~~In order to assure successful protection against the dynamic effects of pipe rupture, the following requirements are satisfied:~~ I

~~-~~Pipe breaks (circumferential and longitudinal) are evaluated for the entire range of effects, including dynamic effects (i.e., pipe whip, jet impingement, jet thrust forces, internal forces due to system decompression, sub-compartment pressurization), environmental conditions, spray wetting, and flooding. When LBB criteria are successfully applied, evaluation of dynamic effects is not required.

~~-Leakage cracks are evaluated for spray wetting, flooding and environmental effects. The dynamic effects of these cracks are not evaluated.~~ J

- ~~Circumferential and longitudinal breaks and leakage cracks are not postulated in the break exclusion zones, but the effects of flooding, spray wetting, and sub-compartment pressurization are evaluated for a postulated 1.0 square foot break for the main steam and feedwater lines at a location that has the greatest effect on essential equipment.~~

- ~~Each postulated piping failure event (pipe break or crack) is considered and analyzed as a single initial event during normal plant operation. For systems not analyzed for seismic conditions, it is considered that SSE event will cause pressure boundary failure at any location.~~ J
- ~~The sub-compartment pressurization loads on structures and components are evaluated for postulated circumferential breaks and longitudinal breaks in piping that cannot be qualified for LBB application.~~

Table 2.3-1 ~~provides a~~ lists ~~of~~ high and moderate energy piping systems ~~considered for~~that are evaluated for the ~~protection of essential systems~~dynamic effects of piping failures. K

Leak-Before-Break (LBB)

~~For applicable~~LBB evaluations are performed for selected high-energy piping, described below, ~~a LBB evaluation is performed for RCPB piping so that~~ to demonstrate that for the piping that meets the LBB criteria, sudden catastrophic failure is not credible. When evaluations demonstrate that the probability of rupture of such piping is extremely low, consideration of the dynamic effects of pipe rupture is eliminated from the design basis for such piping. ~~Additionally the main steam supply system (MSS) piping is evaluated using LBB criteria.~~. The LBB evaluations consider normal and abnormal loads and load combinations to demonstrate compliance with the LBB design criteria. L M N

~~In order to assure successful application of LBB, the following requirements are satisfied:~~ O

- ~~Materials of adequate toughness are used.~~
- ~~Leak detection systems inside the containment meet the requirements of RG 1.45.~~
- ~~100% pre-service inspection of all welds is performed.~~
- ~~In-service inspection and testing of snubbers is performed to assure low snubber failure rate.~~
- ~~The LBB evaluations demonstrate that for piping meeting the criteria, sudden catastrophic failure of the pipe is not credible. This is demonstrated by plant design, operating experience, tests, or analyses that breaks are less likely to occur under the effects of thinning by erosion or corrosion, stress corrosion cracks, water hammer, fatigue (thermal or mechanical), thermal aging, thermal stratification, creep fatigue, indirect factors, and cleavage.~~ P
- ~~The LBB analysis combines normal and abnormal (including seismic) loads to determine a critical crack size for a postulated through-wall crack. The critical crack size is compared to the size of a leakage crack for which detection is certain. If the leakage crack size is significantly smaller than the critical crack size, the LBB requirement is satisfied.~~ Q
- ~~The exclusion of dynamic effects associated with pipe rupture is allowed when analyses demonstrate that the probability of pipe rupture is extremely low for the~~ R

~~applied loading resulting from normal conditions, anticipated transients and a postulated SSE.~~

- ~~For piping systems where design drawings are used to perform the LBB evaluation, the as-built conditions are verified to assure that the design checked for LBB is consistent with the final as-built configuration. The as-built verification includes, but is not limited to, the following:~~ S
  - ~~Material and material specification~~
  - ~~Pipe geometry~~
  - ~~Support locations and their characteristics~~
  - ~~Locations and weights of components such as valves~~

~~Each of the as-built lines~~ Lines identified below ~~is designed to~~ for systems listed in Table 2.3-3 meet the LBB criteria or an evaluation is performed of the dynamic effects of a rupture of the line T

- Reactor coolant ~~loop (RCL) P~~piping
- ~~RCL~~ Reactor Coolant piping branch piping with nominal diameter of 6 inches or larger, except for the steam ~~within the~~ piping for the pressurizer safety valves and power operated relief valves
- Main steam pipe in PCCV

Component Stress Analysis

Components, component supports, and core support structures are analyzed and designed to the requirements of the ASME Code Section III, based on Code classification and ASME Service Level. The requirements of the ASME Code Section III, Subsections NB (Class 1), NC (Class 2), or ND (Class 3) code are used in component stress ~~qualification~~analysis. Stress analysis of components considers design basis loads and load combinations applicable to each system. U Component supports and their attachments for ~~essential~~ ASME Code Class 1, 2, and 3 components are designed in accordance with ASME Code Section III, Subsection NF up to the interface ~~of the~~with a building's structure, with jurisdictional boundaries as defined by Subsection NF. V The requirements of the ASME Code Section III, Subsection NG are used in core support structure stress ~~qualification~~analysis. ~~In addition, the design and installation criteria applicable to over-pressure protection components are included along with the requirements for operability assurance related to maintaining structural and leak tight integrity, pressure retaining capability, and required functionality of pumps and valves.~~ W

~~In order to assure required component stress and functionality are met, the following requirements are satisfied:~~

- ~~In order to assure that ASME components meet the service level stress requirements and functionality requirements, the ASME Code Section III, NCA-2000 requires that a design specification be prepared for ASME Code Section III, Class 1, 2, and 3 components. The specification requires that the ASME Code Section III,~~

~~Class 1 stress analyses for components and core support structures consider sustained loads (including dead load, pressure, and thermal expansion), system operational transient loads (thermal and fluid pressure transients), seismic loads, and pipe rupture loads (design pipe breaks, unless modified by LBB evaluations, LOCA).~~ Additionally, ASME Code Section III, Class 1 pressure boundary components are subject to fatigue usage evaluations over the ~~60-year plant~~ design life of the plant. X

- ~~The basis of the ASME component design acceptance for applicable loading combinations involves comparison of calculated stress and fatigue demand levels to acceptable stress and fatigue capacity allowables specified by ASME Code Section III. The ASME Code acceptance standards differ depending on whether a component is classified as ASME Code Section III, Class 1, 2, or 3.~~ Y
- ~~In addition to the ASME classification, plant operational modes and frequency of system operating and/or transient events are used to define which ASME service limit (Level A [Normal], Level B [Upset], Level C [Emergency], Level D [Faulted], and Test) applies. The design specifications for ASME Code Section III, Class 1, 2 and 3 components, supports, and appurtenances are prepared under administrative procedures that meet or exceed the ASME Code requirements. These specifications conform to and are certified to the requirements of ASME Code Section III depending on the component classification. The Code also requires a design report for safety-related components, to demonstrate that component design meets the requirements of the relevant ASME design specification and the applicable ASME Code.~~

Table 2.3-3 lists systems that have ASME Code Section III, Class 1, 2 and 3 PSC. Z

1.a The ASME Code Section III, Class 1 piping and valves for systems identified in Table 2.3-3 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads. AA

1.b The ASME Code Section III, Class 1 components, except valves for systems identified in Table 2.3-3 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads. BB

1.c The usage factors for ASME Code Section III Class 1 piping and valves for systems identified in Table 2.3-3, except reactor coolant piping and pressurizer surge line piping, are evaluated for both air and reactor coolant environments. CC

1.d The usage factors for ASME Code Section III Class 1 components and reactor coolant piping and pressurizer surge line piping for systems identified in Table 2.3-3 are evaluated for both air and reactor coolant environments. DD

2.a Reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV for systems identified in Table 2.3-3 are designed in accordance with the LBB method. EE

2.b High energy piping for systems identified in Table 2.3-3, except reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV, are designed in accordance with the LBB method. FF

3. The ASME Code Section III, Class 2 and 3 PSC for systems identified in Table 2.3-3 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads. GG

4. Safety-related SSCs are protected against or qualified to withstand the dynamic and environmental effects associated with analyses of postulated failures in high-energy piping and moderate-energy piping systems identified in Table 2.3-1. HH

5. Safety-related SSCs are reconciled with the as-designed high-energy pipe break mitigation features. II

2.3.2 ~~Generic Design and Specific System ITAAC~~Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.3-2 ~~identifies~~describes the design ITAAC for ~~The~~ piping systems and components. ~~ITAAC are divided into generic design ITAAC and the system specific ITAAC. The ITAAC for generic piping systems and component design are located in Table 2.3-2. The ITAAC for specific piping systems and components, other than design ITAAC, are located in their respective fluid system sections, such as Section 2.4, Reactor Systems, Section 2.7, Plant Systems, and Section 2.11, Containment Systems.~~ JJ

Table 2.3-1 High and Moderate Energy Piping System Considered for Protection of Essential Systems[1]

System	High-Energy	Moderate-Energy
Reactor coolant system (RCS)	X	–
Chemical and volume control system (CVCS)	X	–
Safety injection system (SIS)	X	–
Residual heat removal system (RHRS[2])	–	X
Emergency feedwater system (EFWS)[2]	–	X
Feedwater system (FWS)	X	–
Main steam supply system (MSS)	X	–
Containment spray system (CSS)	–	X
Component cooling water system (CCWS)	–	X
Spent fuel pit cooling and purification system (SFPCS)	–	X
Essential service water system (ESWS)	–	X
Gaseous waste management system (GWMS)	–	X
Liquid waste management system (LWMS)	–	X
Solid waste management system (SWMS)	–	X
Process and Post-accident s~~S~~ampling system (PSS)	X	–
Steam generator blowdown system (SGBDS)	X	–
Refueling water storage system (RWS)	–	X
Primary wakeup water system (PMWS)	–	X
Auxiliary steam supply system (ASSS)	X	–
Instrument air system (IAS)	–	X
Fire protection water supply system (FSS)	–	X
Station service air system (SSAS)	–	X
Essential ~~C~~chilled water system (~~VWS~~ECWS)	–	X
Non-essential chilled water system (non-ECWS)	–	X

NOTES:

1. High-energy piping includes those systems or portions of systems in which the maximum normal operating temperature exceeds 200°F or the maximum normal operating pressure exceeds 275 psig. Piping systems or portions of systems pressurized above atmospheric pressure during normal plant conditions and not identified as high-energy are considered as moderate-energy. Piping systems that exceed 200°F or 275 psig for 2% or less of the time during which the system is in operation are considered moderate-energy.
2. The RHRS and EFWS lines are classified as moderate-energy based on the 2% rule. These lines experience high-energy conditions for less than 2% of the system operation time. The portions of the RHRS from the connections to the RCS to the first closed valve in each line are high-energy.

Table 2.3-2 Piping Systems and Components Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of ~~2~~3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The ASME Code Section III, Class 1 piping systems and components (PSC) for systems identified in Table 2.3-3 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads.	1.a An inspection of the stress report(s) for the ASME Code, Section III, Class 1 ~~PSC~~ piping and valves for systems identified in Table 2.3-3 will be performed.	1.a The stress report(s) exist and conclude that the design of the ASME Code Section III Class 1 ~~PSC~~ piping and valves for systems identified in Table 2.3-3 comply with the requirements of the ASME Code Section III.
	1.a.ii An inspection of the stress report for the ASME Code, Section III, Class 1 components, except valves for systems identified in Table 2.3-3 will be performed.	1.a.ii The stress report(s) exist and conclude that the design of the ASME Code Section III Class 1 components, except valves for systems identified in Table 2.3-3 comply with the requirements of the ASME Code Section III.
1.b The usage factors for ASME Code Section III Class 1 piping ~~systems~~and valves for systems identified in Table 2.3-3, except reactor coolant piping and pressurizer surge line piping, are evaluated for both air and reactor coolant environments.	1.b An analysis of the ASME Code, Section III, Class 1 piping ~~systems~~ and valves for systems identified in Table 2.3-3, except for reactor coolant loop piping and pressurizer surge line piping, will be performed.	1.b Report(s) exist and conclude that the usage factors for ASME Code Section III Class 1 piping ~~systems~~ and valves for systems identified in Table 2.3-3, except reactor coolant piping and pressurizer surge line piping, are evaluated for air and reactor coolant environments.
1.c The usage factors for ASME Code Section III Class 1 components and reactor coolant piping and pressurizer surge line piping for systems identified in Table 2.3-3 are evaluated for both air and reactor coolant environments.	1.c An analysis of the ASME Code, Section III, Class 1 components and reactor coolant piping and pressurizer surge line piping for systems identified in Table 2.3-3 will be performed.	1.c Report(s) exist and conclude that the usage factors for ASME Code Section III Class 1 components and reactor coolant piping and pressurizer surge line piping for systems identified in Table 2.3-3 are evaluated for air and reactor coolant environments.

Table 2.3-2 Piping Systems and Components Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2.a ~~RCPB~~ Reactor coolant piping, pressurizer surge line piping and ~~MSS~~main steam piping ~~systems~~ in the PCCV for systems identified in Table 2.3-3 are designed in accordance with the LBB method.	2.a A LBB analysis using the LBB method will be performed for each ~~RCPB~~ reactor coolant loop piping, pressurizer surge line piping and ~~MSS~~ main steam piping ~~system~~in the PCCV for systems identified in Table 2.3-3.	2.a The results of the LBB analysis for each reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV for systems identified in Table 2.3-3 conclude that the stress values conform to the LBB acceptance criteria using the LBB assumptions.
2.b Portions of the high energy piping for systems identified in Table 2.3-3, except reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV, are designed in accordance with the LBB method.	2.b A LBB analysis using the LBB method will be performed for portions of the high energy piping for systems identified in Table 2.3-3, except reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV.	2.b The results of the LBB analysis for portions of the high energy piping for systems identified in Table 2.3-3, except reactor coolant piping, pressurizer surge line piping and main steam piping in the PCCV conclude that the stress values conform to the LBB acceptance criteria using the LBB assumptions.
3. The ASME Code Section III, Class 2 and 3 ~~piping systems and components (~~PSC~~)~~ for systems identified in Table 2.3-3 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design basis loads.	3.i An inspection of the stress report(s) for the ~~risk-significant~~ ASME Code, Section III, Class 2 and 3 PSC for systems identified in Table 2.3-3, except for accumulator, main steam piping in the PCCV, safety injection pump, CS/RHR pump, charging pump, emergency feedwater pump (motor driven), emergency feedwater pump (turbine driven) and component cooling water pump, will be performed	3.i The stress report(s) exist and conclude that the design of the ~~risk-significant~~ ASME Code Section III Class 2 and 3 PSC for systems identified in Table 2.3-3, except for accumulator, main steam piping in the PCCV, safety injection pump, CS/RHR pump, charging pump, emergency feedwater pump (motor driven), emergency feedwater pump (turbine driven) and component cooling water pump, comply with the requirements of ASME Code Section III.
	3.ii An inspection of the stress report(s) for ~~low risk ASME Code Section III, Class 2 and 3 PSC~~ accumulator, main steam piping in the PCCV, safety injection pump, CS/RHR pump, charging pump, emergency feedwater pump (motor driven), emergency feedwater pump (turbine driven) and component cooling water pump will be performed.	3.ii The stress report(s) exist and conclude that the design of the ~~low risk ASME Section III, Class 2 and 3 PSC~~ accumulator, main steam piping in the PCCV, safety injection pump, CS/RHR pump, charging pump, emergency feedwater pump (motor driven), emergency feedwater pump (turbine driven) and component cooling water pump comply with the requirements of ASME Code Section III.

Table 2.3-2 Piping Systems and Components Inspections, Tests, Analyses, and Acceptance Criteria (Sheet ~~2~~ 3 of ~~2~~3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Safety-related SSCs ~~have adequate high-energy pipe break mitigation features~~ are designed to be protected against or qualified to withstand the dynamic and environmental effects associated with analyses of postulated failures in high-energy piping and moderate-energy piping systems identified in Table 2.3-1.	4.i ~~A pipe break analysis of the as-built high-energy line will be performed.~~ Dynamic effects analysis will be performed for the high-energy piping systems identified in Table 2.3-1. The analysis includes the evaluation of pipe whip and jet impingement.	4.i ~~The reconciliation of the as-built configuration of high-energy pipe lines concludes that,~~ Pipe break hazard analysis report(s) exist and conclude that for each postulated piping failure for the high-energy piping systems identified in Table 2.3-1: ~~, the reactor can be shut down safely and maintained in a safe, cold shutdown condition without offsite power.~~ ~~For postulated pipe breaks, The the report confirms whether~~ (A) piping stresses in the containment penetration area are within allowable stress limits, (B) pipe whip restraints and jet shield designs can mitigate pipe break loads, (C) loads on safety-related SSCs are within design load limits~~and (D) SSCs are protected or qualified to withstand the environmental effects of postulated failures.~~
	4.ii Environmental effects analysis will be performed for the high-energy piping and moderate-energy piping systems identified in Table 2.3-1. The analysis includes the evaluation for wetting from spray, flooding, room pressurization, and temperature effects, as applicable.	4.ii Pipe break hazard analysis report(s) exist and conclude that for each postulated piping failure of the high-energy and moderate-energy systems identified in Table 2.3-1, the safety related SSCs are protected or qualified to withstand the environmental effects of postulated failures.
5. Safety-related SSCs are reconciled with the analyses results of as-designed pipe break hazard analysis report(s).	5. A reconciliation analysis of the as-built high-energy piping and moderate-energy piping using as-designed pipe break hazard analysis report(s) and as-built information will be performed.	5. Pipe break hazard analysis report(s) exist and conclude that the as-built high-energy piping systems including the protective features and moderate-energy piping systems are installed in the as-built plant as described in the as-designed pipe break hazard analysis report(s).

Table 2.3-3
Systems with ASME Code Section III, Class 1, 2 and 3 Piping Systems and Components

Tier 1 Section	System Name	ASME Code Section III			LBB
		1	2	3	
2.4.1	Reactor Systems	X	-	-	-
2.4.2	Reactor Coolant System	X	X	-	X
2.4.4	Emergency Core Cooling System	X	X	-	X
2.4.5	Residual Heat Removal System	X	X	X	X
2.4.6	Chemical and Volume Control System	X	X	X	-
2.6.4	Emergency Power Source	-	-	X	-
2.7.1.2	Main Steam Supply System	-	X	X	X
2.7.1.9	Condensate and Feedwater System	-	X	X	-
2.7.1.10	Steam Generator Blowdown System	-	X	X	-
2.7.1.11	Emergency Feedwater System	-	X	X	-
2.7.3.1	Essential Service Water System	-	-	X	-
2.7.3.3	Component Cooling Water System	-	X	X	-
2.7.3.5	Essential Chilled Water System	-	-	X	-
2.7.3.6	Non-Essential Chilled Water System	-	X	X	-
2.7.6.3	Spent Fuel Pit Cooling and Purification System	-	-	X	-
2.7.6.7	Process and Post-accident Sampling System	-	X	-	-
2.7.6.8	Equipment and Floor Drainage System	-	-	X	-
2.11.2	Containment Isolation System	-	X	X	-
2.11.3	Containment Spray System	-	X	-	-

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.3 Piping Systems and components

Item No.	Explanation/Basis for Change
2.3 Piping Systems and Components	
Design Description 2.3	
A	Editorial change
B	Editorial change
C	New text added for the design basis for the piping stress analysis.
D	Added reference to new Table 2.3-3 to identify systems that have ASME Section III, Class 1, 2 and 3 PSCs
E	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
F	Note 2. See items CC and DD. This change alters the response to RAI 404, Question 14.03.03-17.
G	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
H	Editorial change
I	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
J	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
K	Editorial changes.
L	Revised and relocated text for clarity of LBB criteria. (See Item P)
M	Revised and relocated text for clarity of LBB criteria. (See Item R)
N	Revised and relocated (See item Q)
O	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
P	Revised and relocated text for clarity of LBB criteria. (See Item L)
Q	Revised and relocated (See item N)
R	Revised and relocated text for clarity of LBB criteria. (See Item M)
S	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
T	Editorial changes
U	Editorial change and new text added for the design basis for component stress analysis.
V	Editorial changes
W	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
X	Editorial changes
Y	Deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
Z	Added reference to new Table 2.3-3 to identify systems that have ASME Section III, Class 1, 2 and 3 PSCs.
AA	Note 1
BB	Note 1
CC	Note 1 and 2. See Item F
DD	Note 1 and 2. See Item F
EE	Note 1

Item No.	Explanation/Basis for Change
FF	Note 1
GG	Note 1
HH	Note 1
II	Note 1
JJ	Editorial change and deleted text to include only the necessary design information in the DD in accordance with NRC guidance in SRP Section 14.3.
Table 2.3-1	
	Changed to provide consistency and clarity for the following system name: – "Sampling system" to "Process and Post-accident Sampling System" – "Chilled water system" to "Essential Chilled Water System" and "Non-Essential Chilled Water System"
ITAAC Table 2.3-2	
1.a	1.a.i DC, ITA, AC 1. Incorporation, with editorial changes, of ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010 revised this ITAAC item by splitting ITAAC Item 1.a of Rev. 2 of the Table 2.3-2 of Tier 1. Also added reference to Table 2.3-3. 2. These changes alter the responses to RAI 242, Question14.03.03-3, RAI 404, Questions 14.03.03-17 and -19. 3. These changes also alter the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010.
	1.a.ii ITA, AC 1. Incorporated ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010 and added reference to Table 2.3-3. 2. This change alters the responses to RAI 404, Question 14.03.03-17 and -19. 3. This also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010
1.b	DC, ITA, AC 1. Incorporated ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010 and added reference to Table 2.3-3. 2. Corrected typographical error in DC, ITA and AC from MHI letter UAP-HF-10207, dated July 21, 2010 and added reference to Table 2.3-3. 3. This change alters the responses to RAI 404, Question 14.03.03-17. 4. This also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010.
1.c	DC, ITA, AC 1. Corrected typographical error in DC, ITA and AC from MHI letter UAP-HF-10207, dated July 21, 2010. 2. Incorporation, with editorial changes, of ITAAC changes from MHI letter UAP-HF-10207, dated July 21, 2010 added the 'Pressurizer Surge Line Piping" and reference to Table 2.3-3 3. This change alters the responses to RAI 404, Question 14.03.03-17 and -19. 4. This also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010.
2.a	DC, ITA, AC 1. Incorporated, with editorial changes, ITAAC changes from MHI letter UAP-HF-10207, dated July 21, 2010. Added reference to Table 2.3-3. 2. This also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010. 3. Corrected typographical error in DC, ITA and AC from MHI letter UAP-HF-10207, dated July 21, 2010.

Tier 1 Changes Explanation/Basis Document
Tier 1, Section 2.3 Piping Systems and components

Item No.	Explanation/Basis for Change
2.b	DC, ITA, AC 1. Incorporated, with editorial changes, ITAAC changes from MHI letter UAP-HF-10207, dated July 21, 2010. Added 'Portions of high energy' before 'Piping' in the beginning of the DC statement. Added reference to Table 2.3-3. 2. These changes alter the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010. 3. Corrected typographical error in DC, ITA and AC from MHI letter UAP-HF-10207, dated July 21, 2010.
3	DC 1. Incorporated ITAAC changes from MHI letter UAP-HF-10207 dated July 21. 2. Made editorial changes and added reference to Table 2.3-3. 3. This alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010. 4. This change does not impact the response to RAI 404, Question 14.03.03-19.
3.i	ITA, AC. 1. Incorporated, with editorial changes, ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010. 2. Added reference to Table 2.3-3. 3. These changes alter the responses to RAI 242, Question 14.03.03-3, RAI 404, Question 14.03.03-18 and -19 and RAI 499, Question14.03.03-23. 4. These changes also alter the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010.
3.ii	ITA, AC 1. Incorporated, with editorial changes, ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010. 2. These changes alter the responses to RAI 242, Question 14.03.03-3, RAI 404, Question 14.03.03-18 and -19 and RAI 499, Question14.03.03-23. 3. These changes also alter the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010.
4	DC 1. Incorporated ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010. 2. Added reference to Table 2.3-1. 3. This change alters the response to RAI 180, Question 3.6.1-4 and RAI 459, Question 03.06.02-39. 4. This change also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010
4.i	ITA, AC 1. Incorporation of ITAAC Tables changes from MHI letter UAP-HF-10207 dated July 21, 2010. 2. Editorial change to the AC 3. Added reference to Table 2.3-1 4. This change alters the response to RAI 180, Question 3.6.1-6, RAI 459, Question 03.06.02-39, and RAI 636, Question 03.06.02-48. 5. This change also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010

Item No.	Explanation/Basis for Change
4.ii	ITA, AC 1. Incorporation of new ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010 created this as a new ITAAC item. 2. Editorial change to the AC 3. Added reference to Table 2.3-1. 4. This change alters the response to RAI 180, Question 3.6.1-6 and RAI 459, Question 03.06.02-39, and RAI 636, Question 03.06.02-48. 5. This change also alters the 'wording' in MHI letter UAP-HF-10207 dated July 21, 2010
5	DC, ITA, AC 1. Incorporation of ITAAC changes from MHI letter UAP-HF-10207 dated July 21, 2010 that created this as a new ITAAC item. 2. This does not impact the response to RAI 459, Question 03.06.02-39 and RAI 636, Question 03.06.02-48
Table 2.3-3	
	Added Table 2.3-3 to identify systems with ASME Section III PSC.

Note 1: Revised to provide consistency between the Design Description (DD) and the Design Commitment (DC) in the ITAAC table. Revised text to include only the necessary attributes for ITAAC.

Note 2: Text relocated within the DD section to align with the sequence and numbering of the corresponding DC in the ITAAC table.