

sections and design attributes of the NI and EDGB; and (2) the design and construction of the NI and EDGB and the site-specific structures, the ESW and the CCWHX buildings, are in accordance with the applicable codes and standards listed in Table 2.2.1-5 of DCD, Tier 1. The staff reviewed Table 2.2.1-4 and the ITAAC in Table 2.2.1-2, Items 5 and 6; ITAAC Table 2.2.2-2, Items 4 and 5; ITAAC Table 2.2.8-1, Item 2; and ITAAC Table 2.2.9-1, Item 2, and considers the ITAAC proposed by the applicant to be acceptable because the ITAAC provide necessary information to verify the structural integrity of these buildings so that they can withstand seismic design bases loads without loss of their safety functions. Accordingly, the staff considers **RAI 557-9199 Question 03.08.05-20** and **RAI 558-9456 Question 14.03.01-1** to be resolved. Pending the update to applicable sections in DCD Tier 1 and Tier 2, **RAI 557-9199 Question 03.08.05-20** is being tracked as a confirmatory item.

In DCD Tier 1, Section 2.2.2, the applicant stated that the EDGB block comprises two extra buildings: one that houses an additional two generators, and one that houses the diesel fuel oil tank (DFOT). The staff issued RAI 255-8285, Question 03.08.05-06 (ML15293A569), requesting the applicant to provide the ITAAC items for the DFOT building. In its response to RAI 255-8285, Question 03.08.05-06 (ML16036A129), the applicant clarified that the DFOT building is part of the EDGB block and, thus, the ITAAC items listed in Table 2.2.2-2 of DCD Tier 1, Section 2.2.2.1, also apply to the DFOT. The applicant also provided marked-up changes of the ITAAC. The staff reviewed the response and finds the proposed changes acceptable in clarifying the applicability of the ITAAC to the DFOT building, a major structural system in the APR1400 design. The staff confirmed that DCD Tier 2, Revision 1, dated March 10, 2017, was revised as committed in the response to RAI 255-8285, Question 03.08.05-06. Therefore, the staff considers RAI 255-8285 **1.2.14** Question 03.08.05-06, resolved and closed.

As indicated in Tier 2, Section **1.14** Rev. 2, the seismic and structural design of the TGB, CPB, ESWB, and CCWHXB are not within the scope of the certified design, but will be performed by the COL applicant. Nonetheless, Tier 1 Sections 2.2.3, 2.2.4, 2.2.8, and 2.2.9 provide design descriptions and ITAAC for these structures. For the TGB and CPB, the design descriptions and ITAAC relate to ensuring that failure of these Seismic Category II structures do not impair the ability of the safety-related SSCs to perform their safety-related functions. For the ESWB and CCWHXB, the design descriptions and ITAAC relate to ensuring that these structures can withstand the structural design basis loads.

The staff reviewed these tables and figures and finds the ITAAC for the NI, EDGB, TGB, CPB, ESWB, and CCWHXB includes the major structural systems in the APR1400 design to verify the structural capability of the buildings consistent with SRP acceptance criterion 14.3.2.II.2. The detailed review of the following items are in the next subsections:

- Standard design structural integrity
- Pressure boundary integrity
- Normal and seismic loads
- External loads
- Pipe break
- Codes and standards
- As-built reconciliation

In DCD Tier 1, Tables 2.2.6-2 and 2.2.7-2, the applicant proposed ITAAC for the reactor vessel internals and the in-core instrument guide tube system. The staff evaluated the structural and systems engineering related ITAAC in SER Section 3.9.5. In SER Section 14.3.3.4.3, the staff evaluated the piping and component related ITAAC. The staff conclusion on ITAAC Tables 2.2.6-2 and 2.2.7-2, is found in SER Section 3.9.5.

14.3.2.4.4 *Normal and Seismic Loads*

In DCD Tier 1, Section 2.2.1, 2.2.2, 2.2.8, and 2.2.9, the applicant states that the NI structures, EDGB, ESWB, and CCWHXB are designed and constructed to withstand the design-basis loads associated with normal plant operations (including dead live loads, lateral earth pressure loads, hydrodynamic loads and equipment loads, the effect of temperature and equipment vibration), external events (including earthquake), and internal events (including pipe rupture). In DCD Tier 1 the design commitment in Table 2.2.1-2, item 3, Table 2.2.2-2, item 2, Table 2.2.8-1, item 1, and Table 2.2.9-1, item 1, respectively states that the NI structures, EDGB, ESWB, and CCWHXB are designed and constructed to withstand the design-basis loads, which will be verified and documented in a structural analysis report created to satisfy the corresponding ITAAC for this design commitment.

Therefore, the staff finds these ITAAC acceptable because they meet the SRP acceptance criterion 14.3.2.II.5, for an analysis to reconcile the as-built plant with the structural design-basis loads (which include the combination of normal and accident loads with the effects of natural phenomena), and SRP acceptance criterion 14.3.2.II.6, related to the verification that the safety-related systems and structures have been designed to seismic loads.

The staff reviewed the nonseismic Category I structures discussed in DCD Tier 1, Section 2.2.3 and Table 2.2.3-1, item 1 (the TGB), and DCD Tier 1, Section 2.2.4 and Table 2.2.4-1, item 1 (the CPB). Each ITAAC states that seismic Category II buildings do not impair the ability of safety-related SSCs to perform their safety-related function as verified through analyses and inspections, and documented in a report. However, in DCD Revision 0, Tier 1, the applicant did not mention the AAC gas turbine generator building, which is characterized as a seismic Category II structure in DCD Tier 2, Table 3.2-1, "Classification of Structures, Systems, and Components." Therefore, the staff issued RAI 252-8299, Question 03.07.02-15, item (b) (ML15293A566), requesting the applicant to clarify the interaction of the AAC gas turbine generator building with the seismic Category I structures. In its response to RAI 252-8299, Question 03.07.02-15 (ML16089A155), the applicant stated that the AAC gas turbine generator building is located at a considerable distance from the seismic Category I structures and that the interaction criterion for the building is maintenance of sufficient separation between nonseismic Category I structures and seismic Category I structures.

The staff reviewed DCD Tier 2, Figure 1.2-1, and concluded that the AAC gas turbine generator building is at a sufficient distance from seismic Category I structures and does not impair the integrity of an adjacent seismic Category I structure or affect the ability of safety-related SSCs to perform their safety-related function under the effect of a seismic event. The staff confirmed that DCD Revision 1, dated March 10, 2017, was revised as committed to in the response to RAI 252-8299, Question 03.07.02-15. Therefore, the staff considers RAI 252-8299, Question 03.07.02-15, resolved and closed. Based on the discussion above, the staff finds the ITAAC for the nonseismic Category I structures acceptable because the ITAAC conforms to SRP acceptance criterion 14.3.2.II.6, which states that the failure of these structures will not impair the ability of nearby safety-related SSCs to perform their safety-related functions.

In DCD Tier 1, Section 2.2.5, and Table 2.2.5-1, item 1, the applicant provides ITAAC that can verify flood protection features consistent with SRP 14.3.2.II.8; i.e., external walls below flood level are equal to or greater than 0.6 meter (2 feet) to protect against water seepage. Therefore, the staff finds this acceptance criterion acceptable. DCD Tier 1, Section 2.2.5.1.2, addresses the internal flooding sources from high-energy or moderate-energy piping failure, and non-seismically designed component or tank failure, including the operation of the fire protection system. In DCD Tier 1, Table 2.2.5-1, item 2, the applicant provides the characteristics of the protective provisions against internal flooding. The staff evaluated this ITAAC in SER Section 3.4.1.4.10, "ITAAC for Internal Flood Protection for Onsite Equipment Failures."

In DCD Tier 1, Section 2.2.5.1.3, and Table 2.2.5-1, item 3, the applicant discusses the key characteristics of the protective provisions against fire hazards and the ITAAC to verify the as-built design. The staff discusses the protection against fire hazards in SER Section 9.5.1, and the staff's evaluation of the fire protection ITAAC. Similarly, DCD Tier 1, Section 2.2.5.1.4 and Table 2.2.5-1, item 4, discuss the protective provisions against internally generated missiles. The staff discusses protection against this hazard and this ITAAC in SER Section 3.5.1.

14.3.2.4.6 Pipe Break

DCD Tier 1, Section 2.3, "Piping Systems and Components," addresses the analysis of protection against the dynamic effects of piping rupture. The staff evaluates the piping ITAAC in SER Section 14.3.3.

14.3.2.4.7 Codes and Standards

The NRC endorses the ASME B&PV codes under 10 CFR 50.55a, "Codes and Standards," and referenced in the ITAAC tables found in DCD Tier 1, Section 2.2, for the design and construction of safety-related systems and components. Therefore, the staff finds the applicant's use of these codes and standards acceptable and consistent with the SRP acceptance criterion 14.3.2.II.10, to ensure the applicable requirements of GDC 1 have been adequately addressed.

However, the staff noticed that some of the ITAAC were missing the code, section, division and/or class information. The staff issued RAI 247-8314, Question 14.03.02-01 (ML15296A015), requesting the applicant to specify the code, section, division, and class information in Table 2.2.1-2, items 2.a, 2.b, and 2.c, as applicable. In its response to RAI 247-8314, Question 14.03.02-01 (ML15327A441), the applicant added the applicable code, sections, divisions, and class information. The staff confirmed that DCD Tier 1, Revision 1, dated March 10, 2017, was revised as committed to in the response to RAI 247-8314, Question 14.03.02-01. Therefore, the staff considers RAI 247-8314, Question 14.03.02-01, resolved and closed.

Codes and Standards

As Part of the Tier 1 review, the NRC staff issued RAI 557-9199, Question 03.08.05-20 requesting the applicant to identify the applicable codes and standards used for the design of the APR1400. In its response to RAI 557-9199 Question 03.08.05-20, dated May 30, 2018 (ML18150A582) the applicant added Table 2.2.1-5, "Principal Design Codes," listing the codes and standards used for the design of the NI, EDGB, ESWB, and CCWHXB. The applicant further stated that the tolerances for the dimensions in Table 2.2.1-1 and Figures 2.2.1-1 through 2.2.1-13 for the NI and in Table 2.2.2-1 and Figures 2.2.2-1 through 2.2.2-2 for the EDG building shall be in accordance with ACI 117 for concrete structures, ANSI/AISC 303 for