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MFN 08-086 Supplement 3 Docket No. 52-010

February 15, 2008

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application, RAI Numbers 14.3-185, 14.3-213, 14.3-214, 14.3-282, 14.3-283, 14.3-341, 14.3-342, 14.3-344, 14.3-364, 14.3-377, and 14.3-390**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter dated December 20, 2007 (Reference 1). The GEH response to RAI Numbers 14.3-185, 14.3-213, 14.3-214, 14.3-282, 14.3-283, 14.3-341, 14.3-342, 14.3-344, 14.3-364, 14.3-377, and 14.3-390 is contained in Enclosure 1. Enclosure 2 contains the DCD Tier 1 markups.

If you have any questions or require additional information, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

Reference:

1. MFN-07-718. Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 126 Related To ESBWR Design Certification Application,* December 20 2007.

Enclosure:

1. MFN 08-086, Supplement 3, Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application, RAI Numbers 14.3-185, 14.3-213, 14.3-214, 14.3-282, 14.3-283, 14.3-341, 14.3-342, 14.3-344, 14.3-364, 14.3-377, and 14.3-390

2. MFN 08-086, Supplement 3, DCD Tier 1 Markups

cc:	AE Cubbage	USNRC (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	eDRF	0000-0080-4819

Enclosure 1

MFN 08-086, Supplement 3

Response to Portion of NRC Request for

Additional Information Letter No. 126

Related to ESBWR Design Certification Application

RAI Numbers 14.3-185, 14.3-213, 14.3-214, 14.3-282, 14.3-283, 14.3-341, 14.3-342, 14.3-344, 14.3-364, 14.3-377, and 14.3-390

RAI 14.3-185:

DCD Tier 1, Revision 4, Section 2.1.2 Nuclear Boiler System, Table 2.1.2-3, ITAAC 2a and 2b. Change the following in the Design Commitment: "designed and constructed" to "designed, fabricated, installed, and inspected" similar to GDCS ITAAC # 2a, b. They should be consistent.

GEH Response

DCD Tier 1, Revision 4, ITAAC Table 2.1.2-3, ITAAC 2a and 2b, GEH will change "designed and constructed" to "designed, fabricated, installed, and inspected" in the design commitment. This change will be applied to the following DCD Tier 1 subsections and Tables:
2.1.1, DD, Item 3 and Table 2.1.1-3, ITAAC 3, DC
2.1.2, DD, Item 2a, and Table 2.1.2-3, ITAAC 2a, DC
2.1.2, DD, Item 2b, and Table 2.1.2-3, ITAAC 2b, DC
2.2.2, DD, Item 2a and Table 2.2.2-7, ITAAC 2a, DC

Table 2.4.1-3, ITAAC 2a, DC
Table 2.4.1-3, ITAAC 2b, DC
2.6.2, DD, Item 2a and Table 2.6.2-2, ITAAC 2a, DC
2.15.1, DD, Item 2 and Table 2.15.1-2, ITAAC 2, DC
2.15.4, DD, Item 2a and Table 2.15.4-2, ITAAC 2a, DC
2.15.4, DD, Item 2b and Table 2.15.4-2, ITAAC 2b, DC

In response to RAI 14.3-198 response (MFN 08-086, dated February 6, 2008), this change will also be applied to DCD Tier 1, Subsection 2.2.4, DD, Item 10a and Table 2.2.4-6, ITAAC 10a, DC, and Subsection 2.2.4, DD, Item 10b and Table 2.2.4-6, ITAAC 10b, DC.

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-213:

The staff recommends the following changes to DCD Tier 1, Table 2.1.2-3, "ITAAC For Nuclear Boiler System," in order to provide clarification. Since ITAACs 2, 3, and 4 apply to all systems that contain ASME Code Class 1, 2, or 3 components, the staff also requests that the applicant review ITAAC for ALL Class 1, 2, and 3 systems and verify that they are consistent with the Nuclear Boiler System ITAAC where applicable.

ASME Code Section III

ITA 2(a) states: "Inspection will be conducted of the as-built components as documented in the ASME design reports." The staff requests that the applicant modify ITA 2(a) as follows: "Inspection of certified documents for as-built components will be conducted."

Pressure Boundary Welds

ITA 3(a) states: "Pressure boundary welds in components identified in Table 2.1.2-1a as ASME Code Section III meet ASME Code Section III requirements." The staff requests that the applicant modify ITA 3(a) as follows: "Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III."

GEH Response

DCD Tier 1, Revision 4 Table 2.2.1-3, GEH will change the ITA for ITAAC 2a and 3a as requested. This change will be applied to the following DCD Tier 1 Tables:
T2.1.1-3, ITAAC 3a, ITA
T2.1.2-3, ITAAC 2a, 2b, 3a, ITA
T2.2.2-7, ITAAC 2a, 2b, ITA
T2.2.4-6, ITAAC 10a, 10b, ITA
T2.4.1-3, ITAAC 2a, 2b, ITA
T2.4.2-3, ITAAC 2a, 2b, ITA
T2.6.2-2, ITAAC 2a, 2b, ITA
T2.15.1-2, ITAAC 3a, ITA
T2.15.4-2, ITAAC 2a, 2b, ITA

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-214:

DCD Tier 1, Table 2.6.1-2 "ITAAC For The Reactor Water Cleanup/Shutdown Cooling System" appears to be missing some line items including ITAAC to verify design and construction to ASME Code Section III and ITAAC for pressure boundary welds. Please update DCD Tier 1 accordingly.

GEH Response

DCD Tier 1, Revision 4, Table 2.6.1-2, and 2.6.1, Design Description, GEH will add line items for ITAAC to verify design and construction to ASME Code Section III (new ITAAC 8a, 8b) and ITAAC for pressure boundary welds (new ITAAC 9a, 9b).

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-282:

In Table 2.1.1-3, ITAAC #5, the staff requests that the applicant replace "conform" with "comply".

Generic – wherever the acceptance criteria specify compliance with regulatory requirements or ASME Code requirements, the staff requests the applicant to use the more appropriate terminology of "comply" rather than "conform".

GEH Response

DCD Tier 1, Revision 4, ITAAC Table 2.1.1-3, ITAAC 5, GEH will change "conform" to "comply".

GEH will also change "conform" to "comply" where the acceptance criteria specify compliance with regulatory requirements or ASME Code requirements, which includes the following DCD Tier 1, Revision 4, Tables:
T2.1.1-3, ITAAC 5, AC
T2.1.2-3, ITAAC 4a, 4b, AC
T2.2.2-7, ITAAC 4a, AC
T2.2.4-6, ITAAC 12a, 12b, AC
T2.4.1-3, ITAAC 4a, 4b, AC
T2.4.2-3, ITAAC 4a, 4b, AC
T2.6.1-2, ITAAC 3, AC
T2.6.2-2, ITAAC 4i, 4ii, AC
T2.11.1-1, Item 2, AC
T2.15.1-2, ITAAC 4i, 4ii, AC

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-283:

In Section 2.1.2, Nuclear Boiler System, the Design Descriptions (4)a. and (4)b. are not consistent. (4)a. uses the terminology "retain their pressure boundary integrity at internal pressures that will be experienced during service" while (4)b. uses terminology "retains its pressure boundary integrity at its design pressure".

GEH Response

DCD Tier 1, Revision 4, Table 2.1.2-3, ITAAC 4a, Design Commitment, and the related item 4a in subsection 2.1.1, Design Description, will be revised to reference "design pressure" rather than "internal pressure that will be experienced during service."

This RAI is similar to RAI 14.3-341. The generic aspect of this RAI is addressed in RAI 14.3-341.

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-341:

For Table 2.1.1-3, Item 5, the staff requests that the DC reflect the design commitments for hydrostatic pressure testing per the ASME Code (i.e., the staff believes that the DC should refer to "design pressure" rather than “internal pressure that will be experienced during service”).

The applicant should review its other ITAAC for similar inconsistencies (see also comment on Table 2.1.2-3, ITAAC #4)

GEH Response

DCD Tier 1, Revision 4, Table 2.1.1-3, ITAAC 5, Design Commitment, and the related item 5 in subsection 2.1.1, Design Description, will be revised to reference "design pressure" rather than “internal pressure that will be experienced during service.”

Other affected Tier 1, Revision 4, information will be revised to reference the "design pressure" rather than “internal pressure that will be experienced during service” and includes the following:
2.1.2, DD, Item 4a, and T2.1.2-3, ITAAC 4a, DC
2.2.2, DD, Item 4a, and T2.2.2-7, ITAAC 4a, DC
2.2.4, DD, Item 12a, and T2.2.4-6, ITAAC 12a, DC
T2.4.1-3, ITAAC 4a, DC
2.4.2, DD, Item 4a, and T2.4.2-3, ITAAC 4a, DC
2.6.1, DD, Item 3a, and T2.6.1-2, ITAAC 3a, DC
2.6.2, DD, Item 4
2.11.1, DD, Item 2, and T2.11.1-1, ITAAC 2, DC

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-342:

For ITAAC Table 2.1.2-3 Item 2b, the DC and AC refer to piping whereas the ITA refers to components. The staff requests that the applicant revise the ITA to be consistent with the DC and AC (i.e., refer to piping instead of components).

GEH Response

DCD Tier 1, Revision 4, ITAAC Table 2.1.2-3 Item 2b, GEH will revise the ITA to refer to piping instead of components, to be consistent with the DC and AC.

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-344:

For ITAAC Table 2.1.2-3 Item 4b, the DC refers to piping whereas the ITA and AC refer to components. The staff requests that the applicant revise the ITA and AC to be consistent with the DC (i.e., refer to piping instead of components).

In addition, the staff requests that the applicant perform a comprehensive review of its ITAAC associated with ASME Code piping and components to ensure applicability and consistent use of terminology.

GEH Response

DCD Tier 1, Revision 4, ITAAC Table 2.1.2-3 Item 4b, GEH will revise the ITA to refer to piping instead of components, to be consistent with the DC and AC.

GEH performed a review of ITAAC associated with ASME Code piping and components to ensure applicability and consistent use of terminology, and this change will be applied to the following DCD Tier 1, Revision 4, Subsections and Tables:
Table 2.1.2-3, ITAAC 2b, ITA
Table 2.1.2-3, ITAAC 4b, ITA, AC
2.2.2, DD, Item 2a, 2b, 3a, 3b, 4a, 4b
Table 2.2.2-7, ITAAC 2a, 2b, DC, ITA, AC
Table 2.2.2-7, ITAAC 3a, 3b, DC
Table 2.2.4-6, ITAAC 10b, ITA
Table 2.2.4-6, ITAAC 12b, ITA, AC
Table 2.4.1-3, ITAAC 2b, ITA
Table 2.4.1-3, ITAAC 4b, ITA, AC
Table 2.4.2-3, ITAAC 4b, ITA, AC
2.6.1, DD, Item 3b
Table 2.6.1-2, ITAAC 3b, DC
2.6.2, DD, Items 2a, 2b, 3a, 3b
Table 2.6.2-2, ITAAC 2a, 3a, DC
Table 2.6.2-2, ITAAC 2b, 3b, DC, ITA, AC
2.15.1, DD, Item 3a, 3b
Table 2.15.1-2, ITAAC 3a, 3b, DC
Table 2.15.4-2, ITAAC 2b, ITA

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-364:

For ITAAC Table 2.6.1-2 Item 3, the staff request that the DC be revised from "internal pressure that will be experienced during service" to "design pressure". (See also comment on Table 2.1.1-3, Item 5)

GEH Response

DCD Tier 1, Revision 4, Table 2.6.1-2, ITAAC 3, Design Commitment, and the related item in subsection 2.6.1, Design Description, will be revised to reference "design pressure" rather than "internal pressure that will be experienced during service."

This RAI is similar to RAI 14.3-341. The generic aspect of this RAI is addressed in RAI 14.3-341.

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-377:

For ITAAC Table 2.15.1-2 Item 2, the DC, ITA, and AC appear to be inconsistent. The DC refers to design and construction in accordance with the ASME Code while the ITA and AC only verify that the as-built complies with the ASME Code requirements. The staff requests that the applicant modify the ITA and AC to also include the appropriate documentation to verify that the design complies with the ASME Code.

GEH Response

DCD Tier 1, Revision 4, ITAAC Table 2.15.1-2 Item 2, GEH will revise the ITA from "Inspection(s) will be conducted of the as-built Containment System as documented in the Code Certified Stress Report" to "Inspection of certified documents for as-built components and piping, for the RCCV and its liners, and for the steel components of the RCCV will be conducted." This change is consistent with the change recommended by the staff in RAI 14.3-213. GEH will revise DCD Tier 1, Revision 4, ITAAC Table 2.15.1-2 Item 2, AC, to specify that an ASME Code Report exists and concludes that (1) an ASME Code Section III stress report(s) exist for the as-built components and piping identified in Table 2.15.1-1 as ASME Code Section III, (2) for ASME Section III, Division 2 construction, ASME Code Section III stress reports demonstrate compliance to NCA-3350 through NCA-3380, and NCA-3454, and (3) for ASME Section III, Division 1 construction, ASME Code Section III stress reports demonstrate compliance to NCA-3350.

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

RAI 14.3-390:

In Section 1.1.1, Definitions, for clarification purposes, the applicant should add a definition for ASME Code Report which describes that it is a report required by the ASME Code and whose content requirements are stipulated by the ASME Code. The definition should specify that each such ASME Code report is final and has been certified in accordance with the Code. The ITAAC definition does not add to or detract from the requirements of the ASME Code for the existence of and content requirements of this report. The staff believes that having a definition for ASME Code Report will help with clarification of ITAAC that specify various portions of an ASME Code Report as part of the acceptance criteria.

The staff also understands that there various reports required by the ASME Code to demonstrate, document, and certify compliance with the ASME Code requirements. These reports verify that the design complies with applicable ASME Code requirements, the as-built system meets the design and ASME Code requirements, the installation and construction of the system components and equipment complies with ASME Code requirements, design reconciliation for the as-built configuration has been performed in accordance with ASME Code requirements, the results of non-destructive examination of pressure boundary welds performed in accordance with ASME Code requirements have met ASME Code requirements, and the results of hydrostatic testing performed in accordance with ASME Code requirements have met ASME Code requirements. To ensure consistency of format and content in ITAAC included for ASME Code systems, the staff requests that applicant modify the acceptance criteria for all of their ITAAC for ASME Code systems to meet the following example for the Nuclear Boiler System:

Table 2.1.2-3(1): An ASME Code report documents that the as-built NBS conforms to the functional arrangement described in the Design Description in Section 2.1.2, Tables 2.1.2-1 and 2.1.2-2, and Figures 2.1.2-1, 2.1.2-2, and 2.1.2-3.

Table 2.1.2-3(2)(a): An ASME Code N-5 Data Report exists and concludes that installation or construction of the NBS components identified in Table 2.1.2-1 as ASME Code Section III has been completed in accordance with the ASME Code.

Table 2.1.2-3(2)(b): An ASME Code design report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the NBS components identified in Table 2.1.2-1 as ASME Code Section III.

Table 2.1.2-3(3): An ASME Code report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the NBS.

Table 2.1.2-3(4): An ASME Code report exists and concludes that the results of the hydrostatic test of ASME Code components of the NBS comply with the requirements of the ASME Code.

GEH Response

GEH will add a definition for ASME Code Report to Tier 1, Revision 4, subsection 1.1.1, Definitions.

GEH will modify the acceptance criteria for the ITAAC for ASME Code systems to meet the examples provided in RAI 14.3-390 for the Nuclear Boiler System. The Acceptance Criteria for the following DCD Tier 1, Revision 4, Tables will be revised:
Table 2.1.1-3, ITAAC 1, 3-5
Table 2.1.2-3, ITAAC 1-4
Table 2.2.2-7, ITAAC 1-4
Table 2.2.4-6, ITAAC 1, 10-12
Table 2.4.1-3, ITAAC 1-4
Table 2.4.2-3, ITAAC 1-4
Table 2.6.1-2, ITAAC 1, 3, 8, 9
Table 2.6.2-2, ITAAC 1-4
Table 2.11.1-1, ITAAC 2
Table 2.15.1-2, ITAAC 1-4
Table 2.15.4-2, ITAAC 1-4

DCD Impact

DCD Tier 1, Revision 5, will be revised as described in the GEH response above. Refer to the markups attached to this enclosure.

Enclosure 2

MFN 08-086, Supplement 3

DCD Tier 1 Markups

1.1.1 Definitions

The definitions below apply to terms which may be used in the Design Descriptions and associated Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).

Acceptance Criteria means the performance, physical condition, or analysis results for a structure, system, or component that demonstrates a design commitment is met.

Analysis means a calculation, mathematical computation, or engineering or technical evaluation. Engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems, or components.

As-built means the physical properties of the structure, system or component, following the completion of its installation or construction activities at its final location at the plant site.

ASME Code Report means a report required by the ASME Code and whose content requirements are stipulated by the ASME Code. Each such ASME Code report is final, and when required is certified in accordance with the Code.

Cold shutdown means a *safe shutdown* with the average reactor coolant temperature ≤ 93.3°C (200°F).

2. DESIGN DESCRIPTIONS AND ITAAC

This section provides the certified design material for each of the ESBWR systems that is either fully or partially within the scope of the Certified Design.

2.1 NUCLEAR STEAM SUPPLY

The following subsections describe the major Nuclear Steam Supply Systems (NSSS) components of the Reactor Pressure Vessel System and the Nuclear Boiler System. This section also describes the natural circulation process for the ESBWR.

2.1.1 Reactor Pressure Vessel System

Design Description

The RPV system generates heat and boils water to steam in a direct cycle. The functional arrangement of the RPV system is that it includes the reactor core and reactor internals (see Figure 2.1.1-1). The chimney provides an additional elevation head (or driving head) necessary to sustain natural circulation flow through the RPV. The chimney also forms an annulus separating the subcooled recirculation flow returning downward from the steam separators and feedwater from the upward steam-water mixture flow exiting the core. The steam is separated from the steam-water mixture by passing the mixture sequentially through an array of steam separators attached to a removable cover on the top of the chimney assembly, and through the steam dryer, resulting in outlet dry steam. The water mixes with the feedwater as it comes into the RPV through the feedwater nozzle. RPV internals consist of core support structures and other equipment.

The RPV is located in the containment. Internal component locations are shown on Figure 2.1.1-1.

(1) The functional arrangement of the RPV system is as described in the Design Description of this Subsection 2.1.1, Table 2.1.1-1 and Figure 2.1.1-1.

(2) The key dimensions (and acceptable variations) of the as-built RPV are as described in Table 2.1.1-2.

(3) The RPV components identified in Table 2.1.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected~~and constructed~~ in accordance with ASME Code Section III requirements.

(4) Pressure boundary welds in components identified in Table 2.1.1-1 as ASME Code Section III meet ASME Code Section III requirements.

(5) The components identified as ASME Code Section III retain their pressure boundary integrity ~~under internal pressure that will be experienced during service~~at their design pressure.

(6) The seismic Category I equipment identified in Table 2.1.1-1 can withstand seismic design basis loads without loss of safety function.

(7) RPV surveillance specimens are provided from the forging material of the beltline region and the weld and heat affected zone of a weld typical of those adjacent to the beltline region. Brackets welded to the vessel cladding at the location of the calculated peak

Table 2.1.1-3

ITAAC For Reactor Pressure Vessel System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the RPV system is as described in the Design Description of this Subsection 2.1.1, Table 2.1.1-1 and Figure 2.1.1-1.	Inspections of the as-built RPV System will be conducted.	Report(s) document that the RPV system and core arrangement conforms to the functional arrangement described in the Design Description of this Subsection 2.1.1, Table 2.1.1-1 and Figure 2.1.1-1. For components identified in Table 2.1.1-1 as ASME Code Section III, this report is an ASME Code report.
2. The key dimensions (and acceptable variations) of the as-built RPV are as described in Table 2.1.1-2.	Inspection of the as-built RPV key dimensions (and acceptable variations thereof) will be conducted.	Report(s) document that the RPV conforms to the key dimensions (and acceptable variations) described in Table 2.1.1-2.
3. ASME Code Section III ~~3.~~a1) The RPV components identified in Table 2.1.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection~~s~~ of certified documents ~~will be conducted of the~~ for as-built components ~~as documented in the ASME Code design reports~~will be conducted.	An ASME Code N-5 Data Report~~(s) document that the ASME Code Section III design reports~~ exists and concludes that the installation or construction of the RPV components ~~for the as-built components~~ identified in Table 2.1.1-1 as ASME Code Section III has been completed in accordance with ASME Code.

Table 2.1.1-3

ITAAC For Reactor Pressure Vessel System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
a2) The RPV components identified in Table 2.1.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the RPV components identified in Table 2.1.1-1 as ASME Code Section III.
4. Pressure boundary welds in components identified in Table 2.1.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the RPV system.
5. The components in Table 2.1.1-1 identified as ASME Code Section III retain their pressure boundary integrity ~~under internal pressure that will be experienced during service~~at their design pressure.	A hydrostatic test will be conducted on those components of the RPV system required to be hydrostatically tested by the ASME Code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the RPV system ~~conform~~ comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.

2.1.2 Nuclear Boiler System

Design Description

The NBS generates steam from feedwater and transports steam from the RPV to the main turbine.

(1) The functional arrangement of the NBS ~~System~~ is as described in the Design Description of this Subsection 2.1.2, Tables 2.1.2-1 and 2.1.2-2, and Figures 2.1.2-1, 2.1.2-2, and 2.1.2-3.

(2) ASME Code Section III

a. The components identified in Table 2.1.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

b. The piping identified in Table 2.1.2-1 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

(3) Pressure Boundary Welds

a. Pressure boundary welds in components identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) Pressure Boundary Integrity

a. The components identified in Table 2.1.2-1 as ASME Code Section III retain their pressure boundary integrity at ~~internal pressures that will be experienced during service~~their design pressure.

b. The piping identified in Table 2.1.2-1 as ASME Code Section III retains its pressure boundary integrity at its design pressure.

(5) Seismic Capability

a. The seismic Category I equipment identified in Tables 2.1.2-1 and 2.1.2-2 can withstand seismic design basis loads without loss of safety function.

b. Each of the lines identified in Table 2.1.2-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.

(6) a. Each of the NBS ~~System~~ safety-related divisions identified in Table 2.1.2-2 is powered from its respective safety-related division

b. Separation is provided between NBS ~~System~~ safety-related divisions, and between safety-related divisions and nonsafety-related cable.

(7) Each mechanical train of safety-related NBS equipment located in the Reactor Building outside the drywell is physically separated from the other trains.

(8) Instrumentation and Control

a. Control Room alarms, displays, and/or controls provided for the NBS ~~System~~ are defined in Table 2.1.2-2.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the NBS ~~System~~ is as described in the Design Description of this Subsection 2.1.2, Tables 2.1.2-1 and 2.1.2-2 and Figures 2.1.2-1, 2.1.2-2, and 2.1.2-3.	Inspection of the as-built system will be performed.	Report(s) document that the as-built NBS ~~System~~ conforms to the functional arrangement described in the Design Description of this Subsection 2.1.2, Tables 2.1.2-1 and 2.1.2-2 and Figures 2.1.2-1, 2.1.2-2, and 2.1.2-3. For components and piping identified in Table 2.1.2-1 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1) The components identified in Table 2.1.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for ~~will be conducted of the~~ as-built components ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Data Report~~(s) document that the ASME Code Section III design reports~~ exists and concludes that installation or construction of the NBS components ~~for the as-built components~~ identified in Table 2.1.2-1 as ASME Code Section III has been completed in accordance with ASME Code.
a2) The components identified in Table 2.1.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the NBS components identified in Table 2.1.2-1 as ASME Code Section III.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1) The piping identified in Table 2.1.2-1 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for ~~will be conducted of the~~ as-built ~~components~~ piping ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Data Report~~(s) document that the ASME code Section III design reports~~ exists and concludes that installation or construction of the NBS ~~for the as-built~~ piping identified in Table 2.1.2-1 as ASME Code Section III has been completed in accordance with ASME Code.
b2) The piping identified in Table 2.1.2-1 as ASME Code Section III is designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the NBS piping identified in Table 2.1.2-1 as ASME Code Section III.
3. Pressure Boundary Welds a) Pressure boundary welds in components identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements.	~~Pressure boundary welds in components identified in Table 2.1.2-1a as ASME Code Section III meet ASME Code Section III requirements.~~ Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the NBS.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b) Pressure boundary welds in piping identified in Table 2.1.2-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the NBS.
4. Pressure Boundary Integrity a) The components identified in Table 2.1.2-1 as ASME Code Section III retain their pressure boundary integrity at ~~internal pressures that will be experienced during service~~their design pressure.	A hydrostatic test will be conducted on those code components of the NBS ~~System~~ required to be hydrostatically tested by the ASME Code	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the NBS ~~System conform to~~comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
b) The piping identified in Table 2.1.2-1 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	A hydrostatic test will be conducted on ~~those~~ the code ~~components~~ piping of the ~~System~~NBS required to be hydrostatically tested by the ASME Code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code ~~components~~ piping of the ~~System~~ NBS ~~conform~~ comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
5. Seismic Capability a) The seismic Category I equipment identified in Tables 2.1.2-1 and 2.1.2-2 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.1.2-1a are located on the Nuclear Island.	Report(s) document that: i) The seismic Category I equipment identified in Tables 2.1.2-1 and 2.1.2-2 is located on a seismic structure.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
	iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
b) Each of the lines identified in Table 2.1.2-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.	Inspection will be performed for the existence of a report verifying that the as-built piping meets the requirements for functional capability.	Report(s) document that a report exists and concludes that each of the as-built lines identified in Table 2.1.2-1 for which functional capability is required meets the requirements for functional capability.
6a). Each of the NBS ~~System~~ safety-related divisions identified in Table 2.1.2-2 is powered from its respective safety-related division.	See Tier 1, Subsections 2.13.1, 2.13.3, or 2.13.5, as appropriate.	See Tier 1, Subsection 2.13.1, 2.13.3, or 2.13.5, as appropriate.
b) Separation is provided between NBS ~~System~~ safety-related divisions, and between safety-related divisions and nonsafety-related cable.	See Tier 1, Subsection 2.2.15.	See Tier 1, Subsection 2.2.15.

Table 2.1.2-3

ITAAC For The Nuclear Boiler System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. Each mechanical train of safety-related NBS equipment located in the Reactor Building outside the drywell is physically separated from the other trains.	Inspections of the as-built NBS equipment trains will be performed.	Report(s) document that each mechanical train of NBS equipment located in the Reactor Building outside the drywell is physically separated from the other trains by structural and/or fire barriers.
8. Instrumentation and Control		
a) Control Room alarms, displays, and/or controls provided for the NBS ~~System~~ are defined in Table 2.1.2-2.	Inspections will be performed on the as-built Control Room alarms, displays, and/or controls for the NBS ~~System~~.	Report(s) document that alarms, displays, and/or controls exist or can be retrieved in the Control Room as defined in Table 2.1.2-2.
b) The MSIVs close upon any of the following conditions: - Main Condenser Vacuum Low (Run mode) - Turbine Area Ambient Temperature High - MSL Tunnel Ambient Temperature High - MSL Flow Rate High - Turbine Inlet Pressure Low - Reactor Water Level Low	Valve closure tests will be performed on the as-built MSIVs using simulated signals.	Report(s) document that the MSIVs close upon generation of any of the following simulated signals: -Main Condenser Vacuum Low (Run mode) -Turbine Area Ambient Temperature High -MSL Tunnel Ambient Temperature High -MSL Flow Rate High -Turbine Inlet Pressure Low -Reactor Water Level Low

2.2.2 Control Rod Drive System

Design Description

The control rod drive (CRD) system, manually and automatically upon command from the RPS, DPS, and RC&IS, executes rapid control rod (CR) insertion (scram), performs fine CR positioning (reactivity control), detects CR separation (prevent rod drop accident), limits the rate of CR ejection due to a break in the CR pressure boundary (prevent fuel damage), and supplies high pressure makeup water to the reactor during events in which the feedwater system is unable to maintain reactor water level.

Functional Arrangement

(1) CRD system functional arrangement comprises three major functional groups: fine motion control rod drive (FMCRD), hydraulic control unit (HCU), and CRD hydraulic subsystem (CRDHS), as defined in Table 2.2.2-1 and shown in Figure 2.2.2-1.

Functional Requirements

(2) ASME Code Section III

a. The components~~-and piping~~ defined in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected~~-and constructed~~ in accordance with ASME Code Section III requirements.

b. The piping defined in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

(3) Pressure Boundary Welds

a. Pressure boundary welds in components~~-and piping~~ defined in Table 2.2.2-5 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping defined in Table 2.2.2-5 as ASME Code Section III meet ASME Code Section III requirements.

(4) Pressure Boundary Integrity

a. The components~~-and piping~~ defined in Table 2.2.2-5 as ASME Code Section III retain their pressure boundary integrity at ~~rated pressures~~their design pressure.

b. The piping defined in Table 2.2.2-5 as ASME Code Section III retains its pressure boundary integrity at design pressure.

(5) The Seismic Category I equipment defined in Table 2.2.2-1 can withstand seismic design basis loads without loss of structural integrity and safety function.

(6) The FMCRD is capable of positioning CR incrementally and continuously over its entire range.

(7) Valves defined in Table 2.2.2-5 and 2.2.2-6 as having an active safety-related function open, close, or both open and close under differential pressure, fluid flow, and temperature conditions.

(8) For the high pressure makeup mode of operation, the minimum flow supplied to the reactor is 3920 l/min (1036 gpm) with both CRD pumps operating and 1960 l/min (518 gpm) with one pump operating with reactor pressure less than or equal to 8.62 MpaG (1250 psig).

(9) CRD system automatic functions, initiators, and associated interfacing systems are defined in Table 2.2.2-3.

(10) CRD system controls and interlocks are defined in Table 2.2.2-4.

(11) CRD system minimum inventory of alarms, displays, controls, and status indications in the main control room are addressed in Section 3.3.

(12) CRD maximum allowable scram times for vessel bottom pressures below 7.481 MPa gauge (1085 psig) are defined in Table 2.2.2-2.

Table 2.2.2-7

ITAAC For Control Rod Drive System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. CRD system functional arrangement comprises three major functional groups: fine motion control rod drive (FMCRD), hydraulic control unit (HCU), and CRD hydraulic subsystem (CRDHS), as defined in Table 2.2.2-1 and shown in Figure 2.2.2-1.	Inspection(s), test(s), and type test(s) of the as-built system will be conducted.	Inspection report(s) document that the as-built CRD system conforms to the functional arrangement defined in Table 2.2.2-1 and as shown in Figure 2.2.2-1. For components and piping identified in Table 2.2.2-5 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1) The components ~~and piping~~ defined in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for ~~will be conducted of the~~ as-built components ~~and piping as documented in the ASME design reports~~will be conducted.~~.~~	An ASME Code N-5 Data ~~Inspection report(s)~~Report ~~document that the ASME Code Section III design reports~~ exists and concludes that installation or construction of the CRD System ~~for the as-built~~ components ~~and piping~~ defined in Table 2.2.2-5 as ASME Code Section III has been completed in accordance with ASME Code.
a2) The components identified in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the CRD System components identified in Table 2.2.2-5 as ASME Code Section III.

Table 2.2.2-7

ITAAC For Control Rod Drive System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1) The piping defined in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code N-5 Data Report exists and concludes that installation or construction of the CRD System piping defined in Table 2.2.2-5 as ASME Code Section III has been completed in accordance with ASME Code.
b2) The piping defined in Table 2.2.2-5 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the CRD System piping identified in Table 2.2.2-5 as ASME Code Section III
3. Pressure Boundary Welds a. Pressure boundary welds in components ~~and piping defined~~ identified in Table 2.2.2-5 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~Inspection report(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the CRD System.
b. Pressure boundary welds in piping defined in Table 2.2.2-5 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the CRD System.

Table 2.2.2-7

ITAAC For Control Rod Drive System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Pressure Boundary Integrity		
a. The components ~~and piping~~ defined in Table 2.2.2-5 as ASME Code Section III retain their pressure boundary integrity at their design pressure~~rated pressures~~.	A hydrostatic test will be conducted on those code components ~~and piping~~ of the ~~Control Rod Drive~~CRD System required to be hydrostatically tested by the ASME code.	An ASME Code Report~~Inspection report(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components ~~and piping~~ of the CRD System ~~conform~~ comply with the requirements ~~in~~ of the ASME Code Section III.
b. The piping defined in Table 2.2.2-5 as ASME Code Section III retain its pressure boundary integrity at its design pressure.	A hydrostatic test will be conducted on the code piping of the CRD System required to be hydrostatically tested by the ASME code.	An ASME Code Report exists and concludes that the results of the hydrostatic test of the ASME Code piping of the CRD System comply with the requirements of the ASME Code Section III.

2.2.4 Standby Liquid Control System

Design Description

The Standby Liquid Control (SLC) system is an alternative means to reduce core reactivity to ensure complete shutdown of the reactor core from the most reactive conditions at any time in core life, and provides makeup water to the RPV to mitigate the consequences of a Loss-of-Coolant-Accident (LOCA).

Functional Arrangement

(1) The SLC system functional arrangement is defined in Table 2.2.4-1.

Functional Requirements

(2) The SLC system automatic functions, initiators, and associated interfacing systems are defined in Table 2.2.4-2.

(3) The SLC system controls and interlocks in the main control room are defined in Table 2.2.4-3.

(4) The SLC system minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.

(5) Conformance with IEEE Std. 603 requirements by the safety-related control system structures, systems, and components defined in Table 2.2.4-1 is addressed in Subsection 2.2.15.

(6) The equipment qualification of SLC system components defined in Table 2.2.4-1 is addressed in Section 3.8.

(7) During an ATWS, the SLC system shall be capable of injecting borated water into the RPV at flowrates that assure rapid power reduction.

(8) The SLC system shall be capable of injecting borated water for use as makeup water to the RPV in response to a Loss-of-Coolant-Accident (LOCA).

(9) The redundant injection shut-off valves shown in Figure 2.2.4-1 as V1, V2, V3, and V4 are automatically closed by low accumulator level signals.

(10) ASME Code Section III

a. The components identified in Table 2.2.4-4 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

b. The piping identified in Table 2.2.4-4 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

(11) Pressure boundary welds

a. Pressure boundary welds in components identified in Table 2.2.4-4 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.2.4-4 as ASME Code Section III meet ASME Code Section III requirements.

(12) Pressure boundary integrity

a. The components identified in Table 2.2.4-4 as ASME Code Section III retain their pressure boundary integrity at ~~under internal pressures that will be experienced during service~~their design pressure.

b. The piping identified in Table 2.2.4-4 as ASME Code Section III retains its pressure boundary integrity at its design pressure.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SLC system is as described in Table 2.2.4-1 and shown in Figure 2.2.4-1.	Inspection(s), test(s), and type test(s) of the as-built system will be performed.	Report(s) document(s) that the as-built system conforms to the functional arrangement described in Table 2.2.4-1 and shown in Figure 2.2.4-1. For components and piping identified in Table 2.2.4-4 as ASME Code Section III, this report is an ASME Code report.
2. The SLC system automatic functions, initiators, and associated interfacing systems are defined in Table 2.2.4-2.	See Subsection 2.2.15	See Subsection 2.2.15
3. The SLC system controls and interlocks in the main control room are defined in Table 2.2.4-3.	See Subsection 2.2.15	See Subsection 2.2.15
4. The SLC system minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.	See Section 3.3.	See Section 3.3.
5. Conformance with IEEE Std. 603 requirements by the safety-related control system structures, systems, and components defined in Table 2.2.4-1 is addressed in Subsection 2.2.15.	See Subsection 2.2.15.	See Subsection 2.2.15.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The equipment qualification of SLC system components defined in Table 2.2.4-1 is addressed in Section 3.8.	See Section 3.8.	See Section 3.8.
7. During an ATWS, the SLC system shall be capable of injecting borated water into the RPV at flowrates that assure rapid power reduction.	Tests are conducted to measure injection time of the as-built SLC system by injecting demineralized water from both accumulators into the open RPV. The initial differential pressure ([6.21] MPa) between the accumulators and the RPV are set to that expected at the beginning of an ATWS by adjusting the accumulator pressures. Analyses are performed to correlate test results to as-built SLC system performance during an actual ATWS.	Test and analysis reports exist and conclude that during an ATWS the as-built SLC system (both accumulators) injects borated water into the RPV within the following time frames: • The first 5.4 m^3 of solution injects in ≤ [196] seconds. • The first and second 5.4 m^3 of solution injects in ≤ [519] seconds.
8. The SLC system shall be capable of injecting borated water for use as makeup water to the RPV in response to a Loss-of-Coolant-Accident (LOCA).	Tests are conducted with the as-built SLC system to measure the total volume of demineralized water injected from both accumulators into the open RPV. These tests utilize the continuation of the tests conducted in ITAAC #3. Analyses are performed to correlate test results to as-built SLC system performance during an actual LOCA.	Test and analysis reports exist and conclude that the as-built SLC system (both accumulators) injects a total volume of ≥15.6 m^3 of borated water in response to a LOCA.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. The redundant injection shut-off valves shown in Figure 2.2.4-1 as V1, V2, V3, and V4 are automatically closed by low accumulator level signals.	Test(s) will be performed using a simulated low accumulator level signal to close the injection shut-off valves V1, V2, V3, and V4.	Test report(s) document that the as-built injection shut-off valves identified in Figure 2.2.4-1 as V1, V2, V3, and V4 close upon receipt of a simulated low accumulator level signal
10. ASME Code Section III a1)~~.~~ The components identified in Table 2.2.4-4 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	~~a.~~ Inspection of certified documents for~~will be conducted of the~~ as-built components ~~as documented in the ASME design reports~~will be conducted.	~~a.~~ An ASME Code N-5 Data Report~~(s) document that the ASME Code Section III design reports~~ exists and concludes that installation or construction of the SLC components ~~for the as-built components~~ identified in Table 2.2.4-4 as ASME Code Section III have been completed in accordance with ASME Code.
a2) The components identified in Table 2.2.4-4 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the SLC System components identified in Table 2.2.4-4 as ASME Code Section III.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1). The piping identified in Table 2.2.4-4 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	~~b.~~ Inspection of certified documents for ~~will be conducted of the~~ as-built ~~components~~piping ~~as documented in the ASME design reports~~will be conducted.	~~b.~~ An ASME Code N-5 Data Report~~(s) document that the ASME code Section III design reports~~ exists and concludes that installation or construction of the SLC ~~for the as-built~~ piping identified in Table 2.2.4-4 as ASME Code Section III have been completed in accordance with ASME Code.
b2) The piping identified in Table 2.2.4-4 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the SLC System piping identified in Table 2.2.4-4 as ASME Code Section III.
11. Pressure boundary welds a. Pressure boundary welds in components identified in Table 2.2.4-4 as ASME Code Section III meet ASME Code Section III requirements.	~~a.~~ Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	~~a.~~ An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the SLC system.

Table 2.2.4-6

ITAAC For The Standby Liquid Control System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b. Pressure boundary welds in piping identified in Table 2.2.4-4 as ASME Code Section III meet ASME Code Section III requirements.	~~b.~~ Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	~~b.~~ An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the SLC system.
12. Pressure boundary integrity a. The components identified in Table 2.2.4-4 as ASME Code Section III retain their pressure boundary integrity at ~~under internal pressures that will be experienced during service~~their design pressure.	~~a.~~ A hydrostatic test will be conducted on those code components of the SLC System required to be hydrostatically tested by the ASME code.	~~a.~~ An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the SLC System ~~conform~~ comply with ~~to~~ the requirements ~~in~~ of the ASME Code, Section III.
b. The piping identified in Table 2.2.4-4 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	~~b.~~ A hydrostatic test will be conducted on th~~ose~~e code ~~components~~ piping of the SLC System required to be hydrostatically tested by the ASME code.	~~b.~~ An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code ~~components~~ piping of the SLC System ~~conform~~ comply with ~~to~~ the requirements ~~in~~ of the ASME Code, Section III.

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the IC System is as described in the Design Description of this Section 2.4.1, Tables 2.4.1-1 and 2, and Figure 2.4.1-1.	Inspection of the as-built system will be performed.	Report(s) document that the as-built IC System conforms with the functional arrangement described in the Design Description of this Section 2.4.1, Tables 2.4.1-1 and 2, and Figure 2.4.1-1. For components and piping identified in Table 2.4.1-1 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1)~~.~~ The components identified in Table 2.4.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for ~~will be conducted of the~~ as-built components ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Data Report~~(s) document that the ASME Code Section III design reports~~ exists and concludes that installation or construction of the IC system ~~for the as-built~~ components identified in Table 2.4.1-1 as ASME Code Section III have been completed in accordance with ASME Code.
a2) The components identified in Table 2.4.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the IC System components identified in Table 2.4.1-1 as ASME Code Section III.

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1)~~.~~The piping identified in Table 2.4.1-1 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for ~~will be conducted of the~~ as-built ~~components~~ piping ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Data Report~~(s) document that the ASME code Section III design reports~~ exists and concludes that installation or construction of the IC system ~~for the as-built~~ piping identified in Table 2.4.1-1 as ASME Code Section III have been completed in accordance with ASME Code.
b2) The piping identified in Table 2.4.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the IC System piping identified in Table 2.4.1-1 as ASME Code Section III.
3. Pressure Boundary Welds a. Pressure boundary welds in components identified in Table 2.4.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the IC system.

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b. Pressure boundary welds in piping identified in Table 2.4.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the IC system.
4. Pressure Boundary Integrity a. The components identified in Table 2.4.1-1 as ASME Code Section III retain their pressure boundary integrity at ~~under internal pressures that will be experienced during service~~their design pressure.	A hydrostatic test will be conducted on those code components of the IC s~~S~~ystem required to be hydrostatically tested by the ASME code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the IC ~~S~~system ~~conform~~ comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
b. The piping identified in Table 2.4.1-1 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	A hydrostatic test will be conducted on those code ~~components~~ piping of the IC s~~S~~ystem required to be hydrostatically tested by the ASME code.	An ASME Code Report(s) document that the results of the hydrostatic test of the ASME Code ~~components~~ piping of the IC s~~S~~ystem ~~conform~~ comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.

2.4.2 Emergency Core Cooling System - Gravity-Driven Cooling System

Design Description

Emergency core cooling is provided by the Gravity-Driven Cooling System (GDCS) located within containment in conjunction with the ADS in case of a LOCA.

(1) The functional arrangement of the GDCS is as listed in Table 2.4.2-1 and shown on Figure 2.4.2-1.

(2) ASME Code Section III

a. Components identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III requirements.

b. Piping identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III requirements.

(3) Pressure Boundary Welds

a. Pressure boundary welds in components identified in Table 2.4.2-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.4.2-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) Pressure Boundary Integrity

a. The~~Each~~ components identified in Table 2.4.2-1 as ASME Code Section III retains their~~its~~ pressure boundary integrity at ~~under internal pressures that will be experienced during service~~their design pressure.

b. The piping identified in Table 2.4.2-1 as ASME Code Section III retains its pressure boundary integrity at design pressure.

(5) a. The seismic Category I equipment identified in Table 2.4.2-1 can withstand seismic design basis loads without loss of safety function.

b. Each of the lines identified in Table 2.4.2-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.

(6) The minimum set of displays, alarms and controls, based on the applicable codes and standards, including HFE evaluations and emergency procedure guidelines, is available in the main control room.

(7) The equipment qualification of GDCS components is addressed in Tier 1 Section 3.8.

(8) a. The GDCS injections lines provide sufficient flow to maintain water coverage one meter above TAF for 72 hours following a design basis LOCA.

b. The GDCS equalizing lines provide sufficient flow to maintain water coverage one meter above TAF for 72 hours following a design basis LOCA.

(9) The GDCS squib valve used in the injection and equalization open as designed.

(10) Check valves designated in Figure 2.4.2-1 as having an active safety-related function open, close, or both open and also close under system pressure, fluid flow, and temperature conditions.

(11) Control Room indications and controls are provided for the GDCS.

Table 2.4.2-3

ITAAC For The Gravity-Driven Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the GDCS is as listed in Table 2.4.2-1 and shown on Figure 2.4.2-1.	Inspections of the as-built system will be conducted.	The as-built GDCS conforms to the functional arrangement as listed in Table 2.4.2-1 and shown in Figure 2.4.2-1. For components and piping identified in Table 2.4.2-1 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1)~~.~~ Components identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with the ASME Code~~,~~ Section III requirements.	Inspections~~ will be conducted of the ~~of certified documents for as-built components ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Data Report ~~Inspections confirm that the ASME Code components are designed, fabricated, installed, and inspected~~ exists and concludes that installation or construction of the GDCS components identified in Table 2.4.2-1 as ASME Code Section III has been completed in accordance with ~~the~~ ASME Code~~,~~ Section III.
a2) The components identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the GDCS components identified in Table 2.4.2-1 as ASME Code Section III.

Table 2.4.2-3

ITAAC For The Gravity-Driven Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1)~~.~~ Piping identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with the ASME Code, Section III requirements.	Inspection~~s will be conducted of the~~ of certified documents for as-built piping ~~as documented in the ASME design reports~~will be inspected.	An ASME Code N-5 Data Report ~~Inspections confirm that the ASME Code piping is designed, fabricated, installed, and inspected~~ exists and concludes that installation or construction of the GDCS piping identified in Table 2.4.2-1 as ASME Code Section III has been completed in accordance with the ASME Code~~,~~ Section III.
b2) The piping identified in Table 2.4.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the GDCS piping identified in Table 2.4.2-1 as ASME Code Section III.
3. Pressure Boundary Welds a. Pressure boundary welds in components identified in Table 2.4.2-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code ~~A~~ report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the GDCS.

Table 2.4.2-3

ITAAC For The Gravity-Driven Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b. Pressure boundary welds in piping identified in Table 2.4.2-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code ~~A~~ report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the GDCS.
4. Pressure Boundary Integrity a. ~~Each~~ The components identified in Table 2.4.2-1 as ASME Code Section III retain~~s~~ their~~its~~ pressure boundary integrity at ~~under internal pressures that will be experienced during service~~their design pressure.	A hydrostatic test will be conducted on those code components of the GDCS required to be hydrostatically tested by the ASME code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the GDCS ~~conform to~~comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
b. The piping identified in Table 2.4.2-1 as ASME Code Section III retains its pressure boundary integrity at design pressure.	A hydrostatic test will be conducted on th~~ose~~ code piping~~components~~ of the GDCS required to be hydrostatically tested by the ASME code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code ~~components~~ piping of the GDCS ~~conform to~~comply with the requirements in the ASME Code~~,~~ Section III.

2.6 REACTOR AND CONTAINMENT AUXILIARY SYSTEMS

The following subsections describe the auxiliary systems for the ESBWR.

2.6.1 Reactor Water Cleanup/Shutdown Cooling System

Design Description

The Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) system, purifies reactor coolant during normal operation and shutdown, provides shutdown cooling to bring the reactor to cold shutdown, and removes core decay heat to maintain cold shutdown. The RWCU/SDC system is as shown in Figure 2.6.1-1.

(1) The functional arrangement of the RWCU/SDC system is as described in the Design Description of Section 2.6.1, Table 2.6.1-1, and Figure 2.6.1-1.

(2) The containment isolation portions of the RWCU/SDC System are addressed in Tier 1, Subsection 2.15.1.

(3) Pressure Boundary Integrity

a. The components identified in Table 2.6.1-1 as ASME Code Section III retain their pressure boundary integrity ~~under internal pressures that will be experienced during service~~at their design pressure.

b. The piping identified in Table 2.6.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.

(4) Control room features provided for the RWCU/SDC System are defined in Table 2.6.1-1.

(5) Manual closure of the RPV bottom head isolation valve can be accomplished remotely.

(6) Each of the RWCU/SDC System safety-related components with safety-related power identified in Table 2.6.1-1 is powered from its respective safety-related division.

(7) The Seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.

(8) ASME Code Section III

a. The components identified in Table 2.6.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

b. The piping identified in Table 2.6.1-1 as ASME Code Section III is designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

(9) Pressure Boundary Welds

a. Pressure boundary welds in components identified in Table 2.6.1-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.6.1-1 as ASME Code Section III meet ASME Code Section III requirements.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.6.1-2 provides the inspections, tests, and/or analyses that will be undertaken for the RWCU/SDC system.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the RWCU/SDC system is as described in the Design Description of Section 2.6.1, Table 2.6.1-1, and Figure 2.6.1-1.	Inspection of the as-built system will be performed.	Report(s) document that the as-built RWCU/SDC system conforms to the functional arrangement described in the Design Description of Section 2.6.1, Table 2.6.1-1, and Figure 2.6.1-1. For components and piping identified in Table 2.6.1-1 as ASME Code Section III, this report is an ASME Code report.
2. The containment isolation portions of the RWCU/SDC System are addressed in Tier 1, Subsection 2.15.1.	See Tier 1, Subsection 2.15.1.	See Tier 1, Subsection 2.15.1.
3. Pressure Boundary Integrity a) The components identified in Table 2.6.1-1 as ASME Code Section III retain their pressure boundary integrity ~~under internal pressures that will be experienced during service~~at their design pressure.	A hydrostatic test will be conducted on those code components of the RWCU/SDC system required to be hydrostatically tested by the ASME code.	An ASME Code Report~~(s) document~~ exists and concludes that the results of the hydrostatic test of the ASME Code components of the RWCU/SDC System ~~conform to~~comply with the requirements ~~in~~ of the ASME Code~~,~~ Section III.
b) The piping identified in Table 2.6.1-1 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	A hydrostatic test will be conducted on the code piping of the RWCU/SDC System required to be hydrostatically tested by the ASME Code.	An ASME Code Report exists and concludes that the results of the hydrostatic test of the ASME Code piping of the RWCU/SDC System comply with the requirements of the ASME Code Section III.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Control room features provided for the RWCU/SDC System are defined in Table 2.6.1-1.	Inspections will be performed on the Control Room features for the RWCU/SDC system.	Report(s) document that features exist or can be retrieved in the Control Room as defined in Table 2.6.1-1. .
5. Manual closure of the RPV bottom head isolation valve can be accomplished remotely.	Remote manual closure testing of the RPV bottom head isolation valve will be performed by closing the inboard containment isolation valve in the RWCU/SDC system suction line from the RPV bottom head.	Report(s) document that the RPV bottom head isolation valve can be manually closed remotely.
6. Each of the RWCU/SDC System safety-related components with safety-related power identified in Table 2.6.1-1 is powered from its respective safety-related division.	Testing will be performed on the RWCU/SDC System by providing a test signal in only one safety-related division at a time.	Report(s) document that a test signal exists in the safety-related division (or at the equipment identified in Table 2.6.1-1 powered from the safety-related division) under test in the RWCU/SDC System.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. The Seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the Seismic Category I equipment and valves identified in Table 2.6.1-1 are located in the Nuclear Island. ii) Type tests, analyses, or a combination of type tests and analyses of Seismic Category I equipment will be performed. iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	Report(s) document that: i) The Seismic Category I equipment identified in Table 2.6.1-1 is located on a seismic structure. ii) A report exists and concludes that the Seismic Category I equipment can withstand seismic design basis loads without loss of safety function. iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.
8. ASME Code Section III a1) The components identified in Table 2.6.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code N-5 Data Report exists and concludes that installation or construction of the RWCU/SDC System components identified in Table 2.6.1-1 as ASME Code Section III has been completed in accordance with ASME Code.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
a2) The components identified in Table 2.6.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the RWCU/SDC System components identified in Table 2.6.1-1 as ASME Code Section III.
b1) The piping identified in Table 2.6.1-1 as ASME Code Section III is designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code N-5 Data Report exists and concludes that installation or construction of the RWCU/SDC System piping identified in Table 2.6.1-1 as ASME Code Section III has been completed in accordance with ASME Code.
b2) The piping identified in Table 2.6.1-1 as ASME Code Section III is designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the RWCU/SDC System piping identified in Table 2.6.1-1 as ASME Code Section III.
9. Pressure Boundary Welds a) Pressure boundary welds in components identified in Table 2.6.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the RWCU/SDC System.

Table 2.6.1-2

ITAAC For The Reactor Water Cleanup/Shutdown Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b) Pressure boundary welds in piping identified in Table 2.6.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the RWCU/SDC System.

2.6.2 Fuel And Auxiliary Pools Cooling System

Design Description

The Fuel and Auxiliary Pools Cooling System (FAPCS) provides cooling and cleaning of pools located in the containment, reactor building and fuel building, during normal plant operation. The FAPCS provides flow paths for filling and makeup of these pools during normal plant operation and under post-accident condition. The FAPCS provides suppression pool cooling and LPCI as active backup of the passive containment heat removal systems.

The FAPCS is as shown in Figure 2.6.2-1.

(1) The functional arrangement of the FAPCS is as described in the Design Description of this Subsection 2.6.2 and as shown in Figure 2.6.2-1.

(2) ASME Code Section III

a. The components ~~and piping~~ identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

b. The piping identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.

(3) Pressure Boundary Integrity

a. Pressure boundary welds in components ~~and piping~~ identified in Table 2.6.2-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.6.2-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) The components and piping identified in Table 2.6.2-1 as ASME Code Section III retain their pressure boundary integrity ~~under internal pressure that will be experienced during service~~at their design pressure.

(5) The Seismic Category I equipment and piping identified in Table 2.6.2-1 can withstand seismic design basis load without loss of structural integrity and safety function.

(6) The containment isolation portions of the FAPCS are addressed in Tier 1, Subsection 2.15.1.

(7) The FAPCS performs the following nonsafety-related functions:

a. Suppression pool cooling mode

b. Low-pressure coolant injection mode.

c. External connection for emergency water to IC/PCC pool and Spent Fuel Pool.

(8) FAPCS minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.

(9) Level instruments with adequate operating ranges are provided for the Spent Fuel Pool and IC/PCC pools.

(10) Equipment qualification for the FAPCS is addressed in Tier 1 Section 3.8.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.6.2-2 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling Cleanup System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The ~~FAPCS~~ functional arrangement of the FAPCS is as described in the Design Description of Subsection 2.6.2 and Figure 2.6.2-1.	Inspections of the as-built system will be conducted.	Inspection report(s) document that the as-built FAPCS conforms to the functional arrangement ~~configuration is as~~ described in Subsection 2.6.2 and ~~as~~ shown on Figure 2.6.2-1. For components and piping identified in Table 2.6.2-1 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1) The components ~~and piping~~ identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for~~(s) will be conducted of the~~ as-built ~~FAPCS~~ components ~~as documented in the ASME design reports~~ will be conducted.	An ASME Code N-5 Data Report~~(s) document that an ASME Code Section III design report(s)~~ exists and concludes that installation or construction of the FAPCS components ~~for the as-built components~~ identified in Table 2.6.2-1 as ASME Code Section III has been completed in accordance with ASME Code.
a2) The components identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the FAPCS components identified in Table 2.6.2-1 as ASME Code Section III.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling Cleanup System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1) The piping identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements	Inspection of certified documents for as-built piping will be conducted.	An ASME Code N-5 Data Report exists and concludes that installation or construction of the FAPCS piping identified in Table 2.6.2-1 as ASME Code Section III has been completed in accordance with ASME Code..
b2) The piping identified in Table 2.6.2-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the FAPCS piping identified in Table 2.4.2-1 as ASME Code Section III.
3. Pressure Boundary Welds a. Pressure boundary welds in components ~~and piping~~ identified in Table 2.6.2-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection~~(s)~~ of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III.	An ASME Code Report~~A report~~ exists and concludes~~documents~~ that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the FAPCS.
b. Pressure boundary welds in piping identified in Table 2.6.2-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III.	An ASME Code Report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the FAPCS.

Table 2.6.2-2

ITAAC For The Fuel and Auxiliary Pools Cooling Cleanup System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The components and piping identified in Table 2.6.2-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.	i) A hydrostatic or pressure test will be performed on the components and piping required by the ASME Code Section III to be tested.	i) An ASME Code report exists and ~~documents~~ concludes that the results of the pressure test of the components and piping identified in Table 2.6.2-1 as ASME Code Section III ~~conform~~ comply with the requirements of the ASME Code Section III.
	ii) Impact testing will be performed on the containment and pressure-retaining materials in accordance with the ASME Code Section III to confirm the fracture toughness of the materials.	ii) An ASME Code report exists and ~~documents~~ concludes that the containment and pressure-retaining penetration materials ~~conform~~ comply with fracture toughness requirements of the ASME Code section III.

2.11 POWER CYCLE

The following subsections describe the major power cycle (i.e., generation) systems for the ESBWR.

2.11.1 Turbine Main Steam System

Design Description

The Turbine Main Steam System (TMSS) supplies steam generated in the reactor to the Turbine Generator, moisture separator reheaters, steam auxiliaries and turbine bypass system. The TMSS does not include the seismic interface restraint, main turbine stop valves or bypass valves.

The TMSS consists of four lines from the seismic interface restraint to the main turbine stop valves. The TMSS is nonsafety-related. Regulatory Guide 1.26 Quality Group B portions of the TMSS are designed in accordance with ASME Boiler and Pressure Vessel Code, Section III, Class 2 requirements. The TMSS is located in the Reactor Building steam tunnel and Turbine Building.

(1) The functional arrangement of the TMSS is as described in Subsection 2.11.1.

(2) The ASME Code Section III components of the TMSS retain their pressure boundary integrity ~~under internal pressures that will be experienced during service~~at their design pressure.

(3) Upon receipt of an MSIV closure signal, the SAIV(s) close(s)and required MSIV fission product leakage path TMSS drain valve(s) open(s).

(4) The SAIV(s) fail(s) closed and required MSIV fission product leakage path TMSS drain valve(s) fail(s) open on loss of electrical power to the valve actuating solenoid or on loss of pneumatic pressure.

(5) TMSS piping, including the SAIV(s) from the seismic interface restraint to the main stop and main turbine bypass valves and the required MSIV fission product leakage path, is classified as Seismic Category II.

(6) The integrity of the as-built main steam valve leakage path to the condenser (main steam piping, bypass piping, required drain piping, and main condenser) is not compromised by non-seismically designed systems, structures and components.

(7) The TMSS piping provides a nominal turbine inlet (throttle) pressure that is consistent with assumptions in Abnormal Event analyses.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.11.1-1 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the TMSS.

Table 2.11.1-1

Turbine Main Steam System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The TMSS functional arrangement is as described in Subsection 2.11.1.	Inspections of the as-built system will be conducted.	A report exists and confirms that the as-built TMSS conforms to the functional arrangement description in Subsection 2.11.1.
2. The ASME Code Section III components of the TMSS retain their pressure boundary integrity ~~under internal pressures that will be experienced during service~~at their design pressure.	A hydrostatic test will be conducted on those Code components of the TMSS that are required to be hydrostatically tested by the ASME Code~~ Section III~~.	~~A~~ An ASME Code report exists and concludes that the results of the hydrostatic test of the ~~TMSS~~ ASME Code components of the TMSS ~~satisfy~~ comply with the ~~applicable~~ requirements ~~in~~ of the ASME Code~~,~~ Section III.

2.15 CONTAINMENT, COOLING AND ENVIRONMENTAL CONTROL SYSTEMS

2.15.1 Containment System

Design Description

The Containment System confines the potential release of radioactive material in the event of a design basis accident. The Containment System is comprised of a reinforced concrete containment vessel (RCCV), penetrations and drywell head.

The Containment System is as shown in Figure 2.15.1-1. The RCCV is located in the Reactor Building.

(1) The functional arrangement of the Containment System is described in the Design Description of this Section 2.15.1 and as shown in Figure 2.15.1-1.

(2) Components and piping identified in Table 2.15.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

   i. The RCCV and its liners are designed to meet the requirements in Article CC-3000 of ASME Code, Section III, Division 2.

   ii. The steel components of the RCCV are designed to meet the requirements in Article NE-3000 of ASME Code, Section III, Division 1.

(3) Pressure Boundary Welds

   a. Pressure boundary welds in components ~~and piping~~ identified in Table 2.15.1-1 as ASME Code Section III meet ASME Code Section III requirements.

   b. Pressure boundary welds in piping identified in Table 2.15.1-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) The components and piping identified in Table 2.15.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.

(5) The seismic Category I equipment identified in Table 2.15.1-1 can withstand seismic design basis load without loss of structural integrity and safety function.

(6) a. The equipment qualification of Containment Systems components is addressed in DCD Tier 1 Section 3.8.

   b. The safety-related components identified in Table 2.15.1-1 are powered from their respective safety-related division.

   c. Separate electrical penetrations are provided for circuits of each safety-related division and for nonsafety-related circuits.

   d. The circuits of each electrical penetration are of the same voltage class.

(7) The containment system provides a barrier against the release of fission products to the atmosphere.

(8) The containment system pressure boundary retains its integrity when subject to a design pressure of 310 kPa gauge (45 psig).

(9) The containment system provides the safety-related function of containment isolation for containment boundary integrity.

Table 2.15.1-2

ITAAC For The Containment System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the Containment System (CS) is as described in Subsection 2.15.1 and as shown in Figure 2.15.1-1.	Inspections of the as-built system will be conducted.	Inspection report(s) document that the as-built Containment System conforms ~~with~~to the functional arrangement ~~description~~ described in Subsection 2.15.1 and Figure 2.15.1-1. For components and piping identified in Table 2.15.1-1 as ASME Code Section III, this report is an ASME Code report.
2. The components and piping identified in Table 2.15.1-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements. The RCCV and its liners are designed to meet the requirements in Article CC-3000 of ASME Code, Section III, Division 2. The steel components of the RCCV are designed to meet the requirements in Article NE-3000 of ASME Code, Section III, Division 1.	~~Inspection(s) will be conducted of the as-built Containment System as documented in the Code Certified Stress Report.~~ Inspection of certified documents for as-built components and piping, for the RCCV and its liners, and for the steel components of the RCCV will be conducted.	An ASME Code Report~~(s) document~~ exists and concludes that an ASME Code Section III stress report(s) exist for the as-built components and piping identified in Table 2.1.51-1 as ASME Code Section III. An ASME Code Report exists and concludes that ~~For~~ for ASME Section III, Division 2 construction, ASME Code Section III stress reports demonstrate compliance to NCA-3350 through NCA-3380, and NCA-3454. An ASME Code Report exists and concludes that ~~For~~ for ASME Section III, Division 1 construction, ASME Code Section III stress reports demonstrate compliance to NCA-3350.

Table 2.15.1-2

ITAAC For The Containment System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. Pressure Boundary Welds a. Pressure boundary welds in components ~~and piping~~ identified in Table 2.15.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection~~(s)~~ of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III.	An ASME Code Report~~A report~~ exists and ~~documents~~ concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the CS.
b. Pressure boundary welds in piping identified in Table 2.15.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III.	An ASME Code Report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the CS.
4. The components and piping identified in Table 2.15.1-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.	i) A hydrostatic or pressure test will be performed on the components and piping required by the ASME Code Section III to be tested. ii) Impact testing will be performed on the containment and pressure-retaining materials in accordance with the ASME Code Section III to confirm the fracture toughness of the materials.	i) An ASME Code report exists and ~~documents~~ concludes that the results of the pressure test of the components and piping identified in Table 2.15.1-1 as ASME Code Section III ~~conform~~ comply with the requirements of the ASME Code Section III. ii) An ASME Code report exists and ~~documents~~ concludes that the containment and pressure-retaining penetration materials ~~conform~~ comply with fracture toughness requirements of the ASME Code section III.

2.15.4 Passive Containment Cooling System

Design Description

The Passive Containment Cooling System (PCCS), in conjunction with the suppression pool, maintains the containment within its pressure limits for DBAs such as a LOCA, by condensing steam from the Drywell atmosphere and returning the condensed liquid to the Gravity Driven Cooling System (GDCS) pools. The system is entirely passive, with no moving parts.

The PCCS consists of six low pressure, independent sets of two steam condenser modules (passive containment cooling condensers) that condense steam on the tube side and transfer heat from the drywell to water in a large cooling pool (IC/PCC pool) located outside the primary containment, which is vented to atmosphere.

Each PCCS condenser is located in a subcompartment of the IC/PCC pool. The IC/PCC pool subcompartments on each side of the reactor building communicate at their lower ends to enable full use of the collective water inventory, independent of the operational status of any given PCCS condenser.

Each condenser, which is an integral part of the containment, contains a drain line to one of the three GDCS pools, and a vent discharge line the end of which is submerged in the pressure suppression pool.

The PCCS condensers loops are driven by the pressure difference created between the containment drywell and the suppression pool during a LOCA, and as such require no sensing, control, logic or power actuated devices for operation.

(1) The functional arrangement for the PCCS is as described in the Design Description in this Section 2.15.4, Table 2.15.4-1 and Figure 2.15.4-1.

(2) ASME Code Section III

a. The components identified in Table 2.15.4-1 as ASME Code Section III are designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

b. The piping identified in Table 2.15.4-1 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.

(3) Pressure Boundary Welds

a. Pressure boundary welds in components identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.

b. Pressure boundary welds in piping identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.

(4) The pressure boundary of the PCCS retains its integrity under the design pressure of 310 kPa gauge (45 psig).

(5) a. The seismic Category I equipment identified in Table 2.15.4-1 can withstand seismic design basis loads without loss of safety function.

b. Each of the lines identified in Table 2.15.4-1 for which functional capability is required is designed to withstand combined normal and seismic design basis loads without a loss of its functional capability.

Table 2.15.4-2
ITAAC For The Passive Containment Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement for the PCCS is as described in the Design Description in this Section 2.15.4, Table 2.15.4-1 and Figure 2.15.4-1.	Inspections of the as-built system will be conducted.	Report(s) document that the as-built PCCS conforms to the functional arrangement for the PCCS is as described in the Design Description in this Section 2.15.4, Table 2.15.4-1 and Figure 2.15.4 1. For components and piping identified in Table 2.15.4-1 as ASME Code Section III, this report is an ASME Code report.
2. ASME Code Section III a1)~~.~~ The components identified in Table 2.15.4-1 as ASME Code Section III are designed, fabricated, installed, and inspected~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for~~will be conducted of the~~ as-built components ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Report~~(s) document~~ exists and concludes that installation or construction of the PCCS components ~~that the ASME Code Section III design reports exist for the as-built components~~ identified in Table 2.15.4-1 as ASME Code Section III has been completed in accordance with ASME Code.
a2) The components identified in Table 2.15.4-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built components will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the PCCS components identified in Table 2.15.4-1 as ASME Code Section III.

Table 2.15.4-2
ITAAC For The Passive Containment Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
b1)~~.~~ The piping identified in Table 2.15.4-1 as ASME Code Section III is designed, fabricated, installed, and inspected ~~and constructed~~ in accordance with ASME Code Section III requirements.	Inspection of certified documents for~~will be conducted of the~~ as-built ~~components~~piping ~~as documented in the ASME design reports~~will be conducted.	An ASME Code N-5 Report~~(s) document~~ exists and concludes that installation or construction of the NBS piping ~~that the ASME code Section III design reports exist for the as-built piping~~ identified in Table 2.15.4-1 as ASME Code Section III has been completed in accordance with ASME Code.
b2) The piping identified in Table 2.15.4-1 as ASME Code Section III are designed, fabricated, installed, and inspected in accordance with ASME Code Section III requirements.	Inspection of certified documents for as-built piping will be conducted.	An ASME Code Design Report exists and concludes that design reconciliation has been completed in accordance with the ASME Code for as-built reconciliation of the PCCS piping identified in Table 2.15.4-1 as ASME Code Section III.
3. Pressure Boundary Welds a. Pressure boundary welds in components identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the PCCS.
b. Pressure boundary welds in piping identified in Table 2.15.4-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	An ASME Code Report~~(s) document that a report~~ exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in the PCCS.