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5 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

5.1 Introduction

This chapter describes the staff's review of the Bell Bend Nuclear Power Plant (BBNPP) reactor coolant system (RCS) including the integrity of the reactor coolant pressure boundary, the reactor pressure vessel, and component and subsystem design.

5.1.1 Summary of Application

BBNPP Final Safety Analysis Report (FSAR) Chapter 5 incorporates U.S. EPR FSAR Tier 2, Chapter 5 (the design certification FSAR) by reference with supplements as identified in the following sections.

Inspections, Tests, Analyses, and Acceptance Criteria

The staff reviewed BBNPP COL Application (COLA), Part 10, "Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) and ITAAC Closure." For BBNPP COLA Part 10, Appendix B, Section 2.4, "Site-Specific ITAAC," the staff notes there were no ITAAC within the scope of Chapter 5 of this report.

5.2 Integrity of the Reactor Coolant Pressure Boundary

5.2.1 Summary of Application

In BBNPP Combined License (COL) Final Safety Analysis Report (FSAR) Section 5.2, the BBNPP COL applicant provided supplemental information for the following:

U.S. EPR COL Information Item

- U.S. EPR COL Information Item 5.2-1 (deleted by BBNPP COL applicant)
- U.S. EPR COL Information Item 5.2-2

A COL applicant that references the U.S. EPR design certification will identify additional [American Society of Mechanical Engineers] ASME code cases to be used.

- U.S. EPR COL Information Item 5.2-3

A COL applicant that references the U.S. EPR design certification will identify the implementation milestones for the site-specific ASME Section XI preservice and inservice inspection program for the [reactor coolant pressure boundary] RCPB, consistent with the requirements of [Title 10 of the *Code of Federal Regulations*] 10 CFR 50.55a(g). The program will identify the applicable edition and addenda of the ASME Code Section XI, and will identify any additional relief requests and alternatives to Code requirements.

- U.S. EPR COL Information Item 5.2-4

A COL applicant that references the U.S. EPR design certification will develop procedures in accordance with [Regulatory Guide] RG 1.45, Revision 1.

5.2.2 Regulatory Basis

The regulatory basis of the COL information incorporated by reference from the U.S. EPR FSAR is addressed within the staff's SER on the U.S. EPR FSAR.

In addition, the relevant requirements of NRC regulations for the compliance with applicable ASME Code Cases, and the associated acceptance criteria, are described and explained in NUREG-0800, Section 5.2.1.2, which states as follows:

1. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," provide the regulatory basis for the staff review of the information provided in the COL FSAR. For example, NRC regulations in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1, "Quality Standards and Records," require that nuclear power plant structures, systems, and components (SSC) important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed.
2. 10 CFR 50.55a, as related to the establishment of the minimum quality standards for the design, fabrication, erection, construction, testing, and inspection of nuclear power plant components, requires conformance with appropriate editions of published industry codes and standards.

5.2.3 Technical Evaluation

The staff reviewed BBNPP COL FSAR Section 5.2 and reviewed U.S. EPR FSAR Tier 2, Section 5.2 to ensure that the combination of the reference design and the COL application represents the complete scope of information relating to this review topic. The staff's review confirmed that the information contained in the BBNPP COL application and incorporated by reference addresses the required information relating to the integrity of the reactor coolant pressure boundary. The results of the staff's evaluation of the information incorporated by reference in the BBNPP COL application are documented in U.S. EPR SER, Chapter 5.

Section 1.2.3 of this report provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the COL Information Items and use this review to evaluate subsequent COL applications (e.g., COL Information Items). To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Calvert Cliffs Nuclear Power Plant Unit 3 (CCNPP3)) were equally applicable to the BBNPP COL application, the staff undertook the following reviews:

- The staff compared the BBNPP COL FSAR to the CCNPP3 COL FSAR. In performing this comparison, the staff considered changes made to the BBNPP COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed by the BBNPP COL applicant.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and finds the evaluation performed for the standard content directly applicable to the BBNPP COL application.

U.S. EPR COL Information Items

- U.S. EPR COL Information Item 5.2-1

(Deleted)

In U.S. EPR FSAR Table 1.8-2, this COL Information Item is shown as “Deleted”; similarly this COL Information Item is shown as “Deleted” in BBNPP COL FSAR Table 1.8-2. Accordingly, it need not be addressed by the BBNPP applicant.

- U.S. EPR COL Information Item 5.2-2

A COL applicant that references the U.S. EPR design certification will identify additional ASME code cases to be used.

In BBNPP COL FSAR Section 5.2.1.2, the BBNPP COL applicant addressed this item as follows: “No additional ASME code cases will be utilized.”

The following portion of this technical evaluation section is reproduced from CCNPP3 SER Section 5.2.1.2.4:

As noted above, the COL applicant has not identified any code cases other than those included in the U.S. EPR FSAR as necessary at this time for the design and construction of CCNPP Unit 3. If the COL applicant determines in the future that additional ASME Code Cases are needed, the COL applicant may apply those ASME Code Cases that the staff has found acceptable in RGs 1.84, 1.147, or 1.192, including any applicable conditions. If the COL applicant determines that ASME Code Cases other than those approved for use by the staff are needed, the COL applicant must request NRC authorization to use such code cases.

The process to use or obtain ASME Code case approval for the BBNPP COL applicant is the same as described above for CCNPP3 and for any applicant. Accordingly, the staff finds the supplemental material provided by the BBNPP COL applicant for U.S. EPR COL Information Item 5.2-2 acceptable.

- U.S. EPR COL Information Item 5.2-3

A COL applicant that references the U.S. EPR design certification will identify the implementation milestones for the site-specific ASME Section XI preservice and inservice inspection program for the RCPB, consistent with the requirements of 10 CFR 50.55a(g). The program will identify the applicable edition and addenda

of the ASME Section XI, and will identify any additional relief requests and alternatives to Code requirements.

In BBNPP COL FSAR Section 5.2, the BBNPP COL applicant addressed this item as follows:

Preservice inspection and inservice inspection programs for the RCPB meet the requirements of 10 CFR 50.55a(g), and comply with ASME Boiler and Pressure Vessel Code, Section XI, 2004 (ASME, 2004) edition. This code is consistent with that established in U.S. EPR FSAR Section 5.2.4. No relief requests or alternatives are required. The implementation milestones for the site-specific ASME Section XI preservice and inservice inspection programs for the RCPB are identified in BBNPP COL FSAR Table 13.4-1.

The initial inservice inspection program shall incorporate the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load. Inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month inspection interval (or the optional ASME Code cases listed in RG 1.147, that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed in 10 CFR 50.55a(b)).

Should relief requests be required, they will be developed through the regulatory process and submitted to the NRC for approval in accordance with 10 CFR 50.55a(g)(5). The relief requests shall include appropriate justifications and proposed alternative inspection methods.

The following portion of this technical evaluation section is reproduced from CCNPP3 SER Section 5.2.4.4.

COL Information Item 5.2-3 in COL FSAR Section 5.2.4, "Inservice Inspection and Testing of the RCPB," directs a COL applicant referencing the U.S. EPR design certification to identify the implementation milestones for the site-specific ASME Section XI preservice and inservice inspection programs for the RCPB, consistent with the requirements of 10 CFR 50.55a(g). This COL information item also requires that the program identify the applicable edition and addenda of the ASME Code Section XI, and additional relief requests and alternatives to Code requirements.

In the supplemental information the COL applicant provided in COL FSAR Section 5.2.4, the COL applicant stated that the preservice and inservice inspection programs for the RCPB will meet the requirements of the 2004 Edition of the ASME Code, Section XI and that no relief requests or alternatives are required. The COL applicant also stated that the initial inservice inspection program shall incorporate the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a on the date 12 months before initial fuel load, and the implementation milestones for the preservice and inservice inspection programs for the RCPB are identified in COL FSAR Table 13.4-1.

Regulation 10 CFR 50.55a(g) requires that inservice examinations of components and system pressure tests conducted during the initial 120-month inspection interval must comply with the requirements in the latest edition and addenda of the Code incorporated by reference in Paragraph (b) of 10 CFR 50.55a on the date 12 months before the date scheduled for initial loading of fuel under a combined license under 10 CFR Part 52. Pursuant to 10 CFR 52.79(a)(11), a COL applicant must provide a description of the program and its implementation that meets 10 CFR 50.55a for inservice inspection of ASME code components. The PSI and ISI programs are identified as operational programs in RG 1.206. As discussed in RG 1.206, a fully described PSI and ISI program should address: (1) System boundary subject to inspection; (2) accessibility; (3) examination categories and methods; (4) inspection intervals; (5) evaluation of examination results; (6) system pressure tests; (7) Code exemptions; (8) relief requests; and (9) ASME Code Cases. The COL application should fully describe this program as defined in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria." In addition, as discussed in SECY-05-0197, which was approved by the Commission in an SRM dated February 22, 2006, the COL applicant should provide implementation and readiness milestones for this program.

The PSI and ISI programs are considered operational programs and are listed in the COL FSAR, Table 13.4-1, which lists the operational programs with specific milestones for program implementation. The COL applicant has identified a license condition as the implementation requirement for many of the operational programs given in COL FSAR Table 13.4-1. The license conditions would require (1) the implementation of the operational program for those operational programs for which the regulations do not contain specific implementation requirements by the time specified milestones are achieved (2) a licensee to provide operational program implementation schedules reflecting the milestones to facilitate NRC inspections. More specifically, the first license condition will require the licensee to implement the operational program or portions of the program identified in COL FSAR Table 13.4-1 on or before established milestone.

For PSI and ISI programs, the ASME Code, Section XI provides requirements for program implementation in paragraph IWB-2200(a) for PSI programs and paragraph IWA-2430(b) for ISI programs. As such, the first license condition for the program implementation requirement is not necessary in the COL application because the ASME code already requires its implementation. For the second license condition, the COL applicant states that the licensee shall submit to the NRC, a schedule 12 months after issuance of a COL that supports planning for and conduct of NRC inspections of operational programs as provided in COL FSAR Table 13.4-1 and includes the PSI and ISI operational programs. This license condition will also require that the schedule be updated every 6 months before scheduled fuel load, and every month thereafter until either the operational program given in the COL FSAR table has been fully implemented or the plant has been placed in commercial service, whichever comes first. The second license condition is necessary for the PSI and ISI programs. The COL applicant's proposed license condition is consistent with the policy and guidance

established in SECY-05-0197, and is thus acceptable, and adequately addresses COL Information Item 5.2-3, COL FSAR Sections 5.2.4 and 6.6 addresses the PSI and ISI operational programs for ASME Code Class 1, 2, and 3 components. For CCNPP Unit 3, the COL applicant incorporated by reference the PSI and ISI programs descriptions from the U.S. EPR FSAR Tier 2, Sections 5.2.4, "Inservice Inspection and Testing of the RCPB," and 6.6, "Inservice Inspection of Class 2 and 3 Components," with no departures.

In BBNPP COLA Part 10, Appendix A, Section 6, "Operational Program Readiness," the BBNPP COL applicant proposed the following license condition:

A schedule shall be submitted to the appropriate Director of the NRC no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-1, Item 19, Initial Test Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR Table 13.4-1, Item 19, have been fully implemented, or the plant has been placed in commercial service, whichever comes first.

The staff reviewed the information contained in BBNPP COL FSAR Section 5.2 and Table 13.4-1 related to COL Information Item 5.2-3 and concludes that the same information is provided for BBNPP as was provided for CCNPP3. In addition, the staff finds this license condition proposed by the BBNPP COL applicant is consistent with the policy and guidance established in SECY-05-0197, and is thus acceptable, and adequately addresses U.S. EPR COL Information Item 5.2-3. Part 10 of the BBNPP COL application, Appendix A, Section 6, "Operational Program Readiness" addresses the PSI and ISI operational programs for ASME Code Class 1, 2, and 3 components by incorporating by reference, Table 13.4-1, Item 19 of the BBNPP COL FSAR. The remaining items in BBNPP COL FSAR Table 13.4-1 are addressed in Chapter 13 of this report.

U.S. EPR COL Information Item 5.2-4

A COL applicant that references the U.S. EPR design certification will develop procedures in accordance with RG 1.45, Revision 1.

In BBNPP COL FSAR Section 5.2.5, the BBNPP COL applicant addressed this item as follows:

Operating and emergency operating procedures will conform to the guidance of RG 1.45, Revision 1, including adjustment of leakage rate alarm setpoints as specified in Regulatory Position C.3.2. The procedures will also provide conversion of instrument indications of various leakage detection instruments into a common leak rate and procedures that specify operator actions in response to leakage rates less than the limits set forth in the plant technical specifications.

Operating and emergency procedures will be developed in accordance with the schedule provided in Section 13.5.2.1.5.

The following portion of this technical evaluation section is reproduced from CCNPP3 SER Section 5.2.5.

RG 1.45, Revision 1, May 2008, "Guidance on Monitoring and Response to Reactor Coolant System Leakage," Regulatory Position C.3, indicates that procedures for converting various indications to a common leakage equivalent should be available to the operators. In RAI 244, Question 05.02.05-6, the staff requested that the design certification applicant address Regulatory Position C.3 in the U.S. EPR FSAR. In a July 14, 2009, response to RAI 244, Question 05.02.05-6 relating to U.S. EPR FSAR Tier 2, Section 5.2.5, "Reactor Coolant Pressure Boundary Leakage Detection," to address the above regulatory position, the U.S. EPR design certification applicant (AREVA) indicated that the reactor coolant leakage detection procedures and alarm set points are to be developed by the COL applicant. Therefore, in RAI 166, Question 05.02.05-1, the staff requested that the COL applicant provide the following information regarding CCNPP Unit 3:

- Provide procedures to convert the instrument indications of various leakage detection methods (e.g., containment radioactivity monitors, containment sump level monitor, containment air cooler condensate flow rate monitor) into common leakage rate (gpm).
- Specify RCPB leakage detection alarm setpoints and demonstrate that the setpoints are sufficiently low to provide an early warning for operator actions prior to reaching Technical Specification (TS) limits.

In an October 27, 2009, response to RAI 166, Question 05.02.05-1, the COL applicant promised to provide the requested procedures and alarm setpoints. However, neither the procedures nor a commitment to provide the promised procedures are currently in the FSAR. The staff has insufficient information to make a determination whether the promised procedures will be consistent with the guidance in RG 1.45[,] Revision 1[,] Regulatory Position C.3.3 and has no information as to when the promised procedures will be available for NRC inspection.

Further, the COL applicant's response to RAI 166, Question 05.02.05-1 referred the staff to information in the U.S. EPR FSAR Tier 2, Section 5.2.5, which is incorporated by reference in the COL FSAR. The staff reviewed the U.S. EPR FSAR and did not find the information the COL applicant referenced regarding procedures for conversion and alarm setpoints in the U.S. EPR FSAR. The staff also notes that in its response to RAI 244, Question 05.02.05-6, AREVA directed the COL applicant to provide this information in the COL FSAR. Based upon the review above, the staff has determined that the COL applicant's response is not acceptable. As a result, the staff issued follow-up RAI 223, Question 05.02.5-3, requesting that the COL applicant address the procedures for conversion and alarm setpoints to the COL FSAR. **RAI 223, Question 05.02-05-3 is being tracked as an open item.**

Further, in a July 14, 2009, response to RAI 244, Question 05.02.05-7 issued in the staff's review of U.S. EPR FSAR Tier 2, Section 5.2.5, the U.S. EPR design certification applicant indicated that leakage detection procedures for prolonged low-level leakage are to be developed by the COL applicant. Therefore, the staff

issued RAI 166, Question 05.02.05-2, in the staff's review of the COL FSAR, and requested that the COL applicant provide the following information:

Operating experience at the Davis Besse Nuclear Power Plant indicates that prolonged low-level unidentified leakage inside containment could cause material degradation such that it could potentially compromise the integrity of a system leading to the gross rupture of the reactor coolant pressure boundary. The applicant is requested to provide operating procedures that specify operator actions in response to prolonged low level leakage conditions that exist above normal leakage rates and below the TS limits to provide operator sufficient time to take actions before the TS limit is reached. The procedures would include identifying, monitoring, trending, and repairing prolonged low-level leakage. The guidance about developing such procedures for ensuring effective management of leakage, including low-level leakage, is available in Regulatory Guide 1.45, Regulatory Position C.3.

In an October 27, 2009, response to RAI 166, Question 05.02.05-2, the COL applicant promised to provide the requested procedures, but neither the procedures nor a commitment to provide the procedures are currently in the FSAR, and no commitment was made in the COL FSAR. The staff has insufficient information to make a determination whether the promised procedures will be consistent with the guidance in RG 1.45[,] Revision 1[,] Regulatory Position C.3 and has no information as to when the promised procedures will be available for NRC inspection. Additionally, the COL applicant, in responding to RAI 166, Question 05.02.05-2, referred the staff to U.S. EPR FSAR Tier 2, Section 5.2.5, to demonstrate conformance with RG 1.45, Revision 1. The staff reviewed the referenced section of the U.S. EPR FSAR AREVA's response to RAI 244, Question 05.02.05-7, in which AREVA directed a COL applicant referencing the U.S. EPR design certification application to provide such information in the COL FSAR, and determined that the COL applicant has not demonstrated conformance with Regulatory Position C.3 in the COL FSAR.

Based upon the review above, the staff has determined that the COL applicant's response is not acceptable. As a result, the staff issued follow-up RAI 223, Question 05.02.5-4, requesting that the COL applicant provide the requested procedures. **RAI 223, Question 05.02-05-4 is being tracked as an open item.**

In a December 1, 2010, letter, the BBNPP COL applicant endorsed a CCNPP3 August 3, 2010, updated response to CCNPP3 RAI 223, Question 05.02.05-3 and 4, which proposed COL Information Item 5.2-4 regarding RG 1.45, Revision 1.

The staff finds the BBNPP COL applicant's commitment to RG 1.45, Revision 1, the adjustment of leakage rate alarm setpoints, and the preparation of the subject procedures for (1) conversion of instrument indications of various leakage detection instruments into a common leak rate, and (2) operator actions in response to leakage rates less than the limits set forth in the plant technical specifications are acceptable. Operating procedures shall be developed at least 6 months prior to fuel load as noted in the BBNPP COL FSAR Section 13.5.2.1.5. Accordingly, the staff considers this issue resolved for the BBNPP COL application but will be addressed separately for the CCNPP3 COL application.

5.2.4 Post Combined License Activities

U.S. EPR FSAR Tier 2, Table 1.8-2 contains COL information items that the BBNPP COL applicant is required to address. The following COL information items in Table 5.2-1 of this report include the proposed post COL activities that the staff evaluated in this report.

Table 5.2-1 Post Combined License Activities

Item No.	Description	COL FSAR Section	COL SER Section
5.2-3	<p>The initial inservice inspection program for Class 1, 2, and 3 components shall incorporate the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load.</p> <p>[The staff notes that this license condition is unnecessary in that it is a requirement of 10 CFR 50.55a(g)(4)(i).]</p>	[License Condition in BBNPP COLA Part 10 Appendix A, Section 2]	5.2.3
Operational Program Readiness	<p>A schedule shall be submitted to the appropriate Director of the NRC no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 1.4-1, Item 19, Initial Test Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR Table 13.4.1, Item 19, have been fully implemented or the plant has been placed in commercial service, whichever comes first.</p>	[License Condition in BBNPP COLA, Part 10, Appendix A, Section 6]	5.2.3

The NRC staff continues to review BBNPP's proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff's Final Safety Evaluation Report.

Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.

5.2.5 Conclusions

The staff reviewed the BBNPP COL application and the referenced design certification FSAR. The staff's review confirmed that the BBNPP COL application addressed the required information relating to the integrity of the reactor coolant pressure boundary. The results of the staff's technical evaluation of the information incorporated by reference in the BBNPP COL application, and associated conclusions, are documented in U.S. EPR SER, Section 5.2.

Regarding the proposed license conditions in Part 10 of the BBNPP COL application, Appendix A, the NRC staff continues to review BBNPP's proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff's Final Safety Evaluation Report.

Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.

5.3 Reactor Vessel

5.3.1 Summary of Application

In BBNPP COL FSAR Section 5.3, the BBNPP COL applicant provided supplemental information for the following:

U.S. EPR COL Information Items

- U.S. EPR COL Information Item 5.3-1

A COL applicant that references the U.S. EPR design certification will identify the implementation milestones for the material surveillance program.
- U.S. EPR COL Information Item 5.3-2

A COL applicant that references the U.S. EPR design certification will provide a plant-specific pressure and temperature limits report (PTLR), consistent with an approved methodology.
- U.S. EPR COL Information Item 5.3-3

A COL applicant that references the U.S. EPR design certification will provide plant-specific RT_{PTS} values in accordance with 10 CFR 50.61 for vessel beltline materials.
- U.S. EPR COL Information Item 5.3-4

A COL Applicant that references the U. S. EPR design certification will provide plant specific surveillance capsule data to benchmark BAW-2241P-A and demonstrate applicability to the specific plant.

U.S. EPR COL Information Item 5.3-4 is addressed in Chapter 4 of this report.

5.3.2 Regulatory Basis

The regulatory basis of the COL information incorporated by reference from the U.S. EPR FSAR is addressed in the staff's FSER on the U.S. EPR FSAR.

In addition, the relevant requirements of NRC regulations for the material surveillance program, and the associated acceptance criteria, are given in NUREG-0800, Section 5.3.1.

The applicable regulatory requirements for the material surveillance program are as follows:

1. 10 CFR Part 50, Appendix A, GDC 32, which requires the design to permit an appropriate material surveillance program for the reactor pressure vessel
2. 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements," as it relates to materials testing and acceptance criteria for fracture toughness
3. 10 CFR Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," as it relates to RVSP

5.3.3 Technical Evaluation

- U.S. EPR COL Information Item 5.3-1

A COL applicant that references the U.S. EPR design certification will identify the implementation milestones for the material surveillance program.

In BBNPP COL FSAR Section 5.3.1.6, the BBNPP COL applicant addressed this item as follows: "The implementation milestones for the Reactor Vessel material surveillance program are provided in Table 13.4-1."

The following portion of this technical evaluation section is reproduced from CCNPP3 SER Section 5.3.1.4:

COL FSAR Section 5.3.1.6 states that additional information about the implementation of the CCNPP Unit 3 [Reactor Vessel Surveillance Program] RVSP is provided in COL FSAR Table 13.4-1. This table describes the implementation of the RVSP with a license condition prior to initial fuel load. In addition, COLA Part 10, Appendix A, Item 6, "Operational Program Readiness" states that the licensee will submit to the NRC a schedule, no later than 12 months after issuance of the COL, that supports the planning for and conduct of NRC inspections of operational programs (including the RVSP). The COL applicant's proposed license conditions are consistent with the policy and guidance established in SECY-05-0197, and are thus acceptable.

The staff reviewed BBNPP COL FSAR Table 13.4-1, Item 5 and concludes that the same information is provided for BBNPP as was provided for CCNPP3 with regard to the RVSP. In addition, BBNPP COLA, Part 10, Appendix A, Item 6 contains the same proposed license condition as proposed for CCNPP3 regarding the Operational Program Readiness items listed in BBNPP COL FSAR Table 13.4-1. Accordingly, the staff considers this issue resolved.

- U.S. EPR COL Information Item 5.3-2

A COL applicant that references the U.S. EPR design certification will provide a plant-specific pressure and temperature limits report (PTLR), consistent with an approved methodology.

In BBNPP COL FSAR Section 5.3.2.1, the BBNPP COL applicant addressed this item as follows:

A plant-specific PTLR will be provided in accordance with {BBNPP} Technical Specification 5.6.4, "Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)," and will be based on the methodology provided in ANP-10283P, Revision 2 (AREVA, 2012), prior to initial fuel load.

The following portion of this technical evaluation section is reproduced from CCNPP3 SER, Section 5.3.2.4:

COL Information Item 5.3-2, in COL FSAR Section 5.3.2, "Pressure-Temperature Limits, Pressurized Thermal Shock, and Charpy Uppershell Energy Data and Analyses," directs a COL applicant that references the U.S. EPR design certification to provide a plant-specific PTLR consistent with an approved methodology.

To address this COL information Item, COL FSAR Section 5.3.2.1 states that a plant-specific PTLR will be provided in accordance with CCNPP Unit 3 Technical Specification 5.6.4, "Reactor Coolant System Pressure and Temperature Limits Report," and will be based on the methodology provided in ANP-10283P (AREVA, 2007).

In a letter dated April 30, 2009, AREVA submitted a revised technical report, ANP-10283P, Revision 1, to the NRC. The revised technical report contains bounding pressure-temperature (P-T) limit curves based on bounding material properties in the design specifications, and a generic pressure-temperature limits report (PTLR). The staff notes that using a PLTR (reference: NRC Generic Letter 96-03) requires a licensee to inform the staff of any subsequent changes to the P-T limits with no NRC approval necessary when there are no changes to the approved PTLR methodology. This approach is consistent with the approach used for all operating reactors using PTLRs.

In RAI 186, Question 05.03.02-2, the staff requested that the COL applicant confirm the use of the generic PTLR for the U.S. EPR design (provided by AREVA in Technical Report ANP-10283P, Revision 1) and that the COL FSAR Section 5.3.2.1 be revised to provide a commitment to submit plant-specific P-T limits using an approved methodology. In an October 30, 2009, response to RAI 186, Question 05.03.02-2, the COL applicant confirmed the use of the generic PTLR (technical report ANP-10283P, Revision 1) and proposed to update COL FSAR Sections 5.3.2.1 and 5.3.4 accordingly. The COL applicant also proposed revising COL FSAR Section 5.3.2 to indicate that the plant-specific P-T limits will be provided prior to fuel load. The staff finds that the COL applicant's response is in accordance with the guidelines of GL 96-03, and is therefore acceptable. **RAI 186, Question 05.03.02-2 is being tracked as a confirmatory item.**

Except for the confirmatory item identified above, the staff concludes that the information provided in COL FSAR Section 5.3.2.1 and the COL applicant's October 30, 2009, response to RAI 186, Question 05.03.02-2, meets the appropriate regulatory requirements.

In a May 19, 2010, letter, the BBNPP COL applicant adopted the position in the CCNPP3 October 30, 2009, letter that updated the version of the PTLR (ANP-10283P) to the 2009,

Revision 1 version. The staff notes that BBNPP COL FSAR Section 5.3.2.1 now references ANP-10283P, Revision 2 (AREVA, 2012) as does BBNPP COL FSAR Section 5.3.4. In addition, BBNPP COL FSAR Section 5.3.2.1 commits to submittal of plant-specific PTLR prior to initial fuel load. In a December 14, 2010, letter the BBNPP COL applicant stated:

As identified in BBNPP FSAR Chapter 16, the U.S. EPR Generic Technical Specifications and Bases, provided in Chapter 16 of the U.S. EPR FSAR, are incorporated by reference in the BBNPP FSAR and that a complete set of site-specific Technical Specifications will not be included in Chapter 16 until after the Advanced Safety Evaluation Report for the U.S. EPR is issued by the NRC staff.

The BBNPP site-specific Technical Specifications are evaluated by the staff in Chapter 16 of this report. Therefore, the staff considers this issue resolved for the BBNPP COL application. This issue will be addressed separately for the CCNPP3 COL application.

- U.S. EPR COL Information Item 5.3-3

A COL applicant that references the U.S. EPR design certification will provide plant-specific RT_{PTS} values in accordance with 10 CFR 50.61 for vessel beltline materials.

In BBNPP COL FSAR Section 5.3.2.3, the BBNPP COL applicant addressed this item as follows:

The plant-specific RT_{PTS} values for vessel beltline materials will be determined in accordance with 10 CFR 50.61 and provided to the NRC within one year of acceptance of the reactor vessel by the licensee.

The following portion of this technical evaluation section is reproduced from CCNPP3 SER, Section 5.3.3.4:

COL Information Item 5.3-3 states that a COL applicant that references the U.S. EPR design certification will provide plant-specific RT_{PTS} values in accordance with 10 CFR 50.61 for vessel beltline materials. The staff notes that the bounding RT_{PTS} values meet the screening criteria of 10 CFR 50.61. To address this COL item, COL FSAR Section 5.3.3 states that the plant-specific RT_{PTS} values for vessel beltline materials will be determined in accordance with 10 CFR 50.61 and provided to the NRC within 1 year of acceptance of the reactor vessel by the licensee. This commitment is also provided as a license condition in COLA Part 10 (ITAAC), Section 2. The staff finds that the COL applicant's response to COL Information Item 5.3-3 is acceptable because it meets the implementation requirements of 10 CFR 50.61. In addition, this will allow ample time for the staff to review the acceptability of the plant-specific RT_{PTS} values. The staff also confirmed that the proposed license condition has been added to Part 10 of the COLA. The COL applicant's proposed license condition is consistent with the policy and guidance established in SECY-05-0197, and is thus acceptable. On the basis, the staff finds that the actions proposed by the COL applicant meet the requirements of 10 CFR 50.61, and are therefore acceptable.

In a March 27, 2009, response to CCNPP3 RAI 77, Question 05.03.03-1, the CCNPP3 COL applicant proposed a license condition requiring that a plant-specific PTS evaluation be submitted to the NRC within 1 year of acceptance of the reactor vessel by the licensee. In an August 17, 2009, response to the CCNPP3 COL applicant's RAI 135, Question 05.03.03-2, the CCNPP3 COL applicant proposed that COL Information Item 5.3-3 be included in CCNPP3 COL FSAR Table 1.8-2 and a license condition be included Part 10, Appendix A, of the CCPP3 application.

In a June 11, 2010, letter, the BBNPP COL applicant adopted the same COL Information Item and License Condition as that proposed by the CCNPP3 COL applicant in response to CCNPP3 RAI 77, Question 05.03.03-1 and RAI 135, Question 05.03.03-2. The staff finds that the BBNPP COL applicant's response regarding COL Information Item 5.3-3 conforms to that of the CCNPP3 COL applicant's response that the staff found acceptable as noted in CCNPP3 SER Section 5.3.3.4. In addition, the staff also confirmed that the proposed License Condition has been added to BBNPP COLA, Part 10. Accordingly, the staff considers this issue resolved.

5.3.4 Post Combined License Activities

Table 5.3-1 Post Combined License Activities

Item No.	Description	COL FSAR Section	COL SER Section
5.3-2	A Plant-specific Pressure and Temperature Limits Report shall be provided in accordance with {{PPL Bell Bend, LLC}} Technical Specification 5.6.4, "Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)," and shall be based on the methodology provided in ANP-10283P, Revision 2, prior to initial fuel load	[License Condition in BBNPP COLA Part 10, Appendix A, Section 2]	5.3.3
5.3-3	The plant-specific RT_{PTS} values for vessel beltline materials will be determined in accordance with 10 CFR 50.61 and provided to the NRC within one year of acceptance of the reactor vessel by the licensee.	[License Condition in BBNPP COLA Part 10, Appendix A, Section 2]	5.3.3

The NRC staff continues to review BBNPP's proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff's Final Safety Evaluation Report. **Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.**

5.3.5 Conclusions

The staff reviewed the BBNPP COL application and the referenced design certification FSAR. The staff's review confirmed that the BBNPP COL application addressed the required information relating to the reactor vessel. The results of the staff's technical evaluation of the information incorporated by reference in the BBNPP COL application, and associated conclusions, are documented in U.S. EPR design certification SER, Section 5.3.

In addition, the staff finds the supplemental information presented within the BBNPP COL FSAR acceptable.

The staff's SER on the U.S. EPR FSAR is not yet complete. The staff will update Chapter 5 of this report to reflect the final disposition of the U.S. EPR design certification application.

Regarding the proposed license conditions in Part 10 of the BBNPP COL application, the NRC staff continues to review BBNPP's proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff's Final Safety Evaluation Report. **Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.**

5.4 Component and Subsystem Design

5.4.1 Summary of Application

In BBNPP COL FSAR Section 5.3, the BBNPP COL applicant provided supplemental information for the following:

U.S. EPR COL Information Item

- EPR COL Information Item 5.4-1

A COL applicant that references the U.S. EPR design certification will identify the edition and addenda of ASME Section XI applicable to the site-specific SG inspection program.

5.4.2 Regulatory Basis

The regulatory basis of the COL information incorporated by reference from the U.S. EPR FSAR is addressed within the staff's FSER on the U.S. EPR FSAR.

In addition, the relevant requirements of NRC regulations for the supplemental information provided for this area of review, and the associated acceptance criteria, are given in NUREG-0800, Section 5.4.2.2.

The applicable regulatory requirements for acceptance of the COL information item are:

1. 10 CFR 50.55a as they relate to acceptable Code editions for inservice inspection of steam generator tubes.
2. 10 CFR 52.79(d), "Contents of Applications; Technical Information in Final Safety

Analysis Report.”

5.4.3 Technical Evaluation

U.S. EPR COL Information Item

- U.S. EPR COL Information Item 5.4-1

A COL applicant that references the U.S. EPR design certification will identify the edition and addenda of ASME Section XI applicable to the site-specific SG inspection program.

In BBNPP COL FSAR Section 5.4, the BBNPP COL applicant addressed this item as follows:

The Steam Generator Program tube inspections for preservice inspection and the initial inservice inspection interval will comply with ASME Boiler and Pressure Vessel Code, Section XI, 2004 edition (ASME, 2004). This code is consistent with that established in U.S. EPR FSAR Section 5.4.2. No relief requests or alternatives are required for use of the 2004 Edition of ASME Section XI.

The Steam Generator Program tube inspections for the initial inservice inspection interval shall incorporate the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load. Inservice inspections conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month inspection interval (or the optional ASME Code cases listed in Regulatory Guide 1.147, that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed in 10 CFR 50.55a(b)).

Should relief requests be required due to the use of code additions/addenda later than the 2004 Edition, they will be developed through the regulatory process and submitted to the NRC for approval in accordance with 10 CFR 50.55a(g)(5). The relief requests shall include appropriate justifications and proposed alternative inspection methods.

The following portion of this technical evaluation section is reproduced from CCNPP3 SER Section 5.4.2.4:

COL FSAR Section 5.4.2.5.2.2, as shown above, is acceptable, because it refers to the same Code edition (2004) as the corresponding section of the U.S. EPR FSAR (i.e., U.S. EPR FSAR Tier 2, Section 5.4.2) and COL FSAR Section 5.2.4, “Inservice Inspection and Testing of the Reactor Coolant Pressure Boundary.” The 2004 edition of the Code is acceptable for inservice inspection, because it is incorporated by reference into NRC regulations [10 CFR 50.55a(b)]. The information regarding the inspection program following issuance of a COL is acceptable, because it complies with the inservice examination requirements in 10 CFR 50.55a(g) for both the initial inspection interval and subsequent intervals. Therefore, the staff considers RAI 40, Questions 05.04.02.02-11 and 05.04.02.02-12 resolved.

The BBNPP COL applicant adopted the same technical position as the CCNPP3 COL applicant with regard to supplemental information provided for U.S. EPR COL Information Item 5.4-1. Accordingly, the staff finds the BBNPP COL applicant’s supplemental information as described above acceptable for reasons stated above.

5.4.4 Post Combined License Activities

U.S. EPR FSAR Tier 2, Table 1.8-2 contains COL information items that the COL applicant is required to address. The following COL information item in Table 5.4-1 of this report includes the proposed COL activities which the staff has evaluated in this section of the report.

Table 5.4-1 Post Combined License Activities

Item No.	Description	COL FSAR Section	COL SER Section
5.4-1	The Steam Generator Tube Inspection Program shall incorporate the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load.	[License Condition in COLA Part 10, Appendix A, Section 2]	5.4.3

The NRC staff continues to review BBNPP’s proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff’s Final Safety Evaluation Report. **Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.**

5.4.5 Conclusions

The staff reviewed the BBNPP COL application and the referenced design certification FSAR. The staff’s review confirmed that the BBNPP COL application addressed the required information relating to component and subsystem design. The results of the staff’s technical evaluation of the information incorporated by reference in the BBNPP COL application, and associated conclusions, are documented in the U.S. EPR design certification SER, Section 5.4.

The staff’s SER on the U.S. EPR FSAR is not yet complete. The staff will update Chapter 5 of this report to reflect the final disposition of the U.S. EPR design certification application.

Regarding the proposed license condition in Part 10 of the BBNPP COL application, Appendix A, Section 6, “Operational Program Readiness” the NRC staff continues to review BBNPP’s proposed license conditions. The NRC staff will address whether these license conditions are appropriate for inclusion in the COL and the proper wording of the conditions in the NRC staff’s Final Safety Evaluation Report. **Accordingly, final wording of license conditions for the BBNPP COL is being tracked as an Open Item.**