

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 452-8545
SRP Section: 10.03.06 – Steam and Feedwater System Materials
Application Section: 10.3.6
Date of RAI Issue: 03/28/2016

Question No. 10.03.06-21

In response to RAI 314-8378, Question 10.03.06-12 the applicant stated the following:

“Welding material specifications for ASME Class 2 and 3 components will be decided by the manufacturer or constructor in accordance with the ASME Section III NC-2400(Class 2) and ND-2400(Class 3).”

Subsequently the applicant stated that there was no change to the DCD. As written, the DCD would not require this information to be provided by a COL applicant.

Add a new COL item to have a COL applicant provide material specifications that will be utilized for ASME Section III components.

Response

DCD Tier 2, COL item 10.3(5) will be added as indicated in the attachment to clarify what is required of the COL applicant.

Impact on DCD

DCD Tier 2, Table 1.8-2 (16 of 29), Subsection 10.3.7 will be revised as indicated in the Attachment.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

APR1400 DCD TIER 2

Table 1.8-2 (16 of 29)

Item No.	Description
COL 9.5(7)	The COL applicant is to provide the fire brigade radio systems.
COL 9.5(8)	The COL applicant is to provide the LAN and VPN system.
COL 9.5(9)	The COL applicant is to provide the emergency offsite communication system including dedication hotline, local law enforcement radio equipment, and wireless communication system.
COL 9.5(10)	The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident.
COL 9.5(11)	The COL applicant is to provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface.
COL 9.5(12)	The COL applicant is to provide the security radio system that consists of a base unit, mobile units, and portable units.
COL 9.5(13)	The COL applicant is to provide the local law enforcement communications including dedicated conventional telephone and radio-transmitted two-way communication system.
COL 9.5(14)	The COL applicant is to provide electric power for the security lighting system.
COL 9.5(15)	The COL applicant is to provide the system design information of AAC GTG building HVAC system including flow diagram, if the AAC GTG building requires the HVAC system.
COL 10.2(1)	The COL applicant is to identify the turbine vendor and model.
COL 10.2(2)	The COL applicant is to identify how the functional requirements for the overspeed protection system are met and provide a schematic of the TGCS and protection systems from sensors through valve actuators.
COL 10.2(3)	The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP Section 10.2.3 Acceptance Criteria, preservice inspections) will be met.
COL 10.3(1)	The COL applicant is to provide operating and maintenance procedures including adequate precautions to prevent water (steam) hammer and relief valve discharge loads and water entrainment effects in accordance with NUREG-0927 and a milestone schedule for implementation of the procedure.
COL 10.3(2)	The COL applicant is to establish operational procedures and maintenance programs as related to leak detection and contamination control.
COL 10.3(3)	The COL applicant is to provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description is to address consistency with GL 89-08 and NSAC-202L-R3 and provide a milestone schedule for implementation of the program.

COL 10.3(5) The COL applicant is to provide material specifications that will be utilized for ASME Section III components.

APR1400 DCD TIER 2

For the safety/non-safety carbon steel piping with relatively mild FAC degradation, the FAC monitoring program is prepared and implemented using knowledge acquired from experience in pipe wall thinning management of the operating nuclear power plants in Korea. The FAC monitoring program includes preservice thickness measurements of as-built piping considered susceptible to FAC and erosion/corrosion. By performing this preservice measurement, the piping thickness margin that is used as a wall thinning margin is known. By combining the measurement with regular inspections, the frequency of the pipe replacement can be predicted. Reasonable assurance of the integrity and safety of plants is provided by conducting inspection and maintenance during the service life of the plant and replacing piping if necessary. The type of fluid, flow rates, fluid temperatures, and pressure of ASME Class 2 and 3 piping for steam and feedwater system are given in Table 10.3.2-5.

The COL applicant is to provide material specifications that will be utilized for ASME Section III components (COL 10.3(5)).

The COL applicant is to provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description is to address consistency with GL 89-08 and NSAC-202L-R3 and provide a milestone schedule for implementation of the program (COL 10.3(3)).

10.3.7 Combined License Information

COL 10.3(1) The COL applicant is to provide operating and maintenance procedures including adequate precautions to prevent water (steam) hammer and relief valve discharge loads and water entrainment effects in accordance with NUREG-0927 and a milestone schedule for implementation of the procedure.

COL 10.3(2) The COL applicant is to establish operational procedures and maintenance programs as related to leak detection and contamination control.

COL 10.3(3) The COL applicant is to provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description is to address consistency with GL 89-08 and NSAC-202L-R3 and provide a milestone schedule for implementation of the program.

COL 10.3(5) The COL applicant is to provide material specifications that will be utilized for ASME Section III components.

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Question No. 10.03.06-22

In response to RAI 314-8378, Question 10.03.06-15 the applicant provided 4 answers related to the connection between the AFW system and the man feedwater system.

The staff finds the answers 1, 2, and 4 acceptable.

Answer 3 provided process controls for a dissimilar metal weld. The process controls are sufficient but the applicant has indicated that the DCD would not be updated.

Add the information contained in answer 3 to the FASR.

Response

The information that was provided in answer 3 with regards to process control for a dissimilar metal joint of RAI 314-8378 will be added in DCD Tier 2, Subsection 10.3.6.2.

The RG 1.50 concerning welding of low-alloy material is already indicated in “10.3.6.2.d” and the RG 1.71 concerning welder performance qualification is already indicated in “10.3.6.2.e” in DCD Tier 2, Subsection 10.3.6.2. Therefore, the following sentence will be added in DCD Tier 2, Subsection 10.3.6.2.

- e. The welding of austenitic stainless steel conforms with NRC RG 1.31 (Reference 22) and NRC RG 1.44 (Reference 23).
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Impact on DCD

DCD Tier 2, Subsection Table 1.9-1, 10.3.6.2 and 10.3.8 will be revised as indicated on the attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Reports.

APR1400 DCD TIER 2

Table 1.9-1 (4 of 38)

NRC Regulatory Guide	Revision / Issue Date	Conformance or Summary Description of Deviation	DCD Tier 2 Section
1.29 Seismic Design Classification	Rev. 4 03/2007	The APR1400 conforms with this NRC RG.	3.2.1, 5.2.5, 6.2.4.1.2, 9.1.2.1, 9.1.2.2.3, 9.1.4.3, 9.1.5.2.1, 9.1.5.2.2, 9.1.5.2.3, 9.2.1.1.1, 9.2.2.1.1, 9.2.5.1, 9.4.3.1, 9.4.5.1.2, 9.4.5.1.1, 9.5.4.1, 9.5.5.1, 9.5.5.3, 9.5.6.1, 9.5.6.3, 9.5.7.1, 9.5.7.3, 9.5.8.1, 10.3.1, 10.4.8, 10.4.9.3, 11.2, 11.3, 11.4
1.30 Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electrical Equipment	08/1972	The APR1400 conforms with this NRC RG.	17.5
1.31 Control of Ferrite Content in Stainless Steel Weld Metal	Rev. 4 10/2013	The APR1400 conforms with this NRC RG	4.5.2.2, 4.5.2.4, 5.2.3.4.4, 5.3.1.4, 5.4.2.1.4, 6.1.1.1, 6.1.1.2.2
1.32 Criteria for Power Systems for Nuclear Power Plants	Rev. 3 03/2004	The APR1400 conforms with this NRC RG.	8.1.3.3, 8.2.2.2, 8.3.1.2.2, 8.3.2.2.2, 9.5.4.1
1.33 Quality Assurance Program Requirements (Operation)	Rev. 3 06/2013	Not applicable (COL)	N/A

10.3.6.2

APR1400 DCD TIER 2

Table 1.9-1 (6 of 38)

NRC Regulatory Guide		Revision / Issue Date	Conformance or Summary Description of Deviation	DCD Tier 2 Section
1.44	Control of the Processing and Use of Stainless Steel	Rev. 1 03/2011	The APR1400 conforms with this NRC RG.	4.5.1.2, 4.5.2.4, 5.2.3.2.2, 5.2.3.4.1, 5.3.1.4, 5.4.2.1.4, 6.1.1.1, 6.1.1.2.2
1.45	Guidance on Monitoring and Responding to Reactor Coolant System Leakage	Rev. 1 05/2008	The APR1400 conforms with this NRC RG.	3.6.3.5.1, 5.2.5, 5.2.5.1.1.2, 5.2.5.1.2.2, 5.2.5.1.2.4, 5.2.5.1.3, 5.2.5.2, 5.2.5.5, 9.3.3.1.2, 11.5.1.2
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems	Rev. 1 02/2010	The APR1400 conforms with this NRC RG.	7.1.2.39, Table 7.1-1, 7.2.2.5, 7.3.2.5, 7.5.1.3, 7.5.2.3, 7.7.1.3, 8.3.1.2.2, 8.1.3.3, 8.3.2.2.2
1.50	Control of Preheat Temperature for Welding of Low-Alloy Steel	Rev. 1 03/2011	The APR1400 conforms with this NRC RG.	5.2.3.3, 5.3.1.2, 5.3.1.4, 5.4.2.1.3, 6.1.1.1, 6.1.1.2.2, 10.3.6.2
1.52	Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants	Rev. 4 09/2012	The APR1400 conforms with this NRC RG.	6.4.2.2, 6.4.6, 6.5.1.1, 6.5.1.1, 6.5.1.2.1, 6.5.1.4.1, 6.5.1.4.2, 6.5.1.5, 6.5.1.5.4, 6.5.1.6, 7.3.1.9, 9.4.1.1, 9.4.1.4, 9.4.2.1, 9.4.5.1.3, 9.4.5.4.3, 11.3.4, 14.2.12.1.98

10.3.6.2

APR1400 DCD TIER 2

Class 2, and 3 portions of the MSS and feedwater system conform with the ASME Section III, Appendix D, Article D-1000

e. The welding of austenitic stainless steel conforms with the NRC RG 1.31 (Reference 22) and NRC RG 1.44 (Reference 23).

e. Welder performance qualification for areas of limited accessibility conforms with the recommendations of NRC RG 1.71 (Reference 16) (i.e., assurance of the integrity of welds in locations of restricted direct physical and visual accessibility).

f. The nondestructive examination procedures and acceptance criteria for the examination of Class 2 and Class 3 materials of tubular products conform with the requirements of ASME Section III, NC/ND-2550 through NC/ND-2570.

g. A description of periodic inservice inspection and inservice testing of ASME Section III, Class 2 and 3 components is provided in Section 6.6 and Subsection 3.9.6. Preservice and inservice testing and inspection are addressed further in Chapter 14.

h. No copper alloys are used for components that are in contact with feedwater, steam, or condensate.

i.

Oxygen-induced corrosion is minimized by providing the following component materials:

- a. Steam reheater tubes are ferritic stainless steel or equivalent.
- b. Feedwater heater tubes are type 304L stainless steel with carbon steel tube sheets.
- c. Main steam piping, hot reheat piping, condensate piping, feedwater piping, and heater drain piping upstream of the drain control valves are carbon steel or equivalent.

10.3.6.3 Flow-Accelerated Corrosion

FAC-resistant materials are used for the FAC-susceptible piping in steam and power conversion systems. The water chemistry conditions of the secondary system are controlled to minimize corrosion. The additional pipe thickness are applied for the carbon

APR1400 DCD TIER 2

13. ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications," The American Society of Mechanical Engineers, the 2008 Edition with the 2009 Addenda.
14. Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," U.S. Nuclear Regulatory Commission, June 2007.
15. Regulatory Guide 1.50, "Control of Preheat Temperature for Welding of Low-Alloy Steel," Rev. 0, U.S. Nuclear Regulatory Commission, May 1973.
16. Regulatory Guide 1.71, "Welder Qualification for Areas of Limited Accessibility," Rev. 1, U.S. Nuclear Regulatory Commission, March 2007.
17. EPRI Report 1011838, "Recommendations for an Effective Flow- Accelerated Corrosion Program (NSAC-202L-R3)," Electric Power Research Institute, May 2, 2006.
18. NUREG-1344, "Erosion/Corrosion-Induced Pipe Wall Thinning in U.S. Nuclear Power Plants," 1989.
19. Generic Letter 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning," U.S. Nuclear Regulatory Commission, May 2, 1989.
20. ASME B36.10M, "Welded and Seamless Wrought Steel Pipe," The American Society of Mechanical Engineers, 2004.
21. 10 CFR 20.1406, "Radiological Criteria for Unrestricted Use," U.S. Nuclear Regulatory Commission.

22. Regulatory Guide 1.31, "Control of Ferrite Content in Stainless Steel Weld Metal," Rev. 4, U.S. Nuclear Regulatory Commission, October 2013.
23. Regulatory Guide 1.44, "Control of the Processing and Use of Stainless Steel," Rev. 1, U.S. Nuclear Regulatory Commission, March 2011.