
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.: 476-8556
SRP Section: 10.04.10 – Auxiliary Steam System
Application Section: 10.4.10
Date of RAI Issue: 05/09/2016

Question No. 10.04.10-1

10 CFR 20.1406, "Minimization of contamination," requires in part that each DC applicant shall describe how the facility design and procedures for operation will minimize, to extent practicable, contamination of the facility and environment, as well as the generation of radioactive waste.

In DCD Tier 2, Subsection 10.4.10.2.3 "Design Features for Minimization of Contamination," the applicant states that the APR1400 is designed with specific features to meet the requirements of 10 CFR 20.1406 and Regulatory Guide 4.21. DCD Tier 2, Subsection 10.4.10.2.3, goes on to state that piping embedment shall be minimized to the extent practicable and that buried piping in the yard and between buildings and facilities shall be minimized to the extent practicable. However, DCD Tier 2, Subsection 10.4.10.2.3 also states under "Decommissioning Planning," that the auxiliary steam system is designed with no embedded or buried piping. DCD continues by stating that yard piping is routed underground in a concrete tunnel designed with leakage collection and detection.

Although either design would satisfy 10 CFR 20.1406, these statements do not clearly align with each other and provide confusion to the NRC staff as to what the actual design will be.

The applicant is requested to clarify the actual design of the auxiliary steam system piping with regards to meeting the requirements of 10 CFR 20.1406. The applicant is requested to modify the DCD Sections 10.4.10 and 12.4 to clearly depict a consistent design.

Response

The auxiliary steam system will be designed with minimum embedded or buried piping and yard piping will be routed in an underground concrete tunnel that is designed with leakage collection and detection to minimize unintended contamination.

Therefore, the DCD Subsection 10.4.10 and Table 12.4-10 will be revised to clearly depict a consistent design.

Impact on DCD

DCD Tier 2, Subsection 10.4.10 and Table 12.4-10 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 Report.

APR1400 DCD TIER 2

actions, and a signal is sent to open the condensate transfer valves to the LWMS for treatment and release. This design approach minimizes cross-contamination to other components.

Decommissioning Planning

- a. The SSCs are designed for the full service life and are fabricated as individual assemblies for easy removal.
- b. The SSCs are designed with decontamination capabilities. Demineralized water is provided for makeup as well as for decontamination. Design features such as welding techniques used and surface finishes are intended to minimize the need for decontamination, and hence reduce waste generation.

- c. The auxiliary steam system is designed with ~~no~~ ^{minimizing} embedded or buried piping, thus ~~preventing~~ ^{minimum} unintended contamination due to leaking of buried or embedded piping. Yard piping is routed in an underground concrete tunnel that is designed with a leakage collection sump, level switch, and pump. An alarm is also provided in the MCR for operator actions in the event of detection of liquid.

Operations and Documentation

- a. The auxiliary steam system is designed with adequate instrumentation for automatic operation with manual initiation. The boiler is a self-contained vendor package complete with its own instrumentation. Operation of the boiler operation is controlled from a local panel but with remote shutdown at low fuel oil level, or at operator initiation from the MCR.
- b. The auxiliary steam system condensate receiver tank, vent condenser, and pumps are located in an enclosed cubicle inside the auxiliary building, and the boiler is located in an independent auxiliary boiler building for separation purposes. Adequate ingress and egress spaces are provided for prompt assessments and appropriate responses when and where they are needed.

APR1400 DCD TIER 2

Table 12.4-10 (64 of 74)

Objective		SSC Control Measures / Design Features in DCD to Meet Objective	DCD Tier 2 Reference
2	Adequate and Early Leak Detection	<ul style="list-style-type: none"> The auxiliary steam system is designed with automated operation with manual initiation for the different modes of operation. Adequate instrumentation, including level and pressure elements, and a radiation monitor, is provided to monitor and control the operations. Upon a high radiation signal, the condensate is diverted to the LWMS for treatment and release. This design approach thus provides early detection and minimizes spread of contamination and waste generation. 	10.4.10
3	Reduction of Cross-Contamination, Decontamination, and Waste Generation	<ul style="list-style-type: none"> The SSCs are designed with life-cycle planning through the use of nuclear industry-proven materials compatible with the chemical, physical, and radioactive environment, thus minimizing waste generation. The auxiliary steam system is equipped with a radiation monitor to continuously check the contamination level in the condensate, and sampling and analysis for confirmation and calibration of the radiation monitor, if necessary. If contamination is detected at or above a setpoint, an alarm is initiated for operator actions, and a signal is sent to open the condensate transfer valves to the LWMS for treatment and release. This design approach minimizes cross-contamination to other components. 	10.4.10
4	Decommissioning Planning	<ul style="list-style-type: none"> The SSCs are designed for the full service life and are fabricated as individual assemblies for easy removal. The SSCs are designed with decontamination capabilities. Demineralized water is provided for makeup as well as for decontamination. Design features such as welding techniques used and surface finishes are intended to minimize the need for decontamination, and hence reduce waste generation. The auxiliary steam system is designed with no embedded or buried piping, thus preventing unintended contamination due to leaking of buried or embedded piping. Yard piping is routed in an underground concrete tunnel that is designed with a leakage collection sump, level switch, and pump. An alarm is also provided in the MCR for operator actions in the event of detection of liquid. 	10.4.10

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Question No. 10.04.10-2

10 CFR 52.6(a) states in part that the information provided by an applicant for a standard design certification shall be complete and accurate in all material respects.

Regulatory Guide 1.29, Revision 4, Regulatory Position C.1.o states in part that the primary and secondary reactor containment SSC(s), including their foundation and supports, are designated as Seismic Category I and must be designed to withstand the effects of the SSE [safe shutdown earthquake] and remain functional. Regulatory Position C.2 states that those SSCs of which continued function is not required but of which failure could reduce the functioning of any plant feature included in Regulatory Position C.1 to an unacceptable safety level should be designed and constructed so that the SSE would not cause such failure.

In DCD Tier 2, Figure 10.4.10-1, "Auxiliary Steam System Flow Diagram," (sheet 1 of 3), the applicant depicts piping inside the reactor containment building (after the containment penetration) as seismic category II and quality group D. However, DCD Tier 2, Table 3.2-1, "Classification of Structures, Systems, and Components," (3 of 86), does not indicate any auxiliary steam system components within the reactor containment building other than the containment penetration itself which is classified as seismic category I and quality group B. Table 3.2-1, Item 4.c does state that "others" would be seismic category III.

Without proper classification of this system's components within the reactor containment building, failures of those portions could damage safety-related equipment. If one is to bin the reactor containment building piping and components into Table 3.2-1, Item 4.c as seismic category III, this would be unacceptable for a steam piping located in the reactor containment building that contains safety-related equipment required to withstand the effects of a safe shutdown earthquake and remain functional.

The applicant is requested to clarify the actual design classification of the auxiliary steam system components and piping within the reactor containment building. The applicant is requested to modify DCD Figure 10.4.10-1 and Table 3.2-1 to clearly depict a consistent design.

Response

Non-safety related piping and components within the reactor containment building will be classified as seismic category II and quality group D.

Therefore, the DCD Table 3.2-1 will be revised to clearly depict a consistent design.

Impact on DCD

DCD Tier 2, Table 3.2-1 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 Report.

APR1400 DCD TIER 2

Table 3.2-1 (3 of 86)

Item No. / Principal SSCs	Location ⁽²⁾	Safety Class	Quality Group	Codes and Standards	10 CFR 50, App. B ⁽³⁾	Seismic Category	Remarks
e. Auxiliary feedwater pump recirculation piping and valves up to and including auxiliary feedwater recirculation isolation valves (AFW-V1011 A/B, AFW V1013 A/B)	AB	SC-3	C	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	
3. AN – Alarm							
a. Alarm processing server and display device (QIAS-N)	AB	NNS	N/A	N/A	A	I	
b. Alarm processing server and display device (IPS)	AB	NNS	N/A	N/A	A	II	(3)(d)
c. Alarm sound device and speaker	AB	NNS	N/A	N/A	A	II	(3)(d)
4. AS – Auxiliary Steam							
a. Containment isolation valves and associated piping	AB, RCB	SC-2	B	ASME Sec. III Div.1 NC-2007 with 2008 addenda	Yes	I	
b. Non-safety-related piping and components in safety-related areas	AB	NNS	D	ASME B31.1-2010	A	II	(3)(d)
c. Others	TGB, CB	NNS	D	ASME B31.1-2010	N/A	III	
5. AT – Auxiliary Feedwater Pump Turbine							
a. Auxiliary feedwater pump turbines	AB	SC-3	C/G	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	
b. Steam admission/exhaust/preheating lines and valves	AB	SC-3	C	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	