
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.: 246-8307
SRP Section: 09.02.02 Reactor Auxiliary Cooling Water Systems
Application Section: 9.2.8
Date of RAI Issue: 10/14/2015

Question No. 09.02.02-3

Regulatory Guide 4.21 describes a method acceptable to the U.S. Nuclear Regulatory Commission (NRC) for use in the implementation of Title 10, Section 20.1406, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning"

COL Item 9.2(36) states "The COL applicant is to include a site-wide radiological environmental monitoring program to monitor both the horizontal and vertical variability of the onsite hydrogeology and potential effects of the construction and operation of the plant."

The applicability of this COL item to the Turbine Building Closed Cooling Water (TBCCW) system is not clear. Radiological programs would generally be addressed in Chapter 11, and 12 of the DCD. In fact, the requirement for the development of the radiological environmental monitoring program is included in several COL items in this application including four times in Chapter 11 (COL 11.2(11), COL 11.3(6), COL 11.4(5) and COL 11.5(9)). At the same time, Chapter 12 identifies in detail a site-wide environmental program and has an associated COL Item.

The staff questions the need for such repetitive approach when identifying almost identical COL Items throughout the application. Instead, there should be a singular, encompassing COL item addressing the whole plant operation. A COL Item addressing radiological monitoring program would be better identified under Chapter 12 in the DCD. The existence of multiple (and almost identical) COL Items can become a burden to any COL applicant and the staff.

The applicant is requested to clarify the reason for such multitude of COL Items throughout the application.

Response

KHNP agrees with staff's comment and will revise the DCD with a singular, encompassing COL item addressing the site-wide radiological environmental monitoring program in accordance with

RG 4.21. The singular COL item (COL 12.4(4)) will be added to DCD Chapter 12, Subsection 12.4.3. References to this COL item will be added to applicable system design descriptions in the DCD. As for the TGBCCW, because the system has low risk and low radiological consequence, radiological environmental monitoring for the TGBCCW system is not considered effective. Hence reference to the singular COL item on REMP is not required. COL 9.2(36) is therefore deleted.

Also, due to the consolidation of the common COL items relating to RG 4.21, COL 9.2(34) and COL 9.2(35) are revised to 12.4(10) and 12.4(5), respectively for the TGBCCW system.

It is further noted that KHNP is reviewing the DCD RG 4.21 compliance description for other systems that are designed to comply with RG.4.21, and is consolidating encompassing COL items relating to RG 4.21 compliance into DCD Section 12.4, Subsection 12.4.3 Combined License Information. DCD references to these COL items including those in Chapter 11, are being revised to reflect this change for applicable systems.

Impact on DCD

DCD Section 12.4.3 and COL items in Chapter 9 will be revised as indicated in Attachment 1 through 5.

Table 1.8-2 will be revised as indicated in Attachment 6.

COL items in Chapter 11 will be revised as indicated in Attachment 7.

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.

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Response to RAI 246-8307 - Question 9.2.2-3

Response to RAI 14-7858 - Question 12.03-3

COL 12.4(2) ~~The COL applicant is to provide operational procedures and programs, including the development of a site radiological environmental monitoring program, to implement the minimization of contamination approach.~~

COL 12.4(3) The COL applicant is to implement concrete tunnels for piping of the systems that may include underground piping carrying contaminated or potentially contaminated fluid to minimize buried piping.

12.4.4 References

Add the COL items ("A") in next page.

1. Regulatory Guide 8.8, "Information Relevant to Ensuring the Occupational Radiation Exposures at Nuclear Power Stations will be ALARA," Rev. 3, U.S. Nuclear Regulatory Commission, June 1978.
2. Regulatory Guide 8.19, "Occupational Radiation Dose Reactor Power Plants Design Stage Man-Rem Estimate," U.S. Nuclear Regulatory Commission, June 1979.
3. NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities," U.S. Nuclear Regulatory Commission.
4. ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," The American Society of Mechanical Engineers, 2007.
5. NUREG-0737, "Clarification of TMI Action Plan Requirements," U.S. Nuclear Regulatory Commission, November 1980.
6. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," U.S. Nuclear Regulatory Commission, July 2000.
7. Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," U.S. Nuclear Regulatory Commission, June 2008.

in accordance with NRC RG 4.21 and RG 4.22, as applicable. Delete documentation required by 10 CFR 20.1501

The COL applicant is to prepare a site process control program for solid waste management in accordance with 10 CFR61, Part 71, branch Technical Position 11-3, and other applicable regulatory requirements for handling, packaging, transportation, and disposal of radioactive waste resulting from plant operation.

A

- COL 12.4(4) The COL applicant is to provide operational procedures and programs for a site radiological environmental monitoring program for the minimization of contamination control in accordance with NRC RG 4.21 and RG 4.22, as applicable, and the documentation required by 10 CFR 20.1501.
- COL 12.4(5) The COL applicant is to maintain complete documentation of system design and any site specific design modifications during the COL application, for the features for contamination control, in accordance with RG 4.21, Subsection A-3 to facilitate decommissioning
- COL 12.4(6). The COL applicant is to prepare a RG 4.21 Program following the guidance of NEI 08-08A. The RG 4.21 program shall include identification of plant-wide components, buried piping, and embedded piping, that contain or handle radioactive materials, the built-in leak detection methods and capabilities, and the methods utilized for the prevention of unnecessary contamination of clean components, facility areas, and the environment.
- COL 12.4(7) The COL applicant is to prepare an offsite dose calculation manual (ODCM) in accordance with NRC RGs 1.109, 1.111, and 1.113. The ODCM shall include a description of the methodology and parameters for calculation of the offsite doses for the gaseous and liquid effluents. The ODCM can follow the guidance of NEI 07-09A for content and format.
- COL 12.4(8) The COL applicant is to prepare and implement an epoxy inspection, testing, repair, and maintenance program in accordance with RG 1.54 for Service Level I, II and III coatings. This program shall include considerations for the design and operating objectives for implementation of NRC RG 4.21 for minimization of cross-contamination and decommissioning planning.
- COL 12.4(9) The COL applicant is to develop a leak detection program to facilitate timely identification of leaks, prompt assessment, and appropriate responses to isolate and mitigate leakage. The leak identification program can be integrated into and formed part of the PCP.
- COL 12.4(10) The COL applicant is to prepare operational procedures and maintenance programs relating to the RG 4.21 features described in this system. Procedures and maintenance programs are to be completed before fuel is loaded for commissioning.

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- b. Radiation monitoring is not provided for the TGBCCW system due to the low risk of radioactive contamination. Grab sampling is taken periodically for analysis to confirm that the cooling water return is not radioactively contaminated.

Reduction of Cross-Contamination, Decontamination, and Waste Generation

- a. A sump is provided for collection of any leakage. The sump is designed with stainless steel liners and is equipped with level instruments to initiate alarm signal for operator actions.
- b. Boron nitrite is added to control the pH of the system for corrosion inhibition.
- c. Nitrogen gas is used to blanket the surge tank to minimize corrosion, thus minimizing waste generation.

Decommissioning Planning

- a. The surge tank is a packaged unit for the full service life and is fabricated as an individual assembly for easy removal.
- b. The TGBCCW system is designed with minimal embedded or buried piping.

Operations and Documentation

- a. The TGBCCW system is designed for automated operations with manual initiation for the different modes of operation.
- b. Adequate ingress and egress spaces are provided for prompt assessments and appropriate responses when and where they are needed.
- c. The COL applicant is either to prepare or to include operational procedures and maintenance programs (~~COL 9.2(34)~~). Procedures and maintenance programs are to be completed before fuel is loaded for commissioning.

relating to the RG 4.21 features
described in this system (COL 12.4(10))

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- d. The COL applicant is to maintain complete documentation of system design, ~~construction, design modifications, field changes, and operations (COL 9.2(35)).~~ Documentation requirements are included as a COL information item.

Site Radiological Environmental Monitoring

The TGBCCW system is designed to prevent contamination through leakage in the heat exchangers. The integrity of the equipment heat exchanger and the TGBCCW heat exchangers is expected to be well maintained through surveillance, resulting in no contamination or a very low level of contamination of the system. Leakage from the system to the facility and the environment is captured by the design. The TGBCCW surge tank is located at a high elevation. Leakage from the tank is likely to be collected in the drain system inside the TGB. Hence, the TGBCCW system has low risk and low radiological consequence, and radiological environmental monitoring for the TGBCCW system is not considered effective. ~~The COL applicant is to include a site wide radiological environmental monitoring program to monitor both the horizontal and vertical variability of the onsite hydrogeology and the potential effects of the construction and operation of the plant (COL 9.2(36)).~~

9.2.8.3 Safety Evaluation

and any site specific design modifications during the COL application, for the features for contamination control, in accordance with RG 4.21, Subsection A-3 to facilitate decommissioning (COL 12.4(5)).

The TGBCCW performs no safety function. Therefore, no safety evaluation is required.

9.2.8.4 Inspection and Testing Requirements

Preoperational test is carried out as described in Section 14.2 to demonstrate the system performance, structural integrity, and leak-tightness of the system components.

9.2.8.5 Instrumentation Requirements

Local temperature and pressure indicators are provided at the equipment cooler outlet. Local temperature and pressure indicators are provided at the TGBCCW heat exchanger inlet and outlet.

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relating to the RG 4.21 features described in this system
(COL 12.4(10))

- a. The TGBOCWS is designed for automated operations with manual initiation for the different modes of operation in conjunction with the TGBCCW system.
- b. Adequate ingress and egress spaces are provided for prompt assessments and appropriate responses when and where they are needed.
- c. The COL applicant is either to prepare or to include operational procedures and maintenance programs (~~COL 9.2(34)~~). Procedures and maintenance programs are to be completed before fuel is loaded for commissioning.
- d. ~~Complete documentation of design, construction, design modifications, field changes, and operations is to be maintained by the COL applicant. documentation requirements are included as a COL information item.~~

Site Radiological Environmental Monitoring

The TGBOCWS is designed to prevent contamination through leakage in the heat exchangers. The integrity of the TGBCCW heat exchangers is expected to be well maintained, resulting in no contamination or a very low level of contamination of the system. Leakage from the system to the facility and the environment is captured by the design. Any residual contamination of the hydrogeology is not likely to be distinguishable from other contamination sources. Hence, the TGBOCWS has low risk and low radiological consequence, and radiological environmental monitoring for the TGBOCWS is not considered effective. ~~The COL applicant is to include a site-wide radiological environmental monitoring program to monitor both the horizontal and vertical variability of the onsite hydrogeology and the potential effects of the construction and operation of the plant (COL 9.2(34)).~~

9.2.9.3 Safety Evaluation

The TGBOCWS has no safety-related function and therefore requires no safety evaluation.

The COL applicant is to maintain complete documentation of system design and any site specific design modifications during the COL application, for the features for contamination control, in accordance with RG 4.21, Subsection A-3 to facilitate decommissioning (COL 12.4(5))

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- COL 9.2(31) The COL applicant is to provide the inspection and testing of the UHS to demonstrate that fouling and degradation mechanisms applicable to the site are effectively managed to maintain acceptable heat sink performance and integrity.
- COL 9.2(32) The COL applicant is to provide the alarms, instrumentation, and controls required for the safety-related functions of the UHS.
- COL 9.2(33) The COL applicant is to develop the following procedures for the water system: filling, venting, keeping it full, and operating it to minimize the potential for water hammer. The COL applicant is also to analyze the system for water hammer impacts, design the piping system to withstand potential water hammer forces, and analyze inadvertent water hammer events in the ECWS in accordance with NUREG-0927.
- COL 9.2 (34) ~~The COL applicant is either to prepare or to include operational procedures and maintenance programs.~~ Replace this sentence with “(Deleted)”
- COL 9.2 (35) ~~The COL applicant is to maintain complete documentation of system design, construction, design modifications, field changes, and operations.~~ Replace this sentence with “(Deleted)”
- COL 9.2(36) ~~The COL applicant is to include a site-wide radiological environmental monitoring program to monitor both the horizontal and vertical variability of the onsite hydrogeology and the potential effects of the construction and operation of the plant.~~ Replace this sentence with “(Deleted)”

9.2.11 References

1. 40 CFR Part 141, “National Primary Drinking Water Regulations,” Environmental Protection Agency.
2. 29 CFR 1910, “Occupational Safety and Health Standard,” Occupational Safety and Health Administration.
3. ASME B31.1-2010, “Power Piping,” The American Society of Mechanical Engineers, 2010.

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Response to RAI 246-8307 - Question 9.2.2-3

Response to RAI 14-7858 - Question 12.03-3

Table 1.8-2 (14 of 29)

Item No.	Description
COL 9.2(23)	The COL applicant is to specify the following UHS chemistry requirements for bio-fouling and chemistry control: <ul style="list-style-type: none"> a. A chemical injection system to provide non-corrosive, non-scale-forming conditions to limit biological film formation b. The type of biocide, algacide, pH adjuster, corrosion inhibitor, scale inhibitor, and silt dispersant, if necessary to maintain system performance based on site conditions.
COL 9.2(24)	The COL applicant is to verify the piping layout of the ESWS and UHS to prevent water hammer and develop operating procedures to provide reasonable assurance that the ESWS and UHS water pressure are above saturation conditions for all operating modes.
COL 9.2(25)	The COL applicant is to develop maintenance and testing procedures to monitor debris buildup and flush out and to remove the debris in the UHS.
COL 9.2(26)	The COL applicant is to evaluate the potential wind and recirculation effects of cooling towers based on meteorological condition.
COL 9.2(27)	The COL applicant is to provide the material specifications for piping, valves, and fittings of the UHS system based on site-specific conditions and meteorological conditions.
COL 9.2(28)	The COL applicant is to provide the evaluation of maximum evaporation and other losses based on the site-specific conditions and meteorological conditions in the UHS.
COL 9.2(29)	The COL applicant is to provide the detailed evaluation for UHS capability with consideration of site-specific conditions and meteorological data in the UHS.
COL 9.2(30)	The COL applicant is to provide chemical and blowdown to prevent biofouling and long-term corrosion, considering site water quality in the UHS.
COL 9.2(31)	The COL applicant is to provide the inspection and testing of the UHS to demonstrate that fouling and degradation mechanisms applicable to the site are effectively managed to maintain acceptable heat sink performance and integrity.
COL 9.2(32)	The COL applicant is to provide the alarms, instrumentation, and controls required for the safety-related functions of the UHS.
COL 9.2(33)	The COL applicant is to develop the following procedures for the water system: filling, venting, keeping it full, and operating it to minimize the potential for water hammer. The COL applicant is also to analyze the system for water hammer impacts, design the piping system to withstand potential water hammer forces, and analyze inadvertent water hammer events in the ECWS in accordance with NUREG-0927.
COL 9.2(34)	The COL applicant is either to prepare or to include operational procedures and maintenance programs.
COL 9.2(35)	The COL applicant is to maintain complete documentation of system design, construction, design modifications, field changes, and operations.
COL 9.2(36)	The COL applicant is to include a site-wide radiological environmental monitoring program to monitor both the horizontal and vertical variability of the onsite hydrogeology and the potential effects of the construction and operation of the plant.
COL 9.3(1)	The COL applicant is to provide operational procedures and maintenance programs as related to leak detection and contamination control.

Replace this sentence with "(Deleted)"

Replace this sentence with "(Deleted)"

Replace this sentence with "(Deleted)"

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Response to RAI 246-8307 - Question 9.2.2-3

Response to RAI 14-7858 - Question 12.03-3

Add the COL items ("A") in next page.

Table 1.8-2 (21 of 29)

Item No.	Description
COL 12.4(1)	The COL applicant is to estimate construction worker doses based on site-specific number of operating units, distances, meteorological conditions, and construction schedule.
COL 12.4(2)	The COL applicant is to provide operational procedures and programs, including the development of a site radiological environmental monitoring program, to implement the minimization of contamination approach.
COL 12.4(3)	The COL applicant is to implement concrete tunnels for piping of the systems that may include underground piping carrying contaminated or potentially contaminated fluid to minimize buried piping.
COL 12.5(1)	The COL applicant is to provide the operational radiation protection program, including the items described in Section 12.5.
COL 13.1(1)	The COL applicant is to provide a description of the corporate or home office organization, its functions and responsibilities, and the number and the qualifications of personnel. The COL applicant is to be directed to activities such as the facility design, design review, design approval, construction management, testing, and operation of the plant.
COL 13.1(2)	The COL applicant is to develop a description of experience in the design, construction, and operation of nuclear power plants and experience in activities of similar scope and complexity.
COL 13.1(3)	The COL applicant is to describe its management, engineering, and technical support organizations. The description includes organizational charts for the current headquarters and engineering structure and any planned modifications and additions to those organizations to reflect the added functional responsibilities with the nuclear power plant.
COL 13.1(4)	The COL applicant is to develop a description of the organizational arrangement. The description is to include organizational charts reflecting the current headquarters and engineering structure and any planned modifications and additions to reflect the added functional responsibilities associated with the addition of the nuclear plant to the applicant's power generation capacity. The description shows how these responsibilities are delegated and assigned or expected to be assigned to each of the working or performance-level organizational units identified to implement these responsibilities. The description includes organizational charts reflecting the current corporate structure and the working- or performance-level organizational units that provide technical support for the operation.
COL 13.1(5)	The COL applicant is to develop the description of the general qualifications in terms of educational background and experience for positions or classes of positions described in the organizational arrangement.
COL 13.1(6)	The COL applicant is to develop a description of the structure, functions, and responsibilities of the onsite organization established to operate and maintain the plant.
COL 13.1(7)	The COL applicant is to provide an organizational chart showing the title of each position, minimum number of persons to be assigned to duplicate positions, number of operating shift crews, and positions that require reactor operator and senior reactor operator licenses.

~~in accordance with NRC RG 4.21 and RG 4.22, as applicable, and the documentation Delete by 10 CFR 20.1501~~

The COL applicant is to prepare a site process control program for solid waste management in accordance with 10 CFR61, Part 71, branch Technical Position 11-3, and other applicable regulatory requirements for handling, packaging, transportation, and disposal of radioactive waste resulting from plant operation.

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- COL 12.4(4) The COL applicant is to provide operational procedures and programs for a site radiological environmental monitoring program for the minimization of contamination control in accordance with NRC RG 4.21 and RG 4.22, as applicable, and the documentation required by 10 CFR 20.1501.
- COL 12.4(5) The COL applicant is to maintain complete documentation of system design and any site specific design modifications during the COL application, for the features for contamination control, in accordance with RG 4.21, Subsection A-3 to facilitate decommissioning
- COL 12.4(6). The COL applicant is to prepare a RG 4.21 Program following the guidance of NEI 08-08A. The RG 4.21 program shall include identification of plant-wide components, buried piping, and embedded piping, that contain or handle radioactive materials, the built-in leak detection methods and capabilities, and the methods utilized for the prevention of unnecessary contamination of clean components, facility areas, and the environment.
- COL 12.4(7) The COL applicant is to prepare an offsite dose calculation manual (ODCM) in accordance with NRC RGs 1.109, 1.111, and 1.113. The ODCM shall include a description of the methodology and parameters for calculation of the offsite doses for the gaseous and liquid effluents. The ODCM can follow the guidance of NEI 07-09A for content and format.
- COL 12.4(8) The COL applicant is to prepare and implement an epoxy inspection, testing, repair, and maintenance program in accordance with RG 1.54 for Service Level I, II and III coatings. This program shall include considerations for the design and operating objectives for implementation of NRC RG 4.21 for minimization of cross-contamination and decommissioning planning.
- COL 12.4(9) The COL applicant is to develop a leak detection program to facilitate timely identification of leaks, prompt assessment, and appropriate responses to isolate and mitigate leakage. The leak identification program can be integrated into and formed part of the PCP.
- COL 12.4(10) The COL applicant is to prepare operational procedures and maintenance programs relating to the RG 4.21 features described in this system. Procedures and maintenance programs are to be completed before fuel is loaded for commissioning.

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for solid waste management in accordance with 10 CFR Part 61, Part 71, Branch Technical Position 11-3, and other applicable regulatory requirements.

and make them available for decommissioning planning and implementation.

- COL 11.2(11) The COL applicant is to prepare the site process control program ~~and the site radiological environmental monitoring program.~~
- COL 11.2(12) The COL applicant is to confirm the assumed dilution flow rate provided by cooling tower blowdown, dilution pump, or other plant discharges at the discharge point based on site-specific parameters.
- COL 11.2(13) The COL applicant is to calculate dose to members of the public following the guidance of NRC RG 1.109 and NRC RG 1.113 using site-specific parameters and to compare the doses due to the liquid effluents with the numerical design objectives of Appendix I to 10 CFR 50, 10 CFR 20.1302, and 40 CFR 190.
- COL 11.2(14) The COL applicant is to perform an analysis to demonstrate that the potential groundwater or surface water contamination concentrations resulting from radioactive release from the liquid-containing tank failure, are in compliance with the limits in 10 CFR 20, Appendix B, Table 2.

11.2.6 References

1. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Rev. 2, U.S. Nuclear Regulatory Commission, November 2001.
2. NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors," U.S. Nuclear Regulatory Commission, April 1985.
3. 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," U.S. Nuclear Regulatory Commission.

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- c. Leak detection instruments are provided to detect leakage of individual tanks. Adequate clearance around each tank is provided to enable prompt assessment and response when required.
- d. The COL applicant is to develop the leak identification program (COL 11.2(9)) to identify site-specific components that contain radioactive materials, buried piping, embedded piping, leak detection methods and capabilities, and the methods that are used to prevent unnecessary contamination of clean components, facility areas, and the environment. The leak identification program, as part of the process control program, is designed to facilitate timely identification of leaks, prompt assessment, and appropriate responses to isolate and mitigate leakage.
- e. The COL applicant is to prepare the operational procedures and maintenance program as related to leak detection and contamination control (COL 11.2(2)). Procedures and maintenance programs are to be completed before fuel is loaded for commissioning.
- f. The COL applicant is to maintain complete documentation of the system design, construction, design modification, field changes, and operations (COL 11.2(10)).

Site Radiological Environmental Monitoring

The LWMS is included in the site process control program and the site radiological environmental monitoring program for monitoring facility and environmental contamination. The COL applicant is to prepare the site process control program and the site radiological environmental monitoring program ~~(COL 11.2(11))~~. The site radiological environmental monitoring program includes sampling and analysis of effluent to be released, meteorological conditions, hydrogeological parameters, and potential migration pathways of radioactive contaminants.

(COL 11.2(11))

(COL 12.4(4))

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- COL 11.3(4) The COL applicant is to prepare the operational procedures and maintenance programs related to leak detection and contamination control
- COL 11.3(5) The COL applicant is to maintain complete documentation of system design, construction, design modifications, field changes, and operations for decommissioning planning.
- COL 11.3(6) ~~The COL applicant is to prepare the site process control program and the site radiological environmental monitoring program.~~
- COL 11.3(7) The COL applicant is also to perform the dose calculation using the total gaseous effluents from the site for comparison with the requirements of 40 CFR 190.
- COL 11.3(8) The COL applicant is to perform an analysis using site-specific meteorological data to demonstrate that the potential airborne concentration resulting from GRS failure meets the requirements of 10 CFR 20, Appendix B, Table 2.
- COL 11.3(9) The COL applicant is to prepare an ODCM following the guidance in NEI 07-09A template.

Replace this sentence with "Deleted"

11.3.7 References

1. NUREG-0800, Standard Review Plan, Section 11.3, "Gaseous Waste Management System," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.
2. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Rev. 2, U.S. Nuclear Regulatory Commission, November 2001.
3. NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors," U.S. Nuclear Regulatory Commission, April 1985.

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- c. The COL applicant is to maintain the complete documentation of system design, construction, design modifications, field changes, and operations (COL 11.3(5)). Documentation requirements are included as a COL information item.

Site Radiological Environmental Monitoring

The GRS is part of the plant and is included in the site process control program and the site radiological environmental monitoring program for monitoring of facility and environmental contamination. The site radiological environmental monitoring program includes sampling and analysis of effluent to be released, meteorological conditions, hydrogeological parameters, and potential migration pathways of radioactive contaminants. The COL applicant is to prepare the site process control program and the site radiological environmental monitoring program (~~COL 11.3(6)~~).

COL 12.4(4)

11.3.3 Radioactive Effluent Releases

11.3.3.1 Radioactive Effluent Releases and Dose Calculation in Normal Operation

Radioactive gaseous effluents generated from normal operation, including AOOs, are treated and released through the compound building ventilation exhaust. The GRS is designed to treat radioactive gaseous effluents to meet the concentration limits of 10 CFR 20, Appendix B (Reference 4), and dose limits of 10 CFR 50, Appendix I (Reference 5). The treated gaseous effluents are released through the compound building. In addition, other building ventilation exhausts are released from the auxiliary building, reactor containment building, and turbine generator building HVAC vents. Figure 11.3-2 provides information on the release points of gaseous effluents including the height, dimensions, effluent temperature, effluent flow rates, and exit velocity.

During normal operation, there are nine release points from various locations from the top of the auxiliary building, reactor containment building, turbine generator building, and compound building. The releases are monitored and the release concentrations are collected and analyzed for 10 CFR 20, Appendix B (Reference 4) compliance evaluation. The individual release fractions are calculated and summed to obtain the total release fraction for all effluent streams and verify that the total fraction is below 1.0. Table 11.3-1

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Instruments, including backflushing provisions, are located in low-radiation areas when possible for accessibility and fulfillment of the ALARA provisions. A list of alarm instruments and location of readouts is presented in Table 11.4-6.

11.4.9 Combined License Information

COL 11.4(1) The COL applicant can incorporate an onsite laundry facility for processing of contaminated clothing.

COL 11.4(2) The COL applicant is to perform a site-specific cost-benefit analysis following the guidance in NRC RG 1.110.

COL 11.4(3) The COL applicant is to provide reasonable assurance that the provisions and requirements of ANSI/ANS-40.37-2009 are met. The COL applicant is to provide reasonable assurance that mobile and temporary solid radwaste processing and its interconnection to plant systems conform with regulatory requirements and guidance such as 10 CFR 50.34a, 10 CFR 20.1406, and NRC RG 1.143. The COL applicant is to prepare a plan to develop and use operating procedures so the guidance and information in IE Bulletin 80-10 are followed.

COL 11.4(4) The COL applicant is to provide P&IDs.

COL 11.4(5) ~~The COL applicant is to prepare the site process control program and the site radiological environmental monitoring program.~~

Replace this sentence with "Deleted"

COL 11.4(6) The COL applicant is responsible for the collection, temporary storage, and shipment of mixed waste for offsite treatment and disposal.

COL 11.4(7) The COL applicant is responsible for the provision of a site-wide IRSF for interim storage of radioactive wastes.

COL 11.4(8) The COL applicant is to provide a mobile crane to retrieve a waste package that becomes stuck in the lifted condition or that is dropped.

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the compound building via the filter transporter and then placed and capped in a 200 L (55 gal) drum. R/O membranes are dewatered and packaged in a 200 L (55 gal) drum. Low-activity filters, such as drain filters of the detergent waste subsystem and the HEPA filters of the GRS, are removed manually and disposed of in drums. Absorbent materials may be put into the filter disposal drums to minimize any standing water to meet transportation and disposal requirements.

Dry Active Waste Subsystem

The dry active waste subsystem boundary starts at the collection point of dry active wastes from the various generation areas in the plant and terminates at the temporary waste storage area.

The dry active wastes are collected and sorted at the generation area by plant personnel. Non-contaminated wastes are not processed in the SWMS and are handled separately. A space is also provided to sort miscellaneous contaminated dry solids for appropriate and cost-effective packaging and temporary storage. Miscellaneous solid waste consisting of contaminated rags, paper, clothing, glass, and other small items is collected at the DAW sorting area located in the compound building. Wastes are compacted and/or packaged into approved disposal containers and transferred to and stored in a temporary waste storage area in the compound building prior to shipment to the offsite disposal facility.

Charcoal used in the GRS is not expected to be replaced. Therefore, spent charcoal waste is not generated routinely. If spent charcoal waste is generated from the GRS, it is processed in accordance with the process control program provided by the COL applicant (~~COL 11.4(5)~~).

COL 12.4(5)

R/O Concentrate Treatment Subsystem

The R/O concentrate treatment subsystem boundary starts at the R/O concentrate discharge isolation valve from the R/O concentrate feed module of the LWMS and terminates at the temporary waste storage area.

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- COL 11.5(2) The COL applicant is to develop an annual report that specifies the quantity of each principal radionuclide released to unrestricted areas in liquid and gaseous effluents.
- COL 11.5(3) The COL applicant is to provide site-specific procedures that conform with the numerical guides of 10 CFR 50.34a and 10 CFR 50, Appendix I.
- COL 11.5(4) The COL applicant is to prepare an ODCM that contains a description of the methodology and parameters for calculation of the offsite doses for the gaseous and liquid effluents. The COL applicant is to follow NEI 07-09A as an alternative to providing an offsite dose calculation manual.
- COL 11.5(5) The COL applicant is to provide analytical procedures and sensitivity for selected radioanalytical methods and types of sampling media for site-specific matter.
- COL 11.5(6) The COL applicant is to develop the calibration procedures in accordance with NRC RG 1.33 and 4.15.
- COL 11.5(7) The COL applicant is to develop detailed location and tubing installation and provide the sampling method including the sampling time to acquire representative sampling.
- COL 11.5(8) The COL applicant is to provide operational procedures and maintenance programs related to leak detection and contamination control.
- COL 11.5(9) ~~The COL applicant is to develop a radiological and environmental monitoring program, taking into consideration local land use and census data in identifying all potential radiation exposure pathways. The COL applicant is to follow NEI 07-09A as an alternative to providing a radiological and environmental monitoring program.~~

Replace this sentence with "Deleted"