
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.: 218-8183
SRP Section: 11.02 – Liquid Waste Management System
Application Section: 11.2
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Question No. 11.02-3

Staff review of DCD Tier 1, Revision 0, Section 2.7.6 and Table 2.7.6.1-2 found that information on ITAAC for the LWMS to demonstrate compliance with 10 CFR 52.47(b)(1) and to provide reasonable assurance that a plant that incorporates the APR1400 design certification and operates in accordance with the design certification will meet the provisions of the Atomic Energy Act and NRC regulations was not fully described. Without confirming the initial introduction of the proper types and amounts of filtration and adsorbent media, the LWMS would fail to meet the design criteria in the DCD Tier 2, Revision 0, Section 11.2.1.2. As a result, liquid releases could exceed 10 CFR 20, Appendix B, Table 2, effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives. The staff requests the applicant to address the following:

1. Describe in DCD Tier 1, Table 2.7.6.1-2, how the as-built LWMS is designed to process liquid waste prior to release and ensure compliance with 10 CFR 20, Appendix B, Table 2 effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents when the plant is operational.
2. Describe in DCD Tier 1, Section 2.7.6, the process design of the LWMS subsystems and how the initial loading of the subsystem demineralizers and vessels includes the appropriate of types of filtration and adsorption media capability that will meet or exceed the decontamination factors listed in DCD Tier 2, Revision 0, Table 11.2-3. Provide in DCD Tier 1, Table 2.7.6.1-2, the assigned ITAAC to confirm the filter efficiency and demineralizer media.

Please address these items and provide a markup for the proposed DCD changes.

Response

1. DCD Tier 1, Section 2.7.6.1 includes the design description and the ITAAC for ensuring the compliance with 10 CFR 20, Appendix B, effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents.

DCD Tier 1, Section 2.7.6.1.1 includes the LWMS design description for the system configuration, sampling and analysis, the radiation monitoring and isolation provisions for liquid effluent control, and processing of processed liquid waste exceeding the effluent concentration limit in conjunction with DCD Tier 2 Section 11.2, in order to provide the design features for ensuring compliance with 10CFR 20, Appendix B, Table 2 effluent concentration and dose limits, and 10 CFR 50, Appendix I dose objectives for liquid effluents when the plant is operational. Section 2.7.6.1, also includes the related ITAACs for confirming the design features such as functional arrangement, performance, and effluent control.

The description will be updated to clarify the requirement for the effluent concentration limit applied to the LWMS.

2. LWMS include two 100% capacity R/O packages, which are to be procured by a supplier having supplying and operating experiences in the nuclear industry, for processing liquid radwaste with industry proven R/O technology. R/O packages are designed, procured, manufactured, and installed to have the capability of meeting or exceeding the decontamination factors listed in DCD Tier 2, Table 11.2-3, which are established based on the NUREG-0017, in order to reduce the radionuclide effluent concentrations of the liquid radwaste.

The types and volumes of filtration and adsorption media are to be selected and determined by the supplier based on the operating experiences or performance results of similar systems in the nuclear industry, and/or the media test results. This information is to be reviewed during the procurement and detail design stages and the type, volume and quality of the filter and media of the filter and adsorption media is to be inspected at the construction site before the initial loading of the filter and media.

Therefore, the filter efficiency and decontamination factor can be confirmed by the inspection and verification of the specification data and design report, which include the type and volume of filter and adsorption media of the package, as indicated in ITAAC # 3.

Impact on DCD

DCD Tier 1 Section 2.7.6.1.1 will be revised as indicated in 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 12.7.6 Radioactive Waste Management2.7.6.1 Liquid Waste Management System2.7.6.1.1 Design Description

The liquid waste management system (LWMS) is a non safety-related system. The LWMS is designed to handle, process, store, and release the liquid radioactive waste generated during normal operation including anticipated operational occurrences (AOOs). The LWMS treats liquid radioactive waste using eight (8) collection tanks for segregated staging of liquids, two (2) reverse osmosis (R/O) package systems for processing, and two monitor tanks to collect treated effluent for staging confirmatory sampling and analysis. The R/O package system is designed to process liquid radioactive waste with a pretreatment module, an R/O module and a demineralizer module. By sampling from monitor tanks, LWMS provides means to monitor and confirm that the radioactivity levels in the processed liquid waste are below the release limits prior to discharge. The LWMS provides sufficient capacity, redundancy, and flexibility to treat the liquid radioactive waste in a manner to reduce the radionuclide concentrations to meet the effluent concentration limits in 10 CFR Part 20, Appendix B, and 10 CFR Part 50, Appendix I dose objectives for liquid effluents.

and dose

Table 2

During plant operation, treated effluent is collected in the monitor tanks and each batch is sampled for confirmation that the effluent concentrations are within the discharge specifications prior to discharge operation. The effluent is also continuously monitored for radioactivity levels during discharge. The radiation monitor will provide alarms in the MCR and the radwaste control room for operator action in the event that the effluent exceeds a predetermined radiation setpoint, simultaneously turn off the monitor tank pump, and close the discharge valves. The tank contents will be recycled for further treatment before release.

The LWMS is located in the compound building. The component cubicles are designed with early detection features to minimize the spread of unintended contamination. The LWMS consists of equipment waste subsystem, floor drain subsystem, chemical waste subsystem and detergent waste subsystem.