
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.: 538-8720
SRP Section: 11.03 – Gaseous Waste Management System
Application Section: 11.3
Date of RAI Issue: 02/06/2017

Question No. 11.03-11

There are various tanks that contain liquid, gaseous, or solid wastes and are vented to the rooms in which they are located. Understanding the ways the applicant proposes to direct vented gases helps to inform the basis of the gaseous source term for compliance with 10 CFR Part 50 Appendix I. In DCD section 11.2.1.2.k, it is stated that each liquid waste management system tank is provided with vent piping that is terminated at the vicinity of the inlet duct of the heating, ventilation and air conditioning system. Radioactivity from the tank could subsequently result in transport of radionuclides to the room and other areas by the ventilation system and could increase worker exposures. Please address the following for each tank especially for the solid waste management system tanks and the spent resin storage tanks.

Describe the means used to direct the tanks gases to the ventilation system and the basis for providing this set up from a radiation protection perspective. Please provide a description and a basis of the process used to direct tanks gases which are vented and provide information in section 11.3 concerning flows, condensation, contamination, and how this radioactive effluent is quantified prior to release to the environment and the public.

Please address these items and provide a DCD mark-up for the proposed changes.

Response

As described in DCD section 11.4.1.2.b, the gaseous effluents arising from the operation of the Solid Waste Management System (SWMS) are processed through the compound building heating, ventilation, and air conditioning (HVAC) system. The compound building HVAC system has a controlled area HVAC subsystem which is for the radioactive area and components. The subsystem includes necessary HEPA and carbon filters in order to ensure that the releases do not exceed the concentration limits of 10 CFR 20 Appendix B and dose limits of 10 CFR 50 Appendix I. DCD Table 11.3-6 and 11.3-7 shows that all gaseous release streams are well below the regulatory limits.

For the spent resin long term storage tank, the tank vent is designed to vent the gases to the individual tank cubicle close to the cubicle vent in order to minimize the transport of radionuclides to the room. The separation of the tank vent to the cubicle ventilation inlet is to prevent any fluid from being carried into the ventilation duct. The tank vent nozzle is equipped with screens to prevent solids from being discharged to the compound building controlled area HVAC system. This design approach facilitates prevention of cross-contamination and damages to the ventilation components, and minimizes the potentially radiological exposure to plant workers.

For the low activity spent resin tank, the tank vent line is located at the top of the tank which is routed to the proximity of the floor drain inside the low activity spent resin tank room. During venting, the gases in the low activity spent resin tank are vented to the room atmosphere for collection by the controlled area HVAC system. The vented gases are treated within the controlled area HVAC system prior to release to the environment. In general, the low activity spent resin tank vent is not used during normal operation. The tank vent is only opened during the resin transfer process or when depressurization of the tank is required. Therefore, it can be considered that the radiation exposure to plant worker is minimized by the operational conditions.

Since the information above is directly related to component design of solid waste management system, DCD Tier 2, Section 11.4.5.1 will be revised to provide the information above instead of Section 11.3.

Impact on DCD

DCD Tier 2, Section 11.4.5.1 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 the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

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

APR1400 DCD TIER 2

The SRSTs have a thermal dispersion-type level instrument to monitor the water and spent resin levels. A high-water-level alarm is provided for the SRSTs to prevent water overflow to the drain sump, as presented in Table 11.4-6.

The SRST vent nozzles are equipped with screens to prevent solids from being discharged to the compound building HVAC system, thus minimizing cross-contamination.

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11.4.5.2 Piping and Valves

Piping used for the hydraulic transport of ion-exchange resins is designed with long-radius elbows to minimize the obstruction of spent resin slurry flow. Pipe-flow velocities are maintained in a turbulent flow regime to prevent settling when the slurry is being transported. Appropriate valves and pipe fittings are used to maintain unhindered flow. An adequate water/solids ratio is maintained throughout the transfer. Slurry piping is provided with a washing and flushing capability with sufficient water to flush the pipe after each use (e.g., at least two pipe volumes).

Ball or plug valves are selected for use within the SWMS to minimize flow resistance and pockets for trapping solids. A demineralized water connection is provided to flush the piping after each transfer.

11.4.5.3 Solid Waste Compactor

The solid waste compactor is used to reduce the volume of compactable DAW. The wastes are packed into 200 L (55 gal) drums, which are then further compacted by the solid waste compactor equipped with a hydraulic ram, hooded exhaust fan, and HEPA filter to control airborne dust. The compacted drums are then put into oversized drums for temporary storage and final disposal. The exhaust air from compaction is discharged to the compound building HVAC system. Sorting and staging space is available in the low-level waste handling and packing area.

11.4.5.4 Sorting Facility

During normal operation and maintenance, clean solid wastes are collected separately and are not brought into the SWMS sorting area. Contaminated DAW is collected at the point

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For the low activity spent resin tank, the tank vent line is located at the top of the tank which is routed to the proximity of the floor drain inside the low activity spent resin tank room. During venting, the gases in the low activity spent resin tank are vented to the room atmosphere for collection by the controlled area HVAC system. The vented gases are treated within the controlled area HVAC system prior to release to the environment. In general, the low activity spent resin tank vent is not used during normal operation. The tank vent is only opened during the resin transfer process or when depressurization of the tank is required.