

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.: 97-8049

SRP Section: 09.04.03 – Auxiliary and Radwaste Area Ventilation System

Application Section: 9.4.3

Date of RAI Issue: 07/22/2015

Question No. 09.04.03-1

1. To ensure reliable in-place testing, the volumetric air-flow rate of a single cleanup unit should be limited to approximately 849.51 m³/min (30,000 CFM). If a total system air flow in excess of this rate is necessary, multiple units should be used per RG 1.140, Regulatory Position C.3.2. The applicant did not indicate whether multiple-units for the Compound Building HVAC System would be used or provide the maximum air-flow rate for each unit. Therefore, to conform to the guidance in RG 1.140, Regulatory Position C.3.2, the staff requests that the applicant provide data regarding the air-flow rates for the Carbon Absorber Exhaust ACU and HEPA Filter Exhaust ACU.
2. Outdoor air intake openings should be equipped with louvers, grills, screens, or similar protective devices to minimize the effects of high winds, rain, snow, ice, trash and other contaminants on the operation of the system, in accordance with the guidance in RG 1.140, Regulatory Position C.3.5. The staff requests that the applicant provide information on the use of louvers, grills, or screens for the Compound Building Controlled Area HVAC Subsystem to conform to RG 1.140, Regulatory Position C.3.5.

Response

1. As indicated in DCD Tier 2, Table 9.4.7-1, the compound building HEPA filter exhaust ACUs consist of two 50 percent-capacity units and each unit has a 34,220 cfm airflow rate. Also, the compound building carbon adsorber exhaust ACUs consist of two 50 percent-capacity units and each unit has a 34,220 cfm airflow rate.

U.S. Department of Energy (DOE) HDBK-1169-2003, Section 4.4.11 describes that a nominal system capacity of 30,000 cfm has been recommended by DOE and U.S. NRC for any filter or adsorber bank. It describes that for larger systems, this limit requires the system

to be segmented into two or more smaller subsystems, each contained in an individual housing and having an installed capacity of 30,000 cfm or less. The purpose of this requirement was to facilitate maintenance and in-place testing, and to enhance the reliability of the total system. A 30,000 cfm bank using 1,000 cfm HEPA filters with filter layout of 3 HEPA filters high and 10 HEPA filters wide was considered the largest that can be tested in-place conveniently.

DOE HDBK-1169-2003, Section 4.4.11 also describes that the development of higher-flow aerosol generators and manifold in-place test systems has allowed larger filter banks than the recommended 30 filters and the use of 1,500 cfm HEPA filters allows higher-capacity systems without increasing the physical size of the bank, and the in-place testing and maintenance is the determining factor.

In the APR1400 standard design, the compound building HVAC system uses 1,500~2,000 cfm HEPA filters and the compound building HVAC system ACUs can allow at least a 45,000 cfm airflow rate without increasing the physical size and changing the filter layout of 3 HEPA filters high and 10 HEPA filters wide. In-place test equipment, such as aerosol generators, has been developed that provides the capability to perform reliable in-place testing for ACUs up to 65,000 cfm. Therefore, the compound building HEPA filter exhaust ACUs and carbon adsorber exhaust ACUs, which have 34,220 cfm airflow rate per single ACU, can ensure convenient maintenance and reliable in-place testing, and the compound building HVAC system is not required to limit airflow rate of a single ACU to 30,000 cfm in accordance with RG 1.140, Regulatory Position C.3.2.

2. Louvers with screens are used for outside air intake and discharge of the compound building controlled area HVAC subsystem to minimize snow, rain, and trash entrance. The louvers for supply air are installed in the wall of the air intake penthouse and the louvers for exhaust air are installed in the wall of the air exhaust penthouse. For air intake, the air intake louver openings are based on 400 fpm. For exhaust louvers, 500 fpm is used. These air face velocities for louvers are based on Chapter 21 of American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Handbook Fundamentals, 2009. The screens mounted on the interior faces of louvers are 3/4-inch mesh.

Impact on DCD

There is no impact on the DCD.

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.