
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.: 205-8230
SRP Section: 11.03 - Gaseous Waste Management System
Application Section: 11.3
Date of RAI Issue: 09/08/2015

Question No. 11.03-5

Staff review of DCD section 11.3, "Gaseous Waste Management System" (GWMS) did not identify information to describe the operation of the charcoal delay beds. The review of charcoal delay beds is discussed in BTP 11-5.

The staff is requesting information to support compliance with 10 CFR 20.1301 and 1302 in terms of verifying the integrity of the gaseous effluent charcoal delay beds utilized to control radioactive effluent releases to members of the public. The application does not describe the methods that are in place to monitor conditions concerning a fire within the charcoal delay beds, ensuring integrity given a leak of the chilled water system, and information ensuring the applicant is capable of detecting clogs or blockage in the charcoal delay beds. Identification of figures that describe the flow path and the systems that interact with the charcoal delay beds are not evident during the application review.

The staff is requesting the following information:

1. Provide a description of the processes in place to monitor conditions for a fire in the charcoal delay beds.
2. Describe how potential leaks of the chilled water system are monitored and what measures would be taken to address water inside the charcoal delay beds. This should also include a description for how the applicant anticipates the corrosion inhibiting chemicals added from the chilled water would affect the charcoal delay beds.
3. Provide a description for the use of differential pressure sensors on the charcoal delay bed. What measures are in place for the applicant to detect any potential clogs in the charcoal delay beds?
4. Information is requested defining the flow paths and the chilled water flow path that acts to control temperature.

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

Response

1. A fire in the charcoal delay beds can be prevented because the operating and design temperature in the beds is maintained to be sufficiently lower than the self-ignition temperature of the charcoal used in the beds. In addition, the gaseous radwaste system is designed to control oxygen concentration to prevent explosive or flammable conditions with provisions to monitor oxygen/hydrogen in the process radioactive gas and to inject nitrogen gas for the control of oxygen concentration.

Potential fire conditions in the charcoal delay beds can be monitored or detected with temperature instrumentation located at the inlet of each bed by measuring for an abnormal increase of temperature in the beds. In case of a fire, the system can be isolated and nitrogen gas can be injected into the bed in order to extinguish the fire, cool down activated charcoal, and prevent oxygen inflow from waste gas.

2. There are two 100 percent capacity trains, each comprising one waste gas dryer and one charcoal guard bed, are used to reduce the gas moisture to protect the charcoal in the charcoal delay beds from the moisture entrained in the process radioactive gas.

A potential leakage of chilled water in waste gas dryer can be collected in a condensate pot in the bottom of the dryer and drained to the GRS header drain tank. The level instrumentation is installed at the pot and interlocked with a drain line isolation valve. The water collected in the pot is discharged upon receipt of water level high alarm through the ball drainer which is located in the downstream of isolation valve.

If the chilled water leakage accidentally flows to the process downstream waste gas dryer, the moisture instrumentation installed at the upstream of the charcoal guard bed can detect the high moisture condition and then the train is isolated automatically. The other train starts to operate when the train is isolated. Leaked water in the isolated train is drained to the GRS header drain tank. The charcoal guard bed also prevents the wetting of the charcoal delay bed from the chilled water leakage and the contamination of the delay bed from the corrosion inhibiting chemicals in water.

Therefore there is no possibility that the water flows to charcoal delay bed and the corrosion inhibiting chemicals would not affect the charcoal delay beds.

3. The basic flow diagram for GRS package is provided in the Attachment. The flow diagram includes the process and chilled water flow path. Potential clogs or blockages are not expected in the charcoal delay bed because the process gas is transferred from the CVCS equipment processing reactor grade water, as described in Section 9.3.4, and may not contain particulates leading to potential clogs in charcoal delay beds.

Any particulate, which may be entrained with moisture in the process gas, can be dissolved in water by condensation of moisture in the waste gas dryer and removed with the condensed water by drains. Any of the particulates that passed through the dryer will be captured in the activated charcoal contained in guard bed before processing radioactive gas in charcoal delay bed.

The differential pressure sensors or provisions are not required to detect any potential clogs in the charcoal delay bed.

4. The basic flow diagram for GRS package is provided in the Attachment.
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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.

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