Response to SDAA Audit Question

Question Number: A-12.3.2.2-1

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Question:

The NuScale US600 design included over 30 radiation shield doors in the reactor building which were used to prevent radiation streaming from relatively high radiation dose areas to low dose areas. The reactor building design in the US460 is in many ways similar to the reactor building in the US600 design, but does not include radiation shield doors. SDA Section 12.3.2.2 indicates that openings for doors are modeled as openings in the radiation shielding calculations and radiation zoning. While the SDA does discuss the general use of labyrinths, it isn't always clear in the plant figures which areas include labyrinths and which do not.

For rooms that included shield doors in the US600 design but do not in the US460 design, such as the degasifier rooms and the CVCS component rooms, please indicate if there is a means, such as labyrinths, to prevent direct radiation streaming paths from the sources to nearby corridors and other lower dose rate areas that may be more frequently accessed.

Response:

Shield doors for prevention of direct radiation streaming are identified in DCA Table 12.3-8 for the following areas:

- Pool cleanup (PCU) filter rooms
- PCU demineralizer rooms
- Liquid radwaste (LRW) degasifier rooms
- Entrances to corridors accessing chemical and volume control (CVCS) ion exchanger rooms
- CVCS ion exchanger rooms
- CVCS recirculation pump rooms
- Entrances to CVCS heat exchanger (HX) valve galleries

In the US460 design, the following updates are made to the consideration of shielding doors for the prevention of direct radiation streaming through doorways.

- The PCU filters and demineralizers are in the Radioactive Waste Building (RWB). The RWB contains eight shield doors (SDAA Table 12.3-7). While the PCU demineralizer rooms are in the US460 RWB, the adjoining mechanical rooms (with shield doors in US600) do not contain radiation sources warranting shield doors or labyrinths.
- In the LRW degasifier rooms, the mechanical room doorway has a labyrinth, and on Elevation 40’, the tank room has non-shield doors. Personnel access through the tank room doorways is infrequent, therefore, a shield door is not necessary to support ALARA.
- The corridor entrances to the CVCS ion exchanger rooms are not within line of sight of a radiation source in the US460 design; therefore, the supporting design and shielding analysis exclude shield doors.
- The CVCS ion exchanger rooms contain labyrinths between the doors in question and the radiation sources in both the US600 and US460 designs; therefore, the US460 design and supporting shielding analysis eliminates these shield doors.
- For the CVCS recirculation pump rooms and the entrances to CVCS heat exchanger valve galleries, US460 shielding analysis determines that shield doors are not necessary for these openings.

No changes to the SDAA are necessary.