Response to SDAA Audit Question

Question Number: A-3.11-5

Receipt Date: 01/02/2024

Question:

In the response to audit item 3.11-2, NuScale slightly reduced the post-accident total integrated doses in FSAR Table 3C-8 (using the design basis iodine spike source term). The staff noted that even with the original values the total integrated doses in the EQ zones inside containment, under the bioshield, and in the reactor pool area seemed lower than would be expected given staff experience and the previous US600 review.

The US460 FSAR indicates that the methodology for the iodine spike source term is TR-0915-17565, Revision 4, which was the same methodology (including spiking factors) used in the previously approved US600 design. In comparison to the US600, the overall reactor core and reactor coolant source terms in FSAR Chapter 11 increased in US460 (which is expected based on the overall higher power level). In addition, the maximum dose equivalent I-131 and maximum dose equivalent Xe-133 coolant concentration values increased, which is consistent with the source term increase. Also, the Chapter 15 dose consequences at the EAB, LPZ, and MCR from the iodine spike source terms increased in the US460 design (which would be expected with the larger initial reactor coolant source term and same iodine spike source term methodology). However, the total integrated doses inside containment, under the bioshield, and in the reactor pool area in FSAR Table 3C-8 are significantly lower than those in the US460 design (the total integrated doses in other areas of the plant are higher in the US460 design). There are not significant differences in the containment volume, coolant water volume, or containment leak rates that would appear to account for the reduced dose rates in these areas. Given the above, the staff could not identify a reason why the post-design basis iodine spike doses inside containment, under the bioshield, and the reactor pool area would be lower in the US460 design. Please indicate if there are any differences in methodology or assumptions impacting the total integrated doses inside the containment, under the bioshield, and in the pool area from that in the US600 design. Please especially provide any explanation NuScale may have related to why the design basis iodine spike doses inside containment in FSAR Table 3C-8 would be lower in the US460 design.

Response:

The decrease in the total integrated doses in Final Safety Analysis Report Table 3C-8 for inside containment, under the bioshield, and in the reactor pool area is due to a decrease in the applied dose equivalent (DE) I-131 and applied DE Xe-133 concentration values from the approved US600 design to the US460 Standard Design Approval Application (SDAA).

The approved US600 design reactor coolant system (RCS) specific activity limits of 0.037 µCi/gm DE I-131 and 10 µCi/gm DE Xe-133 listed in Section 3.4.8 of the Technical Specifications were based upon an assumed failed fuel fraction that was accepted by NRC staff during the US600 Design Certification Application (DCA) review process. {{

}}[2(a),(c)].

The US460 SDAA total integrated doses are based on the applied RCS specific activity limits of 0.058 µCi/g DE I-131 and 16 µCi/g DE Xe-133 {{

}}[2(a),(c)]. This decrease in applied RCS specific activity limits is the primary factor for the decrease in total integrated doses for inside containment, under the bioshield, and in the reactor pool area.

The calculation methodology of TR-0915-17565, Revision 4 used for the approved US600 design iodine spike design basis source term (ISDBST) analysis is also applied for the US460 SDAA ISDBST analysis.

No changes to the SDAA are necessary.