Response to SDAA Audit Question

Question Number: A-5.4.1.2-7

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Question:

SDAA Section 5.4.1.2 states, “Access to the internal (secondary) sides of tubesheets affords opportunity for inspection, and for removal of foreign objects.” However, DCA Section 5.4.1.2 states, “Access to the internal (secondary) and external (reactor coolant) sides of tubesheets affords opportunity for inspection, and for removal of foreign objects.” Given that the SDAA design, like the DCA design, has steam generator tubes protruding from the tubesheet on the reactor coolant side, comparable to the secondary side in conventional nuclear steam generators, it is unclear why the “external (reactor coolant)” side was removed from the statement about inspection and removal of foreign objects in SDAA Section 5.4.1.2. Please explain why the "external (reactor coolant)" side was removed from the cited statement in Section 5.4.1.2.

Response:

The US460 design does not change access to the primary side of the tubesheet from the design certification descriptions in the final safety analysis report and final safety evaluation report. The attached markup changes the statement in Section 5.4.1.2, System Design, to be consistent with the design certification.

Markups of the affected changes, as described in the response, are provided below:

The steam plena collect steam from the top of the SG tube columns and direct the steam through the steam nozzles. Steam flows through the SG piping, through nozzles penetrating the containment, and then to the main steam system (MSS) and power conversion systems located outside the RXB.

The total SGS heat transfer area provided in Table 5.4-2 comprises the outer surface area of the full length of tubes from the primary face of the feed plenums to the primary face of the steam plenums. The total heat transfer area of each of the two independent SGs includes margin for tube plugging that reduces the heat transfer area by, at most, 10 percent.

Table 5.4-2 provides a fouling factor used for calculating end-of-life heat transfer performance.

The SG design data are in Table 5.4-2. Transient conditions applicable to the SGs are in Section 3.9.1, Special Topics for Mechanical Components; design stress limits, loads, and load combinations applicable to the SGs are in Section 3.9.3, ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures; and piping stress limits, loads, and load combinations are in Section 3.12, ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and Associated Supports.

Main steam isolation valves (MSIVs) and feedwater isolation valves (FWIVs) are outside the NPM on the MS and FW piping, respectively, on top of the CNV at the top support structure platform. A detailed discussion of the isolation functions of the valves is in Section 6.2.4, Containment Isolation System.

The DHRS forms a closed-loop connection between the steam lines and the FW lines inside the containment isolation boundary formed by the MSIVs and FWIVs. During normal operations, the DHRS is isolated from steam flow by the DHRS actuation valves (DHRSAV). A detailed description of the DHRS is in Section 5.4.3, Decay Heat Removal System.

The design of the SGs minimizes tube corrosion, minimizes tube vibration and wear, and enhances overall reliability. The design includes provisions to reduce the potential for tube damage due to loose parts.

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The SG design permits periodic inspection and testing of critical areas and features to assess their structural and pressure boundary integrity when the NPM is disassembled for refueling as shown in Figure 5.4-3. The internal surface of SG tubes is accessible over their entire length for application of nondestructive examination methods and techniques that are capable of finding the types of degradation that may occur over the life of the tubes. Individual SG tubes may be plugged and, if necessary, stabilized to prevent adverse interaction with non-plugged tubes. Access to the internal (secondary) and external (primary) sides of tubesheets affords opportunity for inspection, and for removal of foreign objects. Figure 5.4-3 and Figure 5.4-4 contain illustrations of the steam and feed plena inspection ports.