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Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555

ATTENTION: T. R. QUAY

SUBJECT: AP600 RESPONSE TO FSER OPEN ITEM 640.185 REV. 3

Reference: Westinghouse Letter to NRC, Letter Number DCP/NRC1346, dated 4/24/98

Dear Mr. Quay:

Enclosed is the Westinghouse response to FSER Open Item 640.185 Rev. 3 (OITS 6639), which describes the treatment of heat sinks in the WGOTHIC containment Evaluation Model and the verification of the modeled heat sinks with ITAAC. This revision corrects a typographic error in the Rev. 2 response provided via the referenced letter.

This response closes, from the Westinghouse perspective, this item.

Please contact Bruce Rarig on (412) 374-4358 if you have any questions concerning this transmittal.

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Brian A. McIntyre, Manager Advanced Plant Safety and Licensing

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Enclosure

cc: D. C. Scaletti, NRC (w/ Enclosure)N. J. Liparulo, Westinghouse (w/o Enclosure)

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NRC FSER OPEN ITEM



Question: 640.185 (R3) (OITS 6639)

Your response to RAI 640.168 requires clarification. You committed to add item 1.f to ITAAC 3.3, "Buildings," in your revised response to RAI 640.140, dated December 19, 1997 that will verify certain dimensions of the Nuclear Island. You also committed to add a different item 1.f to ITAAC 3.3 in you response to RAI 640.168, dated January 30, 1998, to verify the above deck region of the AP600 containment volume. If both design Commitments are included in the AP600 ITAAC, they will satisfy a portion of the NRC staff's concern. However, ITAAC 3.3 does not verify the volumes and flow paths to the level of detail assumed in the Containment Evaluation Model (WCAP-14407, Section 4). Also, your response refers to "structures" and "major equipment," as important heat sinks within the containment, but it does not demonstrate that the heat sinks identified in reference 640.168-1 are verified by ITAAC nor does it indicate what fraction of these heat sinks are verified by ITAAC. Because the design pressure, it is important to demonstrate that the assumptions used in the design basis analyses are verified. Also, because the coatings below the operating deck are not safety-related, it is important to assure that the heat transfer characterization of these coatings are covered in the design basis analyses used to support design certification. Therefore:

- (a) Identify the fraction of the heat sinks that are captured in your ITAAC. What is the minimum set necessary to assure that the assumptions in the design basis analyses that support design certification will not result in an unacceptable evaluation?
- (b) Explain how the proposed ITAAC demonstrate that the heat transfer characterizations of the heat sinks are verified to a level of detail described in the AP600 Containment Evaluation Model.
- (c) Provide an ITAAC that verifies the heat sinks, volumes, and flow paths to a level of detail described in WCAP-14407, Section 4.

Response:

Westinghouse's response to RAI 640.185(R1), demonstrated the relative unimportance of miscellaneous internal steel heat sinks in the WGOTHIC Evaluation Model pressure calculation. However, the Staff position is that if the analysis models a heat sink, it is therefore important and must be supported by an ITAAC. Westinghouse's revised approach is to include only those heat sinks that are verified by ITAAC in the design basis analyses that support design certification.

The AP600 Certified Design Material contains ITAAC for the overall dimensions of the physical plant. These dimensions include the containment shell inside diameter and containment height above the operating deck. Verification of these dimensions is sufficient to confirm containment free volume and heat transfer surface of the containment shell. Column-to-column line distances, building elevations, and wall and floor/ceiling thicknesses are verified in the Nuclear Island non-System ITAAC. Section 3.3, of the AP600 Certified Design Material. These physical parameters are in the CDM because they are considered important parameters for input to the plant structural and seismic analysis. They also represent a sufficient level of detail for verification of the important dimensions used as input to the containment analyses.



640.185(R3)-1



The AP600 Certified Design Material also contains ITAAC for the systems located inside containment. These systems have a specific ITAAC to inspect the functional arrangement and the location of the major equipment contained in these systems. These ITAAC verify the existence of the major components that are modeled as metal heat sinks in the containment analysis. For example, the Passive Core Cooling System contains the Core Makeup Tanks (CMTs), which are two large heat sinks modeled in the WGOTHIC calculation. The ITAAC for the CMTs are included in the AP600 CDM Section 2.2.3. Figure 2.2.3-1 (Functional Arrangement) and in Table 2.2.3-4, item 8.c (Volume). Another example is the Mechanical Handling System (CDM Section 2.3.5) which confirms the existence of the containment polar crane.

Westinghouse has systematically reviewed each heat sink input in the WGOTHIC Evaluation Model and identified the ITAAC associated with each heat sink type. Table 640.185(R3)-1 specifies the applicable ITAAC for each heat sink type.

Each internal metal heat sink is input to the WGOTHIC Evaluation Model as a plate with an equivalent thickness and surface area. A review of the engineering calculations for equivalent surface area and thickness identified significant conservatism in the calculated values used to define the input for the analyses reported in Reference 640.185(R3)-1. As a result, certain thicknesses and surface areas have been increased by up to a factor of 2. In response to the Staff position regarding ITAAC, miscellaneous metal heat sinks (e.g., platforms, stairs, rails, jib crane, maintenance hatch, etc.) not supported by ITAAC have been deleted from the WGOTHIC Evaluation Model as suggested by the NRC staff.

The limiting MSLB and LOCA SSAR cases were reanalyzed using the updated WGOTHIC heat sink inputs described above. The calculated peak pressure is 44.1 psig for the limiting MSLB case, and 43.4 psig for the LOCA case. Marked up pages of Reference 640.185(R3)-1 were provided in the Revision 2 version of this open item.

Appendix 4.B of WCAP-14407, Rev. 3, "WGOTHIC Application to AP600," April 1998 describes, in detail, each of the thermal conductors used in the WGOTHIC Evaluation Model. Appendix 4.B includes 1) the ITAAC-related criterion used as the basis for including heat sinks in the evaluation model, 2) the heat sinks removed from the model because no ITAAC for these exist, and 3) updated surface area and thickness values for certain heat sinks used in the containment analysis.

References:

640.185(R3)-1 AP600 Standard Safety Analysis Report (SSAR), Revision 22, Section 6.2

SSAR Revision: Section 5.2 markups provided in the Revision 2 version of this open item.

640.185(R3)-2





ITAAC Revision:

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The proposed ITAAC in Westinghouse's response to RAI 640.168 are consistent with the treatment of equipment and structure heat sinks in the WGOTHIC Evaluation Model. The ITAAC are summarized in Table 640.185(R3)-1.

TABLE 640.185(R3)-1 ITAAC FOR WGOTHIC CONTAINMENT PRESSURE ANALYSIS HEAT SINKS		
HEAT SINK DESCRIPTION	ITAAC	BASIS
1. Containment Shell	Section 2.2.1	ASME Code Section III and Category I Seismic requirements specify dimensions and thickness of containment shell.
	Section 3.3	Dimensions include the containment shell inside diameter and containment height above the operating deck. Verification of these dimensions is sufficient to confirm containment free volume and heat transfer surface of the containment shell.
2. Concrete Structure and Steel Framing	Section 3.3	Column-to-column line distances, building elevations, and wall and floor/ceiling thicknesses are verified. These physical parameters are important parameters for input to the plant structural and seismic analysis. They also represent a sufficient level of detail for verification of the important dimensions used as input to the containment analyses.
3. Equipment	Section 2	Systems have a specific ITAAC to inspect the functional arrangement and the location of the major equipment contained in these systems. These ITAAC verify the existence of the major components that are modeled as metal heat sinks.



640.185(R3)-3