AP1000 DOCUMENT COVER SHEET

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AP1000 DOCUMENT NO.	REVISION NO.		ASSIGNED TO
APP-GW-GLN-001	0	Page of	W-A. Sterdis

ALTERNATE DOCUMENT NUMBER: WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: Westinghouse Electric Company

TITLE: **Passive Residual Heat Removal Heat Exchanger**

ATTACHMENTS:	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION:
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AP1000 RESPONSIBLE MANAGER K. Quinn	SIGNATURE* 4/5/06	APPROVAL DATE 4/5/06

* Approval of the responsible manager signifies that document is complete, all required reviews are complete, electronic file is attached and document is released for use.

Document Number: APP-GW-GLN-001 **Revision Number:** 0

Title: Passive Residual Heat Removal Heat Exchanger

Brief Description of the change (what is being changed and why):

During the detail design stages, the Passive Residual Heat Exchanger (PRHR) design was optimized to reduce its overall weight, design complexity and manufacturing cost. This design development resulted in a configuration of the connection of the heat exchanger to the in-containment refueling water storage tank (IRWST) and tube bundle frame supports that are different than what is shown in Figure 6.3-5 of the AP1000 Design Control Document (DCD). The updated configuration satisfies the AP1000 design criteria and specifications.

I. APPLICABILITY DETERMINATION

This evaluation is prepared to document that the change described above is a departure from Tier 2 information of the AP1000 Design Control Document (DCD) that may be included in plant specific FSARs without prior NRC approval.

A.	Does the proposed change include a change to:		
	1. Tier 1 of the AP1000 Design Control Document APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
	2. Tier 2* of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
	3. Technical Specification in Chapter 16 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
B.	Does the proposed change involve:		
	1. Closure of a Combined License Information Item identified in the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a COL item closure report for NRC review.)
	2. Completion of an ITAAC item identified in Tier 1 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare an ITAAC completion report for NRC review.)

☒ The questions above are answered no, therefore the departure from the DCD does not require prior NRC review unless review is required by the criteria of 10 CFR Part 52 Appendix D Section VIII B.5.b. or B.5c

II. TECHNICAL DESCRIPTION AND JUSTIFICATION

During the detail design phase, a number of relatively minor design modifications to the PRHR heat exchanger were evaluated with the aim of reducing the equipment complexity, weight and cost. These modifications are outlined in the following:

1. Channel Head

The nozzle geometry resulting from detailed calculations suggested two additional changes to the previous design: reduction of the manway diameter from 18 to 16 inches and increase of the head thickness from 2.5 to 3.0 inch. The increase in thickness will avoid major differences in the thickness of adjacent parts, which are likely to give high thermal stresses during the operational transients.

2. Housing

The design evolution of the tube support system resulted in new beams being added to the shroud, in order to shorten the tube support bars and make the support system simpler. Also, the housing has been modified such that it closely matches the tube bundle, thus reducing the component weight and, as a consequence, the loads on supports and IRWST wall.

The housing itself has been given a "C" shape by removing the vertical beams that joined the two flanges; in addition, the width of the structure has been reduced.

Minor adjustments of the tube supports have been included to accommodate the two additional tube rows and one new support has been added in the horizontal leg.

Figure 1 shows the resulting configuration.

3. Tubesheet to Housing connection

Because of the narrower housing structure, the diameter of the flange that connects the tubesheet to the housing has been reduced: the new flange is attached directly to the tubesheet and has large holes to provide for free circulation of pool water. The counterflange on the housing has been simplified, eliminating the large ring with screwed holes of the earlier design. The flexibility of the new flange and housing eliminate the vertically oriented slots. See Figure 2 for the revised tubesheet/housing flange.

The weight of the revised AP1000 heat exchanger design is substantially less than the earlier design.

4. Hx supports

The original configuration of the heat exchanger supports is maintained. The heat exchanger is basically supported by the extended flanges, connected to the IRWST wall openings. Additional supports help in sustaining the deadweight and providing restraint against seismic load.

The existing lower supports have been adapted to the new housing, while the upper lateral support has been rotated by 90 degrees, thus eliminating the bending stress as well as reducing its dimensions as shown in Figure 3.

These changes have been evaluated and analyzed for the effects on design and structural and thermal hydraulic responce. These evaluations showed satisfactory results. These design modifications were reviewed and approved by the Westinghouse AP1000 Change Control process.

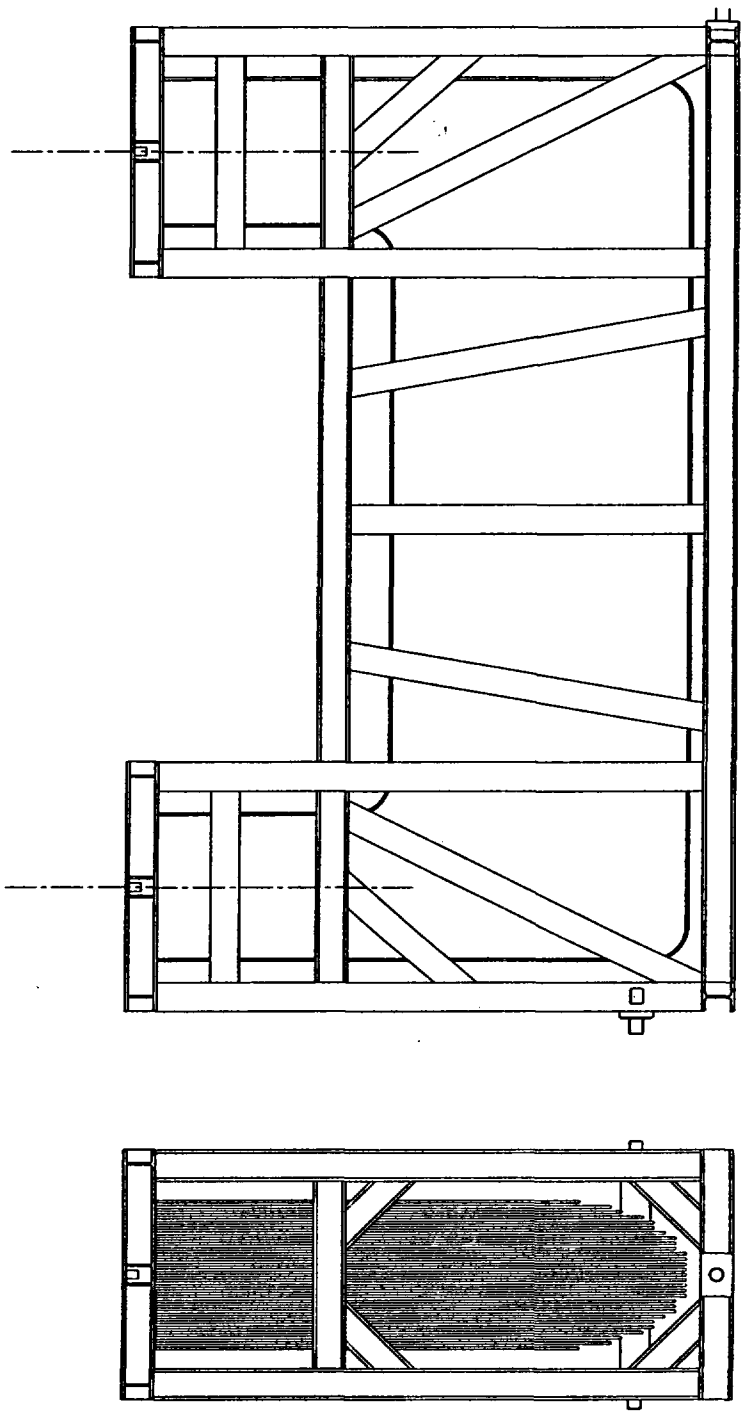

Fig. 1
Revised AP1000 Housing

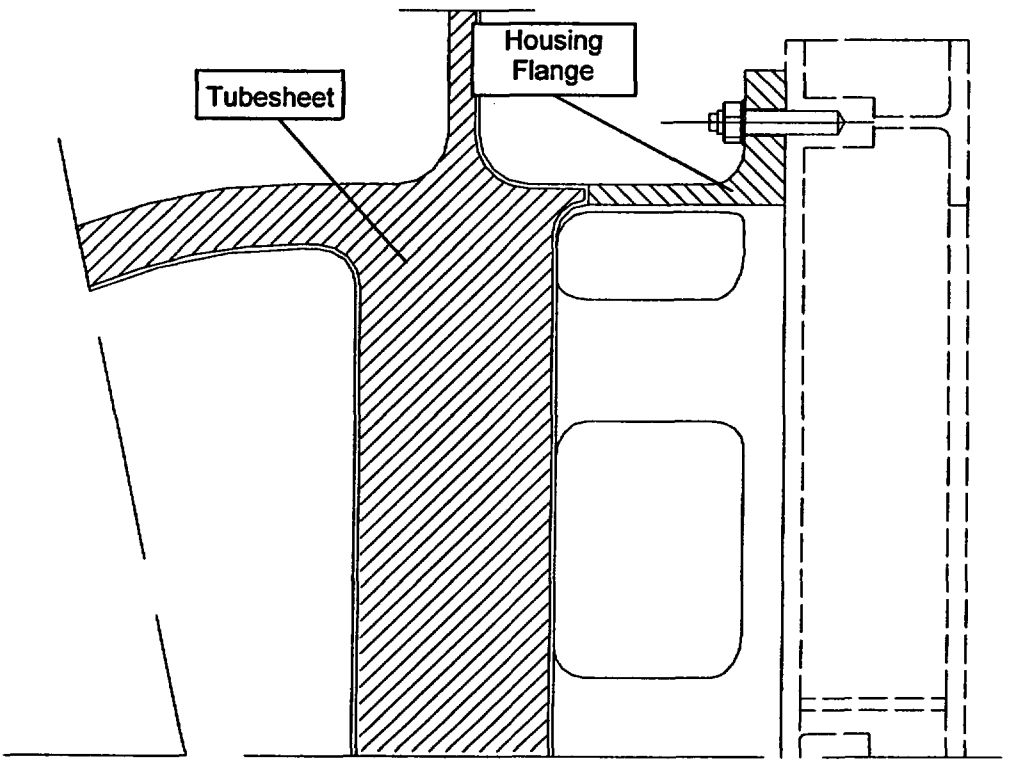

Fig. 2
AP1000 – Tubesheet / Housing Flange

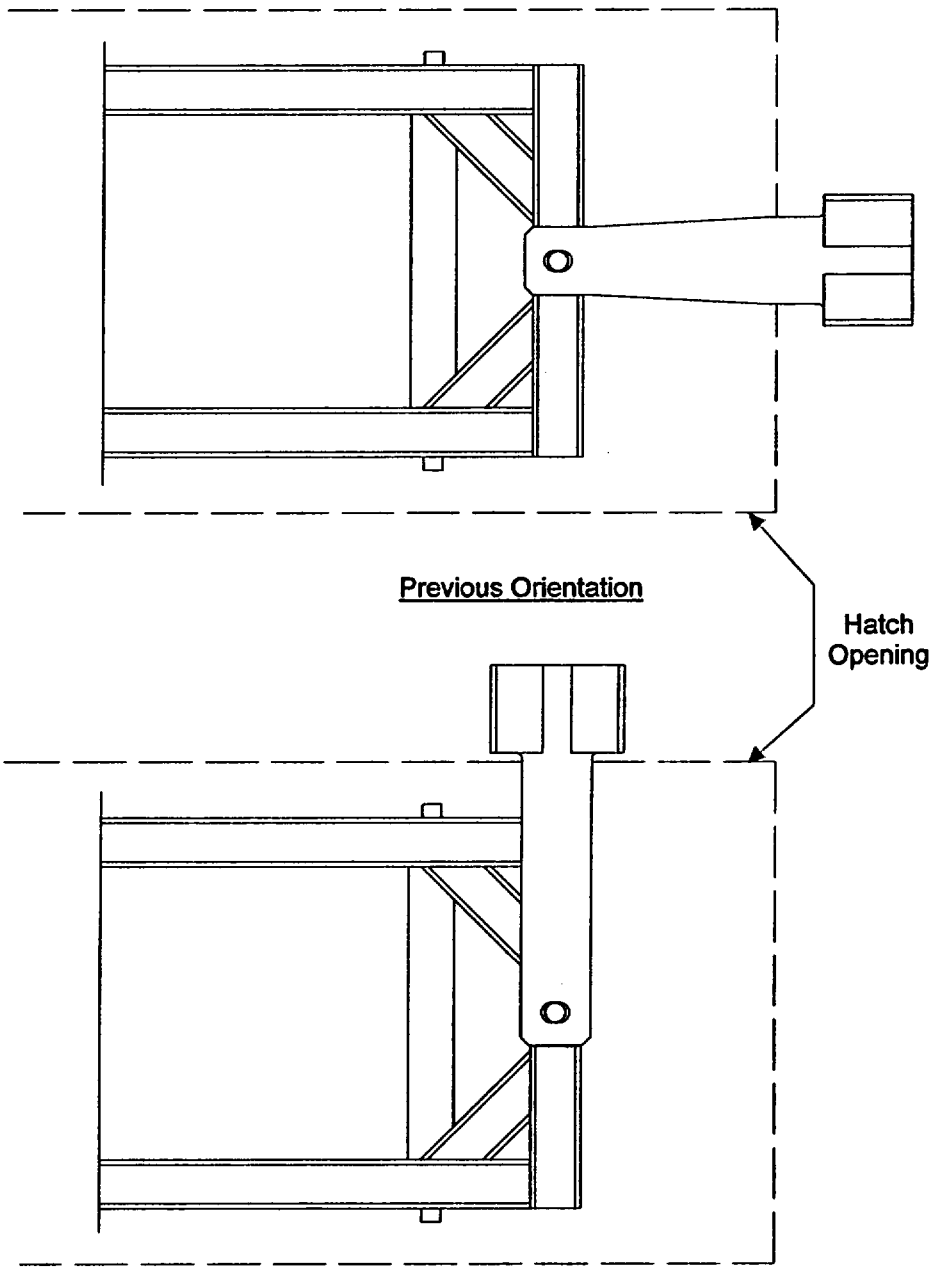

Fig. 3
AP1000 – Upper Support Orientation

Document Number: APP-GW-GLN-001 **Revision Number:** 0

Title: Passive Residual Heat Removal Heat Exchanger

III. DCD MARK-UP

Revised DCD Figure 6.3-5 is attached. No DCD text mark-up is required.

IV. REGULATORY IMPACT

A. FSER IMPACT

The FSER in Subsection 6.3.2.5 discusses the passive residual heat removal heat exchanger. The changes to the support identified in this change review have no effect on the discussion in the FSER. The changes have no effect on the conclusions in FSER Subsection 6.3.6 about the passive core cooling system.

B. SCREENING QUESTIONS (Check correct response and provide justification for that determination under each response)

1. Does the proposed change involve a change to an SSC that adversely affects a DCD described design function? ☐ YES ☒ NO

   There is no change to a design function. The modified design satisfies design requirements including pressure boundary, structural, and thermal hydraulic requirements.

2. Does the proposed change involve a change to a procedure that adversely affects how DCD described SSC design functions are performed or controlled? ☐ YES ☒ NO

   The modified design has no effect on operation of the reactor coolant system. The modified design has no effect on the initiation or operation of the passive core cooling system.

3. Does the proposed activity involve revising or replacing an DCD described evaluation methodology that is used in establishing the design bases or used in the safety analyses? ☐ YES ☒ NO

   The changes to the heat exchanger do not require changes to the evaluation of the response to postulated accident conditions. The changes to the heat exchanger do not require changes to the structural analysis or the heat transfer performance.

4. Does the proposed activity involve a test or experiment not described in the DCD, where an SSC is utilized or controlled in a manner that is outside the reference bounds of the design for that SSC or is inconsistent with analyses or descriptions in the DCD? ☐ YES ☒ NO

   The changes to the heat exchanger do not require an additional test or experiment or changes to testing.

Document Number: APP-GW-GLN-001 **Revision Number:** 0

Title: Passive Residual Heat Removal Heat Exchanger

C. EVALUATION OF DEPARTURE FROM TIER 2 INFORMATION (Check correct response and provide justification for that determination under each response)

10 CFR Part 52, Appendix D, Section VIII. B.5.a. provides that an applicant for a combined licensee who references the AP1000 design certification may depart from Tier 2 information, without prior NRC approval, if it does not require a license amendment under paragraph B.5.b. The questions below address the criteria of B.5.b.

1. Does the proposed departure result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

   Since there is no change to the design function or operation of the PRHR heat exchanger there are no new accident initiators and no effect on the frequency of evaluated accidents.

2. Does the proposed departure result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety and previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

   Since there is no change to the design function or operation of the PRHR heat exchanger there is no effect on malfunctions of structures, systems, or components. The operating conditions for the reactor coolant system and passive core cooling system are not altered.

3. Does the proposed departure result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

   The changes have no effect on the operation, performance, and pressure boundary integrity of the PRHR heat exchanger. Therefore, there is no increase in the calculated release of radioactive material during postulated accident conditions.

4. Does the proposed departure result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

   The changes have no effect on the design functions or reliability of the PRHR heat exchanger or other components and operation of the passive core cooling system. Therefore, there is no increase in the calculated release of radioactive material due to a malfunction of an SSC.

5. Does the proposed departure create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD? ☐ YES ☒ NO

   The changes have no effect on the operation, performance, and pressure boundary integrity of the PRHR heat exchanger. The response of the PRHR heat exchanger and the passive core cooling system to postulated accident conditions is not altered by the changes. The changes do not introduce any additional failure modes. Therefore, there is no possibility of an accident of a different type than any evaluated previously in the DCD.

6. Does the proposed departure create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD? ☐ YES ☒ NO

   The changes have no effect on the design functions of the PRHR heat exchanger or other components or operation of the passive core cooling system. Therefore, there are no additional failure modes or the

possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously.

7. Does the proposed departure result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered? ☐ YES ☒ NO

   There is no change to the design function of the heat exchanger. The criteria to provide for pressure boundary integrity are not exceeded or altered.

8. Does the proposed departure result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses? ☐ YES ☒ NO

   The evaluation methodology for the pressure boundary integrity is not altered by the identified changes.

☒ The answers to the evaluation questions above are "NO" and the proposed departure from Tier 2 does not require prior NRC review to be included in plant specific FSARs as provided in 10 CFR Part 52, Appendix D, Section VIII. B.5.b

☐ One or more of the the answers to the evaluation questions above are "YES" and the proposed change requires NRC review.

D. IMPACT ON RESOLUTION OF A SEVERE ACCIDENT ISSUE

10 CFR Part 52, Appendix D, Section VIII. B.5.a. provides that an applicant for a combined licensee who references the AP1000 design certification may depart from Tier 2 information, without prior NRC approval, if it does not require a license amendment under paragraph B.5.c. The questions below address the criteria of B.5.c.

1. Is there is a substantial increase in the probability of a severe accident such that a particular severe accident previously reviewed and determined to be not credible could become credible? ☐ YES ☒ NO

   The changes have no effect on the operation, performance, and pressure boundary integrity of the PRHR heat exchanger. Therefore, there is no effect on the calculation of the probability of a severe accident.

2. Is there is a substantial increase in the consequences to the public of a particular severe accident previously reviewed? ☐ YES ☒ NO

   The changes have no effect on the operation, performance, and pressure boundary integrity of the PRHR heat exchanger. Therefore, there is no effect on the calculation of the release of radioactive material during a severe accident.

Document Number: APP-GW-GLN-001 **Revision Number:** 0

Title: Passive Residual Heat Removal Heat Exchanger

☒ The answers to the evaluation questions above are "NO" and the proposed departure from Tier 2 does not require prior NRC review to be included in plant specific FSARs as provided in 10 CFR Part 52, Appendix D, Section VIII. B.5.c

☐ One or more of the he answers to the evaluation questions above are "YES" and the proposed change requires NRC review.

E. SECURITY ASSESSMENT

1. Does the proposed change have an adverse impact on the security assessment of the AP1000? ☐ YES ☒ NO

The change to the PRHR heat exchanger will not alter barriers or alarms that control access to protected areas of the plant. The change to the PRHR heat exchanger will not alter requirements for security personnel.

Preparer: D. WISEMAN D. A. Wiseman Date: 4/5/2006
(Print name) (Sign)

Reviewer: RAO MANDAVA P.R. Mandava Date: 4/5/06
(Print name) (Sign)

Document Number: APP-GW-GLN-001 **Revision Number:** 0

Title: Passive Residual Heat Removal Heat Exchanger

Replace the existing Figure 6.3-5 with the figure below. The revised figure shows a different housing frame and supports.

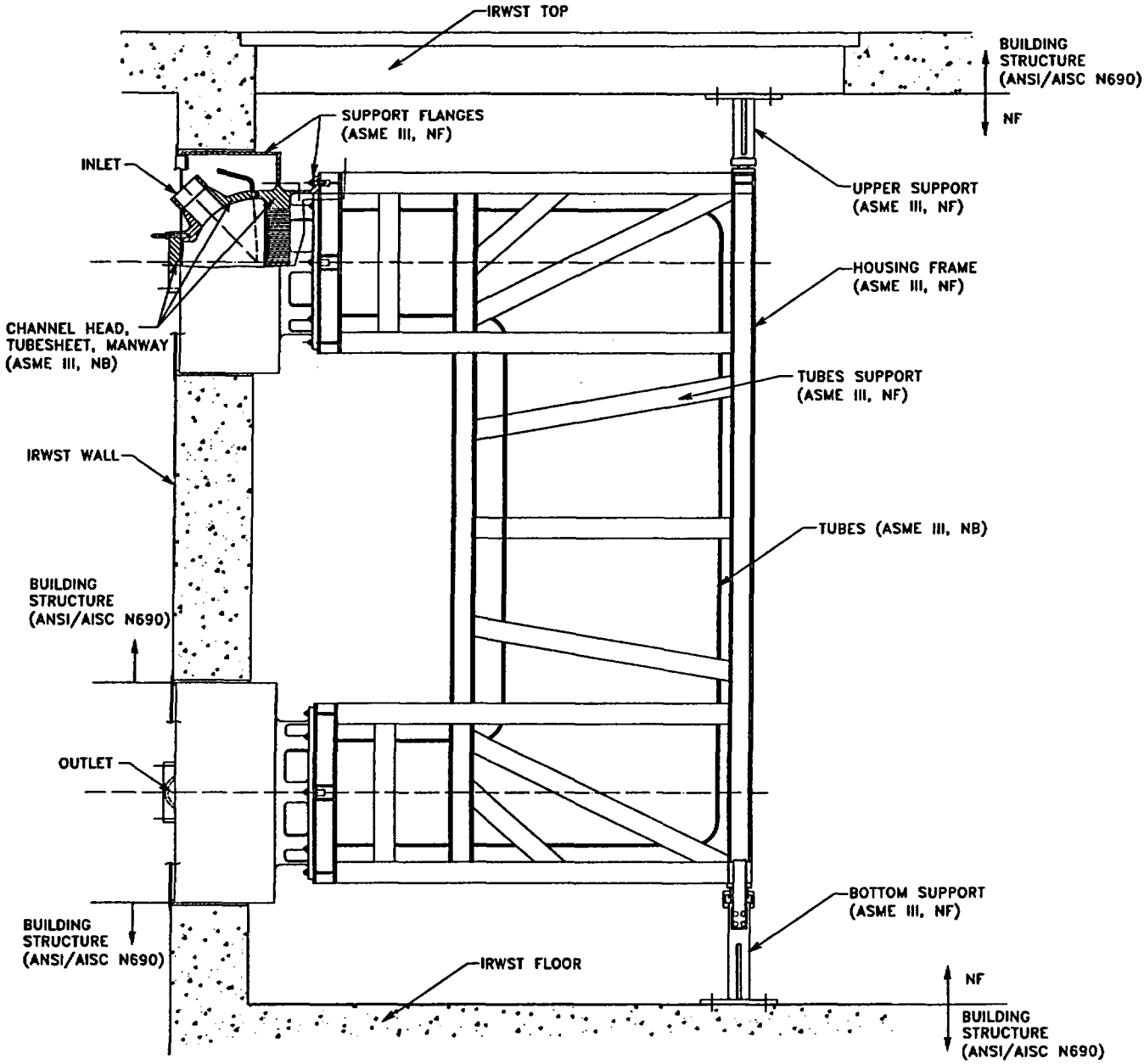

Figure 6.3-5

Passive Heat Removal Heat Exchanger