Tier 1 Subsection 2.3.6; Tables 2.3.6-1, 2.3.6-2, and 2.3.6-4; and Figure 2.3.6-1
Tier 2 Table 5.4-14
Normal Residual Heat Removal System

Description of Change

Update and/or correct normal residual heat removal system (RNS) information in Tier 1 subsection 2.3.6.

Technical/Editorial Justification

This revision includes the following minor editorial corrections in Tier 1 subsection 2.3.6:

- The heading of "Design Description" is missing immediately below the subsection 2.3.6 title. Add this heading.

- In Table 2.3.6-2, revise the entry for the RNS discharge to CVS purification line in Row 18 to reflect a typographical error for Line No. as "RNS-BBC-L021" instead of "RNS-DBC-L021."

- In the Acceptance Criteria of item 9.b).v of Table 2.3.6-4, correct the pipe schedule to indicated Schedule 140 instead of Schedule 160. A review of the piping classification specified for the RNS shows that Schedule 140 is the appropriate size for nominal 20-inch diameter pipe and the design conditions.

- In Row 1 of Table 2.3.6-~~1~~2, for the RNS suction lines from the RCS hot leg, eliminate the redundant "Yes" and "No" responses for the last three columns for the individual lines to be consistent with other table row entries where the indicated response is applicable to all lines for that table row entry.

In Table 2.3.6-1, revise the active functions for valves RNS-PL-V013, -V015A, -V015B, -V017A, and -V017B to include "Transfer Open" since these valves must partially open to provide the flow path(s) for long-term post-accident makeup to the RCS via the RNS heat exchanger drain makeup connections.

In Table 2.3.6-1, revise the information for valve RNS-PL-V024 (RNS discharge to IRWST isolation valve) to eliminate Class 1E power requirement and the associated display and control since this valve does NOT have an active function. This valve is only required to operate to provide the nonsafety function of RNS cooling of the IRWST, as discussed in item 9.d) of the Design Description.

In Table 2.3.6-1, add a new entry for relief valve RNS-PL-V045 in the RNS pump discharge header. This valve is an ASME code relief valve and by definition has an active overpressure protection function for the purposes of ITAACs, although it does NOT have any system-specific design basis active post-accident function. This change is consistent with the information for RNS-PL-V045 in DCD Table 3.9-16. This same situation exists for RNS-PL-V021 (RNS suction line relief valve) that provides similar ASME Code overpressure protection, and the information in Table 2.3.6-1 is correct for this valve.

In Table 2.3.6-1, change the AP1000 Tag Number for RNS heat exchanger A channel head drain valve RNS-PL-V046 to RNS-PL-V046A, to be consistent with the AP1000 component label strategy where redundant components have "A" and "B" Tag Numbers. Also change the RNS heat exchanger B channel head drain valve Tag Number from RNS-PL-V048 to RNS-PL-V046B to be consistent with this strategy.

In Table 2.3.6-1, add a new entry for RNS heat exchanger B channel head drain valve RNS-PL-V046B, which performs redundant function to the heat exchanger A valve, RNS-PL-V046A. This is consistent with the makeup connection information previously shown for both drain valves in Figure 2.3.6-1.

In Table 2.3.6-1, revise the information for valves RNS-PL-V055 and -V056 to correctly indicate that they do NOT have active functions. These valves are used to provide the nonsafety function of SFS cask loading pit low-pressure makeup to the RCS, as discussed in item 9.c) of the Design Description.

In Table 2.3.6-1, revise the information for valves RNS-PL-V057A and -V057B to correctly indicate that they do NOT have active functions. These valves are used to provide the nonsafety function of RNS pump protection during shutoff head RNS pressure conditions and since the RNS pumps do NOT provide any active functions for the AP1000, these valves to do NOT have an active function when they align the pump mini-flow paths.

In Table 2.3.6-2, revise the line description in Row 1 to indicate the correct LBB boundary as valves RNS-PL-V001A and -V001B instead of -V002A and -V002. This is consistent with the LBB boundary as indicated in Tier 2 Figure 3E-2.

In Table 2.3.6-2, revise the line description in Row 2 to indicate the correct LBB boundary as valves RNS-PL-V001A and -V001B instead of -V002A and -V002. In addition, revise Lines RNS-BBB-L004A, -L004B, and -L005 to reflect their functional capability required to preserve containment integrity.

In Table 2.3.6-2, delete Line RNS-BBD-L062 from the table entry in Row 3 because it was listed, but it is NOT an ASME Code Section III line, which is the basis for all lines listed in this table.

In Table 2.3.6-2, revise the entry for the RNS Suction Line LTOP Relief in Row 5 to indicate that the functional capability is required since this line provides a flow path for this ASME Code relief valve, which by definition has an active overpressure protection function for the purposes of ITAACs, as discussed previously.

In Table 2.3.6-2, revise the entry for the RNS Discharge Line from the heat exchanger B to the common discharge header in Row 8 to indicate that the functional capability is required since this line has a redundant functional capability to the corresponding heat exchanger B line to provide a flow path for long-term post-accident makeup to the RCS, as reflected in Figure 2.3.6-1.

Revise the inspections, tests and analyses of items 4.a) and 4.b) of Table 2.3.6-4 to delete the hydrostatic test pressure and design pressure values since these are specific details of the ASME Code testing requirements that are part of the test procedure and not appropriate for the ITAAC. This is consistent with the phraseology used for equivalent ITAAC hydrostatic testing information for the other AP1000 plant systems.

Make several slight parameter changes in item 9 of Table 2.3.6-4 to reflect recent refinements in supporting calculations for the associated design documents. The changes in parameter values have no effect on safety analyses.

- Change item 7.c) and 8.a) to provide direct references to the relevant material.

- Change the RNS pump flow in the Acceptance Criteria for item 9.b) ii to 1400 from 1425 gpm. This change is also reflected in Tier 2, Table, 5.4-14.

- Change the RNS pump flow in Acceptance Criteria of item 9.d~~b).v~~) flow to 2000 from 2200 gpm.

Revise Figure 2.3.6-1 to include the correct valve identifiers for heat exchanger channel head drain valves RNS-PL-V046A and -V046B.

Regulatory Consequence

These changes update the AP1000 Tier 1 information to the correct design information. There is no change to design function. There is no change to safety analyses or analysis methodology. This change will not affect the FSER writeup or conclusions.

Change Markup

Revise Tier 1 subsection 2.3.6 by adding the following heading:

2.3.6 Normal Residual Heat Removal System

Design Description

Tier 1 Table 2.3.6-1 Revise portions of Tier 1 Table 2.3.6-1, beginning on the second page, fourth entry, of the table, as follows:

Table 2.3.6-1 (cont.)

Equipment Name	Tag No.	ASME Code Section III	Seismic Cat. I	Remotely Operated Valve	Class 1E/ Qual. for Harsh Envir.	Safety-Related Display	Control PMS	Active Function	Loss of Motive Power Position
RNS Discharge Header Containment Isolation Check Valve	RNS-PL-V013	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-
RNS Discharge RCS Pressure Boundary Check Valve	RNS-PL-V015A	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-
RNS Discharge RCS Pressure Boundary Check Valve	RNS-PL-V015B	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-
RNS Discharge RCS Pressure Boundary Check Valve	RNS-PL-V017A	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-
RNS Discharge RCS Pressure Boundary Check Valve	RNS-PL-V017B	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-

Note: Dash (-) indicates not applicable.

Table 2.3.6-1 (cont.)

Equipment Name	Tag No.	ASME Code Section III	Seismic Cat. I	Remotely Operated Valve	Class 1E/ Qual. for Harsh Envir.	Safety-Related Display	Control PMS	Active Function	Loss of Motive Power Position
RNS Discharge to IRWST Motor-operated Isolation Valve	RNS-PL-V024	Yes	Yes	Yes	-/- ~~Yes/No~~	No~~Yes (Valve Position)~~	No~~Yes~~	No~~Transfer Closed~~	As Is
RNS Discharge Header Relief Valve	RNS-PL-V045	Yes	Yes	No	-/-	No	-	Transfer Open/ Transfer Closed	-
RNS Heat Exchanger A Channel Head Drain Valve	RNS-PL-V046A	Yes	Yes	No	-/-	No	-	Transfer Open	-
RNS Heat Exchanger B Channel Head Drain Valve	RNS-PL-V046B	Yes	Yes	No	-/-	No	-	Transfer Open	-
RNS Suction from Cask Loading Pit Motor-operated Isolation Valve	RNS-PL-V055	Yes	Yes	Yes	No/No	No	No	No~~Transfer Open~~	As Is
RNS Suction from Cask Loading Pit Check Valve	RNS-PL-V056	Yes	Yes	No	-/-	No	-	No~~Transfer Open/ Transfer Closed~~	-

Note: Dash (-) indicates not applicable.

Table 2.3.6-1 (cont.)

Equipment Name	Tag No.	ASME Code Section III	Seismic Cat. I	Remotely Operated Valve	Class 1E/ Qual. for Harsh Envir.	Safety-Related Display	Control PMS	Active Function	Loss of Motive Power Position
RNS Pump Miniflow Air-Operated Isolation Valve	RNS-PL-V057A	Yes	Yes	Yes	No/No	No	No	No~~Transfer Open/ Transfer Closed~~	Open
RNS Pump Miniflow Air-Operated Isolation Valve	RNS-PL-V057B	Yes	Yes	Yes	No/No	No	No	No~~Transfer Open/ Transfer Closed~~	Open
RNS Return from Chemical and Volume Control System (CVS) Containment Isolation Valve	RNS-PL-V061	Yes	Yes	Yes	Yes/No	Yes (Valve Position)	Yes	Transfer Closed	Closed

Tier 1 Table 2.3.6-2 Revise portions of Tier 1 Table 2.3.6-2 as follows:

Table 2.3.6-2

Line Name	Line No.	ASME Code Section III	Leak Before Break	Functional Capability Required
RNS Suction Lines, from the RCS Hot Leg Connection to the RCS Side of Valves RNS PL-V00112A and RNS-PL-V00112B	RNS-BTA-L001 RNS-BTA-L002A RNS-BTA-L002B	Yes ~~Yes~~ ~~Yes~~	Yes ~~Yes~~ ~~Yes~~	No ~~No~~ ~~No~~
RNS Suction Lines, from the RCS Pressure Boundary Valves, RNS-PL-V00112A and RNS-PL-V00112B, to the RNS pumps	RNS-BBB-L004A RNS-BBB-L004B RNS-BBB-L005 RNS-DBC-L006 RNS-DBC-L007A RNS-DBC-L007B RNS-DBC-L009A RNS-DBC-L009B	Yes	No	Yes Yes Yes No No No No No
RNS Suction Line from CVS	RNS-BBB-L061 ~~RNS-BBD-L062~~	Yes	No	No
RNS Suction Line from IRWST	RNS-BBB-L029	Yes	No	No
RNS Suction Line LTOP Relief	RNS-BBB-L040	Yes	No	Yes~~No~~
RNS Discharge Line, from RNS Heat Exchanger RNS-ME-01B to Common Discharge Header RNS-DBC-L014	RNS-DBC-L012B	Yes	No	Yes~~No~~

Table 2.3.6-2 (cont.)				
Line Name	**Line No.**	**ASME Code Section III**	**Leak Before Break**	**Functional Capability Required**
RNS Discharge to CVS Purification	RNS-~~D~~BBC-L021	Yes	No	No

Tier 1 Table 2.3.6-4 Revise entries 4.a), 4.b), 7.c), 8.a), 9.b), and 9.d) of Tier 1 Table 2.3.6-4 as follows:

Table 2.3.6-4
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a) The components identified in Table 2.3.6-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.	A hydrostatic test ~~≥1125 psi~~ will be performed on the ~~900 psi design pressure~~ components required by the ASME Code Section III to be hydrostatically tested.	A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.3.6-1 as ASME Code Section III conform with the requirements of the ASME Code Section III.
4.b) The piping identified in Table 2.3.6-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	A hydrostatic test ~~≥1125 psi~~ will be performed on the ~~900 psi design pressure~~ piping required by the ASME Code Section III to be hydrostatically tested.	A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.3.6-2 as ASME Code Section III conform with the requirements of the ASME Code Section III.
7.c) Separation is provided between RNS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.	See Tier 1 Material, Table 3.3-6, item 7.d.~~Section 3.3, Nuclear Island Buildings.~~	See Tier 1 Material, Table 3.3-6, item 7.d.~~Section 3.3, Nuclear Island Buildings.~~
8.a) The RNS preserves containment integrity by isolation of the RNS lines penetrating the containment.	See Tier 1 Material, Table 2.2.1-3, item 7.~~subsection 2.2.1, Containment System.~~	See Tier 1 Material, Table 2.2.1-3, item 7.~~subsection 2.2.1, Containment System.~~
9.b) The RNS provides heat removal from the reactor coolant during shutdown operations.	i) Inspection will be performed for the existence of a report that determines the heat removal capability of the RNS heat exchangers. ii) Testing will be performed to confirm that the RNS can provide flow through the RNS heat exchangers when the pump suction is aligned to the RCS hot leg and the discharge is aligned to both PXS DVI lines with the RCS at atmospheric pressure. v) Inspection will be performed of the RNS pump suction nozzle connection to the RCS hot leg.	i) A report exists and concludes that the product of the overall heat transfer coefficient and the effective heat transfer area, UA, of each RNS heat exchanger is greater than or equal to 2.2 million Btu/hr-°F. ii) Each RNS pump provides at least 1400~~25~~ gpm net flow to the RCS when the hot leg water level is at an elevation 15.5 inches ± 2 inches above the bottom of the hot leg. v) The RNS suction line connection to the RCS is constructed from 20-inch Schedule 140~~160~~ pipe.

9.d) The RNS provides heat removal from the in-containment refueling water storage tank (IRWST).	Testing will be performed to confirm that the RNS can provide flow through the RNS heat exchangers when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST.	Two operating RNS pumps provide at least ~~2~~2000 gpm to the IRWST.

Tier 1 Figure 2.3.6-1 Revise Tier 1 Figure 2.3.6-1 as shown on the following page.

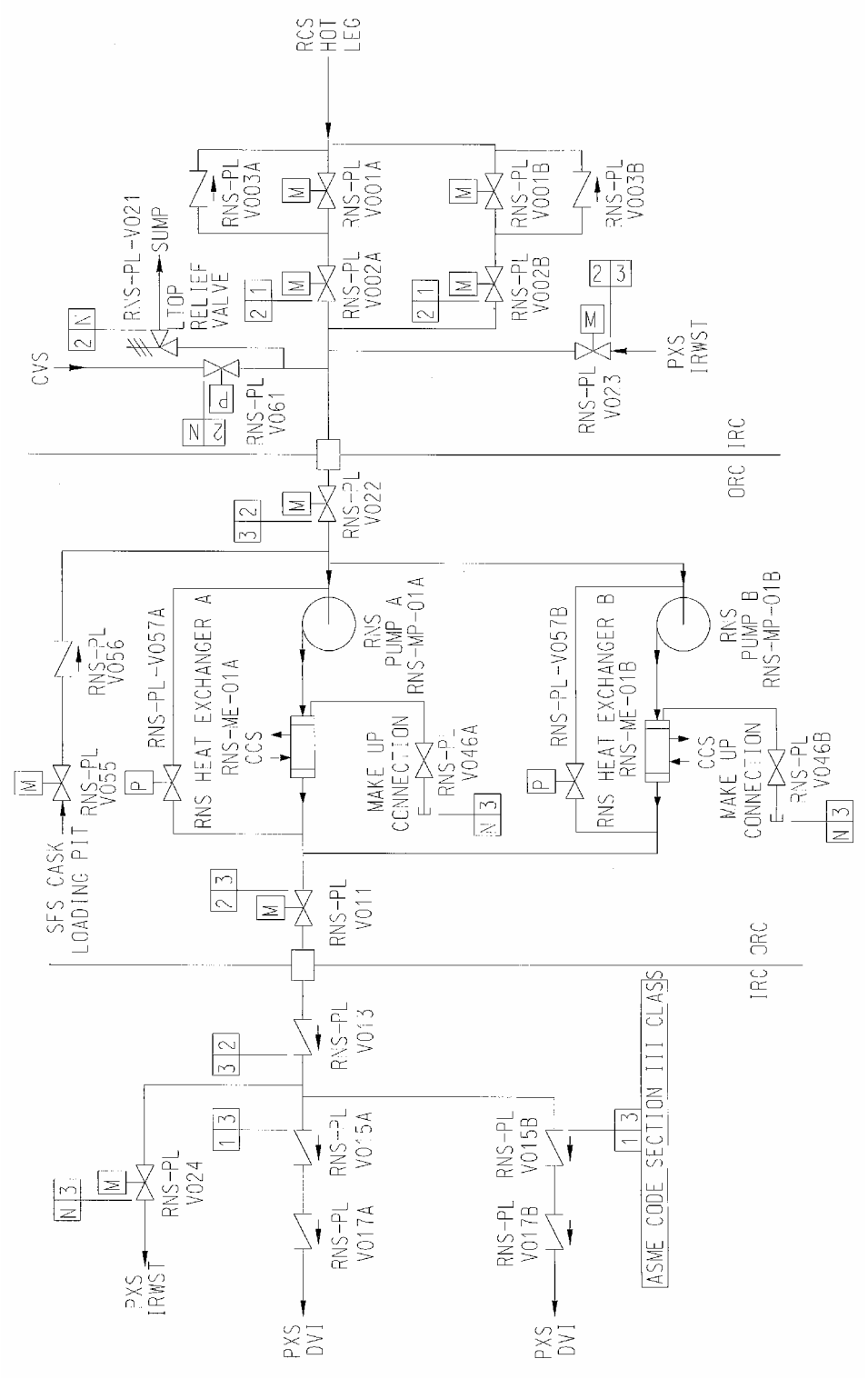

Figure 2.3.6-1
Normal Residual Heat Removal System

Tier 2 Table 5.4-14

Normal Residual Heat Removal System

Description of Change

Revise Table 5.4-14 to be consistent with Tier 1 changes.

Technical Justification

This change reflects recent refinements in supporting calculations for the associated design documents.

Regulatory Consequence

This change is to be consistent with Tier 1 changes.

Change Markup

Tier 2 Table 5.4-14 Revise the normal residual heat removal portion of Table 5.4-14 as follows:

Table 5.4-14

NORMAL RESIDUAL HEAT REMOVAL SYSTEM COMPONENT DATA

Normal RHR Pumps (per pump)	
Minimum Flow Required for Shutdown Cooling (gpm)	1400~~1425~~
Minimum Flow Required for Low Pressure Makeup (gpm)	1100
Design Flow (gpm)	1500
Design Head (ft)	360