Subcompartment Analyses for US-APWR Design Confirmation

Non-Proprietary Version

October 2009

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Revision History

Revision	Page	Description
0	All	Original issue
1		This revision is intended to incorporate the responses to RAIs from the NRC and to add the benchmark analyses for the verification of GOTHIC
	3-1 to 3-2	Optimized the sentence - The description which identifies the break location in Section 3.1 is revised because sensitivity analyses of the break locations are performed and the break location is not precisely known. Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-6 - Revised the description in Section 3.1.2
	3-2	Editorial and Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 - The description “The following subcompartments are not evaluated since the vent paths are large compared to the line sizes. These conditions, in perspective to the compartment structural capacity, will not result in significant differential pressure between the subcompartment and the containment atmosphere.” is deleted and the remaining description is divided into Section 3.1.5 “Pressurizer Spray Valve Room”, Section 3.1.6 “Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room” and Section 3.1.7 “Letdown Heat Exchanger Room” in rev.1. Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 - Revised the description in Section 3.1.5
	3-4 to 3-5	Editorial, Corrected data, Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 and -5 and Added the data of other subcompartments - Revised Table 3-1
	4-3 to 4-7	Clarified the model option - Revised the description and Tables in Section 4.1.2
	4-5	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-7 - Deleted the word “basically” in Section 4.2 line 1

	4-5 to 4-6	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-7 and -11 - Revised the description in Section 4.2
	5-1 to 6-63	Changed a composition for clarification - Section 5.0 “Model Sensitivity Studies and Validation for Subcompartment Analyses” in rev.0 is divided into Section 5.0 “Benchmark Analyses” and Section 6.0 “Model Sensitivity Studies” in rev.1.
	5-1 to 5-18	Editorial, Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-3 (the additional benchmark analyses of Byron/Braidwood station with GOTHIC and TMD (a double-ended hot leg (DEHL) break and a double-ended cold leg (DECL) break in Loop compartments and a double ended spray line break in Upper pressurizer Cubicle)) and Removed unnecessary Tables and Figures (for example, Figure 5.3-2 in rev.0 was removed because the information of this Figure is included in Figure 5.1-8 in rev.1.) - Revised the description, Tables and Figures in Section 5.1
	5-19 to 5-29	Technical (the additional benchmark analyses of River Bend station with GOTHIC(ver.7.2a-p5(QA)), GOTHIC(ver.7.0) and THREED because it is insufficient to verify GOTHIC code with the model MHI selected with only analyses of Byron/Braidwood station) - Added the description, Tables and Figures in Section 5.2
	5-30	Concluded of benchmark analyses - Added the Section 5.3 “Benchmark Analyses Conclusion”
	7-1 to 7-336	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-2, -4, -6, -7, -8, -10, -11 and -13 - Revised all Tables and Figures in Section 7.0
	7-1	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 and -6 - Added the description of the postulated break line in Section 7.0 Editorial and Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-8 - Revised the description in Section 7.1.1 Editorial - Moved the description about the node selection for the reactor cavity analysis to section 7.2.1 (b) page 7-3 (The Nodalization sensitivity studies of all subconpartments are added or revised in Section 7.2.1 (b), 7.3.1 (b), 7.4.1 (b), 7.5.1 (b) and 7.6.1 (b))

	7-46	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-8 - Added the Section 7.3.1 (b) “Nodalization sensitivity study”
	7-46 to 7-47	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-10 - Added the description of the modified nodalization diagrams in Section 7.3.1
	7-47 to 7-48	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-7 and -11 - Added the description of the Mass and Energy release evaluation of Feedwater line break in Section 7.3.2 (c)
	7-189 to 7-190	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-10 - Added the description of the modified nodalization diagrams in Section 7.4.1
	7-191	Editorial and Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-13 - Revised the description in 7.4.3 (c)
	7-237 to 7-238	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-13 - Revised Figures (Figures in this report show the peak pressure transient under the revised condition in RAIs)
	7-239 to 7-311	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 and Modified the description - Added the Section 7.5 “Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room”
	7-312 to 7-329	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-4 and Modified the description - Added the Section 7.6 “Letdown Heat Exchanger Room”
	7-330 to 7-336	Reflected RESPONSE TO RAI 111-932 QUESTION NO.: 06.02.01.02-2 and Modified the description - Added the Section 7.7 “Time Step Sensitivity Using Worst Case for Each Subcompartment”
	Others	Other revisions are editorial and the modification of the description.

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ABSTRACT

In support of the US-APWR Design Certification application, this Technical Report (TR) provides subcompartment analyses to confirm that the calculated peak differential pressures during the piping break transients for each subcompartment are less than structural design differential pressures. Also, it describes the adequacy and conservatism of the subcompartment analysis methodology.

In the introductory chapter, the fundamental information on this Technical Report is presented. In the second and the third chapter, the design basis and the design features for the subcompartment analyses are elaborated. In the chapter four, the methodology used for analysis is discussed including the vent flow behavior models and the short-term mass and energy release model. In the chapter five, benchmark analyses are discussed, and in the chapter six, model sensitivity studies are discussed. In the chapter seven, the plant analysis results are shown.

Table of Contents

List of Tables
List of Figures
List of Acronyms
1.0 Introduction 1-1
2.0 Design Basis 2-1
3.0 Plant Design Features 3-1
3.1 Description of Each Subcompartment 3-1
3.1.1 Reactor Cavity 3-1
3.1.2 Steam Generator Subcompartment 3-1
3.1.3 Pressurizer Subcompartment 3-1
3.1.4 Pressurizer Surge Piping Room 3-2
3.1.5 Pressurizer Spray Valve Room 3-2
3.1.6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room 3-2
3.1.7 Letdown Heat Exchanger Room 3-2
3.2 Break Assumption of High-Energy Lines 3-3
4.0 Analytical Methodology 4-1
4.1 Subcompartment Analyses 4-1
4.1.1 GOTHIC Computer Code Overview 4-1
4.1.2 GOTHIC Application to Subcompartment analyses 4-3
4.2 Short term mass and energy release 4-5
5.0 Benchmark Analyses 5-1
5.1 Benchmark with TMD code in BYRON/BRAIDWOOD (B/B) Stations 5-1
5.1.1 Containment Subcompartment Data of B/B Stations 5-1
5.1.2 Loop compartments 5-1
5.1.3 Upper Pressurizer Cubicle 5-2
5.1.4 Steamline pipe chases 5-2
5.1.5 Conclusions 5-2
5.2 Benchmark with Approved GOTHIC 7.0 Code and THREED Code in River Bend Station Unit 1 5-19
5.2.1 The Benchmark 6-inch RWCU Line Break 5-19
5.2.2 The Updated 4-inch RWCU Line Break 5-19
5.2.3 The Updated 6-inch RWCU Line Break 5-19
5.2.4 Conclusion 5-20
5.3 Benchmark Analyses Conclusion 5-30
6.0 Model Sensitivity Studies 6-1
6.1 Parameters and Models Sensitivity Studies 6-1
6.1.1 BATTELLE-FRANKFURT Test Facility 6-1
6.1.2 Comparisons of BFMC test with GOTHIC Calculation and Sensitivity Studies 6-2
6.1.3 HDR FULL SCALE CONTAINMENT EXPERIMENTS 6-5
6.1.4 Comparisons of HDR test with GOTHIC Calculation and Sensitivity Studies 6-7
6.1.5 Conclusions 6-7
6.2 Time Step Size Sensitivity Studies 6-53
6.2.1 Result for Test BFMC D-16 6-53

6.2.2 Result for Test HDR V21.1 6-53
6.2.3 Conclusions 6-53
7.0 Plant Subcompartment Analyses 7-1
7.1 General Analytical Method 7-1
7.1.1 Nodalization Schemes 7-1
7.1.2 Initial Conditions 7-1
7.1.3 Vent Loss Coefficient 7-1
7.2 Reactor Cavity 7-3
7.2.1 Modeling and nodalization sensitivity study 7-3
7.2.2 Short term mass and energy release data 7-3
7.2.3 Calculated pressure responses 7-4
7.3 Steam Generator Subcompartment 7-46
7.3.1 Modeling and nodalization sensitivity study 7-46
7.3.2 Short term mass and energy release data 7-47
7.3.3 Calculated pressure responses 7-49
7.4 Pressurizer Subcompartment 7-189
7.4.1 Modeling and nodalization sensitivity study 7-189
7.4.2 Short term mass and energy release data 7-190
7.4.3 Calculated pressure responses 7-191
7.5 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve room 7-239
7.5.1 Modeling and nodalization sensitivity study 7-239
7.5.2 Short term mass and energy release data 7-239
7.5.3 Calculated pressure responses 7-240
7.6 Letdown Heat Exchanger Room 7-312
7.6.1 Modeling and nodalization sensitivity study 7-312
7.6.2 Short term mass and energy release data 7-312
7.6.3 Calculated pressure responses 7-313
7.7 Time Step Sensitivity Analyses Using Worst Case for Each Subcompartment 7-330
8.0 Conclusions 8-1
9.0 References 9-1

List of Tables

Table 3-1 Subcompartment and Postulated Break Line condition 3-4
Table 4-1 Summary of MHI Selected GOTHIC Options for Subcompartment Analysis .4-6
Table 4-2 Correspondence between NRC requirements and MHI Selected GOTHIC Model 4-7
Table 5.1-1 GOTHIC Subcompartment Nodal Description for B/B Stations.....5-3
Table 5.1-2 GOTHIC Subcompartment flow path description for B/B Stations.....5-4
Table 5.1-3 DEHL mass and energy release rates to the loop compartment for GOTHIC 5-6
Table 5.1-4 DECL mass and energy release rates to the loop compartment for GOTHIC 5-7
Table 5.1-5 Spray line mass and energy release rates to the upper pressurizer cubicle (B/B FSAR) 5-8
Table 5.1-6 Steam line mass and energy release rates (B/B FSAR) 5-9
Table 5.2-1 Subcompartment Nodal Description for Benchmark 6-Inch RWCU Line Break Analysis.....5-21
Table 5.2-2 Subcompartment Flow Path Description for Benchmark 6-Inch RWCU Line Break Analysis 5-21
Table 5.2-3 Heat Sink Description for Benchmark 6-Inch RWCU Line Break Analysis 5-22
Table 5.2-4 Mass and Energy Release Rates for Benchmark 6-Inch RWCU Line Break Analysis.....5-23
Table 5.2-5 Comparison of Peak Pressure Results for Benchmark 6-Inch RWCU Line Break Analysis 5-23
Table 5.2-6 Subcompartment Nodal Description for Updated 4-inch and 6-inch Line Break Analysis 5-24
Table 5.2-7 Subcompartment Flow Path Description for Updated 4-inch and 6-inch Line Break Analysis 5-24
Table 5.2-8 Mass and Energy Release Rate for Updated 4-Inch RWCU Line Break Analysis.....5-25
Table 5.2-9 Comparison of Peak Differential Pressure Results for Updated 4-Inch RWCU Line Break Analysis.....5-25
Table 5.2-10 Mass and Energy Release Rates for Updated 6-Inch RWCU Line Break Analysis.....5-26
Table 5.2-11 Comparison of Peak Differential Pressure Results for Updated 6-Inch

RWCU Line Break Analysis 5-26
Table 6.1-1 GOTHIC Volumes for BFMC Test D-16 6-8
Table 6.1-2 Analysis cases of SS EACH RUN OPTION 6-9
Table 7.2-1 Reactor cavity compartment Nodal Description 7-5
Table 7.2-2 Reactor cavity Compartment Vent Path Description 7-17
Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses 7-27
Table 7.3-1 Steam Generator Compartment Nodal Description 7-50
Table 7.3-2 Steam Generator Compartment Vent Path Description 7-60
Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses 7-72
Table 7.3-4 Steam Generator Compartment Nodal Description 7-81
Table 7.3-5 Steam Generator Compartment Vent Path Description 7-91
Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses 7-103
Table 7.3-7 Steam Generator Compartment Nodal Description 7-112
Table 7.3-8 Steam Generator Compartment Vent Path Description 7-122
Table 7.3-9 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses 7-134
Table 7.3-10 Steam Generator Compartment Nodal Description 7-135
Table 7.3-11 Steam Generator Compartment Vent Path Description 7-145
Table 7.3-12 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses 7-158
Table 7.3-13 Calculations for Mass and Energy Release from Feedwater Pump Side 7-159
Table 7.3-14 Mass and Energy Release Rates from Feedwater Pump Side 7-159
Table 7.3-15 Calculations for Mass and Energy Release from SG Side 7-160
Table 7.3-16 Mass and Energy Release Rates from SG Side.....7-160
Table 7.4-1 Pressurizer compartment Nodal Description.....7-192
Table 7.4-2 Pressurizer Compartment Vent Path Description 7-195
Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses 7-199
Table 7.4-4 Pressurizer compartment Nodal description.....7-205
Table 7.4-5 Pressurizer Compartment Vent Path Description 7-209
Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses 7-213

Table 7.4-7 Pressurizer compartment Nodal Description (nodalization sensitivity study) 7-221
Table 7.4-8 Pressurizer compartment Vent path description (nodalization sensitivity study) 7-222
Table 7.4-9 Pressurizer compartment Nodal Description (nodalization sensitivity study) 7-223
Table 7.4-10 Pressurizer compartment Vent Path Description (nodalization sensitivity study) 7-224
Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-242
Table 7.5-2 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-251
Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-254
Table 7.5-4 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-261
Table 7.5-5 Mass and Release Rates 7-264
Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-273
Table 7.5-7 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-280
Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-283
Table 7.5-9 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description 7-292
Table 7.5-10 Mass and Release Rates.....7-295
Table 7.6-1 Letdown Heat Exchanger Room Nodal Description 7-314
Table 7.6-2 Letdown Heat Exchanger Room Nodal Description 7-316
Table 7.6-3 Mass and Release Rates 7-317
Table 7.7-1 time step selection for subcompartment analysis.....7-330

List of Figures

Figure 5.1-1 Containment Subcompartment Nodalization Diagram (B/B FSAR) 5-10
Figure 5.1-2 Loop compartment pressure transient for worst case break compartment (element 3) having a DEHL break by GOTHIC 5-11
Figure 5.1-3 Upper compartment pressure transient for worst case break compartment (element 3) having a DEHL break by GOTHIC 5-12
Figure 5.1-4 Loop compartment pressure transient for worst case break compartment (element 3) having a DECL break by GOTHIC 5-13
Figure 5.1-5 Upper compartment pressure transient for worst case break compartment (element 3) having a DECL break by GOTHIC 5-14
Figure 5.1-6 Upper pressurizer cubicle pressure transient for spray line break 5-15
Figure 5.1-7 Upper compartment pressure transient for spray line break (element 28) 5-16
Figure 5.1-8 Steamline compartment and upper compartment pressure transient for steamline break (element 25) by GOTHIC 5-17
Figure 5.1-9 Steamline compartment and upper compartment pressure transient for steamline break (element 26) by GOTHIC 5-18
Figure 5.2-1 Containment Subcompartment Nodalization Diagram for Benchmark 6-Inch RWCU Line Break Analysis 5-27
Figure 5.2-2 Containment Subcompartment Nodalization Diagram for Updated 4-Inch and 6-Inch RWCU Line Break Analysis 5-28
Figure 5.2-3 Comparison of Peak Transient Results of Updated 6-Inch RWCU Line Break Analysis 5-29
Figure 6.1-1 Cutaway View of Interior Rooms in BFMC 6-10
Figure 6.1-2 Room Configuration; BFMC Test D-16. 6-11
Figure 6.1-3 Break Flow for BFMC Test D-16 6-12
Figure 6.1-4 Break Enthalpy for BFMC Test D-16 6-12
Figure 6.1-5 GOTHIC Model; BFMC Test D-16. 6-13
Figure 6.1-6 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Vent Loss Coefficient 6-14
Figure 6.1-7 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Vent Loss Coefficient 6-15
Figure 6.1-8 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Vent Loss Coefficient 6-16

Figure 6.1-9 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Vent Loss Coefficient 6-17
Figure 6.1-10 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Vent Loss Coefficient 6-18
Figure 6.1-11 Differential Pressure, R4 to R5; BFMC Test D-16 for SS INERTIA....6-19
Figure 6.1-12 Differential Pressure, R4 to R7; BFMC Test D-16 for SS INERTIA 6-20
Figure 6.1-13 Differential Pressure, R4 to R9; BFMC Test D-16 for SS INERTIA 6-21
Figure 6.1-14 Differential Pressure, R5 to R9; BFMC Test D-16 for SS INERTIA 6-22
Figure 6.1-15 Differential Pressure, R7 to R8; BFMC Test D-16 for SS INERTIA 6-23
Figure 6.1-16 Differential Pressure, R4 to R5; BFMC Test D-16 for SS RUN OPTIONS 6-24
Figure 6.1-17 Differential Pressure, R4 to R7; BFMC Test D-16 for SS RUN OPTIONS 6-25
Figure 6.1-18 Differential Pressure, R4 to R9; BFMC Test D-16 for SS RUN OPTIONS 6-26
Figure 6.1-19 Differential Pressure, R5 to R9; BFMC Test D-16 for SS RUN OPTIONS 6-27
Figure 6.1-20 Differential Pressure, R7 to R8; BFMC Test D-16 for SS RUN OPTIONS 6-28
Figure 6.1-21 HDR containment – 0 deg to 180 deg. 6-29
Figure 6.1-22 HDR Containment – 90 deg to 270 deg....6-30
Figure 6.1-23 HDR Room & Zone Numbers and Connections. 6-31
Figure 6.1-24 Break Flow; HDR Test V21.1 6-32
Figure 6.1-25 Break Enthalpy; HDR Test V21.1....6-32
Figure 6.1-26 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Vent Loss coefficient 6-33
Figure 6.1-27 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS Vent Loss coefficient 6-34
Figure 6.1-28 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Vent Loss coefficient 6-35
Figure 6.1-29 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Vent Loss coefficient 6-36
Figure 6.1-30 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Vent Loss coefficient 6-37
Figure 6.1-31 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS INERTIA....6-38

Figure 6.1-32 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS INERTIA 6-39
Figure 6.1-33 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS INERTIA 6-40
Figure 6.1-34 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS INERTIA 6-41
Figure 6.1-35 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS INERTIA 6-42
Figure 6.1-36 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS RUN OPTIONS 6-43
Figure 6.1-37 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS RUN OPTIONS 6-44
Figure 6.1-38 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS RUN OPTIONS 6-45
Figure 6.1-39 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS RUN OPTIONS 6-46
Figure 6.1-40 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS RUN OPTIONS 6-47
Figure 6.1-41 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS EACH RUN OPTION 6-48
Figure 6.1-42 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS EACH RUN OPTION 6-49
Figure 6.1-43 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS EACH RUN OPTION 6-50
Figure 6.1-44 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS EACH RUN OPTION 6-51
Figure 6.1-45 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS EACH RUN OPTION 6-52
Figure 6.2-1 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Time Step Size 6-54
Figure 6.2-2 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Time Step Size 6-55
Figure 6.2-3 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Time Step Size 6-56
Figure 6.2-4 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Time Step Size 6-57
Figure 6.2-5 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Time Step Size 6-58
Figure 6.2-6 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Time Step Size 6-59
Figure 6.2-7 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS

Time Step Size 6-60
Figure 6.2-8 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Time Step Size 6-61
Figure 6.2-9 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Time Step Size 6-62
Figure 6.2-10 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Time Step Size 6-63
Figure 7.2-1 Nodalization scheme for the reactor cavity 7-36
Figure 7.2-2 Nodalization scheme for the reactor cavity 7-37
Figure 7.2-3 Nodalization diagram for the reactor cavity in the A-loop direction 7-38
Figure 7.2-4 Nodalization diagram for the reactor cavity in the B-loop direction 7-39
Figure 7.2-5 Nodalization diagram for the reactor cavity in the C-loop direction 7-40
Figure 7.2-6 Nodalization diagram for the reactor cavity in the D-loop direction 7-41
Figure 7.2-7 Nodalization diagram for the reactor cavity 7-42
Figure 7.2-8 Short term mass and energy release data for the reactor cavity (1/2) .. 7-43
Figure 7.2-9 Short term mass and energy release data for the reactor cavity (2/2) .. 7-44
Figure 7.2-10 Pressure transient for peak pressure node(V50) in the reactor cavity ... 7-45
Figure 7.3-1 Nodalization Scheme for Steam Generator Compartment Analysis (1/10) 7-161
Figure 7.3-2 Nodalization Scheme for Steam Generator Compartment Analysis (2/10) 7-162
Figure 7.3-3 Nodalization Scheme for Steam Generator Compartment Analysis (3/10) 7-163
Figure 7.3-4 Nodalization Scheme for Steam Generator Compartment Analysis (4/10) 7-164
Figure 7.3-5 Nodalization Scheme for Steam Generator Compartment Analysis (5/10) 7-165
Figure 7.3-6 Nodalization Scheme for Steam Generator Compartment Analysis (6/10) 7-166
Figure 7.3-7 Nodalization Scheme for Steam Generator Compartment Analysis (7/10) 7-167
Figure 7.3-8 Nodalization Scheme for Steam Generator Compartment Analysis (8/10) 7-168
Figure 7.3-9 Nodalization Scheme for Steam Generator Compartment Analysis (9/10) 7-169
Figure 7.3-10 Nodalization Scheme for Steam Generator Compartment Analysis

(10/10).....7-170
Figure 7.3-11 Nodalization Diagram for Steam Generator Compartment analysis(1/2) 7-171
Figure 7.3-12 Nodalization Diagram for Steam Generator Compartment Analysis(2/2) 7-172
Figure 7.3-13 Short term Mass and Energy Release Data for SG Compartment....7-173
Figure 7.3-14 Short term Mass and Energy Release Data for SG Compartment....7-174
Figure 7.3-15 Pressure Transient at Peak Pressure Node in SG Compartment.....7-175
Figure 7.3-16 Short Term Mass and Energy Release Data for SG Compartment...7-176
Figure 7.3-17 Short Term Mass and Energy Release Data for SG compartment....7-177
Figure 7.3-18 Pressure Transient Peak Pressure Node in SG Compartment.....7-178
Figure 7.3-19 Short Term Mass and Energy Release Data for SG Compartment...7-179
Figure 7.3-20 Short Term Mass and Energy Release Data for SG Compartment...7-180
Figure 7.3-21 Short Term Mass and Energy Release Data for SG Compartment...7-181
Figure 7.3-22 Short Term Mass and Energy Release Data for SG Compartment...7-182
Figure 7.3-23 Pressure Transient at Peak Pressure Node in SG Compartment (Feedwater line break, Full power operating condition).....7-183
Figure 7.3-24 Short Term Mass and Energy Release Data for SG Compartment...7-184
Figure 7.3-25 Short Term Mass and Energy Release Data for SG Compartment...7-185
Figure 7.3-26 Short Term Mass and Energy Release Data for SG Compartment...7-186
Figure 7.3-27 Short Term Mass and Energy Release Data for SG Compartment...7-187
Figure 7.3-28 Pressure Transient at Peak Pressure Node in SG Compartment (Feedwater line break, just after hot shutdown condition).....7-188
Figure 7.4-1 Nodalization Scheme for Pressurizer Compartment Analysis(1/3).....7-225
Figure 7.4-2 Nodalization Scheme for Pressurizer Compartment Analysis (2/3).....7-226
Figure 7.4-3 Nodalization Scheme for Pressurizer Compartment Analysis (3/3).....7-227
Figure 7.4-4 Nodalization Diagram for Pressurizer Compartment Analysis.....7-228
Figure 7.4-5 Nodalization Scheme for Pressurizer Compartment Sensitivity Analysis about Nodalization 7-229
Figure 7.4-6 Nodalization Scheme for Pressurizer Compartment Sensitivity Analysis about Nodalization 7-230
Figure 7.4-7 Nodalization Diagram for Pressurizer Compartment Sensitivity Analysis 7-231
Figure 7.4-8 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (B Loop cold leg side) (1/2) 7-232
Figure 7.4-9 Short Term Mass and Energy Release Data for Pressurizer Compartment

Pressurizer Spray Line Break (B Loop cold leg side) (2/2) 7-232
Figure 7.4-10 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (C Loop cold leg side) (1/2) 7-233
Figure 7.4-11 Short term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (C Loop cold leg side) (2/2).....7-233
Figure 7.4-12 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (pressurizer side) (1/2) .7-234
Figure 7.4-13 Short term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (pressurizer side) (2/2) 7-234
Figure 7.4-14 Pressure Transient at Peak Pressure Node (V27) in Pressurizer Compartment (Pressurizer spray line break) 7-235
Figure 7.4-15 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Relief Line Break (1/2) 7-235
Figure 7.4-16 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Relief Line Break (2/2) 7-236
Figure 7.4-17 Pressure Transient at Peak Pressure Node (V39) in Pressurizer Compartment (Pressurizer relief line break) 7-236
Figure 7.4-18 Result of Nodalization Sensitivity Analysis(PRZ Spray Line Break)..7-237
Figure 7.4-19 Result of Nodalization Sensitivity Analysis(PRZ Relief Line Break)..7-238
Figure 7.5-1 Nodalization Scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve room.....7-304
Figure 7.5-2 Nodalization scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room 7-305
Figure 7.5-3 Nodalization scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room 7-306
Figure 7.5-4 Nodalization Dagram of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room 7-307
Figure 7.5-5 Short Term Mass and Energy Release Data for Charging Line (4B) Break (1/2).....7-308
Figure 7.5-6 Short Term Mass and Energy Release Data for Charging Line (4B) Break (2/2).....7-308
Figure 7.5-7 Pressure Transient at Peak Pressure Node (V6) for Charging Line (4B) Break in Regenerative Heat Exchanger Room Nodal Description.....7-309
Figure 7.5-8 Pressure Transient at Peak Pressure Node (V25) for Charging Line (4B) Break in Regenerative Heat Exchanger Valve Room Nodal Description

.....7-309
Figure 7.5-9 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (1/2).....7-310
Figure 7.5-10 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (2/2).....7-310
Figure 7.5-11 Pressure Transient at Peak Pressure Node (V20) for Letdown Line (3B) Break in Regenerative Heat Exchanger Room Nodal Description..... 7-311
Figure 7.5-12 Pressure Transient at Peak Pressure Node (V25) for Letdown Line (3B) Break in Regenerative Heat Exchanger Valve Room Nodal Description 7-311
Figure 7.6-1 Nodalization Scheme of Letdown Heat Exchanger Room.....7-326
Figure 7.6-2 Nodalization Diagram of Letdown Heat Exchanger Room 7-327
Figure 7.6-3 Short Term Mass and Energy Release Data for Letdown Line (3B) break (1/2).....7-328
Figure 7.6-4 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (2/2).....7-328
Figure 7.6-5 Pressure Transient at Peak Pressure Node (V2) for Letdown Line (3B) Break in Letdown Heat Exchanger Room.....7-329
Figure 7.7-1 Time Step Sensitivity Analysis Result for Reactor Cavity Compartment 7-331
Figure 7.7-2 Time Step Sensitivity Analysis Result for SG Compartment 7-332
Figure 7.7-3 Time Step Sensitivity Analysis Result for Pressurizer Compartment 7-333
Figure 7.7-4 Result of Sensitivity Analysis on Time Step for Regenerative Heat Exchanger Room 7-334
Figure 7.7-5 Result of Sensitivity Analysis on Time Step for Regenerative Heat Exchanger Valve Room 7-335
Figure 7.7-6 Result of Sensitivity Analysis on Time Step for Letdown heat Exchanger Room 7-336

List of Acronyms

APWR Advanced Pressurized Water Reactor
B/B BYRON / BRAIDWOOD Stations
BE Best estimated
BFMC Battelle-Frankfurt Model Containment
CLG Cold Leg
CSNI-OECD Committee for the Safety of Nuclear Installations of the Organization for Economic Development and Cooperation
CVCS Chemical and Volume Control System
DCD US-APWR design control document
DVI Direct Vessel Injection
EPRI Electric Power Research Institute
FSAR Final Safety Analysis Report
HDR Heissdampfreactor
HLG Hot Leg
HELBs High Energy Line Breaks
LBB Leak Before Break
LOCA Loss Of Coolant Accident
MCP Main Coolant Pipe
MHI Mitsubishi Heavy Industries, Ltd
NAI Numerical Applications, Inc
NRC U.S. Nuclear Regulatory Commission
PWR Pressurized Water Reactor
PZR Pressurizer
RCP Reactor Coolant Pump
RCS Reactor Coolant System
RHR Residual Heat Removal
SG Steam Generator
SRP Standard Review Plan
TR Technical Report

1.0 Introduction

The subcompartment differential pressure analyses are performed to confirm the design differential pressure chosen for each subcompartment. A short-term pressure pulse would exist inside a containment subcompartment following a pipe rupture within the subcompartment. This pressure transient produces a pressure differential across the walls of the subcompartment which reaches a maximum value generally within the first few seconds after blowdown begins. The magnitude of the peak value is primarily function of the blowdown mass and energy release rates, subcompartment volume, vent area, and vent flow behavior (key parameters). The GOTHIC(7.2a-p5(QA)) code is used for the transient differential pressure response analysis.

This Technical report (TR) provides the US-APWR subcompartment pressure analyses which demonstrate that the calculated peak differential pressures during the piping break transients for each subcompartment are less than structural design differential pressures. Also it describes the adequacy of the code option, the analysis conditions and the above mentioned key parameters, and conservatism of the analysis models through the model sensitivity.

2.0 Design Basis

To comply with GDC 4 and 50 of 10 CFR 50, Appendix A, subcompartments within the containment are designed to withstand the transient differential pressures due to a postulated pipe break.

The US-APWR has the following subcompartments inside the containment:

- Reactor cavity
- Steam generator (SG) subcompartments
- Pressurizer subcompartment
- Pressurizer surge piping room (Underneath the Pressurizer subcompartment, EL. 25 ft.- 3 in.)
- Pressurizer spray valve room (South side of the Pressurizer subcompartment, EL. 50 ft.- 2 in.)
- Regenerative heat exchanger room and Regenerative Heat Exchanger Valve Room (Northwest side of the SG subcompartment, EL. 50 ft.- 2 in.)
- Letdown heat exchanger room (South side of the Pressurizer subcompartment, EL. 25 ft.- 3 in.)

Some piping segments of the US-APWR are classified as leak-before-break (LBB). For these components, it is not necessary to analyze the dynamic effects of a postulated pipe rupture, including pipe whip, jet impingement loads, and subcompartment pressurization. Chapter 3, Subsection 3.6.3 of the US-APWR design control document (DCD), discusses LBB criteria and evaluation procedures. The pressurizer surge piping room does not need to be analyzed because the pressurizer surge line is classified as LBB.

Analyses are performed to conservatively calculate the peak differential pressure following the most severe specified pipe rupture for each subcompartment. The calculated value is then compared to a differential pressure representing the structural capability of the subcompartment walls to show that the peak differential pressure is within structural capabilities. These analyses are performed using a detailed evaluation model employing the GOTHIC computer program (Ref. 1).

Section 3.0 describes the basis for the selection of the postulated pipe breaks that are analyzed in detail for each subcompartment. This selection process factors in the LBB assessments described in Chapter 3, Subsection 3.6.3 of the US-APWR DCD. The evaluation of these postulated subcompartment piping breaks is described in Section 3.2.

The US-APWR design does not rely on piping restraints to limit the break area of potential high-energy piping failures within these subcompartments.

3.0 Plant Design Features

The plant design features of the subcompartments, component, equipment, vent locations and high energy line locations used in the GOTHIC model are provided below.

Vent paths such as openings in the walls, floor gratings, etc are considered in the subcompartment analysis. Vent paths created by the postulated pipe rupture as a result of insulation collapsing are not credited in the analysis.

3.1 Description of Each Subcompartment

3.1.1 Reactor Cavity

The reactor cavity consists of a cylindrical narrow gap between the reactor vessel and the concrete primary shield wall, the space under the reactor vessel, and the reactor cavity access tunnel. The area under the reactor vessel is designed to hold molten core debris in case of a Severe Accident. In the reactor cavity, four Direct Vessel Injection (DVI) lines are connected to the reactor vessel. The reactor vessel nozzles are considered as the termination points for the high-energy piping. Subcompartment analysis is required for the reactor cavity, as a 4-inch line break therein is assumed.

The reactor cavity has multiple vent paths which are capable of discharging the accident pressure surge to the containment atmosphere. The pressure generated from the pipe break was assumed to discharge to the SG subcompartment through the reactor coolant pipe sleeves (EL. 40 ft. - 4 in.) which penetrate the primary shield wall. The SG subcompartment is open to the containment atmosphere. The pressure is also vented to the bottom chamber through the gap between the reactor vessel and the primary shield wall, through the pressurizer surge piping room (EL. 25 ft. - 3 in.), then through the two vertical vent openings and the personnel access. The Pressurizer surge piping room is open to the SG subcompartment.

3.1.2 Steam Generator Subcompartment

Steam Generator (SG) subcompartments are composed of the secondary shield walls surrounding the primary loops from the SGs, and are open at the top of the subcompartment. The subcompartment walls are designed to protect equipment in other parts of the containment from postulated pipe ruptures inside the subcompartment. High-energy lines are routed in the subcompartment, such as the branch lines from the reactor coolant piping, feedwater piping, and steam generator blowdown lines. The subcompartment analysis is performed under the condition of a 10-inch diameter break of the RHR pump inlet line, an 8-inch diameter break of the RHR pump outlet line connected to the reactor coolant piping and a 16-inch diameter break of the feedwater line because the pressure and temperature conditions and break locations of other lines are covered by these cases

The subcompartment has an entrance opening for each quadrant at elevations 25 ft.- 3 in. and 50 ft.-2 in. These entrances and the open top of the subcompartment are assumed in the analysis as the vent openings to mitigate the accident pressure surge caused by the postulated pipe break.

3.1.3 Pressurizer Subcompartment

The pressurizer subcompartment houses the pressurizer and is located inside a

secondary shield wall at elevation 58 ft. - 5 in. The subcompartment analysis is performed under the condition of an 8-inch diameter break of the pressurizer pressure relief line and a 6-inch diameter break of the pressurizer spray line because the pressure and temperature conditions and break locations of other lines are covered by these cases.

While the top of the subcompartment is covered by a concrete ceiling, two personnel access ways are provided for the purpose of maintenance and inspection of the pressurizer relief valve. The discharge pressure from the accident is vented into the containment atmosphere through these openings. An entrance from SG subcompartment is also provided at the bottom of the Pressurizer subcompartment at elevation 58 ft. - 5 in.

3.1.4 Pressurizer Surge Piping Room

The pressurizer surge piping room is located underneath the pressurizer room at elevation 25 ft.- 3 in. Since the LBB is applied for the 16-inch pressurizer surge line, a postulated pipe break is not considered in this subcompartment.

3.1.5 Pressurizer Spray Valve Room

Pressurizer spray valve rooms are located outside the secondary shield wall, and adjacent to the pressurizer subcompartment at elevation 50 ft. - 2 in. These rooms are provided to access and inspect pressurizer spray control valves. There is no postulated pipe break location in the pressurizer spray valve room, because the terminal ends of pressurizer spray line are not located in the room and the pressurizer spray line in the room is designed such that the maximum stress range and the cumulative usage factor as calculated by the ASME Code, Section III does not exceeds the allowable in accordance with the criteria described in subsection DCD 3.6.2.1.1.2.

3.1.6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room

(Northwest of SG Subcompartment, EL.50’-2”)

The regenerative heat exchanger room and the regenerative heat exchanger valve room are located outside secondary shield walls, at elevation 50 ft. - 2 in. High-energy lines associated with the Chemical and Volume Control System (CVCS), considered as the postulated pipe break, are routed through the room. The subcompartment analysis is performed under the condition of a 4-inch diameter break of the charging line and a 3-inch diameter break of the letdown line. The personnel access to the room and additional openings are the vent paths to the containment atmosphere.

3.1.7 Letdown Heat Exchanger Room

(South Side of Pressurizer Subcompartment, EL.25’-3”)

The letdown heat exchanger room is located outside secondary shield walls, at elevation 25 ft. - 3 in. A high-energy line routed in the room, associated with CVCS, is considered as the postulated pipe break. The subcompartment analysis is performed under the condition of a 4-inch diameter break of the letdown line. The personnel access and additional vent openings are the vent paths to the containment atmosphere.

3.2 Break Assumption of High-Energy Lines

A list of high-energy lines within each subcompartment was developed. For each subcompartment, the high-energy lines excluded from pipe rupture considerations for compartment pressurization by the LBB criterion are noted. The remaining lines are grouped according to the pressure and temperature of the fluid in the line. Certain lines may be excluded from further analysis on a qualitative basis (i.e., the mass and energy of the lines located in the subcompartment are compared to eliminate those lines that clearly do not challenge the bounding failure). A detailed pipe break simulation is performed for the largest diameter line in each group in each subcompartment from the lines that remain under consideration. Table 3-1 provides information about the pipes considered for evaluation of the each subcompartment.

Table 3-1 Subcompartment and Postulated Break Line condition
(Sheet 1 of 2)

Subcompartment	Break Line	Line Spec	Press. psi	Temp. °F	fluid	LBB / Other considerations
Steam Generator Subcompartment	Main Coolant Pipe-Hot Leg	31"ID-RCS-2501	2235	617.0	Subcooled Water	Leak
	Main Coolant Pipe-Cold Leg	31"ID-RCS-2501	2235	550.6	Subcooled Water	Leak
	Main Coolant Pipe-Cross-over Leg	31"ID-RCS-2501	2235	550.6	Subcooled Water	Leak
	Pressurizer Surge Line	16"-RCS-2501	2235	653.0	Saturated Water	Leak
	Accumulator Injection Line	14"-RCS-2501	2235	550.6	Subcooled Water	Leak
		14"-SIS-2501	2235	550.6	Subcooled Water	Leak
		14"-SIS-2511	2235	120.0	Subcooled Water	Leak
	RHR Pump Inlet Line	10"-RCS-2501	2235	617.0	Subcooled Water	Break
	RHR Pump Outlet Line	8"-RCS-2501	2235	550.6	Subcooled Water	Break
	Direct Vessel Injection Line	4"-RCS-2501	2235	550.6	Subcooled Water	Break
	SI High Head Injection Line	4"-RCS-2501	2235	617.0	Subcooled Water	Break
	SI Emergency Letdown Line	2"-RCS-2501	2235	617.0	Subcooled Water	Break
	Pressurizer Spray Line	6"-RCS-2501	2235	550.6	Subcooled Water	Break
	Loop Drain Line	2"-RCS-2501	2235	550.6	Subcooled Water	Break
	Charging Line	4"-RC-2501	2235	550.6	Subcooled Water	Break
		4"-CVS-2501	2235	550.6	Subcooled Water	Break
		4"-CVS-2561	2235	464.0	Subcooled Water	Break
	Letdown Line	3"-RCS-2501	2235	550.6	Subcooled Water	Break
		3"-CVS-2501	2235	550.6	Subcooled Water	Break
		3"-CVS-2561	2235	550.6	Subcooled Water	Break
		3"-CVS-0601	350	269.1	Subcooled Water	Break
		4"-CVS-0601	350	115.0	Subcooled Water	Break
	RCP Seal Water Injection Line	1-1/2"-CVS-2501	2600	130.0	Subcooled Water	Break
		1-1/2"-CVS-2511	2600	130.0	Subcooled Water	Break
	Feedwater Line	16"-FWS-1525	1185	568.0	Saturated Water	Break
	Main Steam Line	32"-MSS-1532	907	535.0	Steam	Leak
	SG Blowdown Line	3"-SGS-1532	907	535.0	Steam	Break
		4"-SGS-1532	907	535.0	Steam	Break

Table 3-1 Subcompartment and Postulated Break Line condition
(Sheet 2 of 2)

Subcompartment	Break Line	Line Spec	Press. psi	Temp. °F	fluid	LBB / Other considerations
Subcompartment under Pressurizer Subcompartment	Pressurizer Surge Line	16”-RCS-2501	2235	653.0	Saturated Water	Leak
Pressurizer Subcompartment	Pressurizer Spray Line	6”-RCS-2501	2235	550.6	Subcooled Water	Break
	Pressurizer Auxiliary Spray Line	3”-RCS-2501	2235	550.6	Subcooled Water	Break
	Pressurizer Safety Valve Inlet Line	6”-RCS-2501	2235	653.0	Steam	Break
	Pressurizer Safety Depressurization Line	8”-RCS-2501	2235	653.0	Steam	Break
		6”-RCS-2501	2235	653.0	Steam	Break
		4”-RCS-2501	2235	653.0	Steam	Break
Pressurizer spray valve room	Pressurizer Spray Line	6”-RCS-2501	2235	550.6	Subcooled Water	No Break
Reactor Cavity	Direct Vessel Injection Line	4”-RCS-2501	2235	554.6	Subcooled Water	Break
Regenerative heat exchanger room	Charging Line	4”-CVS-2511	2600	130.0	Subcooled Water	Break
		4”-CVS-2561	2266	554.6	Subcooled Water	Break
	Letdown Line	3”-CVS-2561	2266	554.6	Subcooled Water	Break
Regenerative heat exchanger valve room	Charging Line	4”-CVS-2561	2366	554.6	Subcooled Water	Break
	Letdown Line	3”-CVS-2561	2266	380	Subcooled Water	Break
		3”-CVS-0601	350	380	Subcooled Water	Break
Letdown heat exchanger room	Letdown Line	4”-CVS-0601	350	380	Subcooled Water	Break

4.0 Analytical Methodology

4.1 Subcompartment Analyses

4.1.1 GOTHIC Computer Code Overview

The GOTHIC computer code is used for the subcompartment differential pressure analysis (Ref. 1).

GOTHIC is a general purpose thermal-hydraulics code for performing design, licensing, safety and operating analysis of nuclear power plant containments and other confinement buildings. GOTHIC was developed for the Electric Power Research Institute (EPRI) by Numerical Applications, Inc. (NAI) (Ref. 1). A summary description of GOTHIC capabilities is given below. More detailed descriptions of the code user options, models and qualification are documented in References 1 through 3.

GOTHIC solves the conservation equations for mass, momentum and energy for multi-component, multi-phase flow in lumped parameter and/or multi-dimensional geometries. The phase balance equations are coupled by mechanistic models for interface mass, energy and momentum transfer that cover the entire flow regime from bubbly flow to film/drop flow, as well as single phase flows. The interface models allow for the possibility of thermal non-equilibrium between phases and unequal phase velocities, including countercurrent flow. GOTHIC includes full treatment of the momentum transport terms in multi-dimensional models, with optional models for turbulent shear and turbulent mass and energy diffusion. Other phenomena include models for commonly available safety equipment, heat transfer to structures, hydrogen burn and isotope transport.

Conservation equations are solved for up to three primary fields and three secondary fields. The primary fields are steam/gas mixture, continuous liquid and liquid droplet; the secondary fields are mist, ice, and liquid components. For the primary fields, GOTHIC calculates the relative velocities between the separate but interacting fluid fields, including the effects of two-phase slip on pressure drop. GOTHIC also calculates heat transfer between phases, and between surfaces and the fluid. Reduced equation sets are solved for the secondary fields by the application of appropriate assumptions as described in the reference documents.

The three primary fluid fields may be in thermal non equilibrium in the same computational cell. For example, saturated steam may exist in the presence of a superheated pool and subcooled drops. The solver can model steam, water and non-condensing gases over the full range of temperature and pressure conditions anticipated for the design basis accidents.

The steam/gas mixture is referred to as the vapor phase and is comprised of steam and, optionally, up to eight different non-condensing gases. The non-condensing gases available in the model are defined by the user. Mass balances are solved for each component of the steam/gas mixture, thereby providing the volume fraction of each type of gas in the mixture. The mist field is included to track very small water droplets that form when the atmosphere becomes super saturated with steam. The liquid component field allows particles or liquid globules to be tracked in the liquid phase.

The principal element of a model is a control volume, which is used to model the space

within a building or subsystem that is occupied by fluid. The fluid may include non-condensing gases, steam, drops or liquid water. GOTHIC features a flexible nodal scheme that allows computational volumes to be treated as lumped parameter (single node) or one-, two- or three-dimensional, or any combination of these within a single model.

Solid structures are referred to in GOTHIC as thermal conductors. Thermal conductors are modeled as one-dimensional slabs for which heat transfer occurs between the fluid and the conductor surfaces and, within a conductor, perpendicular to the surfaces. The one-dimensional thermal conductors can be combined into a conductor assembly to model two-dimensional conduction.

GOTHIC includes a general model for heat transfer between thermal conductors and the steam/gas mixture or the liquid. There is no direct heat transfer between thermal conductors and liquid droplets. Thermal conductors can exchange heat by thermal radiation. Any number of conductors can be assigned to a volume.

Fluid boundary conditions allow the user to specify mass sources and sinks and energy sources and sinks for control volumes. Thermal boundary conditions applied through a heat transfer option on a thermal conductor surface can be used as energy sources and sinks for solid structures.

There are four features in GOTHIC for modeling hydraulic connections, as follows:

(a) Flow paths
(b) Network models
(c) Cell interface connections in subdivided volumes
(d) 3D connectors for subdivided volumes

Flow paths model hydraulic connections between any two computational cells, including lumped parameter volumes and cells in subdivided volumes. Flow paths are also used to connect boundary conditions to computational cells where mass, momentum and energy can be added or removed. A separate set of momentum equations (one for each phase) is solved for each flow path.

Network nodes and links are available specifically for modeling building ventilation or piping systems. These types of hydraulic connections can include multiple branches between connected volumes. Network nodes are assigned to the branch points.

Adjacent cells within a subdivided volume communicate across the cell interface, based on the characteristics of the hydraulic connection. 3D flow connectors define the hydraulic connection across cell interfaces that are common to two subdivided volumes.

GOTHIC includes an extensive set of models for operating equipment. These items, referred to collectively as components, include pumps and fans, valves and doors, heat exchangers and fan coolers, vacuum breakers, spray nozzles, coolers and heaters, volumetric fans, hydrogen recombiners, igniters, pressure relief valves.

Initial conditions allow the user to specify the state of the fluid and solid structures within the modeled region at the start of a transient. These include the initial temperature and composition of the atmosphere, the location and temperature of liquid pools, the location

and amount of liquid components, and the temperatures of solid structures within the building.

Additional resources available to expand the realm of situations that can be modeled by GOTHIC include functions, control variables, trips and material properties.

Using a conservative model prescription, GOTHIC predicts the time dependent subcompartment differential pressure.

4.1.2 GOTHIC Application to Subcompartment analyses

The GOTHIC revision applied to subcompartment analysis for US-APWR is 7.2a-p5(QA). The NRC has approved the application of GOTHIC (Ver.7.0) for use in subcompartment analyses for River Bend (Ref. 19).

The GOTHIC code validation and model benchmarks (Ref. 3) establish the appropriateness of the GOTHIC code and models to predict the containment response to LOCA and SLB/FLB postulated accidents. In addition to qualifying GOTHIC with a comprehensive set of standard problems to test code models, the code has also been used to predict test results from several facilities (for example, the Battelle-Frankfurt Test facility, the Hanford Containment System Test Facility, the Marviken Full Scale Facility, the Carolina Virginia Tube Reactor (CVTR) Facility, and the Heiss Dampf Reactor Facility (HDR)).

4.1.2.1 GOTHIC Model Description

The GOTHIC computer code allows the user the flexibility of specifying different modeling options. In the sections below, the setting of the modeling options and user input for key parameters are described with reference to the regulatory guidelines for subcompartment analysis.

4.1.2.2 Requirements of Subcompartment Analysis Codes (Ref. 5 and 9)

NRC requires that subcompartment analysis codes used for calculating transient pressure gradients incorporate the following features:
(1) Thermodynamic capabilities for mixture of air, steam, and water
(2) Homogeneous equilibrium of control-volume constituents
(3) Complete water entrainment for the determination of mixture flows (100% water entrainment)
(4) Subsonic flow calculations based on the incompressible momentum equation, including terms for:
  (a) Temporal change of momentum
  (b) Pressure loss from friction, area change, turning losses and
  (c) Compressibility effects (variation of upstream density).
(5) Vent-flow based on selection of minimum flow calculated from subsonic calculation and critical-flow calculation
(6) Critical-flow calculation based on the HEM correlation or the frictionless Moody correlation with a 0.6 multiplier

4.1.2.3 MHI method of subcompartment analysis

MHI's method of subcompartment analysis complies with NRC requirements (Ref. 5 and Ref. 9). The summary for each of the selected options in the MHI's method of

subcompartment analysis is shown in Table 4-1 and discussed in detail below. NRC's requirements of subcompartment analysis codes are satisfied with these options configuration and the correspondence between the NRC's requirements and the MHI's selected model for GOTHIC are shown in Table 4-2.

4.1.2.3.1. Vapor Phase, Liquid and Drop Phases

4.1.2.3.2. Force Equilibrium

4.1.2.3.3. Blowdown Droplet size and Drop-liquid Conversion

4.1.2.3.4. Drop Breakup

4.1.2.3.5. Compressibility

4.1.2.3.6. Critical Flow

4.1.2.3.7. Revaporization fraction

4.1.2.3.8. Mist model

4.1.2.3.9. Fog Model

4.1.2.3.10. Minimum Heat Transfer Coefficient

4.1.2.3.11. Reference Pressure

4.1.2.3.12. Forced Entrainment Drop Diameter

4.1.2.3.13. Vapor Phase Head Correction.

4.1.2.3.14. Kinetic Energy

4.2 Short term mass and energy release

Mass and energy releases used for postulated primary piping breaks are calculated by the computer code M-RELAP5 (Ref. 6).

The computer code and volume noding of the piping system are similar to those for the small-break LOCA analyses. A flow multiplier of 1.0 on the applicable choked flow correlation is used.

The mass and energy release used for postulated secondary system piping breaks is calculated with the simplified approach that assumes choked-flow at constant upstream temperature and pressure conditions. The choked-flow model is used for M-RELAP5 choked flow model (Ref. 6) is used with a flow multiplier of 1.0.

Initial plant operating conditions assumed for mass and energy releases are the same as those described in Subsections 6.2.1.3 and 6.2.1.4 of DCD (Ref. 8) for postulated primary and secondary piping breaks, respectively.

Table 4-1 Summary of MHI Selected GOTHIC Options for Subcompartment Analysis

(a) RUN Option		
GOTHIC OPTION	Default Setting	MHI's Selection
Vapor Phase	INCLUDE	
Liquid Phase	INCLUDE	
Drop Phase	INCLUDE	
Force Equilibrium	IGNORE	
Drop-Liq. Conversion	INCLUDE	
Revaporization Fraction	DEFAULT	
Maximum Mist Density	DEFAULT	
Drop Diam. from Mist	DEFAULT	
Fog Model	OFF	
Minimum Heat Transfer Coefficient	0	
Reference Pressure	IGNORE	
Forced Ent. Drop diam.	DEFAULT	
Vapor Phase Head Correction.	INCLUDE	
Kinetic Energy	IGNORE	
(b) Path Option		
Critical Flow Model	OFF	
Compressibility	OFF(NO)	
Drop Breakup Model	OFF	
(c) Boundary Condition Option		
Blowdown Droplet size	NONE	

Table 4-2 Correspondence between NRC requirements and MHI Selected GOTHIC Model

#	NRC requirements	MHI Selected GOTHIC Model
1	Thermodynamic capabilities of mixture of air, steam, and water	
2	Homogeneous equilibrium of control-volume constituents	
3	Complete water entrainment for the determination of flow mixtures (100% water entrainment)	
4	Subsonic flow calculations based on the incompressible momentum equation, including terms for: (a) temporal change of momentum (b) pressure loss from friction, area change, turning losses and (c) compressibility effects (variation of upstream density)	
5	Vent-flow chocks based on selection of minimum flow calculated from subsonic calculation and critical-flow calculation	
6	Critical-flow calculation based on the HEM correlation or the frictionless Moody correlation with a 0.6 multiplier	

5.0 Benchmark Analyses

5.1 Benchmark with TMD code in BYRON/BRAIDWOOD (B/B) Stations

The TMD code has been reviewed by the NRC and approved for use in subcompartment differential pressure analyses (Ref. 13).

Using the same input data described in the subcompartment analysis of FSAR chapter 6 for BYRON/BRAIDWOOD (B/B) Stations (Ref. 11), subcompartment analyses were completed with GOTHIC using the MHI selected option described in Table 4-1 for subcompartment analysis. The analyses are performed for the loop compartments, upper pressurizer cubicle, and steamline pipe chase. Comparisons of the results from the TMD and GOTHIC codes are presented in this section.

5.1.1 Containment Subcompartment Data of B/B Stations

The data for subcompartment nodalization, volume, initial conditions and flowpath for the each analysis are same.

The containment subcompartment nodalization diagram for B/B Stations is presented in Figure 5.1-1.

The subcompartment volume description and initial conditions for GOTHIC code are listed in Table 5.1-1. The air pressure of 14.05 psia and the steam pressure of 0.85 psia for TMD are converted to a total pressure of 14.9 psia and relative humidity of 50 (%) for GOTHIC.

The subcompartment flow path descriptive information for GOTHIC is presented in Table 5.1-2. Fwd./Rev. loss coeff., Inertia length, Hyd. Diam., Flow area and Friction length for GOTHIC correspond to K-Fac, Length, Hydr. D., Flow A and Equip. A, respectively, for TMD. The Relative roughness (ε/D) for GOTHIC is converted from the friction factor (F-Fac) according to the formulation for the friction factor in turbulent flow at high Reynolds number from GOTHIC technical manual.

$$1/\sqrt{(\boldsymbol{F-Fac})} \cong -2\log\left[\frac{\boldsymbol{\varepsilon/D}}{3.7}\right]$$

For F-Fac = 0.022, ε /D is roughly 0.0015.

The option settings used for the GOTHIC analysis are the same as those in Table 4-1.

5.1.2 Loop compartments

Two postulated breaks, a double-ended cold leg (DECL) guillotine rupture and a double-ended hot leg (DEHL) guillotine rupture, maximize mass and energy release to the loop compartment. A DEHL break in volume 3 yielded the maximum pressure differential for the loop compartment. Also, a DECL break yielded a maximum pressure differential when the break occurred in volume 3. Each of two breaks in volume 3 is considered.

The mass and energy release rates for the DEHL guillotine rupture and the DECL guillotine rupture for GOTHIC code are presented in Table 5.1-3 and Table 5.1-4. The

mass and energy release rates for GOTHIC code are from the TMD data, processed to reduce the numbers data points.

The results of the loop compartments are shown in Figure 5.1-2 to Figure 5.1-5 with comparison to those from TMD and GOTHIC (Base option) respectively. The results of GOTHIC (Base option) are provided by using the default option described in Table 4-1. The trend of GOTHIC pressure transient behaviors reproduces that of TMD well. The pressures are slightly lower than that of TMD but much higher than those from GOTHIC (Base option).

5.1.3 Upper Pressurizer Cubicle

A double-ended spray line break is most severe for the vapor space in the upper pressurizer cubicle. Breaks in 7 and 28 are considered.

The mass and energy release rates for GOTHIC are presented in Table 5.1-5. The mass and energy release rates for GOTHIC code are from the TMD data, processed to reduce the numbers data points.

The results for the upper pressurizer cubicle are shown in Figure 5.1-6 and Figure 5.1-7 with comparison to those from TMD and GOTHIC (Base option) respectively. The results of GOTHIC (Base option) are provided by using the default option described in Table 4-1. The trend of GOTHIC pressure transient behaviors reproduces well that of TMD. The pressures are slightly higher than that of TMD and much higher than that of GOTHIC (Base option).

5.1.4 Steamline pipe chases

The steamline double-ended break with flow limiters provides maximum blowdown mass and energy releases to the steamline pipe chases. Breaks in volumes 25 and 26 are considered.

The mass and energy releases for GOTHIC are presented in Table 5.1-6. The mass and energy release rates for GOTHIC code are same as those for TMD code.

The results for the steamline pipe chase are shown in Figure 5.1-8 and Figure 5.1-9 with comparison to those from TMD. From these comparisons, the pressure transient analyses by GOTHIC code reproduce well the pressure responses from TMD.

5.1.5 Conclusions

For a break in the Steamline pipe chases, the pressures from GOTHIC are almost the same as those from TMD. For a break in the loop compartment, the pressures from GOTHIC are slightly lower than those from TMD and much higher than those from GOTHIC (Base option) For a break in the Upper Pressurizer Cubicle, the GOTHIC results are slightly higher than those from TMD and much higher than those from GOTHIC (Base option).

Table 5.1-1 GOTHIC Subcompartment Nodal Description for B/B Stations

Volume #	Description	Volume (ft^3)	Temp. (F)	Total pressure (psia)	Relative Humidity (%)
1	1 Vol	36152.	120.	14.9	50.
2	2 Vol	33294.	120.	14.9	50.
3	3 Vol	35011.	120.	14.9	50.
4	4 Vol	41024.	120.	14.9	50.
5	5 Vol	38625.	120.	14.9	50.
6	6 Vol	36251.	120.	14.9	50.
7	7 Vol	2254200.	120.	14.9	50.
8	8 Vol	9983.	120.	14.9	50.
9	9 Vol	3742.	120.	14.9	50.
10	10 Vol	4159.	120.	14.9	50.
11	11 Vol	15677.	120.	14.9	50.
12	12 Vol	20743.	120.	14.9	50.
13	13 Vol	9914.	120.	14.9	50.
14	14 Vol	3515.	120.	14.9	50.
15	15 Vol	5435.	120.	14.9	50.
16	16 Vol	25159.	120.	14.9	50.
17	17 Vol	6968.	120.	14.9	50.
18	18 Vol	10232.	120.	14.9	50.
19	19 Vol	39190.	120.	14.9	50.
20	20 Vol	51611.	120.	14.9	50.
21	21 Vol	24844.	120.	14.9	50.
22	22 Vol	6250.	120.	14.9	50.
23	23 Vol	12236.	120.	14.9	50.
24	24 Vol	3145.	120.	14.9	50.
25	25 Vol	11472.	120.	14.9	50.
26	26 Vol	11138.	120.	14.9	50.
27	27 Vol	2838	120.	14.9	50.
28	28 Vol	4993.	120.	14.9	50.

Table 5.1-2 GOTHIC Subcompartment flow path description for B/B Stations

F.P. #	Description	Vol. A	Vol. B	Flow Area (ft2)	Hyd. Diam. (ft)	Inertia Length (ft)	Friction Length (ft)	Relative Roughness	Fwd ./Rev. Loss Coeff.	Comp. Opt.	Critical Flow Model
1	Break	3, 7, 25, 26 or 28	1F	1.	1.	1e-005	0.	0.	0.	OFF	OFF
2	1 - 16	1	16	21.	4 2	8.04	7.31	0.0015	3.653	ON	HEM
3	2 - 1	2	1	572.	11.	40.	40.	0.0015	0.59	ON	HEM
4	3 - 4	3	4	220.	10.	80.	70.	0.0015	5.	ON	HEM
5	4 - 28	4	28	19.4	1 09	9.71	2.	0.0015	1.7	ON	HEM
6	5 - 6	5	6	572.	11.	40.	40.	0.0015	0.59	ON	HEM
7	6 - 1	6	1	578.	15.	52.	53.	0.0015	1.02	ON	HEM
8	7 - 6	7	6	23.2	4.73	85.4	51.51	0.0015	2.53	ON	HEM
9	8 - 15	8	15	133.	10 58	43.	43.	0.0015	1.7	ON	HEM
10	9 - 8	9	8	119.	10.6	27.25	38.5	0.0015	0.258	ON	HEM
11	11 - 10	11	10	187.	11.05	32.53	24.94	0.0015	2.515	ON	HEM
12	12 - 20	12	20	632.4	0.166	12.94	6.95	0.0015	2.35	ON	HEM
13	13 - 12	13	12	182.	12.13	34.11	34.07	0.0015	0.205	ON	HEM
14	14 - 15	14	15	119.	10.6	32.45	26.31	0.0015	2.15	ON	HEM
15	16 - 17	16	17	140.	7 2	42.63	0.3794	0.0015	0.71	ON	HEM
16	17 - 18	17	18	266.5	11.91	17.38	15.43	0.0015	0.333	ON	HEM
17	18 - 19	18	19	140.	7.18	32.42	25.9	0.0015	0.967	ON	HEM
18	19 - 20	19	20	133.	11.32	71.8	56.37	0.0015	1.748	ON	HEM
19	20 - 21	20	21	140.	7 31	47.42	39.7	0.0015	0.829	ON	HEM
20	21 - 22	21	22	70.	3.78	9.38	3.97	0.0015	1.911	ON	HEM
21	22 - 23	22	23	140.	7.18	49.18	42.23	0.0015	0.984	ON	HEM
22	23 - 16	23	16	140.	7 2	33.93	28.17	0.0015	0.97	ON	HEM
23	24 - 18	24	18	17.508	3.68	3.15	2.63	0.0015	3.114	ON	HEM
24	25 - 17	25	17	945.	6 82	8.69	6.82	0.0015	0.876	ON	HEM
25	26 - 22	26	22	841.3	26.1	9.2	8.6	0.0015	0.12	ON	HEM
26	1 - 7	1	7	197.	10.	45.	45.	0.0015	1.84	ON	HEM
27	2 - 7	2	7	186.	10.	60.	60.	0.0015	1.84	ON	HEM
28	3 - 7	3	7	219.	10.	45.	45.	0.0015	1.84	ON	HEM
29	4 - 7	4	7	179.	10.	45.	45.	0.0015	1.84	ON	HEM

Table 5.1-2 GOTHIC Subcompartment flow path description for B/B Stations (cont'd)

F.P. #	Description	Vol. A	Vol. B	Flow Area (ft2)	Hyd. Diam. (ft)	Inertia Length (ft)	Friction Length (ft)	Relative Roughness	Fwd. /Rev. Loss Coeff.	Comp. Opt.	Critical Flow Model
30	5 - 7	5	7	190.5	10.	60.	60.	0.0015	1.84	ON	HEM
31	6 - 7	6	7	199.	10.	45.	45.	0.0015	1.84	ON	HEM
32	7 - 15	7	15	96.4	0.47	1.8	0.047	0.0015	1.85	ON	HEM
33	8 - 7	8	7	90.	0.26	1.22	0.028	0.0015	2.23	ON	HEM
34	9 - 10	9	10	119.	10.6	20.	18.	0.0015	0.258	ON	HEM
35	11 - 7	11	7	332.8	0.23	2.09	0.12	0.0015	1.79	ON	HEM
36	12 - 7	12	7	504.	0.2	2.66	0.23	0.0015	1.89	ON	HEM
37	13 - 7	13	7	176.	0.153	3.35	1.35	0.0015	1.62	ON	HEM
38	14 - 7	14	7	48.	0.133	14.8	3.177	0.0015	1.14	ON	HEM
39	16 - 8	26	8	297.	7.92	23.77	21.16	0.0015	0.374	ON	HEM
40	17 - 9	17	9	114.8	0.11	22.27	20.76	0.0015	2.156	ON	HEM
41	18 - 10	18	10	45.	0.133	1.18	0.59	0.0015	2.234	ON	HEM
42	19 - 11	19	11	473.	0.178	17.08	15.48	0.0015	1.843	ON	HEM
43	21 - 13	21	13	204.	0.133	12.5	6.39	0.0015	2.	ON	HEM
44	25 - 7	25	7	198.	9.21	44.71	35.5	0.0015	1.	ON	HEM
45	26 - 14	26	14	420.9	19.1	15.1	12.84	0.0015	0.272	ON	HEM
46	27 - 7	27	7	82.87	6.19	25.	8.38	0.0015	1.64	ON	HEM
47	28 - 7	28	7	58.2	3.05	20.07	18.7	0.0015	0.7	ON	HEM
48	1 - 7	1	7	23.2	4.73	85.4	51.51	0.0015	2.53	ON	HEM
49	2 - 3	2	3	572.	11.	40.	40.	0.0015	0.59	ON	HEM
50	3 - 7	3	7	23.2	4.73	85.4	51.51	0.0015	2.53	ON	HEM
51	4 - 7	4	7	23.2	4.73	85.4	51.51	0.0015	2.53	ON	HEM
52	5 - 4	5	4	572.	11.	40.	40.	0.0015	0.59	ON	HEM
53	11 - 12	11	12	36.	4.8	33.59	19.07	0.0015	1.273	ON	HEM
54	13 - 14	13	14	119.	10.6	23.	19.5	0.0015	0.25	ON	HEM
55	14 - 22	14	22	7.88	0.133	7.82	3.	0.0015	1.	ON	HEM
56	15 - 23	15	23	139.8	0.133	6.63	1.72	0.0015	1.265	ON	HEM
57	25 - 9	25	9	229.5	12.93	27.04	25.84	0.0015	2.475	ON	HEM
58	26 - 7	26	7	198.	9.21	44.71	35.5	0.0015	1.	ON	HEM

Table 5.1-3 DEHL mass and energy release rates to the loop compartment for GOTHIC

Time(S)	break flow(lbm/s)	break enthalpy(Btu/lbm)
0.00000	10450.31	649.82
0.00251	91702.623	647.58
0.00502	84987.827	645.66
0.05002	82700.645	647.32
0.10005	91697.001	647.19
0.15014	82647.574	644.94
0.20002	80496.815	642.42
0.25022	78591.574	639.26
0.30019	76725.683	636.27
0.35022	75341.372	633.54
0.40024	74071.956	631.23
0.45031	73262.141	629.03
0.50024	72273.965	627.29
0.55614	71625.934	625.62
0.60028	70846.25	624.65
0.65032	70279.762	623.89
0.70037	69655.953	623.29
0.75002	69029.48	622.98
0.80016	68426.399	622.81
0.85015	67811.153	622.75
0.90014	67177.304	622.91
0.95015	66352.609	623.10
1.00009	66067.933	623.46
1.05030	65604.456	623.92
1.10039	65077.242	624.43
1.15005	64460.076	624.94
1.20022	63921.631	625.55
1.25009	63380.655	626.11
1.30021	62089.985	626.67
1.35018	62360.042	627.20
1.40030	61069.305	627.71
1.45011	61327.869	628.20
1.50013	60753.043	628.67
1.55010	60152.311	629.14
1.60414	59500.198	629.59
1.65031	59067.275	630.07
1.70037	58227.768	630.59
1.75010	57570.888	631.14
1.80033	56924.962	631.75
1.85043	56285.021	632.41
1.90025	55632.256	633.10
1.95025	54981.66	633.61
2.00032	54354.119	634.58

Table 5.1-4 DECL mass and energy release rates to the loop compartment for GOTHIC

Time(S)	break flow(bm/s)	break enthalpy(Btu/lbm)
0.00000	10450	558.51
0.00252	65293.389	553.64
0.00501	65350.597	553.40
0.05001	67982.945	554.71
0.10002	101811.95	555.75
0.15005	101811.95	555.75
0.20014	100985.18	555.86
0.25019	101673.22	555.95
0.30012	100209.94	555.91
0.35003	101033.49	556.00
0.40013	99105.29	555.86
0.45011	99074.658	555.98
0.50010	98256.31	556.01
0.55001	97970.536	556.15
0.60016	97034.19	556.26
0.65006	96605.719	556.46
0.70010	95749.445	556.68
0.75005	95014.279	556.95
0.80003	94221.962	557.26
0.85000	93277.468	557.60
0.90012	92237.35	557.98
0.95007	92101.935	558.46
1.00003	91507.811	558.91
1.05006	90810.29	559.39
1.10003	90191.154	559.90
1.15017	89579.39	560.43
1.20007	88514.882	560.97
1.25021	87416.555	561.53
1.30017	86243.959	562.12
1.35011	85068.956	562.71
1.40001	84077.437	563.30
1.45012	83070.233	563.91
1.50011	82513.65	564.52
1.55011	81609.505	565.12
1.60004	80867.656	565.72
1.65019	80095.162	566.26
1.70057	79135.253	566.81
1.75057	78073.107	567.23
1.80000	76871.315	567.57
1.85005	75758.761	567.85
1.93011	74603.534	568.11
1.95016	73533.736	568.37
2.00000	72566.963	568.61

Table 5.1-5 Spray line mass and energy release rates to the upper pressurizer cubicle (B/B FSAR)

Time(S)	break flow(bm/s)	break enthalpy(Btu/lbm)
0.00000	0	0
0.00251	5552.0269	613.73
0.00502	5756.6695	611.71
0.05005	6255.1735	603.74
0.10008	6273.5718	602.47
0.15011	6166.741	602.75
0.20015	6057.0812	603.29
0.25009	6018.4316	603.48
0.30004	5925.2478	604.01
0.35027	5901.4291	604.12
0.40002	5902.6209	604.07
0.45005	5789.4038	604.72
0.50011	5760.3602	604.83
0.55000	5797.0116	604.52
0.60004	5749.2097	604.75
0.65003	5717.6191	604.86
0.70010	5736.6181	604.64
0.75003	5709.468	604.73
0.80003	5685.676	604.79
0.85003	5699.4327	604.60
0.90008	5683.0007	604.62
0.95005	5667.307	604.63
1.00005	5671.7795	604.51
1.05002	5654.238	604.54
1.10009	5657.8617	604.43
1.15011	5642.7925	604.44
1.20005	5642.6635	604.36
1.25004	5632.5971	604.35
1.30036	5624.5751	604.32
1.35009	5616.3063	604.30
1.40025	5605.6208	604.30
1.45004	5599.0362	604.27
1.50036	5588.8967	604.27
1.55034	5579.8754	604.26
1.60010	5570.3163	604.26
1.65004	5567.0531	604.23
1.70008	5558.3218	604.23
1.75012	5560.118	604.15
1.80010	5558.8433	604.11
1.85036	5558.0249	604.06
1.90031	5551.3019	604.05
1.95012	5545.001	604.04
2.00000	5535.8334	604.06

Table 5.1-6 Steam line mass and energy release rates (B/B FSAR)

Time(S)	break flow(bm/s)	break enthalpy(Btu/lbm)
0.0	20140.	193.15
0.187	20140.	193.15
0.1871	14560.	1188.87
1.03	14560.	1188.87
1.031	21980.	895.81
1.480	21980.	895.81
1.481	42560.	583.65
4.0	42560.	583.65

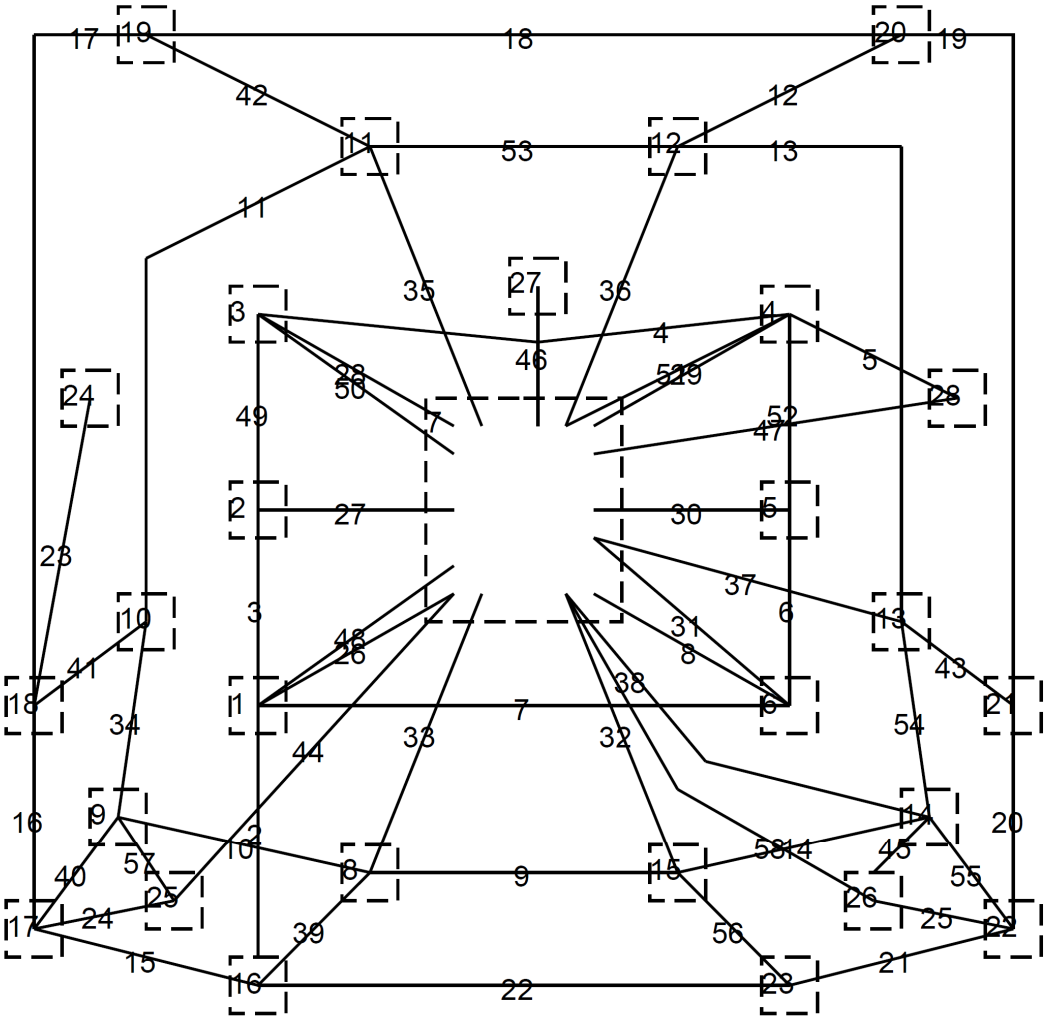

Figure 5.1-1 Containment Subcompartment Nodalization Diagram (B/B FSAR)

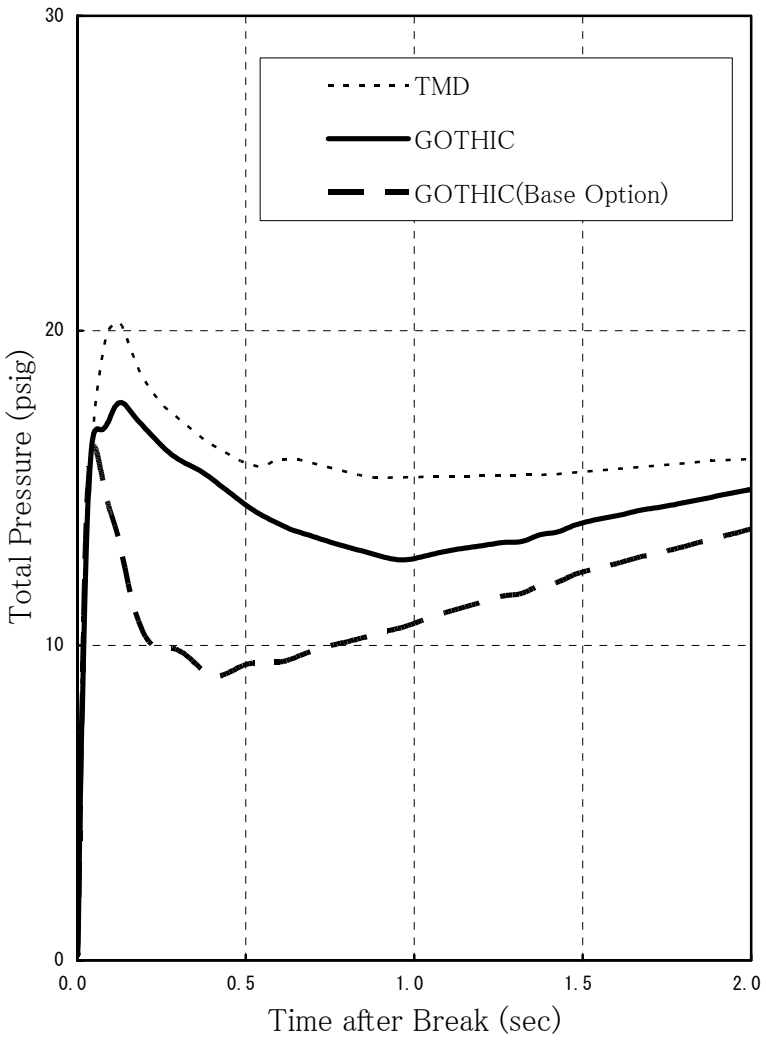

Figure 5.1-2 Loop compartment pressure transient for worst case break compartment (element 3) having a DEHL break by GOTHIC

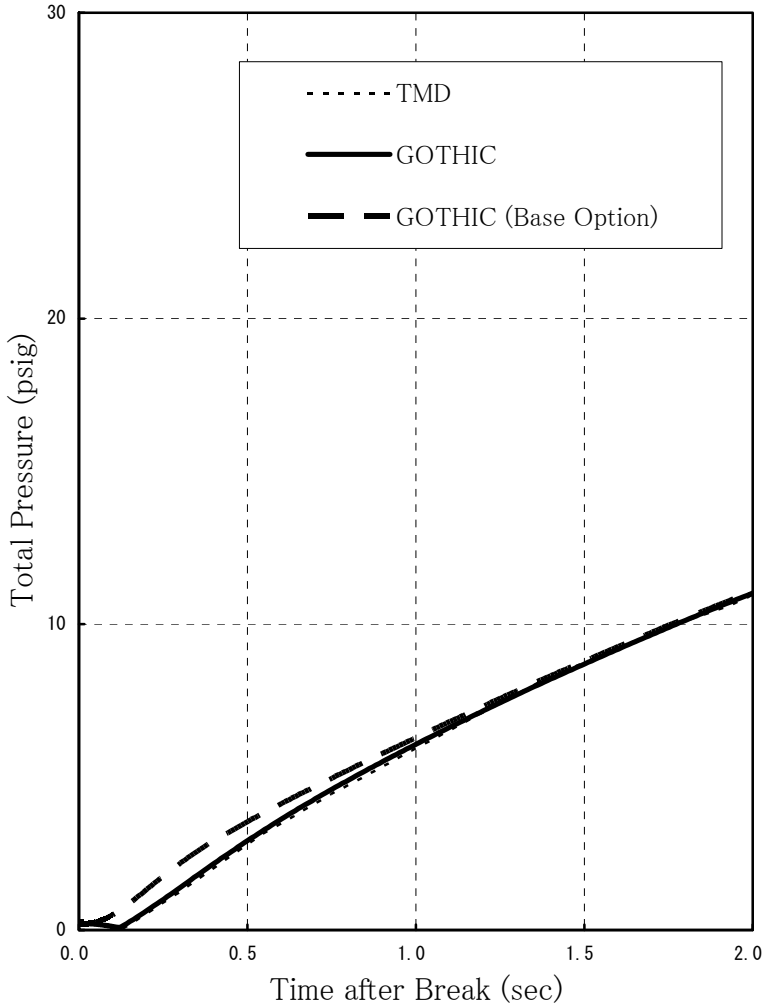

Figure 5.1-3 Upper compartment pressure transient for worst case break compartment (element 3) having a DEHL break by GOTHIC

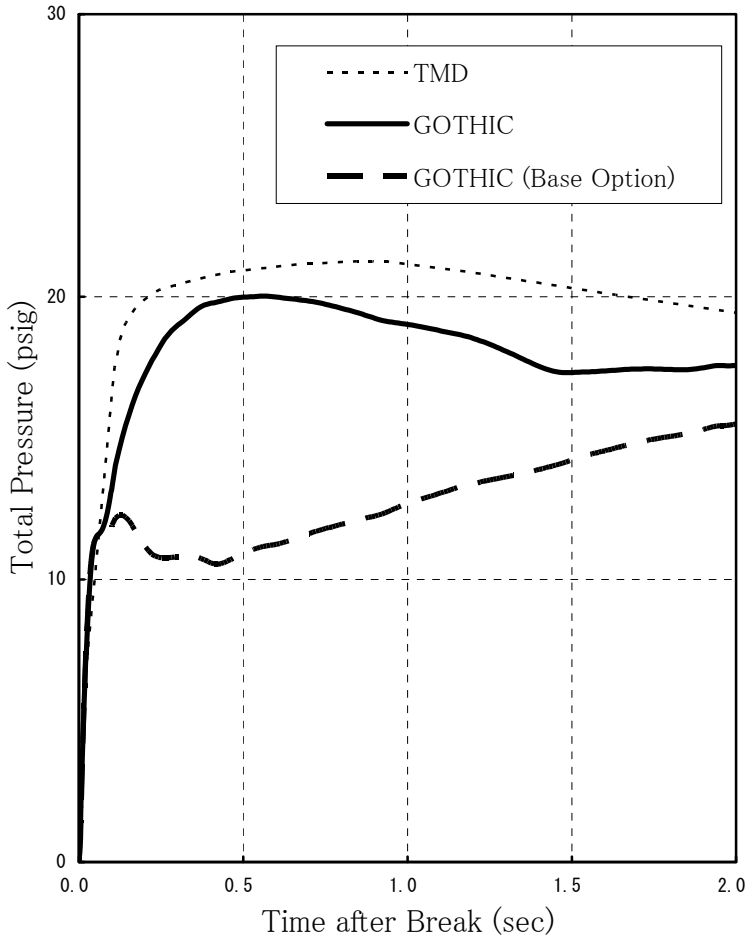

Figure 5.1-4 Loop compartment pressure transient for worst case break compartment (element 3) having a DECL break by GOTHIC

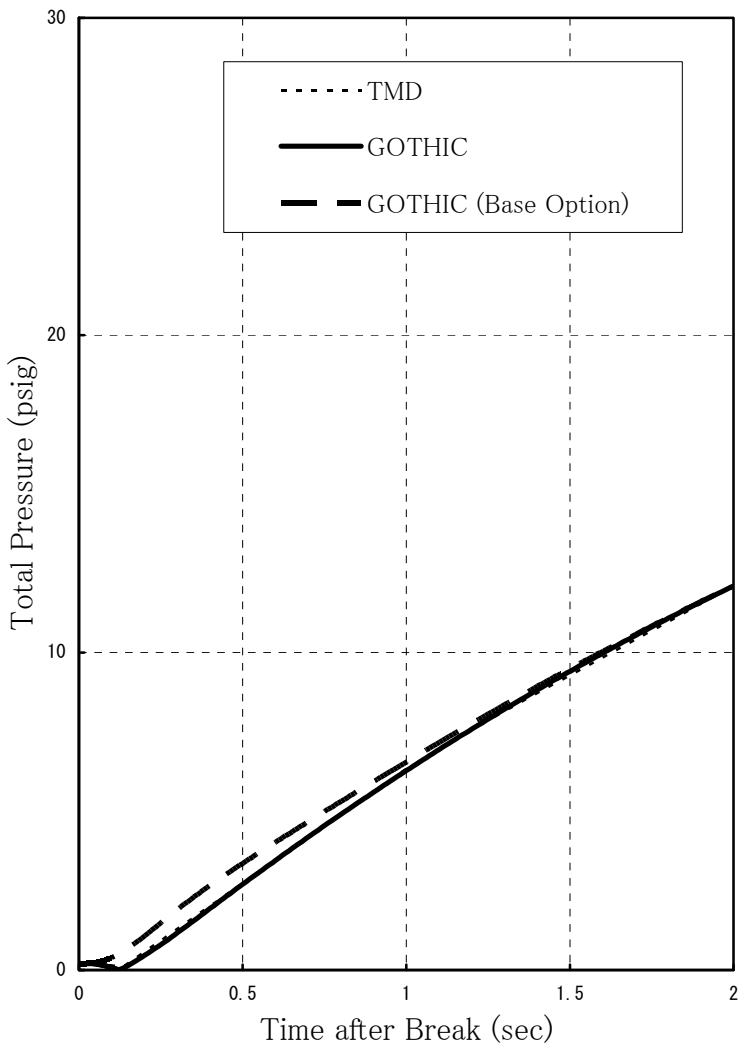

Figure 5.1-5 Upper compartment pressure transient for worst case break compartment (element 3) having a DECL break by GOTHIC

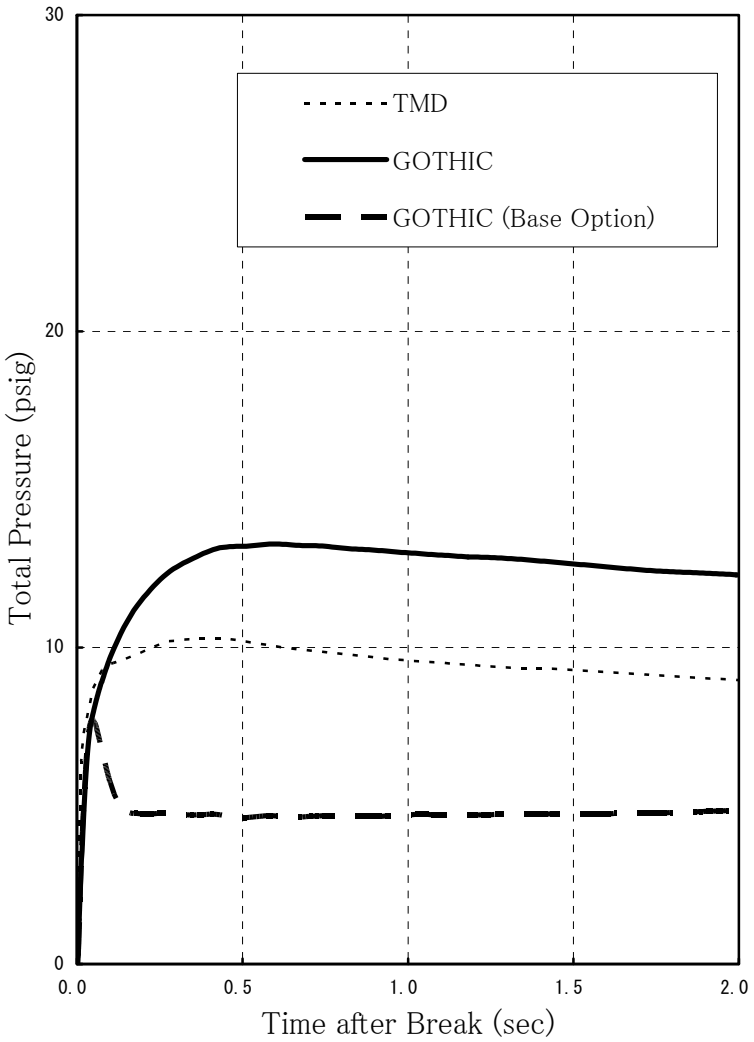

Figure 5.1-6 Upper pressurizer cubicle pressure transient for spray line break (element 28)

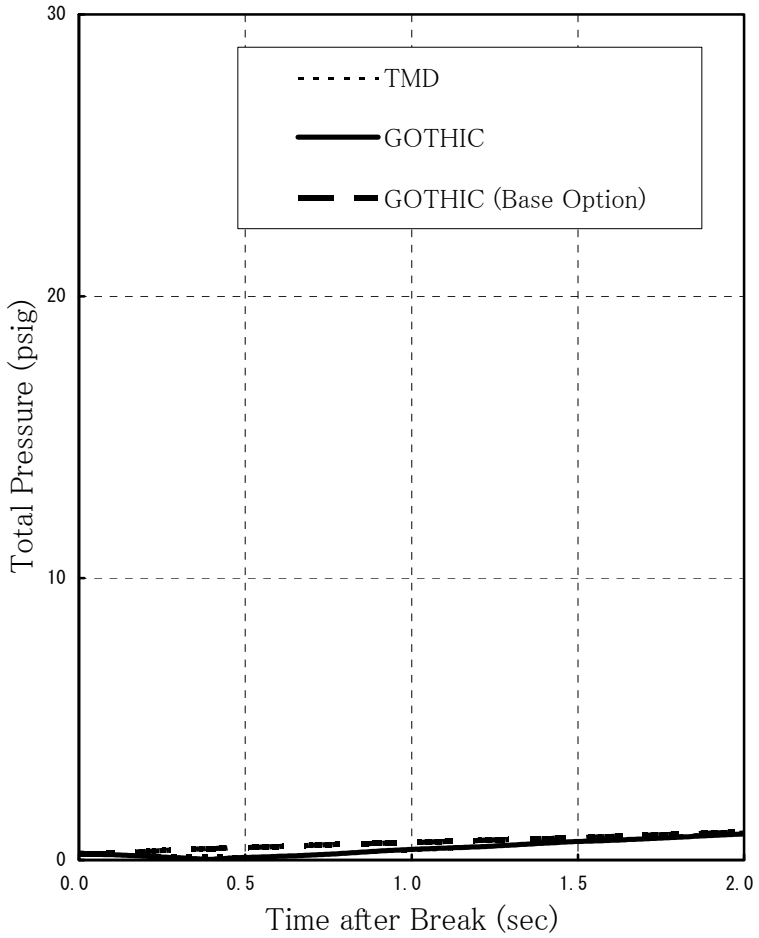

Figure 5.1-7 Upper compartment pressure transient for spray line break (element 28)

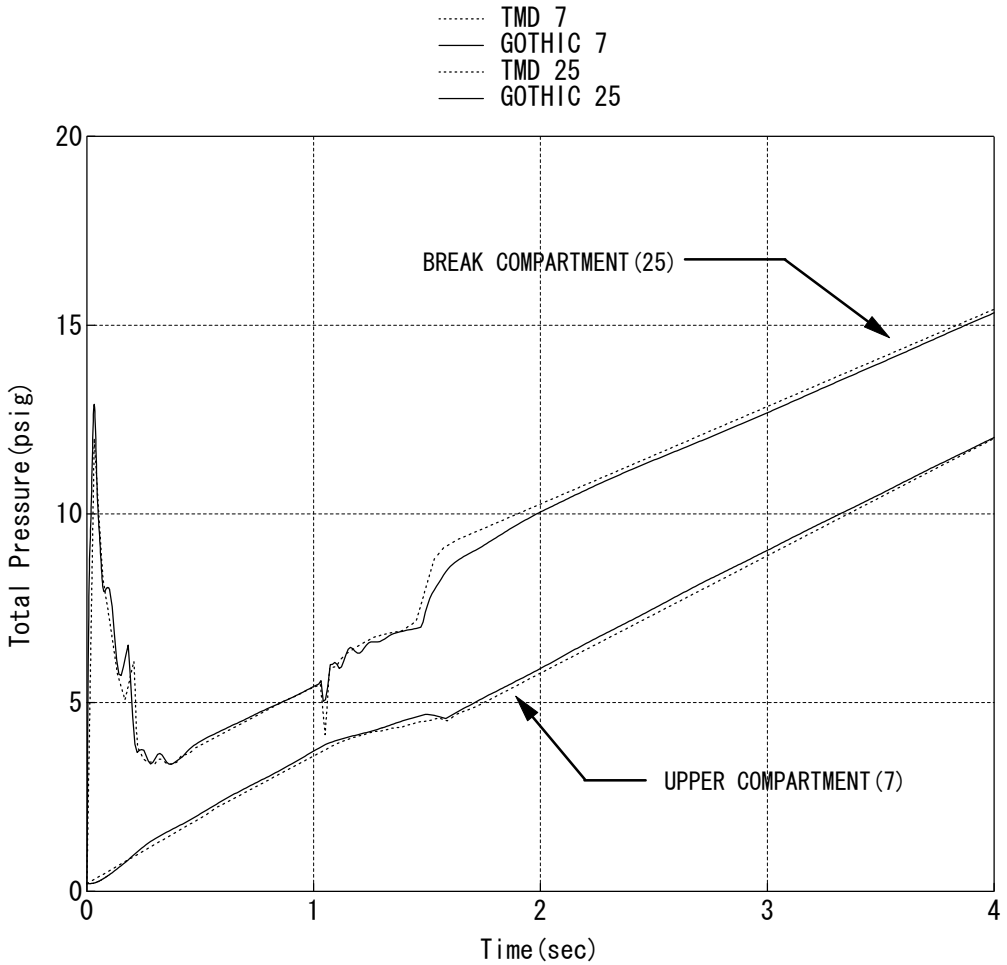

Figure 5.1-8 Steamline compartment and upper compartment pressure transient for steamline break (element 25) by GOTHIC

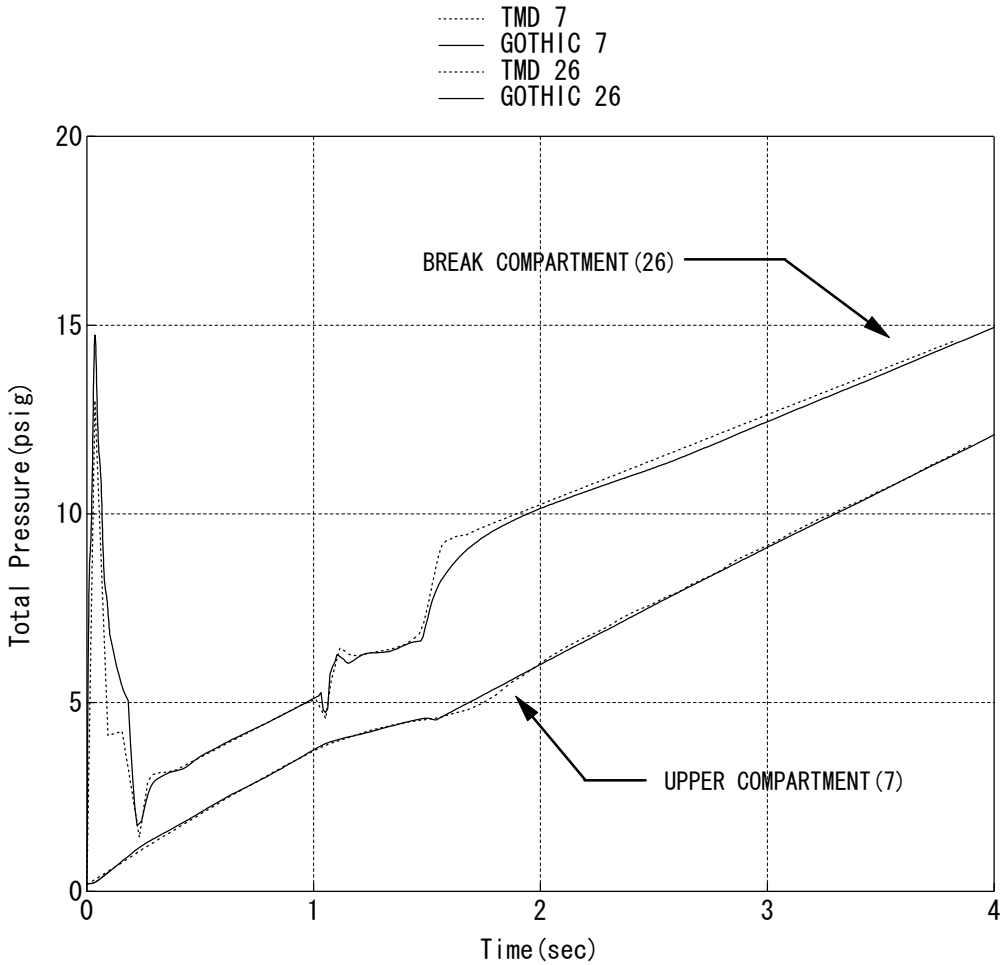

Figure 5.1-9 Steamline compartment and upper compartment pressure transient for steamline break (element 26) by GOTHIC

5.2 Benchmark with Approved GOTHIC 7.0 Code and THREED Code in River Bend Station Unit 1

The subcompartment benchmark analyses results using GOTHIC(7.2a-p5(QA)) for the MHI selected options (described in Table 4.1) are compared with those from GOTHIC 7.0 and THREED.

Entergy Operations, Inc. requested to change the subcompartment code from THREED to GOTHIC 7.0 and to update FSAR section 6.2.1.2 by application and supplemental information (Ref. 14 - Ref.18). NRC approved using GOTHIC 7.0 for HELBs inside and outside containment following the guidance of SRP Section 6.2.1.2, as a result of the review of above application and supplemental information (Ref. 19). To establish the connection between GOTHIC 7.0 and GOTHIC 7.2a-p5, the River Bend analysis is repeated with GOTHIC 7.2a-p5 and compared with 7.0 results.

The benchmark cases are “the Benchmark 6-inch RWCU Line Break”, “the Updated 4-inch RWCU Line Break” and “the Updated 6-inch RWCU Line break” in the RWCU heat exchanger room described in above application and supplemental information.

5.2.1 The Benchmark 6-inch RWCU Line Break

The subcompartment volume description and initial conditions are listed in Table 5.2-1 (Ref. 15, Attachment I A). The subcompartment flowpath descriptive information is listed in Table 5.2-2 (Ref. 15, Attachment I B). The heat sink descriptive information is listed in Table 5.2-3 (Ref. 15, Attachment I C). The containment subcompartment nodalization diagram is presented in Figure 5.2-1. The mass and energy release rates are listed in Table 5.2-4.(Ref.15, Attachment I D) The peak pressure results in GOTHIC(7.2a-p5(QA)) are compared with those from GOTHIC 7.0 and THREED (Ref. 14, Attachment 1, Section 4.2.1), and listed in Table 5.2-5. There is no significant difference in peak pressure results.

5.2.2 The Updated 4-inch RWCU Line Break

The subcompartment volume description and initial conditions are listed in Table 5.2-6 (Ref. 14 Attachment 2, Table 6.2-26). The subcompartment flow path descriptive information is listed in Table 5.2-7 (Ref. 14 Attachment 2, Table 6.2-27). The heat sinks are not modeled. The containment subcompartment nodalization diagram is presented in Figure 5.2-2. The mass and energy release rates are listed in Table 5.2-8 (Ref. 14 Attachment 2, Table 6.2-12). The peak pressure differential result between nod-1 and nod-4 in GOTHIC(7.2a-p5(QA)) is compared with that in GOTHIC 7.0 (Ref. 14 Attachment 2, Table 6.2-26), and listed in Table 5.2-9. There is no significant difference in peak pressure results.

5.2.3 The Updated 6-inch RWCU Line Break

The subcompartment volume description, initial conditions and flow path descriptive information are the same as “the Updated 4-inch RWCU Line Break” (and listed in Table 5.2-6 and Table 5.2-7). The heat sinks are not modeled. The containment subcompartment nodalization diagram is the same as “the Updated 4-inch RWCU Line Break” (and presented in Figure 5.2-2). The mass and energy release rates are listed in Table 5.2-10 (Ref. 14 Attachment 2, Table 6.2-28). The peak pressure differential result between nod-1 and nod-4 in GOTHIC(7.2a-p5(QA)) is compared with that from GOTHIC 7.0 (Ref. 14 Attachment 2, Table 6.2-26), and listed in Table 5.2-11. The pressure

transient result in GOTHIC(7.2a-p5(QA)) is compared with that in GOTHIC 7.0(Ref. 14 Attachment 2, Figure 6.2-51), and presented in Figure 5.2-3. There is no significant difference in the peak differential pressure and pressure transient results.

5.2.4 Conclusion

From these comparisons, the pressure transient analyses by GOTHIC(7.2a-p5(QA)) code reproduce well the pressure responses by GOTHIC7.0 and THREED.

Table 5.2-1 Subcompartment Nodal Description for Benchmark 6-Inch RWCU Line Break Analysis

Node No.	Description	Volume (ft^3)	Initial Conditions		
			Temp (^oF)	Pressure (psia)	RH (%)
1	RWCU Hx Room (break location)	13250	103	14.66	100
2	Annular Space Outside of Hx Room	7149	90	14.66	100
3	Below Hx Room	6312	90	14.66	100
4	Balance of Containment Free Volume	1164879	90	14.66	100
5	Shield Building Annulus	426000	115	14.66	60

Table 5.2-2 Subcompartment Flow Path Description for Benchmark 6-Inch RWCU Line Break Analysis

Vent Path No.	Vol No.		Area (ft^2)	K-F	K-R	Junction Length (ft)	D-h (ft)	Inertia Length (ft)
	From	to						
1	1	2	28.21	2.911	3.076	2	3.719	11
2	1	2	10.21	1.573	1.763	4.75	1.048	11
3	1	4	15.75	3.78	3.78	12	5.334	39.792
4	2	3	194.02	0.59	0.436	0	7.76	23.875
5	2	4	148.6	1.141	0.552	0	6.73	39.431
6	2	4	148.6	1.141	0.552	0	6.73	39.431
7	2	4	14.94	1.507	1.389	0	0.651	57
8	3	4	172.5	0.922	0.49	0	11.02	38.917
9	3	4	172.5	0.922	0.49	0	11.02	38.917

Table 5.2-3 Heat Sink Description for Benchmark 6-Inch RWCU Line Break Analysis

No.	Area (ft^2)	Thickness (in)	Initial T (^oF)	Node Connected	HTC (see note)	Materials
1	13409	0.5"steel+0.5"air gap +60”concrete	100	4/4	Insulated/ Uchida	Carbon Steel / air gap / concrete
2	2471	1.5	90	4/4	Uchida / Uchida	Carbon Steel
3	247692	0.5	90	4/4	Uchida / Uchida	Carbon Steel
4	63641	0.75	102.5	4/5	Uchida / Uchida	Carbon Steel
5	38487	12	90	4/4	Uchida / Insulated	Concrete
6	4210	12	103	1/1	Uchida / Insulated	Concrete
7	1937	12	90	2/2	Uchida / Insulated	Concrete
8	60.54	0.75	102.5	2/5	Uchida / Uchida	Carbon Steel
9	2054	12	90	3/3	Uchida / Insulated	Concrete
10	103.7	0.75	102.5	3/5	Uchida / Uchida	Carbon Steel

Table 5.2-3 Heat Sink Description for Benchmark 6-Inch RWCU Line Break Analysis (cont’d) -Material Properties -

Material	Thermal Conductivity (Btu/hr-ft-F)	Density (lbm/ft^3)	Heat Capacity (Btu/lbm-F)
Carbon Steel	26.0	490	0.11
Concrete	0.54	145	0.1986
Air Gap	4.166	0.068729	0.00829

Table 5.2-4 Mass and Energy Release Rates for Benchmark 6-Inch RWCU Line Break Analysis

Time (sec)	Mass (lbm/sec)	Enthalpy (Btu/lbm)
0.000	0.0	0.00
0.001	873.6	416.00
0.021	873.6	416.00
0.022	1310.3	416.00
1.11	1310.3	416.00
1.111	1259.1	416.00
1.513	1259.1	416.00
1.514	771.2	416.00
1.888	771.2	416.00
1.889	385.6	416.00
5.997	385.6	416.00
5.998	841.3	416.00
9.442	841.3	416.00
9.443	841.3	88.00
16.657	841.3	88.00
16.658	202.2	88.00
23.595	202.2	88.00
25.157	0.0	0.00
1.00E+06	0.0	0.00

Table 5.2-5 Comparison of Peak Pressure Results for Benchmark 6-Inch RWCU Line Break Analysis

Node No	Peak Pressure (psia)		
	THREED	GOTHIC 7.0	GOTHIC(7.2a-p5(QA))
1	15.86	15.807	15.865
2	15.49	15.480	15.503
3	15.52	15.501	15.522
4	15.49	15.488	15.505

Table 5.2-6 Subcompartment Nodal Description for Updated 4-inch and 6-inch Line Break Analysis

Node No.	Description	Volume (ft^3)	Initial Conditions		
			Temp (^oF)	Pressure (psia)	RH (%)
1	RWCU Hx Room (break location)	13250	103	14.7	0
2	Annular Space Outside of Hx Room	7059	90	14.7	0
3	Below Hx Room	6153	90	14.7	0
4	Balance of Containment Free Volume	1165128	90	14.7	0
5	Shield Building Annulus	358000	120	14.7	100

Table 5.2-7 Subcompartment Flow Path Description for Updated 4-inch and 6-inch Line Break Analysis

Vent Path No.	Vol No.		Area (ft^2)	K-F	K-R	Junction Length (ft)	D-h (ft)	Inertia Length (ft)
	From	to						
1	1	1	28.21	3.131	2.902	2	3.719	11
2	2	1	28.21	4.918	4.651	2	3.719	11
3	3	1	23.333	11.708	8.196	13.292	4.516	39.792
4	4	2	192.26	0.63	0.397	0	8.67	23.875
5	5	2	162.828	1.706	1.706	9.014	8.041	39.431
6	6	2	162.828	1.706	1.706	9.014	8.041	39.431
7	7	2	14.708	2.67	1.55	1.75	0.655	57
8	8	3	166.678	1	0.5	0	11.8	38.917
9	9	3	166.678	1	0.5	0	11.8	38.917

Table 5.2-8 Mass and Energy Release Rate for Updated 4-Inch RWCU Line Break Analysis

Time (sec)	Mass (lbm/sec)	Enthalpy (Btu/lbm)
Upstream Blowdown		
0.0000	0.0	531.44
0.0001	564.7	531.44
0.5774	564.7	531.44
0.5775	212.1	531.44
13.4380	212.1	531.44
15.0000	0.0	531.44
Downstream Blowdown		
0.0000	0.0	472.02
0.0001	610.2	472.02
0.7315	610.2	472.02
0.7316	610.2	361.60
1.5297	610.2	361.60
1.5298	610.2	257.54
2.3788	610.2	257.54
2.3789	610.2	150.17
4.6461	610.2	150.17
4.6462	610.2	93.91
21.9969	610.2	93.91
21.9970	610.2	146.46
23.5400	610.2	146.46
23.5401	610.2	252.64
25.0137	610.2	252.64
25.0138	610.2	362.04
26.3952	610.2	362.04
26.3953	610.2	419.00
28.3703	610.2	419.00
28.3704	0.0	0.00
0.0000	0.0	472.02

Table 5.2-9 Comparison of Peak Differential Pressure Results for Updated 4-Inch RWCU Line Break Analysis

Peak Pressure (psid)	
GOTHIC 7.0	GOTHIC(7.2a-p5(QA))
1.627	1.624

Table 5.2-10 Mass and Energy Release Rates for Updated 6-Inch RWCU Line Break Analysis

Time (sec)	Mass (lbm/sec)	Enthalpy (Btu/lbm)
Upstream Blowdown		
0.0000	0.0	419.00
0.0001	892.5	419.00
0.9446	892.5	419.00
0.9447	394.0	419.00
3.2271	394.0	419.00
3.2272	394.0	419.00
5.6170	394.0	419.00
5.6171	1129.4	419.00
9.6189	1129.4	419.00
9.6190	1129.4	93.91
14.9907	1129.4	93.91
14.9908	1129.4	93.91
17.7895	1129.4	93.91
17.7896	212.1	93.91
31.2276	212.1	93.91
32.7896	0.0	93.91
Downstream Blowdown		
0.0000	0.0	419.00
0.0001	446.2	419.00
2.0263	446.2	419.00
2.0264	394.0	419.00
2.7902	394.0	419.00

Table 5.2-11 Comparison of Peak Differential Pressure Results for Updated 6-Inch RWCU Line Break Analysis

Peak Pressure (psid)	
GOTHIC 7.0	GOTHIC(7.2a-p5(QA))
1.488	1.490

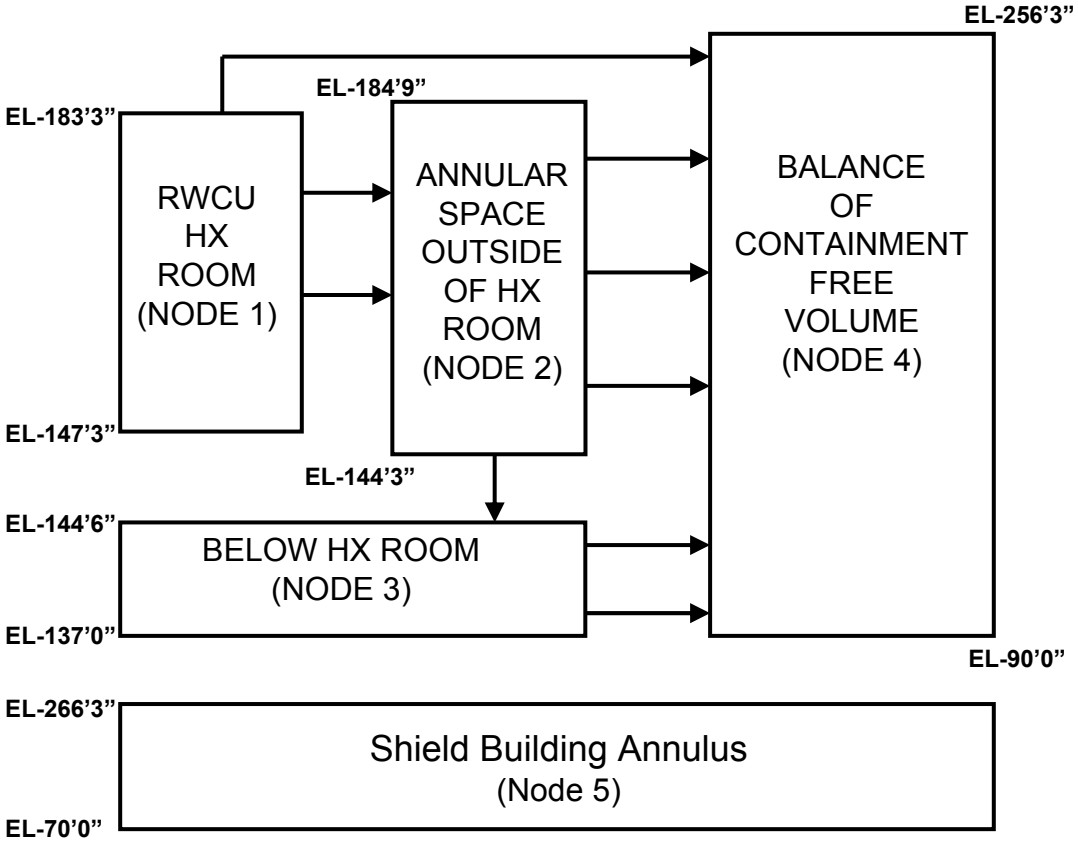

Figure 5.2-1 Containment Subcompartment Nodalization Diagram for Benchmark 6-Inch RWCU Line Break Analysis

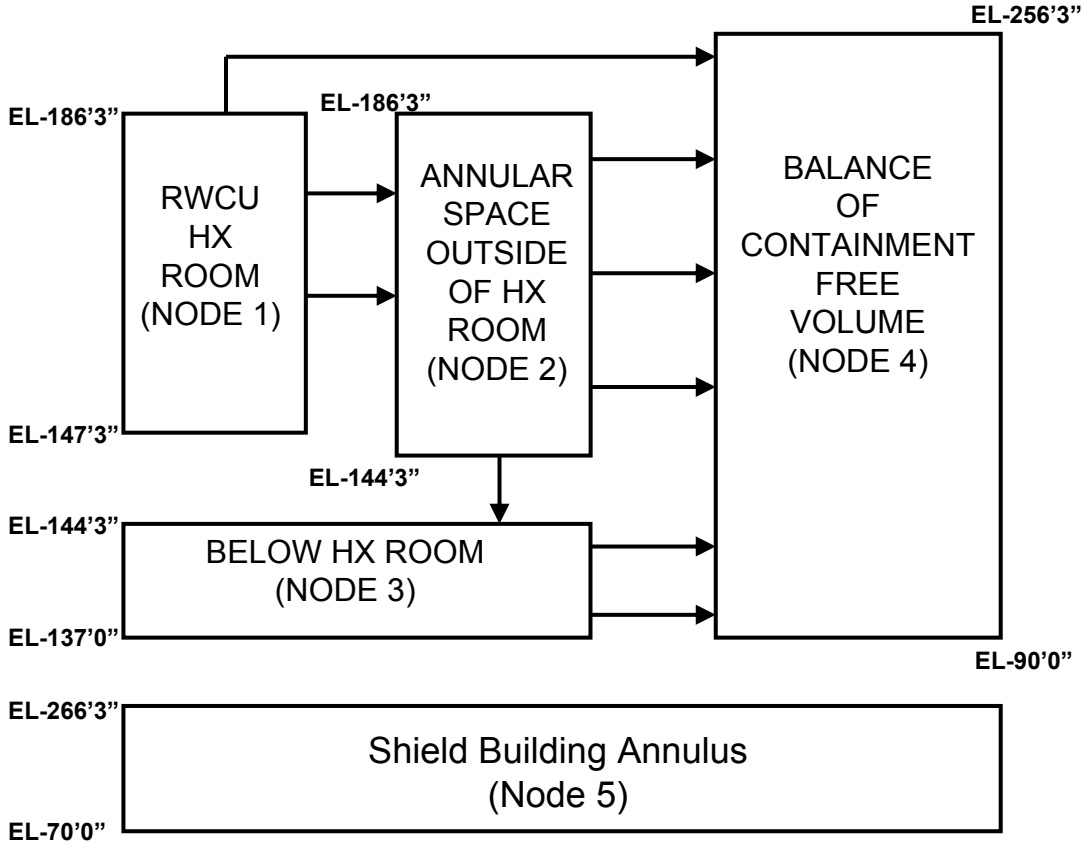

Figure 5.2-2 Containment Subcompartment Nodalization Diagram for Updated 4-Inch and 6-Inch RWCU Line Break Analysis

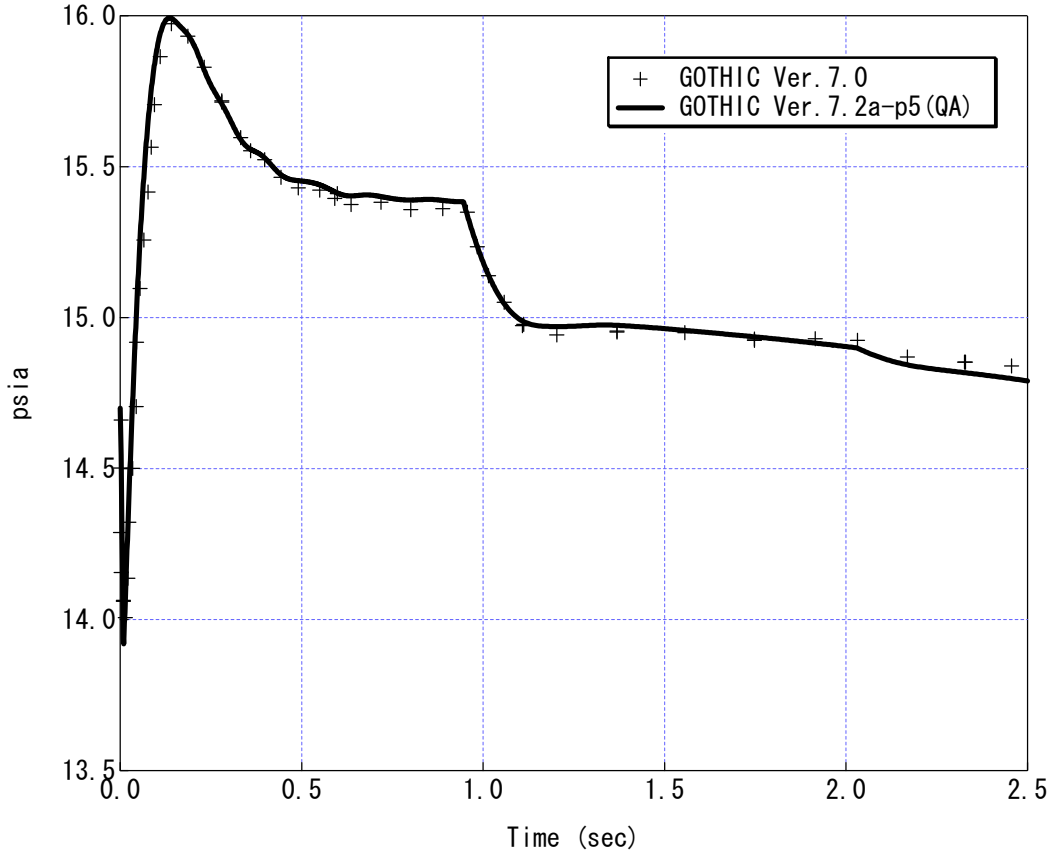

Figure 5.2-3 Comparison of Peak Transient Results of Updated 6-Inch RWCU Line Break Analysis

5.3 Benchmark Analyses Conclusion

Based on the benchmark results, it is concluded that GOTHIC(7.2a-p5(QA)) code is suitable for the containment subcompartment pressure analysis.

6.0 Model Sensitivity Studies

The base models and the test descriptions provided in section 6.1 and 6.2 are taken directly from the GOTHIC Assessment Report (Ref. 3)

6.1 Parameters and Models Sensitivity Studies

When a break occurs inside a compartment, the maximum pressure differential across the compartment walls occurs within a very short time (typically less than five seconds). The peak differential pressure is controlled primarily by the inertia of the fluid in and around the openings to the containment and the flow resistance through the openings. Heat transfer and condensation on the walls and structures in the compartment would tend to reduce the peak differential pressure but the impact is small due to the short time to the peak.

Vent loss coefficients and inertia terms sensitivity studies were performed to support the selection of the results to the vent loss coefficients and inertia terms. The set of vent loss coefficients and inertia terms is checked for sensitivity by comparing the selected output parameter with results obtained using larger or smaller values. This was accomplished by using multipliers of 1.2 or 0.8 on the base values for vent loss coefficients (SS Vent Loss Coefficient) and inertia terms (SS INERTIA). In the explanatory notes of Figure 6.1-6 to Figure 6.1-15 and Figure 6.1-26 to Figure 6.1-35, the label “sensitivity study 1.0 (base)” means that the calculation was conducted by the NAI default option settings (as shown in Table 4-1). The label “sensitivity study 1.0(NRC)” means that the calculation was conducted using the MHI option settings (described in section 4.1.2.3), hereby incorporated by reference. The labels “sensitivity study 1.2” and “sensitivity studies 0.8” mean that the calculations are conducted with the 1.2 times and 0.8 multipliers on the base values of vent loss coefficients (SS Vent Loss Coefficient) and inertia terms (SS INERTIA), respectively.

Vent flow behavior model sensitivity studies (SS RUN OPTIONS) were conducted to indicate the level of conservatism in the MHI methodology relative to the best estimate (BE) model results and the experimental data. These sensitivity studies were conducted using the applicable test data shown below. These test data and best estimate results from Reference 3 were treated as the base data for the comparisons.

6.1.1 BATTELLE-FRANKFURT Test Facility

This section provides a summary description of the Battelle-Frankfurt Model Containment (BFMC) as a reference for the sections that follow. Information presented in this section was acquired from Ref. 3.

The BFMC was constructed specifically to study the thermal-hydraulic response of a containment system during accident conditions and to use test data to assist development of related thermal-hydraulic codes. The BFMC is a multi-room facility in cylindrical geometry, having an outside diameter of 12 *m* and a height of 12.5 *m*. The structure is made of steel reinforced concrete capable of withstanding pressures to 6 *atm*. Total volume is about 600 m^3, although room configuration can be altered by inclusion of concrete inserts that change the volume and surface area of rooms, and steel plates that block or partially block openings between rooms. This flexibility permits a test to be run in a single room or several rooms with a variety of geometries and flow paths (see Figure

6.1-1).

Steam is supplied from a pressure vessel in an adjacent building. The pressure vessel can operate up to 140 *atm* and 300 *C*.

Total volume of the pressure vessel and supply lines is 7 m^3. A recirculation system is available to keep the fluid in the supply lines near the condition of the fluid in the vessel. The length of the supply line piping is on the order of 25 *m*. Pipe diameters are 15 and 20 *cm*.

The BFMC is extremely clean relative to large scale tests at the sites of unfinished or decommissioned reactors where rooms, passage ways, equipment, piping, and miscellaneous equipment make the modeling more difficult and less certain. For example, in the HDR experiments it is necessary to estimate the loss coefficient for flow through a spiral staircase which connects the upper dome to a room below. In contrast, the BFMC is essentially free of such complex internal fixtures. Rooms and openings between rooms are clearly defined. Documentation of geometric parameters, sensor locations, and test data is relatively good. As a result of these attributes, the tests are relatively easy to model in GOTHIC, providing a good basis for judging the validity of code models. A drawback is the small scale which makes the surface area to volume ratio much higher than in the full scale containment. Thus, there may be differences in the performance of the condensation models applied to BFMC tests versus other full scale tests.

The cutaway in Figure 6.1-1 is perhaps the best available drawing to see the general configuration of the containment. The internal room is an open cylinder having discrete diameters over different axial sections. The resulting ledges support inserts used to define separate rooms within this region. An annular region surrounding the inner cylindrical room is divided by a floor about midway up the cylinder. This floor and 3 radially oriented vertical walls in the annulus form boundaries that define 5 distinct rooms in this region. The enclosing walls of the containment form a continuous open annular space outside of that shown in the figure. This outer annular space is open to a domed region which bounds the top of the containment. Openings between rooms are sharply cut circles, rectangles, trapezoids and annular segments.

6.1.2 Comparisons of BFMC test with GOTHIC Calculation and Sensitivity Studies

Battelle-Frankfurt test D-16 is a pressurized water blowdown experiment. This test was also used as Standard Problem No. 2 by the Committee for the Safety of Nuclear Installations of the Organization for Economic Development and Cooperation (CSNI-OECD). Test D-16 is, in some notable respects, uniquely different from tests D-1 and D-15. First of all, the room configuration in test D-16 provides non-symmetric parallel flow paths from the break room to the dome. The room configuration for tests D-1 and D-15 is a series of linked rooms in which the flow must traverse the length of each room in the series before passing to the next room. A second unique aspect of test D-16 is the fluid condition of the break. The blowdown is pressurized liquid, whereas tests D-1 and D-15 are steam blow-downs.

(a) Physical Description of the Test Facility

For BFMC test D-16, steel plates are used to block openings to provide a room

configuration as shown in Figure 6.1-2. Not made clear in Figure 6.1-2 is the fact that the central region of the containment is open to room R9 so that the entire volume of the containment is involved in the test. The break orientation is horizontal and radially outward. Two openings, centered 1.8 *m* above the center elevation of the break, lead from the break room. The openings, shown in Figure 6.1-2 are on the opposing radially oriented vertical walls of R4. These openings, U45 and U47, direct flow circumferential to rooms R5 and R7. Both of these openings are 0.8-*m*-square and are covered with a steel plate having a sharp edged 0.75-*m*-diameter orifice. Flow entering R5 can escape to room R9 by traversing only a short length of R5. Trapezoidal opening U59B has a full open area of 2.25 m^2. It is covered with a steel plate having a 0.55-m-diameter sharp edged orifice. Flow entering R7 must traverse the length of R7 before escaping to room R8 through opening U78B. This is a 1.0-m-diameter opening covered with a steel plate having a 0.55-m diameter sharp edged orifice. Each of the orifice plates is made from 0.10-m-thick steel.

The remaining openings are between R6 and R9 and between R8 and R9. These 2 collections of openings are compiled into 2 connections. At any rate, the openings to R9 infer the collection of flow paths to the annular section of R9 and to the central part of the containment. The connection between R6 and R9 is assigned a total flow area of 2.109 m2. The connection between R8 and R9 is assigned a total flow area of 1.933 m^2.

During the test, a cover plate, located at the interface of the top of R4 and the dome portion of R9, became unattached along one seam, permitting fluid to escape from R4 to R9. This unintended gap was discovered after the test. An evaluation was performed to estimate the behavior of the gap during the test. It is probably fair to suggest that a considerable amount of speculation was involved. It is suggested that the gap size may actually reach the maximum value of 0.0292 m^2 by 0.01 sec and sustain this value to 16 sec following the break.

(b) Test Parameters

Break flow rate and enthalpy are shown in Figure 6.1-3 and Figure 6.1-4. Measured flow rate was derived from measurements taken with a gamma-densitometer and from the mean value of the measured curves of two drag bodies. The flow rates presented in Figure 6.1-3 were corrected to obtain a mass balance.

The flow was adjusted by a factor of 1.3 during the first 0.2 sec after the break. Over the next 0.15 sec the flow was adjusted by a factor that decreased linearly from 1.3 at 0.2 sec, to 1.0 at 0.35 sec. Next, the flow was adjusted by a factor that increased linearly from 1.0 at 1.2 sec, to 1.2 at 4 sec. Beyond 4 sec after the break, measured flow was adjusted by a factor of 1.2. The test report does not indicate whether the adjustment was a multiplication or division.

Specific enthalpy is from measured density and temperature for single-phase flow and density and pressure for 2-phase flow.

Break flow and enthalpy were taken from measurement point II, a position about 2.7 m upstream from the rupture disk. This position is approximately at the center of the containment. Initial containment pressure is 1.0 atm. Average initial temperature of the containment is 27 C. Actual initial room temperatures vary from 23.5 to 30.5 C. Initial relative humidity is 100%.

(c) GOTHIC Model Description

(d) GOTHIC Data Comparisons

Comparisons of predictions from the GOTHIC model to experimental data for test D-16 are shown in Figure 6.1-6 to Figure 6.1-20. A review of these figures indicates that GOTHIC predictions for this test are generally good. The following comments highlight particular aspects of the data comparison. These figures, Figure 6.1-6 through Figure 6.1-10, are differential pressures in the first 2.5 sec following the break including the vent loss coefficient sensitivity study. Differential pressure data between the break room, R4, and the rooms immediately downstream, R5 and R7, exhibits oscillations of 10 to 20 kPa, with the highest oscillations occurring during the earliest part of the transient. This is reflected in the digitized data in Figure 6.1-6 and Figure 6.1-7. Similar oscillations occur in differential pressure data between R4 and R9. Since the pressure in R9 is relatively stable, the oscillations in differential pressure must result from small pressure oscillations in the break room, as would be expected.

Overall, prediction of differential pressures is good with the GOTHIC model using loss coefficients of 1.5 on all junctions. Orifice plates represented by the junctions are probably the same orifice plates used in BFMC test D-15 where we found good agreement with data using similar loss coefficients. If the same orifice separated two very large rooms, the loss coefficient would be 2.78, as noted with regard to test D-15. Smaller loss coefficients here, and for test D-15, are due to the influence of the openings in the concrete wall to which the plates are attached, and to the fact that the connected rooms are not large. That is, the effective cross-section flow area in each room is not infinitely large relative to the flow area through the orifice.

For BFMC tests D-1 and D-15, over prediction of pressure in the first 2.5 sec of the transient exposed the possibility that the measured break flow rate was too high during that period. This suggests that the same possibility exists for test D-16. The reported adjustment of measured break flow rate for test D-16, invoked to obtain a

mass balance, indicates that measurement techniques were not entirely reliable. The constant factors applied to measured flow rates to correct for the discrepancy lead to a mass balance, but such corrections cannot necessarily be expected to improve deviations between actual and measured flow rates on a short term basis. There was no explanation why the adjustment of measured flow rate was ramped in over 4 sec. For tests D-1 and D-15 the GOTHIC model gave improved results for the 2.5 sec transient when the measured break flow rate was multiplied by 0.8. For test D-15, adjustment of measured break flow rate was done in concert with adjustment of loss coefficients. A similar adjustment in the GOTHIC model for test D-16 led to better agreement between predicted and measured pressures and differential pressures for the first 2.5 sec of the transient. In spite of the similarity of data comparisons to GOTHIC predictions for the D-series tests, we do not have enough information to identify a consistent error in the data or other test parameter. It does highlight the fact that the first 2.5 sec of a blowdown is a very short period of time in which it may be very difficult to obtain consistently precise data.

These figures, Figure 6.1-11 through Figure 6.1-15, are differential pressures including the inertia sensitivity study. Also, Figure 6.1-16 through Figure 6.1-20, are differential pressures including the run option sensitivity study.

6.1.3 HDR FULL SCALE CONTAINMENT EXPERIMENTS

Heissdampfreaktor (HDR) is a decommissioned superheated steam reactor in the Federal Republic of Germany. Following its decommissioning, the HDR reactor vessel, subsequently referred to as the pressure vessel, and containment system were used in an experimental role designated as Project HDR. Beginning in the late 1970's, several blowdown and related tests were performed at the site.

Information presented in this section was acquired from Ref. 3. GOTHIC was used to simulate the HDR blowdown test designated as V21.1. Comparison of GOTHIC predictions to data for the test demonstrates the ability of GOTHIC to predict the thermal-hydraulic response of the full scale multi-compartment containment geometry to water or steam/water blowdown from a reactor vessel.

(a) Physical Description of Test Facility

Elevation views of the HDR containment are shown in Figure 6.1-21 and Figure 6.1-22. The containment is 20 *m* in diameter and 60 *m* high, with a total free volume of 11,300 m^3. Notable features of the containment include the dome, which is about 42% of the total containment volume, the spiral stairs at the left of Figure 6.1-22, and the main stairway, identified as room 1307. The stairways are significant because they provide the dominant vertical flow paths from the lower portions of the containment to the dome.

Rooms in the containment are interconnected by a large number of openings between the rooms. The connections are shown schematically in Figure 6.1-23.

Primary physical alterations that distinguish the tests selected for analysis includes the location of the break room. For tests V21.1, T31.1, and V44, the break is in room 1603. For test T31.5 the break is in room 1704. Another distinction between tests was the vent openings from the break room to adjacent rooms. Changes to vent openings

may have been significant within a group of tests, but the combination of changes that differentiate the selected tests precludes any meaningful comparison of the tests on the basis of vent openings alone.

(b) Test Parameters

For each test selected for analysis, the initial containment pressure was 100 *kPa*. Temperatures within the containment were generally around 25 *C* with slight stratification from the bottom to the top of the containment. In the annular gap around the pressure vessel, initial temperatures were about 60 *C*.

For each test, initial vessel conditions included a pressure of about 11.1 *MPa* and a temperature of about 318 *C*. The initial water level in the vessel varied from a condition of full for test V21.1, that is, a depth of near 10.5 *m*, to a depth of 9.2 *m* for test V44, and a depth of about 7.8 *m* for tests T31.1 and T31.5.

The blowdowns continued until the pressure in the vessel reached equilibrium with the containment. The duration of the blowdowns is about 25 *seconds* for the liquid break test, that is, test V21.1, and about 50 *seconds* for the steam break tests, that is, tests T31.1, T31.5 and V44. Break flow rate and enthalpy for test V21.1 are shown in Figure 6.1-24 and Figure 6.1-25.

(c) GOTHIC Model Description

6.1.4 Comparisons of HDR test with GOTHIC Calculation and Sensitivity Studies

Predictions are compared to data in several graphs in the following sections.

(a) Results for Test V21.1

Differential pressures from the break room to one of the adjacent rooms, and from one of the adjacent room to another room are shown in Figure 6.1-26 to Figure 6.1-45. In the case shown, the predicted differential pressure is in good agreement with the data. In the test reports, data is provided for differential pressure between the break room and five other adjacent rooms. If the differential pressures were the focus of interest, better predictions might be achieved by subdividing the break room so that the jet effects and drop flow could be more accurately modeled. This would require accurate description of all features of the break room.

Figure 6.1-26 to Figure 6.1-30 show differential pressures for SS Vent Loss Coefficients. Figure 6.1-31 to Figure 6.1-35 show differential pressures for SS INERTIA. Figure 6.1-36 to Figure 6.1-40 show differential pressures for SS RUN OPTIONS. In addition to SS RUN OPTIONS, Sensitivity Study EACH RUN OPTION has been conducted with each of the relevant run options individually modified. Table 6.1-2 shows the analysis cases. Figure 6.1-41 to Figure 6.1-45 show differential pressures for SS EACH RUN OPTION.

6.1.5 Conclusions

From Section 6.1.2 and 6.1.4, the following conclusions are made.
(a) With respect to the Vent Loss Coefficient Sensitivity Study, the larger the vent loss coefficients are, the larger the differential pressures between the rooms become.

(b) With respect to the Inertia Sensitivity Study, plus or minus effects of the inertia might depend on the mass and energy release rates characteristics. In either case, the effects are slight. Therefore, the selection of the base case (that is, the best estimated value) as the inertia is suitable for the analyses of the differential pressure between the rooms.

(c) With respect to the Run option Sensitivity Study, the NRC acceptable options result in the larger differential pressures between the rooms.

The HEM critical flow model can have a large effect on the differential pressure for two-phase break conditions.

Table 6.1-1 GOTHIC Volumes for BFMC Test D-16

Room #	Volume #	Description
R4	1	break room
R5	2	upper annular room
R6	3	lower annular room
R7	4	upper annular room
R8	5	lower annular room
R9	6	combined R1, R2, R3, R9

Table 6.1-2 Analysis cases of SS EACH RUN OPTION

	Force Equilibrium	Drop-Liq. Conversion	Flow Path-table 3 (Comp.Opt.)	Flow Path-table 3 (Critical flow model)
default	Ignore	include	No	Off
Case-0 (**Test analysis. Same with the default.**)	Ignore	include	No	Off
Case-1 (**NRC acceptable, so called RUN OPTIONS**)	**include**	**Ignore**	**On**	**HEM**
Case-2	**include**	include	No	Off
Case-3	Ignore	**Ignore**	No	Off
Case-4	Ignore	include	**On**	Off
Case-5	Ignore	include	No	**HEM**
Case-6	Ignore	include	**On**	**HEM**

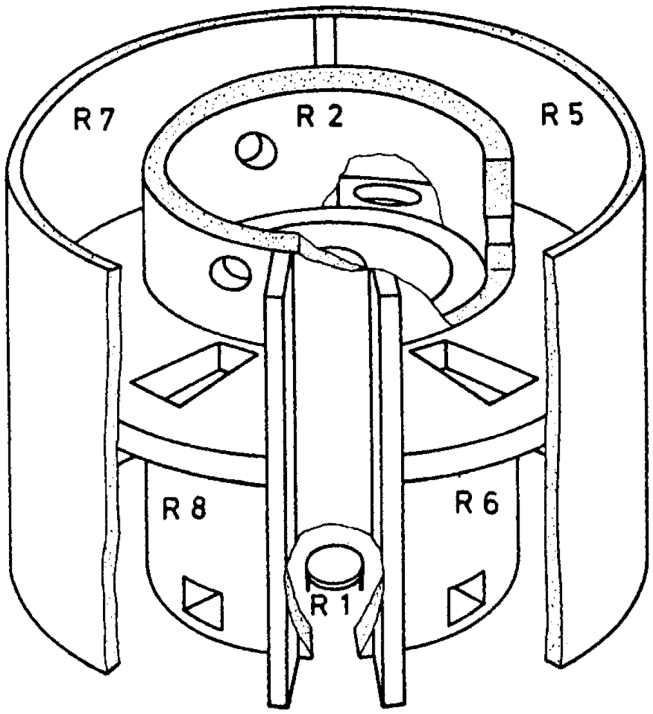

Figure 6.1-1 Cutaway View of Interior Rooms in BFMC.

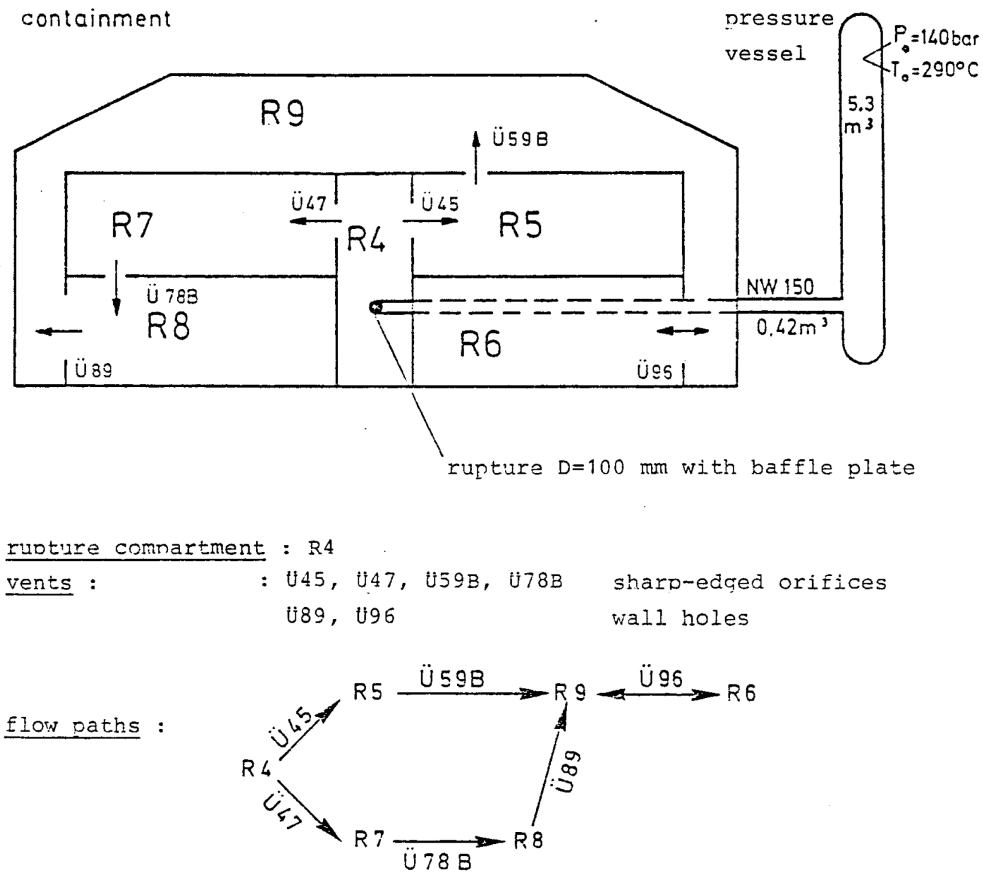

Figure 6.1-2 Room Configuration; BFMC Test D-16.

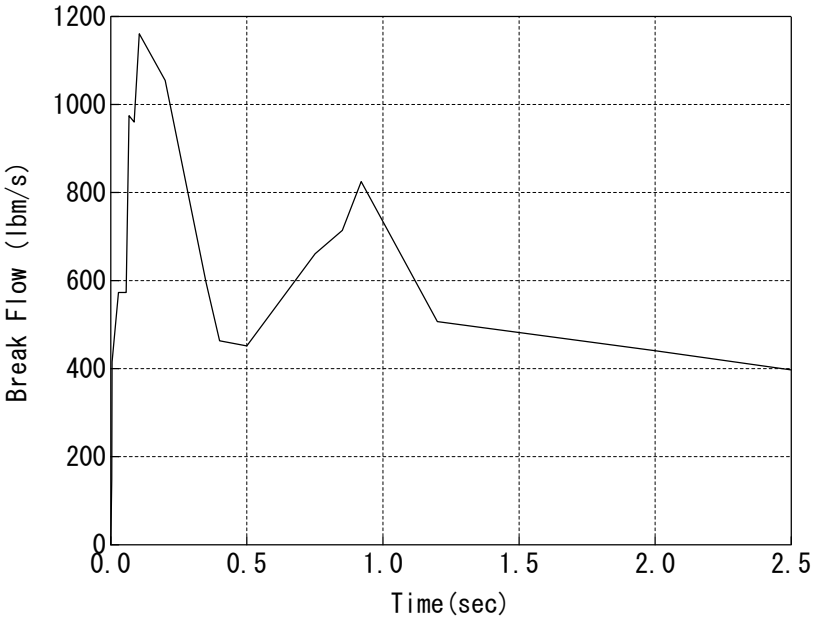

Figure 6.1-3 Break Flow for BFMC Test D-16

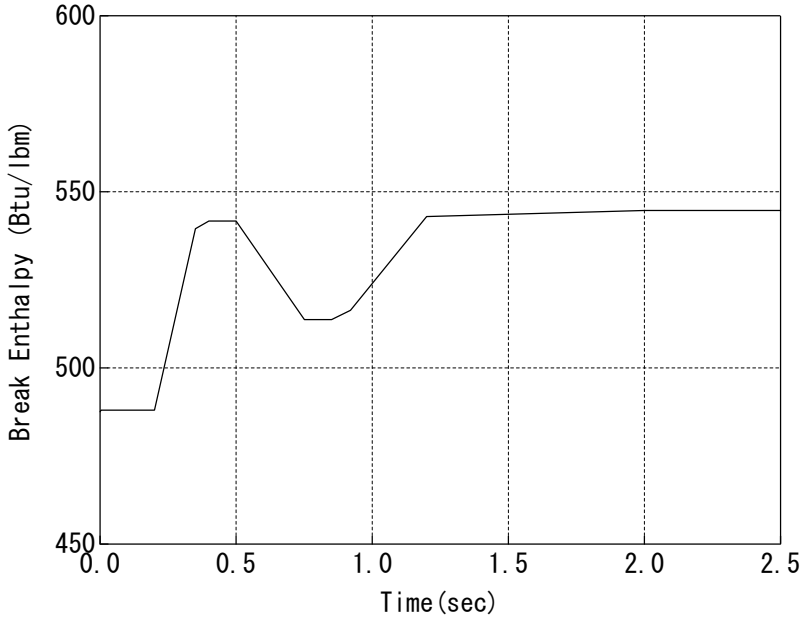

Figure 6.1-4 Break Enthalpy for BFMC Test D-16

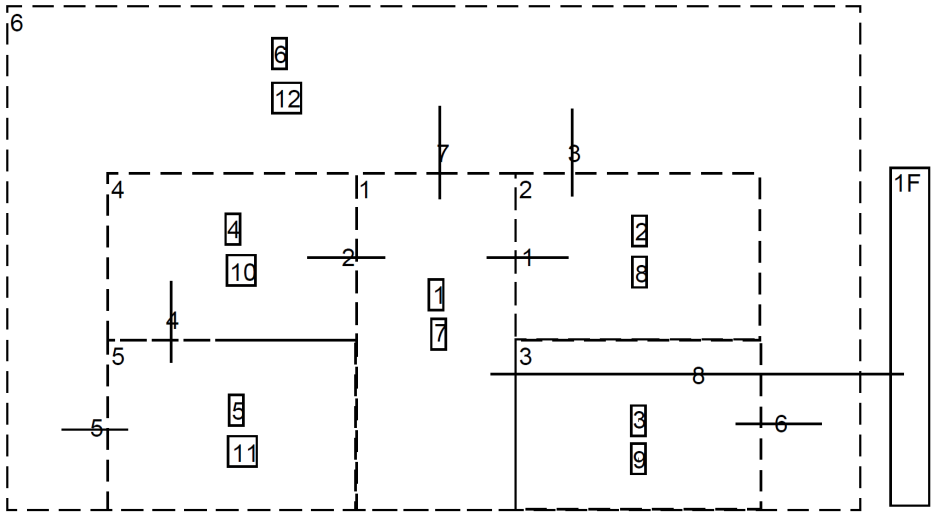

Figure 6.1-5 GOTHIC Model; BFMC Test D-16.

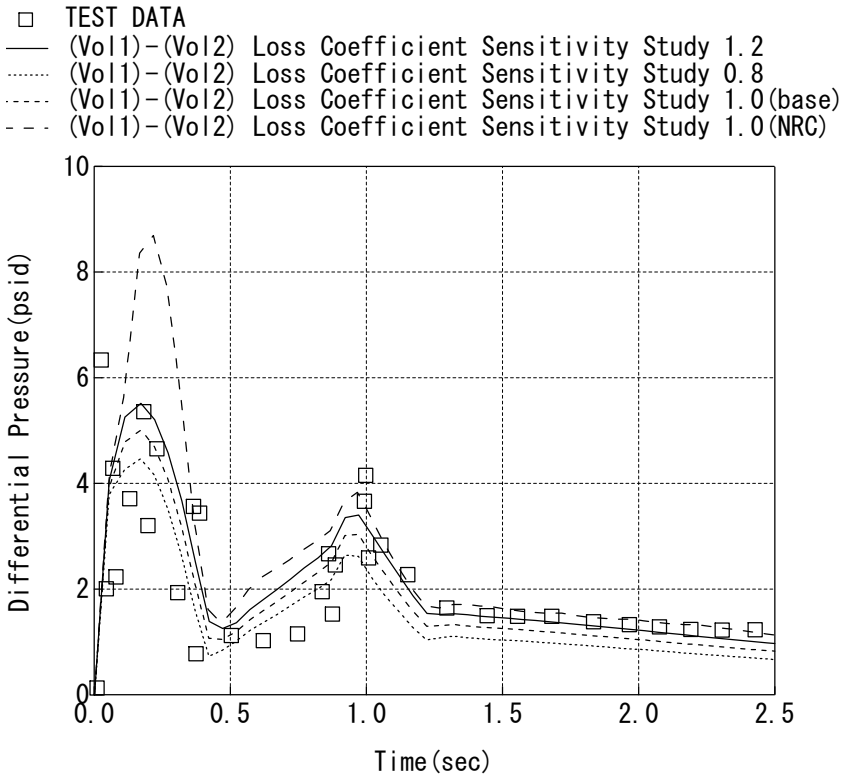

Figure 6.1-6 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Vent Loss Coefficient

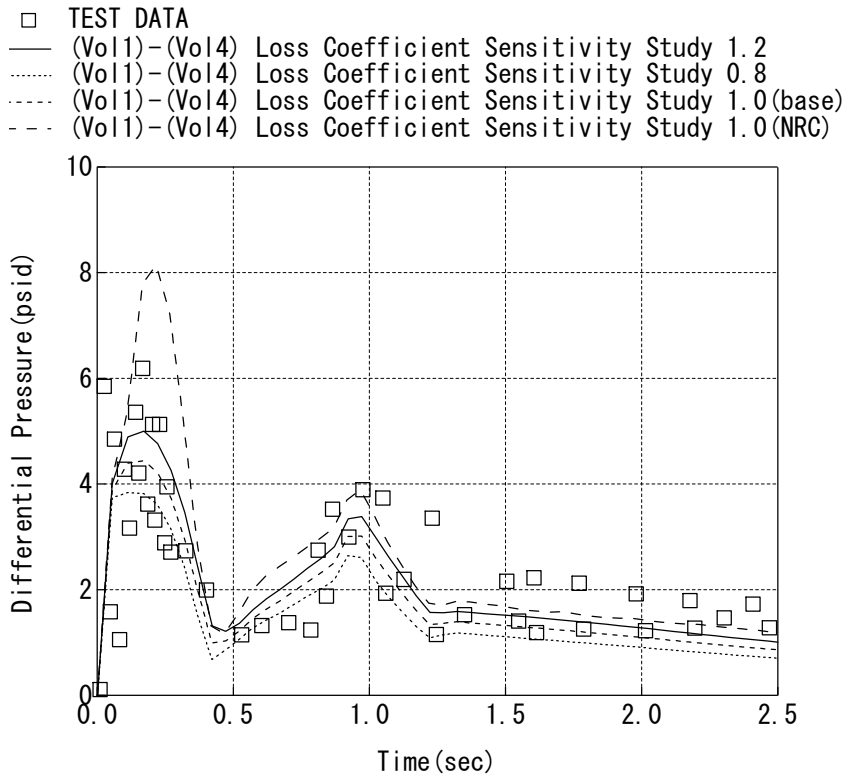

Figure 6.1-7 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Vent Loss Coefficient

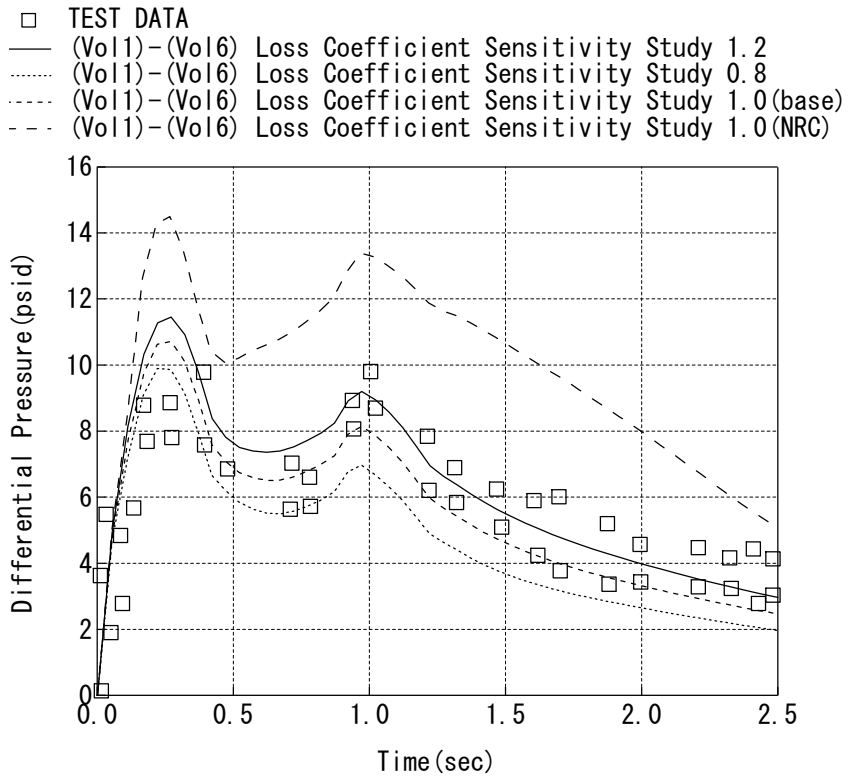

Figure 6.1-8 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Vent Loss Coefficient

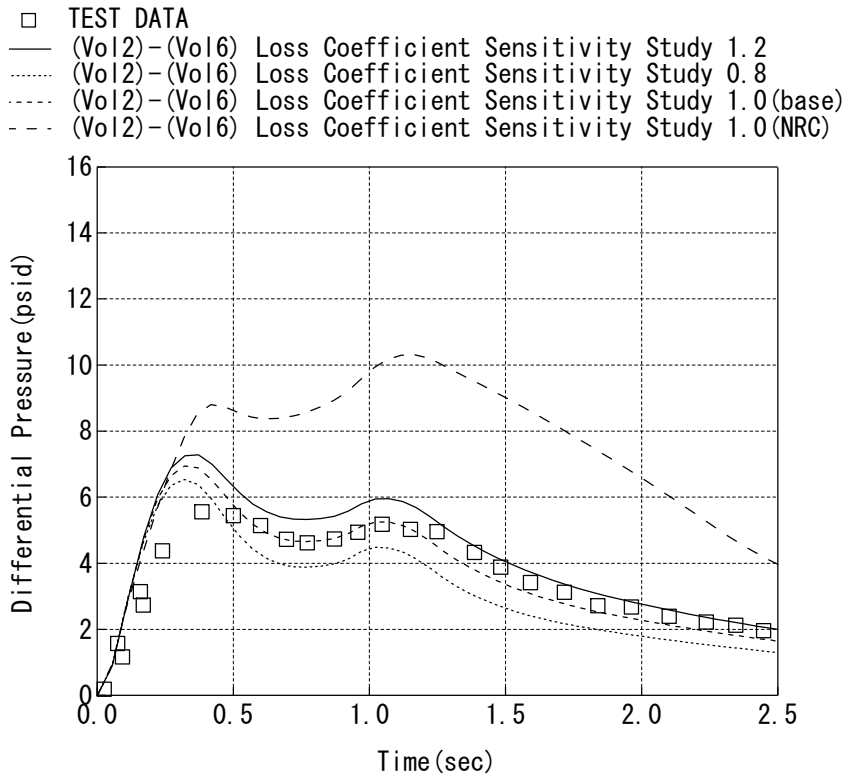

Figure 6.1-9 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Vent Loss Coefficient

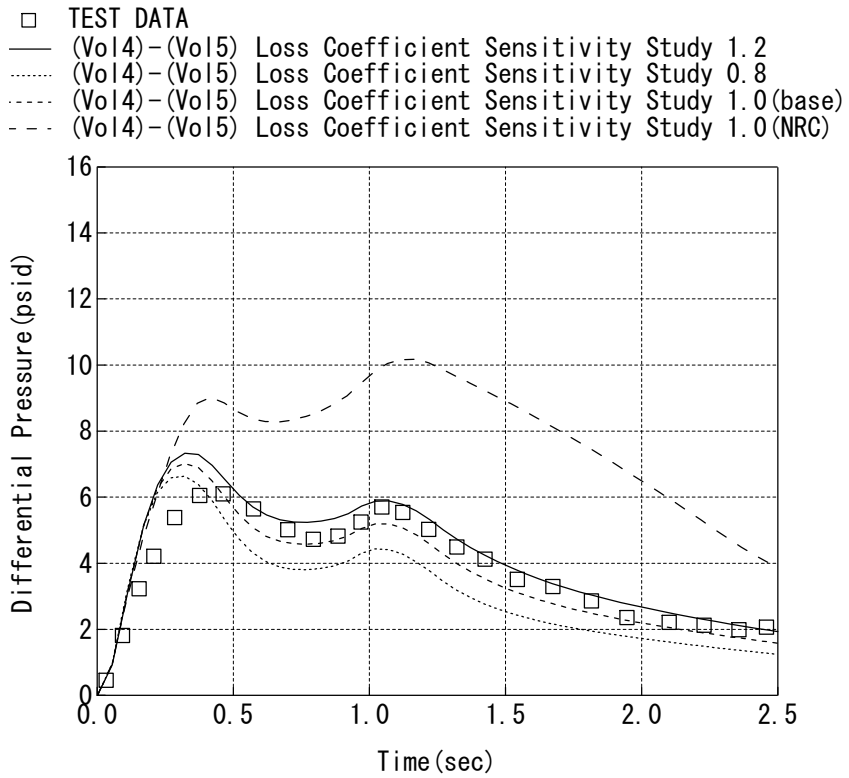

Figure 6.1-10 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Vent Loss Coefficient

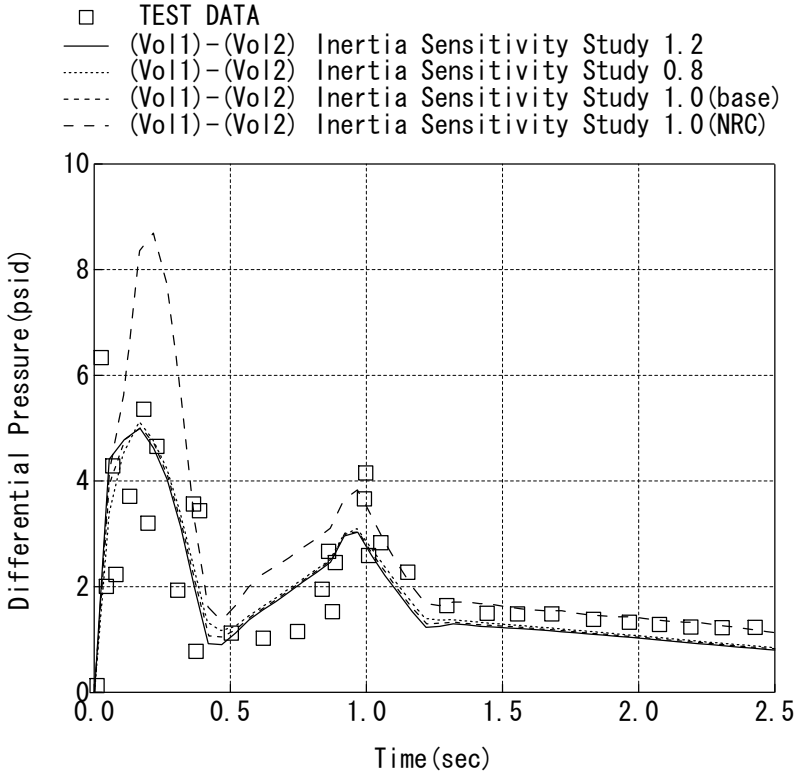

Figure 6.1-11 Differential Pressure, R4 to R5; BFMC Test D-16 for SS INERTIA

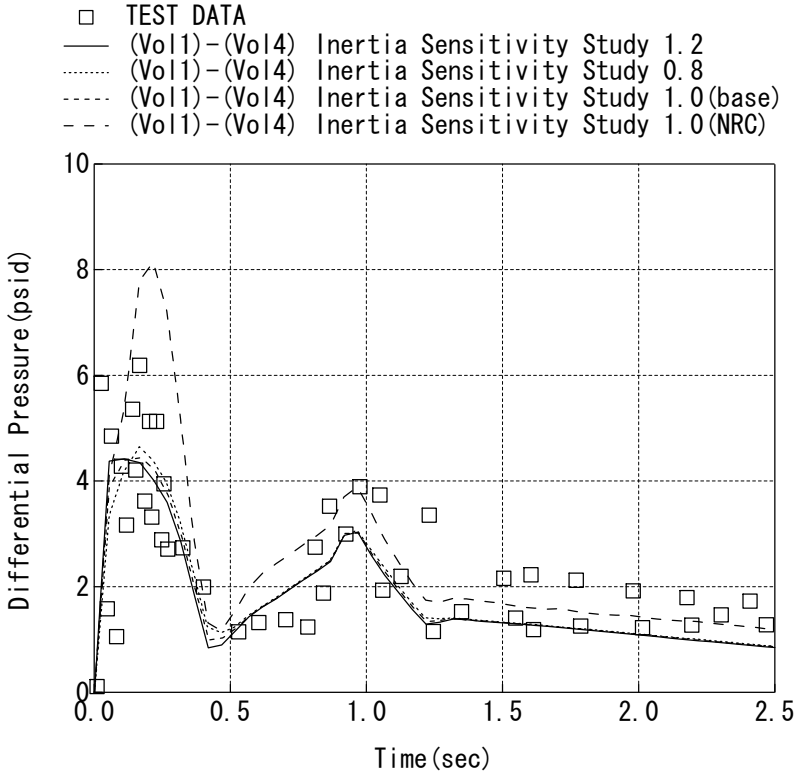

Figure 6.1-12 Differential Pressure, R4 to R7; BFMC Test D-16 for SS INERTIA

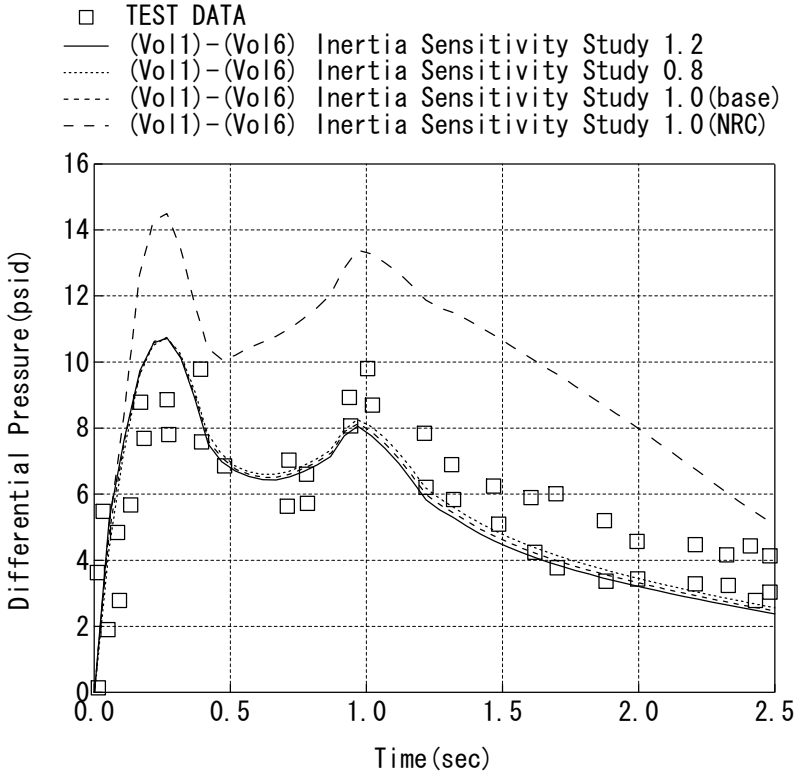

Figure 6.1-13 Differential Pressure, R4 to R9; BFMC Test D-16 for SS INERTIA

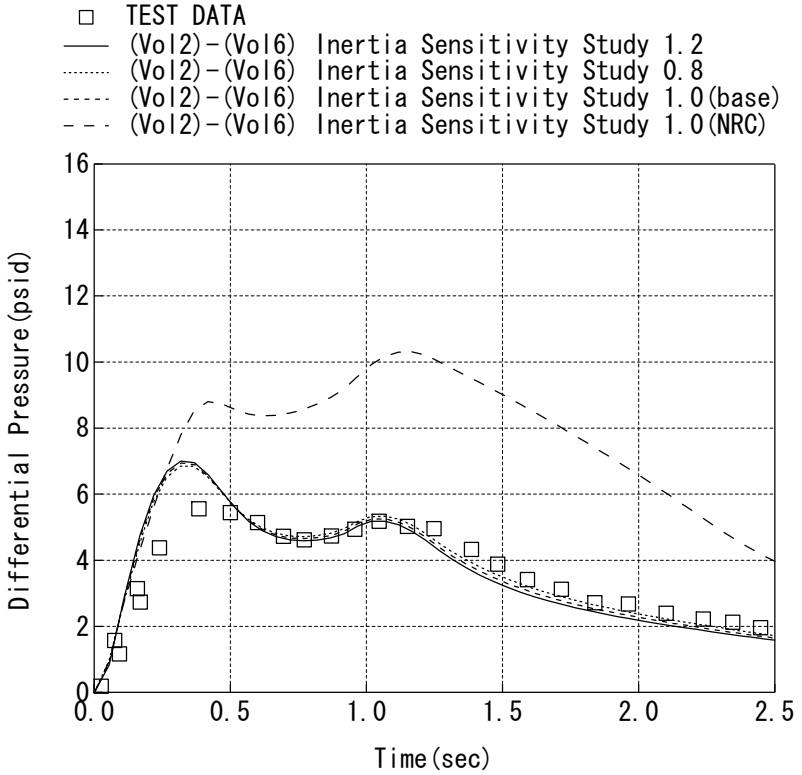

Figure 6.1-14 Differential Pressure, R5 to R9; BFMC Test D-16 for SS INERTIA

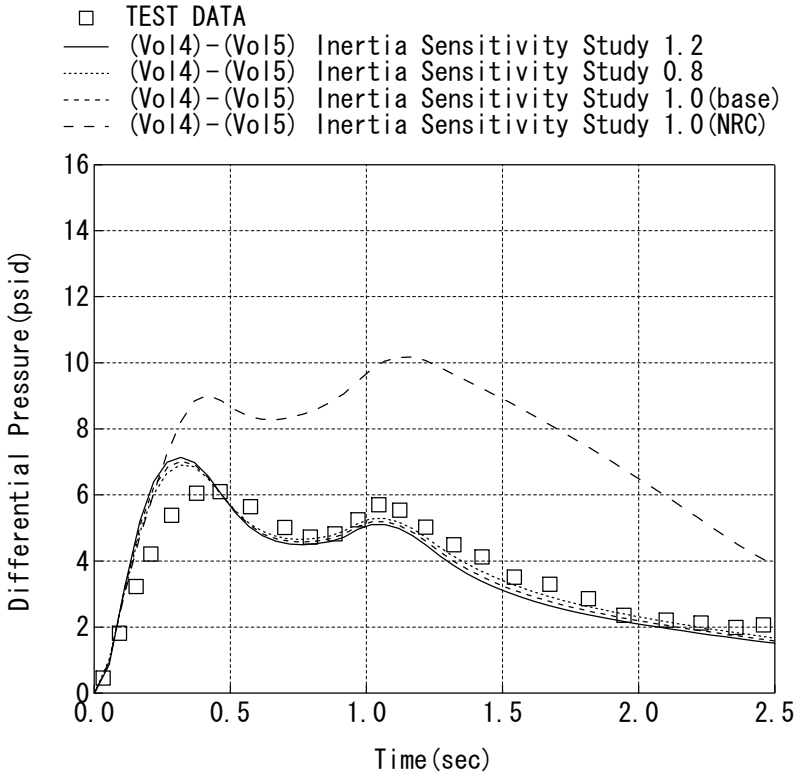

Figure 6.1-15 Differential Pressure, R7 to R8; BFMC Test D-16 for SS INERTIA

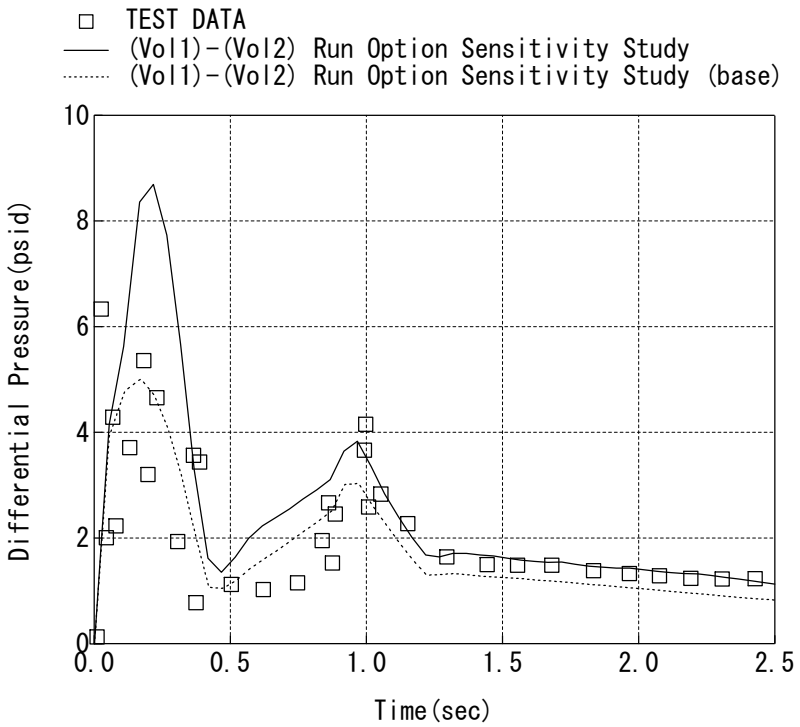

Figure 6.1-16 Differential Pressure, R4 to R5; BFMC Test D-16 for SS RUN OPTIONS

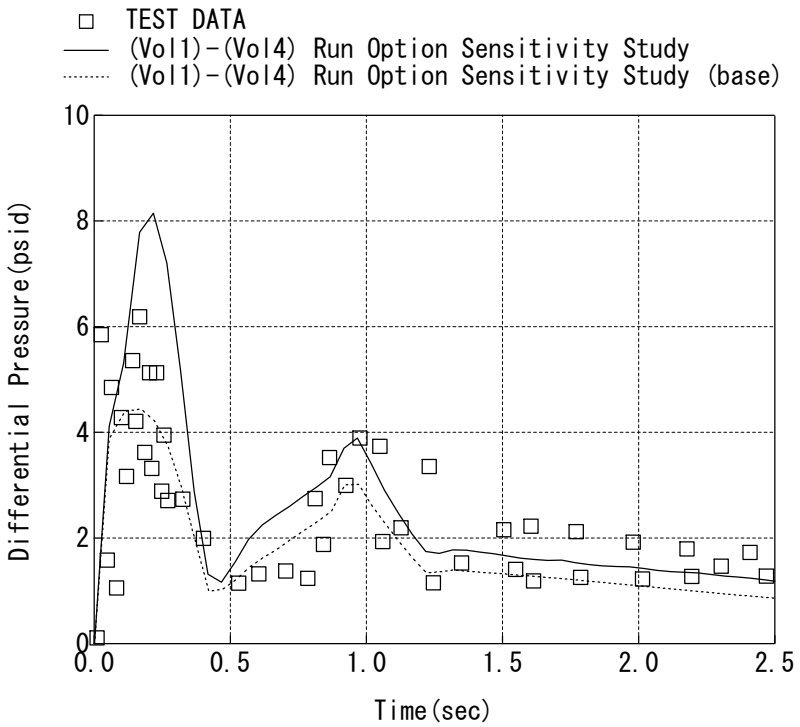

Figure 6.1-17 Differential Pressure, R4 to R7; BFMC Test D-16 for SS RUN OPTIONS

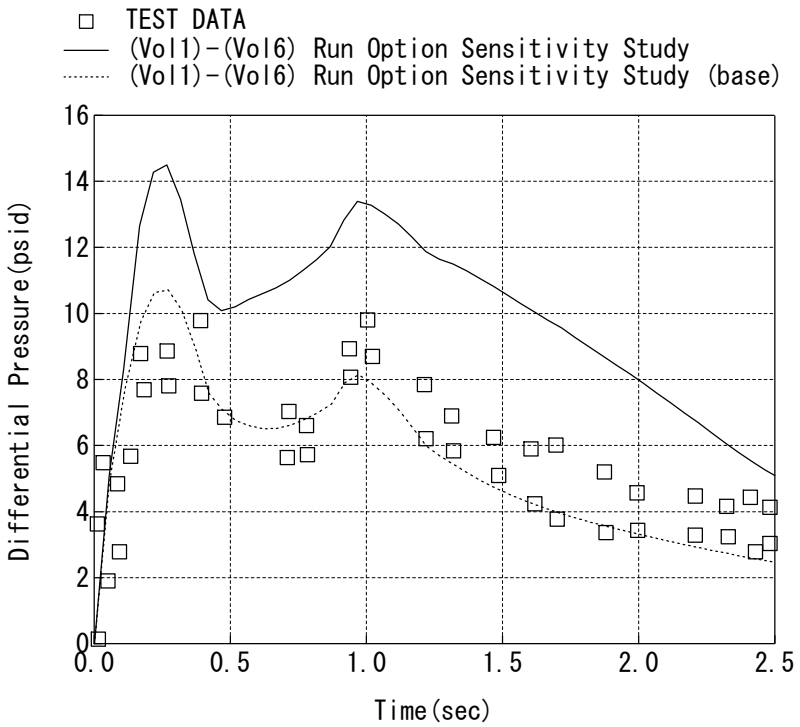

Figure 6.1-18 Differential Pressure, R4 to R9; BFMC Test D-16 for SS RUN OPTIONS

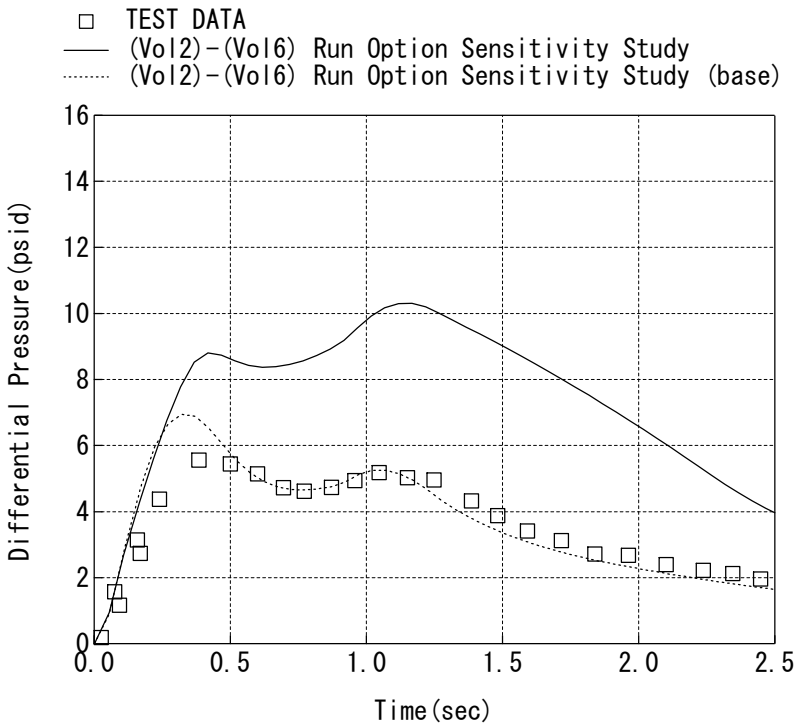

Figure 6.1-19 Differential Pressure, R5 to R9; BFMC Test D-16 for SS RUN OPTIONS

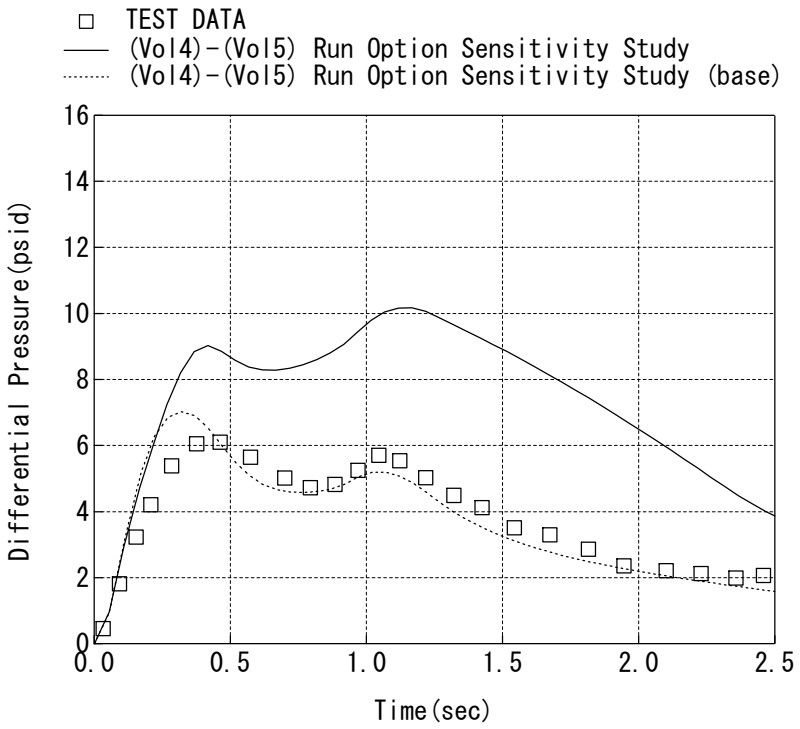

Figure 6.1-20 Differential Pressure, R7 to R8; BFMC Test D-16 for SS RUN OPTIONS

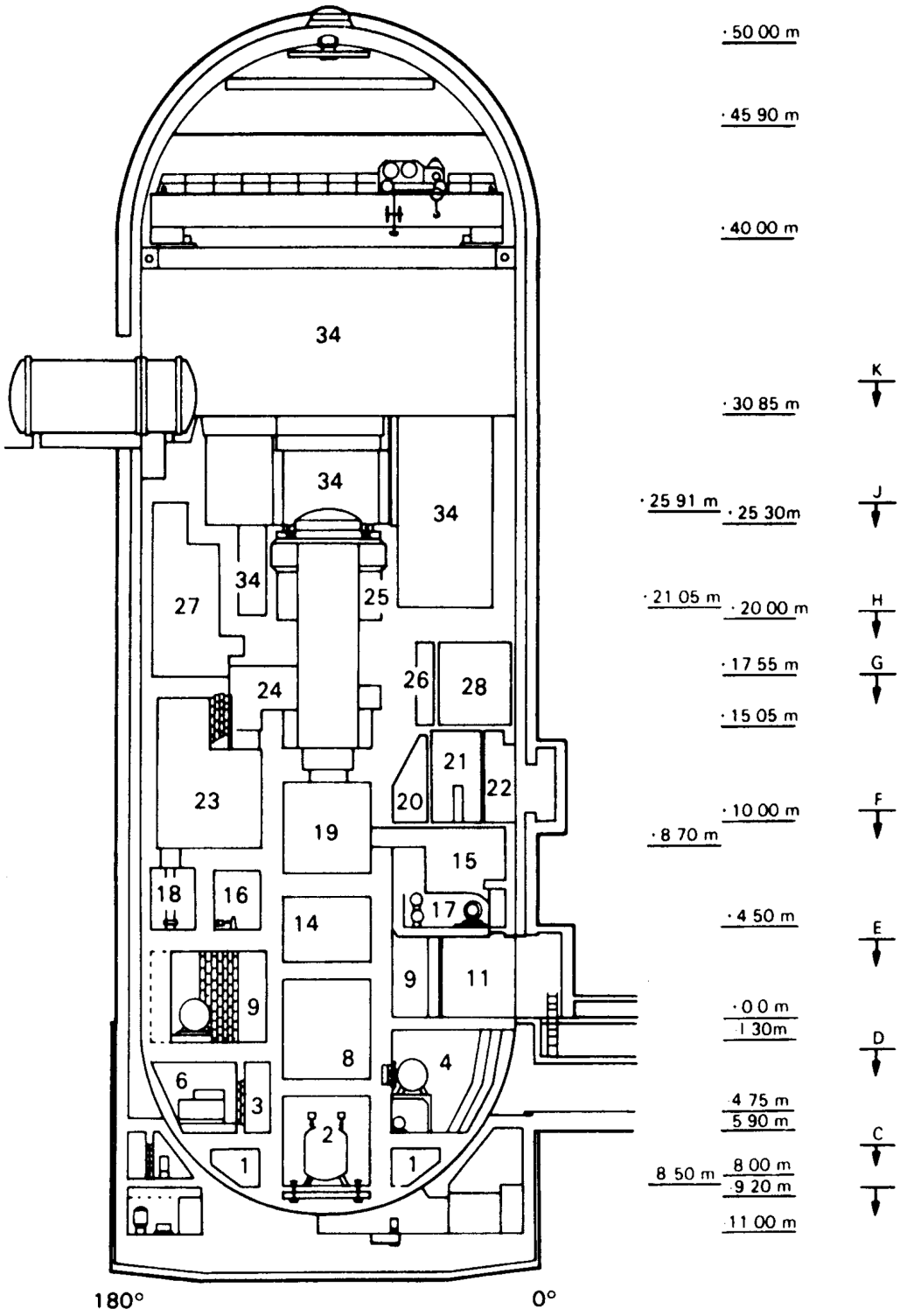

Figure 6.1-21 HDR containment – 0 deg to 180 deg.

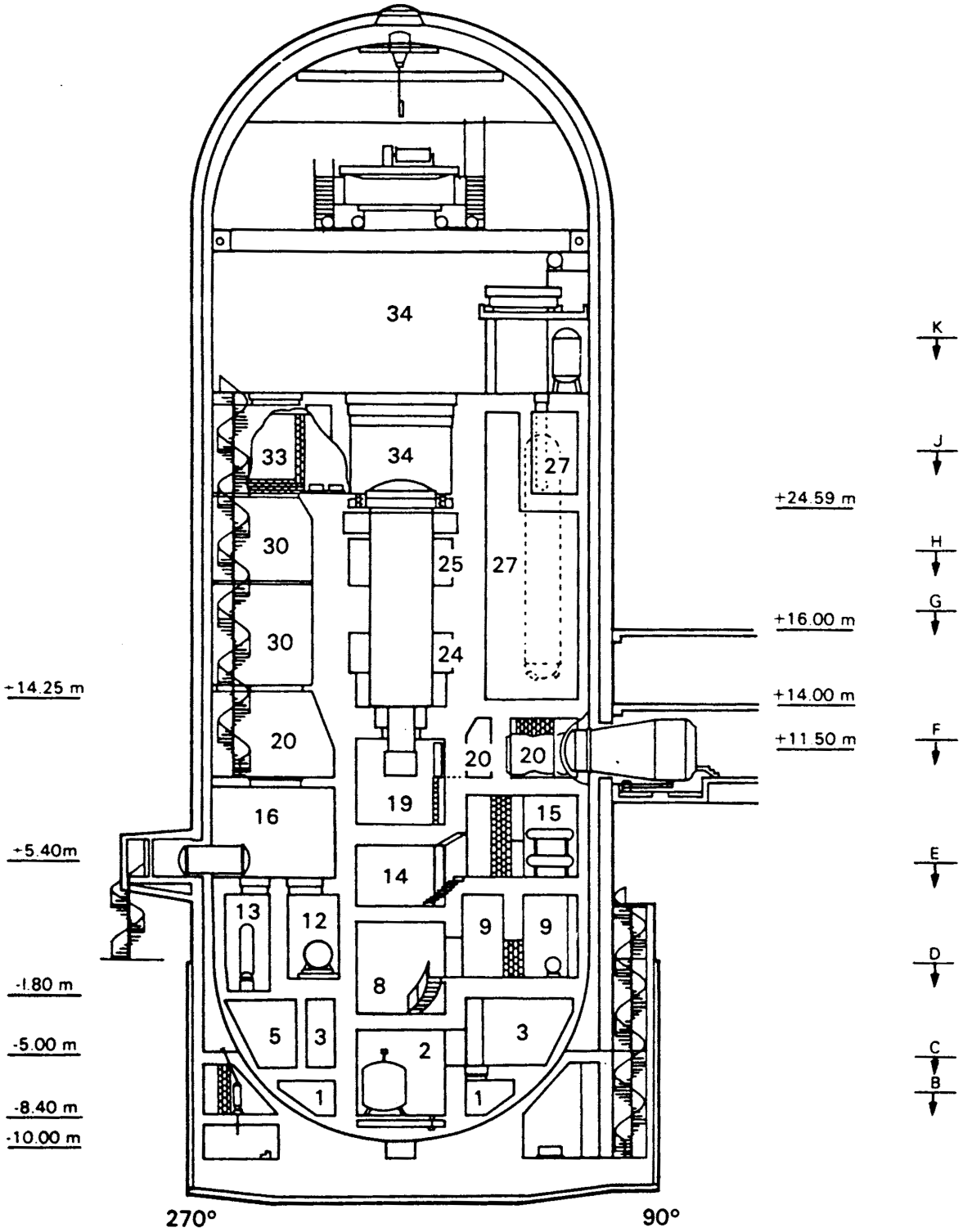

Figure 6.1-22 HDR Containment – 90 deg to 270 deg.

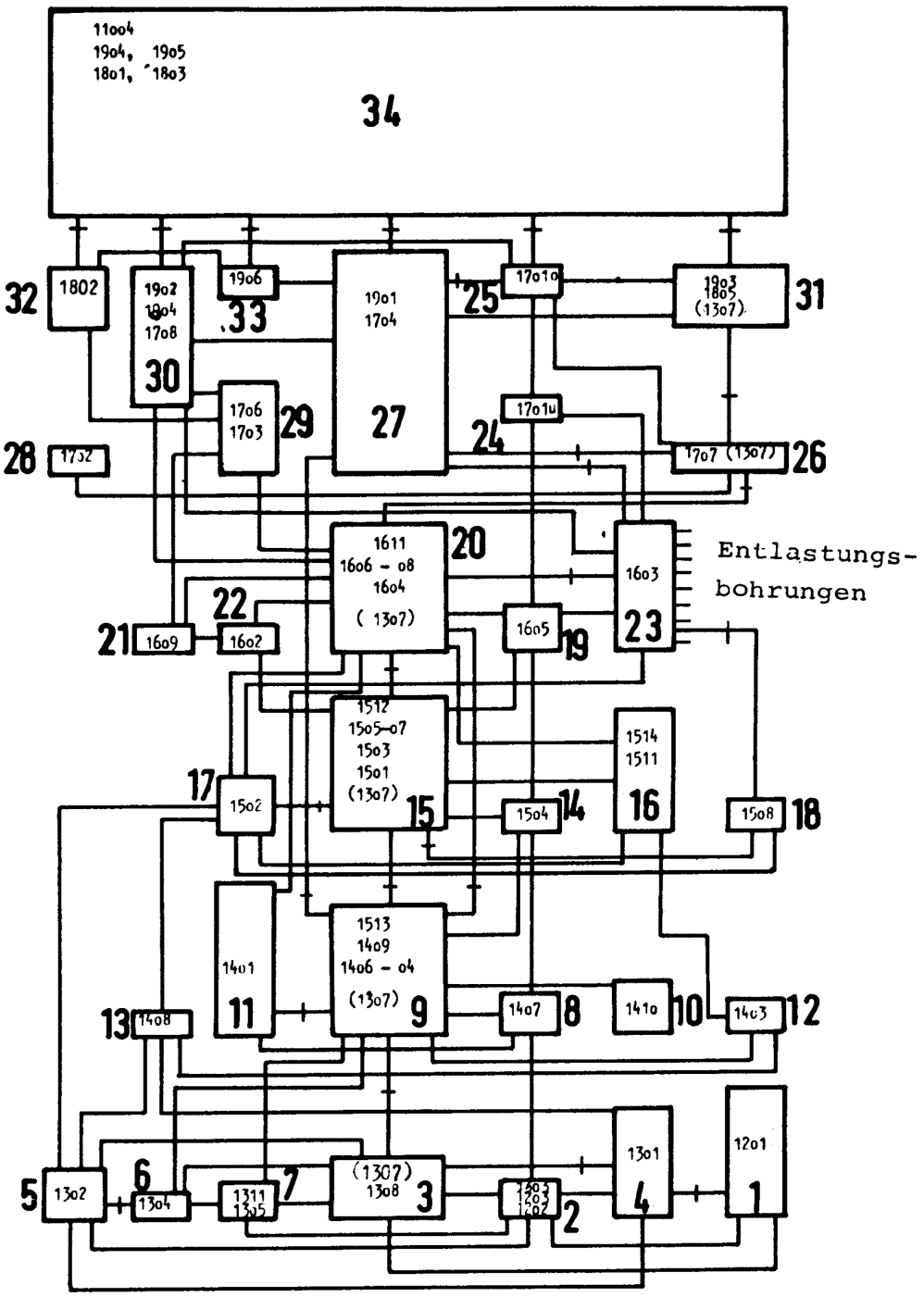

Figure 6.1-23 HDR Room & Zone Numbers and Connections.

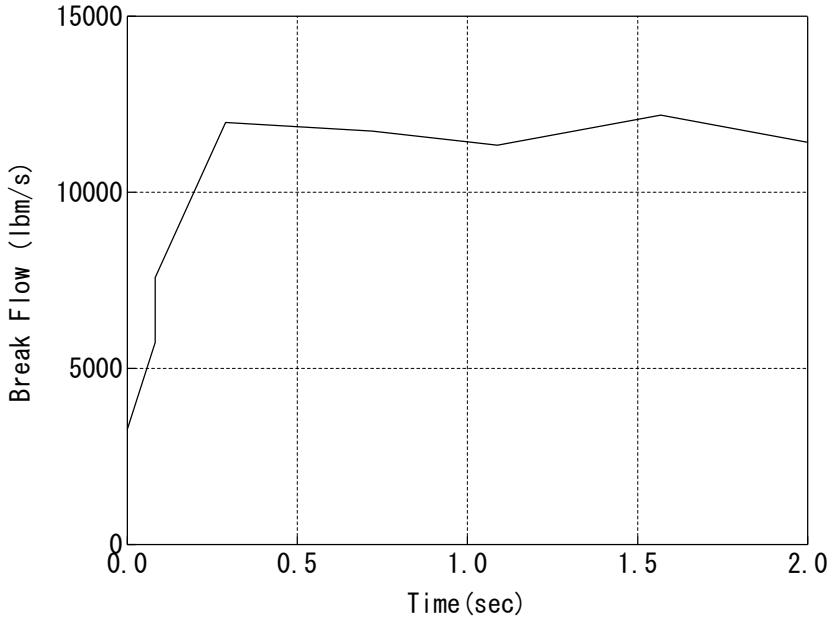

Figure 6.1-24 Break Flow; HDR Test V21.1

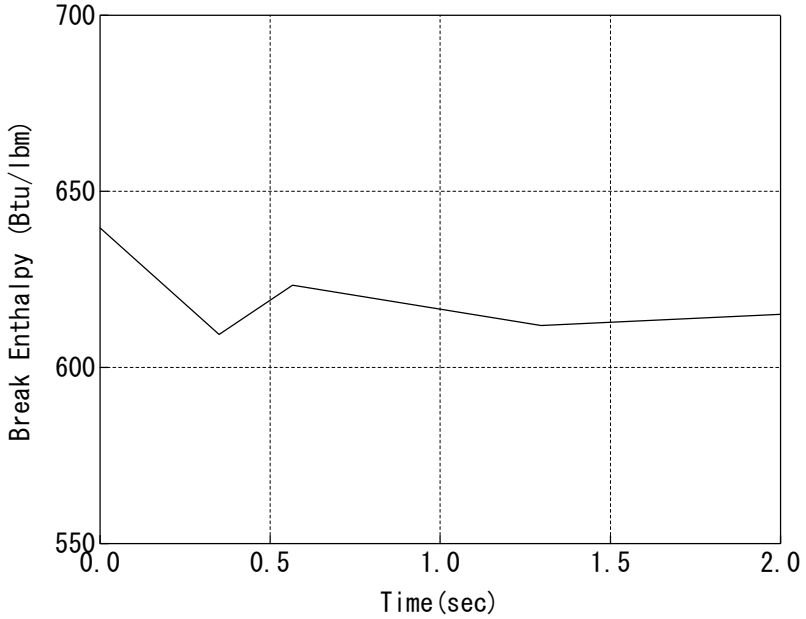

Figure 6.1-25 Break Enthalpy; HDR Test V21.1

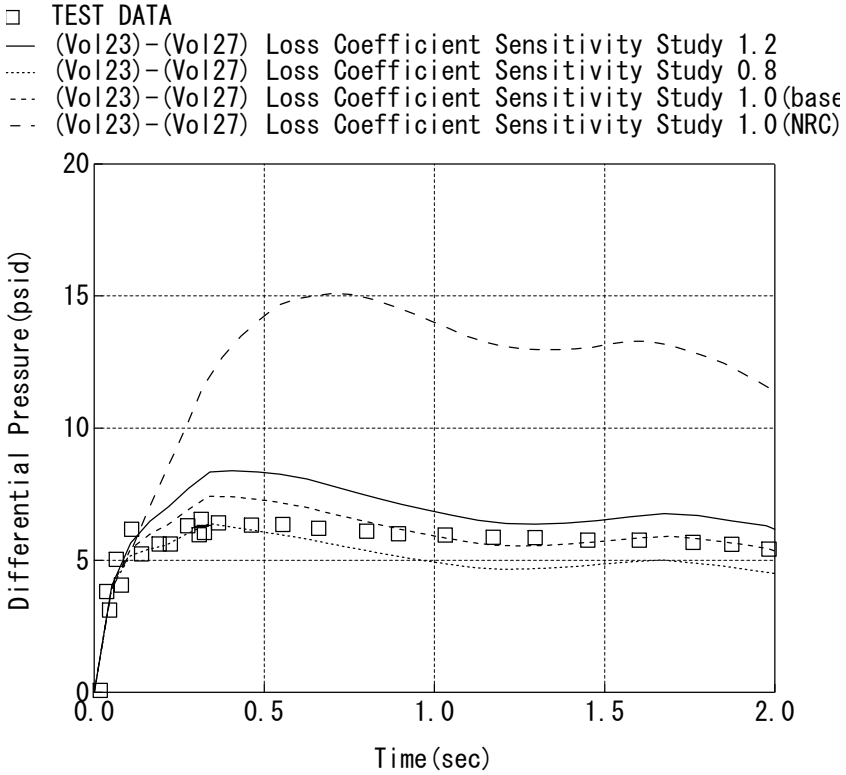

Figure 6.1-26 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Vent Loss coefficient

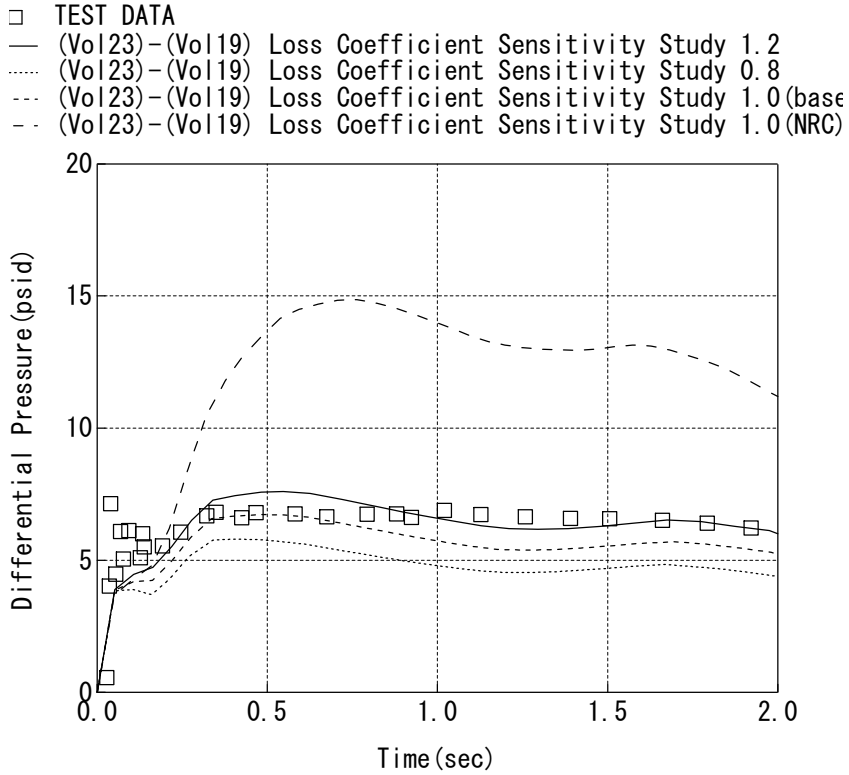

Figure 6.1-27 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS Vent Loss coefficient

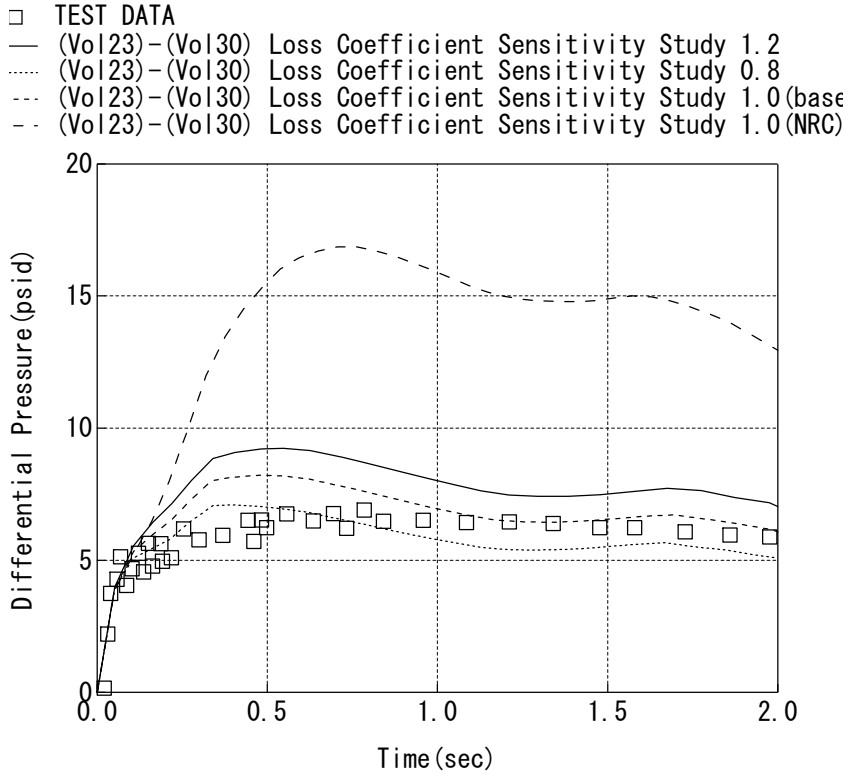

Figure 6.1-28 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Vent Loss coefficient

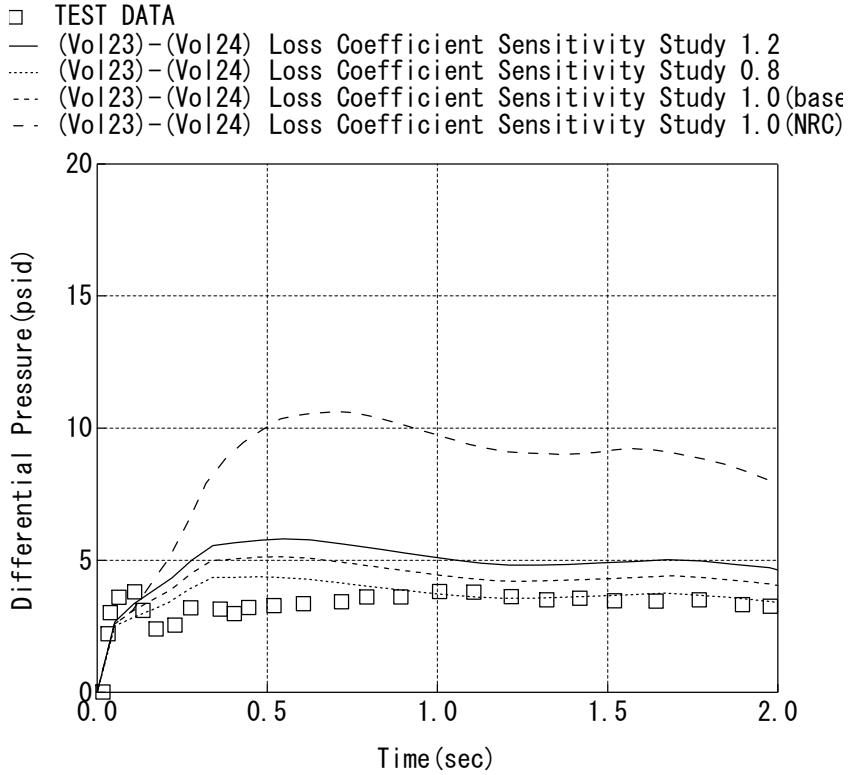

Figure 6.1-29 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Vent Loss coefficient

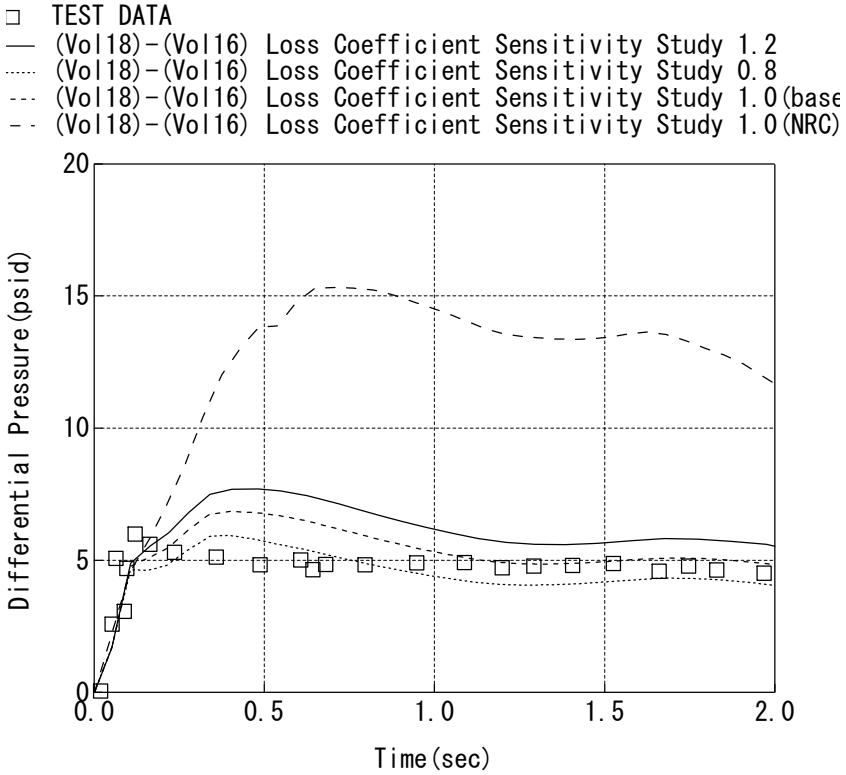

Figure 6.1-30 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Vent Loss coefficient

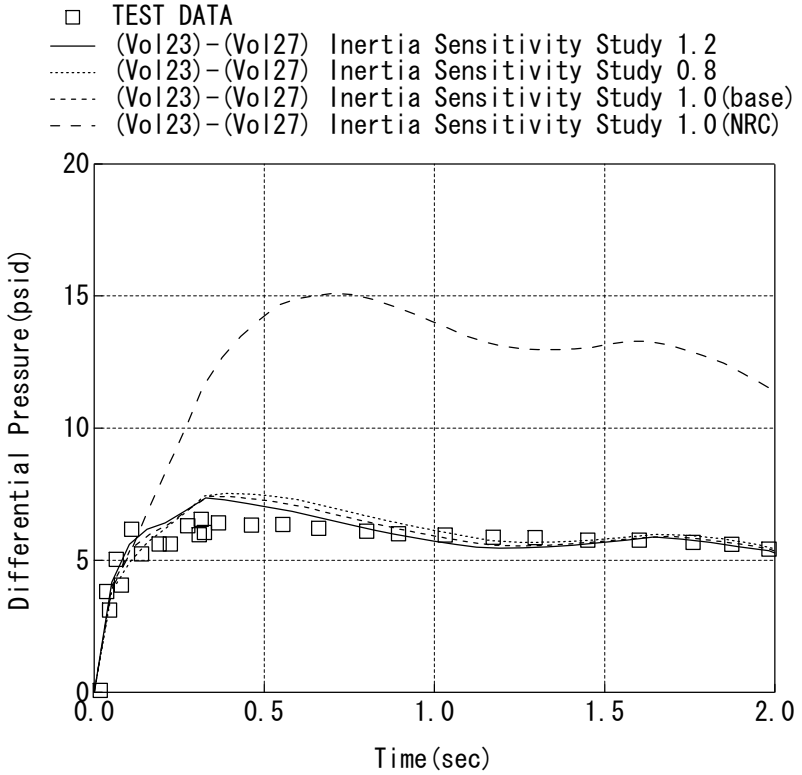

Figure 6.1-31 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS INERTIA

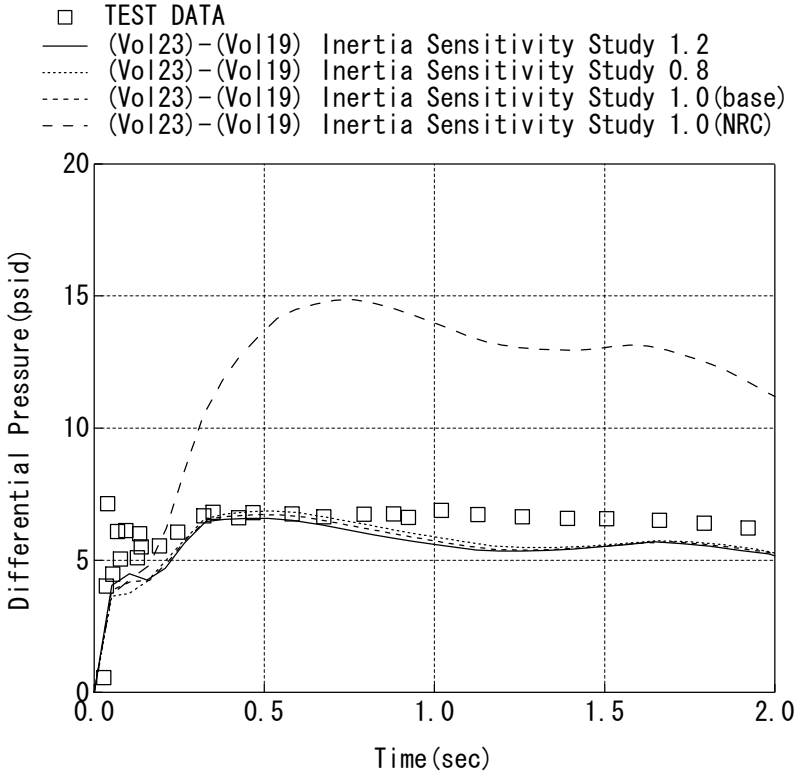

Figure 6.1-32 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS INERTIA

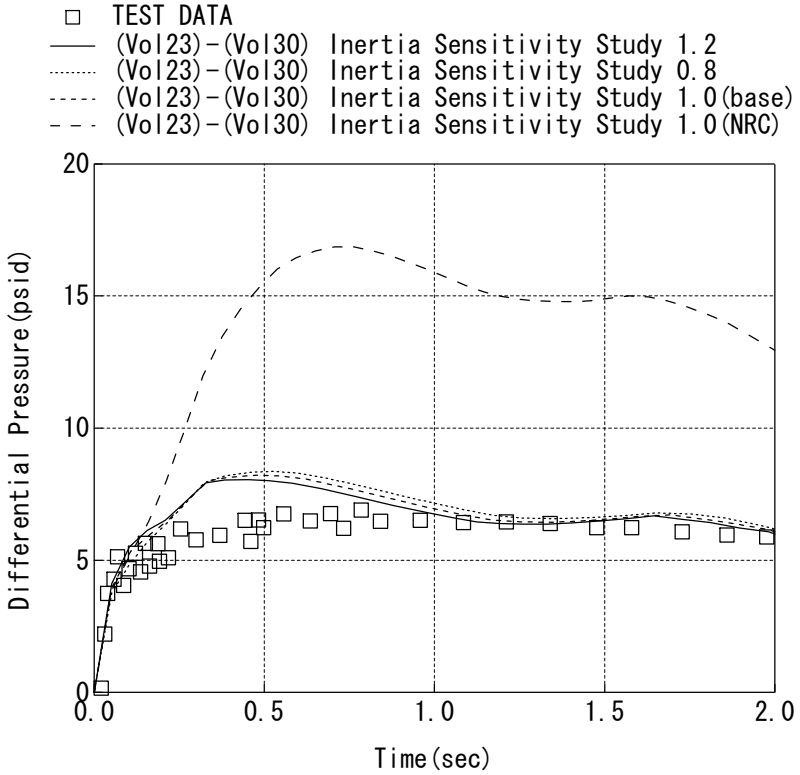

Figure 6.1-33 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS INERTIA

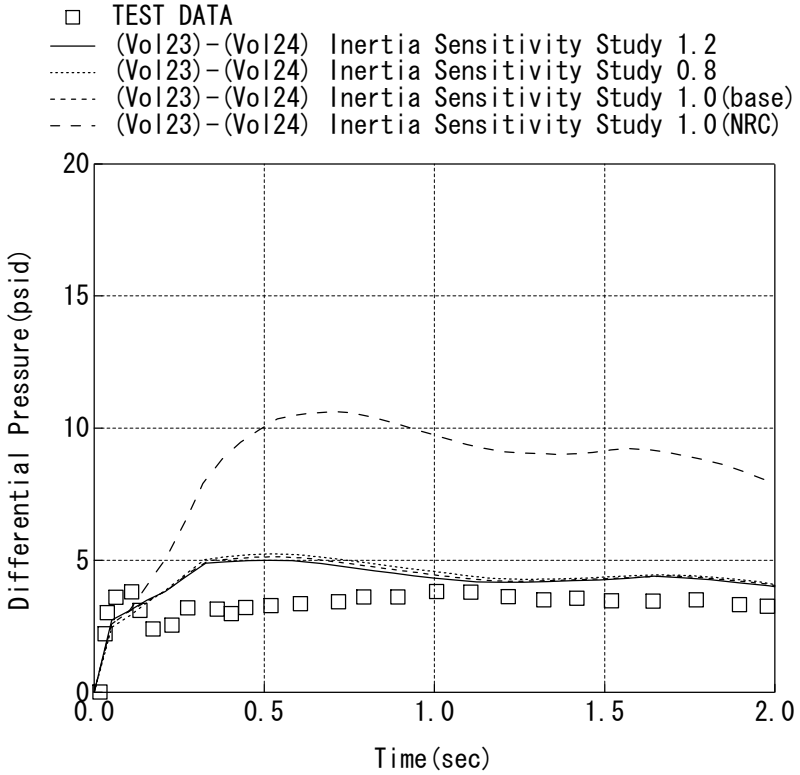

Figure 6.1-34 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS INERTIA

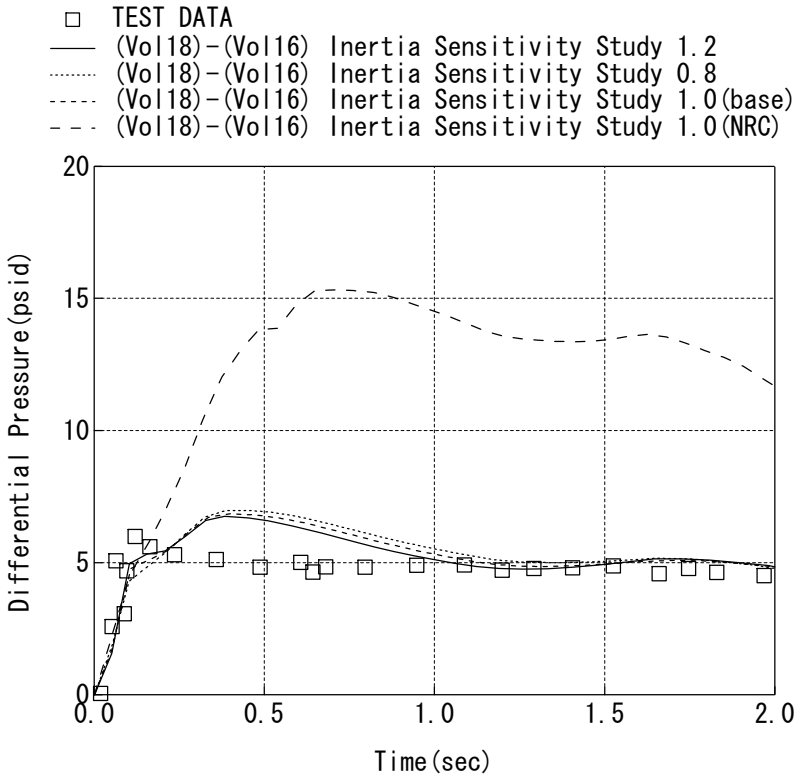

Figure 6.1-35 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS INERTIA

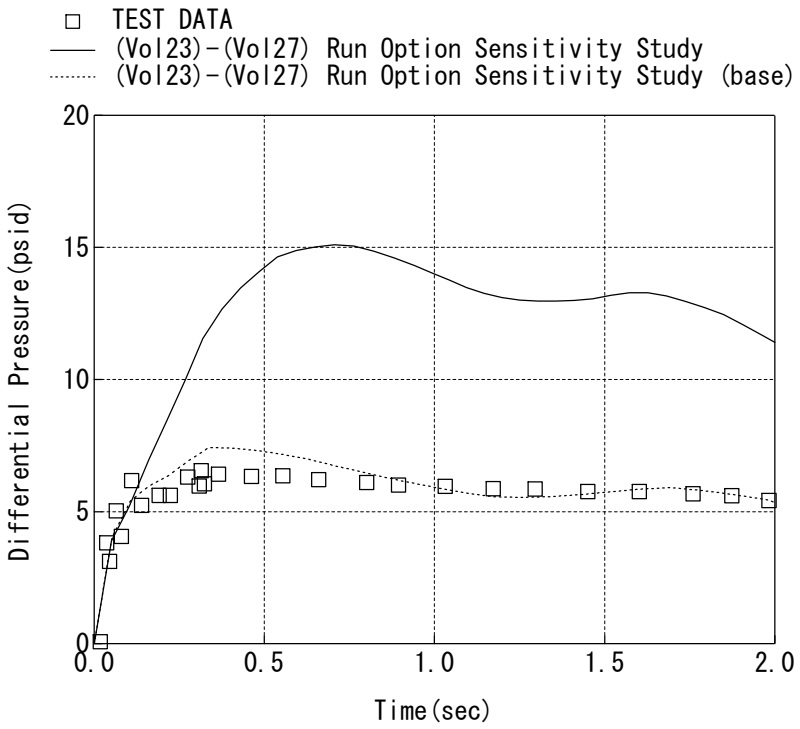

Figure 6.1-36 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS RUN OPTIONS

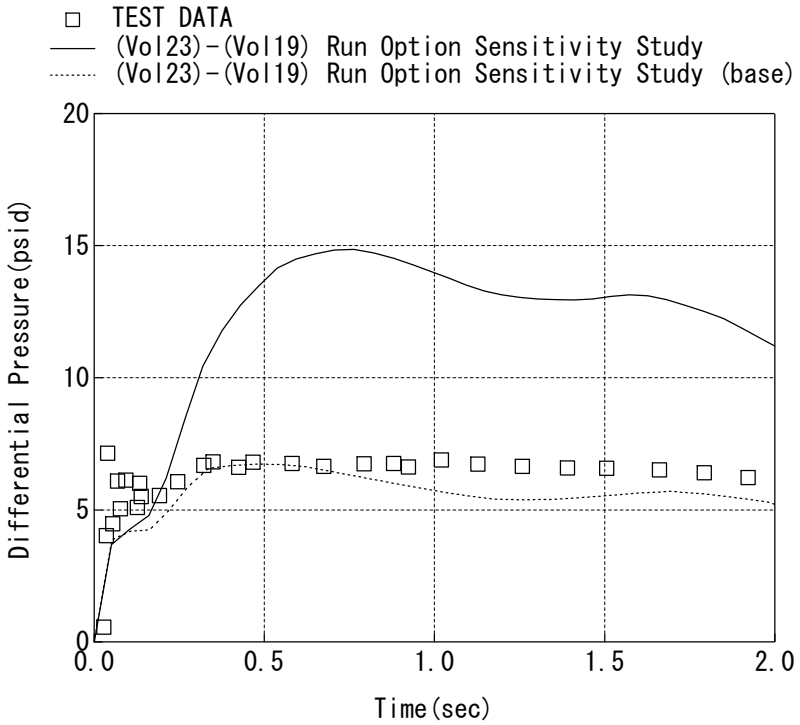

Figure 6.1-37 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS RUN OPTIONS

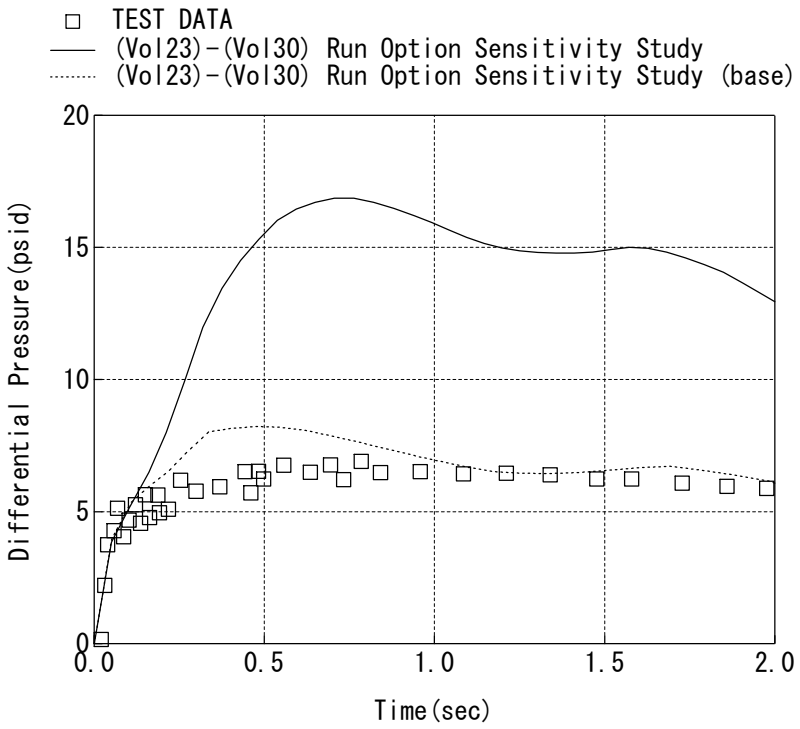

Figure 6.1-38 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS RUN OPTIONS

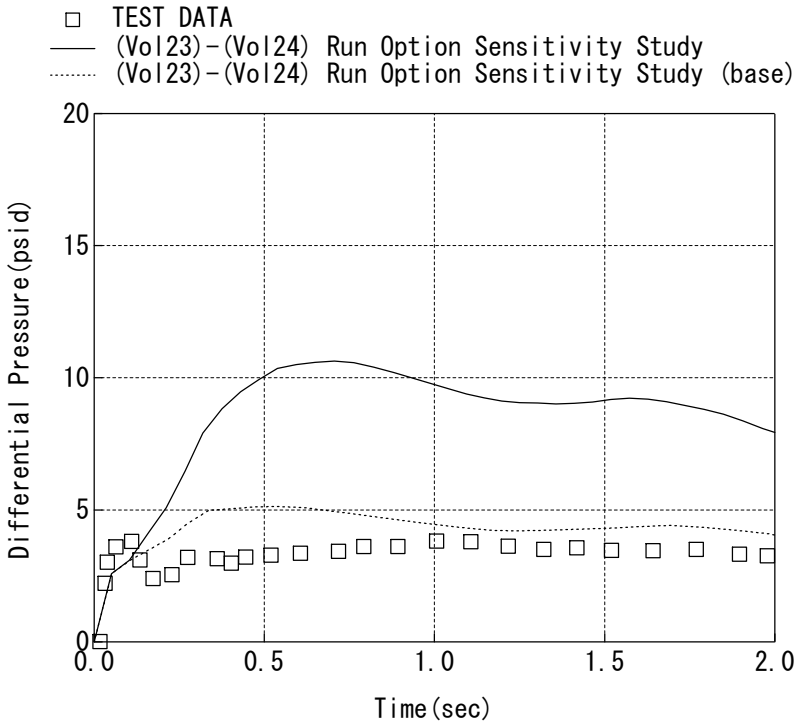

Figure 6.1-39 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS RUN OPTIONS

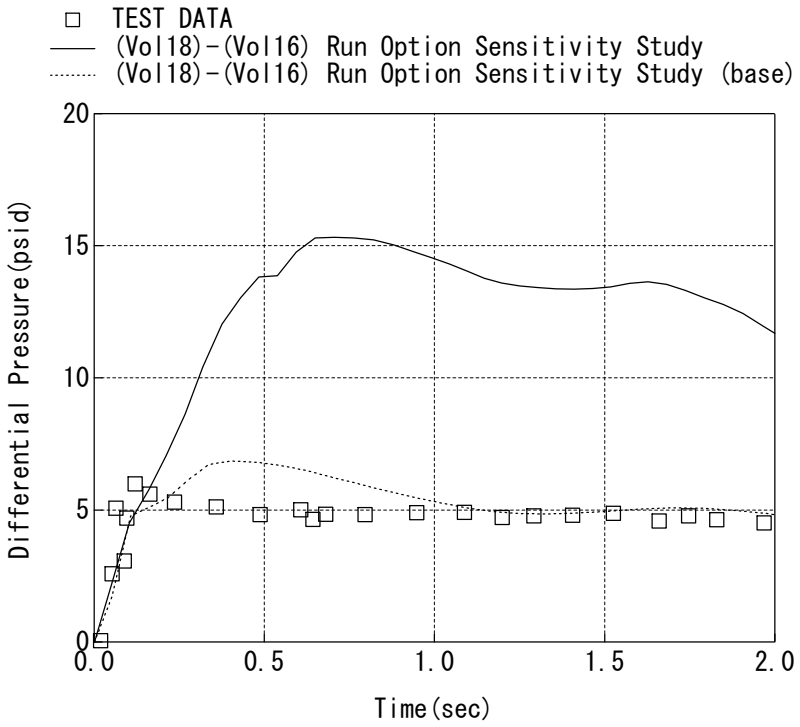

Figure 6.1-40 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS RUN OPTIONS

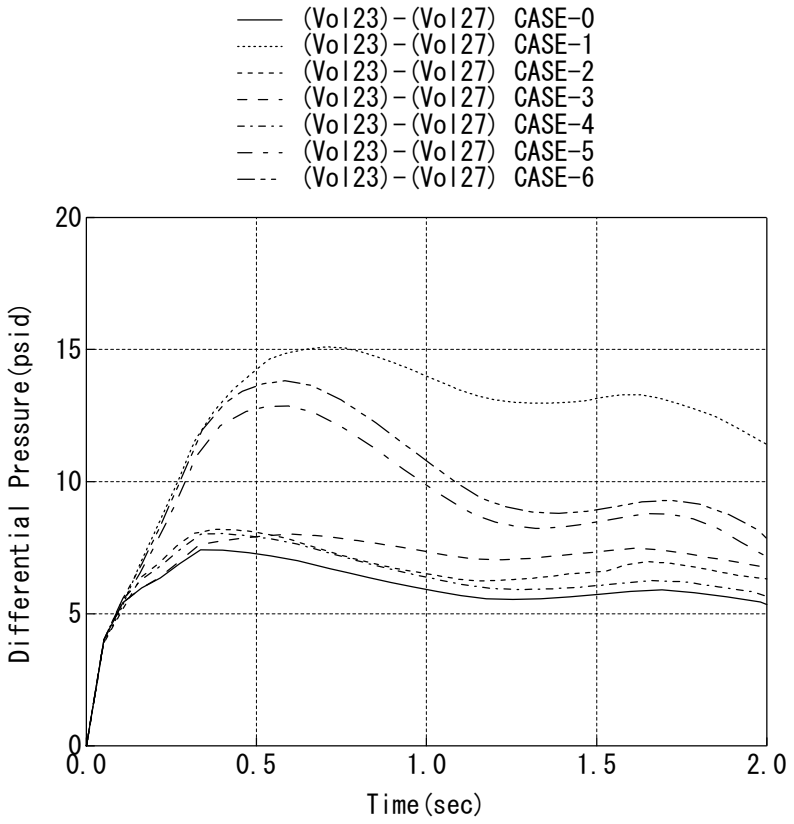

Figure 6.1-41 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS EACH RUN OPTION

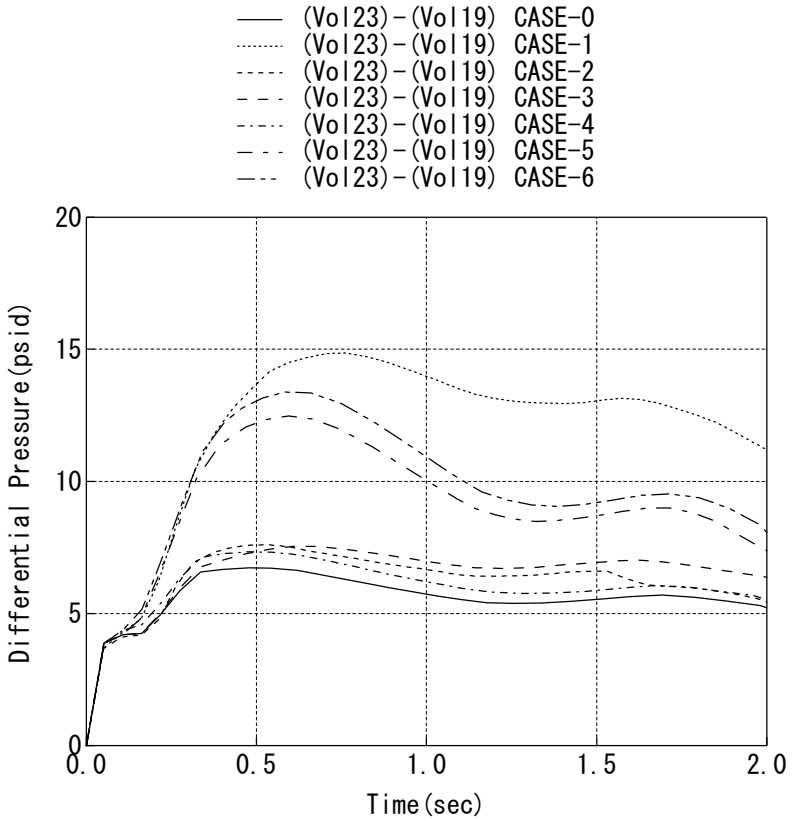

Figure 6.1-42 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS EACH RUN OPTION

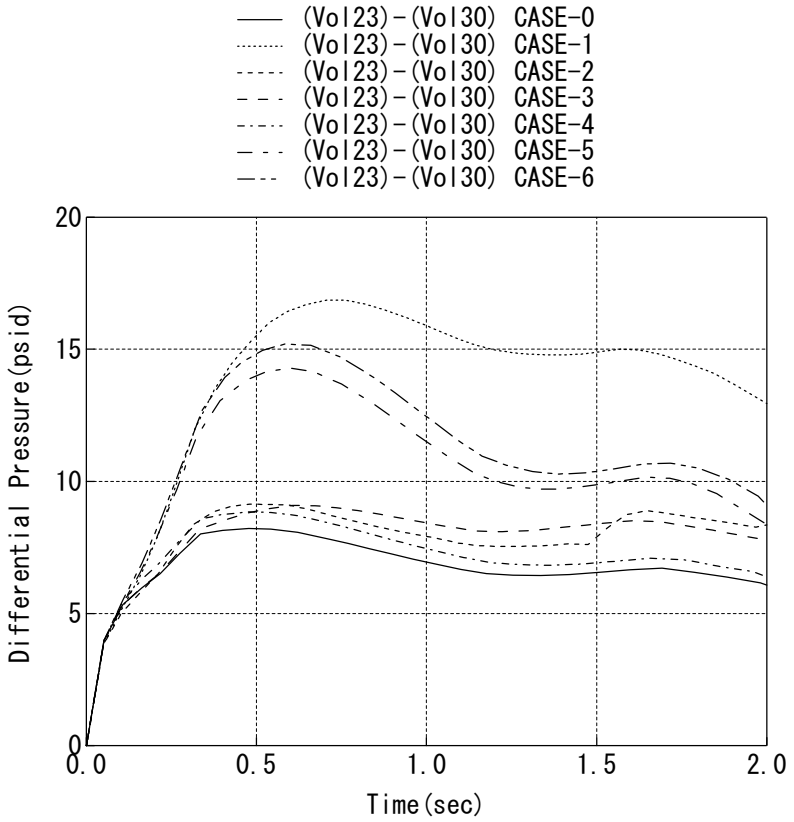

Figure 6.1-43 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS EACH RUN OPTION

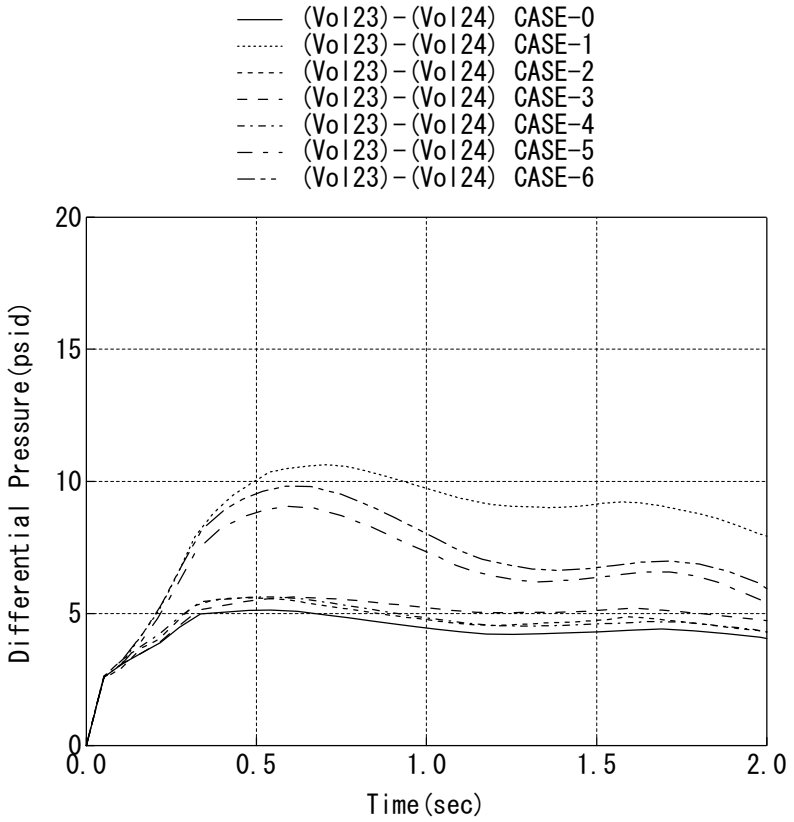

Figure 6.1-44 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS EACH RUN OPTION

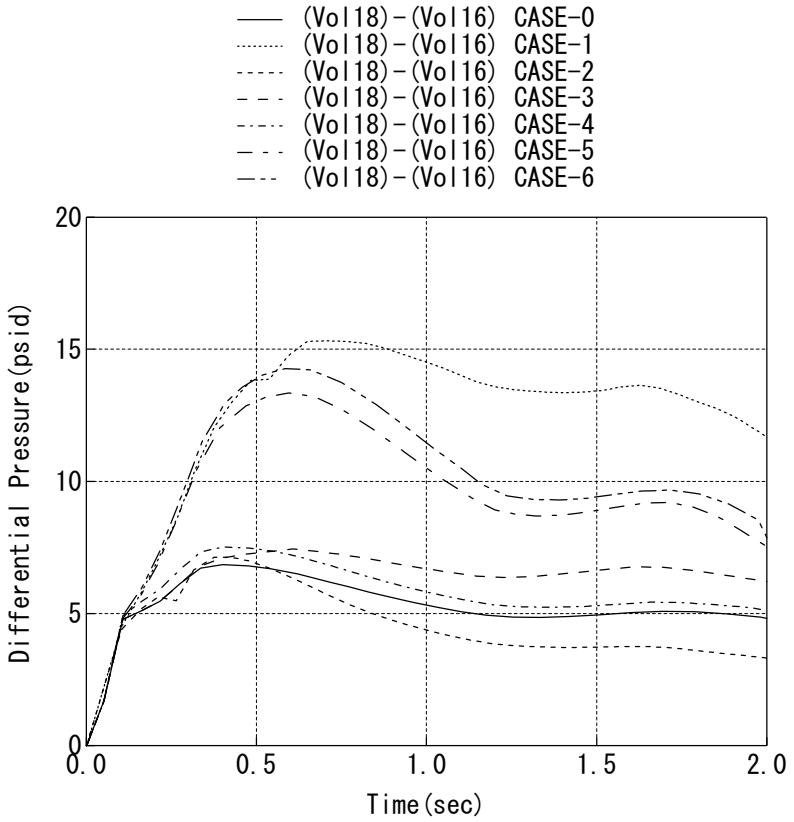

Figure 6.1-45 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS EACH RUN OPTION

6.2 Time Step Size Sensitivity Studies

Selection of time step size is an area of uncertainty. Generally, the smallest time step sizes are needed when the transient begins, particularly where a large amount of high temperature, flashing liquid is injected into small volumes. Time step sizing is highly dependent upon the blowdown spectra, the geometry, and the nodalization scheme. As specified in section C7.2 of ANSI/ANS-56.10-1982, time step sensitivity studies were performed to ensure the insensitivity of the results to the time step sizes chosen, and to find the reasonable and practical time step. The set of optimum time steps is checked for sensitivity by comparing the selected output parameter with results obtained using larger or smaller time step sizes. This was accomplished by doubling or halving each of the maximum and minimum time steps that was specified for each time interval. As a first trial time step, the time step table shown below was used as the base case. Time step size sensitivity studies were conducted using the applicable test data shown in section 6.1 of this report.

Run Control Parameters (Seconds)										
Time Int	DT Min	DT Max	DT Ratio	End Time	Print Int	Graph Int	Max CPU	Dump Int	Ph Chng T Scale	L Flow Shutoff
1	0.001	0.01	1.	2.5	200.	0.05	10000.	0.	DEFAULT	DEFAULT
2	0.001	0.1	1.	50.	200.	0.5	10000.	0.	DEFAULT	DEFAULT

6.2.1 Result for Test BFMC D-16

Figure 6.2-1 to Figure 6.2-5 show differential pressures for BFMC D-16 using the indicated time step limits.

6.2.2 Result for Test HDR V21.1

Figure 6.2-6 to Figure 6.2-10 show differential pressures HDR V21.1 using the indicated time step limits.

6.2.3 Conclusions

From Sections 6.2.1 and 6.2.2, it is concluded that the base time step size selection is suitable for the subcompartment differential pressure analyses.

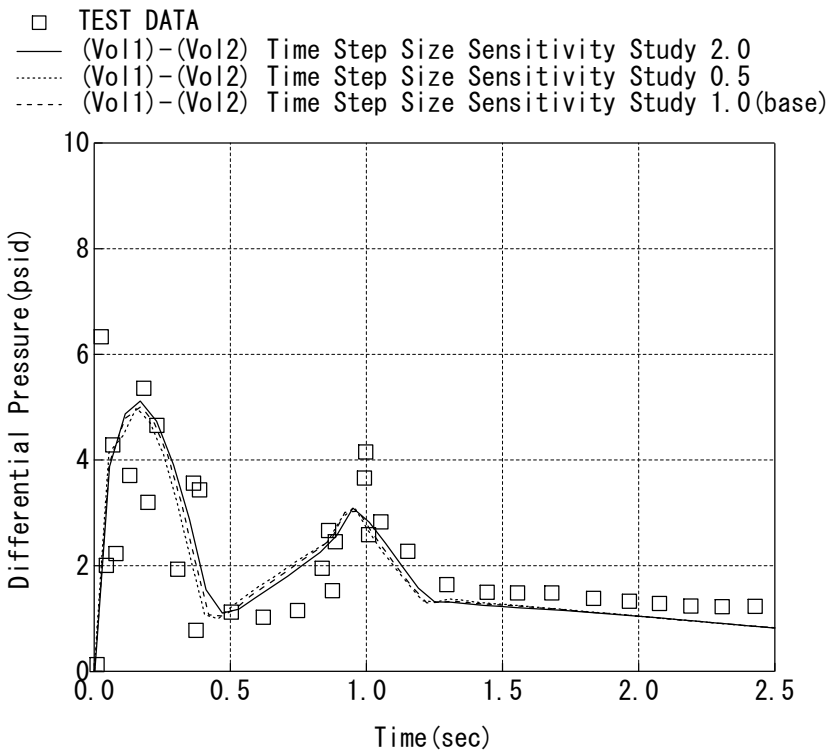

Figure 6.2-1 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Time Step Size

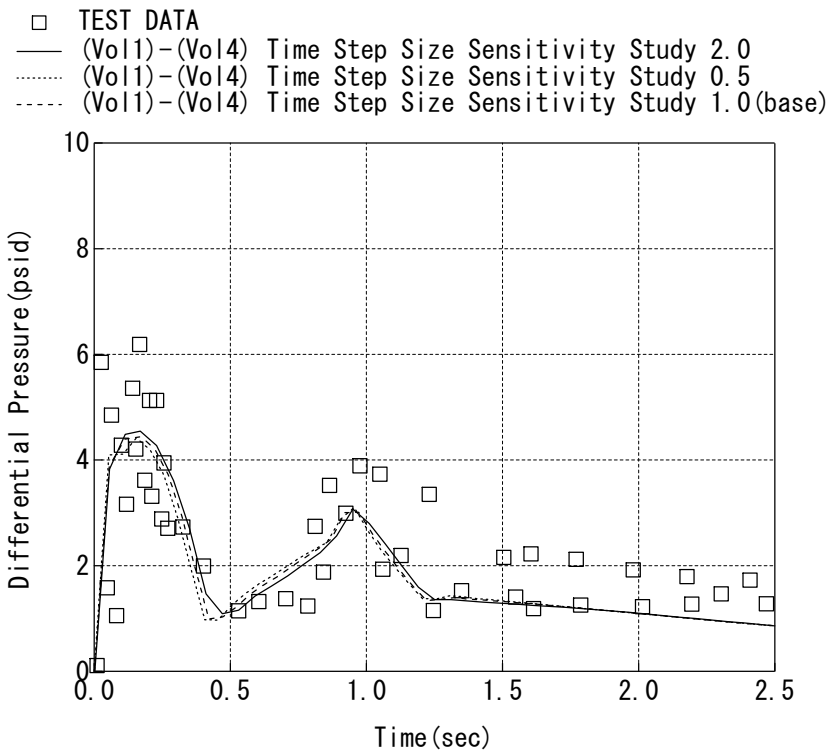

Figure 6.2-2 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Time Step Size

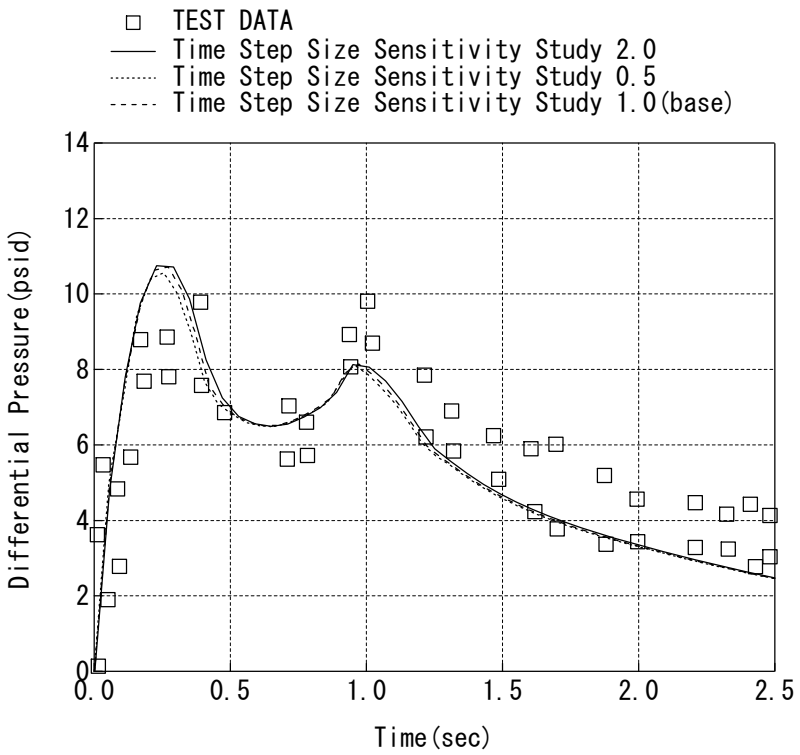

Figure 6.2-3 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Time Step Size

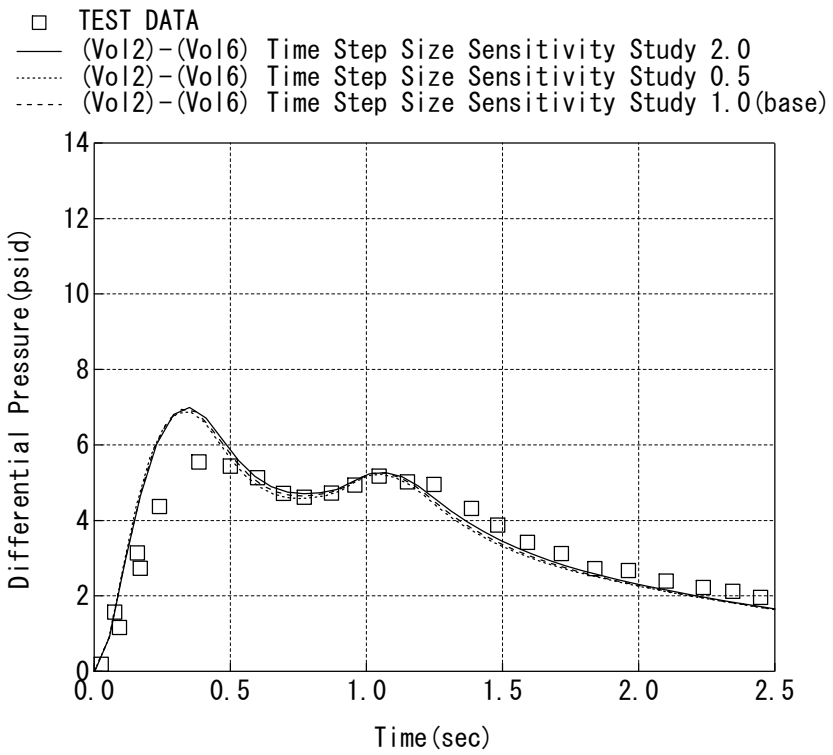

Figure 6.2-4 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Time Step Size

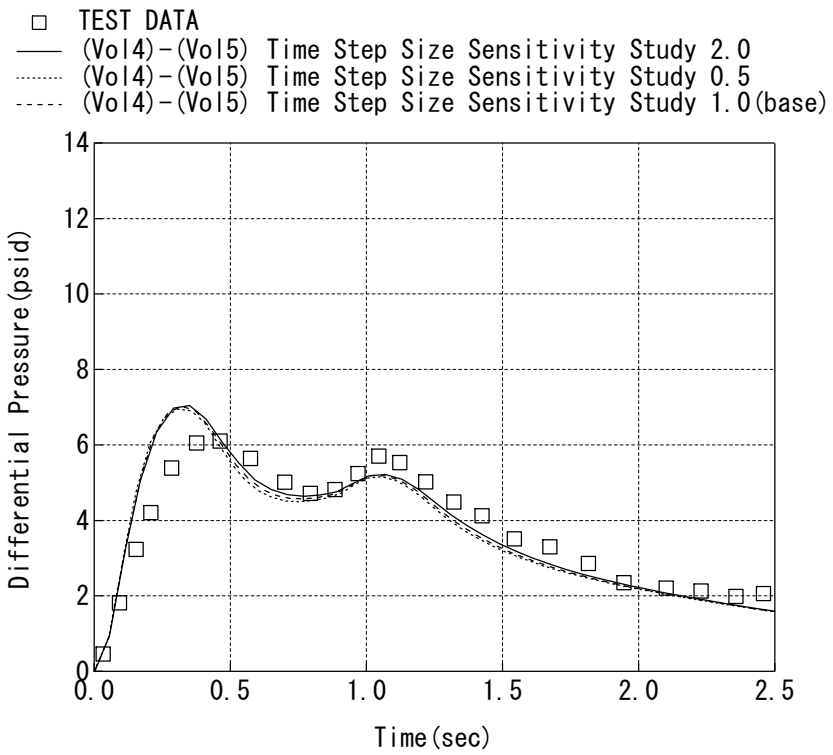

Figure 6.2-5 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Time Step Size

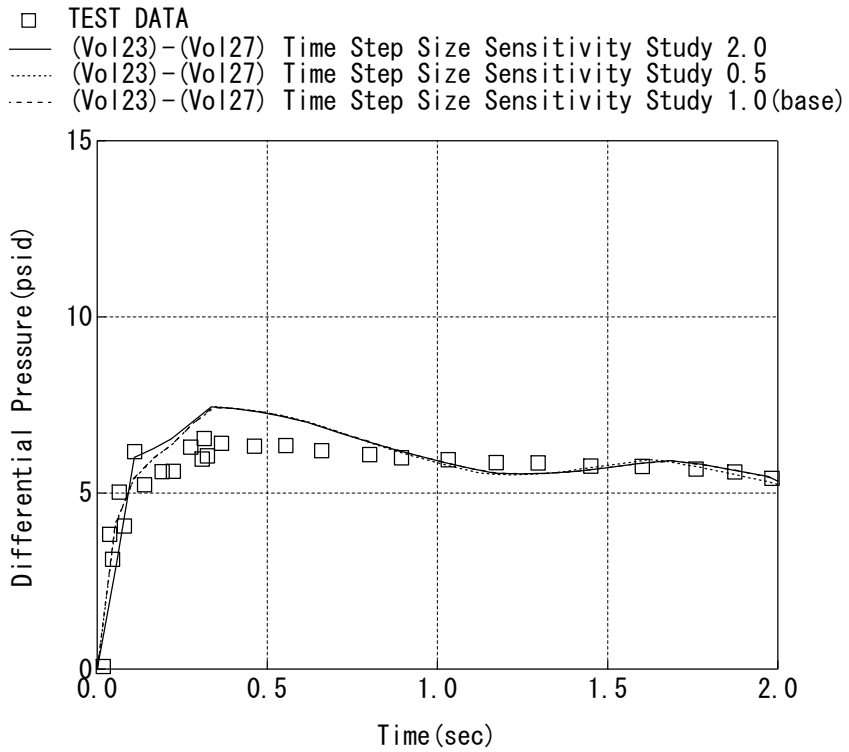

Figure 6.2-6 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Time Step Size

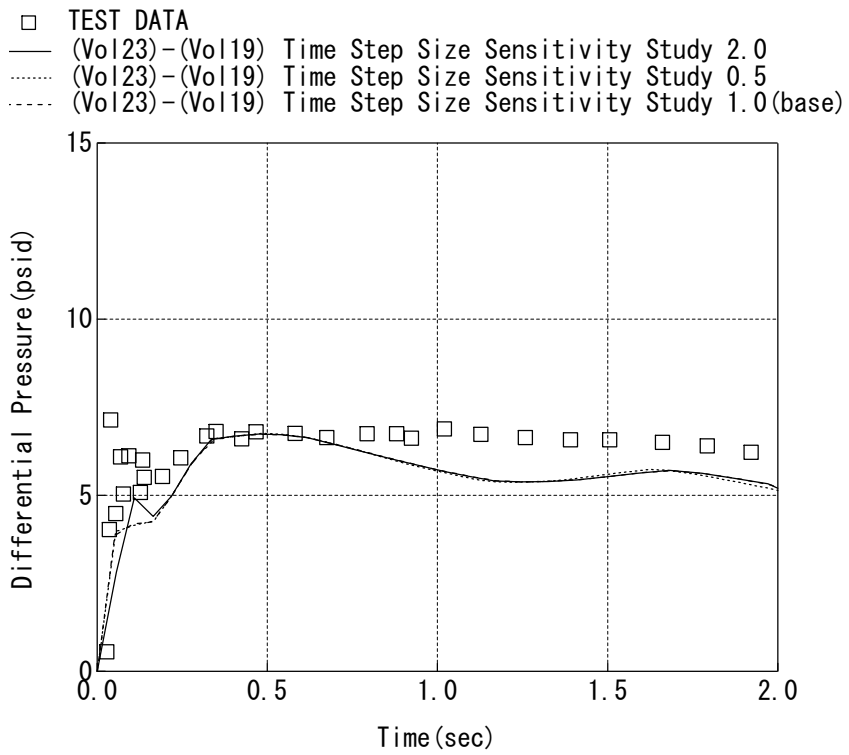

Figure 6.2-7 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS Time Step Size

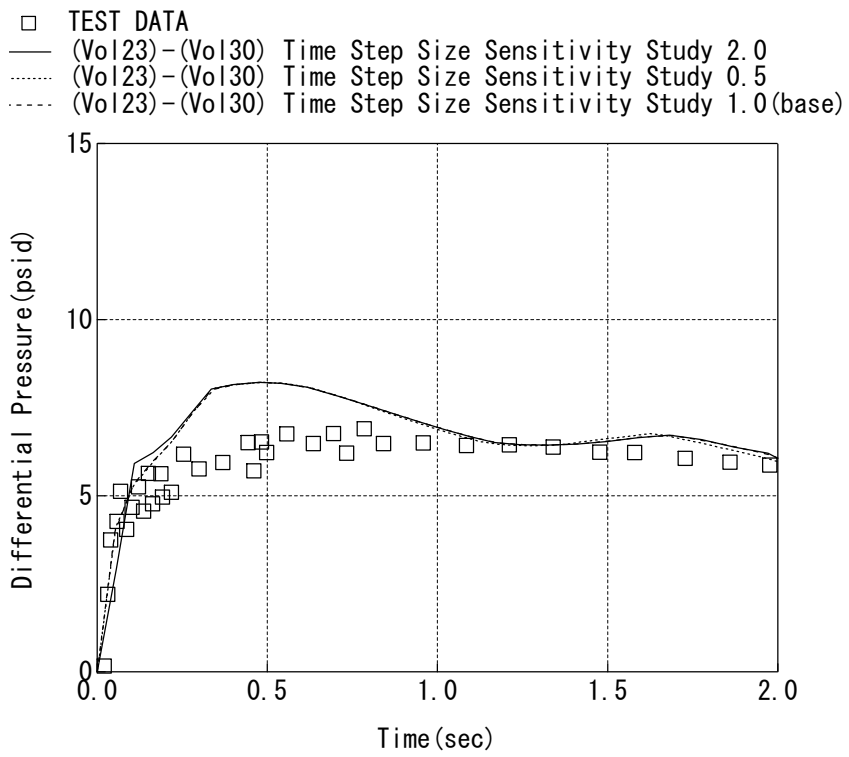

Figure 6.2-8 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Time Step Size

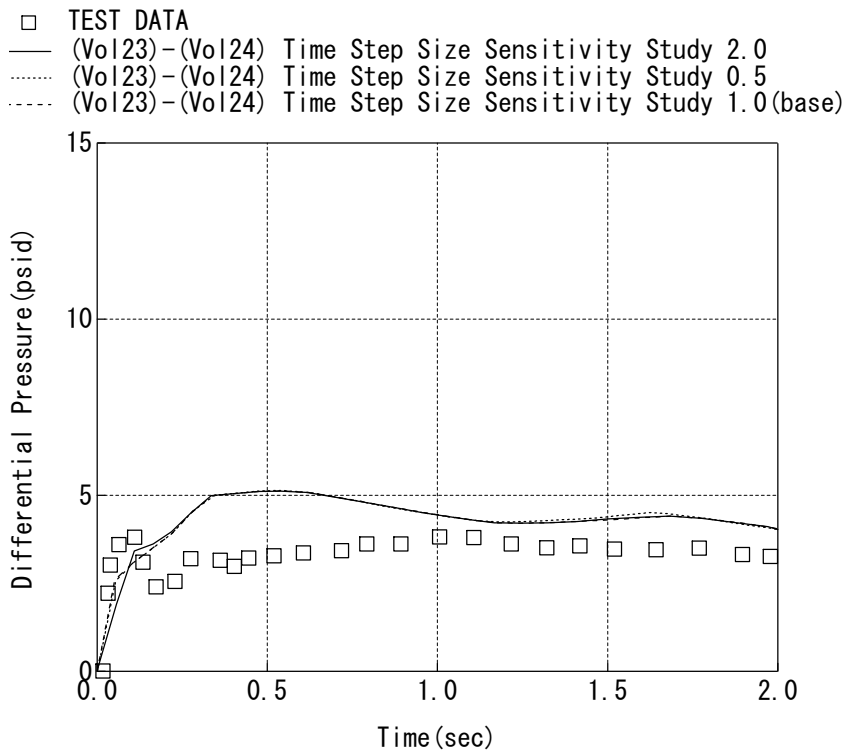

Figure 6.2-9 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Time Step Size

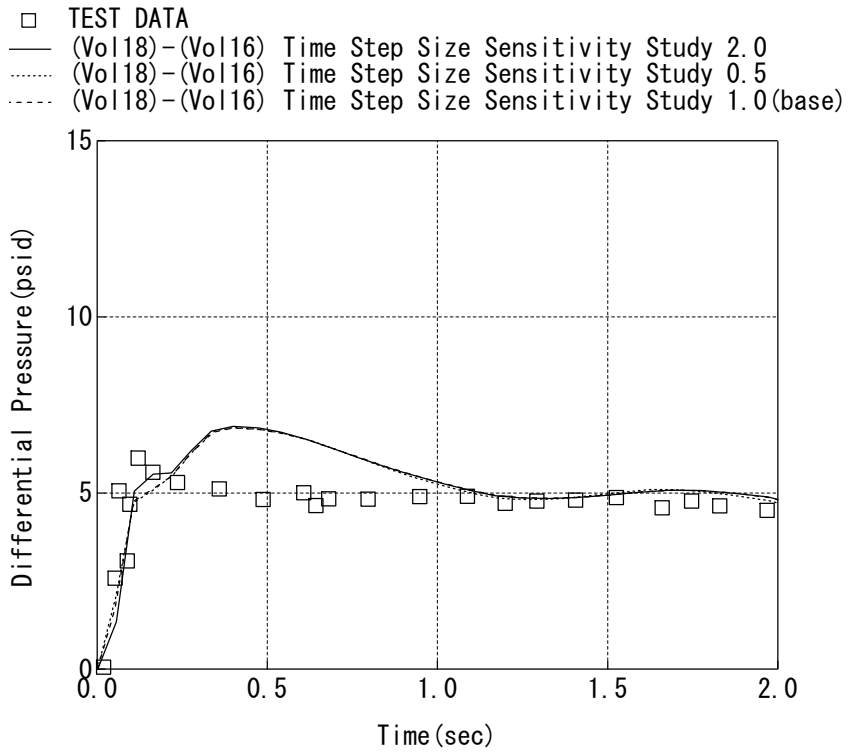

Figure 6.2-10 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Time Step Size

7.0 Plant Subcompartment Analyses

As discussed in Section 3.0 the following cases have been analyzed.

- DVI (4-inch) line break in the reactor cavity
- RHR pump inlet (10-inch) line break, RHR pump outlet (8-inch) line break and feedwater (16-inch) line break in the SG subcompartment
- Pressurizer spray (6-inch) line break and pressurizer safety depressurization (8-inch) line break in the pressurizer subcompartment
- Charging (4-inch) line and letdown (3-inch) line break in regenerative heat exchanger room and regenerative heat exchanger valve room
- Letdown (4-inch) line break in letdown heat exchanger room

7.1 General Analytical Method

7.1.1 Nodalization Schemes

A separate GOTHIC evaluation model is prepared for each subcompartment. In these models, each subcompartment is divided into nodes, with paths defined to model the transfer of mass and energy between nodes during the analyzed transient. The subcompartment nodalization scheme is selected so that nodal boundaries are basically at the location of flow obstructions or geometry changes within the subcompartment. These discontinuities create pressure differentials across nodal boundaries. Within each node, no significant discontinuities would exist, resulting in a negligible pressure gradient within each node. Annular configurations are nodalized circumferentially when asymmetric pressure distribution is presumed.

Nodalization sensitivity studies have been performed using two nodalizations (that is; one base run and the sensitivity run with increased local nodalization) in the pressurizer subcompartment analysis as required in section C5.1 of ANSI/ANS-56.10-1982(Ref. 10) and described in 7.4.1 (b).

In other subcompartment analyses, nodalization sensitivity studies have not been performed. The reason is discussed in 7.2.1 (b), 7.3.1 (b), 7.5.1 (b) and 7.6.1 (b).

7.1.2 Initial Conditions

It is assumed that the air is at the maximum allowable temperature, minimum absolute pressure, and zero percent relative humidity, according to guidance in Standard Review Plan (SRP) 6.2.1.2（Ref. 7）.

7.1.3 Vent Loss Coefficient

The loss coefficients for vent flow paths are determined depending on their geometries referring to Reference 12.

(a)Friction Pressure Loss

Friction pressure loss was calculated using a friction length, a hydraulic diameter, and

a wall friction factor calculated in the code. The friction length between two cells is given conservatively as 1.2 times the distance between centers of two cells through the center the path of connecting cell face.

(b) Expansion and Contraction Pressure Loss

An expansion loss coefficient is conservatively given as 1.0, assuming an abrupt expansion to infinite cross-sectional area for each flow path with expanding configuration. A contraction loss coefficient is conservatively given as 0.5 in the same way as expansion.

For grating, an aperture ratio of 0.6 is conservatively assumed and the loss coefficient was calculated as a thick-edged orifice using the aperture ratio as the cross-sectional area ratio.

For thick-walled orifice configurations like a vent path to the containment atmosphere, a loss coefficient is conservatively given as over 1.5 depending on the ratio of the wall thickness to the hydraulic diameter referring to Reference 12.

7.2 Reactor Cavity

7.2.1 Modeling and nodalization sensitivity study

(a) Base nodal description

The reactor cavity is a narrow annular region surrounded by the reactor vessel and the primary shield. Eight primary loop pipes and four DVI pipes penetrate the region. The postulated pipe break was assumed at one of four DVI pipes in the annular region. The nodalization scheme for US-APWR reactor cavity is shown on Figure 7.2-1 and Figure 7.2-2, and the nodalizaion diagram is shown on Figure 7.2-3 and Figure 7.2-7. The reactor cavity is azimuthally divided into eight equal sectors accounting for penetration of eight primary loop pipes. The upper part of reactor cavity region is blocked by the seal ridge at 45ft 9.41 in EL. The lower part of reactor cavity region is blocked by the base mat, the core catcher and the reactor vessel cooling air supply duct tunnel. Axial division of the reactor cavity region accounts for area change due to structures. Description and geometrical parameters for each node are summarized in Table 7.2-1. A total of one hundred and ten nodes are used for the analysis including SG compartment nodes which provide boundary conditions for the analysis.

(b) Nodalization sensitivity study

Nodalization sensitivity study was not performed. Because if select to the detailed nodalization accounting for all obstructions, resolution of detail in large, constant-area regions, the sensitivity studies are not required according to the description of section 3.2.2.1 of NUREG-0609 (Ref.9). Same node selection was used in the reactor cavity analysis for US-APWR and therefore noding sensitivity studies are not required.

(c) Vent path description

The vent path connection diagram is shown in Figure 7.2-3 to Figure 7.2-6 for each loop direction respectively. Vent path connections in the lower part of the cavity are shown in Figure 7.2-7. Geometric and hydraulic parameters for each vent path are summarized in Table 7.2-2.

Vent paths P1 to P8 run from the reactor cavity to the SG compartments through cooling air exhaust ducts in upper region. Vent paths P137 to P152 run from the reactor cavity to SG compartments through reactor coolant pipe sleeves. Vent paths P153 toP156 run from the reactor cavity to the SG compartments through the DVI penetration.

7.2.2 Short term mass and energy release data

High energy pipes penetrating the reactor cavity are the reactor coolant pipes and the DVI pipes. The reactor coolant pipes are LBB-qualified and no break is assumed. The inner diameter of the DVI pipe is 3.438 inches and LBB is not applicable. A guillotine break at one of the DVI pipes was assumed for short term mass and energy release analysis. The analysis was performed using the M-RELAP5 code which is also used for the small break LOCA analysis for the US-APWR. Nodalization of the reactor coolant system for short term mass and energy release is basically the same as the small break LOCA analysis. The break mass and energy flow from the vessel side break is doubled to account for a guillotine break. The resultant short term mass and energy release data are shown

in Table 7.2-3 and the break mass flow rate and enthalpy are shown in Figure 7.2-8 and Figure 7.2-9.

7.2.3 Calculated pressure responses

The break was assumed to occur in the node V50. The worst calculated peak pressure is 15.22 psig at the break node V50. The pressure transient for V50 was shown on Figure 7.2-10. The worst calculated peak pressure is substantially lower than the design pressure (39 psig). The calculated peak pressure and design pressure for each node are shown on Table 7.2-1. The peak pressure is substantially lower than the design pressure for all nodes.

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Exhaust duct:direction of A-CL	0.43	12.7	150	14.396	0	1.19	39	3177.3
2	Exhaust duct:direction of A-HL	0.43	6.7	150	14.396	0	1.06	39	3579.2
3	Exhaust duct:direction of B-HL	0.43	6.7	150	14.396	0	1.06	39	3579.2
4	Exhaust duct:direction of B-CL	0.43	12.0	150	14.396	0	1.2	39	3150
5	Exhaust duct:direction of C-CL	0.43	12.0	150	14.396	0	1.74	39	2141.4
6	Exhaust duct:direction of C-HL	0.43	6.7	150	14.396	0	1.45	39	2589.7
7	Exhaust duct:direction of D-HL	0.43	6.7	150	14.396	0	1.11	39	3413.5
8	Exhaust duct:direction of D-CL	0.43	12.7	150	14.396	0	1.32	39	2854.5
9	Approximately 1/8 of RV ring duct:direction of A-CL	1.65	10.9	150	14.396	0	2.38	39	1538.7
10	Approximately 1/8 of RV ring duct:direction of A-HL	1.65	10.9	150	14.396	0	2.37	39	1545.6
11	Approximately 1/8 of RV ring duct:direction of B-HL	1.65	10.9	150	14.396	0	2.37	39	1545.6

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
12	Approximately 1/8 of RV ring duct:direction of B-CL	1.65	10.9	150	14.396	0	2.37	39	1545.6
13	Approximately 1/8 of RV ring duct:direction of C-CL	1.65	10.9	150	14.396	0	2.37	39	1545.6
14	Approximately 1/8 of RV ring duct:direction of C-HL	1.65	10.9	150	14.396	0	2.36	39	1552.5
15	Approximately 1/8 of RV ring duct:direction of D-HL	1.65	10.9	150	14.396	0	2.36	39	1552.5
16	Approximately 1/8 of RV ring duct:direction of D-CL	1.65	10.9	150	14.396	0	2.38	39	1538.7
17	Approximately 1/8 of the upper inner cavity:direction of A-CL	3.74	11.9	150	14.396	0	5.44	39	616.9
18	Approximately 1/8 of the upper inner cavity:direction of A-HL	3.74	11.6	150	14.396	0	5.49	39	610.4
19	Approximately 1/8 of the upper inner cavity:direction of B-HL	3.74	11.6	150	14.396	0	5.42	39	619.6

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
20	Approximately 1/8 of the upper inner cavity:direction of B-CL	3.74	11.9	150	14.396	0	5.32	39	633.1
21	Approximately 1/8 of the upper inner cavity:direction of C-CL	3.74	11.9	150	14.396	0	5.27	39	640
22	Approximately 1/8 of the upper inner cavity:direction of C-HL	3.74	11.6	150	14.396	0	5.27	39	640
23	Approximately 1/8 of the upper inner cavity:direction of D-HL	3.74	11.6	150	14.396	0	5.28	39	638.6
24	Approximately 1/8 of the upper inner cavity:direction of D-CL	3.74	11.9	150	14.396	0	5.33	39	631.7
25	Approximately 1/8 of the lower inner cavity:direction of A-CL	4.79	19.5	150	14.396	0	6.47	39	502.8
26	Approximately 1/8 of the lower inner cavity:direction of A-HL	4.79	20.7	150	14.396	0	6.47	39	502.8
27	Approximately 1/8 of the lower inner cavity:direction of B-HL	4.79	20.7	150	14.396	0	6.46	39	503.7

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
28	Approximately 1/8 of the lower inner cavity:direction of B-CL	4.79	19.5	150	14.396	0	6.45	39	504.7
29	Approximately 1/8 of the lower inner cavity:direction of C-CL	4.79	19.5	150	14.396	0	6.43	39	506.5
30	Approximately 1/8 of the lower inner cavity:direction of C-HL	4.79	20.7	150	14.396	0	6.43	39	506.5
31	Approximately 1/8 of the lower inner cavity:direction of D-HL	4.79	20.7	150	14.396	0	6.44	39	505.6
32	Approximately 1/8 of the lower inner cavity:direction of D-CL	4.79	19.5	150	14.396	0	6.44	39	505.6
33	Path of cooling air in R/V support :direction of A-CL	5.46	9.6	150	14.396	0	6.9	39	465.2
34	Path of cooling air in R/V support :direction of A-HL	5.46	9.6	150	14.396	0	7.15	39	445.5
35	Path of cooling air in R/V support :direction of B-HL	5.46	9.6	150	14.396	0	6.78	39	475.2
36	Path of cooling air in R/V support :direction of B-CL	5.46	9.6	150	14.396	0	6.62	39	489.1
37	Path of cooling air in R/V support :direction of C-CL	5.46	9.6	150	14.396	0	6.49	39	500.9

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
38	Path of cooling air in R/V support :direction of C-HL	5.46	9.6	150	14.396	0	6.48	39	501.9
39	Path of cooling air in R/V support :direction of D-HL	5.46	9.6	150	14.396	0	6.5	39	500
40	Path of cooling air in R/V support :direction of D-CL	5.46	9.6	150	14.396	0	6.6	39	490.9
41	Approximately 1/8 of the upper inspection annulus:direction of A-CL	3.08	111.6	150	14.396	0	11.95	39	226.4
42	Approximately 1/8 of the upper inspection annulus:direction of A-HL	3.08	91.4	150	14.396	0	13.34	39	192.4
43	Approximately 1/8 of the upper inspection annulus:direction of B-HL	3.08	93.2	150	14.396	0	9.63	39	305
44	Approximately 1/8 of the upper inspection annulus:direction of B-CL	3.08	112.5	150	14.396	0	6.84	39	470.2
45	Approximately 1/8 of the upper inspection annulus:direction of C-CL	3.08	112.5	150	14.396	0	6.49	39	500.9
46	Approximately 1/8 of the upper inspection annulus:direction of C-HL	3.08	93.2	150	14.396	0	7.08	39	450.8

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
47	Approximately 1/8 of the upper inspection annulus:direction of D-HL	3.08	91.4	150	14.396	0	6.76	39	476.9
48	Approximately 1/8 of the upper inspection annulus:direction of D-CL	3.08	111.6	150	14.396	0	6.79	39	474.4
49	Approximately 1/8 of the lower inspection annulus:direction of A-CL	4.79	199.1	150	14.396	0	9.26	39	321.2
50	Approximately 1/8 of the lower inspection annulus:direction of A-HL	4.79	167.7	150	14.396	0	15.22	39	156.2
51	Approximately 1/8 of the lower inspection annulus:direction of B-HL	4.79	170.8	150	14.396	0	7.59	39	413.8
52	Approximately 1/8 of the lower inspection annulus:direction of B-CL	4.79	200.4	150	14.396	0	6.7	39	482.1
53	Approximately 1/8 of the lower inspection annulus:direction of C-CL	4.79	200.4	150	14.396	0	6.27	39	522
54	Approximately 1/8 of the lower inspection annulus:direction of C-HL	4.79	170.8	150	14.396	0	7.36	39	429.9

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
55	Approximately 1/8 of the lower inspection annulus:direction of D-HL	4.79	167.7	150	14.396	0	6.56	39	494.5
56	Approximately 1/8 of the lower inspection annulus:direction of D-CL	4.79	199.1	150	14.396	0	6.62	39	489.1
57	Upper portion of primary shield penetration for A-CL	2.21	29.2	150	14.396	0	10.16	39	283.9
58	Upper portion of primary shield penetration for A-HL	2.21	11.6	150	14.396	0	10.58	39	268.6
59	Upper portion of primary shield penetration for B-HL	2.21	11.3	150	14.396	0	6.25	39	524
60	Upper portion of primary shield penetration for B-CL	2.21	27.4	150	14.396	0	5.7	39	584.2
61	Upper portion of primary shield penetration for C-CL	2.21	27.4	150	14.396	0	4.85	39	704.1
62	Upper portion of primary shield penetration for C-HL	2.21	11.3	150	14.396	0	3.35	39	1064.2

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
63	Upper portion of primary shield penetration for D-HL	2.21	11.6	150	14.396	0	3.87	39	907.8
64	Upper portion of primary shield penetration for D-CL	2.21	29.2	150	14.396	0	5.83	39	569
65	Lower portion of primary shield penetration for A-CL	2.21	29.2	150	14.396	0	9.07	39	330
66	Lower portion of primary shield penetration for A-HL	2.21	11.6	150	14.396	0	8.12	39	380.3
67	Lower portion of primary shield penetration for B-HL	2.21	11.3	150	14.396	0	4.44	39	778.4
68	Lower portion of primary shield penetration for B-CL	2.21	27.4	150	14.396	0	5.55	39	602.7
69	Lower portion of primary shield penetration for C-CL	2.21	27.4	150	14.396	0	4.62	39	744.2
70	Lower portion of primary shield penetration for C-HL	2.21	11.3	150	14.396	0	3.37	39	1057.3

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
71	Lower portion of primary shield penetration for D-HL	2.21	11.6	150	14.396	0	3.58	39	989.4
72	Lower portion of primary shield penetration for D-CL	2.21	29.2	150	14.396	0	5.56	39	601.4
73	Primary shield penetration for A-DVI line	1.33	5.3	150	14.396	0	5.18	39	652.9
74	Primary shield penetration for B-DVI line	1.33	4.6	150	14.396	0	3.1	39	1158.1
75	Primary shield penetration for C-DVI line	1.33	4.6	150	14.396	0	2.44	39	1498.4
76	Primary shield penetration for D-DVI line	1.33	5.3	150	14.396	0	3.28	39	1089
77	Approximately 1/8 of upper cavity annulus:direction of A-CL	7.93	12.4	150	14.396	0	6.77	14	106.8
78	Approximately 1/8 of upper cavity annulus:direction of A-HL	7.93	12.4	150	14.396	0	6.83	14	105
79	Approximately 1/8 of upper cavity annulus:direction of B-HL	7.93	12.4	150	14.396	0	6.72	14	108.3
80	Approximately 1/8 of upper cavity annulus:direction of B-CL	7.93	12.4	150	14.396	0	6.61	14	111.8

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
81	Approximately 1/8 of upper cavity annulus:direction of C-CL	7.93	12.4	150	14.396	0	6.51	14	115.1
82	Approximately 1/8 of upper cavity annulus:direction of C-HL	7.93	12.4	150	14.396	0	6.5	14	115.4
83	Approximately 1/8 of upper cavity annulus:direction of D-HL	7.93	12.4	150	14.396	0	6.52	14	114.7
84	Approximately 1/8 of upper cavity annulus:direction of D-CL	7.93	12.4	150	14.396	0	6.61	14	111.8
85	Approximately 1/8 of lower cavity annulus:direction of A-CL	7.93	12.4	150	14.396	0	6.71	14	108.6
86	Approximately 1/8 of lower cavity annulus:direction of A-HL	7.93	12.4	150	14.396	0	6.73	14	108
87	Approximately 1/8 of lower cavity annulus:direction of B-HL	7.93	12.4	150	14.396	0	6.69	14	109.3
88	Approximately 1/8 of lower cavity annulus:direction of B-CL	7.93	12.4	150	14.396	0	6.63	14	111.2

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
89	Approximately 1/8 of lower cavity annulus:direction of C-CL	7.93	12.4	150	14.396	0	6.57	14	113.1
90	Approximately 1/8 of lower cavity annulus:direction of C-HL	7.93	12.4	150	14.396	0	6.57	14	113.1
91	Approximately 1/8 of lower cavity annulus:direction of D-HL	7.93	12.4	150	14.396	0	6.58	14	112.8
92	Approximately 1/8 of lower cavity annulus:direction of D-CL	7.93	12.4	150	14.396	0	6.63	14	111.2
93	Operation space of NIS:direction of A-CL	14.78	84.4	150	14.396	0	6.73	18	167.5
94	Operation space of NIS:direction of A-HL	14.78	251.8	150	14.396	0	6.75	18	166.7
95	Operation space of NIS:direction of B-HL	14.78	84.4	150	14.396	0	6.7	18	168.7
96	Operation space of NIS:direction of B-CL	14.78	84.4	150	14.396	0	6.63	18	171.5
97	Operation space of NIS:direction of C-CL	14.78	84.4	150	14.396	0	6.57	18	174
98	Operation space of NIS:direction of C-HL	14.78	251.8	150	14.396	0	6.56	18	174.4
99	Operation space of NIS:direction of D-HL	14.78	84.4	150	14.396	0	6.57	18	174

Table 7.2-1 Reactor cavity compartment Nodal Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
100	Operation space of NIS:direction of D-CL	14.78	84.4	150	14.396	0	6.62	18	171.9
101	Lower reactor cavity region EL -1'-2" to EL 19'-8.856"	20.90	4691.3	150	14.396	0	6.66	18	170.3
102	Lower reactor cavity region EL -9'-2" to EL -1'-2"	8.00	2722.2	150	14.396	0	6.67	18	169.9
103	RV cooling air supply duct tunnel horizontal passageway	8.00	2500.3	150	14.396	0	6.67	18	169.9
104	RV cooling air supply duct tunnel horizontal passageway	8.00	968.9	150	14.396	0	6.67	18	169.9
105	Core debris catcher	8.00	2038.5	150	14.396	0	6.67	18	169.9
106	RV cooling air supply duct tunnel	35.25	3920.7	150	14.396	0	6.66	18	170.3
107	A-SG compartment	-	50000.0	150	14.396	0	-	-	-
108	B-SG compartment	-	50000.0	150	14.396	0	-	-	-
109	C-SG compartment	-	50000.0	150	14.396	0	-	-	-
110	D-SG compartment	-	50000.0	150	14.396	0	-	-	-

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V107		X	0.81	15.66	0.695	18.79	0.0	1.0	0.0	1.0
2	V2	V107		X	0.81	8.22	0.695	9.86	0.0	1.0	0.0	1.0
3	V3	V108		X	0.81	8.22	0.695	9.86	0.0	1.0	0.0	1.0
4	V4	V108		X	0.81	14.68	0.695	17.62	0.0	1.0	0.0	1.0
5	V5	V109		X	0.81	14.68	0.695	17.62	0.0	1.0	0.0	1.0
6	V6	V109		X	0.81	8.22	0.695	9.86	0.0	1.0	0.0	1.0
7	V7	V110		X	0.81	8.22	0.695	9.86	0.0	1.0	0.0	1.0
8	V8	V110		X	0.81	15.66	0.695	18.79	0.0	1.0	0.0	1.0
9	V9	V1		X	0.81	9.13	0.695	10.96	0.0	1.0	0.5	1.5
10	V10	V2		X	0.81	5.64	0.695	6.77	0.0	1.0	0.5	1.5
11	V11	V3		X	0.81	5.64	0.695	6.77	0.0	1.0	0.5	1.5
12	V12	V4		X	0.81	9.13	0.695	10.96	0.0	1.0	0.5	1.5
13	V13	V5		X	0.81	9.13	0.695	10.96	0.0	1.0	0.5	1.5
14	V14	V6		X	0.81	5.64	0.695	6.77	0.0	1.0	0.5	1.5
15	V15	V7		X	0.81	5.64	0.695	6.77	0.0	1.0	0.5	1.5
16	V16	V8		X	0.81	9.13	0.695	10.96	0.0	1.0	0.5	1.5
17	V9	V10		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
18	V10	V11		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
19	V11	V12		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
20	V12	V13		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
21	V13	V14		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
22	V14	V15		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
23	V15	V16		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5
24	V16	V9		X	0.37	8.1	0.272	9.72	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
25	V17	V9	X		0.41	2.46	0.103	2.95	0.0	0	0	0
26	V18	V10	X		0.41	2.46	0.103	2.95	0.0	0	0	0
27	V19	V11	X		0.41	2.46	0.103	2.95	0.0	0	0	0
28	V20	V12	X		0.41	2.46	0.103	2.95	0.0	0	0	0
29	V21	V13	X		0.41	2.46	0.103	2.95	0.0	0	0	0
30	V22	V14		X	0.41	2.46	0.103	2.95	0.0	0	0	0
31	V23	V15	X		0.41	2.46	0.103	2.95	0.0	0	0	0
32	V24	V16	X		0.41	2.46	0.103	2.95	0.0	0	0	0
33	V17	V18		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
34	V18	V19		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
35	V19	V20		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
36	V20	V21		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
37	V21	V22		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
38	V22	V23		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
39	V23	V24		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
40	V24	V17		X	0.32	8.48	0.184	10.18	0.0	1.0	0.5	1.5
41	V25	V17		X	0.67	9.65	0.168	11.58	0.0	0	0	0
42	V26	V18		X	0.67	9.16	0.168	10.99	0.0	0	0	0
43	V27	V19		X	0.67	9.16	0.168	10.99	0.0	0	0	0
44	V28	V20		X	0.67	9.65	0.168	11.58	0.0	0	0	0
45	V29	V21		X	0.67	9.65	0.168	11.58	0.0	0	0	0
46	V30	V22		X	0.67	9.16	0.168	10.99	0.0	0	0	0
47	V31	V23		X	0.67	9.16	0.168	10.99	0.0	0	0	0
48	V32	V24		X	0.67	9.65	0.168	11.58	0.0	0	0	0
49	V25	V26		X	5.89	8.14	1.914	9.77	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
50	V26	V27		X	3.69	8.0	1.281	9.6	0.0	1.0	0.5	1.5
51	V27	V28		X	5.89	8.14	1.914	9.77	0.0	1.0	0.5	1.5
52	V28	V29		X	3.69	8.0	1.281	9.6	0.0	1.0	0.5	1.5
53	V29	V30		X	5.89	8.14	1.914	9.77	0.0	1.0	0.5	1.5
54	V30	V31		X	3.69	8.0	1.281	9.6	0.0	1.0	0.5	1.5
55	V31	V32		X	5.89	8.14	1.914	9.77	0.0	1.0	0.5	1.5
56	V32	V25		X	3.69	8.0	1.281	9.6	0.0	1.0	0.5	1.5
57	V41	V17		X	0.20	3.37	0.064	4.04	0.0	1.0	0.5	1.5
58	V42	V18	X		0.20	2.94	0.064	3.53	0.0	1.0	0.5	1.5
59	V43	V19		X	0.20	3.0	0.064	3.6	0.0	1.0	0.5	1.5
60	V44	V20		X	0.20	3.37	0.064	4.04	0.0	1.0	0.5	1.5
61	V45	V21		X	0.20	3.37	0.064	4.04	0.0	1.0	0.5	1.5
62	V46	V22		X	0.20	3.0	0.064	3.6	0.0	1.0	0.5	1.5
63	V47	V23		X	0.20	2.94	0.064	3.53	0.0	1.0	0.5	1.5
64	V48	V24		X	0.20	3.37	0.064	4.04	0.0	1.0	0.5	1.5
65	V49	V25		X	0.30	4.82	0.066	5.78	0.0	1.0	0.5	1.5
66	V50	V26	X		0.25	4.68	0.064	5.62	0.0	1.0	0.5	1.5
67	V51	V27		X	0.25	4.74	0.064	5.69	0.0	1.0	0.5	1.5
68	V52	V28		X	0.30	4.82	0.066	5.78	0.0	1.0	0.5	1.5
69	V53	V29		X	0.30	4.82	0.066	5.78	0.0	1.0	0.5	1.5
70	V54	V30		X	0.25	4.74	0.064	5.69	0.0	1.0	0.5	1.5
71	V55	V31		X	0.25	4.68	0.064	5.62	0.0	1.0	0.5	1.5
72	V56	V32		X	0.30	4.82	0.066	5.78	0.0	1.0	0.5	1.5
73	V50	V26		X	0.09	10.04	0.063	12.05	0.0	1.0	0.5	1.5
74	V51	V27		X	0.09	10.08	0.063	12.1	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
75	V54	V30		X	0.09	10.08	0.063	12.1	0.0	1.0	0.5	1.5
76	V55	V31		X	0.09	10.04	0.063	12.05	0.0	1.0	0.5	1.5
77	V49	V33		X	1.40	7.73	0.423	9.28	0.0	1.0	0.5	1.5
78	V50	V34	X		1.40	7.43	0.423	8.92	0.0	1.0	0.5	1.5
79	V51	V35		X	1.40	7.47	0.423	8.96	0.0	1.0	0.5	1.5
80	V52	V36		X	1.40	7.73	0.423	9.28	0.0	1.0	0.5	1.5
81	V53	V37		X	1.40	7.73	0.423	9.28	0.0	1.0	0.5	1.5
82	V54	V38		X	1.40	7.47	0.423	8.96	0.0	1.0	0.5	1.5
83	V55	V39		X	1.40	7.43	0.423	8.92	0.0	1.0	0.5	1.5
84	V56	V40		X	1.40	7.73	0.423	9.28	0.0	1.0	0.5	1.5
85	V41	V42		X	11.85	10.98	3.422	13.18	0.0	1.0	0.5	1.5
86	V42	V43		X	9.21	10.73	3.035	12.88	0.0	1.0	0.5	1.5
87	V43	V44		X	12.08	10.99	3.451	13.19	0.0	1.0	0.5	1.5
88	V44	V45		X	9.21	10.96	3.035	13.15	0.0	1.0	0.5	1.5
89	V45	V46		X	12.08	10.99	3.451	13.19	0.0	1.0	0.5	1.5
90	V46	V47		X	9.21	10.73	3.035	12.88	0.0	1.0	0.5	1.5
90	V47	V48		X	11.85	10.98	3.422	13.18	0.0	1.0	0.5	1.5
92	V48	V41		X	9.21	10.96	3.035	13.15	0.0	1.0	0.5	1.5
93	V49	V41		X	26.97	9.86	3.545	11.83	0.0	0.0	0.0	0.0
94	V50	V42		X	23.07	9.27	3.277	11.12	0.0	0.0	0.0	0.0
95	V51	V43		X	23.46	9.29	3.308	11.15	0.0	0.0	0.0	0.0
96	V52	V44		X	27.19	9.88	3.561	11.86	0.0	0.0	0.0	0.0
97	V53	V45		X	27.19	9.88	3.561	11.86	0.0	0.0	0.0	0.0
98	V54	V46		X	23.46	9.29	3.308	11.15	0.0	0.0	0.0	0.0
99	V55	V47		X	23.07	9.27	3.277	11.12	0.0	0.0	0.0	0.0

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
100	V56	V48		X	26.97	9.86	3.545	11.83	0.0	0.0	0.0	0.0
101	V49	V50		X	18.56	11.15	3.873	13.38	0.0	1.0	0.5	1.5
102	V50	V51	X		12.26	10.87	3.154	13.04	0.0	1.0	0.5	1.5
103	V51	V52		X	18.92	11.17	3.917	13.4	0.0	1.0	0.5	1.5
104	V52	V53		X	12.26	11.02	3.154	13.22	0.0	1.0	0.5	1.5
105	V53	V54		X	18.92	11.17	3.917	13.4	0.0	1.0	0.5	1.5
106	V54	V55		X	12.26	10.87	3.154	13.04	0.0	1.0	0.5	1.5
107	V55	V56		X	18.56	11.15	3.873	13.38	0.0	1.0	0.5	1.5
108	V56	V49		X	12.26	11.02	3.154	13.22	0.0	1.0	0.5	1.5
109	V41	V57		X	4.75	8.34	1.089	10.01	0.0	1.0	0.5	1.5
110	V42	V58		X	2.66	3.98	0.784	4.78	0.0	1.0	0.5	1.5
111	V43	V59		X	2.66	3.99	0.782	4.79	0.0	1.0	0.5	1.5
112	V44	V60		X	4.75	8.0	1.089	9.6	0.0	1.0	0.5	1.5
113	V45	V61		X	4.75	8.0	1.089	9.6	0.0	1.0	0.5	1.5
114	V46	V62		X	2.66	3.99	0.782	4.79	0.0	1.0	0.5	1.5
115	V47	V63		X	2.66	3.98	0.784	4.78	0.0	1.0	0.5	1.5
116	V48	V64		X	4.75	8.34	1.089	10.01	0.0	1.0	0.5	1.5
117	V49	V65		X	4.75	8.68	1.089	10.42	0.0	1.0	0.5	1.5
118	V50	V66	X		2.66	4.44	0.784	5.33	0.0	1.0	0.5	1.5
119	V51	V67		X	2.66	4.43	0.782	5.32	0.0	1.0	0.5	1.5
120	V52	V68		X	4.75	8.34	1.089	10.01	0.0	1.0	0.5	1.5
121	V53	V69		X	4.75	8.34	1.089	10.01	0.0	1.0	0.5	1.5
122	V54	V70		X	2.66	4.43	0.782	5.32	0.0	1.0	0.5	1.5
123	V55	V71		X	2.66	4.44	0.784	5.33	0.0	1.0	0.5	1.5
124	V56	V72		X	4.75	8.68	1.089	10.42	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
125	V57	V65		X	9.24	5.68	1.524	6.82	0.0	0.0	0.0	0.0
126	V58	V66		X	3.68	5.68	1.382	6.82	0.0	0.0	0.0	0.0
127	V59	V67		X	3.58	5.68	1.377	6.82	0.0	0.0	0.0	0.0
128	V60	V68		X	8.67	5.68	1.518	6.82	0.0	0.0	0.0	0.0
129	V61	V69		X	8.67	5.68	1.518	6.82	0.0	0.0	0.0	0.0
130	V62	V70		X	3.58	5.68	1.377	6.82	0.0	0.0	0.0	0.0
131	V63	V71		X	3.68	5.68	1.382	6.82	0.0	0.0	0.0	0.0
132	V64	V72		X	9.24	5.68	1.524	6.82	0.0	0.0	0.0	0.0
133	V49	V73	X		0.82	8.92	0.463	10.7	0.0	1.0	0.5	1.5
134	V52	V74	X		0.82	8.57	0.463	10.28	0.0	1.0	0.5	1.5
135	V53	V75	X		0.82	8.57	0.463	10.28	0.0	1.0	0.5	1.5
136	V56	V76	X		0.82	8.92	0.463	10.7	0.0	1.0	0.5	1.5
137	V57	V107	X		3.64	11.3	0.881	13.56	0.0	1.0	0.0	1.0
138	V58	V107	X		2.58	4.5	0.767	5.4	0.0	1.0	0.0	1.0
139	V59	V108	X		2.59	4.38	0.769	5.26	0.0	1.0	0.0	1.0
140	V60	V108	X		3.64	10.62	0.881	12.74	0.0	1.0	0.0	1.0
141	V61	V109	X		3.64	10.62	0.881	12.74	0.0	1.0	0.0	1.0
142	V62	V109	X		2.59	4.38	0.769	5.26	0.0	1.0	0.0	1.0
143	V63	V110	X		2.58	4.5	0.767	5.4	0.0	1.0	0.0	1.0
144	V64	V110	X		3.64	11.3	0.881	13.56	0.0	1.0	0.0	1.0
145	V65	V107	X		3.64	11.3	0.881	13.56	0.0	1.0	0.0	1.0
146	V66	V107	X		2.58	4.5	0.767	5.4	0.0	1.0	0.0	1.0
147	V67	V108	X		2.59	4.38	0.769	5.26	0.0	1.0	0.0	1.0
148	V68	V108	X		3.64	10.62	0.881	12.74	0.0	1.0	0.0	1.0
149	V69	V109	X		3.64	10.62	0.881	12.74	0.0	1.0	0.0	1.0

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
150	V70	V109	X		2.59	4.38	0.769	5.26	0.0	1.0	0.0	1.0
151	V71	V110	X		2.58	4.5	0.767	5.4	0.0	1.0	0.0	1.0
152	V72	V110	X		3.64	11.3	0.881	13.56	0.0	1.0	0.0	1.0
153	V73	V107		X	1.11	6.66	0.525	7.99	0.0	1.0	0.5	1.5
154	V74	V108		X	1.11	5.9	0.525	7.08	0.0	1.0	0.5	1.5
155	V75	V109		X	1.11	5.9	0.525	7.08	0.0	1.0	0.5	1.5
156	V76	V110		X	1.11	6.66	0.525	7.99	0.0	1.0	0.5	1.5
157	V25	V77		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
158	V26	V78		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
159	V27	V79		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
160	V28	V80		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
161	V29	V81		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
162	V30	V82		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
163	V31	V83		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
164	V32	V84		X	0.88	5.2	0.225	6.24	0.0	0.0	0.0	0.0
165	V33	V77		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
166	V34	V78		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
167	V35	V79		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
168	V36	V80		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
169	V37	V81		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
170	V38	V82		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
171	V39	V83		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
172	V40	V84		X	4.36	4.4	1.968	5.28	0.0	1.0	0.5	1.5
173	V77	V78		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
174	V78	V79		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
175	V79	V80		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
176	V80	V81		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
177	V81	V82		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
178	V82	V83		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
179	V83	V84		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
180	V84	V77		X	1.60	7.62	0.395	9.14	0.0	1.0	0.5	1.5
181	V77	V85		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
182	V78	V86		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
183	V79	V87		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
184	V80	V88		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
185	V81	V89		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
186	V82	V90		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
187	V83	V91		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
188	V84	V92		X	1.56	7.94	0.397	9.53	0.0	0.0	0.0	0.0
189	V85	V86		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
190	V86	V87		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
191	V87	V88		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
192	V88	V89		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
193	V89	V90		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
194	V90	V91		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
195	V91	V92		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
196	V92	V85		X	1.61	7.62	0.396	9.14	0.0	1.0	0.5	1.5
197	V77	V93		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5
198	V78	V94		X	0.16	13.89	0.164	16.67	0.0	1.0	0.5	1.5
199	V79	V95		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
200	V80	V96		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5
201	V81	V97		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5
202	V82	V98		X	0.16	13.89	0.164	16.67	0.0	1.0	0.5	1.5
203	V83	V99		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5
204	V84	V100		X	0.04	13.89	0.119	16.67	0.0	1.0	0.5	1.5
205	V85	V93		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
206	V86	V94		X	0.32	13.33	0.307	16.0	0.0	1.0	0.5	1.5
207	V87	V95		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
207	V88	V96		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
209	V89	V97		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
210	V90	V98		X	0.32	13.33	0.307	16.0	0.0	1.0	0.5	1.5
211	V91	V99		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
212	V92	V100		X	0.08	13.33	0.216	16.0	0.0	1.0	0.5	1.5
213	V85	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
214	V86	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
215	V87	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
216	V88	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
217	V89	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
218	V90	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
219	V91	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
220	V92	V101		X	1.56	21.95	0.397	26.34	0.0	0.0	0.0	0.0
221	V101	V102		X	305.36	9.8	19.717	11.76	0.0	0.0	0.0	0.0
222	V102	V103		X	155.64	17.4	11.338	20.88	0.0	1.0	0.5	1.5
223	V103	V104		X	171.97	10.35	11.659	12.42	0.0	1.0	0.5	1.5
224	V104	V105		X	171.97	8.74	11.659	10.49	0.0	1.0	0.5	1.5

Table 7.2-2 Reactor cavity Compartment Vent Path Description
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
225	V104	V106		X	121.11	23.38	8.926	28.06	0.0	0.0	0.0	0.0

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	550.129
0.001	1330.97	550.129
0.002	1789.05	552.732
0.003	1846.51	553.128
0.004	1849.08	553.162
0.005	1838.15	553.104
0.006	1838.68	553.123
0.007	1841.12	553.156
0.008	1832.63	553.115
0.009	1829.6	553.109
0.01	1833.31	553.15
0.011	1827.97	553.13
0.012	1821.91	553.104
0.013	1824.38	553.136
0.014	1822.73	553.14
0.015	1816.86	553.116
0.016	1818.64	553.142
0.017	1820.26	553.168
0.018	1813.93	553.14
0.019	1811.25	553.136
0.02	1813.95	553.169
0.021	1810.63	553.161
0.022	1805.45	553.14
0.023	1806.49	553.161
0.024	1805.84	553.17
0.025	1800.66	553.149
0.026	1799.9	553.157
0.027	1801.01	553.179
0.028	1796.66	553.163
0.029	1793.1	553.152
0.03	1793.55	553.168
0.031	1790.86	553.164
0.032	1787.09	553.151
0.033	1787.67	553.168
0.034	1786.25	553.171
0.035	1781.17	553.15
0.036	1780.23	553.155
0.037	1780.44	553.169
0.038	1775.59	553.149
0.039	1772	553.137

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.04	1772.04	553.149
0.041	1768.79	553.14
0.042	1764.68	553.124
0.043	1765.02	553.138
0.044	1764.39	553.146
0.045	1760.71	553.132
0.046	1759.64	553.137
0.047	1759.62	553.148
0.048	1756.79	553.14
0.049	1754.74	553.138
0.05	1754.12	553.145
0.051	1751.21	553.136
0.052	1748.47	553.129
0.053	1748.43	553.139
0.054	1747.3	553.142
0.055	1744.66	553.135
0.056	1744.1	553.142
0.057	1743.95	553.152
0.058	1741.87	553.148
0.059	1740.68	553.15
0.06	1740.9	553.162
0.061	1739.36	553.162
0.062	1736.87	553.155
0.063	1736.05	553.159
0.064	1735.21	553.164
0.065	1733.03	553.159
0.066	1731.33	553.157
0.067	1730.01	553.158
0.068	1727.55	553.151
0.069	1725.33	553.146
0.07	1724.06	553.146
0.071	1721.89	553.141
0.072	1719.32	553.133
0.073	1718.1	553.134
0.074	1716.84	553.135
0.075	1714.74	553.13
0.076	1713.72	553.132
0.077	1713.16	553.137
0.078	1711.15	553.132
0.079	1709.39	553.129
0.08	1709.02	553.135

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.081	1707.94	553.136
0.082	1706.05	553.132
0.083	1704.97	553.133
0.084	1703.81	553.134
0.085	1701.91	553.129
0.086	1700.55	553.128
0.087	1699.39	553.129
0.088	1697.37	553.123
0.089	1695.53	553.119
0.09	1694.24	553.118
0.091	1692.5	553.114
0.092	1690.87	553.111
0.093	1690.03	553.113
0.094	1688.89	553.113
0.095	1687.4	553.111
0.096	1686.77	553.114
0.097	1686.48	553.12
0.098	1685.51	553.12
0.099	1684.47	553.121
0.1	1683.83	553.124
0.101	1682.89	553.125
0.102	1681.67	553.124
0.103	1680.67	553.124
0.104	1679.57	553.124
0.105	1678.09	553.121
0.106	1676.7	553.118
0.107	1675.5	553.117
0.108	1674.12	553.115
0.109	1672.75	553.112
0.11	1671.47	553.11
0.111	1669.94	553.107
0.112	1668.41	553.103
0.113	1667.33	553.102
0.114	1666.18	553.101
0.115	1664.59	553.097
0.116	1663.19	553.094
0.117	1662.09	553.093
0.118	1660.73	553.09
0.119	1659.36	553.087
0.12	1658.37	553.086
0.121	1657.29	553.085

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.122	1656.01	553.083
0.123	1655.03	553.082
0.124	1654.2	553.082
0.125	1653.21	553.082
0.126	1652.31	553.081
0.127	1651.48	553.082
0.128	1650.58	553.081
0.129	1649.89	553.082
0.13	1649.38	553.085
0.131	1648.61	553.085
0.132	1647.75	553.085
0.133	1647.14	553.086
0.134	1646.5	553.087
0.135	1645.67	553.087
0.136	1644.94	553.088
0.137	1644.22	553.088
0.138	1643.24	553.087
0.139	1642.23	553.085
0.14	1641.41	553.085
0.141	1640.61	553.085
0.142	1639.74	553.084
0.143	1638.92	553.084
0.144	1638.16	553.084
0.145	1637.44	553.084
0.146	1636.75	553.084
0.147	1635.97	553.084
0.148	1635.03	553.082
0.149	1634.04	553.08
0.15	1633.06	553.079
0.151	1631.94	553.076
0.152	1630.69	553.072
0.153	1629.46	553.069
0.154	1628.17	553.065
0.155	1626.74	553.06
0.156	1625.41	553.055
0.157	1624.25	553.052
0.158	1623.06	553.048
0.159	1621.82	553.044
0.16	1620.75	553.042
0.161	1619.83	553.04
0.162	1618.99	553.038

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.163	1618.27	553.038
0.164	1617.64	553.038
0.165	1617.07	553.038
0.166	1616.64	553.039
0.167	1616.3	553.041
0.168	1615.95	553.043
0.169	1615.6	553.045
0.17	1615.26	553.046
0.171	1614.8	553.047
0.172	1614.29	553.048
0.173	1613.84	553.049
0.174	1613.35	553.049
0.175	1612.73	553.049
0.176	1612.09	553.049
0.177	1611.54	553.049
0.178	1610.99	553.049
0.179	1610.44	553.049
0.18	1609.92	553.049
0.181	1609.42	553.049
0.182	1608.95	553.05
0.183	1608.5	553.05
0.184	1608.07	553.051
0.185	1607.61	553.051
0.186	1607.13	553.052
0.187	1606.61	553.052
0.188	1606.07	553.052
0.189	1605.56	553.052
0.19	1605.09	553.052
0.191	1604.55	553.052
0.192	1603.96	553.051
0.193	1603.41	553.051
0.194	1602.92	553.051
0.195	1602.42	553.05
0.196	1601.91	553.05
0.197	1601.45	553.05
0.198	1601.01	553.051
0.199	1600.57	553.051
0.2	1600.16	553.051
0.205	1597.94	553.052
0.21	1595.05	553.047
0.215	1592.18	553.042

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.22	1589.42	553.037
0.225	1586.54	553.03
0.23	1583.95	553.025
0.235	1582.01	553.024
0.24	1580.11	553.022
0.245	1577.41	553.015
0.25	1574.85	553.008
0.255	1572.85	553.005
0.26	1570.94	553.002
0.265	1569.06	552.998
0.27	1567.32	552.995
0.275	1565.86	552.994
0.28	1564.42	552.992
0.285	1563.06	552.991
0.29	1561.95	552.991
0.295	1560.82	552.99
0.3	1559.55	552.989
0.305	1558.14	552.986
0.31	1556.56	552.982
0.315	1555.12	552.978
0.32	1554.15	552.977
0.325	1553.64	552.979
0.33	1553.16	552.981
0.335	1552.41	552.981
0.34	1551.47	552.98
0.345	1550.41	552.977
0.35	1549.27	552.974
0.355	1548.17	552.971
0.36	1547.08	552.968
0.365	1545.98	552.965
0.37	1544.85	552.961
0.375	1543.76	552.957
0.38	1542.76	552.954
0.385	1541.93	552.952
0.39	1541.29	552.951
0.395	1540.69	552.95
0.4	1540.02	552.948
0.405	1539.34	552.946
0.41	1538.75	552.945
0.415	1538.27	552.945
0.42	1537.86	552.944

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.425	1537.52	552.944
0.43	1537.22	552.945
0.435	1536.91	552.945
0.44	1536.58	552.945
0.445	1536.25	552.945
0.45	1535.89	552.944
0.455	1535.46	552.943
0.46	1534.96	552.942
0.465	1534.46	552.94
0.47	1534.02	552.939
0.475	1533.67	552.938
0.48	1533.41	552.938
0.485	1533.12	552.937
0.49	1532.71	552.936
0.495	1532.2	552.934
0.5	1531.68	552.932
0.6	1528.52	552.929
0.7	1527.99	552.935
0.8	1528.49	552.944
0.9	1529.99	552.958
1	1531.85	552.974
1.1	1533.38	552.988
1.2	1534.51	552.998
1.3	1535.14	553.005
1.4	1535.15	553.006
1.5	1534.73	553.005
1.6	1533.89	553.001
1.7	1532.59	552.994
1.8	1530.94	552.984
1.9	1529.1	552.974
2	1527.13	552.964
2.1	1525.1	552.954
2.2	1523.09	552.946
2.3	1521.17	552.938
2.4	1519.36	552.932
2.5	1517.7	552.929
2.6	1516.19	552.926
2.7	1514.83	552.926
2.8	1513.59	552.926
2.9	1512.44	552.928
3	1511.35	552.931

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.1	1510.26	552.933
3.2	1509.17	552.937
3.3	1508.06	552.94
3.4	1506.93	552.943
3.5	1505.78	552.947
3.6	1504.62	552.95
3.7	1503.45	552.954
3.8	1502.25	552.958
3.9	1501.03	552.962
4	1499.86	552.966
4.1	1498.62	552.971
4.2	1497.25	552.975
4.3	1495.93	552.979
4.4	1494.69	552.985
4.5	1493.49	552.991
4.6	1492.32	552.998
4.7	1491.18	553.005
4.8	1490.06	553.013
4.9	1488.95	553.022
5	1487.84	553.032
5.1	1486.74	553.041
5.2	1485.64	553.052
5.3	1484.53	553.063
5.4	1483.41	553.075
5.5	1482.26	553.087
5.6	1481.14	553.1
5.7	1480.02	553.114
5.8	1478.89	553.129
5.9	1477.74	553.144
6	1476.6	553.16
6.1	1475.47	553.178
6.2	1474.35	553.196
6.3	1473.23	553.215
6.4	1472.13	553.235
6.5	1471.02	553.255
6.6	1469.92	553.277
6.7	1468.83	553.3
6.8	1467.73	553.323
6.9	1466.64	553.347
7	1465.55	553.371
7.1	1464.48	553.396

Table 7.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses
A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft2)
Break location : Volume number 50

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
7.2	1463.41	553.422
7.3	1462.35	553.448
7.4	1461.27	553.475
7.5	1460.19	553.501
7.6	1459.1	553.528
7.7	1458.02	553.555
7.8	1456.93	553.582
7.9	1455.85	553.609
8	1454.76	553.635
8.1	1453.69	553.662
8.2	1452.61	553.688
8.3	1451.55	553.714
8.4	1450.49	553.739
8.5	1449.45	553.764
8.6	1448.41	553.788
8.7	1447.37	553.812
8.8	1446.33	553.835
8.9	1445.3	553.858
9	1444.28	553.879
9.1	1443.25	553.9
9.2	1442.23	553.92
9.3	1441.21	553.939
9.4	1440.16	553.957
9.5	1439.13	553.974
9.6	1438.13	553.99
9.7	1437.13	554.006
9.8	1436.12	554.02
9.9	1435.11	554.034
10	1434.1	554.047

Figure 7.2-1 Nodalization scheme for the reactor cavity

Figure 7.2-2 Nodalization scheme for the reactor cavity

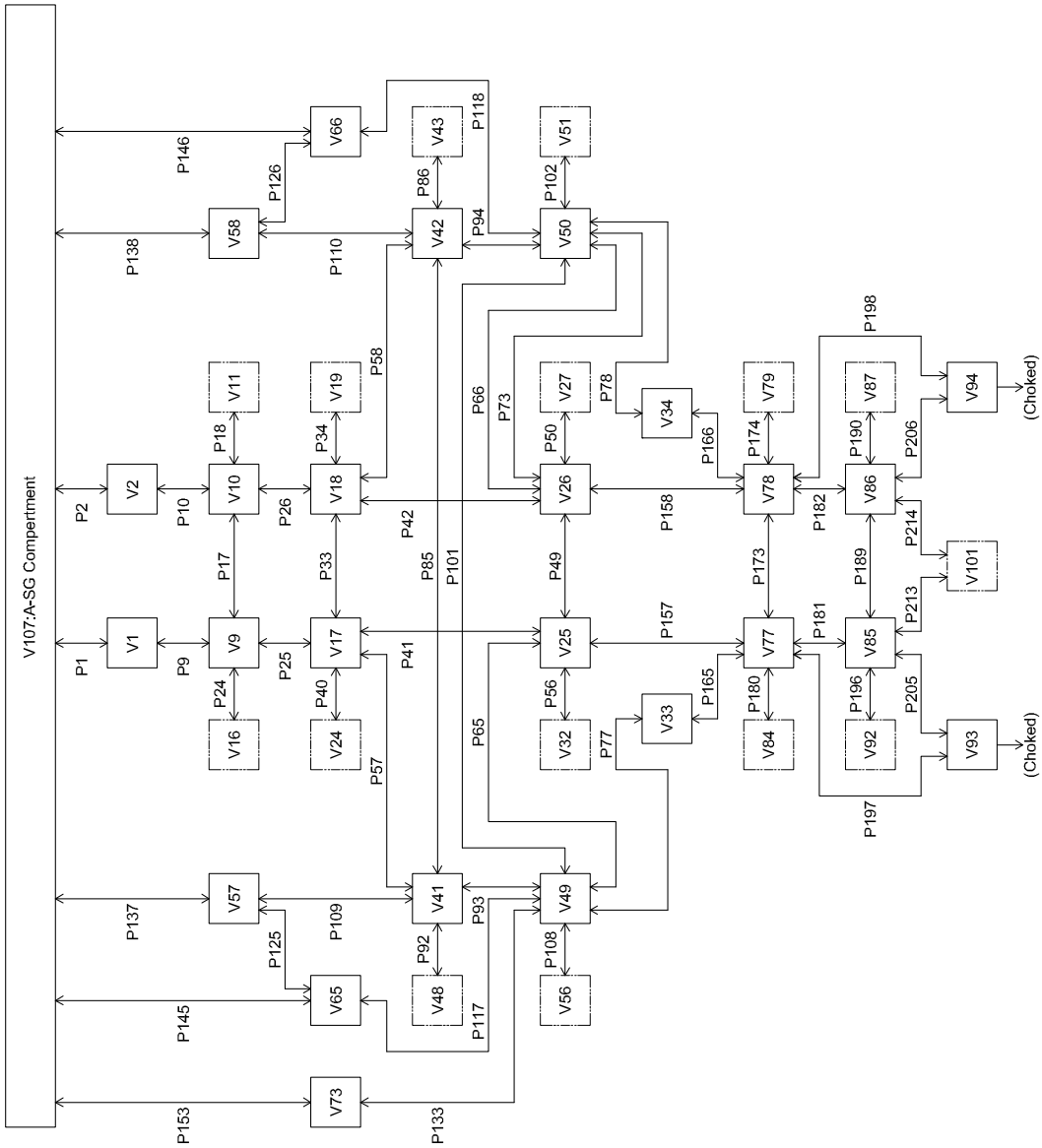

Figure 7.2-3 Nodalization diagram for the reactor cavity in the A-loop direction

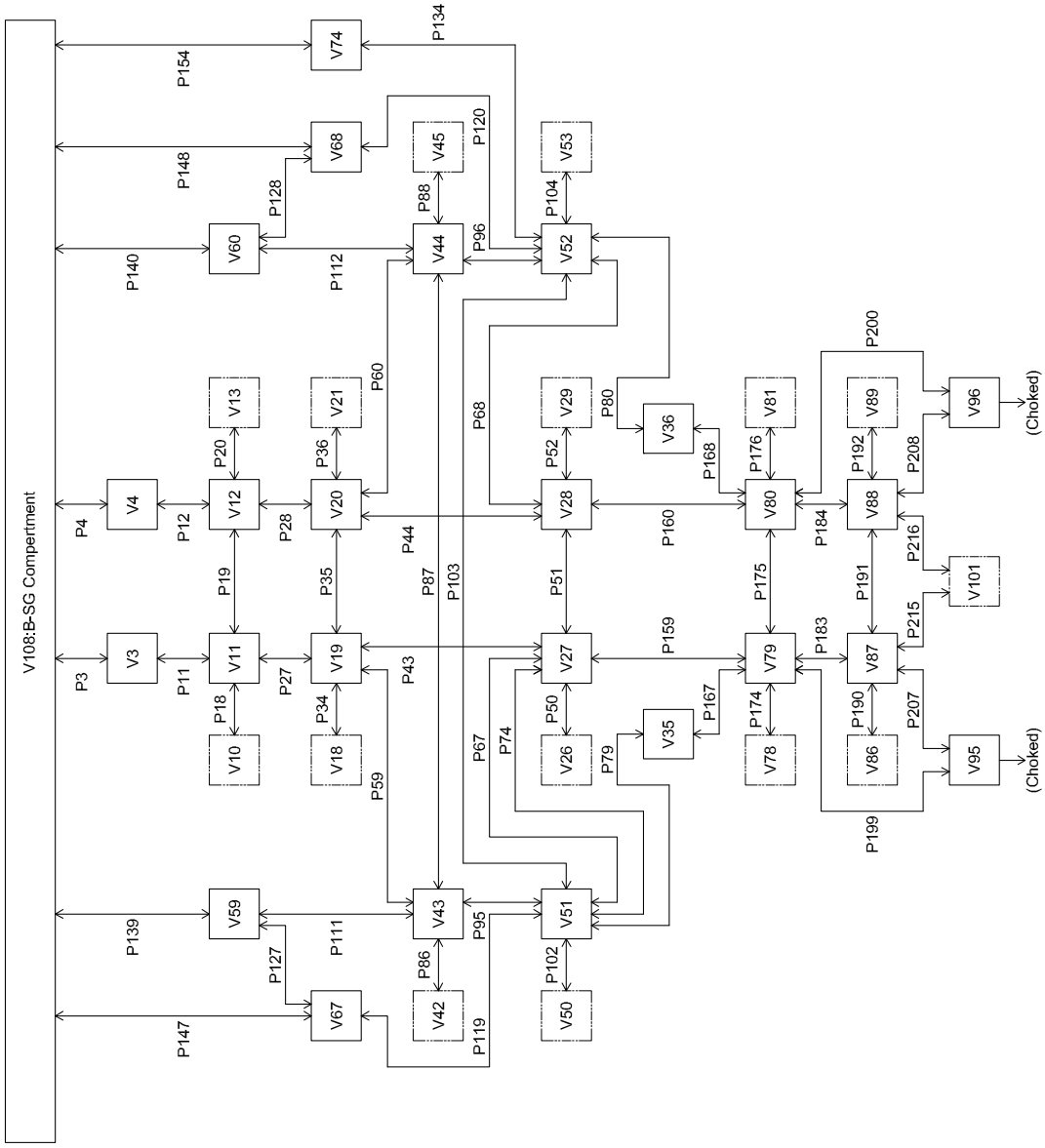

Figure 7.2-4 Nodalization diagram for the reactor cavity in the B-loop direction

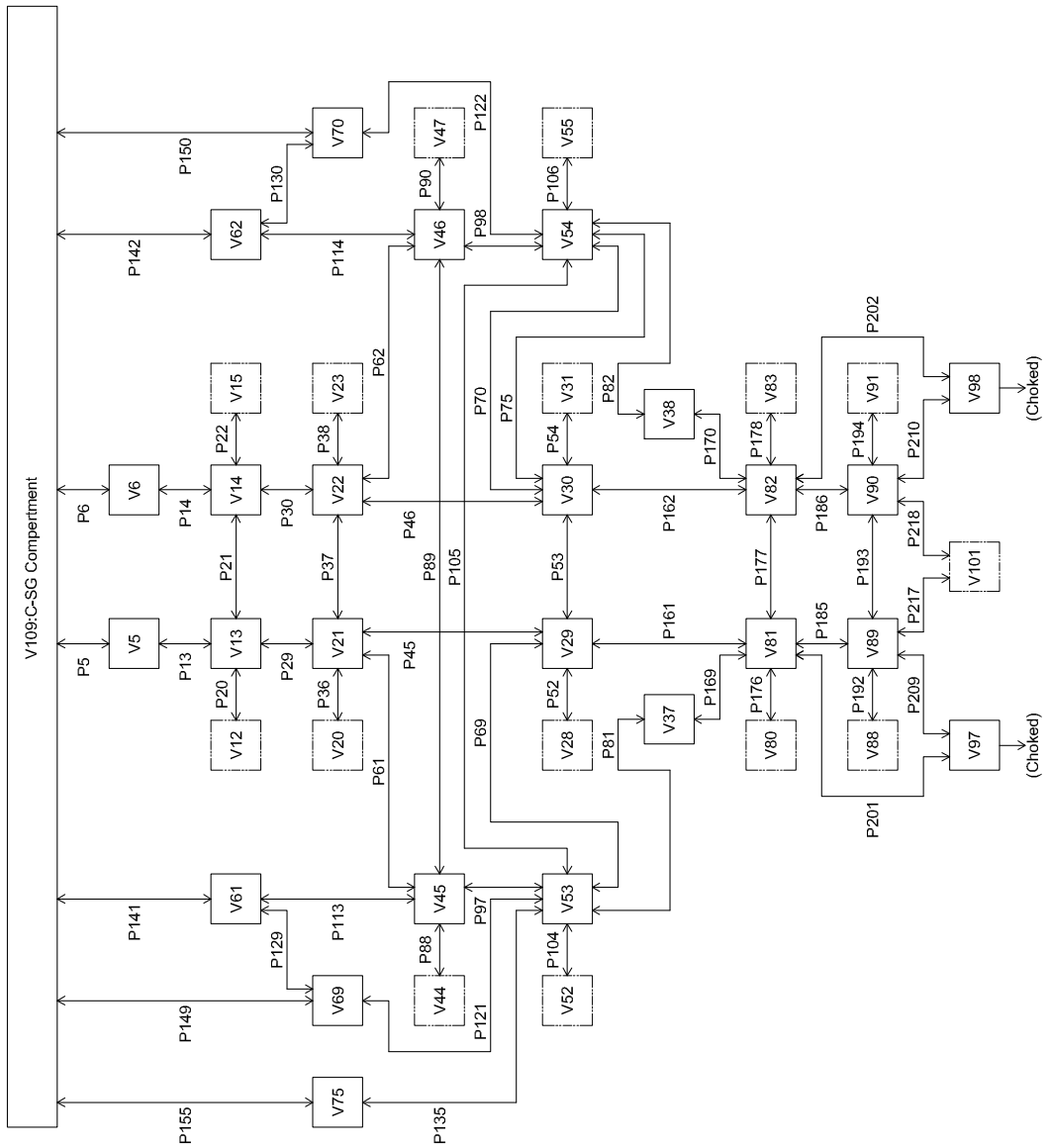

Figure 7.2-5 Nodalization diagram for the reactor cavity in the C-loop direction

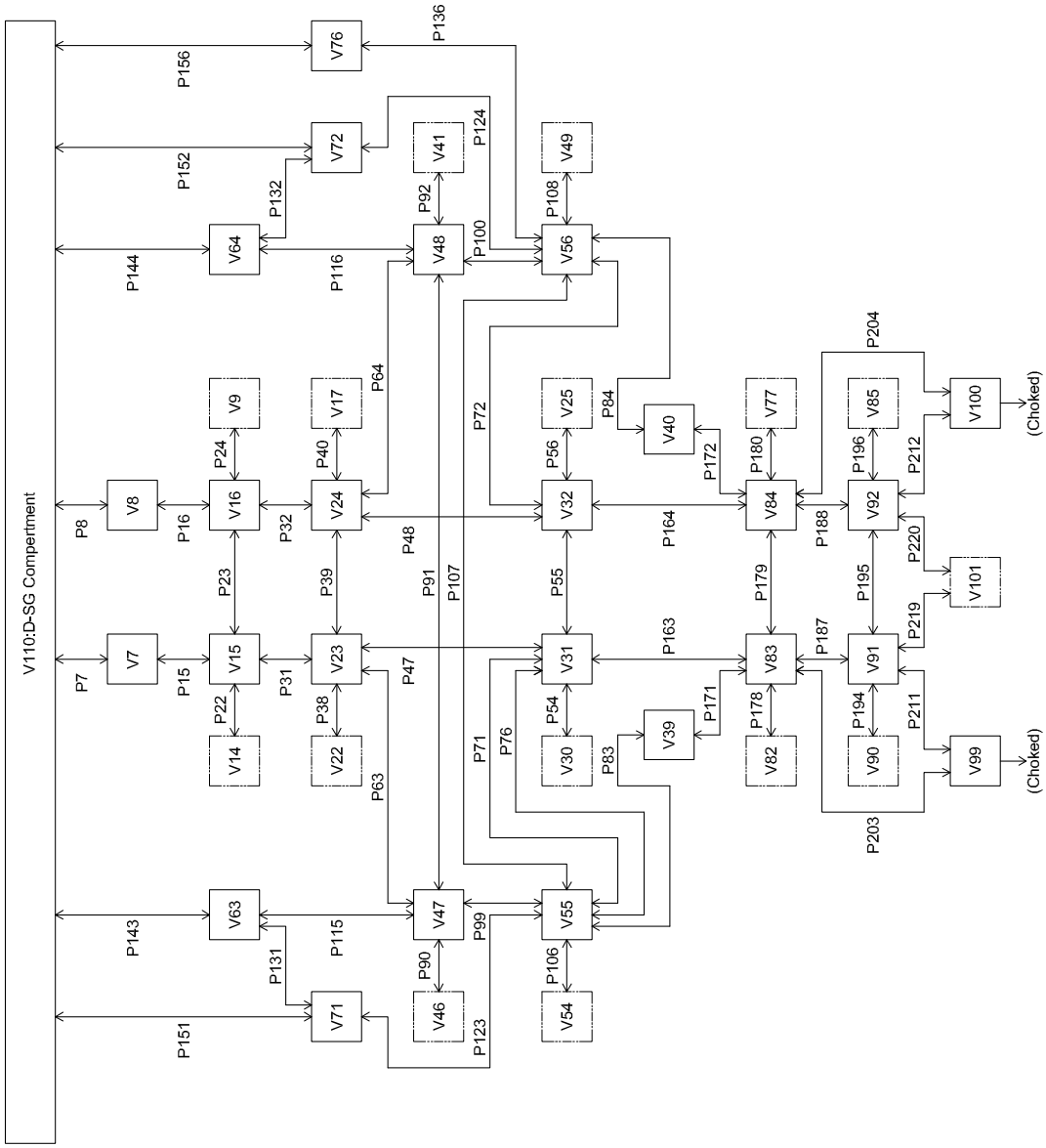

Figure 7.2-6 Nodalization diagram for the reactor cavity in the D-loop direction

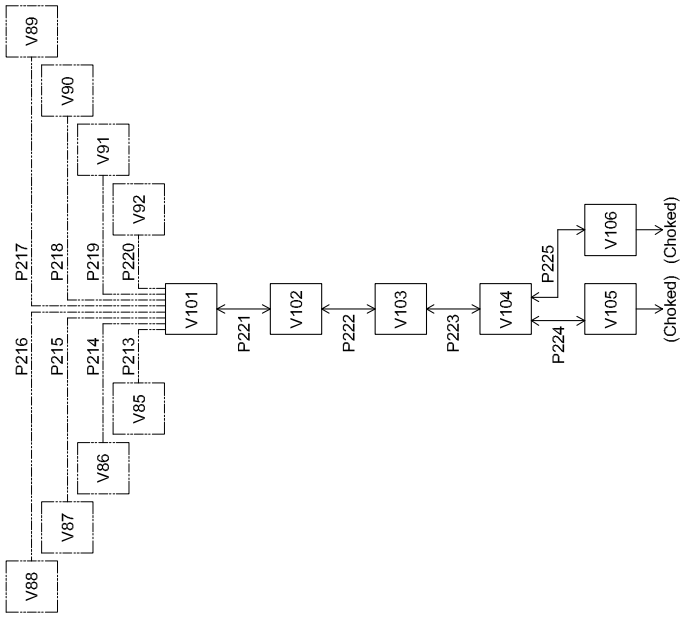

Figure 7.2-7 Nodalization diagram for the reactor cavity

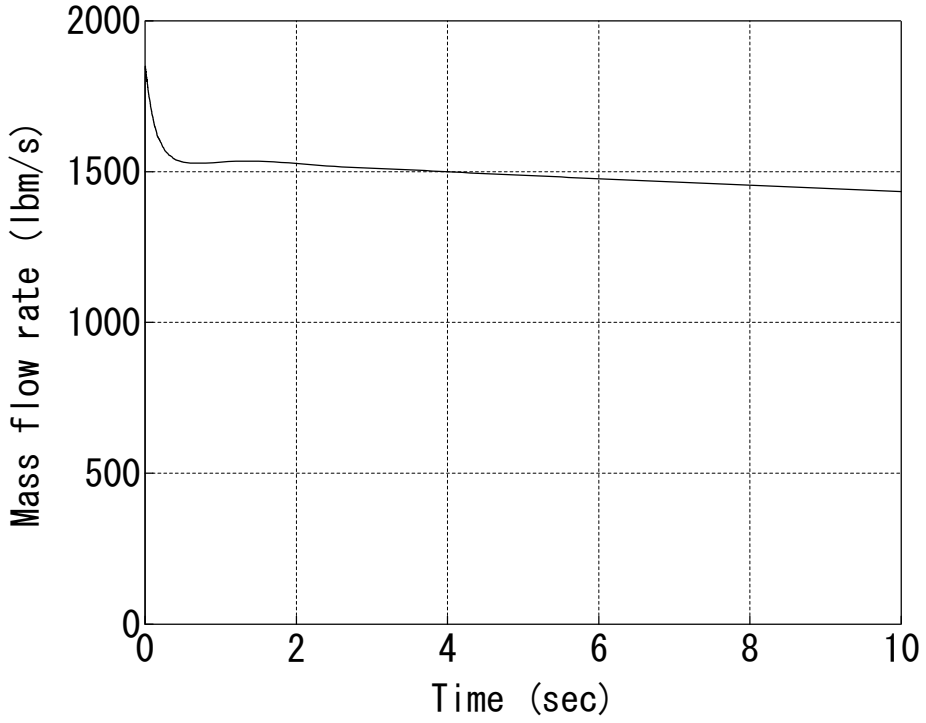

Figure 7.2-8 Short term mass and energy release data for the reactor cavity (1/2)

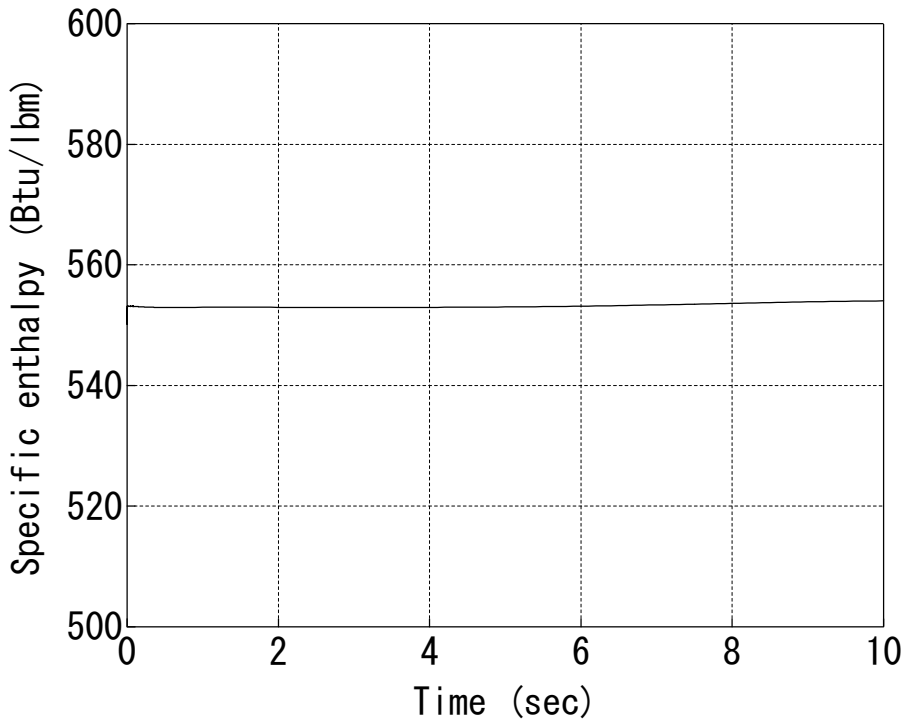

Figure 7.2-9 Short term mass and energy release data for the reactor cavity (2/2)

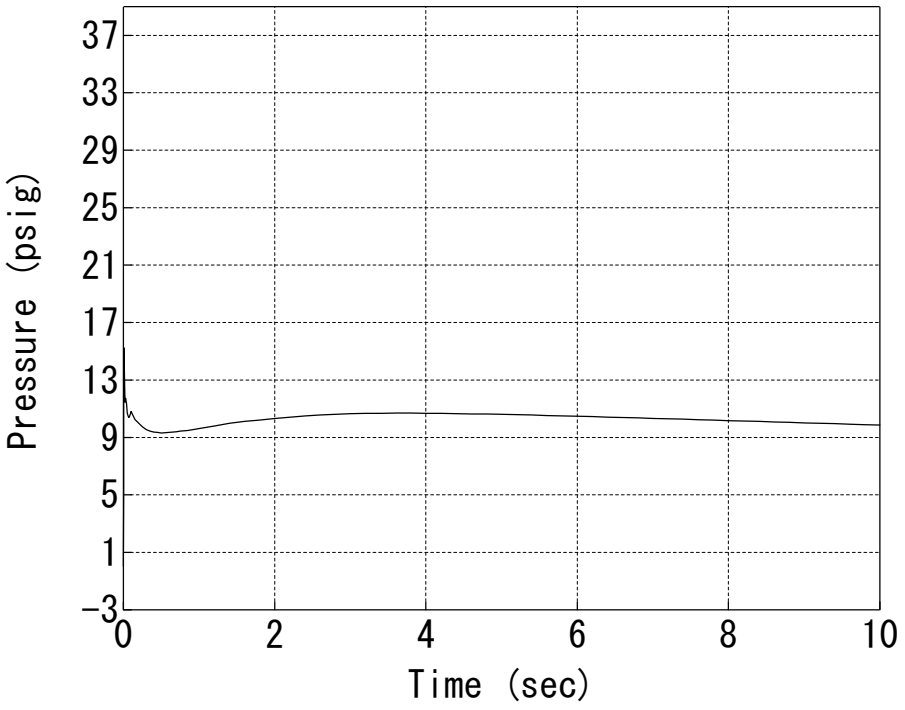

Figure 7.2-10 Pressure transient for peak pressure node(V50) in the reactor cavity

7.3 Steam Generator Subcompartment

7.3.1 Modeling and nodalization sensitivity study

(a) Base nodal description

The Steam Generator (SG) compartment consists of the upper region which is nearly rectangular chimney shaped and includes the upper part of SG, and lower region including the Reactor Coolant Pump (RCP), Main Coolant Pipes (MCPs) and other pipes connecting MCPs.

All SG compartments have almost the same configuration. In particular the A and D loop compartments are identical and the B and C loop compartments are identical. Since the free volume of the A-loop compartment is slightly smaller than that of B-loop, the A-loop compartment is chosen among 4 compartments as the object for SG compartment pressure analyses.

The SG compartment has 2 openings to the containment atmosphere at the top, 2 openings to the containment atmosphere through the side wall, 7 openings to adjacent SG compartments through the side wall and 2 openings to reactor coolant drain tank compartment. There are some openings between the SG compartment and reactor cavity that are conservatively neglected.

The nodalization scheme for the US-APWR SG compartment pressure analysis is shown in Figure 7.3-1 to Figure 7.3-10. The SG compartment is azimuthally divided into each 4 sectors around the SG and the RCP, and vertically divided into 8 sectors for SG region except for the region surrounding the feedwater line nozzle, and 6 sectors for RCP region. The vertical nodal boundaries are basically at the location of flow obstructions (gratings) or geometry changes. The GOTHIC nodalization for SG compartment analysis is shown in Figure 7.3-11 and Figure 7.3-12. A total of 97 nodes, including the containment atmosphere node, are used for the SG compartment analyses. To calculate conservative pressure differences between the SG compartment nodes and the containment atmosphere node, the pressure of the containment atmosphere and adjacent compartments is assumed constant at 0.0 psig. This assumption generates conservatively high pressure differentials.

The description and geometric parameters for each node are summarized in Table 7.3-1, Table 7.3-4, Table 7.3-7 and Table 7.3-10. The free volume of each node is estimated by subtracting the obstructed volume from the room volume. The obstructed volume is estimated from the volume of main components with margin to assure minimum free volume for the node. This assumption generates conservative results.

(b) Nodalization sensitivity study

The SG compartment nodalization diagram for most limiting break case (feed water line break) has enough number of nodes. Additionally, among the nodes which contact a wall, pressure differentials between the peak pressure node and the nodes adjacent to that are small as shown in Table 7.3-1. Therefore, noding sensitivity studies are not required.

(c) Vent path description

The vent path connection diagram is shown in Figure 7.3-11 and Figure 7.3-12.

Geometric and hydraulic parameters for each vent path are summarized in Table 7.3-2, Table 7.3-5, Table 7.3-8 and Table 7.3-11. Vent paths P7, P49, P68, P111 to P114, P237 to P239, P241, P242, P244, P251, P253, P255 to P256 and P258 to P262 are openings from the SG compartment to the containment atmosphere. Vent paths P14, P15, P34, P35, P74, P93 and P110 are openings from the SG compartment (A-loop) to the adjacent SG compartment (B-loop). Vent paths P3 and P9 are openings from the SG compartment to the reactor coolant drain tank compartment. To obtain conservative results, P3, P9, P14, P15, P34, P35, P74, P93 and P110 were closed for this analysis.

The flow area of each vent path is conservatively estimated considering the flow obstruction by main components including margin. The friction length is conservatively estimated considering the length of the estimated flow line plus margin. The loss coefficient is conservatively estimated considering the effect of obstruction, contraction and expansion plus margin.

7.3.2 Short term mass and energy release data

High energy pipes penetrating the SG compartment are listed in Table 3-1. The postulated breaks were chosen from this table, considering the inner diameter of pipe, fluid temperature (density), and inside fluid pressure. The LBB-qualified pipes were not considered. For the SG compartment pressure analyses, breaks of the RHR pump inlet line, RHR pump outlet line and Feedwater line were postulated.

(a) RHR pump inlet line break

A guillotine break of the RHR pump inlet line was assumed. The RHR pump inlet line is connecting to the RCS hot leg (HLG). The mass and energy release from a HLG side was calculated using M-RELAP5 code which is the small break LOCA analysis code for the US-APWR. The opposite side (RHR pump side) is isolated by valves; therefore the amount of break flow from RHR pump side is limited. However, the break mass and energy release data from HLG is conservatively doubled and used for analyses. The resultant short term mass and energy release data are shown in Table 7.3-3 and the break mass flow rate and enthalpy are shown in Figure 7.3-13 and Figure 7.3-14.

(b) RHR pump outlet line break

A guillotine break of the RHR pump outlet line was assumed. The RHR pump outlet line connects to the RCS cold leg (CLG). The mass and energy release from CLG side was calculated using M-RELAP5 code which is the small break LOCA analysis code for the US-APWR. The opposite side (RHR pump side) is isolated by valves; therefore the amount of break flow from RHR pump side is limited. However, the break mass and energy release data from CLG was conservatively doubled and used for analyses. The resultant short term mass and energy release data are shown in Table 7.3-6 and the break mass flow rate and enthalpy are shown in Figure 7.3-16 and Figure 7.3-17.

(c) Feedwater line break

A guillotine break in the feedwater line was assumed. For estimating the mass and energy, two operating conditions are considered, full power operation and just after

hot shutdown. The resultant short term mass and energy release data are shown in Table 7.3-13 and Table 7.3-16, and the break mass flow rate and enthalpy are shown in Figure 7.3-19 to Figure 7.3-22 and Figure 7.3-24 to Figure 7.3-28. The mass and energy release evaluation methodology for a feedwater line break is described below.

<Mass and energy release from feed water pump side>

The flow rate from the piping break is the summation of initial flow rate and the increased flow rate due to the fluid expansion by depressurization. The decompression expansion of fluid is propagated from break point at the speed of sound. The system pressure decreases to the saturation pressure of initial temperature.

$$M_{out} = M_{in} + M_{ex} \quad (7.3\text{-}1)$$

$$M_{ex} = a \cdot A \cdot (-\Delta\rho) \quad (7.3\text{-}2)$$

M_{out} : Break mass flow rate (lbm/sec)
M_{in} : Initial mass flow rate (lbm/sec)
M_{ex} : Increased mass flow rate due to fluid expansion (lbm/sec)
a : speed of sound (ft/sec)
A : cross-sectional area of piping (ft^2) (=1.12 ft^2)
Δρ : change of fluid density due to expansion (lbm/ft^3)

The initial conditions and calculation results are shown in Table 7.3-13. The critical flow rates of liquid phase at saturation conditions calculated by M-RELAP5 (M_{crit}) are also shown in Table 7.3-13. M_{crit} calculated by M-RELAP5 is much larger than M_{out}. It is also confirmed that M_{crit} is larger than pump flow rate considering the pump speed increase due to the system decompression. It is therefore conservative to assume M_{crit} as the break flow. The mass and energy release data for SG compartment pressure analysis is shown in Table 7.3-14.

<Mass and energy release from SG side>

For the evaluation of mass and energy release from SG side, a constant blowdown profile using initial mass and energy release conditions calculated by M-RELAP5 code, is assumed. This is conservative because it neglects the decrease in mass flow rate due to decompression. The break flow from the SG side has a varying temperature. The part from the feed water nozzle to feedwater ring includes a comparatively low enthalpy fluid, while the secondary side of SG includes comparatively high enthalpy fluid. After the break occurs, these fluids with different enthalpy sequentially emitted from SG side. The duration time of first emission is calculated from the volume of water from the feed water nozzle to feedwater ring, the fluid density and flow rate. The initial conditions and calculation results are shown in Table 7.3-15. The mass and energy release data for SG compartment pressure analysis is shown in Table 7.3-16.

7.3.3 Calculated pressure responses

(a) RHR pump inlet line break

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in V16.

The worst calculated peak pressure was 11.02 psig at the break node V16. The pressure transient for V16 is shown in Figure 7.3-15. The design pressure of this node is 18 psig and the worst calculated peak pressure is less than the design pressure. The calculated peak pressure and design pressure for each node are shown on Table 7.3-1. The peak pressure is substantially lower than the design pressure for all nodes.

(b) RHR pump outlet line break

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in V9.

The worst calculated peak pressure was 12.89 psig at the break node V9. The pressure transient for V9 is shown in Figure 7.3-18. The design pressure of this node is 18 psig and the worst calculated peak pressure is less than the design pressure. The calculated peak pressure and design pressure for each node are shown on Table 7.3-4. The peak pressure is substantially lower than the design pressure for all nodes.

(c) Feedwater line break (full power operating condition)

The break was assumed to occur in the node V71. The worst calculated peak pressure was 31.15 psig at the node V76 (under the break in V71). The pressure transient for V76 is shown in Figure 7.3-23. The design pressure of this node is 35 psig and the worst calculated peak pressure is less than the design pressure. The calculated peak pressure and design pressure for each node are shown on Table 7.3-7. The peak pressure is substantially lower than the design pressure for all nodes.

(d) Feedwater line break (just after hot shutdown condition)

The break was assumed to occur in the node V71. The worst calculated peak pressure was 33.90 psig at the node V76 (under the break in V71). The pressure transient for V76 is shown in Figure 7.3-28. The design pressure of this node is 35 psig and the worst calculated peak pressure is less than the design pressure. The calculated peak pressure and design pressure for each node are shown on Table 7.3-10. The peak pressure is substantially lower than the design pressure for all nodes.

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	West quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	819	120	14.396	0	5.63	18	219.7
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	729	120	14.396	0	5.67	18	217.5
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1327	120	14.396	0	5.62	18	220.3
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1133	120	14.396	0	5.71	18	215.2
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1503	120	14.396	0	5.64	18	219.1
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1835	120	14.396	0	5.75	18	213.0
7	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1518	120	14.396	0	6.59	18	173.1

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1239	120	14.396	0	5.83	18	208.7
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	591	120	14.396	0	5.35	18	236.4
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	539	120	14.396	0	6.02	18	199.0
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1125	120	14.396	0	6.00	18	200.0
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	967	120	14.396	0	5.42	18	232.1
13	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1126	120	14.396	0	5.53	18	225.5
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1434	120	14.396	0	5.47	18	229.1
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1227	120	14.396	0	5.57	18	223.2

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1019	120	14.396	0	11.02	18	63.3
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	552	120	14.396	0	4.82	18	273.4
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	461	120	14.396	0	5.04	18	257.1
19	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	934	120	14.396	0	4.64	18	287.9
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	857	120	14.396	0	4.60	18	291.3
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	931	120	14.396	0	4.76	18	278.2
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	538	120	14.396	0	4.40	18	309.1
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	918	120	14.396	0	4.41	18	308.2

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	802	120	14.396	0	5.26	18	242.2
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	388	120	14.396	0	3.33	10	200.3
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	335	120	14.396	0	3.31	10	202.1
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	696	120	14.396	0	3.54	10	182.5
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	702	120	14.396	0	3.98	10	151.3
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	832	120	14.396	0	4.26	10	134.7
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	546	120	14.396	0	3.78	10	164.6
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	631	120	14.396	0	4.33	10	130.9

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	701	120	14.396	0	4.42	10	126.2
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	460	120	14.396	0	3.30	10	203.0
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	392	120	14.396	0	3.22	10	210.6
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	755	120	14.396	0	3.49	10	186.5
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	669	120	14.396	0	3.95	10	153.2
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	679	120	14.396	0	4.14	10	141.5
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	809	120	14.396	0	3.62	10	176.2
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	602	120	14.396	0	3.83	10	161.1

Table 7.3-1 Steam Generator Compartment Nodal Description
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	598	120	14.396	0	4.11	10	143.3
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	364	120	14.396	0	3.25	10	207.7
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	330	120	14.396	0	3.12	10	220.5
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	395	120	14.396	0	3.26	10	206.7
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	265	120	14.396	0	3.53	10	183.3
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	261	120	14.396	0	4.32	10	131.5
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	474	120	14.396	0	3.93	10	154.5
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	480	120	14.396	0	3.57	10	180.1

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	269	120	14.396	0	4.10	10	143.9
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	420	120	14.396	0	3.62	10	176.2
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	888	120	14.396	0	3.63	10	175.5
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	965	120	14.396	0	3.43	10	191.5
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	474	120	14.396	0	3.73	10	168.1
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	327	120	14.396	0	2.62	35	1235.9
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	789	120	14.396	0	2.97	35	1078.5
55	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	412	120	14.396	0	2.32	35	1408.6

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
56	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 88'-11.28"	5.19	36	120	14.396	0	2.44	35	1334.4
57		5.19	42	120	14.396	0	2.43	35	1340.3
58		5.19	70	120	14.396	0	2.41	35	1352.3
59		5.19	15	120	14.396	0	2.39	-	-
60		5.19	26	120	14.396	0	2.39	-	-
61		5.19	26	120	14.396	0	2.39	-	-
62		5.19	47	120	14.396	0	2.39	35	1364.4
63		5.19	66	120	14.396	0	2.36	35	1383.1
64		5.19	40	120	14.396	0	2.30	35	1421.7
65		5.19	34	120	14.396	0	2.22	35	1476.6
66	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	27	120	14.396	0	2.45	35	1328.6
67		3.79	31	120	14.396	0	2.39	35	1364.4
68		3.79	28	120	14.396	0	2.34	-	-
69		3.79	23	120	14.396	0	2.33	35	1402.1
70		3.79	6	120	14.396	0	2.28	-	-
71		3.79	14	120	14.396	0	2.28	-	-
72		3.79	15	120	14.396	0	2.28	-	-
73		3.79	21	120	14.396	0	2.28	-	-
74		3.79	26	120	14.396	0	2.29	35	1428.4
75		3.79	28	120	14.396	0	2.24	-	-
76		3.79	20	120	14.396	0	2.25	35	1455.6
77		3.79	29	120	14.396	0	2.20	35	1490.9

Table 7.3-1 Steam Generator Compartment Nodal Description
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
78	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	25	120	14.396	0	2.14	35	1535.5
79	Southeast quadrant around A-SG in A-SG compartment:between EL 92'-8.74" and 95'-1"	2.35	17	120	14.396	0	2.38	35	1370.6
80		2.35	19	120	14.396	0	2.31	35	1415.2
81		2.35	32	120	14.396	0	2.23	35	1469.5
82		2.35	7	120	14.396	0	2.16	-	-
83		2.35	12	120	14.396	0	2.16	-	-
84		2.35	12	120	14.396	0	2.16	-	-
85		2.35	35	120	14.396	0	2.14	35	1535.5
86		2.35	30	120	14.396	0	2.13	35	1543.2
87		2.35	18	120	14.396	0	2.10	35	1566.7
88		2.35	15	120	14.396	0	2.08	35	1582.7
89	Northwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	143	120	14.396	0	0.26	35	13361.5
90	Northeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	388	120	14.396	0	1.04	35	3265.4
91	Southeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	445	120	14.396	0	1.60	35	2087.5

Table 7.3-1 Steam Generator Compartment Nodal Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
92	Southwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	194	120	14.396	0	0.42	35	8233.3
93	Northwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	318	120	14.396	0	0.03	35	116566.7
94	Northeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	741	120	14.396	0	0.25	35	13900.0
95	Southeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	911	120	14.396	0	0.84	35	4066.7
96	Southwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	400	120	14.396	0	0.13	35	26823.1
~~97~~	~~B-SG compartment~~	~~200~~	~~47000~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
~~98~~	~~C/V reactor coolant drain tank compartment~~	~~200~~	~~3086~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
99	Containment building free volume	200	2790086	120	14.396	0	0.00	-	-

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		x	96.72	7.47	8.65	8.96	0.0	1.0	0.5	1.50
2	V1	V4		x	129.70	8.68	9.27	10.42	0.0	1.0	0.5	1.50
~~3~~	~~V1~~	~~V98~~		~~x~~	~~61.86~~	~~7.13~~	~~7.86~~	~~8.56~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
4	V2	V3		x	62.97	9.87	3.88	11.84	0.0	1.0	0.5	1.50
5	V3	V4		x	66.68	10.36	4.4	12.43	0.0	1.0	0.5	1.50
6	V3	V6		x	142.53	11.93	10.75	14.32	0.0	1.0	0.5	1.50
7	V3	V99		x	30.94	20.56	5.46	24.67	3.5	0.0	0.5	4.00
8	V4	V5		x	163.80	12.5	10.52	15	0.0	1.0	0.5	1.50
~~9~~	~~V4~~	~~V98~~		~~x~~	~~28.22~~	~~9.32~~	~~4.36~~	~~11.18~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
10	V5	V6		x	76.50	11.69	5.8	14.03	0.0	1.0	0.5	1.50
11	V5	V8		x	167.99	10.36	8.33	12.43	0.0	1.0	0.5	1.50
12	V6	V7		x	135.63	13.13	11.64	15.76	0.0	1.0	0.5	1.50
13	V7	V8		x	125.67	9.97	8.05	11.96	0.0	1.0	0.5	1.50
~~14~~	~~V7~~	~~V97~~		~~x~~	~~36.65~~	~~11.06~~	~~5.9~~	~~13.27~~	~~0.84~~	~~1.0~~	~~0.5~~	~~2.34~~
~~15~~	~~V8~~	~~V97~~		~~x~~	~~21.94~~	~~10.86~~	~~4.42~~	~~13.03~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
16	V1	V9		x	46.77	6.39	6.4	21.6	0.34	0.16	0.2	0.70
17	V2	V10		x	40.68	6.39	7.91	23.73	0.34	0.16	0.2	0.70
18	V3	V11		x	78.56	6.39	10.96	28.03	0.34	0.16	0.2	0.70
19	V4	V12		x	69.44	6.39	9.44	25.88	0.34	0.16	0.2	0.70
20	V5	V13		x	85.84	6.39	9.36	25.77	0.34	0.16	0.2	0.70
21	V6	V14		x	101.84	6.39	9.09	25.39	0.34	0.16	0.2	0.70

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
22	V7	V15		x	86.47	6.39	11.12	28.25	0.34	0.16	0.2	0.70
23	V8	V16		x	75.48	6.39	8.8	24.98	0.34	0.16	0.2	0.70
24	V9	V10		x	61.42	10.63	6.55	12.76	0.0	1.0	0.5	1.50
25	V9	V12		x	48.55	11.41	2.96	13.69	0.0	1.0	0.5	1.50
26	V10	V11		x	41.34	13.22	5.22	15.86	0.0	1.0	0.5	1.50
27	V11	V12		x	66.03	13.4	6.15	16.08	0.0	1.0	0.5	1.50
28	V11	V14		x	120.32	10.2	10.31	12.24	0.0	1.0	0.5	1.50
29	V12	V13		x	140.68	7.34	9.95	8.81	0.0	1.0	0.5	1.50
30	V13	V14		x	42.11	16.96	3.42	20.35	0.0	1.0	0.5	1.50
31	V13	V16		x	83.03	14.62	4.15	17.54	0.0	1.0	0.5	1.50
32	V14	V15		x	86.90	18.53	7.85	22.24	0.0	1.0	0.5	1.50
33	V15	V16		x	84.52	14.17	7.7	17	0.0	1.0	0.5	1.50
~~34~~	~~V15~~	~~V97~~		~~x~~	~~13.17~~	~~8.66~~	~~3.07~~	~~10.39~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
~~35~~	~~V16~~	~~V97~~		~~x~~	~~16.48~~	~~11.58~~	~~3.62~~	~~13.9~~	~~0.26~~	~~1.0~~	~~0.5~~	~~1.76~~
36	V9	V17		x	43.13	5.64	5.91	19.41	0.34	0.16	0.2	0.70
37	V10	V18		x	37.12	5.64	6.72	20.55	0.34	0.16	0.2	0.70
38	V11	V19		x	72.16	5.64	10.22	25.48	0.34	0.16	0.2	0.70
39	V12	V20		x	67.19	5.64	9.93	25.07	0.34	0.16	0.2	0.70
40	V13	V21		x	48.11	5.64	3.73	16.33	0.34	0.16	0.2	0.70
41	V14	V22		x	21.94	5.64	2.16	14.12	0.34	0.16	0.2	0.70
42	V15	V23		x	49.34	5.64	4.07	16.81	0.34	0.16	0.2	0.70
43	V16	V24		x	48.67	5.64	4.37	17.23	0.34	0.16	0.2	0.70

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
44	V17	V18		x	57.59	9.96	7.41	11.95	0.0	1.0	0.5	1.50
45	V17	V20		x	69.73	10.82	5.88	12.98	0.0	1.0	0.5	1.50
46	V18	V19		x	38.11	12.4	5.35	14.88	0.0	1.0	0.5	1.50
47	V19	V20		x	61.30	12.67	7.93	15.2	0.0	1.0	0.5	1.50
48	V19	V22		x	70.67	12.89	8.4	15.47	0.0	1.0	0.5	1.50
49	V19	V99		x	14.75	16.21	3.73	19.45	3.5	0.0	0.5	4.00
50	V20	V21		x	128.07	7.78	8.31	9.34	0.0	1.0	0.5	1.50
51	V21	V22		x	30.56	14.83	4.61	17.8	0.0	1.0	0.5	1.50
52	V21	V24		x	79.37	14.62	6.27	17.54	0.0	1.0	0.5	1.50
53	V22	V23		x	47.78	16.71	5.7	20.05	0.0	1.0	0.5	1.50
54	V23	V24		x	47.11	14.17	6.68	17	0.0	1.0	0.5	1.50
55	V17	V25		x	33.53	4.82	4.96	16.42	0.34	0.16	0.2	0.70
56	V18	V26		x	29.86	4.82	5.77	17.56	0.34	0.16	0.2	0.70
57	V19	V27		x	62.57	4.82	6.8	19.02	0.34	0.16	0.2	0.70
58	V20	V28		x	60.47	4.82	8.53	21.46	0.34	0.16	0.2	0.70
59	V21	V29		x	79.65	5.39	9.88	23.36	0.34	0.16	0.2	0.70
60	V22	V30		x	59.73	7.26	5.44	17.1	0.34	0.16	0.2	0.70
61	V23	V31		x	110.29	7.96	8.54	9.55	0.0	0.0	0.0	0.00
62	V24	V32		x	83.90	6.76	6.79	19	0.34	0.16	0.2	0.70
63	V25	V26		x	35.33	11.65	4.53	13.98	0.0	1.0	0.5	1.50
64	V25	V28		x	55.78	12.5	7.47	15	0.0	1.0	0.5	1.50
65	V26	V27		x	24.22	13.84	4.57	16.61	0.0	1.0	0.5	1.50

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
66	V27	V28		x	48.82	14.18	6.51	17.02	0.0	1.0	0.5	1.50
67	V27	V30		x	65.64	12.91	6.38	15.49	0.0	1.0	0.5	1.50
68	V27	V99		x	6.00	15.58	2.4	18.7	3.5	0.0	0.5	4.00
69	V28	V29		x	111.76	7.78	9.86	9.34	0.0	1.0	0.5	1.50
70	V29	V30		x	25.86	14.83	4.78	17.8	0.0	1.0	0.5	1.50
71	V29	V32		x	72.03	14.62	8.38	17.54	0.0	1.0	0.5	1.50
72	V30	V31		x	40.83	16.71	6.34	20.05	0.0	1.0	0.5	1.50
73	V31	V32		x	33.41	14.17	3.2	17	0.0	1.0	0.5	1.50
~~74~~	~~V32~~	~~V97~~		~~x~~	~~13.17~~	~~9.5~~	~~3.07~~	~~11.4~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
75	V25	V33		x	62.52	6.59	6.14	7.91	0.0	0.0	0.0	0.00
76	V26	V34		x	50.81	6.59	5.9	7.91	0.0	0.0	0.0	0.00
77	V27	V35		x	111.57	6.59	9.22	7.91	0.0	0.0	0.0	0.00
78	V28	V36		x	101.10	6.59	8.93	7.91	0.0	0.0	0.0	0.00
79	V29	V37		x	100.49	5.61	9.88	21.72	0.34	0.16	0.2	0.70
80	V30	V38		x	84.55	4	10.72	22.9	0.34	0.16	0.2	0.70
81	V31	V39		x	63.33	4	7.77	18.74	0.34	0.16	0.2	0.70
82	V32	V40		x	79.82	5.08	9.73	21.5	0.34	0.16	0.2	0.70
83	V33	V34		x	56.50	10.89	6.56	13.07	0.0	1.0	0.5	1.50
84	V33	V36		x	72.89	12.5	7.06	15	0.0	1.0	0.5	1.50
85	V34	V35		x	47.64	13.84	6.44	16.61	0.0	1.0	0.5	1.50
86	V35	V36		x	60.24	14.18	7.22	17.02	0.0	1.0	0.5	1.50
87	V35	V38		x	78.91	10.14	8.2	12.17	0.0	1.0	0.5	1.50

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
88	V36	V37		x	91.21	6.16	8.55	7.39	0.0	1.0	0.5	1.50
89	V37	V38		x	21.11	16.96	4.45	20.35	0.0	1.0	0.5	1.50
90	V37	V40		x	58.79	14.62	7.42	17.54	0.0	1.0	0.5	1.50
91	V38	V39		x	33.32	18.53	5.77	22.24	0.0	1.0	0.5	1.50
92	V39	V40		x	32.19	14.17	5.67	17	0.0	1.0	0.5	1.50
~~93~~	~~V39~~	~~V97~~		~~x~~	~~11.81~~	~~8.02~~	~~2.99~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
94	V33	V41		x	83.14	5.38	8.15	6.46	0.0	0.0	0.0	0.00
95	V34	V42		x	71.41	5.38	8.28	6.46	0.0	0.0	0.0	0.00
96	V35	V43		x	84.57	5.38	9.02	6.46	0.0	0.0	0.0	0.00
97	V36	V44		x	60.77	5.38	6.61	6.46	0.0	0.0	0.0	0.00
98	V37	V45		x	55.70	5.38	6.43	6.46	0.0	0.0	0.0	0.00
99	V38	V46		x	105.41	5.38	8.78	6.46	0.0	0.0	0.0	0.00
100	V39	V47		x	99.31	5.38	6.57	6.46	0.0	0.0	0.0	0.00
101	V40	V48		x	57.32	5.38	7.19	6.46	0.0	0.0	0.0	0.00
102	V41	V42		x	47.93	7.47	6.39	8.96	0.0	1.0	0.5	1.50
103	V41	V44		x	59.38	8.62	6.58	10.34	0.0	1.0	0.5	1.50
104	V42	V43		x	42.87	8.22	6.26	9.86	0.0	1.0	0.5	1.50
105	V43	V44		x	32.72	7.05	5.64	8.46	0.0	1.0	0.5	1.50
106	V45	V46		x	17.24	15.05	4.1	18.06	0.0	1.0	0.5	1.50
107	V45	V48		x	18.64	11.81	4.29	14.17	0.0	1.0	0.5	1.50
108	V46	V47		x	20.90	17.36	2.8	20.83	0.0	1.0	0.5	1.50
109	V47	V48		x	26.29	13.78	5.12	16.54	0.0	1.0	0.5	1.50

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
~~110~~	~~V47~~	~~V97~~		~~x~~	~~1.33~~	~~8.02~~	~~1~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
111	V41	V99		x	42.73	2.42	6.39	2.9	0.94	1.0	0.25	2.19
112	V42	V99		x	64.61	2.42	8.11	2.9	0.43	1.0	0.05	1.48
113	V43	V99		x	82.76	2.42	9.21	2.9	0.23	1.0	0.02	1.25
114	V44	V99		x	30.65	2.42	5.45	2.9	0.95	1.0	0.25	2.2
115	V45	V49		x	33.42	4.69	6.43	18.24	0.34	0.16	0.2	0.70
116	V46	V50		x	63.25	4.69	8.78	21.56	0.34	0.16	0.2	0.70
117	V47	V51		x	65.41	4.69	8.49	21.15	0.34	0.16	0.2	0.70
118	V48	V52		x	34.39	4.69	7.19	19.31	0.34	0.16	0.2	0.70
119	V49	V50		x	26.26	16.93	3.69	20.32	0.0	1.0	0.5	1.50
120	V49	V52		x	25.92	13.28	3.24	15.94	0.0	1.0	0.5	1.50
121	V50	V51		x	44.11	19.24	4.87	23.09	0.0	1.0	0.5	1.50
122	V51	V52		x	46.23	15.23	5.74	18.28	0.0	1.0	0.5	1.50
123	V49	V53		x	17.85	6.64	3.54	18.07	0.34	0.16	0.2	0.70
124	V50	V54		x	43.06	6.64	5.98	21.51	0.34	0.16	0.2	0.70
125	V52	V55		x	22.48	6.64	4.98	20.1	0.34	0.16	0.2	0.70
126	V53	V54		x	15.36	16.93	2.42	20.32	0.0	1.0	0.5	1.50
127	V53	V55		x	18.65	13.28	2.87	15.94	0.0	1.0	0.5	1.50
128	V53	V89		x	8.57	5.22	2.15	13.26	0.34	0.16	0.2	0.70
129	V54	V90		x	36.76	5.22	4.92	17.17	0.34	0.16	0.2	0.70
130	V55	V92		x	13.99	5.22	2.43	13.66	0.34	0.16	0.2	0.70
131	V51	V56		x	4.31	4.8	2.57	13.02	0.34	0.16	0.2	0.70

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
132	V51	V57		x	5.04	4.8	2.71	13.21	0.34	0.16	0.2	0.70
133	V51	V58		x	8.33	4.8	3.24	13.96	0.34	0.16	0.2	0.70
134	V51	V59		x	1.75	4.79	1.24	11.14	0.34	0.16	0.2	0.70
135	V51	V60		x	3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
136	V51	V61		x	3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
137	V51	V62		x	7.36	4.8	2.31	12.65	0.34	0.16	0.2	0.70
138	V51	V63		x	7.82	4.8	3.15	13.83	0.34	0.16	0.2	0.70
139	V51	V64		x	4.74	4.8	2.64	13.11	0.34	0.16	0.2	0.70
140	V51	V65		x	4.04	4.8	2.5	12.92	0.34	0.16	0.2	0.70
141	V54	V56		x	17.74	11.1	4.12	13.32	0.0	1.0	0.5	1.50
142	V56	V57		x	18.98	2.1	4.29	2.52	0.0	0.0	0.0	0.00
143	V57	V58		x	22.94	2.56	4.77	3.07	0.0	0.0	0.0	0.00
144	V58	V59		x	4.79	4.24	1.57	5.09	0.0	0.0	0.0	0.00
145	V58	V60		x	6.95	3.39	2.13	4.07	0.0	0.0	0.0	0.00
146	V58	V61		x	6.95	3.12	2.13	3.74	0.0	0.0	0.0	0.00
147	V58	V62		x	16.47	4.98	3.94	5.98	0.0	0.0	0.0	0.00
148	V59	V60		x	19.70	1.02	4.38	1.22	0.0	0.0	0.0	0.00
149	V60	V61		x	19.70	1.34	4.38	1.61	0.0	0.0	0.0	0.00
150	V61	V62		x	19.70	3.07	4.38	3.68	0.0	0.0	0.0	0.00
151	V59	V63		x	4.79	4.13	1.57	4.96	0.0	0.0	0.0	0.00
152	V60	V63		x	6.95	3.28	2.13	3.94	0.0	0.0	0.0	0.00
153	V61	V63		x	6.95	3.14	2.13	3.77	0.0	0.0	0.0	0.00

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
154	V62	V63		x	15.06	5	3.72	6	0.0	0.0	0.0	0.00
155	V63	V64		x	21.86	2.52	4.65	3.02	0.0	0.0	0.0	0.00
156	V64	V65		x	17.96	2.08	4.15	2.5	0.0	0.0	0.0	0.00
157	V65	V55		x	16.75	7.1	3.98	8.52	0.0	1.0	0.5	1.50
158	V56	V66		x	7.19	4.5	2.57	5.4	0.0	0.0	0.0	0.00
159	V57	V67		x	8.40	4.5	2.71	5.4	0.0	0.0	0.0	0.00
160	V58	V68		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
161	V58	V69		x	6.25	4.5	2.19	5.4	0.0	0.0	0.0	0.00
162	V59	V70		x	2.92	4.5	1.24	5.4	0.0	0.0	0.0	0.00
163	V60	V71		x	5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
164	V61	V72		x	5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
165	V62	V73		x	5.30	4.5	1.19	5.4	0.0	0.0	0.0	0.00
166	V62	V74		x	6.97	4.5	2.55	5.4	0.0	0.0	0.0	0.00
167	V63	V75		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
168	V63	V76		x	5.41	4.5	2	5.4	0.0	0.0	0.0	0.00
169	V64	V77		x	7.90	4.5	2.64	5.4	0.0	0.0	0.0	0.00
170	V65	V78		x	6.73	4.5	2.5	5.4	0.0	0.0	0.0	0.00
171	V54	V66		x	12.95	11.1	3.59	13.32	0.0	1.0	0.5	1.50
172	V66	V67		x	13.85	2.1	3.72	2.52	0.0	0.0	0.0	0.00
173	V67	V68		x	13.36	2.16	3.65	2.59	0.0	0.0	0.0	0.00
174	V67	V69		x	3.38	4.08	1.44	4.9	0.0	0.0	0.0	0.00
175	V68	V69		x	10.99	2.73	3.29	3.28	0.0	0.0	0.0	0.00

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
176	V68	V70		x	3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
177	V68	V71		x	5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
178	V68	V72		x	5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
179	V69	V73		x	8.12	3.45	2.74	4.14	0.0	0.0	0.0	0.00
180	V69	V74		x	3.90	4.6	1.62	5.52	0.0	0.0	0.0	0.00
181	V70	V71		x	8.09	1.02	1.34	1.22	0.0	0.0	0.0	0.00
182	V71	V72		x	11.54	1.34	2.18	1.61	0.0	0.0	0.0	0.00
183	V72	V73		x	11.54	1.74	2.18	2.09	0.0	0.0	0.0	0.00
184	V70	V75		x	3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
185	V71	V75		x	5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
186	V72	V75		x	5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
187	V73	V74		x	9.36	2.4	1.87	2.88	0.0	0.0	0.0	0.00
188	V73	V76		x	8.12	3.47	2.74	4.16	0.0	0.0	0.0	0.00
189	V74	V76		x	2.87	4.62	1.26	5.54	0.0	0.0	0.0	0.00
190	V75	V76		x	10.99	2.62	3.29	3.14	0.0	0.0	0.0	0.00
191	V75	V77		x	13.36	2.14	3.65	2.57	0.0	0.0	0.0	0.00
192	V76	V77		x	2.60	4.04	1.16	4.85	0.0	0.0	0.0	0.00
193	V77	V78		x	13.11	2.08	3.62	2.5	0.0	0.0	0.0	0.00
194	V78	V55		x	12.22	7.1	3.48	8.52	0.0	1.0	0.5	1.50
195	V66	V79		x	7.19	3.07	2.57	3.68	0.0	0.0	0.0	0.00
196	V67	V80		x	8.40	3.07	2.71	3.68	0.0	0.0	0.0	0.00
197	V68	V81		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
198	V69	V81		x	6.25	3.07	2.19	3.68	0.0	0.0	0.0	0.00
199	V70	V82		x	2.92	3.07	1.24	3.68	0.0	0.0	0.0	0.00
200	V71	V83		x	5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
201	V72	V84		x	5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
202	V73	V85		x	8.14	3.07	2.74	3.68	0.0	0.0	0.0	0.00
203	V74	V85		x	6.97	3.07	2.55	3.68	0.0	0.0	0.0	0.00
204	V75	V86		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00
205	V76	V86		x	5.41	3.07	2	3.68	0.0	0.0	0.0	0.00
206	V77	V87		x	7.90	3.07	2.64	3.68	0.0	0.0	0.0	0.00
207	V78	V88		x	6.73	3.07	2.5	3.68	0.0	0.0	0.0	0.00
208	V54	V79		x	8.05	11.1	2.79	13.32	0.0	1.0	0.5	1.50
209	V79	V80		x	8.61	2.1	2.86	2.52	0.0	0.0	0.0	0.00
210	V80	V81		x	10.41	2.56	3.07	3.07	0.0	0.0	0.0	0.00
211	V81	V82		x	2.17	4.24	1.32	5.09	0.0	0.0	0.0	0.00
212	V81	V83		x	3.15	3.39	1.71	4.07	0.0	0.0	0.0	0.00
213	V81	V84		x	3.15	3.12	1.71	3.74	0.0	0.0	0.0	0.00
214	V81	V85		x	7.47	4.98	2.7	5.98	0.0	0.0	0.0	0.00
215	V82	V83		x	8.94	1.02	2.91	1.22	0.0	0.0	0.0	0.00
216	V83	V84		x	8.94	1.34	2.91	1.61	0.0	0.0	0.0	0.00
217	V84	V85		x	8.94	3.07	2.91	3.68	0.0	0.0	0.0	0.00
218	V82	V86		x	2.17	4.13	1.32	4.96	0.0	0.0	0.0	0.00
219	V83	V86		x	3.15	3.28	1.71	3.94	0.0	0.0	0.0	0.00

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
220	V84	V86		x	3.15	3.14	1.71	3.77	0.0	0.0	0.0	0.00
221	V85	V86		x	65.64	5	24.98	6	0.0	0.0	0.0	0.00
222	V86	V87		x	9.92	2.52	3.02	3.02	0.0	0.0	0.0	0.00
223	V87	V88		x	8.15	2.08	2.8	2.5	0.0	0.0	0.0	0.00
224	V88	V55		x	7.60	7.1	2.72	8.52	0.0	1.0	0.5	1.50
225	V79	V91		x	2.16	2.52	1.83	7.41	0.34	0.16	0.2	0.70
226	V80	V91		x	2.55	2.52	1.36	6.75	0.34	0.16	0.2	0.70
227	V81	V91		x	6.35	3.35	1.72	7.26	0.34	0.16	0.2	0.70
228	V82	V91		x	1.75	2.52	1.24	6.58	0.34	0.16	0.2	0.70
229	V83	V91		x	3.05	2.52	1.98	7.62	0.34	0.16	0.2	0.70
230	V84	V91		x	3.22	3.44	1.71	7.24	0.34	0.16	0.2	0.70
231	V85	V91	x		6.77	4.13	1.56	4.96	0.0	0.0	0.0	0.00
232	V86	V91		x	9.29	2.97	3.15	9.27	0.34	0.16	0.2	0.70
233	V87	V91		x	4.74	2.52	2.64	8.55	0.34	0.16	0.2	0.70
234	V88	V91		x	2.77	2.52	1.7	7.23	0.34	0.16	0.2	0.70
235	V89	V90		x	8.02	16.93	2.21	20.32	0.0	1.0	0.5	1.50
236	V89	V92		x	9.74	12.59	2.58	15.11	0.0	1.0	0.5	1.50
237	V89	V99		x	13.23	11.34	3.25	13.61	0.0	1.0	0.5	1.50
238	V89	V99		x	27.82	5.99	4.02	7.19	0.0	1.0	0.5	1.50
239	V89	V99		x	36.11	8.4	5.57	10.08	0.0	1.0	0.5	1.50
240	V90	V91		x	16.16	19.24	2.91	23.09	0.0	1.0	0.5	1.50
241	V90	V99		x	46.62	10.29	6.2	12.35	0.0	1.0	0.5	1.50

Table 7.3-2 Steam Generator Compartment Vent Path Description

Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

Vent Path No	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
242	V90	V99		x	26.61	5.87	4.65	7.04	0.0	1.0	0.5	1.50
243	V91	V92		x	14.58	15.23	2.62	18.28	0.0	1.0	0.5	1.50
244	V92	V99		x	45.84	6.21	5.38	7.45	0.0	1.0	0.5	1.50
245	V89	V93		x	17.85	5.12	3.54	15.02	0.34	0.16	0.2	0.70
246	V90	V94		x	43.06	5.12	5.98	18.46	0.34	0.16	0.2	0.70
247	V91	V95		x	62.67	6.24	7.68	20.86	0.34	0.16	0.2	0.70
248	V92	V96		x	22.48	5.12	4.98	17.05	0.34	0.16	0.2	0.70
249	V93	V94		x	14.91	16.93	2.41	20.32	0.0	1.0	0.5	1.50
250	V93	V96		x	18.10	12.59	2.86	15.11	0.0	1.0	0.5	1.50
251	V93	V99		x	24.59	11.34	3.72	13.61	0.0	1.0	0.5	1.50
252	V93	V99		x	87.07	5.99	9.21	7.19	0.0	1.0	0.5	1.50
253	V93	V99		x	77.44	8.4	8.59	10.08	0.0	1.0	0.5	1.50
254	V94	V95		x	37.61	19.24	5.22	23.09	0.0	1.0	0.5	1.50
255	V94	V99		x	100.40	10.29	9.98	12.35	0.0	1.0	0.5	1.50
256	V94	V99		x	90.07	5.87	9.39	7.04	0.0	1.0	0.5	1.50
257	V95	V96		x	35.51	15.23	4.99	18.28	0.0	1.0	0.5	1.50
258	V96	V99		x	95.07	6.21	9.68	7.45	0.0	1.0	0.5	1.50
259	V93	V99		x	29.75	5.5	3.54	6.6	0.0	1.0	0.0	1.00
260	V94	V99		x	71.76	5.5	5.98	6.6	0.0	1.0	0.0	1.00
261	V95	V99		x	74.61	5.5	6.03	6.6	0.0	1.0	0.0	1.00
262	V96	V99		x	37.46	5.5	4.98	6.6	0.0	1.0	0.0	1.00

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	643.125
0.001	3924.77	643.125
0.002	3714.69	643.206
0.003	3894.44	642.847
0.004	4434.31	642.507
0.005	6355.1	643.359
0.006	6184.88	643.343
0.007	6197.05	643.434
0.008	6370.46	643.635
0.009	6571.7	643.847
0.01	6711.53	644.001
0.011	6801.25	644.104
0.012	6925.5	644.232
0.013	7164.33	644.459
0.014	7520.33	644.799
0.015	7906.86	645.182
0.016	8199.72	645.487
0.017	8315.7	645.619
0.018	8259.25	645.576
0.019	8106.68	645.434
0.02	7951.43	645.291
0.021	7850.23	645.201
0.022	7797.11	645.16
0.023	7737.3	645.112
0.024	7611.86	645.002
0.025	7402.67	644.814
0.026	7149.77	644.589
0.027	6930.72	644.399
0.028	6820.36	644.307
0.029	6852.92	644.341
0.03	7004.81	644.483
0.031	7207.54	644.674
0.032	7389.07	644.852
0.033	7510.41	644.975
0.034	7575.99	645.047
0.035	7615.17	645.094
0.036	7652.34	645.138
0.037	7687.04	645.181
0.038	7695.58	645.198
0.039	7651.22	645.164

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.04	7547.33	645.073
0.041	7407.21	644.947
0.042	7274.42	644.83
0.043	7190.03	644.758
0.044	7170.08	644.746
0.045	7197.02	644.778
0.046	7231.15	644.817
0.047	7235.54	644.828
0.048	7198.58	644.801
0.049	7140.08	644.754
0.05	7098.38	644.722
0.051	7106.71	644.736
0.052	7172.66	644.803
0.053	7272.39	644.904
0.054	7363.13	644.997
0.055	7406.42	645.047
0.056	7387.74	645.037
0.057	7321.4	644.981
0.058	7239.76	644.91
0.059	7174.86	644.855
0.06	7142.79	644.831
0.061	7138.58	644.834
0.062	7143.28	644.845
0.063	7138.06	644.846
0.064	7116.34	644.832
0.065	7086.91	644.811
0.066	7067.34	644.799
0.067	7072.35	644.809
0.068	7104.38	644.845
0.069	7151.6	644.895
0.07	7193.99	644.942
0.071	7213.43	644.967
0.072	7201.66	644.962
0.073	7162.03	644.931
0.074	7105.26	644.883
0.075	7042.76	644.83
0.076	6981.63	644.779
0.077	6923.83	644.731
0.078	6869.06	644.685
0.079	6818.72	644.644
0.08	6778.01	644.612

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.081	6754.73	644.595
0.082	6755.61	644.601
0.083	6782.35	644.63
0.084	6829.97	644.678
0.085	6888.09	644.737
0.086	6944.42	644.794
0.087	6988.27	644.841
0.088	7012.38	644.869
0.089	7012.73	644.875
0.09	6987.73	644.856
0.091	6937.84	644.815
0.092	6866.5	644.754
0.093	6781.42	644.68
0.094	6695.03	644.605
0.095	6622.31	644.543
0.096	6576.97	644.506
0.097	6566.91	644.5
0.098	6591.26	644.526
0.099	6640.71	644.575
0.1	6701.05	644.634
0.101	6758.52	644.691
0.102	6804	644.738
0.103	6834.45	644.771
0.104	6851.13	644.791
0.105	6856.49	644.8
0.106	6851.58	644.8
0.107	6835.66	644.79
0.108	6807.84	644.769
0.109	6769.28	644.737
0.11	6724.51	644.7
0.111	6680.59	644.664
0.112	6644.63	644.634
0.113	6620.95	644.616
0.114	6609.56	644.61
0.115	6607.02	644.611
0.116	6608.97	644.616
0.117	6613.1	644.624
0.118	6620.6	644.634
0.119	6635.36	644.652
0.12	6661.24	644.679
0.121	6699.01	644.718

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.122	6744.59	644.764
0.123	6789.68	644.81
0.124	6824.59	644.847
0.125	6841.78	644.867
0.126	6838.62	644.868
0.127	6818.1	644.853
0.128	6787.39	644.828
0.129	6755.06	644.802
0.13	6728.07	644.78
0.131	6709.64	644.767
0.132	6698.58	644.76
0.133	6690.15	644.756
0.134	6677.99	644.748
0.135	6656.57	644.732
0.136	6623.18	644.704
0.137	6579.19	644.667
0.138	6530.1	644.625
0.139	6484.26	644.587
0.14	6450.89	644.559
0.141	6437.57	644.55
0.142	6448	644.562
0.143	6480.6	644.594
0.144	6528.51	644.641
0.145	6581.14	644.693
0.146	6626.61	644.738
0.147	6654.58	644.767
0.148	6658.41	644.774
0.149	6636.34	644.757
0.15	6591.42	644.719
0.151	6530.57	644.666
0.152	6463.24	644.607
0.153	6399.4	644.552
0.154	6347.8	644.508
0.155	6314.21	644.48
0.156	6300.32	644.47
0.157	6303.45	644.475
0.158	6317.25	644.49
0.159	6333.49	644.507
0.16	6344.5	644.519
0.161	6345.39	644.523
0.162	6335.39	644.516

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.163	6317.84	644.503
0.164	6298.74	644.488
0.165	6284.46	644.477
0.166	6279.39	644.475
0.167	6284.47	644.482
0.168	6296.9	644.495
0.169	6311.32	644.51
0.17	6321.72	644.522
0.171	6323.53	644.526
0.172	6314.98	644.521
0.173	6297.5	644.508
0.174	6274.9	644.49
0.175	6252.06	644.471
0.176	6233.29	644.457
0.177	6221.24	644.448
0.178	6216.42	644.446
0.179	6217.44	644.449
0.18	6221.78	644.455
0.181	6226.82	644.461
0.182	6230.59	644.467
0.183	6232.22	644.47
0.184	6231.9	644.472
0.185	6230.61	644.473
0.186	6229.65	644.474
0.187	6230.21	644.477
0.188	6232.99	644.481
0.189	6237.97	644.488
0.19	6244.32	644.495
0.191	6250.42	644.503
0.192	6253.96	644.508
0.193	6252.36	644.509
0.194	6243.2	644.503
0.195	6224.88	644.489
0.196	6197.15	644.466
0.197	6161.41	644.436
0.198	6120.67	644.401
0.199	6079.09	644.366
0.2	6041.26	644.334
0.205	6007.95	644.311
0.21	6092.3	644.395
0.215	6003.89	644.328

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.22	5957.04	644.291
0.225	5983.72	644.323
0.23	5954.8	644.306
0.235	5931.79	644.293
0.24	5871.9	644.248
0.245	5878.77	644.26
0.25	5943.64	644.324
0.255	5914.97	644.309
0.26	5824.07	644.237
0.265	5823.15	644.242
0.27	5867.14	644.288
0.275	5853.22	644.285
0.28	5830.14	644.272
0.285	5860.69	644.305
0.29	5864.96	644.318
0.295	5832.63	644.298
0.3	5795.11	644.274
0.305	5784.87	644.271
0.31	5822.53	644.311
0.315	5842.16	644.337
0.32	5828.79	644.335
0.325	5805.13	644.322
0.33	5780.29	644.309
0.335	5730.34	644.273
0.34	5686.21	644.242
0.345	5669.19	644.234
0.35	5648.01	644.221
0.355	5632.66	644.214
0.36	5620.38	644.209
0.365	5613.4	644.208
0.37	5626.99	644.226
0.375	5636.05	644.241
0.38	5623.47	644.238
0.385	5601.61	644.227
0.39	5579.59	644.215
0.395	5553.03	644.198
0.4	5523.06	644.179
0.405	5506.47	644.17
0.41	5508.74	644.177
0.415	5519.38	644.193
0.42	5523.02	644.204

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.425	5516.29	644.206
0.43	5518.39	644.216
0.435	5534.79	644.239
0.44	5548.56	644.261
0.445	5557.75	644.279
0.45	5566.92	644.298
0.455	5573.01	644.315
0.46	5575.76	644.329
0.465	5574.79	644.34
0.47	5554.95	644.356
0.475	5516.92	644.363
0.48	5468.65	644.36
0.485	5412.64	644.35
0.49	5364.2	644.344
0.495	5332.96	644.35
0.5	5314.69	644.365
0.6	4941.09	644.528
0.7	4824.3	644.792
0.8	4804.23	645.078
0.9	4767.53	645.356
1	4797	645.666
1.1	4770.03	645.923
1.2	4785.66	646.195
1.3	4771.29	646.418
1.4	4770.16	646.631
1.5	4767.67	646.809
1.6	4763.15	646.965
1.7	4759.19	647.095
1.8	4757.5	647.204
1.9	4755.11	647.292
2	4751.54	647.358
2.1	4748.17	647.404
2.2	4744.78	647.432
2.3	4741.21	647.442
2.4	4737.75	647.436
2.5	4734.29	647.415
2.6	4731.18	647.382
2.7	4727.39	647.338
2.8	4723.98	647.284
2.9	4720.96	647.224
3	4718.55	647.159

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.1	4717.97	647.094
3.2	4717.88	647.03
3.3	4718.22	646.967
3.4	4717.09	646.901
3.5	4715.67	646.832
3.6	4713.91	646.761
3.7	4711.92	646.689
3.8	4709.75	646.619
3.9	4707.46	646.552
4	4705.21	646.489
4.1	4702.57	646.429
4.2	4699.83	646.373
4.3	4696.85	646.319
4.4	4693.03	646.266
4.5	4689.82	646.213
4.6	4686.61	646.161
4.7	4683.04	646.109
4.8	4679.07	646.056
4.9	4674.69	646.001
5	4670.04	645.944
5.1	4664.94	645.885
5.2	4659.55	645.823
5.3	4653.91	645.759
5.4	4647.97	645.693
5.5	4641.75	645.625
5.6	4635.22	645.554
5.7	4627.95	645.482
5.8	4620.62	645.408
5.9	4613.68	645.336
6	4606.17	645.264
6.1	4598.36	645.195
6.2	4590.31	645.127
6.3	4582.14	645.059
6.4	4573.93	644.992
6.5	4565.75	644.925
6.6	4557.64	644.859
6.7	4549.71	644.794
6.8	4541.91	644.73
6.9	4534.28	644.666
7	4526.77	644.604
7.1	4519.28	644.542

Table 7.3-3 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft2)
Break location : Volume number 16

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
7.2	4511.79	644.48
7.3	4504.33	644.42
7.4	4496.93	644.36
7.5	4489.72	644.302
7.6	4482.29	644.244
7.7	4475.12	644.188
7.8	4467.98	644.134
7.9	4460.85	644.082
8	4453.74	644.031
8.1	4446.62	643.983
8.2	4439.49	643.936
8.3	4432.33	643.891
8.4	4425.12	643.848
8.5	4417.89	643.807
8.6	4410.69	643.768
8.7	4403.42	643.729
8.8	4396.21	643.693
8.9	4389.17	643.658
9	4379.68	643.62
9.1	4374.77	643.589
9.2	4367.86	643.55
9.3	4360.78	643.518
9.4	4353.67	643.485
9.5	4347.17	643.453
9.6	4340.82	643.419
9.7	4334.4	643.384
9.8	4327.81	643.353
9.9	4321.34	643.324
10	4314.91	643.295

Table 7.3-4 Steam Generator Compartment Nodal Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	West quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	819	120	14.396	0	4.96	18	262.9
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	729	120	14.396	0	6.69	18	169.1
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1327	120	14.396	0	3.83	18	370.0
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1133	120	14.396	0	4.03	18	346.7
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1503	120	14.396	0	3.66	18	391.8
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1835	120	14.396	0	3.68	18	389.1
7	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1518	120	14.396	0	4.38	18	311.0

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1239	120	14.396	0	4.41	18	308.2
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	591	120	14.396	0	12.89	18	39.6
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	539	120	14.396	0	6.67	18	169.9
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1125	120	14.396	0	3.67	18	390.5
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	967	120	14.396	0	3.83	18	370.0
13	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1126	120	14.396	0	3.64	18	394.5
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1434	120	14.396	0	4.25	18	323.5
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1227	120	14.396	0	4.82	18	273.4

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1019	120	14.396	0	4.25	18	323.5
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	552	120	14.396	0	5.90	18	205.1
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	461	120	14.396	0	6.36	18	183.0
19	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	934	120	14.396	0	3.26	18	452.1
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	857	120	14.396	0	3.38	18	432.5
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	931	120	14.396	0	3.22	18	459.0
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	538	120	14.396	0	2.97	18	506.1
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	918	120	14.396	0	4.15	18	333.7

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	802	120	14.396	0	3.72	18	383.9
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	388	120	14.396	0	3.27	10	205.8
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	335	120	14.396	0	3.96	10	152.5
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	696	120	14.396	0	2.69	10	271.7
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	702	120	14.396	0	2.88	10	247.2
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	832	120	14.396	0	2.96	10	237.8
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	546	120	14.396	0	2.71	10	269.0
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	631	120	14.396	0	3.71	10	169.5

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	701	120	14.396	0	3.37	10	196.7
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	460	120	14.396	0	2.59	10	286.1
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	392	120	14.396	0	2.50	10	300.0
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	755	120	14.396	0	2.53	10	295.3
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	669	120	14.396	0	2.70	10	270.4
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	679	120	14.396	0	3.00	10	233.3
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	809	120	14.396	0	2.52	10	296.8
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	602	120	14.396	0	3.38	10	195.9

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	598	120	14.396	0	3.21	10	211.5
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	364	120	14.396	0	2.50	10	300.0
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	330	120	14.396	0	2.34	10	327.4
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	395	120	14.396	0	2.30	10	334.8
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	265	120	14.396	0	2.46	10	306.5
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	261	120	14.396	0	3.02	10	231.1
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	474	120	14.396	0	2.56	10	290.6
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	480	120	14.396	0	3.29	10	204.0

Table 7.3-4 Steam Generator Compartment Nodal Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	269	120	14.396	0	3.22	10	210.6
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	420	120	14.396	0	3.09	10	223.6
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	888	120	14.396	0	2.50	10	300.0
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	965	120	14.396	0	2.98	10	235.6
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	474	120	14.396	0	3.11	10	221.5
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	327	120	14.396	0	2.34	35	1395.7
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	789	120	14.396	0	1.83	35	1812.6
55	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	412	120	14.396	0	2.29	35	1428.4

Table 7.3-4 Steam Generator Compartment Nodal Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
56	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 88'-11.28"	5.19	36	120	14.396	0	2.33	35	1402.1
57		5.19	42	120	14.396	0	2.45	35	1328.6
58		5.19	70	120	14.396	0	2.53	35	1283.4
59		5.19	15	120	14.396	0	2.55	-	-
60		5.19	26	120	14.396	0	2.55	-	-
61		5.19	26	120	14.396	0	2.55	-	-
62		5.19	47	120	14.396	0	2.55	35	1272.5
63		5.19	66	120	14.396	0	2.51	35	1294.4
64		5.19	40	120	14.396	0	2.43	35	1340.3
65		5.19	34	120	14.396	0	2.34	35	1395.7
66	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	27	120	14.396	0	2.17	35	1512.9
67		3.79	31	120	14.396	0	2.28	35	1435.1
68		3.79	28	120	14.396	0	2.33	-	-
69		3.79	23	120	14.396	0	2.35	35	1389.4
70		3.79	6	120	14.396	0	2.34	-	-
71		3.79	14	120	14.396	0	2.34	-	-
72		3.79	15	120	14.396	0	2.35	-	-
73		3.79	21	120	14.396	0	2.35	-	-
74		3.79	26	120	14.396	0	2.36	35	1383.1
75		3.79	28	120	14.396	0	2.32	-	-
76		3.79	20	120	14.396	0	2.33	35	1402.1
77		3.79	29	120	14.396	0	2.27	35	1441.9

Table 7.3-4 Steam Generator Compartment Nodal Description
Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
78	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	25	120	14.396	0	2.20	35	1490.9
79	Southeast quadrant around A-SG in A-SG compartment:between EL 92'-8.74" and 95'-1"	2.35	17	120	14.396	0	2.08	35	1582.7
80		2.35	19	120	14.396	0	2.16	35	1520.4
81		2.35	32	120	14.396	0	2.19	35	1498.2
82		2.35	7	120	14.396	0	2.17	-	-
83		2.35	12	120	14.396	0	2.17	-	-
84		2.35	12	120	14.396	0	2.17	-	-
85		2.35	35	120	14.396	0	2.17	35	1512.9
86		2.35	30	120	14.396	0	2.15	35	1527.9
87		2.35	18	120	14.396	0	2.12	35	1550.9
88		2.35	15	120	14.396	0	2.09	35	1574.6
89	Northwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	143	120	14.396	0	0.15	35	23233.3
90	Northeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	388	120	14.396	0	0.54	35	6381.5
91	Southeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	445	120	14.396	0	1.53	35	2187.6

Table 7.3-4 Steam Generator Compartment Nodal Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
92	Southwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	194	120	14.396	0	0.42	35	8233.3
93	Northwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	318	120	14.396	0	0.02	35	174900.0
94	Northeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	741	120	14.396	0	0.12	35	29066.7
95	Southeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	911	120	14.396	0	0.76	35	4505.3
96	Southwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	400	120	14.396	0	0.13	35	26823.1
~~97~~	~~B-SG compartment~~	~~200~~	~~47000~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
~~98~~	~~C/V reactor coolant drain tank compartment~~	~~200~~	~~3086~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
99	Containment building free volume	200	2790086	120	14.396	0	0.00	-	-

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		x	96.72	7.47	8.65	8.96	0.0	1.0	0.5	1.50
2	V1	V4		x	129.70	8.68	9.27	10.42	0.0	1.0	0.5	1.50
~~3~~	~~V1~~	~~V98~~		~~x~~	~~61.86~~	~~7.13~~	~~7.86~~	~~8.56~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
4	V2	V3		x	62.97	9.87	3.88	11.84	0.0	1.0	0.5	1.50
5	V3	V4		x	66.68	10.36	4.4	12.43	0.0	1.0	0.5	1.50
6	V3	V6		x	142.53	11.93	10.75	14.32	0.0	1.0	0.5	1.50
7	V3	V99		x	30.94	20.56	5.46	24.67	3.5	0.0	0.5	4.00
8	V4	V5		x	163.80	12.5	10.52	15	0.0	1.0	0.5	1.50
~~9~~	~~V4~~	~~V98~~		~~x~~	~~28.22~~	~~9.32~~	~~4.36~~	~~11.18~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
10	V5	V6		x	76.50	11.69	5.8	14.03	0.0	1.0	0.5	1.50
11	V5	V8		x	167.99	10.36	8.33	12.43	0.0	1.0	0.5	1.50
12	V6	V7		x	135.63	13.13	11.64	15.76	0.0	1.0	0.5	1.50
13	V7	V8		x	125.67	9.97	8.05	11.96	0.0	1.0	0.5	1.50
~~14~~	~~V7~~	~~V97~~		~~x~~	~~36.65~~	~~11.06~~	~~5.9~~	~~13.27~~	~~0.84~~	~~1.0~~	~~0.5~~	~~2.34~~
~~15~~	~~V8~~	~~V97~~		~~x~~	~~21.94~~	~~10.86~~	~~4.42~~	~~13.03~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
16	V1	V9	x		46.77	6.39	6.4	21.6	0.34	0.16	0.2	0.70
17	V2	V10		x	40.68	6.39	7.91	23.73	0.34	0.16	0.2	0.70
18	V3	V11		x	78.56	6.39	10.96	28.03	0.34	0.16	0.2	0.70
19	V4	V12		x	69.44	6.39	9.44	25.88	0.34	0.16	0.2	0.70
20	V5	V13		x	85.84	6.39	9.36	25.77	0.34	0.16	0.2	0.70
21	V6	V14		x	101.84	6.39	9.09	25.39	0.34	0.16	0.2	0.70

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
22	V7	V15		x	86.47	6.39	11.12	28.25	0.34	0.16	0.2	0.70
23	V8	V16		x	75.48	6.39	8.8	24.98	0.34	0.16	0.2	0.70
24	V9	V10		x	61.42	10.63	6.55	12.76	0.0	1.0	0.5	1.50
25	V9	V12	x		48.55	11.41	2.96	13.69	0.0	1.0	0.5	1.50
26	V10	V11		x	41.34	13.22	5.22	15.86	0.0	1.0	0.5	1.50
27	V11	V12		x	66.03	13.4	6.15	16.08	0.0	1.0	0.5	1.50
28	V11	V14		x	120.32	10.2	10.31	12.24	0.0	1.0	0.5	1.50
29	V12	V13		x	140.68	7.34	9.95	8.81	0.0	1.0	0.5	1.50
30	V13	V14		x	42.11	16.96	3.42	20.35	0.0	1.0	0.5	1.50
31	V13	V16		x	83.03	14.62	4.15	17.54	0.0	1.0	0.5	1.50
32	V14	V15		x	86.90	18.53	7.85	22.24	0.0	1.0	0.5	1.50
33	V15	V16		x	84.52	14.17	7.7	17	0.0	1.0	0.5	1.50
~~34~~	~~V15~~	~~V97~~		~~x~~	~~13.17~~	~~8.66~~	~~3.07~~	~~10.39~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
~~35~~	~~V16~~	~~V97~~		~~x~~	~~16.48~~	~~11.58~~	~~3.62~~	~~13.9~~	~~0.26~~	~~1.0~~	~~0.5~~	~~1.76~~
36	V9	V17	x		43.13	5.64	5.91	19.41	0.34	0.16	0.2	0.70
37	V10	V18		x	37.12	5.64	6.72	20.55	0.34	0.16	0.2	0.70
38	V11	V19		x	72.16	5.64	10.22	25.48	0.34	0.16	0.2	0.70
39	V12	V20		x	67.19	5.64	9.93	25.07	0.34	0.16	0.2	0.70
40	V13	V21		x	48.11	5.64	3.73	16.33	0.34	0.16	0.2	0.70
41	V14	V22		x	21.94	5.64	2.16	14.12	0.34	0.16	0.2	0.70
42	V15	V23		x	49.34	5.64	4.07	16.81	0.34	0.16	0.2	0.70
43	V16	V24		x	48.67	5.64	4.37	17.23	0.34	0.16	0.2	0.70

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
44	V17	V18		x	57.59	9.96	7.41	11.95	0.0	1.0	0.5	1.50
45	V17	V20		x	69.73	10.82	5.88	12.98	0.0	1.0	0.5	1.50
46	V18	V19		x	38.11	12.4	5.35	14.88	0.0	1.0	0.5	1.50
47	V19	V20		x	61.30	12.67	7.93	15.2	0.0	1.0	0.5	1.50
48	V19	V22		x	70.67	12.89	8.4	15.47	0.0	1.0	0.5	1.50
49	V19	V99		x	14.75	16.21	3.73	19.45	3.5	0.0	0.5	4.00
50	V20	V21		x	128.07	7.78	8.31	9.34	0.0	1.0	0.5	1.50
51	V21	V22		x	30.56	14.83	4.61	17.8	0.0	1.0	0.5	1.50
52	V21	V24		x	79.37	14.62	6.27	17.54	0.0	1.0	0.5	1.50
53	V22	V23		x	47.78	16.71	5.7	20.05	0.0	1.0	0.5	1.50
54	V23	V24		x	47.11	14.17	6.68	17	0.0	1.0	0.5	1.50
55	V17	V25		x	33.53	4.82	4.96	16.42	0.34	0.16	0.2	0.70
56	V18	V26		x	29.86	4.82	5.77	17.56	0.34	0.16	0.2	0.70
57	V19	V27		x	62.57	4.82	6.8	19.02	0.34	0.16	0.2	0.70
58	V20	V28		x	60.47	4.82	8.53	21.46	0.34	0.16	0.2	0.70
59	V21	V29		x	79.65	5.39	9.88	23.36	0.34	0.16	0.2	0.70
60	V22	V30		x	59.73	7.26	5.44	17.1	0.34	0.16	0.2	0.70
61	V23	V31		x	110.29	7.96	8.54	9.55	0.0	0.0	0.0	0.00
62	V24	V32		x	83.90	6.76	6.79	19	0.34	0.16	0.2	0.70
63	V25	V26		x	35.33	11.65	4.53	13.98	0.0	1.0	0.5	1.50
64	V25	V28		x	55.78	12.5	7.47	15	0.0	1.0	0.5	1.50
65	V26	V27		x	24.22	13.84	4.57	16.61	0.0	1.0	0.5	1.50

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
66	V27	V28		x	48.82	14.18	6.51	17.02	0.0	1.0	0.5	1.50
67	V27	V30		x	65.64	12.91	6.38	15.49	0.0	1.0	0.5	1.50
68	V27	V99		x	6.00	15.58	2.4	18.7	3.5	0.0	0.5	4.00
69	V28	V29		x	111.76	7.78	9.86	9.34	0.0	1.0	0.5	1.50
70	V29	V30		x	25.86	14.83	4.78	17.8	0.0	1.0	0.5	1.50
71	V29	V32		x	72.03	14.62	8.38	17.54	0.0	1.0	0.5	1.50
72	V30	V31		x	40.83	16.71	6.34	20.05	0.0	1.0	0.5	1.50
73	V31	V32		x	33.41	14.17	3.2	17	0.0	1.0	0.5	1.50
~~74~~	~~V32~~	~~V97~~		~~x~~	~~13.17~~	~~9.5~~	~~3.07~~	~~11.4~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
75	V25	V33		x	62.52	6.59	6.14	7.91	0.0	0.0	0.0	0.00
76	V26	V34		x	50.81	6.59	5.9	7.91	0.0	0.0	0.0	0.00
77	V27	V35		x	111.57	6.59	9.22	7.91	0.0	0.0	0.0	0.00
78	V28	V36		x	101.10	6.59	8.93	7.91	0.0	0.0	0.0	0.00
79	V29	V37		x	100.49	5.61	9.88	21.72	0.34	0.16	0.2	0.70
80	V30	V38		x	84.55	4	10.72	22.9	0.34	0.16	0.2	0.70
81	V31	V39		x	63.33	4	7.77	18.74	0.34	0.16	0.2	0.70
82	V32	V40		x	79.82	5.08	9.73	21.5	0.34	0.16	0.2	0.70
83	V33	V34		x	56.50	10.89	6.56	13.07	0.0	1.0	0.5	1.50
84	V33	V36		x	72.89	12.5	7.06	15	0.0	1.0	0.5	1.50
85	V34	V35		x	47.64	13.84	6.44	16.61	0.0	1.0	0.5	1.50
86	V35	V36		x	60.24	14.18	7.22	17.02	0.0	1.0	0.5	1.50
87	V35	V38		x	78.91	10.14	8.2	12.17	0.0	1.0	0.5	1.50

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
88	V36	V37		x	91.21	6.16	8.55	7.39	0.0	1.0	0.5	1.50
89	V37	V38		x	21.11	16.96	4.45	20.35	0.0	1.0	0.5	1.50
90	V37	V40		x	58.79	14.62	7.42	17.54	0.0	1.0	0.5	1.50
91	V38	V39		x	33.32	18.53	5.77	22.24	0.0	1.0	0.5	1.50
92	V39	V40		x	32.19	14.17	5.67	17	0.0	1.0	0.5	1.50
~~93~~	~~V39~~	~~V97~~		~~x~~	~~11.81~~	~~8.02~~	~~2.99~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
94	V33	V41		x	83.14	5.38	8.15	6.46	0.0	0.0	0.0	0.00
95	V34	V42		x	71.41	5.38	8.28	6.46	0.0	0.0	0.0	0.00
96	V35	V43		x	84.57	5.38	9.02	6.46	0.0	0.0	0.0	0.00
97	V36	V44		x	60.77	5.38	6.61	6.46	0.0	0.0	0.0	0.00
98	V37	V45		x	55.70	5.38	6.43	6.46	0.0	0.0	0.0	0.00
99	V38	V46		x	105.41	5.38	8.78	6.46	0.0	0.0	0.0	0.00
100	V39	V47		x	99.31	5.38	6.57	6.46	0.0	0.0	0.0	0.00
101	V40	V48		x	57.32	5.38	7.19	6.46	0.0	0.0	0.0	0.00
102	V41	V42		x	47.93	7.47	6.39	8.96	0.0	1.0	0.5	1.50
103	V41	V44		x	59.38	8.62	6.58	10.34	0.0	1.0	0.5	1.50
104	V42	V43		x	42.87	8.22	6.26	9.86	0.0	1.0	0.5	1.50
105	V43	V44		x	32.72	7.05	5.64	8.46	0.0	1.0	0.5	1.50
106	V45	V46		x	17.24	15.05	4.1	18.06	0.0	1.0	0.5	1.50
107	V45	V48		x	18.64	11.81	4.29	14.17	0.0	1.0	0.5	1.50
108	V46	V47		x	20.90	17.36	2.8	20.83	0.0	1.0	0.5	1.50
109	V47	V48		x	26.29	13.78	5.12	16.54	0.0	1.0	0.5	1.50

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
~~110~~	~~V47~~	~~V97~~		~~x~~	~~1.33~~	~~8.02~~	~~1~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
111	V41	V99		x	42.73	2.42	6.39	2.9	0.94	1.0	0.25	2.19
112	V42	V99		x	64.61	2.42	8.11	2.9	0.43	1.0	0.05	1.48
113	V43	V99		x	82.76	2.42	9.21	2.9	0.23	1.0	0.02	1.25
114	V44	V99		x	30.65	2.42	5.45	2.9	0.95	1.0	0.25	2.2
115	V45	V49		x	33.42	4.69	6.43	18.24	0.34	0.16	0.2	0.70
116	V46	V50		x	63.25	4.69	8.78	21.56	0.34	0.16	0.2	0.70
117	V47	V51		x	65.41	4.69	8.49	21.15	0.34	0.16	0.2	0.70
118	V48	V52		x	34.39	4.69	7.19	19.31	0.34	0.16	0.2	0.70
119	V49	V50		x	26.26	16.93	3.69	20.32	0.0	1.0	0.5	1.50
120	V49	V52		x	25.92	13.28	3.24	15.94	0.0	1.0	0.5	1.50
121	V50	V51		x	44.11	19.24	4.87	23.09	0.0	1.0	0.5	1.50
122	V51	V52		x	46.23	15.23	5.74	18.28	0.0	1.0	0.5	1.50
123	V49	V53		x	17.85	6.64	3.54	18.07	0.34	0.16	0.2	0.70
124	V50	V54		x	43.06	6.64	5.98	21.51	0.34	0.16	0.2	0.70
125	V52	V55		x	22.48	6.64	4.98	20.1	0.34	0.16	0.2	0.70
126	V53	V54		x	15.36	16.93	2.42	20.32	0.0	1.0	0.5	1.50
127	V53	V55		x	18.65	13.28	2.87	15.94	0.0	1.0	0.5	1.50
128	V53	V89		x	8.57	5.22	2.15	13.26	0.34	0.16	0.2	0.70
129	V54	V90		x	36.76	5.22	4.92	17.17	0.34	0.16	0.2	0.70
130	V55	V92		x	13.99	5.22	2.43	13.66	0.34	0.16	0.2	0.70
131	V51	V56		x	4.31	4.8	2.57	13.02	0.34	0.16	0.2	0.70

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
132	V51	V57		x	5.04	4.8	2.71	13.21	0.34	0.16	0.2	0.70
133	V51	V58		x	8.33	4.8	3.24	13.96	0.34	0.16	0.2	0.70
134	V51	V59		x	1.75	4.79	1.24	11.14	0.34	0.16	0.2	0.70
135	V51	V60		x	3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
136	V51	V61		x	3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
137	V51	V62		x	7.36	4.8	2.31	12.65	0.34	0.16	0.2	0.70
138	V51	V63		x	7.82	4.8	3.15	13.83	0.34	0.16	0.2	0.70
139	V51	V64		x	4.74	4.8	2.64	13.11	0.34	0.16	0.2	0.70
140	V51	V65		x	4.04	4.8	2.5	12.92	0.34	0.16	0.2	0.70
141	V54	V56		x	17.74	11.1	4.12	13.32	0.0	1.0	0.5	1.50
142	V56	V57		x	18.98	2.1	4.29	2.52	0.0	0.0	0.0	0.00
143	V57	V58		x	22.94	2.56	4.77	3.07	0.0	0.0	0.0	0.00
144	V58	V59		x	4.79	4.24	1.57	5.09	0.0	0.0	0.0	0.00
145	V58	V60		x	6.95	3.39	2.13	4.07	0.0	0.0	0.0	0.00
146	V58	V61		x	6.95	3.12	2.13	3.74	0.0	0.0	0.0	0.00
147	V58	V62		x	16.47	4.98	3.94	5.98	0.0	0.0	0.0	0.00
148	V59	V60		x	19.70	1.02	4.38	1.22	0.0	0.0	0.0	0.00
149	V60	V61		x	19.70	1.34	4.38	1.61	0.0	0.0	0.0	0.00
150	V61	V62		x	19.70	3.07	4.38	3.68	0.0	0.0	0.0	0.00
151	V59	V63		x	4.79	4.13	1.57	4.96	0.0	0.0	0.0	0.00
152	V60	V63		x	6.95	3.28	2.13	3.94	0.0	0.0	0.0	0.00
153	V61	V63		x	6.95	3.14	2.13	3.77	0.0	0.0	0.0	0.00

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
154	V62	V63		x	15.06	5	3.72	6	0.0	0.0	0.0	0.00
155	V63	V64		x	21.86	2.52	4.65	3.02	0.0	0.0	0.0	0.00
156	V64	V65		x	17.96	2.08	4.15	2.5	0.0	0.0	0.0	0.00
157	V65	V55		x	16.75	7.1	3.98	8.52	0.0	1.0	0.5	1.50
158	V56	V66		x	7.19	4.5	2.57	5.4	0.0	0.0	0.0	0.00
159	V57	V67		x	8.40	4.5	2.71	5.4	0.0	0.0	0.0	0.00
160	V58	V68		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
161	V58	V69		x	6.25	4.5	2.19	5.4	0.0	0.0	0.0	0.00
162	V59	V70		x	2.92	4.5	1.24	5.4	0.0	0.0	0.0	0.00
163	V60	V71		x	5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
164	V61	V72		x	5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
165	V62	V73		x	5.30	4.5	1.19	5.4	0.0	0.0	0.0	0.00
166	V62	V74		x	6.97	4.5	2.55	5.4	0.0	0.0	0.0	0.00
167	V63	V75		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
168	V63	V76		x	5.41	4.5	2	5.4	0.0	0.0	0.0	0.00
169	V64	V77		x	7.90	4.5	2.64	5.4	0.0	0.0	0.0	0.00
170	V65	V78		x	6.73	4.5	2.5	5.4	0.0	0.0	0.0	0.00
171	V54	V66		x	12.95	11.1	3.59	13.32	0.0	1.0	0.5	1.50
172	V66	V67		x	13.85	2.1	3.72	2.52	0.0	0.0	0.0	0.00
173	V67	V68		x	13.36	2.16	3.65	2.59	0.0	0.0	0.0	0.00
174	V67	V69		x	3.38	4.08	1.44	4.9	0.0	0.0	0.0	0.00
175	V68	V69		x	10.99	2.73	3.29	3.28	0.0	0.0	0.0	0.00

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
176	V68	V70		x	3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
177	V68	V71		x	5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
178	V68	V72		x	5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
179	V69	V73		x	8.12	3.45	2.74	4.14	0.0	0.0	0.0	0.00
180	V69	V74		x	3.90	4.6	1.62	5.52	0.0	0.0	0.0	0.00
181	V70	V71		x	8.09	1.02	1.34	1.22	0.0	0.0	0.0	0.00
182	V71	V72		x	11.54	1.34	2.18	1.61	0.0	0.0	0.0	0.00
183	V72	V73		x	11.54	1.74	2.18	2.09	0.0	0.0	0.0	0.00
184	V70	V75		x	3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
185	V71	V75		x	5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
186	V72	V75		x	5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
187	V73	V74		x	9.36	2.4	1.87	2.88	0.0	0.0	0.0	0.00
188	V73	V76		x	8.12	3.47	2.74	4.16	0.0	0.0	0.0	0.00
189	V74	V76		x	2.87	4.62	1.26	5.54	0.0	0.0	0.0	0.00
190	V75	V76		x	10.99	2.62	3.29	3.14	0.0	0.0	0.0	0.00
191	V75	V77		x	13.36	2.14	3.65	2.57	0.0	0.0	0.0	0.00
192	V76	V77		x	2.60	4.04	1.16	4.85	0.0	0.0	0.0	0.00
193	V77	V78		x	13.11	2.08	3.62	2.5	0.0	0.0	0.0	0.00
194	V78	V55		x	12.22	7.1	3.48	8.52	0.0	1.0	0.5	1.50
195	V66	V79		x	7.19	3.07	2.57	3.68	0.0	0.0	0.0	0.00
196	V67	V80		x	8.40	3.07	2.71	3.68	0.0	0.0	0.0	0.00
197	V68	V81		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
198	V69	V81		x	6.25	3.07	2.19	3.68	0.0	0.0	0.0	0.00
199	V70	V82		x	2.92	3.07	1.24	3.68	0.0	0.0	0.0	0.00
200	V71	V83		x	5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
201	V72	V84		x	5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
202	V73	V85		x	8.14	3.07	2.74	3.68	0.0	0.0	0.0	0.00
203	V74	V85		x	6.97	3.07	2.55	3.68	0.0	0.0	0.0	0.00
204	V75	V86		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00
205	V76	V86		x	5.41	3.07	2	3.68	0.0	0.0	0.0	0.00
206	V77	V87		x	7.90	3.07	2.64	3.68	0.0	0.0	0.0	0.00
207	V78	V88		x	6.73	3.07	2.5	3.68	0.0	0.0	0.0	0.00
208	V54	V79		x	8.05	11.1	2.79	13.32	0.0	1.0	0.5	1.50
209	V79	V80		x	8.61	2.1	2.86	2.52	0.0	0.0	0.0	0.00
210	V80	V81		x	10.41	2.56	3.07	3.07	0.0	0.0	0.0	0.00
211	V81	V82		x	2.17	4.24	1.32	5.09	0.0	0.0	0.0	0.00
212	V81	V83		x	3.15	3.39	1.71	4.07	0.0	0.0	0.0	0.00
213	V81	V84		x	3.15	3.12	1.71	3.74	0.0	0.0	0.0	0.00
214	V81	V85		x	7.47	4.98	2.7	5.98	0.0	0.0	0.0	0.00
215	V82	V83		x	8.94	1.02	2.91	1.22	0.0	0.0	0.0	0.00
216	V83	V84		x	8.94	1.34	2.91	1.61	0.0	0.0	0.0	0.00
217	V84	V85		x	8.94	3.07	2.91	3.68	0.0	0.0	0.0	0.00
218	V82	V86		x	2.17	4.13	1.32	4.96	0.0	0.0	0.0	0.00
219	V83	V86		x	3.15	3.28	1.71	3.94	0.0	0.0	0.0	0.00

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
220	V84	V86		x	3.15	3.14	1.71	3.77	0.0	0.0	0.0	0.00
221	V85	V86		x	65.64	5	24.98	6	0.0	0.0	0.0	0.00
222	V86	V87		x	9.92	2.52	3.02	3.02	0.0	0.0	0.0	0.00
223	V87	V88		x	8.15	2.08	2.8	2.5	0.0	0.0	0.0	0.00
224	V88	V55		x	7.60	7.1	2.72	8.52	0.0	1.0	0.5	1.50
225	V79	V91		x	2.16	2.52	1.83	7.41	0.34	0.16	0.2	0.70
226	V80	V91		x	2.55	2.52	1.36	6.75	0.34	0.16	0.2	0.70
227	V81	V91		x	6.35	3.35	1.72	7.26	0.34	0.16	0.2	0.70
228	V82	V91		x	1.75	2.52	1.24	6.58	0.34	0.16	0.2	0.70
229	V83	V91		x	3.05	2.52	1.98	7.62	0.34	0.16	0.2	0.70
230	V84	V91		x	3.22	3.44	1.71	7.24	0.34	0.16	0.2	0.70
231	V85	V91	x		6.77	4.13	1.56	4.96	0.0	0.0	0.0	0.00
232	V86	V91		x	9.29	2.97	3.15	9.27	0.34	0.16	0.2	0.70
233	V87	V91		x	4.74	2.52	2.64	8.55	0.34	0.16	0.2	0.70
234	V88	V91		x	2.77	2.52	1.7	7.23	0.34	0.16	0.2	0.70
235	V89	V90		x	8.02	16.93	2.21	20.32	0.0	1.0	0.5	1.50
236	V89	V92		x	9.74	12.59	2.58	15.11	0.0	1.0	0.5	1.50
237	V89	V99		x	13.23	11.34	3.25	13.61	0.0	1.0	0.5	1.50
238	V89	V99		x	27.82	5.99	4.02	7.19	0.0	1.0	0.5	1.50
239	V89	V99		x	36.11	8.4	5.57	10.08	0.0	1.0	0.5	1.50
240	V90	V91		x	16.16	19.24	2.91	23.09	0.0	1.0	0.5	1.50
241	V90	V99		x	46.62	10.29	6.2	12.35	0.0	1.0	0.5	1.50

Table 7.3-5 Steam Generator Compartment Vent Path Description

Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
242	V90	V99		x	26.61	5.87	4.65	7.04	0.0	1.0	0.5	1.50
243	V91	V92		x	14.58	15.23	2.62	18.28	0.0	1.0	0.5	1.50
244	V92	V99		x	45.84	6.21	5.38	7.45	0.0	1.0	0.5	1.50
245	V89	V93		x	17.85	5.12	3.54	15.02	0.34	0.16	0.2	0.70
246	V90	V94		x	43.06	5.12	5.98	18.46	0.34	0.16	0.2	0.70
247	V91	V95		x	62.67	6.24	7.68	20.86	0.34	0.16	0.2	0.70
248	V92	V96		x	22.48	5.12	4.98	17.05	0.34	0.16	0.2	0.70
249	V93	V94		x	14.91	16.93	2.41	20.32	0.0	1.0	0.5	1.50
250	V93	V96		x	18.10	12.59	2.86	15.11	0.0	1.0	0.5	1.50
251	V93	V99		x	24.59	11.34	3.72	13.61	0.0	1.0	0.5	1.50
252	V93	V99		x	87.07	5.99	9.21	7.19	0.0	1.0	0.5	1.50
253	V93	V99		x	77.44	8.4	8.59	10.08	0.0	1.0	0.5	1.50
254	V94	V95		x	37.61	19.24	5.22	23.09	0.0	1.0	0.5	1.50
255	V94	V99		x	100.40	10.29	9.98	12.35	0.0	1.0	0.5	1.50
256	V94	V99		x	90.07	5.87	9.39	7.04	0.0	1.0	0.5	1.50
257	V95	V96		x	35.51	15.23	4.99	18.28	0.0	1.0	0.5	1.50
258	V96	V99		x	95.07	6.21	9.68	7.45	0.0	1.0	0.5	1.50
259	V93	V99		x	29.75	5.5	3.54	6.6	0.0	1.0	0.0	1.00
260	V94	V99		x	71.76	5.5	5.98	6.6	0.0	1.0	0.0	1.00
261	V95	V99		x	74.61	5.5	6.03	6.6	0.0	1.0	0.0	1.00
262	V96	V99		x	37.46	5.5	4.98	6.6	0.0	1.0	0.0	1.00

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	548.03
0.001	2449.59	548.03
0.002	5051.31	550.212
0.003	5631.08	550.983
0.004	5703.47	551.094
0.005	5813.28	551.255
0.006	6049.07	551.604
0.007	6287.96	551.975
0.008	6424.02	552.199
0.009	6471.97	552.287
0.01	6521.09	552.375
0.011	6630.33	552.562
0.012	6767.91	552.799
0.013	6844.83	552.941
0.014	6807.37	552.892
0.015	6697.91	552.722
0.016	6631.55	552.623
0.017	6709.95	552.76
0.018	6933.26	553.146
0.019	7182.29	553.592
0.02	7300.74	553.819
0.021	7209.34	553.671
0.022	6951.15	553.232
0.023	6648.9	552.733
0.024	6426.05	552.379
0.025	6341.11	552.252
0.026	6368.83	552.304
0.027	6439.71	552.427
0.028	6505.62	552.543
0.029	6572.76	552.663
0.03	6676.84	552.844
0.031	6829.64	553.112
0.032	6988.66	553.397
0.033	7080	553.57
0.034	7055.48	553.539
0.035	6932.28	553.335
0.036	6783.66	553.089
0.037	6691.86	552.942
0.038	6695.84	552.957
0.039	6768.4	553.089

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.04	6840.8	553.223
0.041	6856.25	553.261
0.042	6807.34	553.187
0.043	6731.28	553.067
0.044	6674.68	552.979
0.045	6658.99	552.962
0.046	6671.38	552.991
0.047	6684.95	553.023
0.048	6687.93	553.038
0.049	6695.06	553.058
0.05	6731.68	553.129
0.051	6804.73	553.263
0.052	6886.31	553.414
0.053	6926.4	553.494
0.054	6886.44	553.435
0.055	6766.19	553.236
0.056	6604.36	552.968
0.057	6455.34	552.727
0.058	6359.27	552.576
0.059	6323.96	552.526
0.06	6329.19	552.542
0.061	6348.15	552.58
0.062	6367.98	552.62
0.063	6393.19	552.668
0.064	6432.62	552.741
0.065	6484.06	552.833
0.066	6531.5	552.921
0.067	6557.34	552.972
0.068	6558.01	552.981
0.069	6548.76	552.973
0.07	6552.75	552.987
0.071	6582.77	553.044
0.072	6629.48	553.131
0.073	6665.91	553.202
0.074	6665.19	553.209
0.075	6617.93	553.136
0.076	6536.9	553.005
0.077	6447.77	552.862
0.078	6374.07	552.746
0.079	6326.91	552.674
0.08	6304.91	552.644

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.081	6302.26	552.646
0.082	6316.52	552.676
0.083	6349.46	552.736
0.084	6400.76	552.828
0.085	6461.52	552.936
0.086	6514.68	553.032
0.087	6543.78	553.089
0.088	6543.35	553.095
0.089	6522.71	553.066
0.09	6499.91	553.034
0.091	6489.85	553.023
0.092	6495.06	553.038
0.093	6505.25	553.061
0.094	6505.63	553.068
0.095	6487.17	553.043
0.096	6451.41	552.989
0.097	6407.35	552.921
0.098	6364.4	552.854
0.099	6327.3	552.798
0.1	6296.27	552.752
0.101	6270.9	552.716
0.102	6253.34	552.692
0.103	6247.48	552.688
0.104	6254.62	552.704
0.105	6269.63	552.734
0.106	6281.53	552.76
0.107	6278.88	552.761
0.108	6256.57	552.729
0.109	6219.03	552.673
0.11	6177.92	552.61
0.111	6145.9	552.563
0.112	6130.58	552.543
0.113	6132.17	552.55
0.114	6145.84	552.577
0.115	6166.07	552.615
0.116	6189.73	552.658
0.117	6215.77	552.706
0.118	6243.03	552.755
0.119	6268.67	552.803
0.12	6289.18	552.842
0.121	6303.06	552.87

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.122	6312.45	552.891
0.123	6321.99	552.911
0.124	6335.13	552.938
0.125	6350.87	552.969
0.126	6363.51	552.995
0.127	6365.77	553.004
0.128	6353.3	552.988
0.129	6327.13	552.948
0.13	6292.98	552.895
0.131	6258.05	552.841
0.132	6227.86	552.795
0.133	6205.06	552.762
0.134	6190.32	552.741
0.135	6183.86	552.735
0.136	6186.16	552.742
0.137	6197	552.764
0.138	6214.15	552.797
0.139	6233.09	552.832
0.14	6248.48	552.862
0.141	6256.68	552.88
0.142	6257.4	552.885
0.143	6253.28	552.883
0.144	6247.54	552.877
0.145	6241.36	552.871
0.146	6232.88	552.86
0.147	6218.42	552.84
0.148	6195.02	552.805
0.149	6162.38	552.755
0.15	6123.1	552.694
0.151	6081.12	552.628
0.152	6040.04	552.565
0.153	6002.33	552.507
0.154	5969.86	552.458
0.155	5944.7	552.42
0.156	5929.2	552.399
0.157	5924.87	552.395
0.158	5930.98	552.408
0.159	5944.1	552.432
0.16	5959.18	552.459
0.161	5971.79	552.483
0.162	5979.99	552.499

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.163	5984.72	552.51
0.164	5988.66	552.52
0.165	5994.28	552.532
0.166	6002.46	552.548
0.167	6012.34	552.567
0.168	6022.2	552.587
0.169	6030.58	552.603
0.17	6036.73	552.617
0.171	6040.4	552.626
0.172	6041.33	552.63
0.173	6039.17	552.63
0.174	6033.98	552.624
0.175	6026.86	552.615
0.176	6020.12	552.607
0.177	6016.46	552.604
0.178	6017.69	552.609
0.179	6023.67	552.621
0.18	6032.41	552.639
0.181	6041.12	552.656
0.182	6047.66	552.669
0.183	6051.31	552.678
0.184	6052.7	552.683
0.185	6052.92	552.686
0.186	6052.85	552.689
0.187	6052.89	552.692
0.188	6053.21	552.695
0.189	6053.99	552.699
0.19	6055.35	552.704
0.191	6056.95	552.709
0.192	6057.6	552.713
0.193	6055.43	552.712
0.194	6048.55	552.703
0.195	6035.86	552.685
0.196	6017.62	552.657
0.197	5995.21	552.623
0.198	5970.5	552.585
0.199	5945.08	552.546
0.2	5919.9	552.508
0.205	5828.47	552.372
0.21	5865.17	552.438
0.215	5948.11	552.584

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.22	5941.11	552.586
0.225	5892.65	552.516
0.23	5893.78	552.525
0.235	5920.05	552.578
0.24	5868.64	552.506
0.245	5805.44	552.411
0.25	5801.69	552.411
0.255	5796.69	552.412
0.26	5762.02	552.363
0.265	5766.54	552.375
0.27	5814.6	552.459
0.275	5817.88	552.473
0.28	5776.33	552.412
0.285	5766.26	552.401
0.29	5773.41	552.419
0.295	5727.6	552.353
0.3	5670.31	552.265
0.305	5678.18	552.281
0.31	5727.04	552.363
0.315	5747.8	552.402
0.32	5739.19	552.393
0.325	5731.84	552.386
0.33	5713	552.361
0.335	5677	552.308
0.34	5653.55	552.274
0.345	5646.43	552.266
0.35	5631.44	552.246
0.355	5622.06	552.234
0.36	5643.29	552.27
0.365	5672.2	552.319
0.37	5672.15	552.323
0.375	5650.78	552.293
0.38	5637.2	552.274
0.385	5624.1	552.256
0.39	5593.49	552.211
0.395	5562.48	552.165
0.4	5557.65	552.159
0.405	5575.43	552.188
0.41	5591.9	552.217
0.415	5596.32	552.226
0.42	5591.72	552.222

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.425	5579.31	552.205
0.43	5563.66	552.182
0.435	5554.4	552.169
0.44	5554.12	552.171
0.445	5557.7	552.178
0.45	5562.14	552.187
0.455	5569.61	552.2
0.46	5578.92	552.217
0.465	5580.8	552.222
0.47	5569.13	552.206
0.475	5548.98	552.176
0.48	5529.01	552.147
0.485	5513.36	552.124
0.49	5503.87	552.11
0.495	5504.56	552.112
0.5	5517.35	552.133
0.6	5487.05	552.112
0.7	5461.38	552.092
0.8	5446.69	552.087
0.9	5427.26	552.072
1	5422.8	552.079
1.1	5410.29	552.072
1.2	5407.06	552.079
1.3	5399.57	552.079
1.4	5393.56	552.082
1.5	5385.81	552.084
1.6	5376.05	552.085
1.7	5364.85	552.087
1.8	5353.45	552.092
1.9	5342.62	552.102
2	5332.88	552.117
2.1	5324.27	552.138
2.2	5315.54	552.162
2.3	5306.79	552.19
2.4	5297.66	552.22
2.5	5288.28	552.252
2.6	5278.49	552.286
2.7	5268.52	552.323
2.8	5258.49	552.361
2.9	5248.65	552.401
3	5238.2	552.442

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.1	5227.86	552.484
3.2	5217.96	552.529
3.3	5208.18	552.574
3.4	5198.68	552.621
3.5	5189.73	552.67
3.6	5181.38	552.721
3.7	5173.8	552.773
3.8	5166.32	552.827
3.9	5159.12	552.882
4	5152.32	552.938
4.1	5145.68	552.996
4.2	5139	553.055
4.3	5132.17	553.114
4.4	5125.27	553.175
4.5	5118.23	553.237
4.6	5111.35	553.301
4.7	5104.49	553.367
4.8	5097.62	553.435
4.9	5090.63	553.504
5	5083.36	553.576
5.1	5075.88	553.649
5.2	5068.42	553.725
5.3	5060.99	553.804
5.4	5053.58	553.885
5.5	5046.15	553.969
5.6	5038.72	554.056
5.7	5031.23	554.145
5.8	5023.49	554.237
5.9	5015.99	554.331
6	5008.38	554.428
6.1	5000.71	554.526
6.2	4992.98	554.627
6.3	4985.27	554.729
6.4	4977.59	554.833
6.5	4969.88	554.939
6.6	4962.1	555.045
6.7	4954.3	555.152
6.8	4946.47	555.259
6.9	4938.63	555.366
7	4930.79	555.473
7.1	4922.96	555.58

Table 7.3-6 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft2)
Break location : Volume number 9

*Mass Release Rate was doubled from the following value for guillotine break

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
7.2	4915.17	555.686
7.3	4907.31	555.791
7.4	4899.68	555.895
7.5	4892.43	555.998
7.6	4885.28	556.1
7.7	4878	556.199
7.8	4870.72	556.296
7.9	4863.45	556.391
8	4856.09	556.483
8.1	4849.06	556.574
8.2	4842.09	556.661
8.3	4835.23	556.746
8.4	4828.49	556.828
8.5	4821.84	556.907
8.6	4815.27	556.984
8.7	4808.78	557.057
8.8	4802.29	557.128
8.9	4795.88	557.195
9	4789.49	557.259
9.1	4783.13	557.321
9.2	4776.82	557.379
9.3	4770.56	557.435
9.4	4764.35	557.487
9.5	4758.19	557.537
9.6	4752.1	557.584
9.7	4746.09	557.628
9.8	4740.17	557.67
9.9	4734.31	557.709
10	4728.51	557.746

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	West quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	819	120	14.396	0	3.48	18	417.2
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	729	120	14.396	0	3.69	18	387.8
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1327	120	14.396	0	2.95	18	510.2
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1133	120	14.396	0	2.93	18	514.3
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1503	120	14.396	0	2.79	18	545.2
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1835	120	14.396	0	2.85	18	531.6
7	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1518	120	14.396	0	3.04	18	492.1

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1239	120	14.396	0	2.84	18	533.8
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	591	120	14.396	0	2.74	18	556.9
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	539	120	14.396	0	2.75	18	554.5
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1125	120	14.396	0	2.75	18	554.5
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	967	120	14.396	0	2.76	18	552.2
13	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1126	120	14.396	0	2.78	18	547.5
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1434	120	14.396	0	2.79	18	545.2
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1227	120	14.396	0	2.89	18	522.8

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1019	120	14.396	0	2.81	18	540.6
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	552	120	14.396	0	2.69	18	569.1
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	461	120	14.396	0	2.69	18	569.1
19	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	934	120	14.396	0	2.71	18	564.2
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	857	120	14.396	0	2.73	18	559.3
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	931	120	14.396	0	2.84	18	533.8
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	538	120	14.396	0	2.87	18	527.2
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	918	120	14.396	0	3.03	18	494.1

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	802	120	14.396	0	2.94	18	512.2
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	388	120	14.396	0	2.48	10	303.2
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	335	120	14.396	0	2.41	10	314.9
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	696	120	14.396	0	2.54	10	293.7
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	702	120	14.396	0	2.61	10	283.1
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	832	120	14.396	0	2.89	10	246.0
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	546	120	14.396	0	2.95	10	239.0
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	631	120	14.396	0	3.04	10	228.9

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	701	120	14.396	0	3.07	10	225.7
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	460	120	14.396	0	2.47	10	304.9
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	392	120	14.396	0	2.40	10	316.7
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	755	120	14.396	0	2.53	10	295.3
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	669	120	14.396	0	2.61	10	283.1
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	679	120	14.396	0	3.09	10	223.6
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	809	120	14.396	0	3.91	10	155.8
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	602	120	14.396	0	4.62	10	116.5

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	598	120	14.396	0	3.76	10	166.0
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	364	120	14.396	0	2.46	10	306.5
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	330	120	14.396	0	2.39	10	318.4
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	395	120	14.396	0	2.50	10	300.0
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	265	120	14.396	0	2.59	10	286.1
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	261	120	14.396	0	4.70	10	112.8
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	474	120	14.396	0	4.48	10	123.2
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	480	120	14.396	0	4.94	10	102.4

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	269	120	14.396	0	4.85	10	106.2
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	420	120	14.396	0	6.73	10	48.6
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	888	120	14.396	0	5.60	10	78.6
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	965	120	14.396	0	6.54	10	52.9
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	474	120	14.396	0	6.90	10	44.9
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	327	120	14.396	0	6.74	35	419.3
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	789	120	14.396	0	6.39	35	447.7
55	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	412	120	14.396	0	13.12	35	166.8

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
56	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 88'-11.28"	5.19	36	120	14.396	0	30.40	35	15.1
57		5.19	42	120	14.396	0	30.32	35	15.4
58		5.19	70	120	14.396	0	30.33	35	15.4
59		5.19	15	120	14.396	0	31.39	-	-
60		5.19	26	120	14.396	0	30.62	-	-
61		5.19	26	120	14.396	0	30.73	-	-
62		5.19	47	120	14.396	0	30.52	35	14.7
63		5.19	66	120	14.396	0	30.34	35	15.4
64		5.19	40	120	14.396	0	30.31	35	15.5
65		5.19	34	120	14.396	0	30.38	35	15.2
66	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	27	120	14.396	0	30.45	35	14.9
67		3.79	31	120	14.396	0	30.69	35	14.0
68		3.79	28	120	14.396	0	31.58	-	-
69		3.79	23	120	14.396	0	31.09	35	12.6
70		3.79	6	120	14.396	0	84.73	-	-
71		3.79	14	120	14.396	0	130.69	-	-
72		3.79	15	120	14.396	0	44.04	-	-
73		3.79	21	120	14.396	0	31.58	-	-
74		3.79	26	120	14.396	0	30.98	35	13.0
75		3.79	28	120	14.396	0	31.56	-	-
76		3.79	20	120	14.396	0	31.15	35	12.4

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
77	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	29	120	14.396	0	30.70	35	14.0
78		3.79	25	120	14.396	0	30.45	35	14.9
79	Southeast quadrant around A-SG in A-SG compartment:between EL 92'-8.74" and 95'-1"	2.35	17	120	14.396	0	30.67	35	14.1
80		2.35	19	120	14.396	0	30.64	35	14.2
81		2.35	32	120	14.396	0	30.76	35	13.8
82		2.35	7	120	14.396	0	33.72	-	-
83		2.35	12	120	14.396	0	32.48	-	-
84		2.35	12	120	14.396	0	31.78	-	-
85		2.35	35	120	14.396	0	30.92	35	13.2
86		2.35	30	120	14.396	0	30.67	35	14.1
87		2.35	18	120	14.396	0	30.55	35	14.6
88		2.35	15	120	14.396	0	30.57	35	14.5
89	Northwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	143	120	14.396	0	1.32	35	2551.5
90	Northeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	388	120	14.396	0	3.28	35	967.1
91	Southeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	445	120	14.396	0	9.34	35	274.7

Table 7.3-7 Steam Generator Compartment Nodal Description

Break Type : Feed Water line(16B) guillotine break (Full power operating condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
92	Southwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	194	120	14.396	0	3.54	35	888.7
93	Northwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	318	120	14.396	0	0.22	35	15809.1
94	Northeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	741	120	14.396	0	1.43	35	2347.6
95	Southeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	911	120	14.396	0	5.55	35	530.6
96	Southwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	400	120	14.396	0	1.67	35	1995.8
~~97~~	~~B-SG compartment~~	~~200~~	~~47000~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
~~98~~	~~C/V reactor coolant drain tank compartment~~	~~200~~	~~3086~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
99	Containment building free volume	200	2790086	120	14.396	0	0.00	-	-

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		x	96.72	7.47	8.65	8.96	0.0	1.0	0.5	1.50
2	V1	V4		x	129.70	8.68	9.27	10.42	0.0	1.0	0.5	1.50
~~3~~	~~V1~~	~~V98~~		~~x~~	~~61.86~~	~~7.13~~	~~7.86~~	~~8.56~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
4	V2	V3		x	62.97	9.87	3.88	11.84	0.0	1.0	0.5	1.50
5	V3	V4		x	66.68	10.36	4.4	12.43	0.0	1.0	0.5	1.50
6	V3	V6		x	142.53	11.93	10.75	14.32	0.0	1.0	0.5	1.50
7	V3	V99		x	30.94	20.56	5.46	24.67	3.5	0.0	0.5	4.00
8	V4	V5		x	163.80	12.5	10.52	15	0.0	1.0	0.5	1.50
~~9~~	~~V4~~	~~V98~~		~~x~~	~~28.22~~	~~9.32~~	~~4.36~~	~~11.18~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
10	V5	V6		x	76.50	11.69	5.8	14.03	0.0	1.0	0.5	1.50
11	V5	V8		x	167.99	10.36	8.33	12.43	0.0	1.0	0.5	1.50
12	V6	V7		x	135.63	13.13	11.64	15.76	0.0	1.0	0.5	1.50
13	V7	V8		x	125.67	9.97	8.05	11.96	0.0	1.0	0.5	1.50
~~14~~	~~V7~~	~~V97~~		~~x~~	~~36.65~~	~~11.06~~	~~5.9~~	~~13.27~~	~~0.84~~	~~1.0~~	~~0.5~~	~~2.34~~
~~15~~	~~V8~~	~~V97~~		~~x~~	~~21.94~~	~~10.86~~	~~4.42~~	~~13.03~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
16	V1	V9		x	46.77	6.39	6.4	21.6	0.34	0.16	0.2	0.70
17	V2	V10		x	40.68	6.39	7.91	23.73	0.34	0.16	0.2	0.70
18	V3	V11		x	78.56	6.39	10.96	28.03	0.34	0.16	0.2	0.70
19	V4	V12		x	69.44	6.39	9.44	25.88	0.34	0.16	0.2	0.70
20	V5	V13		x	85.84	6.39	9.36	25.77	0.34	0.16	0.2	0.70
21	V6	V14		x	101.84	6.39	9.09	25.39	0.34	0.16	0.2	0.70

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
22	V7	V15		x	86.47	6.39	11.12	28.25	0.34	0.16	0.2	0.70
23	V8	V16		x	75.48	6.39	8.8	24.98	0.34	0.16	0.2	0.70
24	V9	V10		x	61.42	10.63	6.55	12.76	0.0	1.0	0.5	1.50
25	V9	V12		x	48.55	11.41	2.96	13.69	0.0	1.0	0.5	1.50
26	V10	V11		x	41.34	13.22	5.22	15.86	0.0	1.0	0.5	1.50
27	V11	V12		x	66.03	13.4	6.15	16.08	0.0	1.0	0.5	1.50
28	V11	V14		x	120.32	10.2	10.31	12.24	0.0	1.0	0.5	1.50
29	V12	V13		x	140.68	7.34	9.95	8.81	0.0	1.0	0.5	1.50
30	V13	V14		x	42.11	16.96	3.42	20.35	0.0	1.0	0.5	1.50
31	V13	V16		x	83.03	14.62	4.15	17.54	0.0	1.0	0.5	1.50
32	V14	V15		x	86.90	18.53	7.85	22.24	0.0	1.0	0.5	1.50
33	V15	V16		x	84.52	14.17	7.7	17	0.0	1.0	0.5	1.50
~~34~~	~~V15~~	~~V97~~		~~x~~	~~13.17~~	~~8.66~~	~~3.07~~	~~10.39~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
~~35~~	~~V16~~	~~V97~~		~~x~~	~~16.48~~	~~11.58~~	~~3.62~~	~~13.9~~	~~0.26~~	~~1.0~~	~~0.5~~	~~1.76~~
36	V9	V17		x	43.13	5.64	5.91	19.41	0.34	0.16	0.2	0.70
37	V10	V18		x	37.12	5.64	6.72	20.55	0.34	0.16	0.2	0.70
38	V11	V19		x	72.16	5.64	10.22	25.48	0.34	0.16	0.2	0.70
39	V12	V20		x	67.19	5.64	9.93	25.07	0.34	0.16	0.2	0.70
40	V13	V21		x	48.11	5.64	3.73	16.33	0.34	0.16	0.2	0.70
41	V14	V22		x	21.94	5.64	2.16	14.12	0.34	0.16	0.2	0.70
42	V15	V23		x	49.34	5.64	4.07	16.81	0.34	0.16	0.2	0.70
43	V16	V24		x	48.67	5.64	4.37	17.23	0.34	0.16	0.2	0.70

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
44	V17	V18		x	57.59	9.96	7.41	11.95	0.0	1.0	0.5	1.50
45	V17	V20		x	69.73	10.82	5.88	12.98	0.0	1.0	0.5	1.50
46	V18	V19		x	38.11	12.4	5.35	14.88	0.0	1.0	0.5	1.50
47	V19	V20		x	61.30	12.67	7.93	15.2	0.0	1.0	0.5	1.50
48	V19	V22		x	70.67	12.89	8.4	15.47	0.0	1.0	0.5	1.50
49	V19	V99		x	14.75	16.21	3.73	19.45	3.5	0.0	0.5	4.00
50	V20	V21		x	128.07	7.78	8.31	9.34	0.0	1.0	0.5	1.50
51	V21	V22		x	30.56	14.83	4.61	17.8	0.0	1.0	0.5	1.50
52	V21	V24		x	79.37	14.62	6.27	17.54	0.0	1.0	0.5	1.50
53	V22	V23		x	47.78	16.71	5.7	20.05	0.0	1.0	0.5	1.50
54	V23	V24		x	47.11	14.17	6.68	17	0.0	1.0	0.5	1.50
55	V17	V25		x	33.53	4.82	4.96	16.42	0.34	0.16	0.2	0.70
56	V18	V26		x	29.86	4.82	5.77	17.56	0.34	0.16	0.2	0.70
57	V19	V27		x	62.57	4.82	6.8	19.02	0.34	0.16	0.2	0.70
58	V20	V28		x	60.47	4.82	8.53	21.46	0.34	0.16	0.2	0.70
59	V21	V29		x	79.65	5.39	9.88	23.36	0.34	0.16	0.2	0.70
60	V22	V30		x	59.73	7.26	5.44	17.1	0.34	0.16	0.2	0.70
61	V23	V31		x	110.29	7.96	8.54	9.55	0.0	0.0	0.0	0.00
62	V24	V32		x	83.90	6.76	6.79	19	0.34	0.16	0.2	0.70
63	V25	V26		x	35.33	11.65	4.53	13.98	0.0	1.0	0.5	1.50
64	V25	V28		x	55.78	12.5	7.47	15	0.0	1.0	0.5	1.50
65	V26	V27		x	24.22	13.84	4.57	16.61	0.0	1.0	0.5	1.50

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
66	V27	V28		x	48.82	14.18	6.51	17.02	0.0	1.0	0.5	1.50
67	V27	V30		x	65.64	12.91	6.38	15.49	0.0	1.0	0.5	1.50
68	V27	V99		x	6.00	15.58	2.4	18.7	3.5	0.0	0.5	4.00
69	V28	V29		x	111.76	7.78	9.86	9.34	0.0	1.0	0.5	1.50
70	V29	V30		x	25.86	14.83	4.78	17.8	0.0	1.0	0.5	1.50
71	V29	V32		x	72.03	14.62	8.38	17.54	0.0	1.0	0.5	1.50
72	V30	V31		x	40.83	16.71	6.34	20.05	0.0	1.0	0.5	1.50
73	V31	V32		x	33.41	14.17	3.2	17	0.0	1.0	0.5	1.50
~~74~~	~~V32~~	~~V97~~		~~x~~	~~13.17~~	~~9.5~~	~~3.07~~	~~11.4~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
75	V25	V33		x	62.52	6.59	6.14	7.91	0.0	0.0	0.0	0.00
76	V26	V34		x	50.81	6.59	5.9	7.91	0.0	0.0	0.0	0.00
77	V27	V35		x	111.57	6.59	9.22	7.91	0.0	0.0	0.0	0.00
78	V28	V36		x	101.10	6.59	8.93	7.91	0.0	0.0	0.0	0.00
79	V29	V37		x	100.49	5.61	9.88	21.72	0.34	0.16	0.2	0.70
80	V30	V38		x	84.55	4	10.72	22.9	0.34	0.16	0.2	0.70
81	V31	V39		x	63.33	4	7.77	18.74	0.34	0.16	0.2	0.70
82	V32	V40		x	79.82	5.08	9.73	21.5	0.34	0.16	0.2	0.70
83	V33	V34		x	56.50	10.89	6.56	13.07	0.0	1.0	0.5	1.50
84	V33	V36		x	72.89	12.5	7.06	15	0.0	1.0	0.5	1.50
85	V34	V35		x	47.64	13.84	6.44	16.61	0.0	1.0	0.5	1.50
86	V35	V36		x	60.24	14.18	7.22	17.02	0.0	1.0	0.5	1.50
87	V35	V38		x	78.91	10.14	8.2	12.17	0.0	1.0	0.5	1.50

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
88	V36	V37		x	91.21	6.16	8.55	7.39	0.0	1.0	0.5	1.50
89	V37	V38		x	21.11	16.96	4.45	20.35	0.0	1.0	0.5	1.50
90	V37	V40		x	58.79	14.62	7.42	17.54	0.0	1.0	0.5	1.50
91	V38	V39		x	33.32	18.53	5.77	22.24	0.0	1.0	0.5	1.50
92	V39	V40		x	32.19	14.17	5.67	17	0.0	1.0	0.5	1.50
~~93~~	~~V39~~	~~V97~~		~~x~~	~~11.81~~	~~8.02~~	~~2.99~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
94	V33	V41		x	83.14	5.38	8.15	6.46	0.0	0.0	0.0	0.00
95	V34	V42		x	71.41	5.38	8.28	6.46	0.0	0.0	0.0	0.00
96	V35	V43		x	84.57	5.38	9.02	6.46	0.0	0.0	0.0	0.00
97	V36	V44		x	60.77	5.38	6.61	6.46	0.0	0.0	0.0	0.00
98	V37	V45		x	55.70	5.38	6.43	6.46	0.0	0.0	0.0	0.00
99	V38	V46		x	105.41	5.38	8.78	6.46	0.0	0.0	0.0	0.00
100	V39	V47		x	99.31	5.38	6.57	6.46	0.0	0.0	0.0	0.00
101	V40	V48		x	57.32	5.38	7.19	6.46	0.0	0.0	0.0	0.00
102	V41	V42		x	47.93	7.47	6.39	8.96	0.0	1.0	0.5	1.50
103	V41	V44		x	59.38	8.62	6.58	10.34	0.0	1.0	0.5	1.50
104	V42	V43		x	42.87	8.22	6.26	9.86	0.0	1.0	0.5	1.50
105	V43	V44		x	32.72	7.05	5.64	8.46	0.0	1.0	0.5	1.50
106	V45	V46		x	17.24	15.05	4.1	18.06	0.0	1.0	0.5	1.50
107	V45	V48		x	18.64	11.81	4.29	14.17	0.0	1.0	0.5	1.50
108	V46	V47		x	20.90	17.36	2.8	20.83	0.0	1.0	0.5	1.50
109	V47	V48		x	26.29	13.78	5.12	16.54	0.0	1.0	0.5	1.50

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
~~110~~	~~V47~~	~~V97~~		~~x~~	~~1.33~~	~~8.02~~	~~1~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
111	V41	V99		x	42.73	2.42	6.39	2.9	0.94	1.0	0.25	2.19
112	V42	V99		x	64.61	2.42	8.11	2.9	0.43	1.0	0.05	1.48
113	V43	V99		x	82.76	2.42	9.21	2.9	0.23	1.0	0.02	1.25
114	V44	V99		x	30.65	2.42	5.45	2.9	0.95	1.0	0.25	2.2
115	V45	V49		x	33.42	4.69	6.43	18.24	0.34	0.16	0.2	0.70
116	V46	V50		x	63.25	4.69	8.78	21.56	0.34	0.16	0.2	0.70
117	V47	V51	x		65.41	4.69	8.49	21.15	0.34	0.16	0.2	0.70
118	V48	V52	x		34.39	4.69	7.19	19.31	0.34	0.16	0.2	0.70
119	V49	V50		x	26.26	16.93	3.69	20.32	0.0	1.0	0.5	1.50
120	V49	V52		x	25.92	13.28	3.24	15.94	0.0	1.0	0.5	1.50
121	V50	V51		x	44.11	19.24	4.87	23.09	0.0	1.0	0.5	1.50
122	V51	V52		x	46.23	15.23	5.74	18.28	0.0	1.0	0.5	1.50
123	V49	V53		x	17.85	6.64	3.54	18.07	0.34	0.16	0.2	0.70
124	V50	V54		x	43.06	6.64	5.98	21.51	0.34	0.16	0.2	0.70
125	V52	V55	x		22.48	6.64	4.98	20.1	0.34	0.16	0.2	0.70
126	V53	V54		x	15.36	16.93	2.42	20.32	0.0	1.0	0.5	1.50
127	V53	V55	x		18.65	13.28	2.87	15.94	0.0	1.0	0.5	1.50
128	V53	V89	x		8.57	5.22	2.15	13.26	0.34	0.16	0.2	0.70
129	V54	V90	x		36.76	5.22	4.92	17.17	0.34	0.16	0.2	0.70
130	V55	V92	x		13.99	5.22	2.43	13.66	0.34	0.16	0.2	0.70
131	V51	V56	x		4.31	4.8	2.57	13.02	0.34	0.16	0.2	0.70

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
132	V51	V57	x		5.04	4.8	2.71	13.21	0.34	0.16	0.2	0.70
133	V51	V58	x		8.33	4.8	3.24	13.96	0.34	0.16	0.2	0.70
134	V51	V59	x		1.75	4.79	1.24	11.14	0.34	0.16	0.2	0.70
135	V51	V60	x		3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
136	V51	V61	x		3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
137	V51	V62	x		7.36	4.8	2.31	12.65	0.34	0.16	0.2	0.70
138	V51	V63	x		7.82	4.8	3.15	13.83	0.34	0.16	0.2	0.70
139	V51	V64	x		4.74	4.8	2.64	13.11	0.34	0.16	0.2	0.70
140	V51	V65	x		4.04	4.8	2.5	12.92	0.34	0.16	0.2	0.70
141	V54	V56	x		17.74	11.1	4.12	13.32	0.0	1.0	0.5	1.50
142	V56	V57		x	18.98	2.1	4.29	2.52	0.0	0.0	0.0	0.00
143	V57	V58		x	22.94	2.56	4.77	3.07	0.0	0.0	0.0	0.00
144	V58	V59		x	4.79	4.24	1.57	5.09	0.0	0.0	0.0	0.00
145	V58	V60		x	6.95	3.39	2.13	4.07	0.0	0.0	0.0	0.00
146	V58	V61		x	6.95	3.12	2.13	3.74	0.0	0.0	0.0	0.00
147	V58	V62		x	16.47	4.98	3.94	5.98	0.0	0.0	0.0	0.00
148	V59	V60		x	19.70	1.02	4.38	1.22	0.0	0.0	0.0	0.00
149	V60	V61		x	19.70	1.34	4.38	1.61	0.0	0.0	0.0	0.00
150	V61	V62		x	19.70	3.07	4.38	3.68	0.0	0.0	0.0	0.00
151	V59	V63		x	4.79	4.13	1.57	4.96	0.0	0.0	0.0	0.00
152	V60	V63		x	6.95	3.28	2.13	3.94	0.0	0.0	0.0	0.00
153	V61	V63		x	6.95	3.14	2.13	3.77	0.0	0.0	0.0	0.00

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
154	V62	V63		x	15.06	5	3.72	6	0.0	0.0	0.0	0.00
155	V63	V64		x	21.86	2.52	4.65	3.02	0.0	0.0	0.0	0.00
156	V64	V65		x	17.96	2.08	4.15	2.5	0.0	0.0	0.0	0.00
157	V65	V55	x		16.75	7.1	3.98	8.52	0.0	1.0	0.5	1.50
158	V56	V66		x	7.19	4.5	2.57	5.4	0.0	0.0	0.0	0.00
159	V57	V67		x	8.40	4.5	2.71	5.4	0.0	0.0	0.0	0.00
160	V58	V68		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
161	V58	V69		x	6.25	4.5	2.19	5.4	0.0	0.0	0.0	0.00
162	V59	V70	x		2.92	4.5	1.24	5.4	0.0	0.0	0.0	0.00
163	V60	V71	x		5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
164	V61	V72	x		5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
165	V62	V73		x	5.30	4.5	1.19	5.4	0.0	0.0	0.0	0.00
166	V62	V74		x	6.97	4.5	2.55	5.4	0.0	0.0	0.0	0.00
167	V63	V75		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
168	V63	V76		x	5.41	4.5	2	5.4	0.0	0.0	0.0	0.00
169	V64	V77		x	7.90	4.5	2.64	5.4	0.0	0.0	0.0	0.00
170	V65	V78		x	6.73	4.5	2.5	5.4	0.0	0.0	0.0	0.00
171	V54	V66	x		12.95	11.1	3.59	13.32	0.0	1.0	0.5	1.50
172	V66	V67		x	13.85	2.1	3.72	2.52	0.0	0.0	0.0	0.00
173	V67	V68	x		13.36	2.16	3.65	2.59	0.0	0.0	0.0	0.00
174	V67	V69		x	3.38	4.08	1.44	4.9	0.0	0.0	0.0	0.00
175	V68	V69		x	10.99	2.73	3.29	3.28	0.0	0.0	0.0	0.00

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
176	V68	V70	x		3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
177	V68	V71	x		5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
178	V68	V72	x		5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
179	V69	V73		x	8.12	3.45	2.74	4.14	0.0	0.0	0.0	0.00
180	V69	V74		x	3.90	4.6	1.62	5.52	0.0	0.0	0.0	0.00
181	V70	V71	x		8.09	1.02	1.34	1.22	0.0	0.0	0.0	0.00
182	V71	V72	x		11.54	1.34	2.18	1.61	0.0	0.0	0.0	0.00
183	V72	V73	x		11.54	1.74	2.18	2.09	0.0	0.0	0.0	0.00
184	V70	V75	x		3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
185	V71	V75	x		5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
186	V72	V75	x		5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
187	V73	V74		x	9.36	2.4	1.87	2.88	0.0	0.0	0.0	0.00
188	V73	V76		x	8.12	3.47	2.74	4.16	0.0	0.0	0.0	0.00
189	V74	V76		x	2.87	4.62	1.26	5.54	0.0	0.0	0.0	0.00
190	V75	V76		x	10.99	2.62	3.29	3.14	0.0	0.0	0.0	0.00
191	V75	V77	x		13.36	2.14	3.65	2.57	0.0	0.0	0.0	0.00
192	V76	V77		x	2.60	4.04	1.16	4.85	0.0	0.0	0.0	0.00
193	V77	V78		x	13.11	2.08	3.62	2.5	0.0	0.0	0.0	0.00
194	V78	V55	x		12.22	7.1	3.48	8.52	0.0	1.0	0.5	1.50
195	V66	V79		x	7.19	3.07	2.57	3.68	0.0	0.0	0.0	0.00
196	V67	V80		x	8.40	3.07	2.71	3.68	0.0	0.0	0.0	0.00
197	V68	V81		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
198	V69	V81		x	6.25	3.07	2.19	3.68	0.0	0.0	0.0	0.00
199	V70	V82	x		2.92	3.07	1.24	3.68	0.0	0.0	0.0	0.00
200	V71	V83	x		5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
201	V72	V84	x		5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
202	V73	V85		x	8.14	3.07	2.74	3.68	0.0	0.0	0.0	0.00
203	V74	V85		x	6.97	3.07	2.55	3.68	0.0	0.0	0.0	0.00
204	V75	V86		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00
205	V76	V86		x	5.41	3.07	2	3.68	0.0	0.0	0.0	0.00
206	V77	V87		x	7.90	3.07	2.64	3.68	0.0	0.0	0.0	0.00
207	V78	V88		x	6.73	3.07	2.5	3.68	0.0	0.0	0.0	0.00
208	V54	V79	x		8.05	11.1	2.79	13.32	0.0	1.0	0.5	1.50
209	V79	V80		x	8.61	2.1	2.86	2.52	0.0	0.0	0.0	0.00
210	V80	V81	x		10.41	2.56	3.07	3.07	0.0	0.0	0.0	0.00
211	V81	V82	x		2.17	4.24	1.32	5.09	0.0	0.0	0.0	0.00
212	V81	V83	x		3.15	3.39	1.71	4.07	0.0	0.0	0.0	0.00
213	V81	V84		x	3.15	3.12	1.71	3.74	0.0	0.0	0.0	0.00
214	V81	V85		x	7.47	4.98	2.7	5.98	0.0	0.0	0.0	0.00
215	V82	V83		x	8.94	1.02	2.91	1.22	0.0	0.0	0.0	0.00
216	V83	V84	x		8.94	1.34	2.91	1.61	0.0	0.0	0.0	0.00
217	V84	V85		x	8.94	3.07	2.91	3.68	0.0	0.0	0.0	0.00
218	V82	V86	x		2.17	4.13	1.32	4.96	0.0	0.0	0.0	0.00
219	V83	V86	x		3.15	3.28	1.71	3.94	0.0	0.0	0.0	0.00

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
220	V84	V86		x	3.15	3.14	1.71	3.77	0.0	0.0	0.0	0.00
221	V85	V86		x	65.64	5	24.98	6	0.0	0.0	0.0	0.00
222	V86	V87	x		9.92	2.52	3.02	3.02	0.0	0.0	0.0	0.00
223	V87	V88		x	8.15	2.08	2.8	2.5	0.0	0.0	0.0	0.00
224	V88	V55	x		7.60	7.1	2.72	8.52	0.0	1.0	0.5	1.50
225	V79	V91	x		2.16	2.52	1.83	7.41	0.34	0.16	0.2	0.70
226	V80	V91	x		2.55	2.52	1.36	6.75	0.34	0.16	0.2	0.70
227	V81	V91	x		6.35	3.35	1.72	7.26	0.34	0.16	0.2	0.70
228	V82	V91	x		1.75	2.52	1.24	6.58	0.34	0.16	0.2	0.70
229	V83	V91	x		3.05	2.52	1.98	7.62	0.34	0.16	0.2	0.70
230	V84	V91	x		3.22	3.44	1.71	7.24	0.34	0.16	0.2	0.70
231	V85	V91	x		6.77	4.13	1.56	4.96	0.0	0.0	0.0	0.00
232	V86	V91	x		9.29	2.97	3.15	9.27	0.34	0.16	0.2	0.70
233	V87	V91	x		4.74	2.52	2.64	8.55	0.34	0.16	0.2	0.70
234	V88	V91	x		2.77	2.52	1.7	7.23	0.34	0.16	0.2	0.70
235	V89	V90		x	8.02	16.93	2.21	20.32	0.0	1.0	0.5	1.50
236	V89	V92		x	9.74	12.59	2.58	15.11	0.0	1.0	0.5	1.50
237	V89	V99		x	13.23	11.34	3.25	13.61	0.0	1.0	0.5	1.50
238	V89	V99		x	27.82	5.99	4.02	7.19	0.0	1.0	0.5	1.50
239	V89	V99		x	36.11	8.4	5.57	10.08	0.0	1.0	0.5	1.50
240	V90	V91	x		16.16	19.24	2.91	23.09	0.0	1.0	0.5	1.50
241	V90	V99		x	46.62	10.29	6.2	12.35	0.0	1.0	0.5	1.50

Table 7.3-8 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
242	V90	V99		x	26.61	5.87	4.65	7.04	0.0	1.0	0.5	1.50
243	V91	V92	x		14.58	15.23	2.62	18.28	0.0	1.0	0.5	1.50
244	V92	V99		x	45.84	6.21	5.38	7.45	0.0	1.0	0.5	1.50
245	V89	V93		x	17.85	5.12	3.54	15.02	0.34	0.16	0.2	0.70
246	V90	V94		x	43.06	5.12	5.98	18.46	0.34	0.16	0.2	0.70
247	V91	V95	x		62.67	6.24	7.68	20.86	0.34	0.16	0.2	0.70
248	V92	V96		x	22.48	5.12	4.98	17.05	0.34	0.16	0.2	0.70
249	V93	V94		x	14.91	16.93	2.41	20.32	0.0	1.0	0.5	1.50
250	V93	V96		x	18.10	12.59	2.86	15.11	0.0	1.0	0.5	1.50
251	V93	V99		x	24.59	11.34	3.72	13.61	0.0	1.0	0.5	1.50
252	V93	V99		x	87.07	5.99	9.21	7.19	0.0	1.0	0.5	1.50
253	V93	V99		x	77.44	8.4	8.59	10.08	0.0	1.0	0.5	1.50
254	V94	V95		x	37.61	19.24	5.22	23.09	0.0	1.0	0.5	1.50
255	V94	V99		x	100.40	10.29	9.98	12.35	0.0	1.0	0.5	1.50
256	V94	V99		x	90.07	5.87	9.39	7.04	0.0	1.0	0.5	1.50
257	V95	V96		x	35.51	15.23	4.99	18.28	0.0	1.0	0.5	1.50
258	V96	V99		x	95.07	6.21	9.68	7.45	0.0	1.0	0.5	1.50
259	V93	V99		x	29.75	5.5	3.54	6.6	0.0	1.0	0.0	1.00
260	V94	V99		x	71.76	5.5	5.98	6.6	0.0	1.0	0.0	1.00
261	V95	V99		x	74.61	5.5	6.03	6.6	0.0	1.0	0.0	1.00
262	V96	V99		x	37.46	5.5	4.98	6.6	0.0	1.0	0.0	1.00

Table 7.3-9 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : Feedwater line(16B) guillotine break (Full power operating condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Time (s)	SG side		Feedwater Pumps side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.0	0.0	438.17	2588.78	437.91
0.001	18728.2	438.17	7424.14	437.91
0.12	18728.2	438.17	7424.14	437.91
0.120001	13724.3	506.36	7424.14	437.91
10	13724.3	506.36	7424.14	437.91

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	West quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	819	120	14.396	0	3.60	18	400.0
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	729	120	14.396	0	3.81	18	372.4
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1327	120	14.396	0	3.07	18	486.3
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1133	120	14.396	0	3.04	18	492.1
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1503	120	14.396	0	2.86	18	529.4
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1835	120	14.396	0	3.02	18	496.0
7	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1518	120	14.396	0	3.19	18	464.3

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1239	120	14.396	0	2.99	18	502.0
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	591	120	14.396	0	2.69	18	569.1
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	539	120	14.396	0	2.85	18	531.6
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1125	120	14.396	0	2.81	18	540.6
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	967	120	14.396	0	2.53	18	611.5
13	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1126	120	14.396	0	2.74	18	556.9
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1434	120	14.396	0	2.92	18	516.4
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1227	120	14.396	0	2.96	18	508.1

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10	1019	120	14.396	0	2.93	18	514.3
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	552	120	14.396	0	2.59	18	595.0
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	461	120	14.396	0	2.55	18	605.9
19	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	934	120	14.396	0	2.45	18	634.7
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	857	120	14.396	0	2.51	18	617.1
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	931	120	14.396	0	2.56	18	603.1
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	538	120	14.396	0	2.61	18	589.7
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	918	120	14.396	0	2.87	18	527.2

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	802	120	14.396	0	3.01	18	498.0
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	388	120	14.396	0	2.50	10	300.0
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	335	120	14.396	0	2.48	10	303.2
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	696	120	14.396	0	2.34	10	327.4
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	702	120	14.396	0	2.41	10	314.9
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	832	120	14.396	0	2.70	10	270.4
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	546	120	14.396	0	3.02	10	231.1
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	631	120	14.396	0	3.26	10	206.7

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	701	120	14.396	0	3.26	10	206.7
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	460	120	14.396	0	2.36	10	323.7
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	392	120	14.396	0	2.28	10	338.6
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	755	120	14.396	0	2.32	10	331.0
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	669	120	14.396	0	2.37	10	321.9
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	679	120	14.396	0	3.26	10	206.7
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	809	120	14.396	0	4.08	10	145.1
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	602	120	14.396	0	4.76	10	110.1

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	598	120	14.396	0	3.92	10	155.1
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	364	120	14.396	0	2.30	10	334.8
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	330	120	14.396	0	2.15	10	365.1
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	395	120	14.396	0	2.18	10	358.7
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	265	120	14.396	0	2.33	10	329.2
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	261	120	14.396	0	4.88	10	104.9
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	474	120	14.396	0	4.60	10	117.4
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	480	120	14.396	0	5.06	10	97.6

Table 7.3-10 Steam Generator Compartment Nodal Description

Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	269	120	14.396	0	4.98	10	100.8
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	420	120	14.396	0	7.00	10	42.9
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	888	120	14.396	0	5.84	10	71.2
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	965	120	14.396	0	6.96	10	43.7
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	474	120	14.396	0	7.13	10	40.3
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	327	120	14.396	0	7.34	35	376.8
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	789	120	14.396	0	6.66	35	425.5
55	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	412	120	14.396	0	14.60	35	139.7

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
56	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 88'-11.28"	5.19	36	120	14.396	0	32.91	35	6.4
57		5.19	42	120	14.396	0	32.90	35	6.4
58		5.19	70	120	14.396	0	32.94	35	6.3
59		5.19	15	120	14.396	0	34.42	-	-
60		5.19	26	120	14.396	0	33.24	-	-
61		5.19	26	120	14.396	0	33.38	-	-
62		5.19	47	120	14.396	0	33.14	35	5.6
63		5.19	66	120	14.396	0	32.94	35	6.3
64		5.19	40	120	14.396	0	32.89	35	6.4
65		5.19	34	120	14.396	0	32.88	35	6.4
66	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	27	120	14.396	0	33.08	35	5.8
67		3.79	31	120	14.396	0	33.39	35	4.8
68		3.79	28	120	14.396	0	34.51	-	-
69		3.79	23	120	14.396	0	33.83	35	3.5
70		3.79	6	120	14.396	0	92.09	-	-
71		3.79	14	120	14.396	0	139.07	-	-
72		3.79	15	120	14.396	0	48.55	-	-
73		3.79	21	120	14.396	0	35.01	-	-
74		3.79	26	120	14.396	0	33.88	35	3.3
75		3.79	28	120	14.396	0	34.48	-	-
76		3.79	20	120	14.396	0	33.90	35	3.2

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
77	Southeast quadrant around A-SG in A-SG compartment:between EL 88'-11.28" and 92'-8.74"	3.79	29	120	14.396	0	33.39	35	4.8
78		3.79	25	120	14.396	0	33.06	35	5.9
79	Southeast quadrant around A-SG in A-SG compartment:between EL 92'-8.74" and 95'-1"	2.35	17	120	14.396	0	33.16	35	5.5
80		2.35	19	120	14.396	0	33.21	35	5.4
81		2.35	32	120	14.396	0	33.38	35	4.9
82		2.35	7	120	14.396	0	37.41	-	-
83		2.35	12	120	14.396	0	35.60	-	-
84		2.35	12	120	14.396	0	34.64	-	-
85		2.35	35	120	14.396	0	33.59	35	4.2
86		2.35	30	120	14.396	0	33.29	35	5.1
87		2.35	18	120	14.396	0	33.10	35	5.7
88		2.35	15	120	14.396	0	33.07	35	5.8
89	Northwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	143	120	14.396	0	1.37	35	2454.7
90	Northeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	388	120	14.396	0	3.39	35	932.4
91	Southeast quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	445	120	14.396	0	9.65	35	262.7

Table 7.3-10 Steam Generator Compartment Nodal Description
Break Type : Feedwater line(16B) guillotine break (just after hot shutdown condition)
Break Area :2.234(ft2)
Break location : Volume number 71

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
92	Southwest quadrant around A-SG in A-SG compartment:between EL 95'-1" and 101'-0"	5.92	194	120	14.396	0	3.65	35	858.9
93	Northwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	318	120	14.396	0	0.22	35	15809.1
94	Northeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	741	120	14.396	0	1.51	35	2217.9
95	Southeast quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	911	120	14.396	0	5.67	35	517.3
96	Southwest quadrant around A-SG in A-SG compartment:between EL 101'-0" and 112'-0"	11.00	400	120	14.396	0	1.74	35	1911.5
~~97~~	~~B-SG compartment~~	~~200~~	~~47000~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
~~98~~	~~C/V reactor coolant drain tank compartment~~	~~200~~	~~3086~~	~~120~~	~~14.396~~	~~0~~	~~0.00~~	~~-~~	~~-~~
99	Containment building free volume	200	2790086	120	14.396	0	0.00	-	-

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		x	96.72	7.47	8.65	8.96	0.0	1.0	0.5	1.50
2	V1	V4		x	129.70	8.68	9.27	10.42	0.0	1.0	0.5	1.50
~~3~~	~~V1~~	~~V98~~		~~x~~	~~61.86~~	~~7.13~~	~~7.86~~	~~8.56~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
4	V2	V3		x	62.97	9.87	3.88	11.84	0.0	1.0	0.5	1.50
5	V3	V4		x	66.68	10.36	4.4	12.43	0.0	1.0	0.5	1.50
6	V3	V6		x	142.53	11.93	10.75	14.32	0.0	1.0	0.5	1.50
7	V3	V99		x	30.94	20.56	5.46	24.67	3.5	0.0	0.5	4.00
8	V4	V5		x	163.80	12.5	10.52	15	0.0	1.0	0.5	1.50
~~9~~	~~V4~~	~~V98~~		~~x~~	~~28.22~~	~~9.32~~	~~4.36~~	~~11.18~~	~~0.0~~	~~1.0~~	~~0.5~~	~~1.50~~
10	V5	V6		x	76.50	11.69	5.8	14.03	0.0	1.0	0.5	1.50
11	V5	V8		x	167.99	10.36	8.33	12.43	0.0	1.0	0.5	1.50
12	V6	V7		x	135.63	13.13	11.64	15.76	0.0	1.0	0.5	1.50
13	V7	V8		x	125.67	9.97	8.05	11.96	0.0	1.0	0.5	1.50
~~14~~	~~V7~~	~~V97~~		~~x~~	~~36.65~~	~~11.06~~	~~5.9~~	~~13.27~~	~~0.84~~	~~1.0~~	~~0.5~~	~~2.34~~
~~15~~	~~V8~~	~~V97~~		~~x~~	~~21.94~~	~~10.86~~	~~4.42~~	~~13.03~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
16	V1	V9		x	46.77	6.39	6.4	21.6	0.34	0.16	0.2	0.70
17	V2	V10		x	40.68	6.39	7.91	23.73	0.34	0.16	0.2	0.70
18	V3	V11		x	78.56	6.39	10.96	28.03	0.34	0.16	0.2	0.70
19	V4	V12		x	69.44	6.39	9.44	25.88	0.34	0.16	0.2	0.70
20	V5	V13		x	85.84	6.39	9.36	25.77	0.34	0.16	0.2	0.70

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
21	V6	V14		x	101.84	6.39	9.09	25.39	0.34	0.16	0.2	0.70
22	V7	V15		x	86.47	6.39	11.12	28.25	0.34	0.16	0.2	0.70
23	V8	V16		x	75.48	6.39	8.8	24.98	0.34	0.16	0.2	0.70
24	V9	V10		x	61.42	10.63	6.55	12.76	0.0	1.0	0.5	1.50
25	V9	V12		x	48.55	11.41	2.96	13.69	0.0	1.0	0.5	1.50
26	V10	V11		x	41.34	13.22	5.22	15.86	0.0	1.0	0.5	1.50
27	V11	V12		x	66.03	13.4	6.15	16.08	0.0	1.0	0.5	1.50
28	V11	V14		x	120.32	10.2	10.31	12.24	0.0	1.0	0.5	1.50
29	V12	V13		x	140.68	7.34	9.95	8.81	0.0	1.0	0.5	1.50
30	V13	V14		x	42.11	16.96	3.42	20.35	0.0	1.0	0.5	1.50
31	V13	V16		x	83.03	14.62	4.15	17.54	0.0	1.0	0.5	1.50
32	V14	V15		x	86.90	18.53	7.85	22.24	0.0	1.0	0.5	1.50
33	V15	V16		x	84.52	14.17	7.7	17	0.0	1.0	0.5	1.50
~~34~~	~~V15~~	~~V97~~		~~x~~	~~13.17~~	~~8.66~~	~~3.07~~	~~10.39~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
~~35~~	~~V16~~	~~V97~~		~~x~~	~~16.48~~	~~11.58~~	~~3.62~~	~~13.9~~	~~0.26~~	~~1.0~~	~~0.5~~	~~1.76~~
36	V9	V17		x	43.13	5.64	5.91	19.41	0.34	0.16	0.2	0.70
37	V10	V18		x	37.12	5.64	6.72	20.55	0.34	0.16	0.2	0.70
38	V11	V19		x	72.16	5.64	10.22	25.48	0.34	0.16	0.2	0.70
39	V12	V20		x	67.19	5.64	9.93	25.07	0.34	0.16	0.2	0.70
40	V13	V21		x	48.11	5.64	3.73	16.33	0.34	0.16	0.2	0.70
41	V14	V22		x	21.94	5.64	2.16	14.12	0.34	0.16	0.2	0.70

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
42	V15	V23		x	49.34	5.64	4.07	16.81	0.34	0.16	0.2	0.70
43	V16	V24		x	48.67	5.64	4.37	17.23	0.34	0.16	0.2	0.70
44	V17	V18		x	57.59	9.96	7.41	11.95	0.0	1.0	0.5	1.50
45	V17	V20		x	69.73	10.82	5.88	12.98	0.0	1.0	0.5	1.50
46	V18	V19		x	38.11	12.4	5.35	14.88	0.0	1.0	0.5	1.50
47	V19	V20		x	61.30	12.67	7.93	15.2	0.0	1.0	0.5	1.50
48	V19	V22		x	70.67	12.89	8.4	15.47	0.0	1.0	0.5	1.50
49	V19	V99		x	14.75	16.21	3.73	19.45	3.5	0.0	0.5	4.00
50	V20	V21		x	128.07	7.78	8.31	9.34	0.0	1.0	0.5	1.50
51	V21	V22		x	30.56	14.83	4.61	17.8	0.0	1.0	0.5	1.50
52	V21	V24		x	79.37	14.62	6.27	17.54	0.0	1.0	0.5	1.50
53	V22	V23		x	47.78	16.71	5.7	20.05	0.0	1.0	0.5	1.50
54	V23	V24		x	47.11	14.17	6.68	17	0.0	1.0	0.5	1.50
55	V17	V25		x	33.53	4.82	4.96	16.42	0.34	0.16	0.2	0.70
56	V18	V26		x	29.86	4.82	5.77	17.56	0.34	0.16	0.2	0.70
57	V19	V27		x	62.57	4.82	6.8	19.02	0.34	0.16	0.2	0.70
58	V20	V28		x	60.47	4.82	8.53	21.46	0.34	0.16	0.2	0.70
59	V21	V29		x	79.65	5.39	9.88	23.36	0.34	0.16	0.2	0.70
60	V22	V30		x	59.73	7.26	5.44	17.1	0.34	0.16	0.2	0.70
61	V23	V31		x	110.29	7.96	8.54	9.55	0.0	0.0	0.0	0.00
62	V24	V32		x	83.90	6.76	6.79	19	0.34	0.16	0.2	0.70

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
63	V25	V26		x	35.33	11.65	4.53	13.98	0.0	1.0	0.5	1.50
64	V25	V28		x	55.78	12.5	7.47	15	0.0	1.0	0.5	1.50
65	V26	V27		x	24.22	13.84	4.57	16.61	0.0	1.0	0.5	1.50
66	V27	V28		x	48.82	14.18	6.51	17.02	0.0	1.0	0.5	1.50
67	V27	V30		x	65.64	12.91	6.38	15.49	0.0	1.0	0.5	1.50
68	V27	V99		x	6.00	15.58	2.4	18.7	3.5	0.0	0.5	4.00
69	V28	V29		x	111.76	7.78	9.86	9.34	0.0	1.0	0.5	1.50
70	V29	V30		x	25.86	14.83	4.78	17.8	0.0	1.0	0.5	1.50
71	V29	V32		x	72.03	14.62	8.38	17.54	0.0	1.0	0.5	1.50
72	V30	V31		x	40.83	16.71	6.34	20.05	0.0	1.0	0.5	1.50
73	V31	V32		x	33.41	14.17	3.2	17	0.0	1.0	0.5	1.50
~~74~~	~~V32~~	~~V97~~		~~x~~	~~13.17~~	~~9.5~~	~~3.07~~	~~11.4~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
75	V25	V33		x	62.52	6.59	6.14	7.91	0.0	0.0	0.0	0.00
76	V26	V34		x	50.81	6.59	5.9	7.91	0.0	0.0	0.0	0.00
77	V27	V35		x	111.57	6.59	9.22	7.91	0.0	0.0	0.0	0.00
78	V28	V36		x	101.10	6.59	8.93	7.91	0.0	0.0	0.0	0.00
79	V29	V37		x	100.49	5.61	9.88	21.72	0.34	0.16	0.2	0.70
80	V30	V38		x	84.55	4	10.72	22.9	0.34	0.16	0.2	0.70
81	V31	V39		x	63.33	4	7.77	18.74	0.34	0.16	0.2	0.70
82	V32	V40		x	79.82	5.08	9.73	21.5	0.34	0.16	0.2	0.70
83	V33	V34		x	56.50	10.89	6.56	13.07	0.0	1.0	0.5	1.50

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
84	V33	V36		x	72.89	12.5	7.06	15	0.0	1.0	0.5	1.50
85	V34	V35		x	47.64	13.84	6.44	16.61	0.0	1.0	0.5	1.50
86	V35	V36		x	60.24	14.18	7.22	17.02	0.0	1.0	0.5	1.50
87	V35	V38		x	78.91	10.14	8.2	12.17	0.0	1.0	0.5	1.50
88	V36	V37		x	91.21	6.16	8.55	7.39	0.0	1.0	0.5	1.50
89	V37	V38		x	21.11	16.96	4.45	20.35	0.0	1.0	0.5	1.50
90	V37	V40		x	58.79	14.62	7.42	17.54	0.0	1.0	0.5	1.50
91	V38	V39		x	33.32	18.53	5.77	22.24	0.0	1.0	0.5	1.50
92	V39	V40		x	32.19	14.17	5.67	17	0.0	1.0	0.5	1.50
~~93~~	~~V39~~	~~V97~~		~~x~~	~~11.81~~	~~8.02~~	~~2.99~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
94	V33	V41		x	83.14	5.38	8.15	6.46	0.0	0.0	0.0	0.00
95	V34	V42		x	71.41	5.38	8.28	6.46	0.0	0.0	0.0	0.00
96	V35	V43		x	84.57	5.38	9.02	6.46	0.0	0.0	0.0	0.00
97	V36	V44		x	60.77	5.38	6.61	6.46	0.0	0.0	0.0	0.00
98	V37	V45		x	55.70	5.38	6.43	6.46	0.0	0.0	0.0	0.00
99	V38	V46		x	105.41	5.38	8.78	6.46	0.0	0.0	0.0	0.00
100	V39	V47		x	99.31	5.38	6.57	6.46	0.0	0.0	0.0	0.00
101	V40	V48		x	57.32	5.38	7.19	6.46	0.0	0.0	0.0	0.00
102	V41	V42		x	47.93	7.47	6.39	8.96	0.0	1.0	0.5	1.50
103	V41	V44		x	59.38	8.62	6.58	10.34	0.0	1.0	0.5	1.50
104	V42	V43		x	42.87	8.22	6.26	9.86	0.0	1.0	0.5	1.50

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
105	V43	V44		x	32.72	7.05	5.64	8.46	0.0	1.0	0.5	1.50
106	V45	V46		x	17.24	15.05	4.1	18.06	0.0	1.0	0.5	1.50
107	V45	V48		x	18.64	11.81	4.29	14.17	0.0	1.0	0.5	1.50
108	V46	V47		x	20.90	17.36	2.8	20.83	0.0	1.0	0.5	1.50
109	V47	V48		x	26.29	13.78	5.12	16.54	0.0	1.0	0.5	1.50
~~110~~	~~V47~~	~~V97~~		~~x~~	~~1.33~~	~~8.02~~	~~1~~	~~9.62~~	~~0.17~~	~~1.0~~	~~0.5~~	~~1.67~~
111	V41	V99		x	42.73	2.42	6.39	2.9	0.94	1.0	0.25	2.19
112	V42	V99		x	64.61	2.42	8.11	2.9	0.43	1.0	0.05	1.48
113	V43	V99		x	82.76	2.42	9.21	2.9	0.23	1.0	0.02	1.25
114	V44	V99		x	30.65	2.42	5.45	2.9	0.95	1.0	0.25	2.2
115	V45	V49		x	33.42	4.69	6.43	18.24	0.34	0.16	0.2	0.70
116	V46	V50		x	63.25	4.69	8.78	21.56	0.34	0.16	0.2	0.70
117	V47	V51		x	65.41	4.69	8.49	21.15	0.34	0.16	0.2	0.70
118	V48	V52		x	34.39	4.69	7.19	19.31	0.34	0.16	0.2	0.70
119	V49	V50		x	26.26	16.93	3.69	20.32	0.0	1.0	0.5	1.50
120	V49	V52		x	25.92	13.28	3.24	15.94	0.0	1.0	0.5	1.50
121	V50	V51		x	44.11	19.24	4.87	23.09	0.0	1.0	0.5	1.50
122	V51	V52		x	46.23	15.23	5.74	18.28	0.0	1.0	0.5	1.50
123	V49	V53		x	17.85	6.64	3.54	18.07	0.34	0.16	0.2	0.70
124	V50	V54		x	43.06	6.64	5.98	21.51	0.34	0.16	0.2	0.70
125	V52	V55	x		22.48	6.64	4.98	20.1	0.34	0.16	0.2	0.70

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
126	V53	V54		x	15.36	16.93	2.42	20.32	0.0	1.0	0.5	1.50
127	V53	V55	x		18.65	13.28	2.87	15.94	0.0	1.0	0.5	1.50
128	V53	V89	x		8.57	5.22	2.15	13.26	0.34	0.16	0.2	0.70
129	V54	V90	x		36.76	5.22	4.92	17.17	0.34	0.16	0.2	0.70
130	V55	V92	x		13.99	5.22	2.43	13.66	0.34	0.16	0.2	0.70
131	V51	V56	x		4.31	4.8	2.57	13.02	0.34	0.16	0.2	0.70
132	V51	V57	x		5.04	4.8	2.71	13.21	0.34	0.16	0.2	0.70
133	V51	V58	x		8.33	4.8	3.24	13.96	0.34	0.16	0.2	0.70
134	V51	V59	x		1.75	4.79	1.24	11.14	0.34	0.16	0.2	0.70
135	V51	V60	x		3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
136	V51	V61	x		3.05	4.8	1.98	12.18	0.34	0.16	0.2	0.70
137	V51	V62	x		7.36	4.8	2.31	12.65	0.34	0.16	0.2	0.70
138	V51	V63	x		7.82	4.8	3.15	13.83	0.34	0.16	0.2	0.70
139	V51	V64	x		4.74	4.8	2.64	13.11	0.34	0.16	0.2	0.70
140	V51	V65	x		4.04	4.8	2.5	12.92	0.34	0.16	0.2	0.70
141	V54	V56	x		17.74	11.1	4.12	13.32	0.0	1.0	0.5	1.50
142	V56	V57		x	18.98	2.1	4.29	2.52	0.0	0.0	0.0	0.00
143	V57	V58		x	22.94	2.56	4.77	3.07	0.0	0.0	0.0	0.00
144	V58	V59		x	4.79	4.24	1.57	5.09	0.0	0.0	0.0	0.00
145	V58	V60		x	6.95	3.39	2.13	4.07	0.0	0.0	0.0	0.00
146	V58	V61		x	6.95	3.12	2.13	3.74	0.0	0.0	0.0	0.00

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
147	V58	V62		x	16.47	4.98	3.94	5.98	0.0	0.0	0.0	0.00
148	V59	V60		x	19.70	1.02	4.38	1.22	0.0	0.0	0.0	0.00
149	V60	V61		x	19.70	1.34	4.38	1.61	0.0	0.0	0.0	0.00
150	V61	V62		x	19.70	3.07	4.38	3.68	0.0	0.0	0.0	0.00
151	V59	V63		x	4.79	4.13	1.57	4.96	0.0	0.0	0.0	0.00
152	V60	V63		x	6.95	3.28	2.13	3.94	0.0	0.0	0.0	0.00
153	V61	V63		x	6.95	3.14	2.13	3.77	0.0	0.0	0.0	0.00
154	V62	V63		x	15.06	5	3.72	6	0.0	0.0	0.0	0.00
155	V63	V64		x	21.86	2.52	4.65	3.02	0.0	0.0	0.0	0.00
156	V64	V65		x	17.96	2.08	4.15	2.5	0.0	0.0	0.0	0.00
157	V65	V55	x		16.75	7.1	3.98	8.52	0.0	1.0	0.5	1.50
158	V56	V66		x	7.19	4.5	2.57	5.4	0.0	0.0	0.0	0.00
159	V57	V67		x	8.40	4.5	2.71	5.4	0.0	0.0	0.0	0.00
160	V58	V68		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00
161	V58	V69		x	6.25	4.5	2.19	5.4	0.0	0.0	0.0	0.00
162	V59	V70	x		2.92	4.5	1.24	5.4	0.0	0.0	0.0	0.00
163	V60	V71	x		5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
164	V61	V72	x		5.08	4.5	1.98	5.4	0.0	0.0	0.0	0.00
165	V62	V73		x	5.30	4.5	1.19	5.4	0.0	0.0	0.0	0.00
166	V62	V74		x	6.97	4.5	2.55	5.4	0.0	0.0	0.0	0.00
167	V63	V75		x	7.63	4.5	2.65	5.4	0.0	0.0	0.0	0.00

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
168	V63	V76		x	5.41	4.5	2	5.4	0.0	0.0	0.0	0.00
169	V64	V77		x	7.90	4.5	2.64	5.4	0.0	0.0	0.0	0.00
170	V65	V78		x	6.73	4.5	2.5	5.4	0.0	0.0	0.0	0.00
171	V54	V66	x		12.95	11.1	3.59	13.32	0.0	1.0	0.5	1.50
172	V66	V67		x	13.85	2.1	3.72	2.52	0.0	0.0	0.0	0.00
173	V67	V68	x		13.36	2.16	3.65	2.59	0.0	0.0	0.0	0.00
174	V67	V69		x	3.38	4.08	1.44	4.9	0.0	0.0	0.0	0.00
175	V68	V69		x	10.99	2.73	3.29	3.28	0.0	0.0	0.0	0.00
176	V68	V70	x		3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
177	V68	V71	x		5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
178	V68	V72	x		5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
179	V69	V73		x	8.12	3.45	2.74	4.14	0.0	0.0	0.0	0.00
180	V69	V74		x	3.90	4.6	1.62	5.52	0.0	0.0	0.0	0.00
181	V70	V71	x		8.09	1.02	1.34	1.22	0.0	0.0	0.0	0.00
182	V71	V72	x		11.54	1.34	2.18	1.61	0.0	0.0	0.0	0.00
183	V72	V73	x		11.54	1.74	2.18	2.09	0.0	0.0	0.0	0.00
184	V70	V75	x		3.49	3.39	1.48	4.07	0.0	0.0	0.0	0.00
185	V71	V75	x		5.07	2.97	1.98	3.56	0.0	0.0	0.0	0.00
186	V72	V75	x		5.07	3.67	1.98	4.4	0.0	0.0	0.0	0.00
187	V73	V74		x	9.36	2.4	1.87	2.88	0.0	0.0	0.0	0.00
188	V73	V76		x	8.12	3.47	2.74	4.16	0.0	0.0	0.0	0.00

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
189	V74	V76		x	2.87	4.62	1.26	5.54	0.0	0.0	0.0	0.00
190	V75	V76		x	10.99	2.62	3.29	3.14	0.0	0.0	0.0	0.00
191	V75	V77	x		13.36	2.14	3.65	2.57	0.0	0.0	0.0	0.00
192	V76	V77		x	2.60	4.04	1.16	4.85	0.0	0.0	0.0	0.00
193	V77	V78		x	13.11	2.08	3.62	2.5	0.0	0.0	0.0	0.00
194	V78	V55	x		12.22	7.1	3.48	8.52	0.0	1.0	0.5	1.50
195	V66	V79		x	7.19	3.07	2.57	3.68	0.0	0.0	0.0	0.00
196	V67	V80		x	8.40	3.07	2.71	3.68	0.0	0.0	0.0	0.00
197	V68	V81		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00
198	V69	V81		x	6.25	3.07	2.19	3.68	0.0	0.0	0.0	0.00
199	V70	V82	x		2.92	3.07	1.24	3.68	0.0	0.0	0.0	0.00
200	V71	V83	x		5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
201	V72	V84	x		5.08	3.07	1.98	3.68	0.0	0.0	0.0	0.00
202	V73	V85		x	8.14	3.07	2.74	3.68	0.0	0.0	0.0	0.00
203	V74	V85		x	6.97	3.07	2.55	3.68	0.0	0.0	0.0	0.00
204	V75	V86		x	7.63	3.07	2.65	3.68	0.0	0.0	0.0	0.00
205	V76	V86		x	5.41	3.07	2	3.68	0.0	0.0	0.0	0.00
206	V77	V87		x	7.90	3.07	2.64	3.68	0.0	0.0	0.0	0.00
207	V78	V88		x	6.73	3.07	2.5	3.68	0.0	0.0	0.0	0.00
208	V54	V79	x		8.05	11.1	2.79	13.32	0.0	1.0	0.5	1.50
209	V79	V80		x	8.61	2.1	2.86	2.52	0.0	0.0	0.0	0.00

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
210	V80	V81	x		10.41	2.56	3.07	3.07	0.0	0.0	0.0	0.00
211	V81	V82		x	2.17	4.24	1.32	5.09	0.0	0.0	0.0	0.00
212	V81	V83	x		3.15	3.39	1.71	4.07	0.0	0.0	0.0	0.00
213	V81	V84		x	3.15	3.12	1.71	3.74	0.0	0.0	0.0	0.00
214	V81	V85		x	7.47	4.98	2.7	5.98	0.0	0.0	0.0	0.00
215	V82	V83		x	8.94	1.02	2.91	1.22	0.0	0.0	0.0	0.00
216	V83	V84	x		8.94	1.34	2.91	1.61	0.0	0.0	0.0	0.00
217	V84	V85		x	8.94	3.07	2.91	3.68	0.0	0.0	0.0	0.00
218	V82	V86	x		2.17	4.13	1.32	4.96	0.0	0.0	0.0	0.00
219	V83	V86	x		3.15	3.28	1.71	3.94	0.0	0.0	0.0	0.00
220	V84	V86		x	3.15	3.14	1.71	3.77	0.0	0.0	0.0	0.00
221	V85	V86		x	65.64	5	24.98	6	0.0	0.0	0.0	0.00
222	V86	V87	x		9.92	2.52	3.02	3.02	0.0	0.0	0.0	0.00
223	V87	V88		x	8.15	2.08	2.8	2.5	0.0	0.0	0.0	0.00
224	V88	V55	x		7.60	7.1	2.72	8.52	0.0	1.0	0.5	1.50
225	V79	V91	x		2.16	2.52	1.83	7.41	0.34	0.16	0.2	0.70
226	V80	V91	x		2.55	2.52	1.36	6.75	0.34	0.16	0.2	0.70
227	V81	V91	x		6.35	3.35	1.72	7.26	0.34	0.16	0.2	0.70
228	V82	V91	x		1.75	2.52	1.24	6.58	0.34	0.16	0.2	0.70
229	V83	V91	x		3.05	2.52	1.98	7.62	0.34	0.16	0.2	0.70
230	V84	V91	x		3.22	3.44	1.71	7.24	0.34	0.16	0.2	0.70

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
231	V85	V91	x		6.77	4.13	1.56	4.96	0.0	0.0	0.0	0.00
232	V86	V91	x		9.29	2.97	3.15	9.27	0.34	0.16	0.2	0.70
233	V87	V91	x		4.74	2.52	2.64	8.55	0.34	0.16	0.2	0.70
234	V88	V91	x		2.77	2.52	1.7	7.23	0.34	0.16	0.2	0.70
235	V89	V90		x	8.02	16.93	2.21	20.32	0.0	1.0	0.5	1.50
236	V89	V92		x	9.74	12.59	2.58	15.11	0.0	1.0	0.5	1.50
237	V89	V99		x	13.23	11.34	3.25	13.61	0.0	1.0	0.5	1.50
238	V89	V99		x	27.82	5.99	4.02	7.19	0.0	1.0	0.5	1.50
239	V89	V99		x	36.11	8.4	5.57	10.08	0.0	1.0	0.5	1.50
240	V90	V91	x		16.16	19.24	2.91	23.09	0.0	1.0	0.5	1.50
241	V90	V99		x	46.62	10.29	6.2	12.35	0.0	1.0	0.5	1.50
242	V90	V99		x	26.61	5.87	4.65	7.04	0.0	1.0	0.5	1.50
243	V91	V92	x		14.58	15.23	2.62	18.28	0.0	1.0	0.5	1.50
244	V92	V99		x	45.84	6.21	5.38	7.45	0.0	1.0	0.5	1.50
245	V89	V93		x	17.85	5.12	3.54	15.02	0.34	0.16	0.2	0.70
246	V90	V94		x	43.06	5.12	5.98	18.46	0.34	0.16	0.2	0.70
247	V91	V95	x		62.67	6.24	7.68	20.86	0.34	0.16	0.2	0.70
248	V92	V96		x	22.48	5.12	4.98	17.05	0.34	0.16	0.2	0.70
249	V93	V94		x	14.91	16.93	2.41	20.32	0.0	1.0	0.5	1.50
250	V93	V96		x	18.10	12.59	2.86	15.11	0.0	1.0	0.5	1.50
251	V93	V99		x	24.59	11.34	3.72	13.61	0.0	1.0	0.5	1.50

Table 7.3-11 Steam Generator Compartment Vent Path Description

Break Type : Feedwater line(16B) guillotine break(just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
252	V93	V99		x	87.07	5.99	9.21	7.19	0.0	1.0	0.5	1.50
253	V93	V99		x	77.44	8.4	8.59	10.08	0.0	1.0	0.5	1.50
254	V94	V95		x	37.61	19.24	5.22	23.09	0.0	1.0	0.5	1.50
255	V94	V99		x	100.40	10.29	9.98	12.35	0.0	1.0	0.5	1.50
256	V94	V99		x	90.07	5.87	9.39	7.04	0.0	1.0	0.5	1.50
257	V95	V96		x	35.51	15.23	4.99	18.28	0.0	1.0	0.5	1.50
258	V96	V99		x	95.07	6.21	9.68	7.45	0.0	1.0	0.5	1.50
259	V93	V99		x	29.75	5.5	3.54	6.6	0.0	1.0	0.0	1.00
260	V94	V99		x	71.76	5.5	5.98	6.6	0.0	1.0	0.0	1.00
261	V95	V99		x	74.61	5.5	6.03	6.6	0.0	1.0	0.0	1.00
262	V96	V99		x	37.46	5.5	4.98	6.6	0.0	1.0	0.0	1.00

Table 7.3-12 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses
Break Type : Feed Water line(16B) guillotine break (Just after hot shutdown condition)
Break Area : 2.234(ft2)
Break location : Volume number 71

Time (s)	SG side		Feedwater Pumps side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.0	0.0	438.23	2397.22	437.91
0.001	20587.1	438.23	7424.14	437.91
0.12	20587.1	438.23	7424.14	437.91
0.120001	11364.1	563.38	7424.14	437.91
10	11364.1	563.38	7424.14	437.91

Table 7.3-13 Calculations for Mass and Energy Release from Feedwater Pump Side

Operating mode		Full power	Zero power (Just after hot shutdown)
Initial condition	Min flow rate(lbm/sec)	2588.78	2397.22
	press. (psia)	1016	1140
	Temperature(F)	456.8	456.8
	density (lbm/ft3)	51.39	51.44
	a Speed of sound (ft/sec)	3971.42	3985.72
Saturated condition	Press. (psia)	452.3	452.3
	Temperature(F)	456.8	456.8
	Density (lbm/ft3)	51.14	51.14
	Mcrit Critical flow (lbm/sec)	7424.14	7424.14
	Specific enthalpy (Btu/lbm)	437.91	437.91
-Δρ	(lbm/ft3)	0.25	0.30
Mex	(lbm/sec)	1112	1339
Mout	(lbm/sec)	3700.78	3736.22

Table 7.3-14 Mass and Energy Release Rates from Feedwater Pump Side
(For SG compartment pressure analysis)

Time (sec)	Full power		Zero power	
	Mass flow (lbm/sec)	Specific enthalpy (Btu/lbm)	Mass flow (lbm/sec)	Specific enthalpy (Btu/lbm)
0.0	2588.78	437.91	2397.22	437.91
0.001	7424.14	437.91	7424.14	437.91
10	7424.14	437.91	7424.14	437.91

Table 7.3-15 Calculations for Mass and Energy Release from SG Side

Operating mode		Full power	Zero power (Just after hot shutdown)
Between feed water nozzle and feed water ring	press. (psia)	1016	1140
	Temperature(F)	456.8	456.8
	density (lbm/ft3)	51.39	51.44
	Specific enthalpy (Btu/lbm)	438.17	438.23
	Critical flow (lbm/sec)	18728.2	20587.1
	Volume (ft3)	27.2	27.2
	Duration time (sec)	0.075	0.068
SG secondary side	Press. (psia)	1016	1140
	Temperature(F)	515.5	560.73
	Density (lbm/ft3)	48.22	45.25
	Specific enthalpy (Btu/lbm)	506.36	563.38
	Critical flow (lbm/sec)	13724.3	11364.1

Table 7.3-16 Mass and Energy Release Rates from SG Side
(For SG compartment pressure analysis)

Full power			Zero power		
Time(sec)	Mass flow (lbm/sec)	Specific enthalpy (Btu/lbm)	Time(sec)	Mass flow (lbm/sec)	Specific enthalpy (Btu/lbm)
0.0	0.0	438.17	0.0	0.0	438.23
0.001	18728.2	438.17	0.001	20587.1	438.23
0.12	18728.2	438.17	0.11	20587.1	438.23
0.120001	13724.3	506.36	0.110001	11364.1	563.38
10	13724.3	506.36	10	11364.1	563.38

Figure 7.3-1 Nodalization Scheme for Steam Generator Compartment Analysis (1/10)

Figure 7.3-2 Nodalization Scheme for Steam Generator Compartment Analysis (2/10)

Figure 7.3-3 Nodalization Scheme for Steam Generator Compartment Analysis (3/10)

Figure 7.3-4 Nodalization Scheme for Steam Generator Compartment Analysis (4/10)

Figure 7.3-5 Nodalization Scheme for Steam Generator Compartment Analysis (5/10)

Figure 7.3-6 Nodalization Scheme for Steam Generator Compartment Analysis (6/10)

Figure 7.3-7 Nodalization Scheme for Steam Generator Compartment Analysis (7/10)

Figure 7.3-8 Nodalization Scheme for Steam Generator Compartment Analysis (8/10)

Figure 7.3-9 Nodalization Scheme for Steam Generator Compartment Analysis (9/10)

Figure 7.3-10 Nodalization Scheme for Steam Generator Compartment Analysis (10/10)

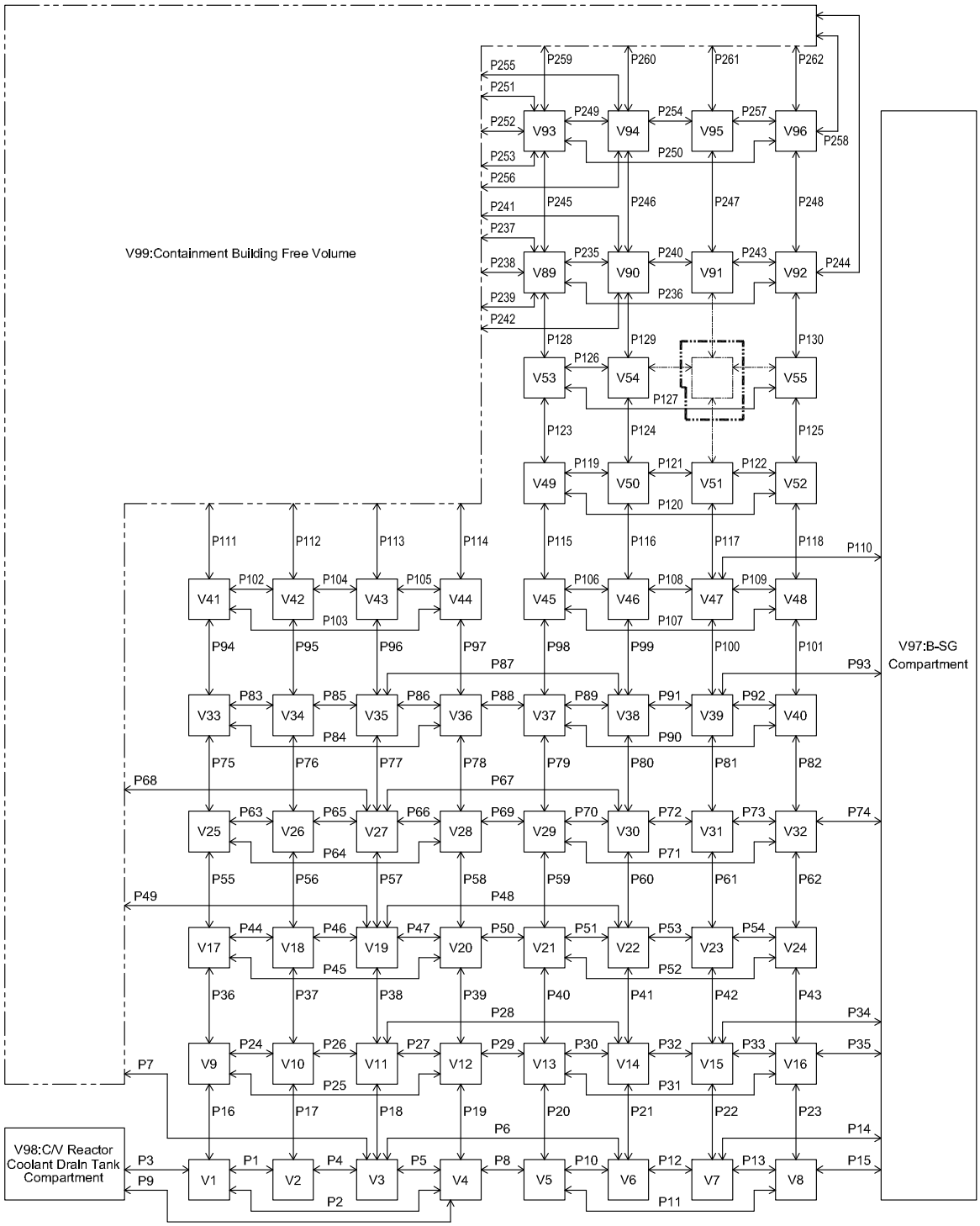

Figure 7.3-11 Nodalization Diagram for Steam Generator Compartment analysis(1/2)

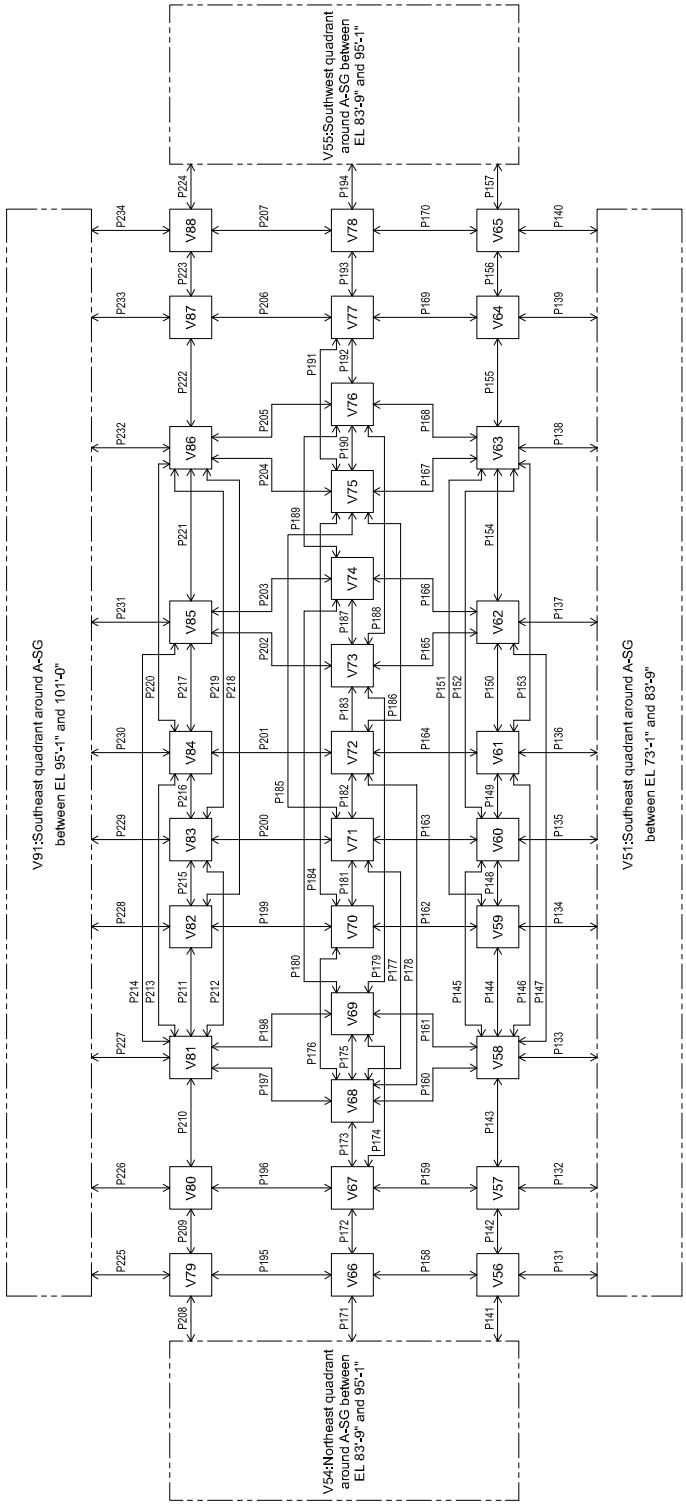

Figure 7.3-12 Nodalization Diagram for Steam Generator Compartment Analysis(2/2)

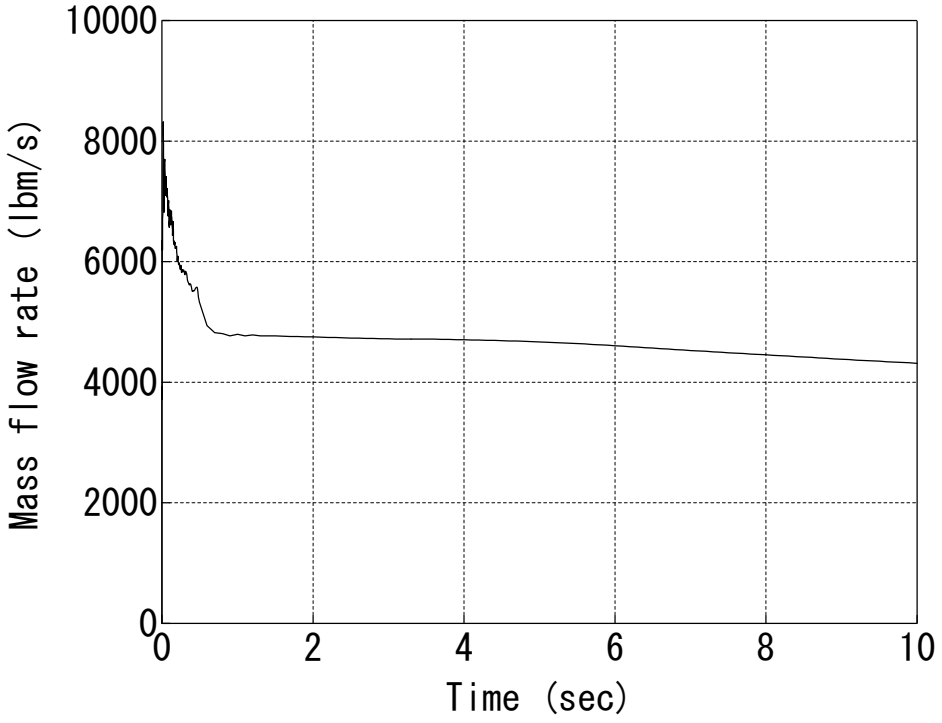

Figure 7.3-13 Short term Mass and Energy Release Data for SG Compartment
RHR Pump Inlet Line Break (1/2)

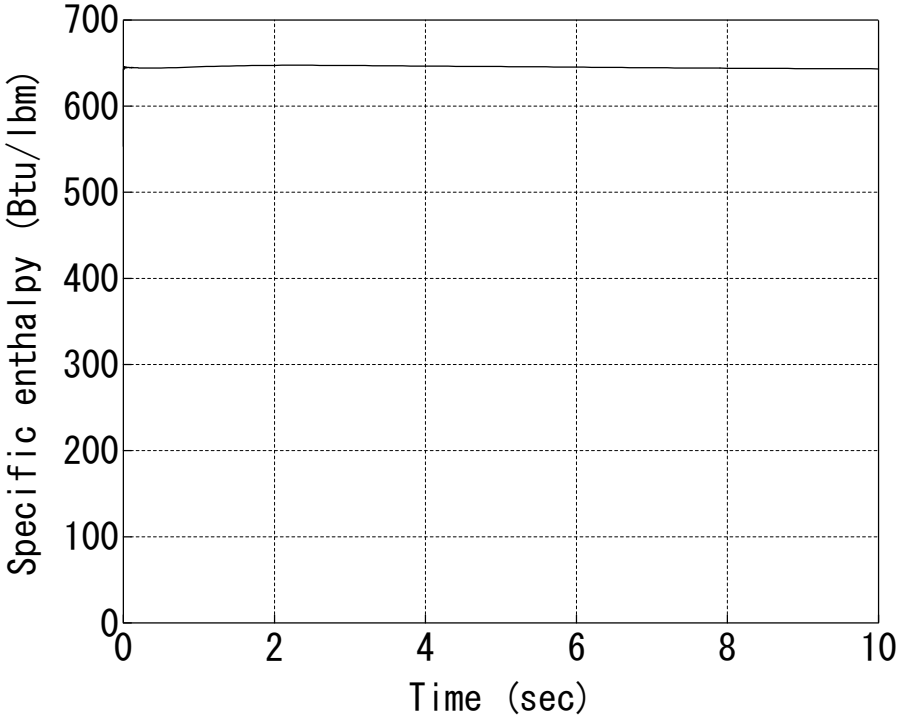

Figure 7.3-14 Short term Mass and Energy Release Data for SG Compartment
RHR pump inlet line break (2/2)

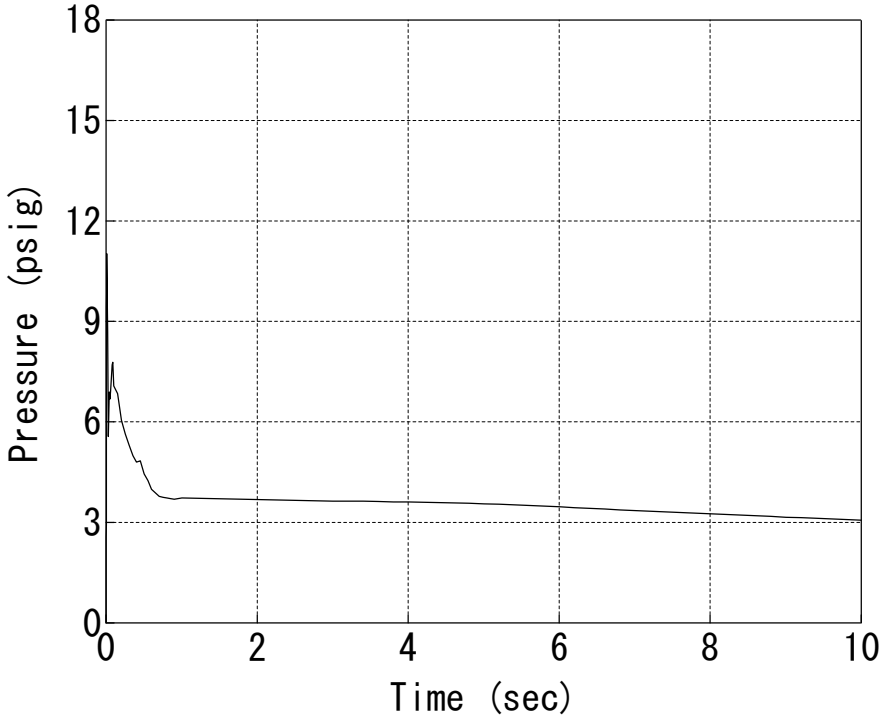

Figure 7.3-15 Pressure Transient at Peak Pressure Node in SG Compartment
RHR Pump Inlet Line Break

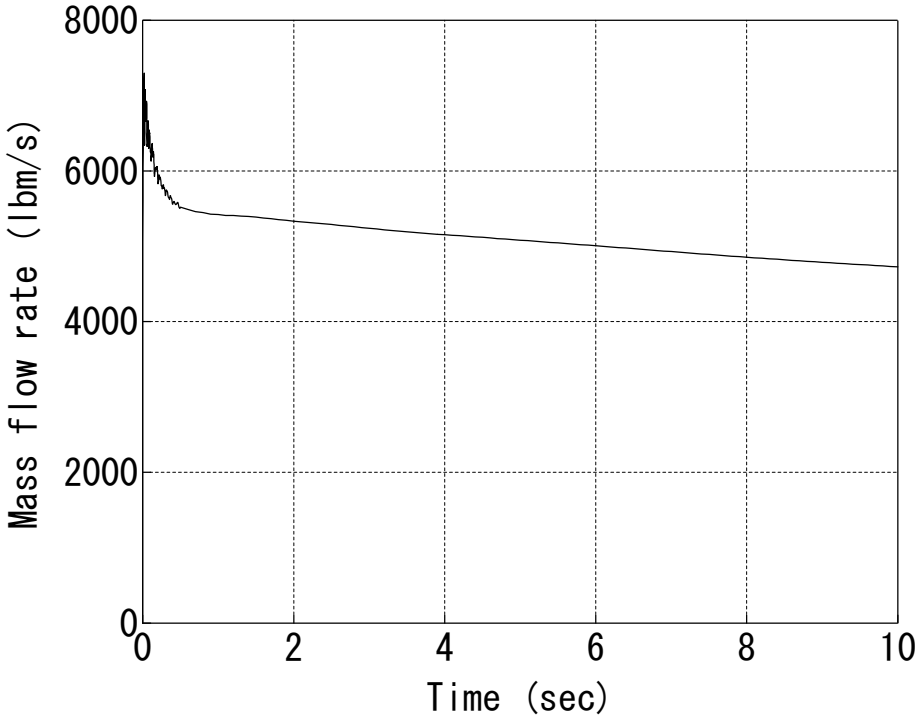

Figure 7.3-16 Short Term Mass and Energy Release Data for SG Compartment
RHR Pump Outlet Line Break (1/2)

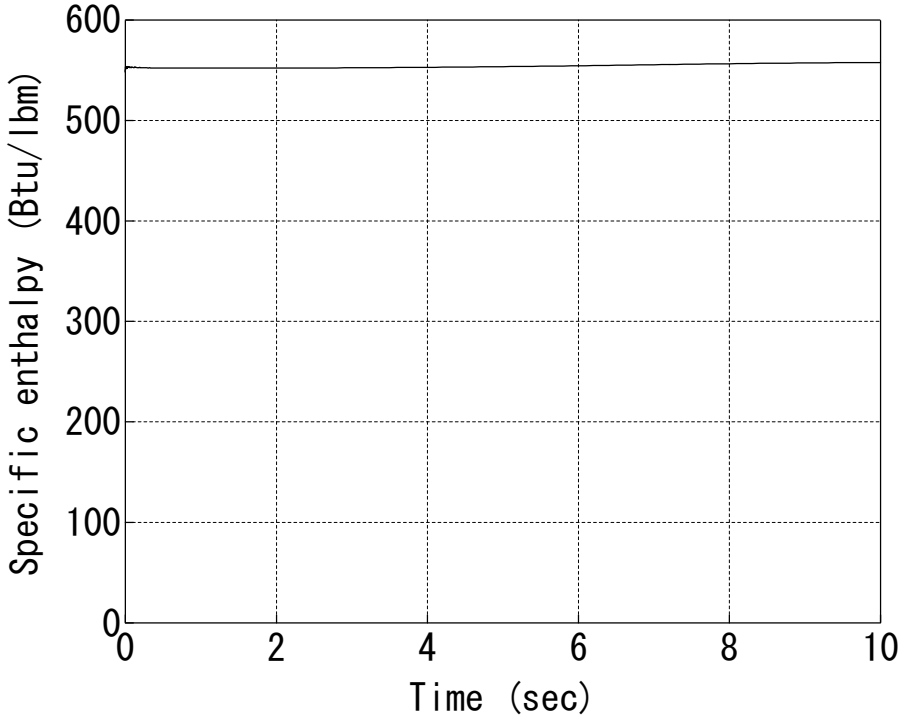

Figure 7.3-17 Short Term Mass and Energy Release Data for SG compartment
RHR Pump Outlet Line Break (2/2)

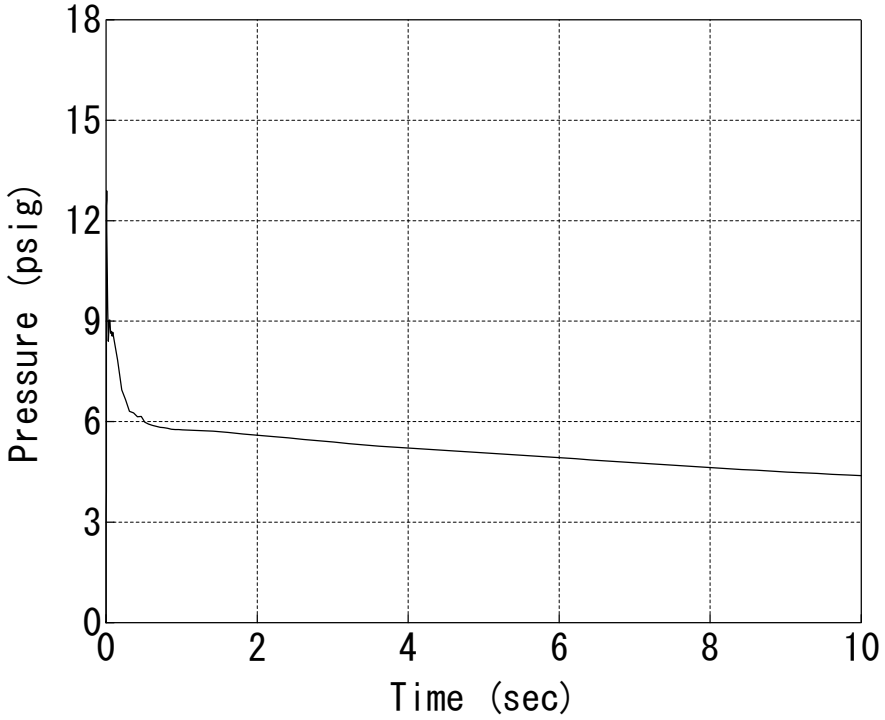

Figure 7.3-18 Pressure Transient Peak Pressure Node in SG Compartment
RHR Pump Outlet Line Break

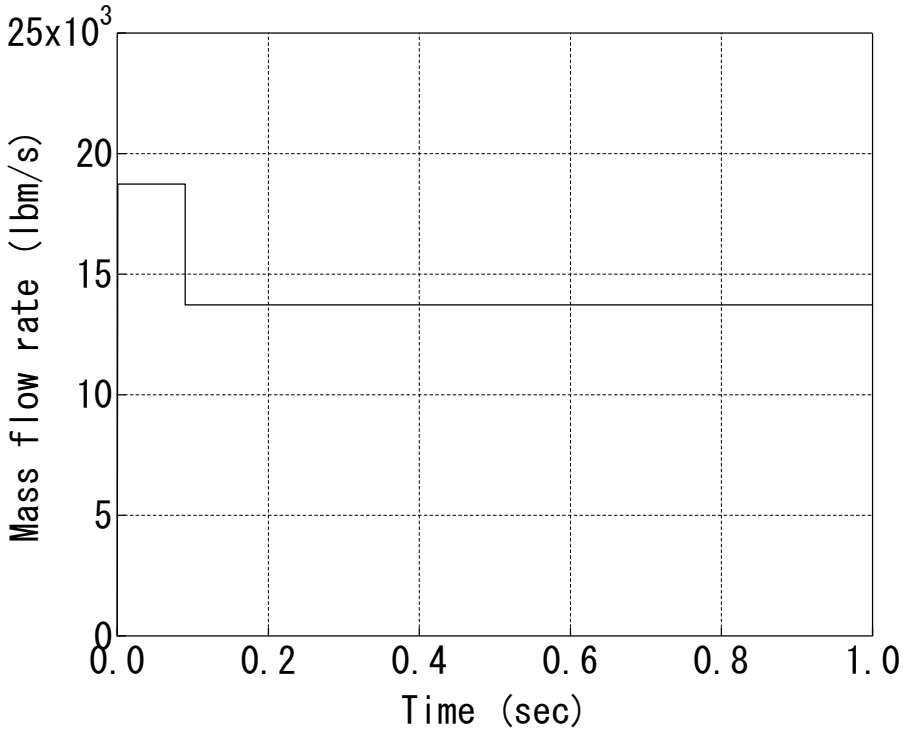

Figure 7.3-19 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (SG side, full power operating condition) (1/2)

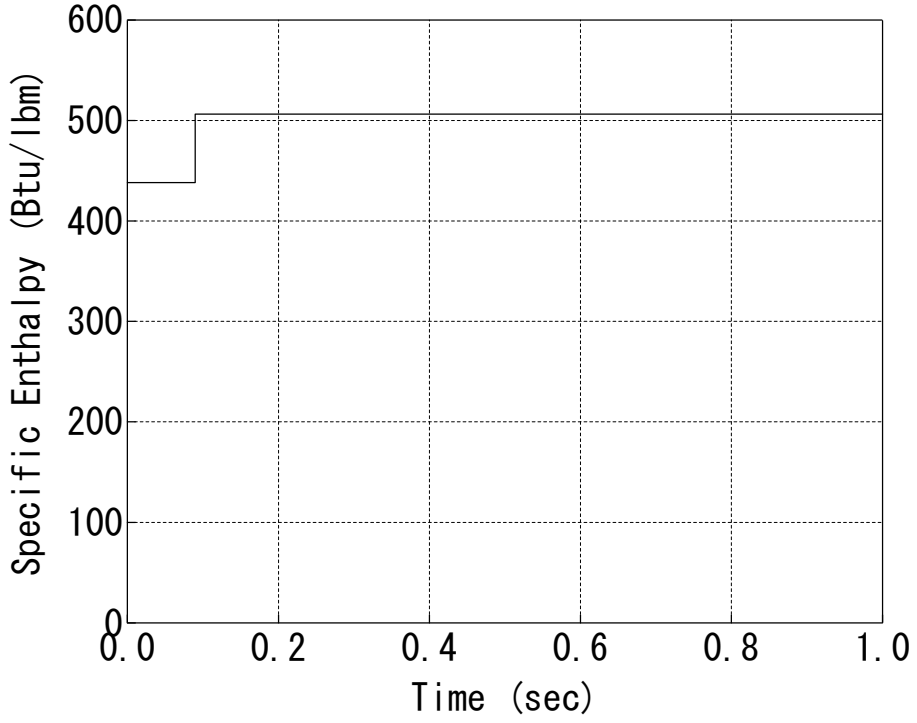

Figure 7.3-20 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (SG side, full power operating condition) (2/2)

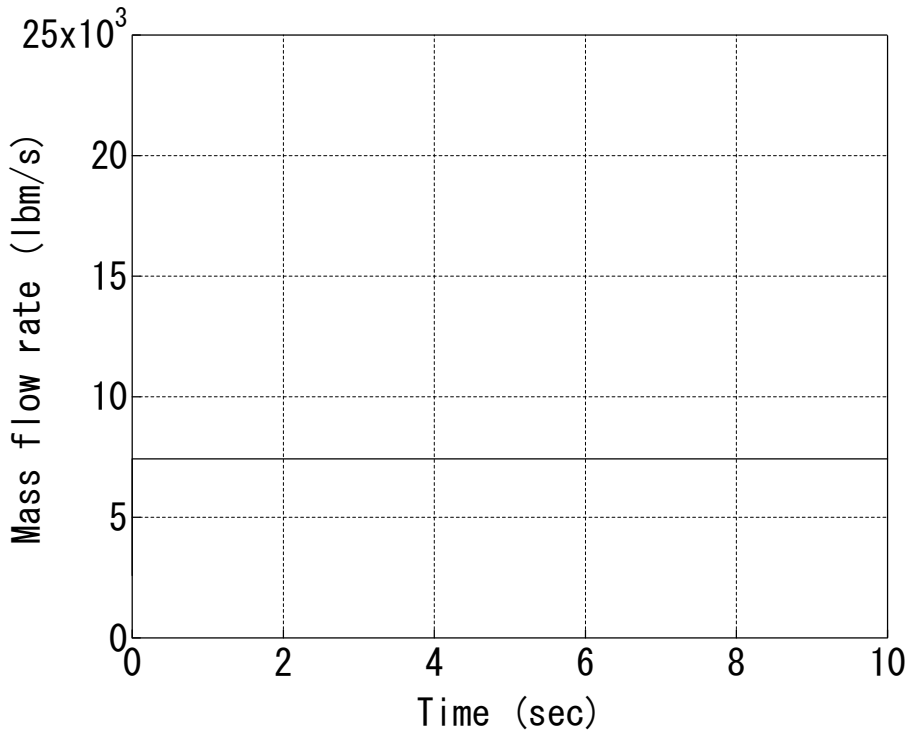

Figure 7.3-21 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (Feedwater pump side, full power operating condition) (1/2)

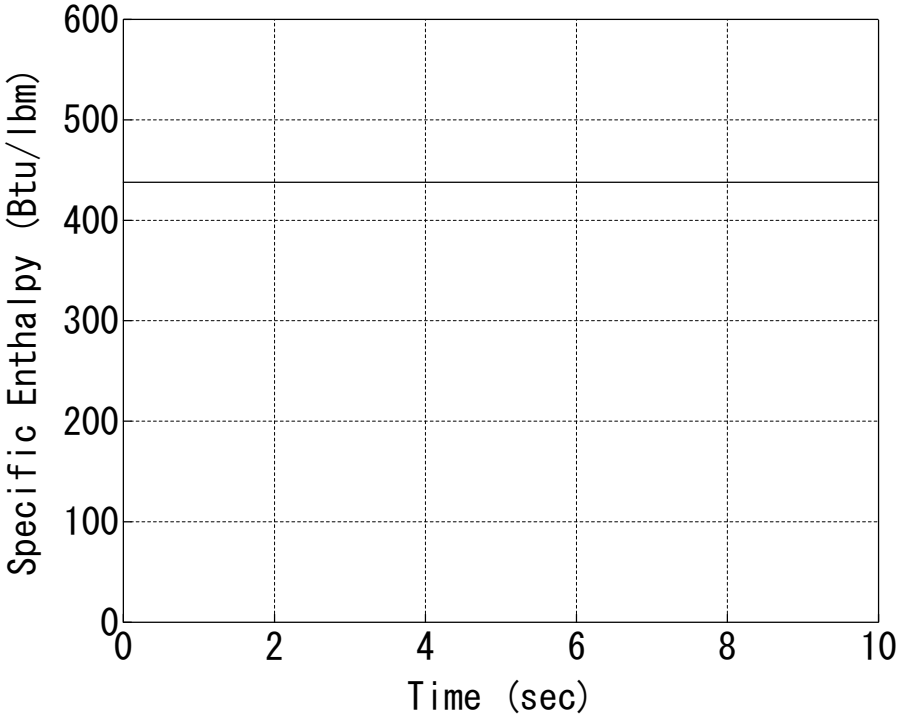

Figure 7.3-22 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (Feedwater pump side, full power operating condition) (2/2)

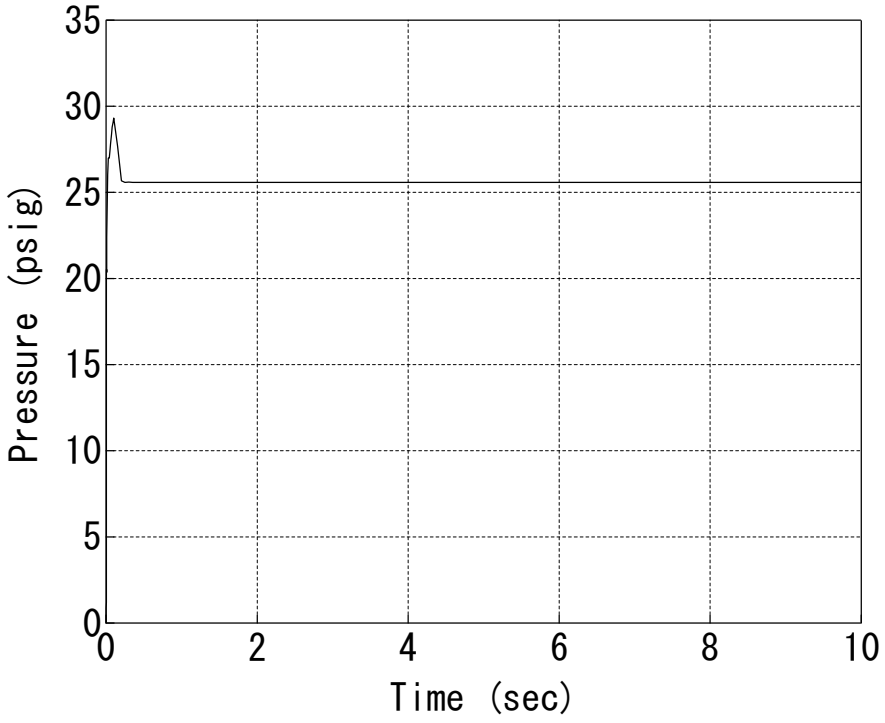

Figure 7.3-23 Pressure Transient at Peak Pressure Node in SG Compartment
(Feedwater line break, Full power operating condition)

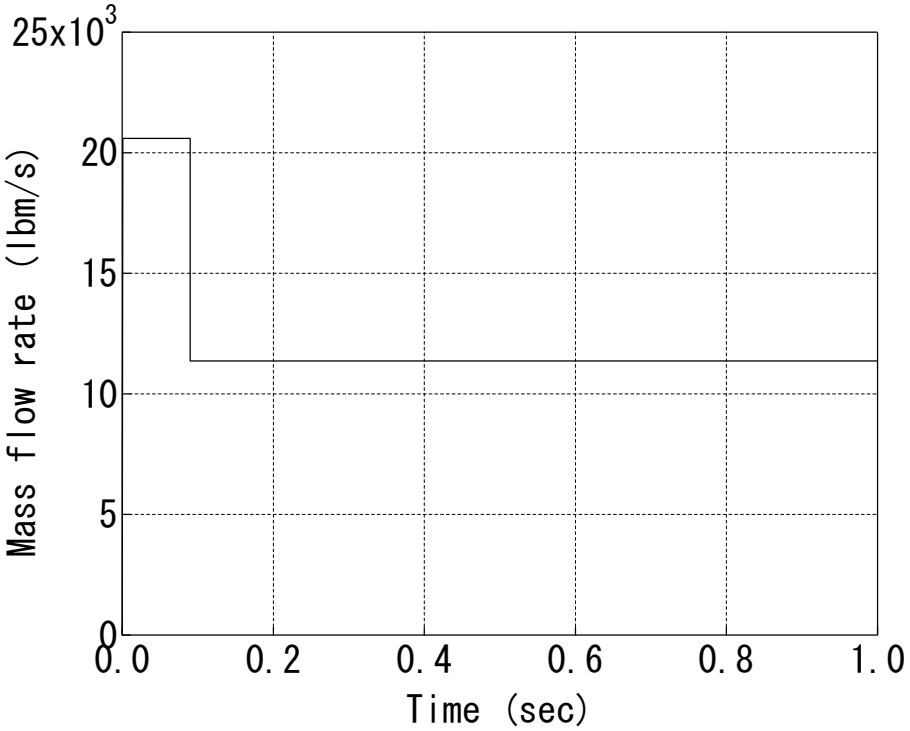

Figure 7.3-24 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (SG side, just after hot shutdown condition) (1/2)

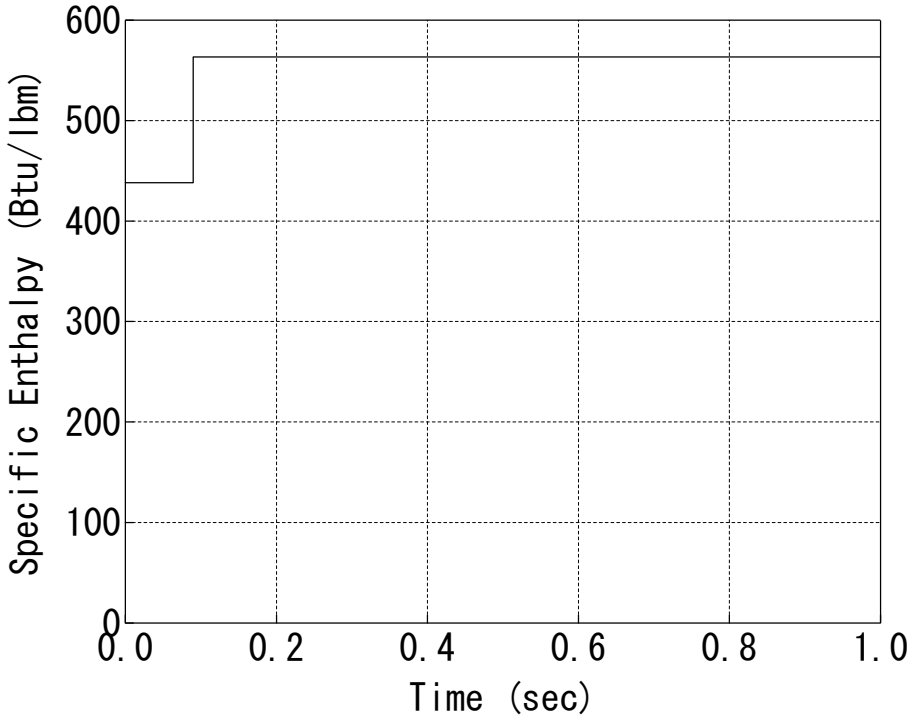

Figure 7.3-25 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (SG side, just after hot shutdown condition) (2/2)

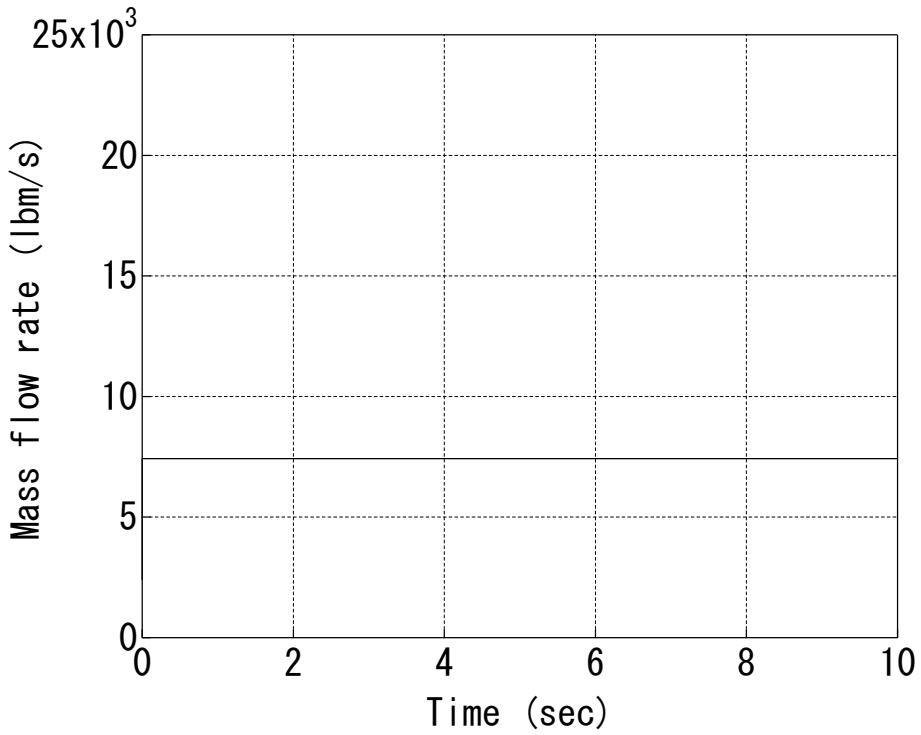

Figure 7.3-26 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (Feedwater pump side, just after hot shutdown condition) (1/2)

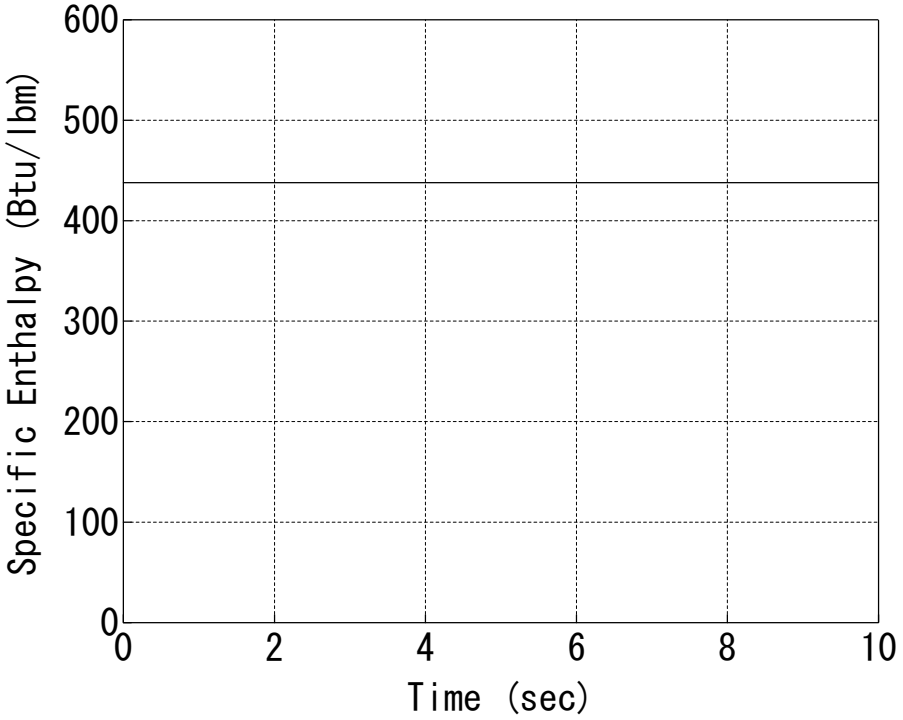

Figure 7.3-27 Short Term Mass and Energy Release Data for SG Compartment Feedwater Line Break (Feedwater pump side, just after hot shutdown condition) (2/2)

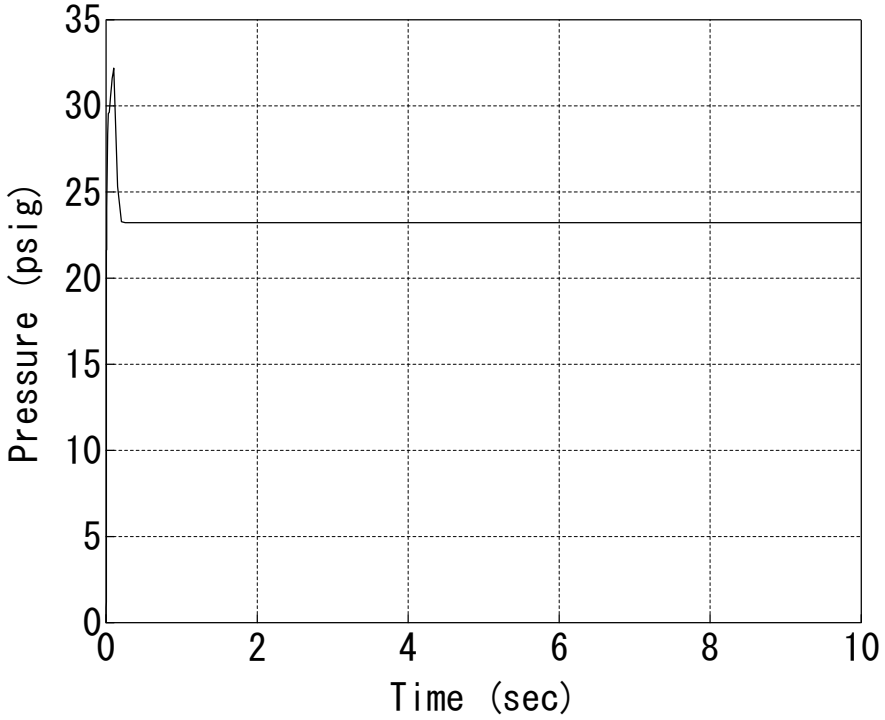

Figure 7.3-28 Pressure Transient at Peak Pressure Node in SG Compartment
(Feedwater line break, just after hot shutdown condition)

7.4 Pressurizer Subcompartment

7.4.1 Modeling and nodalization sensitivity study

(a) Base Nodal description

The pressurizer compartment consists of a nearly rectangular chimney including the pressurizer, supports, pipes, etc. and two openings to the containment atmosphere at the top and an opening to steam generator compartment at the bottom.

The nodalization scheme for the pressurizer compartment pressure analysis is shown in Figure 7.4-1 to Figure 7.4-3. The pressurizer compartment is azimuthally divided into 4 sectors, and vertically divided into 11 sectors. The vertical nodal boundaries are basically at the location of flow obstructions (grating) or geometry changes. The GOTHIC nodalization diagram for the pressurizer compartment analysis is shown in Figure 7.4-4. A total 45 nodes, including the containment atmosphere node, are used for the pressurizer compartment analyses. To calculate conservative pressure differential across the pressurizer walls, the pressure of containment atmosphere is assumed constant at 0.0 psig.

The description and geometric parameters for each node are summarized in Table 7.4-1 and Table 7.4-4. The free volume of each node was estimated by subtracting the obstructed volume from the room volume. The obstructed volume was estimated from the volume of main components with margin to assure minimum free volume. This assumption generates conservative results.

(b) Nodalization sensitivity study

A sensitivity study analysis was performed to confirm the validity of nodalization scheme. For the nodalization diagram described above, the horizontal segmentations were removed. The nodalization scheme for the sensitivity study is shown in Figure 7.4-5 and Figure 7.4-6. Specifically the pressurizer compartment was modeled as total 11 nodes. The nodalization diagram is shown in Figure 7.4-7. The description and geometric parameters for each node are summarized in Table 7.4-7 and Table 7.4-9.

(c) Vent path description

The vent path connection diagram for the base nodalization is shown in Figure 7.4-14. Geometric and hydraulic parameters for each vent path are summarized in Table 7.4-2 and Table 7.4-5. Vent paths P86 and P87 run from the pressurizer compartment to the containment atmosphere. Vent path P5 and P88 runs from the pressurizer compartment to the C-loop SG compartment. To obtain conservative results, P5 and P88 were closed for analysis.

The vent path connection diagram for nodalization sensitivity study is shown in Figure 7.4-7. Geometric and hydraulic parameters for each vent path are summarized in Table 7.4-8 and Table 7.4-10. Vent paths P12 and P13 run from the pressurizer compartment to the containment atmosphere. Vent paths P1 and P14 run from the pressurizer compartment to the C-loop SG compartment. To obtain conservative results, P1 and P14 were closed for analysis.

The flow area of each vent path is conservatively estimated considering the flow obstruction by main components, including margin. The friction length is

conservatively estimated considering the length of expected flow line plus margin. The loss coefficient is conservatively estimated considering the effect of obstructions, contraction and expansion.

7.4.2 Short term mass and energy release data

High energy pipes penetrating the pressurizer compartment are the pressurizer surge line, pressurizer relief line, and pressurizer spray line. The pressurizer surge line is LBB-qualified and no break is assumed. For the relief line (ID=6.813 inch) and the spray line (ID=5.187 inch), LBB are not applicable and breaks in these lines are considered.

(a)Pressurizer spray line break

A guillotine break of the spray line was assumed. The analysis was performed using M-RELAP5 code which is the small break LOCA analysis code for the US-APWR. Nodalization of reactor coolant system for short term mass and energy release is basically same as for the small break LOCA analysis.

The break mass and energy flow from the pressurizer side was calculated as the single end pipe break connecting to pressurizer vapor space. The break flow from the cold leg side was calculated as the single end pipe break connecting to the cold leg. The mass and energy release data for pressurizer compartment analyses is the sum of sources.

The resultant short term mass and energy release data in shown in Table 7.4-3 and the transient of break mass flow rate and enthalpy are shown in Figure 7.4-8 and Figure 7.4-13.

(b) Pressurizer relief line break

A guillotine break at the relief line was assumed. The analysis was performed using M-RELAP5 code which is the small break LOCA analysis code for the US-APWR. Nodalization of reactor coolant system for short term mass and energy release is basically same as for the small break LOCA analysis.

The break flow from the pressurizer relief tank side was assumed zero because the relief tank is not pressurized. The only the break mass and energy flow is from the pressurizer side of the break and is calculated by using the M-RELAP5 code.

The resultant short term mass and energy release data are shown in Table 7.4-6 and the transient of break mass flow rate and enthalpy are shown in Figure 7.4-15 and Figure 7.4-16.

7.4.3 Calculated pressure responses

(a) Pressurizer spray line break

The break was assumed to occur in the node V27. The worst calculated peak pressure was 11.19 psig at the break node, V27. The pressure transient at V27 is shown in Figure 7.4-14. The design pressure for all nodes in pressurizer compartment is 14 psig and the calculated peak pressure is less than the design pressure as shown on Table 7.4-1.

(b) Pressurizer relief line break

The pressurizer relief line runs from top of the pressurizer to the top of the compartment. Pipe breaks at various locations were analyzed. The worst case break location was in node V39.

The worst calculated peak pressure was 5.67 psig at the break node V39. The pressure transient at V39 is shown in Figure 7.4-17. The design pressure for all nodes in pressurizer compartment is 14 psig and the calculated peak pressure is less than the design pressure as shown on Table 7.4-4.

(c) Nodalization sensitivity analyses

The results of the nodalization sensitivity analyses are shown in Figure 7.4-18 and Figure 7.4-19. This sensitivity study result demonstrates that the selected nodalization has sufficient nodes to calculate the peak pressure difference in postulated pipe breaks inside the pressurizer compartment.

Table 7.4-1 Pressurizer compartment Nodal Description

Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.1467(ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Bottom of pressurizer compartment; EL=58''-5'	7.66	388	120	14.396	0	11.02	14	27.0
2	Bottom of pressurizer compartment; EL=58''-5'	7.66	346	120	14.396	0	11.02	14	27.0
3	Bottom of pressurizer compartment; EL=58''-5'	7.66	412	120	14.396	0	11.02	14	27.0
4	Bottom of pressurizer compartment; EL=58''-5'	7.66	433	120	14.396	0	11.02	14	27.0
5	EL=66"-1'	10.00	513	120	14.396	0	11.01	14	27.2
6	EL=66"-1'	10.00	504	120	14.396	0	11.02	14	27.0
7	EL=66"-1'	10.00	568	120	14.396	0	11.02	14	27.0
8	EL=66"-1'	10.00	559	120	14.396	0	11.01	14	27.2
9	EL=76"-1' (grating floor)	6.84	351	120	14.396	0	11.00	14	27.3
10	EL=76"-1' (grating floor)	6.84	343	120	14.396	0	11.01	14	27.2
11	EL=76"-1' (grating floor)	6.84	398	120	14.396	0	11.01	14	27.2
12	EL=76"-1' (grating floor)	6.84	408	120	14.396	0	11.00	14	27.3
13	EL=82"-11'	6.83	351	120	14.396	0	10.99	14	27.4
14	EL=82"-11'	6.83	351	120	14.396	0	11.00	14	27.3
15	EL=82"-11'	6.83	368	120	14.396	0	11.00	14	27.3
16	EL=82"-11'	6.83	403	120	14.396	0	10.99	14	27.4
17	EL=89"-9' (grating floor)	6.83	351	120	14.396	0	10.97	14	27.6
18	EL=89"-9' (grating floor)	6.83	351	120	14.396	0	11.00	14	27.3
19	EL=89"-9' (grating floor)	6.83	378	120	14.396	0	11.02	14	27.0
20	EL=89"-9' (grating floor)	6.83	417	120	14.396	0	10.97	14	27.6

Table 7.4-1 Pressurizer compartment Nodal Description
Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.1467(ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
21	EL=96”-7’	6.84	351	120	14.396	0	10.97	14	27.6
22	EL=96”-7’	6.84	351	120	14.396	0	10.99	14	27.4
23	EL=96”-7’	6.84	371	120	14.396	0	11.01	14	27.2
24	EL=96”-7’	6.84	392	120	14.396	0	10.97	14	27.6
25	EL=103”-5’ (grating floor)	8.91	453	120	14.396	0	10.91	14	28.3
26	EL=103”-5’ (grating floor)	8.91	452	120	14.396	0	10.98	14	27.5
27	EL=103”-5’ (grating floor)	8.91	517	120	14.396	0	11.19	14	25.1
28	EL=103”-5’ (grating floor)	8.91	506	120	14.396	0	10.91	14	28.3
29	EL=112”-4’	4.34	218	120	14.396	0	10.84	14	29.2
30	EL=112”-4’	4.34	188	120	14.396	0	10.88	14	28.7
31	EL=112”-4’	4.34	214	120	14.396	0	10.92	14	28.2
32	EL=112”-4’	4.34	241	120	14.396	0	10.84	14	29.2
33	EL=116”-8’ (grating floor)	5.8	376	120	14.396	0	10.74	14	30.4
34	EL=116”-8’ (grating floor)	5.8	353	120	14.396	0	10.75	14	30.2
35	EL=116”-8’ (grating floor)	5.8	437	120	14.396	0	10.75	14	30.2
36	EL=116”-8’ (grating floor)	5.8	452	120	14.396	0	10.74	14	30.4
37	Top of Pressurizer; EL=122’’-5.6’	5.36	462	120	14.396	0	10.67	14	31.2
38	Top of Pressurizer; EL=122’’-5.6’	5.36	458	120	14.396	0	10.67	14	31.2
39	Top of Pressurizer; EL=122’’-5.6’	5.36	494	120	14.396	0	10.67	14	31.2
40	Top of Pressurizer; EL=122’’-5.6’	5.36	509	120	14.396	0	10.67	14	31.2

Table 7.4-1 Pressurizer compartment Nodal Description
Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.1467(ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
41	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	817	120	14.396	0	10.59	14	32.2
42	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	809	120	14.396	0	10.59	14	32.2
43	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	860	120	14.396	0	10.56	14	32.6
44	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	868	120	14.396	0	10.54	14	32.8
45	Containment atmosphere	200	2741212	120	14.396	0	–	–	–

Table 7.4-2 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer Spray line(6B)
Break Area : 0.1467(ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.94	13.34	3.25	16.01	0.0	1.0	0.5	1.50
2	V1	V4		X	44.55	9.52	6.27	11.42	0.0	1.0	0.5	1.50
3	V2	V3		X	20.21	9.55	2.98	11.46	0.0	1.0	0.5	1.50
4	V3	V4		X	19.13	14.90	3.75	17.88	0.0	1.0	0.5	1.50
~~5~~	~~V4~~	~~V45~~		~~X~~	~~10.75~~	~~7.57~~	~~3.26~~	~~9.08~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
6	V1	V5		X	60.54	8.83	7.38	10.60	0.0	0.0	0.0	0.00
7	V2	V6		X	60.68	8.83	7.70	10.60	0.0	0.0	0.0	0.00
8	V3	V7		X	69.31	8.83	7.30	10.60	0.0	0.0	0.0	0.00
9	V4	V8		X	66.47	8.83	6.05	10.60	0.0	0.0	0.0	0.00
10	V5	V6		X	21.28	13.34	3.51	16.01	0.0	1.0	0.5	1.50
11	V5	V8		X	58.78	9.52	7.40	11.42	0.0	1.0	0.5	1.50
12	V6	V7		X	57.68	9.52	6.50	11.42	0.0	1.0	0.5	1.50
13	V7	V8		X	22.61	14.90	2.91	17.88	0.0	1.0	0.5	1.50
14	V5	V9		X	36.41	5.09	7.70	20.84	0.7	0.0	0.0	0.70
15	V6	V10		X	35.75	5.09	6.76	19.51	0.7	0.0	0.0	0.70
16	V7	V11		X	40.54	5.09	6.72	19.46	0.7	0.0	0.0	0.70
17	V8	V12		X	41.38	5.09	6.89	19.70	0.7	0.0	0.0	0.70
18	V9	V10		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
19	V9	V12		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
20	V10	V11		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
21	V11	V12		X	17.39	14.90	3.71	17.88	0.0	1.0	0.5	1.50
22	V9	V13		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
23	V10	V14		X	59.58	6.84	6.76	8.21	0.0	0.0	0.0	0.00

Table 7.4-2 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer Spray line(6B)
Break Area : 0.1467(ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
24	V11	V15		X	67.57	6.84	6.72	8.21	0.0	0.0	0.0	0.00
25	V12	V16		X	68.97	6.84	6.89	8.21	0.0	0.0	0.0	0.00
26	V13	V14		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
27	V13	V16		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
28	V14	V15		X	39.07	9.52	5.36	11.42	0.0	1.0	0.5	1.50
29	V15	V16		X	15.95	14.90	2.60	17.88	0.0	1.0	0.5	1.50
30	V13	V17		X	36.41	4.15	7.70	18.94	0.7	0.0	0.0	0.70
31	V14	V18		X	36.41	4.15	7.70	18.94	0.7	0.0	0.0	0.70
32	V15	V19		X	39.02	4.15	5.23	15.46	0.7	0.0	0.0	0.70
33	V16	V20		X	42.25	4.15	8.23	19.69	0.7	0.0	0.0	0.70
34	V17	V18		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
35	V17	V20		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
36	V18	V19		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
37	V19	V20		X	17.39	14.90	3.71	17.88	0.0	1.0	0.5	1.50
38	V17	V21		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
39	V18	V22		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
40	V19	V23		X	62.66	6.84	4.66	8.21	0.0	0.0	0.0	0.00
41	V20	V24		X	70.41	6.84	8.23	8.21	0.0	0.0	0.0	0.00
42	V21	V22		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
43	V21	V24		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
44	V22	V23		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
45	V23	V24		X	14.55	14.90	2.35	17.88	0.0	1.0	0.5	1.50
46	V21	V25		X	36.41	4.77	7.70	20.19	0.7	0.0	0.0	0.70
47	V22	V26		X	36.41	4.77	7.70	20.19	0.7	0.0	0.0	0.70

Table 7.4-2 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer Spray line(6B)
Break Area : 0.1467(ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
48	V23	V27		X	40.72	4.77	6.20	18.07	0.7	0.0	0.0	0.70
49	V24	V28		X	40.54	4.77	6.72	18.81	0.7	0.0	0.0	0.70
50	V25	V26		X	18.91	13.34	3.12	16.01	0.0	1.0	0.5	1.50
51	V25	V28		X	52.41	9.52	5.37	11.42	0.0	1.0	0.5	1.50
52	V26	V27		X	52.34	9.52	5.33	11.42	0.0	1.0	0.5	1.50
53	V27	V28		X	22.62	14.90	3.49	17.88	0.0	1.0	0.5	1.50
54	V25	V29		X	59.77	6.63	6.68	7.96	0.0	1.0	0.0	1.00
55	V26	V30		X	54.42	6.63	3.60	7.96	0.0	1.0	0.0	1.00
56	V27	V31		X	61.81	6.63	3.38	7.96	0.0	1.0	0.0	1.00
57	V28	V32		X	64.65	6.63	5.11	7.96	0.0	1.0	0.0	1.00
58	V29	V30		X	5.86	13.34	1.25	16.01	0.0	1.0	0.5	1.50
59	V29	V32		X	25.47	9.52	4.99	11.42	0.0	1.0	0.5	1.50
60	V30	V31		X	21.58	9.52	2.86	11.42	0.0	1.0	0.5	1.50
61	V31	V32		X	8.13	14.90	1.63	17.88	0.0	1.0	0.5	1.50
62	V29	V33		X	45.74	3.08	7.62	16.70	0.7	0.0	0.0	0.70
63	V30	V34		X	45.07	3.08	6.70	15.41	0.7	0.0	0.0	0.70
64	V31	V35		X	52.21	3.08	7.12	16.00	0.7	0.0	0.0	0.70
65	V32	V36		X	52.74	3.08	8.21	17.54	0.7	0.0	0.0	0.70
66	V33	V34		X	14.80	14.00	2.51	16.80	0.0	1.0	0.5	1.50
67	V33	V36		X	39.89	10.50	6.29	12.60	0.0	1.0	0.5	1.50
68	V34	V35		X	39.89	10.50	6.29	12.60	0.0	1.0	0.5	1.50
69	V35	V36		X	20.56	15.84	4.40	19.01	0.0	1.0	0.5	1.50
70	V33	V37		X	74.83	5.58	7.30	6.70	0.0	1.0	0.0	1.00
71	V34	V38		X	72.30	5.58	6.29	6.70	0.0	1.0	0.0	1.00

Table 7.4-2 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer Spray line(6B)
Break Area : 0.1467(ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
72	V35	V39		X	85.94	5.58	7.19	6.70	0.0	1.0	0.0	1.00
73	V36	V40		X	86.60	5.58	7.39	6.70	0.0	1.0	0.0	1.00
74	V37	V38		X	38.77	9.60	4.55	11.52	0.0	1.0	0.5	1.50
75	V37	V40		X	61.30	7.63	7.22	9.16	0.0	1.0	0.5	1.50
76	V38	V39		X	61.03	7.63	6.82	9.16	0.0	1.0	0.5	1.50
77	V39	V40		X	35.21	11.76	3.56	14.11	0.0	1.0	0.5	1.50
78	V37	V41		X	51.94	4.60	9.22	22.00	0.7	0.0	0.0	0.70
79	V38	V42		X	51.77	4.60	8.76	21.35	0.7	0.0	0.0	0.70
80	V39	V43		X	58.56	4.60	8.89	21.53	0.7	0.0	0.0	0.70
81	V40	V44		X	58.56	4.60	8.89	21.53	0.7	0.0	0.0	0.70
82	V41	V42		X	58.26	9.60	3.81	11.52	0.0	1.0	0.5	1.50
83	V41	V44		X	100.97	7.63	8.32	9.16	0.0	1.0	0.5	1.50
84	V42	V43		X	100.19	7.63	7.76	9.16	0.0	1.0	0.5	1.50
85	V43	V44		X	58.79	11.76	4.66	14.11	0.0	1.0	0.5	1.50
86	V43	V45	X		20.75	9.00	4.19	10.80	0.84	1.0	0.5	2.34
87	V44	V45	X		32.78	9.03	4.98	10.84	0.84	1.0	0.5	2.34
~~88~~	~~V4~~	~~V45~~		~~X~~	~~9.00~~	~~7.57~~	~~3.00~~	~~9.08~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0	0	548.699	0	548.698	0	548.697
0.001	1333.33	548.699	1333.36	548.698	1333.71	548.697
0.002	1051.83	549.91	1052.59	549.907	1053.1	549.906
0.003	976.336	546.15	976.964	546.156	978.905	546.167
0.004	911.443	546.41	910.784	546.405	914.545	546.411
0.005	874.957	547.038	872.234	547.011	877.481	547.035
0.006	880.8	547.808	877.733	547.765	872.981	547.788
0.007	903.186	548.471	902.715	548.426	898.807	548.443
0.008	907.568	548.972	909.971	548.927	904.669	548.948
0.009	884.3	549.348	888.933	549.305	882.261	549.313
0.01	856.156	549.745	862.952	549.749	867.653	549.605
0.011	844.181	547.825	837.91	548.052	838.218	548.06
0.012	813.174	546.016	817.989	546.179	818.818	546.105
0.013	811.577	545.219	811.237	545.275	816.636	545.258
0.014	812.461	545.006	808.227	544.988	814.508	544.998
0.015	827.95	545.161	822.686	545.086	829.41	545.134
0.016	843.444	545.499	839.098	545.4	845.181	545.459
0.017	852.838	545.88	850.655	545.769	855.358	545.833
0.018	854.833	546.258	855.413	546.14	861.636	546.201
0.019	850.255	546.611	853.74	546.491	871.056	546.522
0.02	840.6	546.932	846.771	546.81	887.079	546.769
0.021	827.481	547.217	835.831	547.097	908.58	546.934
0.022	812.527	547.44	822.265	547.344	932.568	547.023
0.023	811.341	548.232	807.543	547.532	956.196	547.057

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.024	800.57	547.691	803.035	548.222	977.5	547.051
0.025	788.704	548.245	792.883	547.734	995.422	547.021
0.026	779.017	547.866	782.084	548.222	1009.88	546.979
0.027	774.115	548.311	774.446	547.875	1021.29	546.931
0.028	764.21	548.18	770.373	548.263	1030.34	546.882
0.029	769.558	547.905	775.971	547.873	1037.94	546.836
0.03	765.068	547.377	766.373	547.68	1044.98	546.792
0.031	765.602	546.582	763.097	546.994	1052.2	546.75
0.032	771.118	545.836	765.318	546.224	1060.13	546.709
0.033	780.391	545.256	772.233	545.564	1069.12	546.672
0.034	791.41	544.897	782.236	545.081	1079.39	546.636
0.035	802.025	544.692	793.361	544.796	1091.91	546.703
0.036	810.563	544.613	803.741	544.643	1106.46	547.261
0.037	816.008	544.63	811.999	544.599	1119.55	547.86
0.038	818.004	544.717	817.331	544.636	1131.88	548.217
0.039	816.716	544.85	819.471	544.732	1145.89	548.28
0.04	812.632	545.013	818.569	544.867	1163.51	548.113
0.041	806.391	545.192	815.033	545.027	1185.69	547.815
0.042	798.662	545.379	809.395	545.2	1213.39	547.467
0.043	790.064	545.567	802.218	545.379	1249.74	547.121
0.044	781.137	545.75	794.032	545.559	1295.43	546.81
0.045	772.372	545.898	785.309	545.735	1347.11	546.564
0.046	764.111	546.052	776.456	545.886	1400.29	546.399
0.047	756.527	546.202	767.872	546.028	1451.56	546.318
0.048	754.535	547.212	759.724	546.17	1499.13	546.316

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.049	757.087	545.955	760.4	547.474	1542.67	546.378
0.05	747.05	546.277	761.338	545.858	1583.89	546.49
0.6	741.777	546.492	747.953	546.204	1625.3	546.641
0.7	745.321	547.633	740.711	546.438	1668.82	546.823
0.8	738.471	547.224	739.861	547.328	1715.74	547.032
0.9	737.473	547.03	734.328	547.054	1765.89	547.266
1	738.115	546.943	742.657	546.195	1819.16	547.526
1.1	739.04	546.909	736.011	546.508	1876.56	547.814
1.2	740.11	546.899	733.19	546.693	1940.57	548.133
1.3	741.467	546.899	732.25	546.804	2010.35	548.487
1.4	743.172	546.901	732.39	546.871	2079.84	548.875
1.5	745.177	546.9	733.292	546.911	2143.54	549.295
1.6	747.351	546.897	734.786	546.932	2200.56	549.75
1.7	749.55	546.89	736.733	546.941	2254.74	550.246
1.8	751.647	546.878	738.998	546.94	2301.05	550.774
1.9	753.213	546.817	741.457	546.932	2331.58	551.323
2	753.838	546.661	744.003	546.918	2349.99	551.902
2.1	753.803	546.424	746.547	546.899	2361.55	552.519
2.2	753.683	546.14	748.772	546.85	2368.43	553.179
2.3	753.961	545.839	750.207	546.726	2372.72	553.89
2.4	754.87	545.547	751.031	546.506	2376.42	554.659
2.5	756.386	545.281	751.761	546.229	2380.27	555.495
2.6	758.316	545.08	752.856	545.927	2414.13	556.485
2.7	760.39	544.904	754.566	545.628	2414.91	557.483
2.8	762.373	544.76	756.906	545.351	2416.56	558.618

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
2.9	764.026	544.651	759.726	545.105	2405.24	559.83
3	765.167	544.576	762.797	544.898	2388.66	561.132
3.1	765.684	544.531	765.876	544.729	2368.4	562.515
3.2	765.542	544.515	768.766	544.599	2345.49	563.978
3.3	764.77	544.522	771.332	544.506	2320.92	565.531
3.4	763.443	544.549	773.542	544.445	2295.41	567.184
3.5	761.672	544.592	775.431	544.414	2269.1	568.941
3.6	759.589	544.649	777.088	544.408	2241.98	570.808
3.7	757.34	544.716	778.638	544.423	2214.44	572.795
3.8	755.065	544.774	780.205	544.456	2186.14	574.9
3.9	752.939	544.835	781.912	544.503	2155.59	577.102
4	751.043	544.91	783.861	544.561	2122.46	579.388
4.1	749.466	544.992	786.132	544.627	2088.69	581.772
4.2	748.316	545.078	788.779	544.699	2056.23	584.283
4.3	747.682	545.164	791.838	544.774	2024.21	586.903
4.4	747.628	545.248	795.314	544.85	1989.7	589.522
4.5	748.197	545.33	799.2	544.926	1958.71	592.224
4.6	749.413	545.407	803.474	545.002	1929.27	594.887
4.7	751.279	545.48	808.11	545.074	1905.91	597.475
4.8	753.792	545.547	813.047	545.144	1883.29	599.671
4.9	756.938	545.622	818.239	545.21	1875.48	602.658
5	760.692	545.69	823.641	545.272	1837.96	606.362
5.1	765.043	545.745	829.195	545.33	1782.64	610.349
5.2	769.956	545.788	834.849	545.383	1727.56	614.547
5.3	775.353	545.824	840.539	545.431	1700.97	618.886

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
5.4	781.172	545.851	846.222	545.475	1692.36	623.537
5.5	787.357	545.872	851.854	545.515	1678.65	628.709
5.6	793.843	545.887	857.392	545.55	1660.5	634.294
5.7	800.556	545.897	862.802	545.583	1633.44	640.204
5.8	807.448	545.901	868.04	545.612	1599.09	646.311
5.9	814.458	545.901	873.074	545.638	1561.9	652.923
6	821.531	545.898	877.887	545.661	1521.21	660.079
6.1	828.605	545.892	882.458	545.682	1477.3	667.6
6.2	835.632	545.883	886.766	545.7	1433.07	675.444
6.3	842.556	545.872	890.806	545.717	1389.98	683.595
6.4	849.34	545.859	894.563	545.732	1348.23	692.035
6.5	855.938	545.845	898.093	545.752	1307.7	700.764
6.6	862.31	545.831	901.472	545.785	1268.36	709.78
6.7	868.434	545.817	904.715	545.838	1230.16	719.069
6.8	874.274	545.802	907.77	545.913	1192.8	728.596
6.9	879.821	545.789	910.529	546.008	1156.38	738.338
7	885.039	545.776	912.872	546.121	1121	748.238
7.1	889.923	545.764	914.704	546.244	1087.32	758.366
7.2	894.457	545.752	915.968	546.373	1055.41	768.847
7.3	898.634	545.742	916.653	546.501	1023.65	779.633
7.4	902.449	545.733	916.79	546.623	991.554	790.565
7.5	905.905	545.725	916.44	546.736	960.132	801.707
7.6	909.003	545.718	915.685	546.836	929.287	812.907
7.7	911.75	545.713	914.617	546.922	929.544	825.95
7.8	914.151	545.709	913.33	546.992	879.38	835.833

Table 7.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.1467(ft^2)
Break location : Volume number 27

Time (s)	B Loop CLG side		C Loop CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
7.9	916.215	545.706	911.907	547.047	855.167	846.493
8	917.954	545.705	910.422	547.086	844.914	855.772
8.1	919.379	545.704	908.938	547.111	816.343	868.236
8.2	920.505	545.705	907.501	547.123	793.486	879.685
8.3	921.346	545.706	906.144	547.124	780.048	893.568
8.4	921.917	545.709	904.886	547.115	764.147	902.711
8.5	922.233	545.713	903.738	547.097	747.497	912.461
8.6	922.311	545.718	902.698	547.072	731.818	922.402
8.7	922.168	545.723	901.763	547.041	716.732	932.258
8.8	921.821	545.729	900.919	547.007	711.362	939.531
8.9	921.287	545.736	900.156	546.969	694.087	951.003
9	920.581	545.744	899.457	546.929	680.74	960.752
9.1	919.722	545.752	898.807	546.888	669.435	969.767
9.2	918.723	545.761	898.194	546.846	659.124	978.308
9.3	917.603	545.771	897.605	546.805	649.746	986.474
9.4	916.376	545.78	897.031	546.764	641.307	994.291
9.5	915.057	545.791	896.464	546.724	633.677	1001.76
9.6	913.661	545.801	895.9	546.686	626.716	1008.87
9.7	912.2	545.812	895.339	546.649	620.298	1015.61
9.8	910.688	545.823	894.783	546.614	614.543	1022
9.9	909.137	545.834	894.236	546.581	609.352	1028.03
10	907.558	545.846	893.705	546.55	604.577	1033.71

Table 7.4-4 Pressurizer compartment Nodal description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Bottom of pressurizer compartment; EL=58''-5'	7.66	388	120	14.396	0	5.20	14	169.2
2	Bottom of pressurizer compartment; EL=58''-5'	7.66	346	120	14.396	0	5.27	14	165.7
3	Bottom of pressurizer compartment; EL=58''-5'	7.66	412	120	14.396	0	5.45	14	156.9
4	Bottom of pressurizer compartment; EL=58''-5'	7.66	433	120	14.396	0	5.19	14	169.7
5	EL=66"-1'	10.00	513	120	14.396	0	5.18	14	170.3
6	EL=66"-1'	10.00	504	120	14.396	0	5.22	14	168.2
7	EL=66"-1'	10.00	568	120	14.396	0	5.22	14	168.2
8	EL=66"-1'	10.00	559	120	14.396	0	5.16	14	171.3
9	EL=76"-1' (grating floor)	6.84	351	120	14.396	0	5.12	14	173.4
10	EL=76"-1' (grating floor)	6.84	343	120	14.396	0	5.14	14	172.4
11	EL=76"-1' (grating floor)	6.84	398	120	14.396	0	5.14	14	172.4
12	EL=76"-1' (grating floor)	6.84	408	120	14.396	0	5.10	14	174.5

Table 7.4-4 Pressurizer compartment Nodal description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
13	EL=82”-11’	6.83	351	120	14.396	0	5.04	14	177.8
14	EL=82”-11’	6.83	351	120	14.396	0	5.06	14	176.7
15	EL=82”-11’	6.83	368	120	14.396	0	5.05	14	177.2
16	EL=82”-11’	6.83	403	120	14.396	0	5.03	14	178.3
17	EL=89”-9’ (grating floor)	6.83	351	120	14.396	0	4.92	14	184.6
18	EL=89”-9’ (grating floor)	6.83	351	120	14.396	0	4.94	14	183.4
19	EL=89”-9’ (grating floor)	6.83	378	120	14.396	0	4.93	14	184.0
20	EL=89”-9’ (grating floor)	6.83	417	120	14.396	0	4.92	14	184.6
21	EL=96”-7’	6.84	351	120	14.396	0	4.80	14	191.7
22	EL=96”-7’	6.84	351	120	14.396	0	4.80	14	191.7
23	EL=96”-7’	6.84	371	120	14.396	0	4.80	14	191.7
24	EL=96”-7’	6.84	392	120	14.396	0	4.81	14	191.1
25	EL=103”-5’ (grating floor)	8.91	453	120	14.396	0	4.82	14	190.5
26	EL=103”-5’ (grating floor)	8.91	452	120	14.396	0	4.88	14	186.9
27	EL=103”-5’ (grating floor)	8.91	517	120	14.396	0	4.88	14	186.9
28	EL=103”-5’ (grating floor)	8.91	506	120	14.396	0	4.82	14	190.5

Table 7.4-4 Pressurizer compartment Nodal description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
29	EL=112”-4’	4.34	218	120	14.396	0	4.88	14	186.9
30	EL=112”-4’	4.34	188	120	14.396	0	4.92	14	184.6
31	EL=112”-4’	4.34	214	120	14.396	0	4.94	14	183.4
32	EL=112”-4’	4.34	241	120	14.396	0	4.89	14	186.3
33	EL=116”-8’ (grating floor)	5.8	376	120	14.396	0	4.90	14	185.7
34	EL=116”-8’ (grating floor)	5.8	353	120	14.396	0	4.94	14	183.4
35	EL=116”-8’ (grating floor)	5.8	437	120	14.396	0	4.97	14	181.7
36	EL=116”-8’ (grating floor)	5.8	452	120	14.396	0	4.90	14	185.7
37	Top of Pressurizer; EL=122”-5.6’	5.36	462	120	14.396	0	4.91	14	185.1
38	Top of Pressurizer; EL=122”-5.6’	5.36	458	120	14.396	0	4.93	14	184.0
39	Top of Pressurizer; EL=122”-5.6’	5.36	494	120	14.396	0	5.67	14	146.9
40	Top of Pressurizer; EL=122”-5.6’	5.36	509	120	14.396	0	4.91	14	185.1
41	Top of Pressurizer compartment; EL=127”-10’ (grating floor)	9.84	817	120	14.396	0	4.89	14	186.3

Table 7.4-4 Pressurizer compartment Nodal description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
42	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	809	120	14.396	0	4.89	14	186.3
43	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	860	120	14.396	0	4.87	14	187.5
44	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	868	120	14.396	0	4.85	14	188.7
45	Containment atmosphere	200	2741212	120	14.396	0	—	—	—

Table 7.4-5 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.94	13.34	3.25	16.01	0.0	1.0	0.5	1.50
2	V1	V4		X	44.55	9.52	6.27	11.42	0.0	1.0	0.5	1.50
3	V2	V3		X	20.21	9.55	2.98	11.46	0.0	1.0	0.5	1.50
4	V3	V4		X	19.13	14.90	3.75	17.88	0.0	1.0	0.5	1.50
~~5~~	~~V4~~	~~V45~~		~~X~~	~~10.75~~	~~7.57~~	~~3.26~~	~~9.08~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
6	V1	V5		X	60.54	8.83	7.38	10.60	0.0	0.0	0.0	0.00
7	V2	V6		X	60.68	8.83	7.70	10.60	0.0	0.0	0.0	0.00
8	V3	V7		X	69.31	8.83	7.30	10.60	0.0	0.0	0.0	0.00
9	V4	V8		X	66.47	8.83	6.05	10.60	0.0	0.0	0.0	0.00
10	V5	V6		X	21.28	13.34	3.51	16.01	0.0	1.0	0.5	1.50
11	V5	V8		X	58.78	9.52	7.40	11.42	0.0	1.0	0.5	1.50
12	V6	V7		X	57.68	9.52	6.50	11.42	0.0	1.0	0.5	1.50
13	V7	V8		X	22.61	14.90	2.91	17.88	0.0	1.0	0.5	1.50
14	V5	V9		X	36.41	5.09	7.70	20.84	0.7	0.0	0.0	0.70
15	V6	V10		X	35.75	5.09	6.76	19.51	0.7	0.0	0.0	0.70
16	V7	V11		X	40.54	5.09	6.72	19.46	0.7	0.0	0.0	0.70
17	V8	V12		X	41.38	5.09	6.89	19.70	0.7	0.0	0.0	0.70
18	V9	V10		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
19	V9	V12		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
20	V10	V11		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
21	V11	V12		X	17.39	14.90	3.71	17.88	0.0	1.0	0.5	1.50
22	V9	V13		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
23	V10	V14		X	59.58	6.84	6.76	8.21	0.0	0.0	0.0	0.00

Table 7.4-5 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
24	V11	V15		X	67.57	6.84	6.72	8.21	0.0	0.0	0.0	0.00
25	V12	V16		X	68.97	6.84	6.89	8.21	0.0	0.0	0.0	0.00
26	V13	V14		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
27	V13	V16		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
28	V14	V15		X	39.07	9.52	5.36	11.42	0.0	1.0	0.5	1.50
29	V15	V16		X	15.95	14.90	2.60	17.88	0.0	1.0	0.5	1.50
30	V13	V17		X	36.41	4.15	7.70	18.94	0.7	0.0	0.0	0.70
31	V14	V18		X	36.41	4.15	7.70	18.94	0.7	0.0	0.0	0.70
32	V15	V19		X	39.02	4.15	5.23	15.46	0.7	0.0	0.0	0.70
33	V16	V20		X	42.25	4.15	8.23	19.69	0.7	0.0	0.0	0.70
34	V17	V18		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
35	V17	V20		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
36	V18	V19		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
37	V19	V20		X	17.39	14.90	3.71	17.88	0.0	1.0	0.5	1.50
38	V17	V21		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
39	V18	V22		X	60.68	6.84	7.70	8.21	0.0	0.0	0.0	0.00
40	V19	V23		X	62.66	6.84	4.66	8.21	0.0	0.0	0.0	0.00
41	V20	V24		X	70.41	6.84	8.23	8.21	0.0	0.0	0.0	0.00
42	V21	V22		X	14.54	13.34	3.25	16.01	0.0	1.0	0.5	1.50
43	V21	V24		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
44	V22	V23		X	40.17	9.52	6.32	11.42	0.0	1.0	0.5	1.50
45	V23	V24		X	14.55	14.90	2.35	17.88	0.0	1.0	0.5	1.50
46	V21	V25		X	36.41	4.77	7.70	20.19	0.7	0.0	0.0	0.70
47	V22	V26		X	36.41	4.77	7.70	20.19	0.7	0.0	0.0	0.70

Table 7.4-5 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
48	V23	V27		X	40.72	4.77	6.20	18.07	0.7	0.0	0.0	0.70
49	V24	V28		X	40.54	4.77	6.72	18.81	0.7	0.0	0.0	0.70
50	V25	V26		X	18.91	13.34	3.12	16.01	0.0	1.0	0.5	1.50
51	V25	V28		X	52.41	9.52	5.37	11.42	0.0	1.0	0.5	1.50
52	V26	V27		X	52.34	9.52	5.33	11.42	0.0	1.0	0.5	1.50
53	V27	V28		X	22.62	14.90	3.49	17.88	0.0	1.0	0.5	1.50
54	V25	V29		X	59.77	6.63	6.68	7.96	0.0	0.0	0.5	0.50
55	V26	V30		X	54.42	6.63	3.60	7.96	0.0	0.0	0.5	0.50
56	V27	V31		X	61.81	6.63	3.38	7.96	0.0	0.0	0.5	0.50
57	V28	V32		X	64.65	6.63	5.11	7.96	0.0	0.0	0.5	0.50
58	V29	V30		X	5.86	13.34	1.25	16.01	0.0	1.0	0.5	1.50
59	V29	V32		X	25.47	9.52	4.99	11.42	0.0	1.0	0.5	1.50
60	V30	V31		X	21.58	9.52	2.86	11.42	0.0	1.0	0.5	1.50
61	V31	V32		X	8.13	14.90	1.63	17.88	0.0	1.0	0.5	1.50
62	V29	V33		X	45.74	3.08	7.62	16.70	0.7	0.0	0.0	0.70
63	V30	V34		X	45.07	3.08	6.70	15.41	0.7	0.0	0.0	0.70
64	V31	V35		X	52.21	3.08	7.12	16.00	0.7	0.0	0.0	0.70
65	V32	V36		X	52.74	3.08	8.21	17.54	0.7	0.0	0.0	0.70
66	V33	V34		X	14.80	14.00	2.51	16.80	0.0	1.0	0.5	1.50
67	V33	V36		X	39.89	10.50	6.29	12.60	0.0	1.0	0.5	1.50
68	V34	V35		X	39.89	10.50	6.29	12.60	0.0	1.0	0.5	1.50
69	V35	V36		X	20.56	15.84	4.40	19.01	0.0	1.0	0.5	1.50
70	V33	V37		X	74.83	5.58	7.30	6.70	0.0	0.0	0.5	0.50
71	V34	V38		X	72.30	5.58	6.29	6.70	0.0	0.0	0.5	0.50

Table 7.4-5 Pressurizer Compartment Vent Path Description

Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
72	V35	V39		X	85.94	5.58	7.19	6.70	0.0	0.0	0.5	0.50
73	V36	V40		X	86.60	5.58	7.39	6.70	0.0	0.0	0.5	0.50
74	V37	V38		X	38.77	9.60	4.55	11.52	0.0	1.0	0.5	1.50
75	V37	V40		X	61.30	7.63	7.22	9.16	0.0	1.0	0.5	1.50
76	V38	V39		X	61.03	7.63	6.82	9.16	0.0	1.0	0.5	1.50
77	V39	V40		X	35.21	11.76	3.56	14.11	0.0	1.0	0.5	1.50
78	V37	V41		X	51.94	4.60	9.22	22.00	0.7	0.0	0.0	0.70
79	V38	V42		X	51.77	4.60	8.76	21.35	0.7	0.0	0.0	0.70
80	V39	V43		X	58.56	4.60	8.89	21.53	0.7	0.0	0.0	0.70
81	V40	V44		X	58.56	4.60	8.89	21.53	0.7	0.0	0.0	0.70
82	V41	V42		X	58.26	9.60	3.81	11.52	0.0	1.0	0.5	1.50
83	V41	V44		X	100.97	7.63	8.32	9.16	0.0	1.0	0.5	1.50
84	V42	V43		X	100.19	7.63	7.76	9.16	0.0	1.0	0.5	1.50
85	V43	V44		X	58.79	11.76	4.66	14.11	0.0	1.0	0.5	1.50
86	V43	V45		X	20.75	9.00	4.19	10.80	0.84	1.0	0.5	2.34
87	V44	V45		X	32.78	9.03	4.98	10.84	0.84	1.0	0.5	2.34
~~88~~	~~V4~~	~~V45~~		~~X~~	~~9.00~~	~~7.57~~	~~3.00~~	~~9.08~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	1101.12
0.001	1162.03	1101.12
0.002	2123.8	1114.97
0.003	2267.31	1115.41
0.004	2231.63	1114.51
0.005	2218.07	1114.33
0.006	2213.22	1114.36
0.007	2210.68	1114.45
0.008	2210.88	1114.58
0.009	2212.39	1114.75
0.01	2213.43	1114.9
0.011	2212.37	1115.02
0.012	2208.2	1115.08
0.013	2200.67	1115.06
0.014	2189.89	1114.97
0.015	2176.54	1114.84
0.016	2161.68	1114.68
0.017	2146.89	1114.51
0.018	2133.74	1114.38
0.019	2123.44	1114.3
0.02	2116.7	1114.28
0.021	2113.6	1114.34
0.022	2113.59	1114.46
0.023	2115.55	1114.63
0.024	2118.07	1114.8
0.025	2119.66	1114.95
0.026	2118.7	1115.07
0.027	2114.63	1115.12
0.028	2107.6	1115.08
0.029	2097.39	1114.97
0.03	2084.5	1114.84
0.031	2070.27	1114.67
0.032	2056.06	1114.5
0.033	2043.36	1114.36
0.034	2033.3	1114.26
0.035	2026.54	1114.23
0.036	2023.14	1114.27
0.037	2022.57	1114.37
0.038	2023.8	1114.51
0.039	2025.49	1114.65

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.04	2026.26	1114.77
0.041	2024.89	1114.85
0.042	2020.55	1114.87
0.043	2012.93	1114.83
0.044	2002.24	1114.71
0.045	1989.26	1114.55
0.046	1975.14	1114.36
0.047	1961.26	1114.17
0.048	1949	1114.02
0.049	1939.48	1113.92
0.05	1933.37	1113.89
0.051	1930.78	1113.93
0.052	1931.22	1114.04
0.053	1933.74	1114.19
0.054	1937.08	1114.36
0.055	1939.92	1114.51
0.056	1941.11	1114.64
0.057	1939.84	1114.71
0.058	1935.75	1114.72
0.059	1929	1114.67
0.06	1920.18	1114.58
0.061	1910.26	1114.47
0.062	1900.35	1114.35
0.063	1891.58	1114.25
0.064	1884.81	1114.2
0.065	1880.53	1114.2
0.066	1878.75	1114.25
0.067	1879.01	1114.34
0.068	1880.45	1114.46
0.069	1881.97	1114.58
0.07	1882.49	1114.68
0.071	1881.05	1114.74
0.072	1877.05	1114.74
0.073	1870.27	1114.68
0.074	1860.99	1114.57
0.075	1849.89	1114.42
0.076	1837.94	1114.24
0.077	1826.29	1114.07
0.078	1816.05	1113.93
0.079	1808.08	1113.83
0.08	1802.84	1113.8

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.081	1800.3	1113.82
0.082	1799.98	1113.89
0.083	1801	1113.99
0.084	1802.31	1114.1
0.085	1802.83	1114.19
0.086	1801.65	1114.24
0.087	1798.19	1114.25
0.088	1792.29	1114.19
0.089	1784.22	1114.09
0.09	1774.65	1113.96
0.091	1764.51	1113.8
0.092	1754.89	1113.66
0.093	1746.78	1113.55
0.094	1740.95	1113.49
0.095	1737.74	1113.49
0.096	1737.05	1113.55
0.097	1738.43	1113.65
0.098	1741.42	1113.78
0.099	1745.09	1113.9
0.1	1748.27	1114.02
0.101	1749.5	1114.1
0.102	1748	1114.14
0.103	1743.54	1114.13
0.104	1736.41	1114.08
0.105	1727.36	1113.99
0.106	1717.46	1113.88
0.107	1707.91	1113.78
0.108	1699.78	1113.7
0.109	1693.88	1113.66
0.11	1690.54	1113.66
0.111	1689.64	1113.7
0.112	1690.59	1113.78
0.113	1692.46	1113.87
0.114	1694.17	1113.95
0.115	1694.63	1114.02
0.116	1693	1114.05
0.117	1688.79	1114.03
0.118	1681.97	1113.97
0.119	1672.99	1113.88
0.12	1662.69	1113.76
0.121	1652.18	1113.63

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.122	1642.62	1113.51
0.123	1635.01	1113.43
0.124	1630.05	1113.4
0.125	1628.04	1113.41
0.126	1628.76	1113.48
0.127	1631.65	1113.58
0.128	1635.7	1113.7
0.129	1639.8	1113.83
0.13	1642.93	1113.93
0.131	1644.27	1114
0.132	1643.34	1114.04
0.133	1640.11	1114.03
0.134	1634.93	1113.99
0.135	1628.55	1113.93
0.136	1621.87	1113.86
0.137	1615.89	1113.81
0.138	1611.43	1113.77
0.139	1609.03	1113.78
0.14	1608.86	1113.82
0.141	1610.7	1113.9
0.142	1613.97	1114
0.143	1617.83	1114.11
0.144	1621.34	1114.22
0.145	1623.61	1114.3
0.146	1623.96	1114.35
0.147	1622	1114.36
0.148	1617.72	1114.34
0.149	1611.5	1114.27
0.15	1604	1114.19
0.151	1596.09	1114.1
0.152	1588.67	1114.01
0.153	1582.49	1113.95
0.154	1578.07	1113.91
0.155	1575.56	1113.91
0.156	1574.8	1113.93
0.157	1575.26	1113.98
0.158	1576.24	1114.04
0.159	1576.9	1114.09
0.16	1576.49	1114.12
0.161	1574.45	1114.13
0.162	1570.49	1114.1

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.163	1564.68	1114.04
0.164	1557.42	1113.95
0.165	1549.38	1113.85
0.166	1541.4	1113.74
0.167	1534.3	1113.65
0.168	1528.79	1113.59
0.169	1525.3	1113.56
0.17	1523.95	1113.57
0.171	1524.49	1113.62
0.172	1526.38	1113.69
0.173	1528.87	1113.77
0.174	1531.14	1113.85
0.175	1532.43	1113.9
0.176	1532.12	1113.93
0.177	1529.91	1113.93
0.178	1525.82	1113.89
0.179	1520.16	1113.82
0.18	1513.52	1113.74
0.181	1506.65	1113.65
0.182	1500.3	1113.56
0.183	1495.1	1113.5
0.184	1491.48	1113.47
0.185	1489.56	1113.46
0.186	1489.18	1113.49
0.187	1489.91	1113.53
0.188	1491.13	1113.59
0.189	1492.19	1113.64
0.19	1492.48	1113.67
0.191	1491.55	1113.69
0.192	1489.2	1113.67
0.193	1485.51	1113.64
0.194	1480.79	1113.58
0.195	1475.58	1113.51
0.196	1470.51	1113.45
0.197	1466.17	1113.4
0.198	1463.03	1113.37
0.199	1461.36	1113.37
0.2	1461.12	1113.39
0.205	1466.07	1113.62
0.21	1446.73	1113.4
0.215	1433.8	1113.27

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.22	1444.68	1113.6
0.225	1437.22	1113.58
0.23	1426.6	1113.49
0.235	1425.45	1113.58
0.24	1410.35	1113.41
0.245	1401.09	1113.33
0.25	1402.43	1113.45
0.255	1389.19	1113.29
0.26	1379.35	1113.19
0.265	1380.65	1113.3
0.27	1373.08	1113.23
0.275	1367.02	1113.19
0.28	1366.01	1113.25
0.285	1357.66	1113.16
0.29	1353.56	1113.14
0.295	1353.83	1113.22
0.3	1346.15	1113.13
0.305	1341.61	1113.1
0.31	1342.59	1113.18
0.315	1338.76	1113.17
0.32	1335.76	1113.16
0.325	1333.72	1113.18
0.33	1327.49	1113.11
0.335	1324.91	1113.11
0.34	1324.74	1113.16
0.345	1320.1	1113.11
0.35	1316.84	1113.09
0.355	1315.52	1113.11
0.36	1311.65	1113.08
0.365	1308.88	1113.06
0.37	1306.41	1113.06
0.375	1302.02	1113.01
0.38	1300.26	1113.01
0.385	1299.72	1113.04
0.39	1296.87	1113.01
0.395	1294.82	1113.01
0.4	1293.53	1113.02
0.405	1291.28	1113
0.41	1290.05	1113.01
0.415	1288.8	1113.02
0.42	1286.57	1113

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.425	1285.93	1113.02
0.43	1285.74	1113.05
0.435	1284.07	1113.05
0.44	1282.54	1113.04
0.445	1281.17	1113.05
0.45	1279.65	1113.04
0.455	1279.04	1113.06
0.46	1278.18	1113.07
0.465	1276.44	1113.06
0.47	1275.34	1113.06
0.475	1274.42	1113.07
0.48	1272.97	1113.07
0.485	1271.77	1113.07
0.49	1270.63	1113.07
0.495	1269.55	1113.07
0.5	1269.05	1113.09
0.6	1260.71	1113.31
0.7	1254.72	1113.63
0.8	1248.8	1114.06
0.9	1243.47	1114.54
1	1237.66	1115.02
1.1	1233.94	1115.58
1.2	1329.75	1118.64
1.3	1261.85	1116.89
1.4	1240.39	1116.24
1.5	1228.25	1116.11
1.6	1228.81	1116.41
1.7	1222.22	1116.58
1.8	1217.98	1116.92
1.9	1213.22	1117.33
2	1207.31	1117.74
2.1	1201.5	1118.3
2.2	1194.8	1118.86
2.3	1189.98	1119.52
2.4	1183.81	1120.17
2.5	1178.1	1120.86
2.6	1171.57	1121.56
2.7	1164.38	1122.25
2.8	1157.77	1123.03
2.9	1150.52	1123.84
3	1143.43	1124.67

Table 7.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 39

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.1	1136.6	1125.55
3.2	1130.06	1126.45
3.3	1123.91	1127.35
3.4	1118.02	1128.24
3.5	1112.39	1129.1
3.6	1107	1129.93
3.7	1101.77	1130.72
3.8	1096.69	1131.48
3.9	1091.87	1132.19
4	1087.16	1132.86
4.1	1082.53	1133.5
4.2	1078	1134.1
4.3	1073.49	1134.66
4.4	1069.07	1135.2
4.5	1064.76	1135.73
4.6	1060.51	1136.23
4.7	1056.32	1136.72
4.8	1052.18	1137.2
4.9	1048.09	1137.66
5	1044.04	1138.12

Table 7.4-7 Pressurizer compartment Nodal Description (nodalization sensitivity study)
Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.1467(ft2)
Break location : Volume number 7

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Bottom of pressurizer compartment; EL=58''-5'	7.66	1580	120	14.396	0	11.16	14	25.4
2	EL=66"-1	10.00	2144	120	14.396	0	11.16	14	25.4
3	EL=76"-1' (grating floor)	6.84	1500	120	14.396	0	11.15	14	25.6
4	EL=82"-11	6.83	1466	120	14.396	0	11.14	14	25.7
5	EL=89"-9' (grating floor)	6.83	1498	120	14.396	0	11.14	14	25.7
6	EL=96"-7'	6.84	1465	120	14.396	0	11.13	14	25.8
7	EL=103"-5' (grating floor)	8.91	1928	120	14.396	0	11.12	14	25.9
8	EL=112"-4'	4.34	862	120	14.396	0	11.00	14	27.3
9	EL=116"-8' (grating floor)	5.8	1619	120	14.396	0	10.87	14	28.8
10	Top of Pressurizer; EL=122''-5.6'	5.36	1923	120	14.396	0	10.80	14	29.6
11	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	3353	120	14.396	0	10.70	14	30.8
12	Containment atmosphere	200	2741212	120	14.396	0	–	–	–

Table 7.4-8 Pressurizer compartment Vent path description (nodalization sensitivity study)
Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.1467(ft2)
Break location : Volume number 7

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
~~1~~	~~V1~~	~~V12~~		~~X~~	~~10.75~~	~~15.44~~	~~3.26~~	~~18.53~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
2	V1	V2		X	257.00	8.83	9.07	10.60	0.0	0.0	0.0	0.00
3	V2	V3		X	154.08	5.09	9.00	22.67	0.7	0.0	0.0	0.70
4	V3	V4		X	256.80	6.84	9.00	8.21	0.0	0.0	0.0	0.00
5	V4	V5		X	154.08	4.15	9.00	20.77	0.7	0.0	0.0	0.70
6	V5	V6		X	254.43	6.84	8.62	8.21	0.0	0.0	0.0	0.00
7	V6	V7		X	154.08	4.77	9.00	22.02	0.7	0.0	0.0	0.70
8	V7	V8		X	240.64	6.63	5.07	7.96	0.0	1.0	0.0	1.00
9	V8	V9		X	195.76	3.08	9.62	19.53	0.7	0.0	0.0	0.70
10	V9	V10		X	319.66	5.58	9.02	6.70	0.0	1.0	0.0	1.00
11	V10	V11		X	220.83	4.60	16.60	32.40	0.7	0.0	0.0	0.70
12	V11	V12	X		20.75	15.09	4.19	18.11	0.84	1.0	0.5	2.34
13	V11	V12	X		32.78	15.13	4.98	18.16	0.84	1.0	0.5	2.34
~~14~~	~~V1~~	~~V12~~		~~X~~	~~9.00~~	~~15.44~~	~~3.00~~	~~18.53~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~

Table 7.4-9 Pressurizer compartment Nodal Description (nodalization sensitivity study)
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 10

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Bottom of pressurizer compartment; EL=58''-5'	7.66	1580	120	14.396	0	5.52	14	153.6
2	EL=66"-1	10.00	2144	120	14.396	0	5.48	14	155.5
3	EL=76"-1' (grating floor)	6.84	1500	120	14.396	0	5.40	14	159.3
4	EL=82"-11	6.83	1466	120	14.396	0	5.30	14	164.2
5	EL=89"-9' (grating floor)	6.83	1498	120	14.396	0	5.17	14	170.8
6	EL=96"-7'	6.84	1465	120	14.396	0	4.99	14	180.6
7	EL=103"-5' (grating floor)	8.91	1928	120	14.396	0	5.01	14	179.4
8	EL=112"-4'	4.34	862	120	14.396	0	5.08	14	175.6
9	EL=116"-8' (grating floor)	5.8	1619	120	14.396	0	5.11	14	174.0
10	Top of Pressurizer; EL=122''-5.6'	5.36	1923	120	14.396	0	5.12	14	173.4
11	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.84	3353	120	14.396	0	5.07	14	176.1
12	Containment atmosphere	200	2741212	120	14.396	0	—	—	—

Table 7.4-10 Pressurizer compartment Vent Path Description (nodalization sensitivity study)
Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2532(ft2)
Break location : Volume number 10

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
~~1~~	~~V1~~	~~V12~~		~~X~~	~~10.75~~	~~15.44~~	~~3.26~~	~~18.53~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~
2	V1	V2		X	257.00	8.83	9.07	10.60	0.0	0.0	0.0	0.00
3	V2	V3		X	154.08	5.09	9.00	22.67	0.7	0.0	0.0	0.70
4	V3	V4		X	256.80	6.84	9.00	8.21	0.0	0.0	0.0	0.00
5	V4	V5		X	154.08	4.15	9.00	20.77	0.7	0.0	0.0	0.70
6	V5	V6		X	254.43	6.84	8.62	8.21	0.0	0.0	0.0	0.00
7	V6	V7		X	154.08	4.77	9.00	22.02	0.7	0.0	0.0	0.70
8	V7	V8		X	240.64	6.63	5.07	7.96	0.0	0.0	0.5	0.50
9	V8	V9		X	195.76	3.08	9.62	19.53	0.7	0.0	0.0	0.70
10	V9	V10		X	319.66	5.58	9.02	6.70	0.0	0.0	0.5	0.50
11	V10	V11		X	220.83	4.60	16.60	32.40	0.7	0.0	0.0	0.70
12	V11	V12		X	20.75	15.09	4.19	18.11	0.84	1.0	0.5	2.34
13	V11	V12		X	32.78	15.13	4.98	18.16	0.84	1.0	0.5	2.34
~~14~~	~~V1~~	~~V12~~		~~X~~	~~9.00~~	~~15.44~~	~~3.00~~	~~18.53~~	~~0.45~~	~~1.0~~	~~0.5~~	~~1.95~~

Figure 7.4-1 Nodalization Scheme for Pressurizer Compartment Analysis(1/3)

Figure 7.4-2 Nodalization Scheme for Pressurizer Compartment Analysis (2/3)

Figure 7.4-3 Nodalization Scheme for Pressurizer Compartment Analysis (3/3)

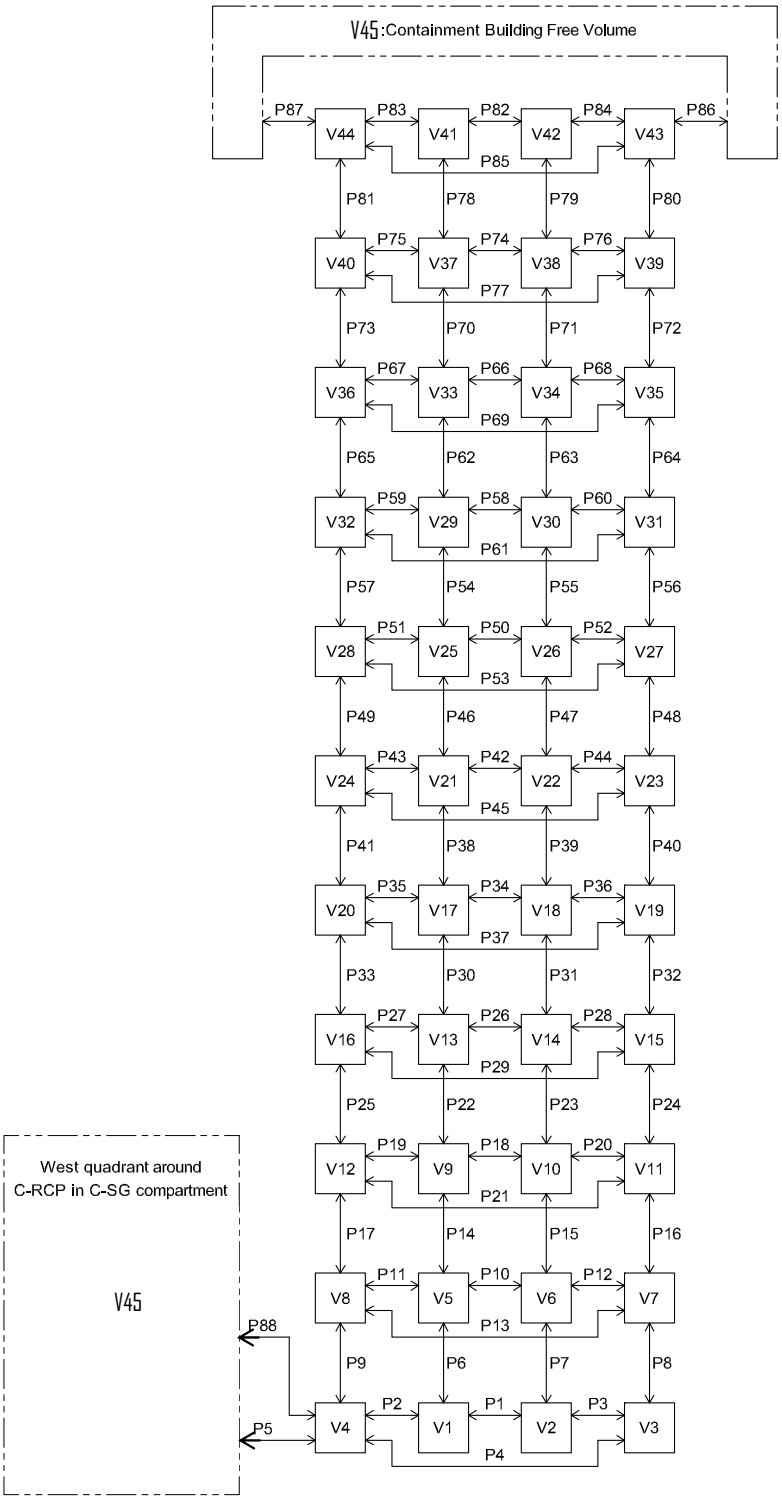

Figure 7.4-4 Nodalization Diagram for Pressurizer Compartment Analysis

Figure 7.4-5 Nodalization Scheme for Pressurizer Compartment Sensitivity Analysis about Nodalization

Figure 7.4-6 Nodalization Scheme for Pressurizer Compartment Sensitivity Analysis about Nodalization

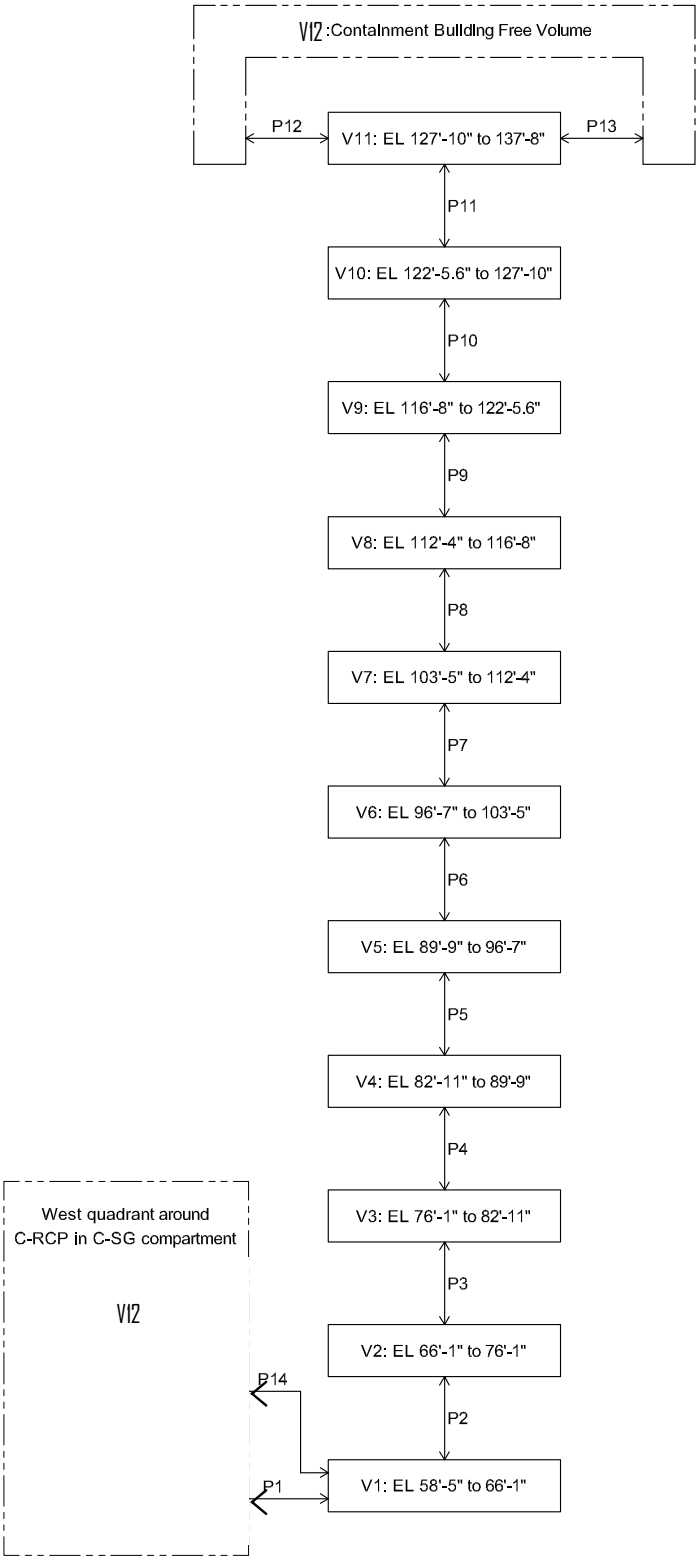

Figure 7.4-7 Nodalization Diagram for Pressurizer Compartment Sensitivity Analysis

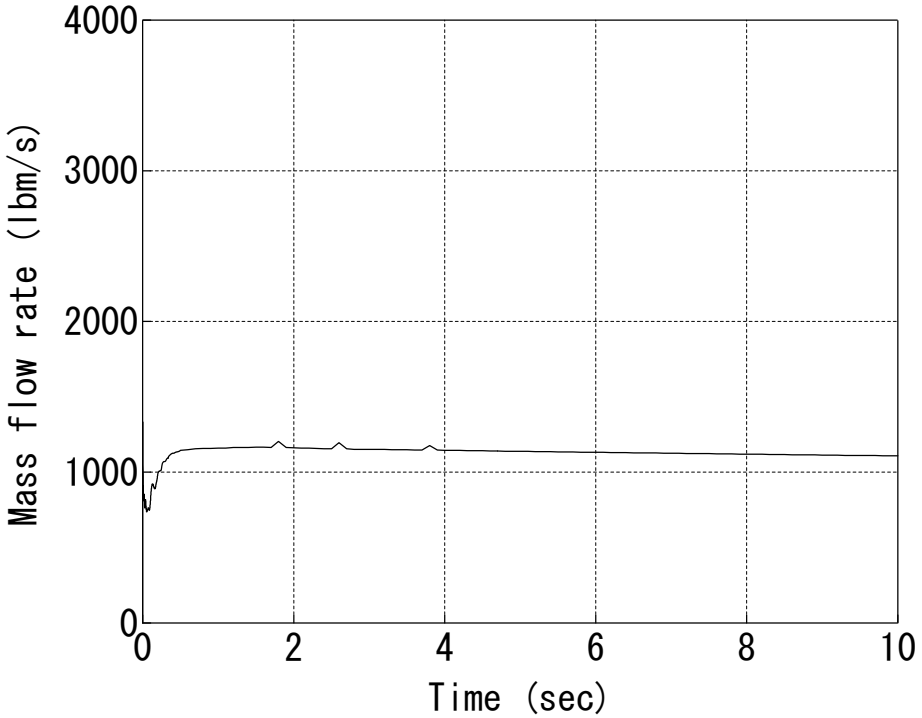

Figure 7.4-8 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (B Loop cold leg side) (1/2)

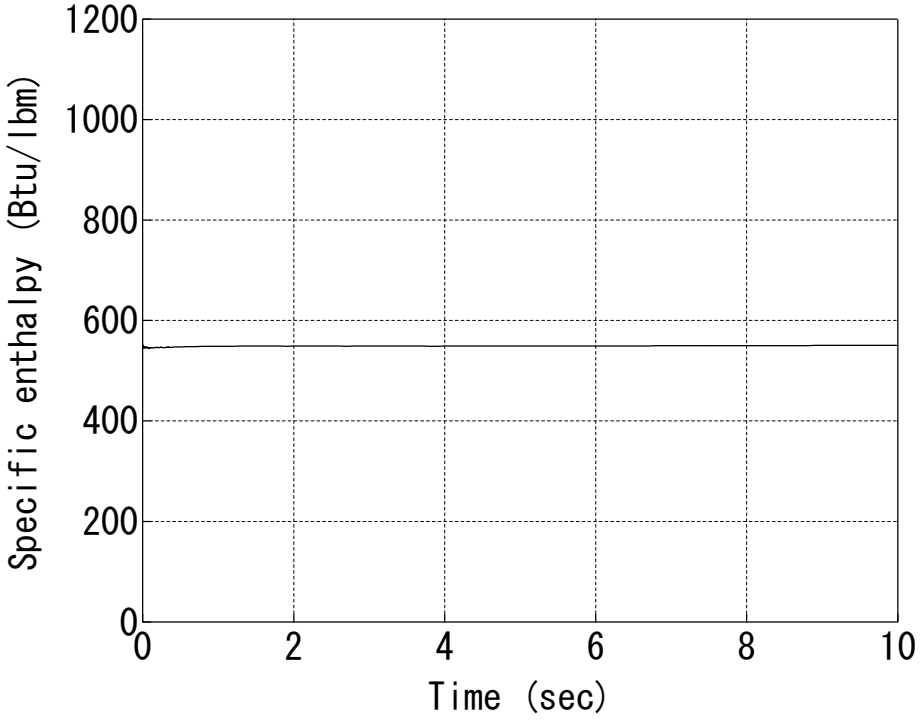

Figure 7.4-9 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (B Loop cold leg side) (2/2)

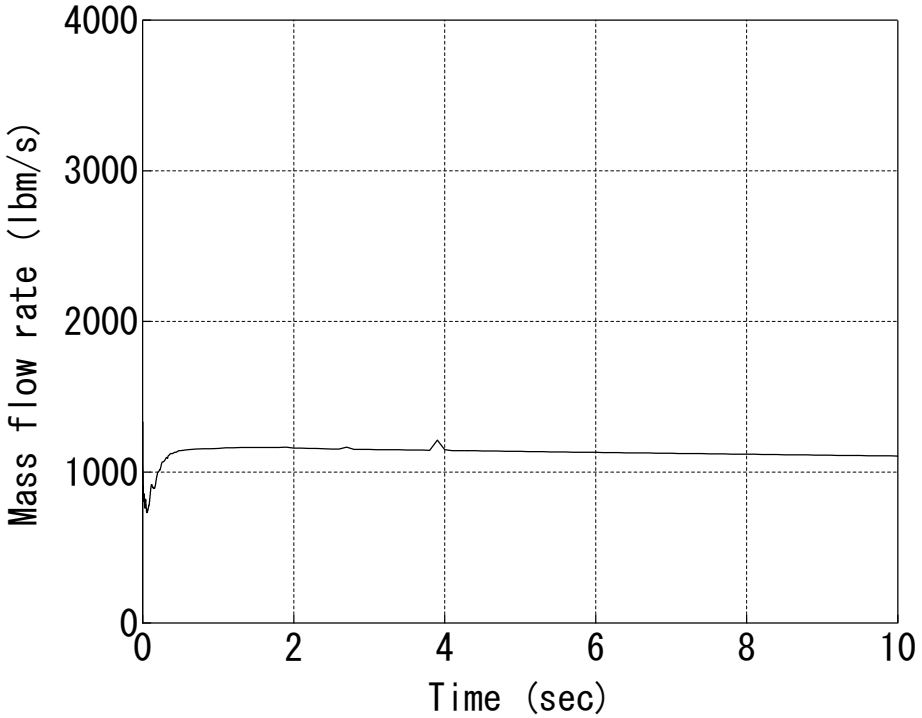

Figure 7.4-10 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (C Loop cold leg side) (1/2)

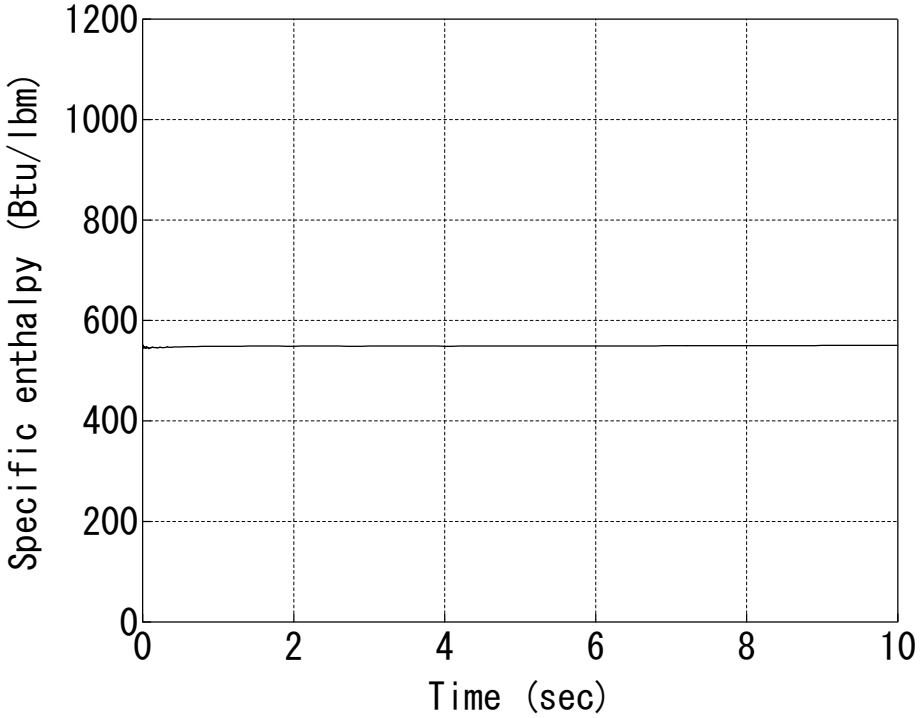

Figure 7.4-11 Short term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (C Loop cold leg side) (2/2)

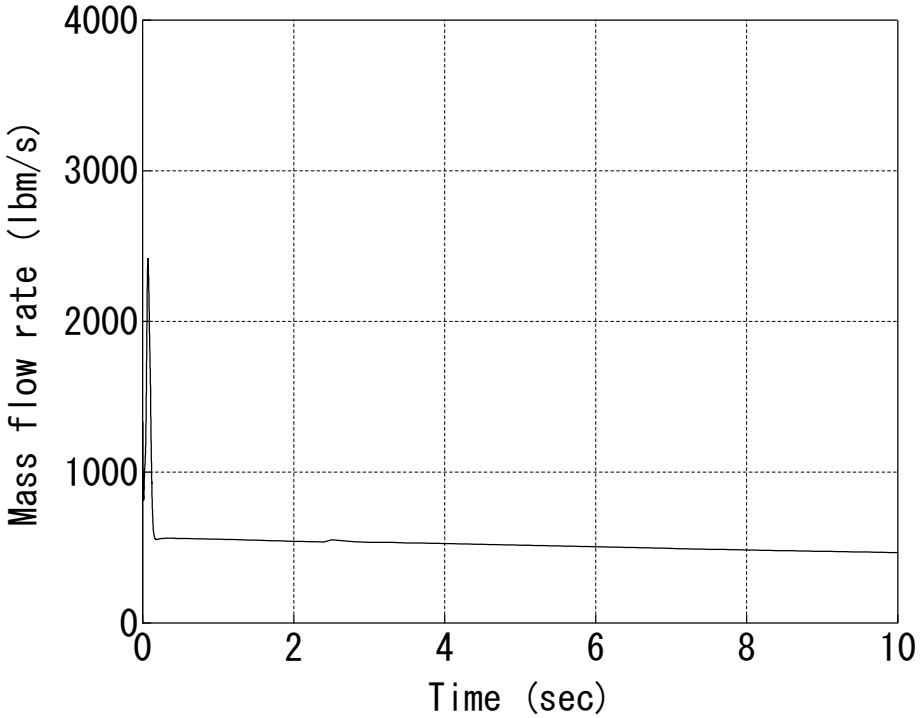

Figure 7.4-12 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (pressurizer side) (1/2)

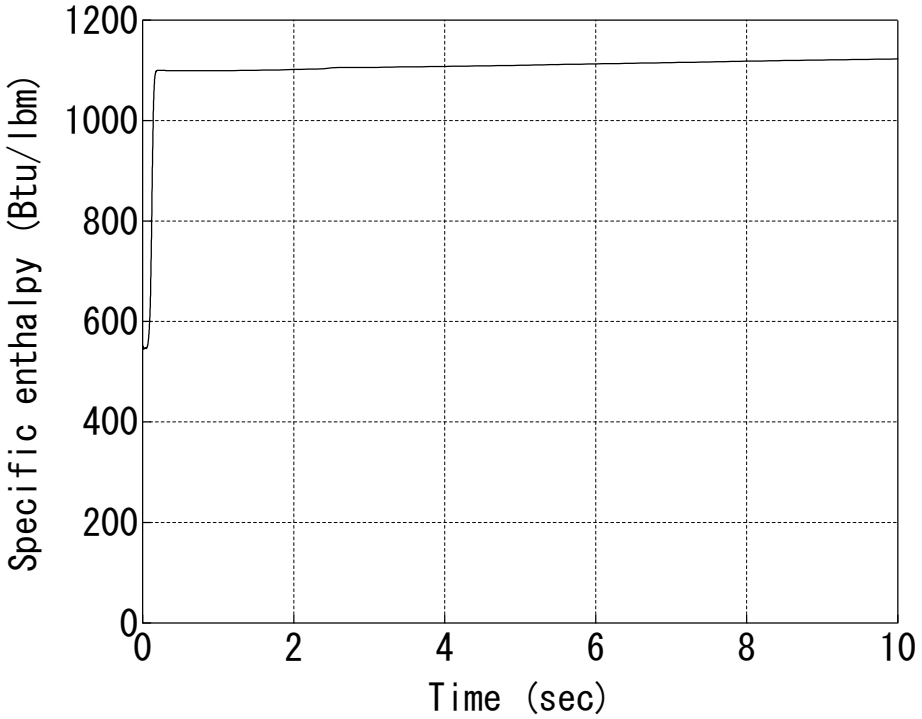

Figure 7.4-13 Short term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Spray Line Break (pressurizer side) (2/2)

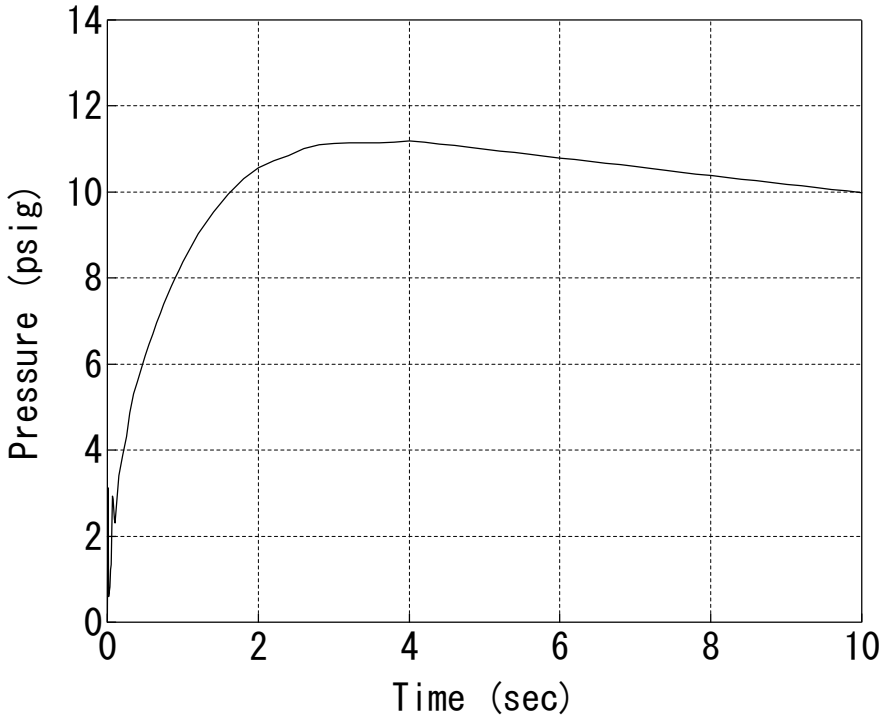

Figure 7.4-14 Pressure Transient at Peak Pressure Node (V27) in Pressurizer Compartment (Pressurizer spray line break)

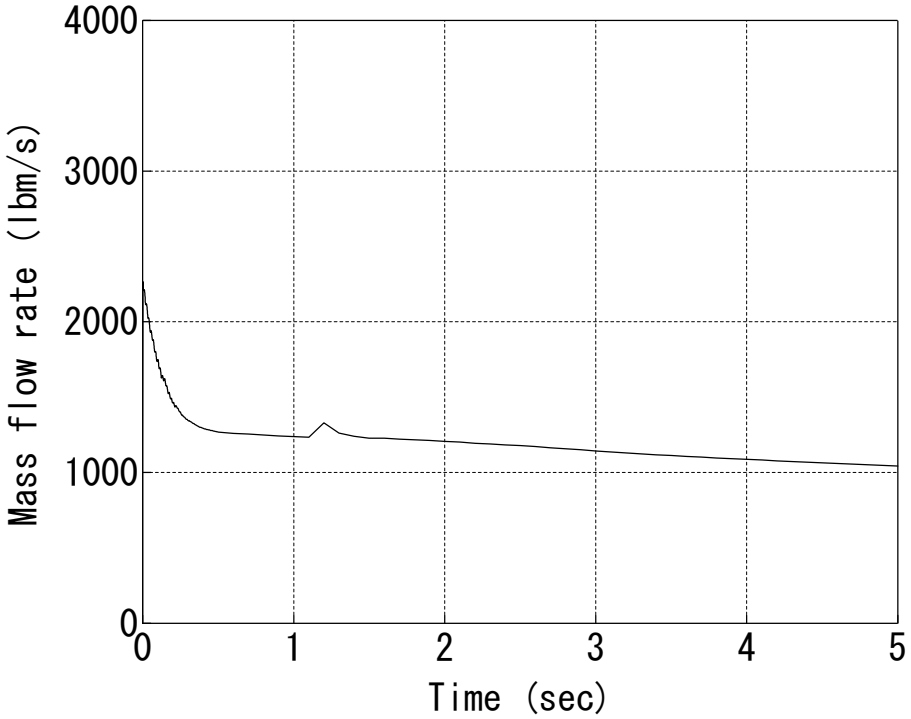

Figure 7.4-15 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Relief Line Break (1/2)

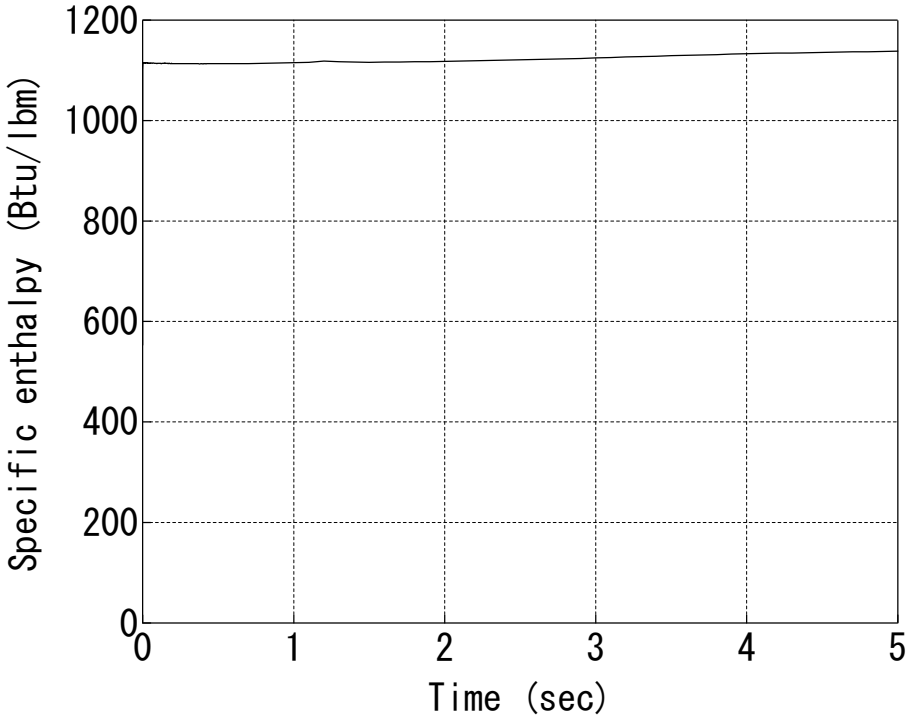

Figure 7.4-16 Short Term Mass and Energy Release Data for Pressurizer Compartment Pressurizer Relief Line Break (2/2)

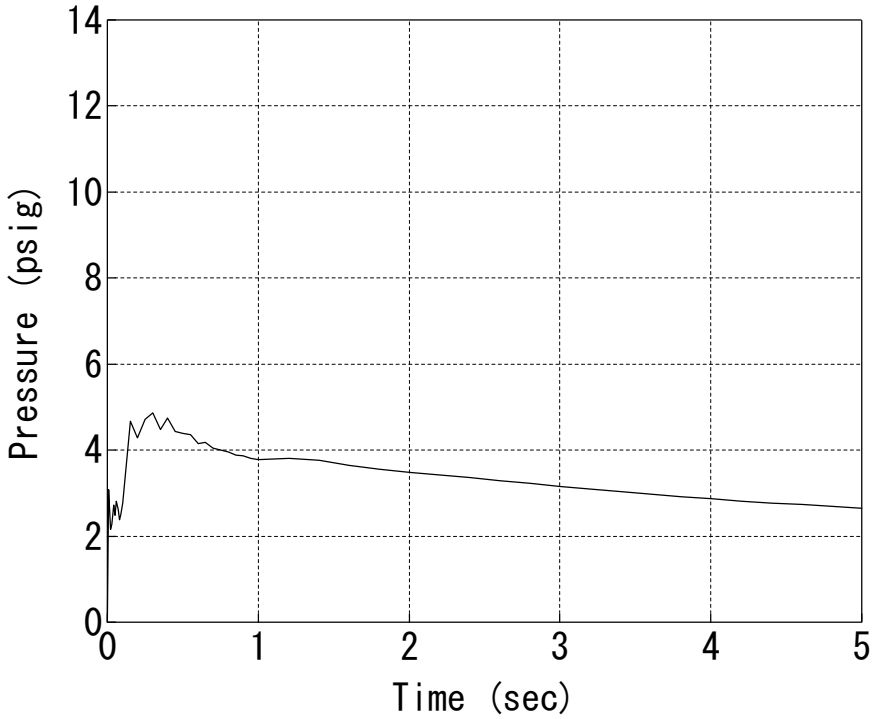

Figure 7.4-17 Pressure Transient at Peak Pressure Node (V39) in Pressurizer Compartment (Pressurizer relief line break)

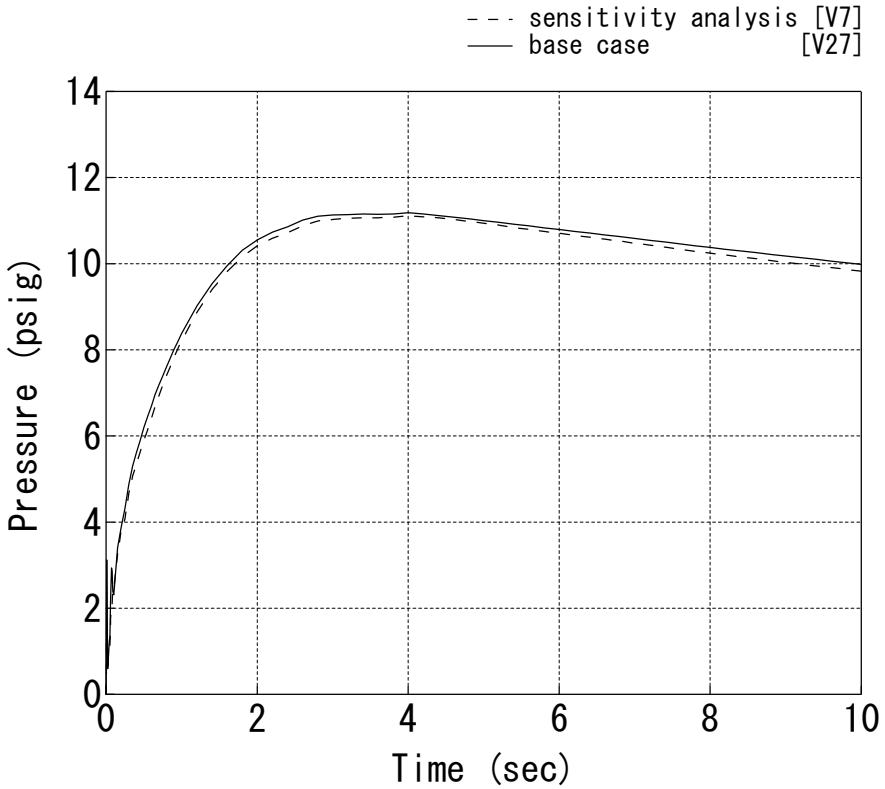

Figure 7.4-18 Result of Nodalization Sensitivity Analysis(PRZ Spray Line Break)

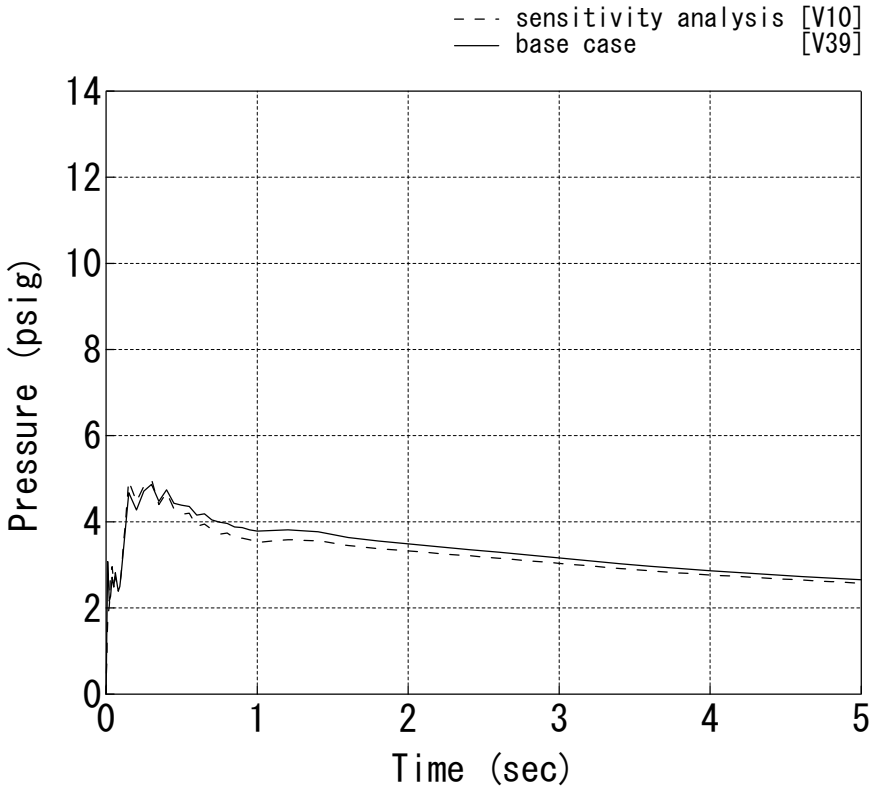

Figure 7.4-19 Result of Nodalization Sensitivity Analysis(PRZ Relief Line Break)

7.5 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve room

7.5.1 Modeling and nodalization sensitivity study

(a) Base nodal description

The nodalization used for US-APWR regenerative heat exchanger room and regenerative heat exchanger valve room is shown on Figure 7.5-1 to Figure 7.5-3 and the nodalization diagram is shown on Figure 7.5-4. A total of 33 nodes, including the containment atmosphere node, are used for the regenerative heat exchanger room and regenerative heat exchanger valve room analyses.

The description and geometric parameters for each node are summarized in Table 7.5-1, Table 7.5-3, Table 7.5-6 and Table 7.5-8. The free volume of each node was estimated by subtracting the obstructed volume from the room volume. The obstructed volume was estimated from the volume of main components with margin to assure minimum free volume. This assumption generates conservative results.

(b) Nodalization sensitivity study

Nodalization sensitivity study for the regenerative heat exchanger room is not necessary because the modeling includes all of the obstructions that may influence the pressure losses. Additionally the peak pressure are very small and much less than the design pressure for all nodes for the worst case (Charging line break) as shown on Table 7.5-1.

Nodalization sensitivity study for regenerative heat exchanger valve room for is not necessary because the modeling includes all of the obstructions that may influence the pressure losses. Additionally all node peak pressures in the regenerative heat exchanger valve room are same for the worst case (Letdown line break) as shown on Table 7.5-8.

(c) Vent path description

The vent path connection diagram is shown in Figure 7.5-4. Geometric and hydraulic parameters for each vent path are summarized in Table 7.5-2, Table 7.5-4, Table 7.5-7 and Table 7.5-9.

Vent paths P8, P22, P36 and P50 run from the regenerative heat exchanger room to the Corridor. Vent paths P53 runs from the regenerative heat exchanger valve room to the Corridor. Vent paths P59 to P62 run from the Corridor to containment atmosphere node.

The flow area of each vent path is conservatively estimated considering the flow obstruction by main components, including margin. The friction length is conservatively estimated considering the length of the expected flow line plus margin. The loss coefficient is conservatively estimated considering the effects of obstruction, contraction and expansion.

7.5.2 Short term mass and energy release data

The analysis of short term mass and energy release is performed using M-RELAP5 code which is also used for the small break LOCA analysis for the

US-APWR. Nodalization of the reactor coolant system for short term mass and energy release is the same as for the small break LOCA analysis.

(a) Charging line break

Break mass and energy flow is released from the charging pump side and the RCS (Reactor Coolant System) side. The mass and energy flow is not likely to occur from the RCS side because the break location is isolated from RCS by the isolation valve. Therefore, to calculate the subcompartment analysis conservatively, the break mass and energy flow from the RCS side is assumed to be the same side as that from the charging pump side.

For the charging pump side, the pressure at the break location will be less than the pressure at the outlet of charging pump due to the pressure drop at the piping elbows. The charging line between the charging pump and the break location is included in the model to account for the pressure drop in the charging line. The line to the inlet of the regenerative heat exchanger room was conservatively modeled as the end of charging line and the loss coefficients for the elbows were conservatively assumed at minimum value. The initial pressure and temperature were conservatively set to the maximum values of pressure and temperature in the charging line.

The resultant short term mass and energy release data are shown in Table 7.5-5 and the transient of break mass flow rate and enthalpy are shown in Figure 7.5-5 and Figure 7.5-6.

(b) Letdown line break

Break mass and energy flow is released from the RCS cross-over leg side and CVCS (Chemical Volume Control System) side. The mass and energy flow is from the CVCS side will be relatively small because the temperature and pressure of CVCS are much lower than that of RCS. Therefore, for a conservative subcompartment analysis, the break mass and energy flow from the CVCS side is assumed equal to that from the RCS side of the break.

For the cross-over leg side, the pressure at the break location will be less than the cross-over leg due to the pressure drop at the elbows. The letdown line between the cross-over leg and the break location is included in the model to account for the pressure drop in the letdown line. The line to the inlet of the regenerative heat exchanger room was conservatively modeled as the end of letdown line and the loss coefficients for the elbows were conservatively assumed at minimum value. The initial pressure and temperature were conservatively set to the maximum values of pressure and temperature in the letdown line.

The resultant short term mass and energy release data are shown in Table 7.5-10 and the transient of break mass flow rate and enthalpy are shown in Figure 7.5-9 and Figure 7.5-10.

7.5.3 Calculated pressure responses

(a)-1 Charging line break in Regenerative heat exchanger room

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the

line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in node V6.

The worst calculated peak pressure was 4.3 psig at the break node V6. The pressure transient for V6 is shown in Figure 7.5-7. The design pressure for all nodes in the regenerative heat exchanger room is 10 psig and the calculated peak pressure is much less than the design pressure as shown on Table 7.5-1.

(a)-2 Charging line break in Regenerative heat exchanger valve room

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in V27.

The worst calculated peak pressure was 6.1 psig in V25 (under the break V27). The pressure transient for V25 is shown in Figure 7.5-8. The design pressure for all nodes in the regenerative heat exchanger room is 16 psig and the calculated peak pressure is much less than the design pressure as shown on Table 7.5-3.

(b)-1 Letdown line break in Regenerative heat exchanger room

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in node V20.

The worst calculated peak pressure was 3.2 psig at the break node V20. The pressure transient for V20 is shown in Figure 7.5-11. The design pressure for all nodes in Regenerative heat exchanger room is 10 psig and the calculated peak pressure is much less than the design pressure as shown on Table 7.5-6.

(b)-2 Letdown line break in Regenerative heat exchanger valve room

The break was assumed to occur in the node V27. The worst calculated peak pressure was 10.6 psig in V25 (under the break in V27). The pressure transient for V25 is shown in Figure 7.5-12. The design pressure for all nodes in Regenerative heat exchanger valve room is 16 psig and the calculated peak pressure is much less than the design pressure as shown on Table 7.5-8.

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	77	120	14.396	0	1.80	10	455.6
2	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	54	120	14.396	0	2.05	10	387.8
3	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	66	120	14.396	0	1.83	10	446.4

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
4	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	43	120	14.396	0	1.92	10	420.8
5	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	98	120	14.396	0	3.22	10	210.6
6	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	82	120	14.396	0	4.31	10	132.0

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
7	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	100	120	14.396	0	1.86	10	437.6
8	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	70	120	14.396	0	1.77	10	465.0
9	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	98	120	14.396	0	1.68	10	495.2

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
10	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	68	120	14.396	0	1.74	10	474.7
11	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	127	120	14.396	0	2.34	10	327.4
12	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	107	120	14.396	0	2.37	10	321.9

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
13	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	100	120	14.396	0	1.99	10	402.5
14	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	70	120	14.396	0	1.86	10	437.6
15	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	98	120	14.396	0	1.55	10	545.2

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	68	120	14.396	0	1.55	10	545.2
17	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	127	120	14.396	0	1.68	10	495.2
18	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	107	120	14.396	0	1.59	10	528.9

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
19	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	99	120	14.396	0	2.15	10	365.1
20	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	70	120	14.396	0	2.26	10	342.5
21	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	98	120	14.396	0	1.51	10	562.3

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
22	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	69	120	14.396	0	1.66	10	502.4
23	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	126	120	14.396	0	1.54	10	549.4
24	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	106	120	14.396	0	1.57	10	536.9
25	Southwest part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.92	16	1639.1

Table 7.5-1 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
26	Central part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.84	16	1804.8
27	Northeast part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.91	16	1658.2
28	Opening to piping room	6.58	22	120	14.396	0	0.83	16	1827.7
29	Corridor:between EL 50'-2" and 53'-5.76"	3.31	50	120	14.396	0	1.21	10	726.4
30	Corridor:between EL 53'-5.76" and 57'-9.32"	4.30	65	120	14.396	0	0.84	10	1090.5
31	Corridor:between EL 57'-9.32" and 62'-0.88"	4.29	65	120	14.396	0	0.81	10	1134.6
32	Corridor:between EL 62'-0.88" and 66'-3"	4.18	63	120	14.396	0	0.83	10	1104.8
33	Containment Building Free Volume	200	2740000	120	14.396	0	-	-	-

Table 7.5-2 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.38	3.55	3.35	4.26	0.0	1.0	0.5	1.5
2	V1	V3		X	11.23	5.89	3.09	7.07	0.0	1.0	0.5	1.5
3	V2	V4		X	7.22	5.89	2.67	7.07	0.0	1.0	0.5	1.5
4	V3	V4		X	10.50	3.55	2.73	4.26	0.0	1.0	0.5	1.5
5	V3	V5		X	11.23	6.47	3.09	7.76	0.0	1.0	0.5	1.5
6	V4	V6		X	7.22	7.35	2.67	8.82	0.0	1.0	0.5	1.5
7	V5	V6		X	25.45	3.73	4.2	4.48	0.0	1.0	0.5	1.5
8	V6	V29		X	6.63	7.5	2.49	9	0.0	0.0	0.5	0.5
9	V1	V7		X	20.96	3.81	4.19	4.57	0.0	1.0	0.5	1.5
10	V2	V8		X	14.03	3.81	3.18	4.57	0.0	1.0	0.5	1.5
11	V3	V9		X	19.26	3.81	4.2	4.57	0.0	1.0	0.5	1.5
12	V4	V10		X	12.30	3.81	3.08	4.57	0.0	1.0	0.5	1.5
13	V5	V11		X	27.26	3.81	4.47	4.57	0.0	1.0	0.5	1.5
14	V6	V12		X	22.60	3.81	3.85	4.57	0.0	1.0	0.5	1.5
15	V7	V8		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
16	V7	V9		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
17	V8	V10		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
18	V9	V10		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
19	V9	V11		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
20	V10	V12		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
21	V11	V12		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
22	V12	V30		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
23	V7	V13		X	12.58	2.62	4.19	10.94	0.0	1.0	0.5	1.5
24	V8	V14		X	8.42	2.62	3.18	9.52	0.0	1.0	0.5	1.5

Table 7.5-2 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
25	V9	V15		X	11.56	2.62	4.2	10.96	0.0	1.0	0.5	1.5
26	V10	V16		X	7.38	2.62	3.08	9.38	0.0	1.0	0.5	1.5
27	V11	V17		X	16.36	2.62	4.47	11.34	0.0	1.0	0.5	1.5
28	V12	V18		X	13.56	2.62	3.85	10.46	0.0	1.0	0.5	1.5
29	V13	V14		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
30	V13	V15		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
31	V14	V16		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
32	V15	V16		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
33	V15	V17		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
34	V16	V18		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
35	V17	V18		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
36	V18	V31		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
37	V13	V19		X	20.96	4.24	4.19	5.09	0.0	1.0	0.5	1.5
38	V14	V20		X	14.03	4.24	3.18	5.09	0.0	1.0	0.5	1.5
39	V15	V21		X	19.26	4.24	4.2	5.09	0.0	1.0	0.5	1.5
40	V16	V22		X	12.30	4.24	3.08	5.09	0.0	1.0	0.5	1.5
41	V17	V23		X	27.26	4.24	4.47	5.09	0.0	1.0	0.5	1.5
42	V18	V24		X	22.60	4.24	3.85	5.09	0.0	1.0	0.5	1.5
43	V19	V20		X	21.23	3.55	4.22	4.26	0.0	1.0	0.5	1.5
44	V19	V21		X	16.66	5.89	4.1	7.07	0.0	1.0	0.5	1.5
45	V20	V22		X	11.74	5.89	3.38	7.07	0.0	1.0	0.5	1.5
46	V21	V22		X	19.53	3.55	4.24	4.26	0.0	1.0	0.5	1.5
47	V21	V23		X	16.66	6.47	4.1	7.76	0.0	1.0	0.5	1.5
48	V22	V24		X	11.74	7.35	3.38	8.82	0.0	1.0	0.5	1.5
49	V23	V24		X	33.37	3.73	5.14	4.48	0.0	1.0	0.5	1.5

Table 7.5-2 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 6

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
50	V24	V32		X	8.35	7.5	2.7	9	0.0	0.0	0.5	0.5
51	V25	V26		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
52	V26	V27		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
53	V27	V28		X	13.17	3.92	3.07	4.7	0.0	0.0	0.5	0.5
54	V28	V29		X	6.63	2.22	2.49	2.66	0.64	2.1	0.0	2.74
55	V28	V30		X	6.54	2.22	2.48	2.66	0.64	2.1	0.0	2.74
56	V29	V30		X	15.17	3.81	3.17	4.57	0.0	0.0	0.0	0.0
57	V30	V31		X	15.17	4.3	3.17	5.16	0.0	0.0	0.0	0.0
58	V31	V32		X	15.17	4.24	3.17	5.09	0.0	0.0	0.0	0.0
59	V29	V33		X	6.63	3.79	2.49	4.55	0.0	1.0	0.0	1.0
60	V30	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
61	V31	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
62	V32	V33		X	8.35	3.79	2.7	4.55	0.0	1.0	0.0	1.0

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	77	120	14.396	0	0.45	10	2122.2
2	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	54	120	14.396	0	0.45	10	2122.2
3	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	66	120	14.396	0	0.44	10	2172.7
4	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	43	120	14.396	0	0.44	10	2172.7

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
5	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	98	120	14.396	0	0.44	10	2172.7
6	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	82	120	14.396	0	0.44	10	2172.7
7	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	100	120	14.396	0	0.44	10	2172.7
8	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	70	120	14.396	0	0.44	10	2172.7

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
9	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	98	120	14.396	0	0.43	10	2225.6
10	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	68	120	14.396	0	0.43	10	2225.6
11	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	127	120	14.396	0	0.43	10	2225.6
12	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	107	120	14.396	0	0.45	10	2122.2

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
13	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	100	120	14.396	0	0.44	10	2172.7
14	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	70	120	14.396	0	0.44	10	2172.7
15	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	98	120	14.396	0	0.43	10	2225.6
16	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	68	120	14.396	0	0.43	10	2225.6

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
17	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	127	120	14.396	0	0.43	10	2225.6
18	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	107	120	14.396	0	0.42	10	2281.0
19	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	99	120	14.396	0	0.47	10	2027.7
20	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	70	120	14.396	0	0.48	10	1983.3

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
21	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	98	120	14.396	0	0.44	10	2172.7
22	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	69	120	14.396	0	0.44	10	2172.7
23	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	126	120	14.396	0	0.43	10	2225.6
24	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	106	120	14.396	0	0.42	10	2281.0
25	Southwest part of piping room divided into 3 parts	16.42	501	120	14.396	0	6.12	16	161.4

Table 7.5-3 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
26	Central part of piping room divided into 3 parts	16.42	501	120	14.396	0	6.12	16	161.4
27	Northeast part of piping room divided into 3 parts	16.42	501	120	14.396	0	6.12	16	161.4
28	Opening to piping room	6.58	22	120	14.396	0	5.29	16	202.5
29	Corridor:between EL 50'-2" and 53'-5.76"	3.31	50	120	14.396	0	0.84	10	1090.5
30	Corridor:between EL 53'-5.76" and 57'-9.32"	4.30	65	120	14.396	0	0.66	10	1415.2
31	Corridor:between EL 57'-9.32" and 62'-0.88"	4.29	65	120	14.396	0	0.40	10	2400.0
32	Corridor:between EL 62'-0.88" and 66'-3"	4.18	63	120	14.396	0	0.55	10	1718.2
33	Containment Building Free Volume	200	2740000	120	14.396	0	-	-	-

Table 7.5-4 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.38	3.55	3.35	4.26	0.0	1.0	0.5	1.5
2	V1	V3		X	11.23	5.89	3.09	7.07	0.0	1.0	0.5	1.5
3	V2	V4		X	7.22	5.89	2.67	7.07	0.0	1.0	0.5	1.5
4	V3	V4		X	10.50	3.55	2.73	4.26	0.0	1.0	0.5	1.5
5	V3	V5		X	11.23	6.47	3.09	7.76	0.0	1.0	0.5	1.5
6	V4	V6		X	7.22	7.35	2.67	8.82	0.0	1.0	0.5	1.5
7	V5	V6		X	25.45	3.73	4.2	4.48	0.0	1.0	0.5	1.5
8	V6	V29		X	6.63	7.5	2.49	9	0.0	0.0	0.5	0.5
9	V1	V7		X	20.96	3.81	4.19	4.57	0.0	1.0	0.5	1.5
10	V2	V8		X	14.03	3.81	3.18	4.57	0.0	1.0	0.5	1.5
11	V3	V9		X	19.26	3.81	4.2	4.57	0.0	1.0	0.5	1.5
12	V4	V10		X	12.30	3.81	3.08	4.57	0.0	1.0	0.5	1.5
13	V5	V11		X	27.26	3.81	4.47	4.57	0.0	1.0	0.5	1.5
14	V6	V12		X	22.60	3.81	3.85	4.57	0.0	1.0	0.5	1.5
15	V7	V8		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
16	V7	V9		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
17	V8	V10		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
18	V9	V10		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
19	V9	V11		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
20	V10	V12		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
21	V11	V12		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
22	V12	V30		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
23	V7	V13		X	12.58	2.62	4.19	10.94	0.0	1.0	0.5	1.5
24	V8	V14		X	8.42	2.62	3.18	9.52	0.0	1.0	0.5	1.5

Table 7.5-4 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
25	V9	V15		X	11.56	2.62	4.2	10.96	0.0	1.0	0.5	1.5
26	V10	V16		X	7.38	2.62	3.08	9.38	0.0	1.0	0.5	1.5
27	V11	V17		X	16.36	2.62	4.47	11.34	0.0	1.0	0.5	1.5
28	V12	V18		X	13.56	2.62	3.85	10.46	0.0	1.0	0.5	1.5
29	V13	V14		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
30	V13	V15		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
31	V14	V16		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
32	V15	V16		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
33	V15	V17		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
34	V16	V18		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
35	V17	V18		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
36	V18	V31		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
37	V13	V19		X	20.96	4.24	4.19	5.09	0.0	1.0	0.5	1.5
38	V14	V20		X	14.03	4.24	3.18	5.09	0.0	1.0	0.5	1.5
39	V15	V21		X	19.26	4.24	4.2	5.09	0.0	1.0	0.5	1.5
40	V16	V22		X	12.30	4.24	3.08	5.09	0.0	1.0	0.5	1.5
41	V17	V23		X	27.26	4.24	4.47	5.09	0.0	1.0	0.5	1.5
42	V18	V24		X	22.60	4.24	3.85	5.09	0.0	1.0	0.5	1.5
43	V19	V20		X	21.23	3.55	4.22	4.26	0.0	1.0	0.5	1.5
44	V19	V21		X	16.66	5.89	4.1	7.07	0.0	1.0	0.5	1.5
45	V20	V22		X	11.74	5.89	3.38	7.07	0.0	1.0	0.5	1.5
46	V21	V22		X	19.53	3.55	4.24	4.26	0.0	1.0	0.5	1.5
47	V21	V23		X	16.66	6.47	4.1	7.76	0.0	1.0	0.5	1.5
48	V22	V24		X	11.74	7.35	3.38	8.82	0.0	1.0	0.5	1.5
49	V23	V24		X	33.37	3.73	5.14	4.48	0.0	1.0	0.5	1.5

Table 7.5-4 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
50	V24	V32		X	8.35	7.5	2.7	9	0.0	0.0	0.5	0.5
51	V25	V26		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
52	V26	V27		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
53	V27	V28		X	13.17	3.92	3.07	4.7	0.0	0.0	0.5	0.5
54	V28	V29		X	6.63	2.22	2.49	2.66	0.64	2.1	0.0	2.74
55	V28	V30		X	6.54	2.22	2.48	2.66	0.64	2.1	0.0	2.74
56	V29	V30		X	15.17	3.81	3.17	4.57	0.0	0.0	0.0	0.0
57	V30	V31		X	15.17	4.3	3.17	5.16	0.0	0.0	0.0	0.0
58	V31	V32		X	15.17	4.24	3.17	5.09	0.0	0.0	0.0	0.0
59	V29	V33		X	6.63	3.79	2.49	4.55	0.0	1.0	0.0	1.0
60	V30	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
61	V31	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
62	V32	V33		X	8.35	3.79	2.7	4.55	0.0	1.0	0.0	1.0

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	552.4
0.001	502.308	545.918
0.002	427.514	545.601
0.003	398.64	550.284
0.004	388.332	548.444
0.005	407.039	546.21
0.006	408.543	545.285
0.007	389.408	544.852
0.008	369.684	544.768
0.009	363.476	545.94
0.01	359.535	546.278
0.011	363.639	545.974
0.012	371.567	545.344
0.013	378.689	545.06
0.014	381.181	545.174
0.015	377.516	545.593
0.016	368.793	545.853
0.017	360.006	545.728
0.018	353.557	545.428
0.019	356.957	545.916
0.02	351.99	545.202
0.021	354.438	544.812
0.022	357.059	544.526
0.023	360.273	544.322
0.024	363.751	544.201
0.025	366.757	544.245
0.026	369.019	544.344
0.027	370.306	544.492
0.028	370.353	544.697
0.029	369.156	544.955
0.03	366.865	545.246
0.031	363.725	545.499
0.032	360.119	545.644
0.033	356.296	545.727
0.034	352.956	545.718
0.035	350.406	545.622
0.036	348.709	545.452
0.037	347.798	545.231
0.038	347.554	544.984
0.039	347.817	544.737
0.04	348.38	544.515

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.041	349.036	544.334
0.042	349.6	544.205
0.043	349.925	544.137
0.044	349.901	544.135
0.045	349.463	544.199
0.046	348.573	544.327
0.047	348.14	545.361
0.048	348.112	545.26
0.049	346.23	545.34
0.05	344.011	545.519
0.051	342.69	546.833
0.052	340.819	546.575
0.053	338.506	546.523
0.054	340.467	547.907
0.055	336.246	547.239
0.056	335.566	546.936
0.057	334.713	546.683
0.058	334.445	546.464
0.059	334.422	546.236
0.06	334.706	545.987
0.061	335.326	545.724
0.062	336.208	545.455
0.063	337.248	545.187
0.064	338.347	544.931
0.065	339.418	544.693
0.066	340.382	544.482
0.067	341.182	544.302
0.068	341.773	544.158
0.069	342.128	544.051
0.07	342.235	543.982
0.071	342.094	543.949
0.072	341.713	543.95
0.073	341.11	543.982
0.074	340.311	544.041
0.075	339.347	544.122
0.076	338.255	544.221
0.077	337.079	544.333
0.078	335.859	544.452
0.079	335.796	545.562
0.08	336.241	545.28
0.081	335.474	545.139
0.082	334.869	545.1

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.083	334.125	545.089
0.084	333.465	545.073
0.085	333.086	545.045
0.086	333.02	544.994
0.087	333.269	544.915
0.088	333.83	544.805
0.089	334.697	544.666
0.09	335.849	544.502
0.091	337.257	544.321
0.092	338.878	544.128
0.093	340.663	543.931
0.094	342.557	543.735
0.095	344.504	543.546
0.096	346.449	543.37
0.097	348.298	543.248
0.098	350.06	543.141
0.099	351.759	543.039
0.1	353.314	542.953
0.101	354.685	542.887
0.102	355.844	542.844
0.103	356.782	542.823
0.104	357.496	542.824
0.105	357.993	542.844
0.106	358.284	542.882
0.107	358.384	542.934
0.108	358.309	542.998
0.109	358.078	543.072
0.11	357.708	543.154
0.111	357.219	543.241
0.112	356.627	543.331
0.113	355.95	543.422
0.114	355.205	543.513
0.115	354.407	543.602
0.116	353.577	543.687
0.117	352.735	543.767
0.118	351.893	543.843
0.119	351.066	543.912
0.12	350.265	543.976
0.121	349.497	544.033
0.122	348.77	544.083
0.123	348.086	544.128
0.124	347.448	544.166

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.125	346.868	544.183
0.126	346.379	544.177
0.127	345.863	544.184
0.128	345.367	544.196
0.129	344.902	544.209
0.13	344.477	544.22
0.131	344.096	544.229
0.132	343.758	544.236
0.133	343.461	544.24
0.134	343.201	544.243
0.135	342.978	544.243
0.136	342.787	544.242
0.137	342.625	544.24
0.138	342.491	544.237
0.139	342.38	544.232
0.14	342.289	544.227
0.141	342.216	544.221
0.142	342.155	544.214
0.143	342.105	544.207
0.144	342.062	544.201
0.145	342.021	544.194
0.146	341.982	544.188
0.147	341.939	544.182
0.148	341.892	544.178
0.149	341.837	544.174
0.15	341.772	544.171
0.151	341.696	544.169
0.152	341.608	544.169
0.153	341.506	544.169
0.154	341.39	544.172
0.155	341.26	544.175
0.156	341.115	544.18
0.157	340.955	544.186
0.158	340.782	544.193
0.159	340.597	544.201
0.16	340.399	544.21
0.161	340.191	544.22
0.162	339.973	544.231
0.163	339.747	544.242
0.164	339.515	544.253
0.165	339.278	544.265
0.166	339.037	544.276

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.167	338.794	544.288
0.168	338.55	544.3
0.169	338.307	544.311
0.17	338.066	544.321
0.171	337.829	544.332
0.172	337.595	544.341
0.173	337.367	544.35
0.174	337.144	544.358
0.175	336.929	544.365
0.176	336.72	544.371
0.177	336.52	544.377
0.178	336.327	544.381
0.179	336.143	544.385
0.18	335.966	544.388
0.181	335.798	544.389
0.182	335.637	544.39
0.183	335.484	544.391
0.184	335.338	544.39
0.185	335.199	544.389
0.186	335.067	544.387
0.187	334.94	544.385
0.188	334.818	544.383
0.189	334.7	544.38
0.19	334.586	544.377
0.191	334.474	544.375
0.192	334.362	544.372
0.193	334.251	544.37
0.194	334.138	544.367
0.195	334.022	544.366
0.196	333.902	544.365
0.197	333.777	544.365
0.198	333.647	544.365
0.199	333.509	544.366
0.2	333.364	544.369
0.205	332.522	544.391
0.21	331.433	544.438
0.215	330.149	544.504
0.22	328.691	544.571
0.225	327.164	544.625
0.23	325.69	544.656
0.235	324.291	544.667
0.24	322.931	544.67

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.245	321.594	544.671
0.25	320.294	544.674
0.255	319.058	544.677
0.26	317.915	544.674
0.265	316.878	544.665
0.27	315.943	544.649
0.275	315.092	544.627
0.28	314.3	544.604
0.285	313.536	544.582
0.29	312.815	544.534
0.295	310.93	544.42
0.3	309.129	544.349
0.305	307.989	544.341
0.31	307.171	544.375
0.315	306.468	544.412
0.32	305.777	544.444
0.325	305.093	544.471
0.33	304.421	544.497
0.335	303.766	544.522
0.34	303.13	544.546
0.345	302.511	544.568
0.35	301.9	544.59
0.355	301.29	544.612
0.36	300.678	544.633
0.365	300.067	544.654
0.37	299.461	544.674
0.375	298.866	544.693
0.38	298.292	544.709
0.385	297.745	544.721
0.39	297.236	544.729
0.395	296.771	544.731
0.4	296.353	544.726
0.405	295.981	544.714
0.41	295.646	544.693
0.415	295.348	544.664
0.42	295.098	544.625
0.425	294.9	544.577
0.43	294.759	544.519
0.435	294.672	544.453
0.44	294.63	544.383
0.445	294.614	544.311
0.45	294.608	544.242

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.455	294.596	544.179
0.46	294.568	544.123
0.465	294.52	544.074
0.47	294.448	544.033
0.475	294.351	544
0.48	294.228	543.972
0.485	294.081	543.95
0.49	293.91	543.933
0.495	293.715	543.92
0.5	293.496	543.912
0.6	287	544
0.7	281.637	543.711
0.8	276.549	543.687
0.9	267.485	542.984
1	263.728	543.02
1.1	260.031	543.03
1.2	256.904	542.912
1.3	250.936	542.588
1.4	248.705	542.489
1.5	246.273	542.451
1.6	243.853	542.459
1.7	241.564	542.443
1.8	238.382	542.145
1.9	236.537	542.118
2	234.784	542.098
2.1	233.01	542.082
2.2	231.453	541.994
2.3	229.993	541.932
2.4	231.351	539.327
2.5	226.348	541.811
2.6	225.067	541.733
2.7	223.907	541.652
2.8	222.84	541.585
2.9	221.713	541.559
3	220.67	541.525
3.1	219.624	541.483
3.2	218.677	541.419
3.3	217.863	541.34
3.4	216.978	541.308
3.5	216.106	541.283
3.6	215.311	541.242
3.7	214.476	541.205

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.8	221.598	535.626
3.9	212.845	540.71
4	211.62	540.952
4.1	210.896	540.925
4.2	210.251	540.889
4.3	209.661	540.85
4.4	209.081	540.814
4.5	208.529	540.782
4.6	207.99	540.749
4.7	207.489	540.715
4.8	207.014	540.682
4.9	206.532	540.656
5	206.046	540.636
5.1	205.572	540.615
5.2	205.125	540.589
5.3	204.702	540.563
5.4	204.32	540.529
5.5	203.918	540.505
5.6	203.525	540.48
5.7	203.15	540.452
5.8	202.779	540.429
5.9	202.414	540.408
6	202.057	540.387
6.1	201.709	540.367
6.2	201.369	540.347
6.3	201.017	540.33
6.4	200.69	540.314
6.5	200.389	540.29
6.6	200.076	540.274
6.7	199.763	540.26
6.8	199.476	540.236
6.9	199.203	540.209
7	198.932	540.188
7.1	198.664	540.17
7.2	198.4	540.153
7.3	198.143	540.136
7.4	197.892	540.119
7.5	197.646	540.103
7.6	197.39	540.089
7.7	197.153	540.077
7.8	196.945	540.053
7.9	196.732	540.037

Table 7.5-5 Mass and Release Rates
Break Type : Charging line (4B) guillotine break
Break Area : 0.06447(ft2)
Break location : Volume number 6, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
8	196.514	540.026
8.1	196.301	540.016
8.2	196.091	540.003
8.3	195.893	539.987
8.4	195.71	539.966
8.5	195.532	539.947
8.6	195.354	539.932
8.7	195.182	539.886
8.8	197.417	537.027
8.9	195.945	539.164
9	194.684	539.836
9.1	194.355	539.875
9.2	194.172	539.85
9.3	194.008	539.831
9.4	193.848	539.818
9.5	193.689	539.809
9.6	193.544	539.799
9.7	193.419	539.785
9.8	193.299	539.772
9.9	193.173	539.766
10	193.046	539.762

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	77	120	14.396	0	1.13	10	785.0
2	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	54	120	14.396	0	1.13	10	785.0
3	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	66	120	14.396	0	1.18	10	747.5
4	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	43	120	14.396	0	1.17	10	754.7

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
5	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	98	120	14.396	0	1.31	10	663.4
6	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	82	120	14.396	0	1.35	10	640.7
7	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	100	120	14.396	0	1.15	10	769.6
8	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	70	120	14.396	0	1.17	10	754.7

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
9	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	98	120	14.396	0	1.01	10	890.1
10	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	68	120	14.396	0	1.04	10	861.5
11	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	127	120	14.396	0	1.13	10	785.0
12	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	107	120	14.396	0	1.11	10	800.9

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
13	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	100	120	14.396	0	1.57	10	536.9
14	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	70	120	14.396	0	1.59	10	528.9
15	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	98	120	14.396	0	1.15	10	769.6
16	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	68	120	14.396	0	1.13	10	785.0

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
17	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	127	120	14.396	0	0.98	10	920.4
18	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	107	120	14.396	0	0.94	10	963.8
19	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	99	120	14.396	0	2.25	10	344.4
20	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	70	120	14.396	0	3.17	10	215.5

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
21	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	98	120	14.396	0	1.21	10	726.4
22	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	69	120	14.396	0	1.21	10	726.4
23	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	126	120	14.396	0	1.19	10	740.3
24	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	106	120	14.396	0	1.25	10	700.0
25	Southwest part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.69	16	2218.8

Table 7.5-6 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
26	Central part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.67	16	2288.1
27	Northeast part of piping room divided into 3 parts	16.42	501	120	14.396	0	0.66	16	2324.2
28	Opening to piping room	6.58	22	120	14.396	0	0.63	16	2439.7
29	Corridor:between EL 50'-2" and 53'-5.76"	3.31	50	120	14.396	0	0.61	10	1539.3
30	Corridor:between EL 53'-5.76" and 57'-9.32"	4.30	65	120	14.396	0	0.60	10	1566.7
31	Corridor:between EL 57'-9.32" and 62'-0.88"	4.29	65	120	14.396	0	0.59	10	1594.9
32	Corridor:between EL 62'-0.88" and 66'-3"	4.18	63	120	14.396	0	0.59	10	1594.9
33	Containment Building Free Volume	200	2740000	120	14.396	0	-	-	-

Table 7.5-7 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.38	3.55	3.35	4.26	0.0	1.0	0.5	1.5
2	V1	V3		X	11.23	5.89	3.09	7.07	0.0	1.0	0.5	1.5
3	V2	V4		X	7.22	5.89	2.67	7.07	0.0	1.0	0.5	1.5
4	V3	V4		X	10.50	3.55	2.73	4.26	0.0	1.0	0.5	1.5
5	V3	V5		X	11.23	6.47	3.09	7.76	0.0	1.0	0.5	1.5
6	V4	V6		X	7.22	7.35	2.67	8.82	0.0	1.0	0.5	1.5
7	V5	V6		X	25.45	3.73	4.2	4.48	0.0	1.0	0.5	1.5
8	V6	V29		X	6.63	7.5	2.49	9	0.0	0.0	0.5	0.5
9	V1	V7		X	20.96	3.81	4.19	4.57	0.0	1.0	0.5	1.5
10	V2	V8		X	14.03	3.81	3.18	4.57	0.0	1.0	0.5	1.5
11	V3	V9		X	19.26	3.81	4.2	4.57	0.0	1.0	0.5	1.5
12	V4	V10		X	12.30	3.81	3.08	4.57	0.0	1.0	0.5	1.5
13	V5	V11		X	27.26	3.81	4.47	4.57	0.0	1.0	0.5	1.5
14	V6	V12		X	22.60	3.81	3.85	4.57	0.0	1.0	0.5	1.5
15	V7	V8		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
16	V7	V9		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
17	V8	V10		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
18	V9	V10		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
19	V9	V11		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
20	V10	V12		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
21	V11	V12		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
22	V12	V30		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
23	V7	V13		X	12.58	2.62	4.19	10.94	0.0	1.0	0.5	1.5
24	V8	V14		X	8.42	2.62	3.18	9.52	0.0	1.0	0.5	1.5

Table 7.5-7 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
25	V9	V15		X	11.56	2.62	4.2	10.96	0.0	1.0	0.5	1.5
26	V10	V16		X	7.38	2.62	3.08	9.38	0.0	1.0	0.5	1.5
27	V11	V17		X	16.36	2.62	4.47	11.34	0.0	1.0	0.5	1.5
28	V12	V18		X	13.56	2.62	3.85	10.46	0.0	1.0	0.5	1.5
29	V13	V14		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
30	V13	V15		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
31	V14	V16		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
32	V15	V16		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
33	V15	V17		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
34	V16	V18		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
35	V17	V18		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
36	V18	V31		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
37	V13	V19		X	20.96	4.24	4.19	5.09	0.0	1.0	0.5	1.5
38	V14	V20		X	14.03	4.24	3.18	5.09	0.0	1.0	0.5	1.5
39	V15	V21		X	19.26	4.24	4.2	5.09	0.0	1.0	0.5	1.5
40	V16	V22		X	12.30	4.24	3.08	5.09	0.0	1.0	0.5	1.5
41	V17	V23		X	27.26	4.24	4.47	5.09	0.0	1.0	0.5	1.5
42	V18	V24		X	22.60	4.24	3.85	5.09	0.0	1.0	0.5	1.5
43	V19	V20		X	21.23	3.55	4.22	4.26	0.0	1.0	0.5	1.5
44	V19	V21		X	16.66	5.89	4.1	7.07	0.0	1.0	0.5	1.5
45	V20	V22		X	11.74	5.89	3.38	7.07	0.0	1.0	0.5	1.5
46	V21	V22		X	19.53	3.55	4.24	4.26	0.0	1.0	0.5	1.5
47	V21	V23		X	16.66	6.47	4.1	7.76	0.0	1.0	0.5	1.5
48	V22	V24		X	11.74	7.35	3.38	8.82	0.0	1.0	0.5	1.5
49	V23	V24		X	33.37	3.73	5.14	4.48	0.0	1.0	0.5	1.5

Table 7.5-7 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
50	V24	V32		X	8.35	7.5	2.7	9	0.0	0.0	0.5	0.5
51	V25	V26		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
52	V26	V27		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
53	V27	V28		X	13.17	3.92	3.07	4.7	0.0	0.0	0.5	0.5
54	V28	V29		X	6.63	2.22	2.49	2.66	0.64	2.1	0.0	2.74
55	V28	V30		X	6.54	2.22	2.48	2.66	0.64	2.1	0.0	2.74
56	V29	V30		X	15.17	3.81	3.17	4.57	0.0	0.0	0.0	0.0
57	V30	V31		X	15.17	4.3	3.17	5.16	0.0	0.0	0.0	0.0
58	V31	V32		X	15.17	4.24	3.17	5.09	0.0	0.0	0.0	0.0
59	V29	V33		X	6.63	3.79	2.49	4.55	0.0	1.0	0.0	1.0
60	V30	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
61	V31	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
62	V32	V33		X	8.35	3.79	2.7	4.55	0.0	1.0	0.0	1.0

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	77	120	14.396	0	0.59	10	1594.9
2	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	54	120	14.396	0	0.59	10	1594.9
3	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	66	120	14.396	0	0.59	10	1594.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
4	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	43	120	14.396	0	0.59	10	1594.9
5	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	98	120	14.396	0	0.59	10	1594.9
6	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 50'-2" and 53'-5.76"	3.31	82	120	14.396	0	0.59	10	1594.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
7	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	100	120	14.396	0	0.59	10	1594.9
8	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	70	120	14.396	0	0.59	10	1594.9
9	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	98	120	14.396	0	0.59	10	1594.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
10	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	68	120	14.396	0	0.59	10	1594.9
11	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	127	120	14.396	0	0.59	10	1594.9
12	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 53'-5.76" and 57'-9.32"	4.30	107	120	14.396	0	0.59	10	1594.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
13	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	100	120	14.396	0	0.59	10	1594.9
14	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	70	120	14.396	0	0.59	10	1594.9
15	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	98	120	14.396	0	0.59	10	1594.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
16	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	68	120	14.396	0	0.59	10	1594.9
17	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	127	120	14.396	0	0.59	10	1594.9
18	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 57'-9.32" and 62'-0.88"	4.29	107	120	14.396	0	0.58	10	1624.1

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
19	Enclosed area by regenerative Hx,support strcture, SE wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	99	120	14.396	0	0.58	10	1624.1
20	Enclosed area by regenerative Hx,support strcture, NW wall,and SW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	70	120	14.396	0	0.58	10	1624.1
21	Enclosed area by regenerative Hx,support strcture, and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	98	120	14.396	0	0.58	10	1624.1

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
22	Enclosed area by regenerative Hx,support strcture, and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	69	120	14.396	0	0.58	10	1624.1
23	Enclosed area by regenerative Hx,support strcture, NE wall,and SE wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	126	120	14.396	0	0.58	10	1624.1
24	Enclosed area by regenerative Hx,support strcture, NE wall,and NW wall in regenerative Hx room:between EL 62'-0.88" and 66'-3"	4.18	106	120	14.396	0	0.58	10	1624.1
25	Southwest part of piping room divided into 3 parts	16.42	501	120	14.396	0	10.60	16	50.9

Table 7.5-8 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
26	Central part of piping room divided into 3 parts	16.42	501	120	14.396	0	10.60	16	50.9
27	Northeast part of piping room divided into 3 parts	16.42	501	120	14.396	0	10.60	16	50.9
28	Opening to piping room	6.58	22	120	14.396	0	9.60	16	66.7
29	Corridor:between EL 50'-2" and 53'-5.76"	3.31	50	120	14.396	0	0.75	10	1233.3
30	Corridor:between EL 53'-5.76" and 57'-9.32"	4.30	65	120	14.396	0	0.75	10	1233.3
31	Corridor:between EL 57'-9.32" and 62'-0.88"	4.29	65	120	14.396	0	0.58	10	1624.1
32	Corridor:between EL 62'-0.88" and 66'-3"	4.18	63	120	14.396	0	0.58	10	1624.1
33	Containment Building Free Volume	200	2740000	120	14.396	0	-	-	-

Table 7.5-9 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	15.38	3.55	3.35	4.26	0.0	1.0	0.5	1.5
2	V1	V3		X	11.23	5.89	3.09	7.07	0.0	1.0	0.5	1.5
3	V2	V4		X	7.22	5.89	2.67	7.07	0.0	1.0	0.5	1.5
4	V3	V4		X	10.50	3.55	2.73	4.26	0.0	1.0	0.5	1.5
5	V3	V5		X	11.23	6.47	3.09	7.76	0.0	1.0	0.5	1.5
6	V4	V6		X	7.22	7.35	2.67	8.82	0.0	1.0	0.5	1.5
7	V5	V6		X	25.45	3.73	4.2	4.48	0.0	1.0	0.5	1.5
8	V6	V29		X	6.63	7.5	2.49	9	0.0	0.0	0.5	0.5
9	V1	V7		X	20.96	3.81	4.19	4.57	0.0	1.0	0.5	1.5
10	V2	V8		X	14.03	3.81	3.18	4.57	0.0	1.0	0.5	1.5
11	V3	V9		X	19.26	3.81	4.2	4.57	0.0	1.0	0.5	1.5
12	V4	V10		X	12.30	3.81	3.08	4.57	0.0	1.0	0.5	1.5
13	V5	V11		X	27.26	3.81	4.47	4.57	0.0	1.0	0.5	1.5
14	V6	V12		X	22.60	3.81	3.85	4.57	0.0	1.0	0.5	1.5
15	V7	V8		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
16	V7	V9		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
17	V8	V10		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
18	V9	V10		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
19	V9	V11		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
20	V10	V12		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
21	V11	V12		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
22	V12	V30		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
23	V7	V13		X	12.58	2.62	4.19	10.94	0.0	1.0	0.5	1.5
24	V8	V14		X	8.42	2.62	3.18	9.52	0.0	1.0	0.5	1.5

Table 7.5-9 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
25	V9	V15		X	11.56	2.62	4.2	10.96	0.0	1.0	0.5	1.5
26	V10	V16		X	7.38	2.62	3.08	9.38	0.0	1.0	0.5	1.5
27	V11	V17		X	16.36	2.62	4.47	11.34	0.0	1.0	0.5	1.5
28	V12	V18		X	13.56	2.62	3.85	10.46	0.0	1.0	0.5	1.5
29	V13	V14		X	18.60	3.55	3.66	4.26	0.0	1.0	0.5	1.5
30	V13	V15		X	16.56	5.89	4.11	7.07	0.0	1.0	0.5	1.5
31	V14	V16		X	11.50	5.89	3.34	7.07	0.0	1.0	0.5	1.5
32	V15	V16		X	15.11	3.55	3.57	4.26	0.0	1.0	0.5	1.5
33	V15	V17		X	16.56	6.47	4.11	7.76	0.0	1.0	0.5	1.5
34	V16	V18		X	11.50	7.35	3.34	8.82	0.0	1.0	0.5	1.5
35	V17	V18		X	31.06	3.73	4.74	4.48	0.0	1.0	0.5	1.5
36	V18	V31		X	8.59	7.5	2.73	9	0.0	0.0	0.5	0.5
37	V13	V19		X	20.96	4.24	4.19	5.09	0.0	1.0	0.5	1.5
38	V14	V20		X	14.03	4.24	3.18	5.09	0.0	1.0	0.5	1.5
39	V15	V21		X	19.26	4.24	4.2	5.09	0.0	1.0	0.5	1.5
40	V16	V22		X	12.30	4.24	3.08	5.09	0.0	1.0	0.5	1.5
41	V17	V23		X	27.26	4.24	4.47	5.09	0.0	1.0	0.5	1.5
42	V18	V24		X	22.60	4.24	3.85	5.09	0.0	1.0	0.5	1.5
43	V19	V20		X	21.23	3.55	4.22	4.26	0.0	1.0	0.5	1.5
44	V19	V21		X	16.66	5.89	4.1	7.07	0.0	1.0	0.5	1.5
45	V20	V22		X	11.74	5.89	3.38	7.07	0.0	1.0	0.5	1.5
46	V21	V22		X	19.53	3.55	4.24	4.26	0.0	1.0	0.5	1.5
47	V21	V23		X	16.66	6.47	4.1	7.76	0.0	1.0	0.5	1.5
48	V22	V24		X	11.74	7.35	3.38	8.82	0.0	1.0	0.5	1.5
49	V23	V24		X	33.37	3.73	5.14	4.48	0.0	1.0	0.5	1.5

Table 7.5-9 Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room Nodal Description
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 27

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
50	V24	V32		X	8.35	7.5	2.7	9	0.0	0.0	0.5	0.5
51	V25	V26		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
52	V26	V27		X	91.66	5.76	8.33	6.91	0.0	0.0	0.0	0.0
53	V27	V28		X	13.17	3.92	3.07	4.7	0.0	0.0	0.5	0.5
54	V28	V29	X		6.63	2.22	2.49	2.66	0.64	2.1	0.0	2.74
55	V28	V30	X		6.54	2.22	2.48	2.66	0.64	2.1	0.0	2.74
56	V29	V30		X	15.17	3.81	3.17	4.57	0.0	0.0	0.0	0.0
57	V30	V31		X	15.17	4.3	3.17	5.16	0.0	0.0	0.0	0.0
58	V31	V32		X	15.17	4.24	3.17	5.09	0.0	0.0	0.0	0.0
59	V29	V33		X	6.63	3.79	2.49	4.55	0.0	1.0	0.0	1.0
60	V30	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
61	V31	V33		X	8.59	3.79	2.73	4.55	0.0	1.0	0.0	1.0
62	V32	V33		X	8.35	3.79	2.7	4.55	0.0	1.0	0.0	1.0

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0	0	547.478
0.001	265.636	547.478
0.002	226.818	552.579
0.003	217.104	550.99
0.004	240.192	547.642
0.005	233.745	546.735
0.006	214.337	547.222
0.007	205.432	550.659
0.008	201.788	552.362
0.009	205.368	550.036
0.01	216.964	546.693
0.011	226.881	545.718
0.012	225.618	546.307
0.013	217.658	546.74
0.014	210.022	546.905
0.015	204.953	547.068
0.016	202.222	547.432
0.017	200.889	547.949
0.018	200.642	548.265
0.019	201.552	548.129
0.02	203.853	547.559
0.021	207.341	546.844
0.022	211.17	546.289
0.023	214.556	545.946
0.024	216.457	545.932
0.025	216.229	546.187
0.026	213.988	546.517
0.027	210.651	546.798
0.028	206.993	546.989
0.029	203.637	546.975
0.03	200.694	546.934
0.031	198.308	546.898
0.032	196.543	546.863
0.033	195.401	546.83
0.034	194.836	546.794
0.035	194.779	546.75
0.036	195.152	546.69
0.037	195.875	546.609
0.038	196.877	546.504
0.039	198.083	546.381
0.04	199.419	546.247

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.041	200.808	546.115
0.042	202.165	545.998
0.043	203.408	545.908
0.044	204.458	545.857
0.045	205.245	545.852
0.046	205.709	545.901
0.047	205.812	546.006
0.048	205.521	546.165
0.049	204.795	546.365
0.05	203.626	546.582
0.051	202.084	546.797
0.052	200.275	546.996
0.053	198.311	547.171
0.054	196.289	547.318
0.055	194.289	547.434
0.056	193.465	548.732
0.057	192.847	548.225
0.058	191.541	547.964
0.059	190.327	547.848
0.06	190.804	549.901
0.061	189.851	548.615
0.062	189.516	548.044
0.063	189.416	547.71
0.064	189.319	547.465
0.065	189.354	547.229
0.066	189.682	546.993
0.067	190.309	546.751
0.068	191.213	546.496
0.069	192.371	546.228
0.07	193.76	545.951
0.071	195.362	545.671
0.072	197.162	545.393
0.073	199.14	545.123
0.074	201.226	544.939
0.075	203.526	544.733
0.076	205.979	544.521
0.077	208.521	544.323
0.078	211.103	544.147
0.079	213.662	543.992
0.08	216.109	543.84
0.081	218.465	543.678
0.082	220.814	543.513

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.083	223.208	543.357
0.084	225.639	543.224
0.085	228.057	543.122
0.086	230.393	543.06
0.087	232.58	543.039
0.088	234.568	543.062
0.089	236.324	543.124
0.09	237.837	543.22
0.091	239.116	543.343
0.092	240.182	543.486
0.093	241.061	543.642
0.094	241.783	543.803
0.095	242.382	543.964
0.096	242.888	544.121
0.097	243.328	544.271
0.098	243.729	544.41
0.099	244.112	544.538
0.1	244.496	544.654
0.101	244.9	544.757
0.102	245.338	544.848
0.103	245.826	544.926
0.104	246.376	544.993
0.105	247.004	545.049
0.106	247.723	545.091
0.107	248.599	545.105
0.108	249.731	545.094
0.109	251.102	545.069
0.11	252.623	545.044
0.111	254.184	545.031
0.112	255.684	545.036
0.113	257.058	545.062
0.114	258.268	545.108
0.115	259.304	545.169
0.116	260.183	545.24
0.117	260.923	545.315
0.118	261.536	545.388
0.119	262.049	545.458
0.12	262.487	545.523
0.121	262.876	545.582
0.122	263.238	545.633
0.123	263.589	545.678
0.124	263.942	545.716

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.125	264.285	545.743
0.126	264.659	545.754
0.127	265.069	545.759
0.128	265.46	545.769
0.129	265.812	545.785
0.13	266.127	545.805
0.131	266.409	545.829
0.132	266.66	545.854
0.133	266.879	545.881
0.134	267.064	545.909
0.135	267.21	545.939
0.136	267.313	545.969
0.137	267.376	546
0.138	267.4	546.03
0.139	267.39	546.06
0.14	267.352	546.088
0.141	267.294	546.115
0.142	267.224	546.139
0.143	267.171	546.161
0.144	267.2	546.181
0.145	267.297	546.194
0.146	267.431	546.202
0.147	267.582	546.209
0.148	267.749	546.215
0.149	267.949	546.22
0.15	268.206	546.223
0.151	268.541	546.224
0.152	268.964	546.221
0.153	269.478	546.218
0.154	270.08	546.215
0.155	270.756	546.214
0.156	271.485	546.216
0.157	272.256	546.223
0.158	273.056	546.233
0.159	273.871	546.247
0.16	274.688	546.265
0.161	275.492	546.287
0.162	276.27	546.312
0.163	277.014	546.339
0.164	277.717	546.368
0.165	278.361	546.396
0.166	278.93	546.423

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.167	279.456	546.448
0.168	279.97	546.471
0.169	280.481	546.493
0.17	280.981	546.512
0.171	281.459	546.531
0.172	281.907	546.549
0.173	282.321	546.566
0.174	282.691	546.582
0.175	282.975	546.596
0.176	283.199	546.607
0.177	283.424	546.615
0.178	283.688	546.622
0.179	284	546.627
0.18	284.353	546.631
0.181	284.734	546.637
0.182	285.133	546.645
0.183	285.537	546.654
0.184	285.94	546.665
0.185	286.37	546.678
0.186	286.947	546.699
0.187	287.358	546.723
0.188	287.592	546.749
0.189	287.78	546.774
0.19	288.012	546.797
0.191	288.316	546.817
0.192	288.69	546.835
0.193	289.133	546.852
0.194	289.642	546.87
0.195	290.213	546.887
0.196	290.835	546.905
0.197	291.501	546.924
0.198	292.147	546.942
0.199	292.833	546.958
0.2	293.615	546.976
0.205	297.45	547.074
0.21	301.23	547.14
0.215	306.194	547.298
0.22	310.625	547.44
0.225	314.247	547.563
0.23	317.415	547.681
0.235	320.909	547.793
0.24	326.628	547.887

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.245	332.913	547.985
0.25	338.101	548.069
0.255	340.801	548.143
0.26	342.274	548.211
0.265	343.448	548.275
0.27	344.849	548.338
0.275	346.964	548.404
0.28	350.946	548.476
0.285	356.565	548.555
0.29	361.685	548.636
0.295	363.843	548.708
0.3	363.331	548.768
0.305	362.508	548.823
0.31	362.4	548.877
0.315	362.564	548.932
0.32	362.785	548.985
0.325	363.283	549.039
0.33	364.743	549.095
0.335	367.012	549.154
0.34	368.237	549.211
0.345	367.667	549.261
0.35	366.382	549.307
0.355	365.631	549.353
0.36	365.452	549.399
0.365	365.307	549.446
0.37	365.141	549.491
0.375	365.196	549.537
0.38	365.66	549.583
0.385	366.393	549.629
0.39	366.829	549.675
0.395	366.537	549.718
0.4	365.827	549.759
0.405	365.341	549.799
0.41	365.226	549.839
0.415	365.173	549.878
0.42	365.032	549.917
0.425	364.966	549.955
0.43	365.1	549.993
0.435	365.351	550.03
0.44	365.475	550.067
0.445	365.311	550.102
0.45	364.974	550.136

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
0.455	364.734	550.169
0.46	364.666	550.202
0.465	364.625	550.234
0.47	364.513	550.265
0.475	364.408	550.295
0.48	364.407	550.325
0.485	364.484	550.354
0.49	364.533	550.382
0.495	364.49	550.41
0.5	364.393	550.436
0.6	364.879	550.699
0.7	364.487	550.791
0.8	364.133	550.811
0.9	364.022	550.81
1	364.088	550.807
1.1	364.07	550.808
1.2	364.157	550.811
1.3	364.335	550.816
1.4	364.418	550.823
1.5	364.459	550.831
1.6	364.532	550.84
1.7	364.457	550.848
1.8	364.083	550.856
1.9	363.946	550.864
2	363.647	550.871
2.1	363.176	550.878
2.2	362.863	550.884
2.3	362.408	550.891
2.4	362.068	550.897
2.5	361.757	550.904
2.6	361.732	550.913
2.7	361.402	550.922
2.8	361.264	550.932
2.9	361.199	550.943
3	361.207	550.956
3.1	361.248	550.97
3.2	361.118	550.985
3.3	361.233	551
3.4	361.159	551.016
3.5	361.137	551.032
3.6	360.957	551.049
3.7	360.867	551.065

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
3.8	360.861	551.081
3.9	360.749	551.097
4	360.537	551.113
4.1	360.456	551.13
4.2	360.277	551.146
4.3	360.227	551.162
4.4	360.083	551.178
4.5	360.071	551.195
4.6	359.961	551.213
4.7	359.729	551.23
4.8	359.627	551.248
4.9	359.422	551.267
5	359.319	551.286
5.1	359.345	551.305
5.2	359.243	551.325
5.3	359.03	551.345
5.4	358.935	551.366
5.5	358.944	551.387
5.6	358.86	551.409
5.7	358.668	551.431
5.8	358.608	551.453
5.9	358.456	551.476
6	358.437	551.498
6.1	358.312	551.521
6.2	358.086	551.544
6.3	357.982	551.566
6.4	357.789	551.589
6.5	357.715	551.612
6.6	357.757	551.635
6.7	357.685	551.657
6.8	357.484	551.679
6.9	357.394	551.701
7	357.416	551.722
7.1	357.312	551.743
7.2	357.07	551.763
7.3	356.941	551.783
7.4	356.907	551.802
7.5	356.965	551.82
7.6	356.889	551.838
7.7	356.681	551.855
7.8	356.561	551.871
7.9	356.54	551.886

Table 7.5-10 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 20, 27

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate* (lbm/s)	Enthalpy (BTU/lbm)
8	356.373	551.9
8.1	356.294	551.914
8.2	356.301	551.926
8.3	356.151	551.938
8.4	356.093	551.949
8.5	356.082	551.959
8.6	355.948	551.969
8.7	355.867	551.977
8.8	355.849	551.985
8.9	355.908	551.992
9	355.773	551.998
9.1	355.714	552.004
9.2	355.708	552.009
9.3	355.53	552.013
9.4	355.627	552.017
9.5	355.535	552.019
9.6	355.502	552.022
9.7	355.286	552.023
9.8	355.334	552.025
9.9	355.209	552.025
10	355.359	552.026

Figure 7.5-1 Nodalization Scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve room

Figure 7.5-2 Nodalization scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room

Figure 7.5-3 Nodalization scheme of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room

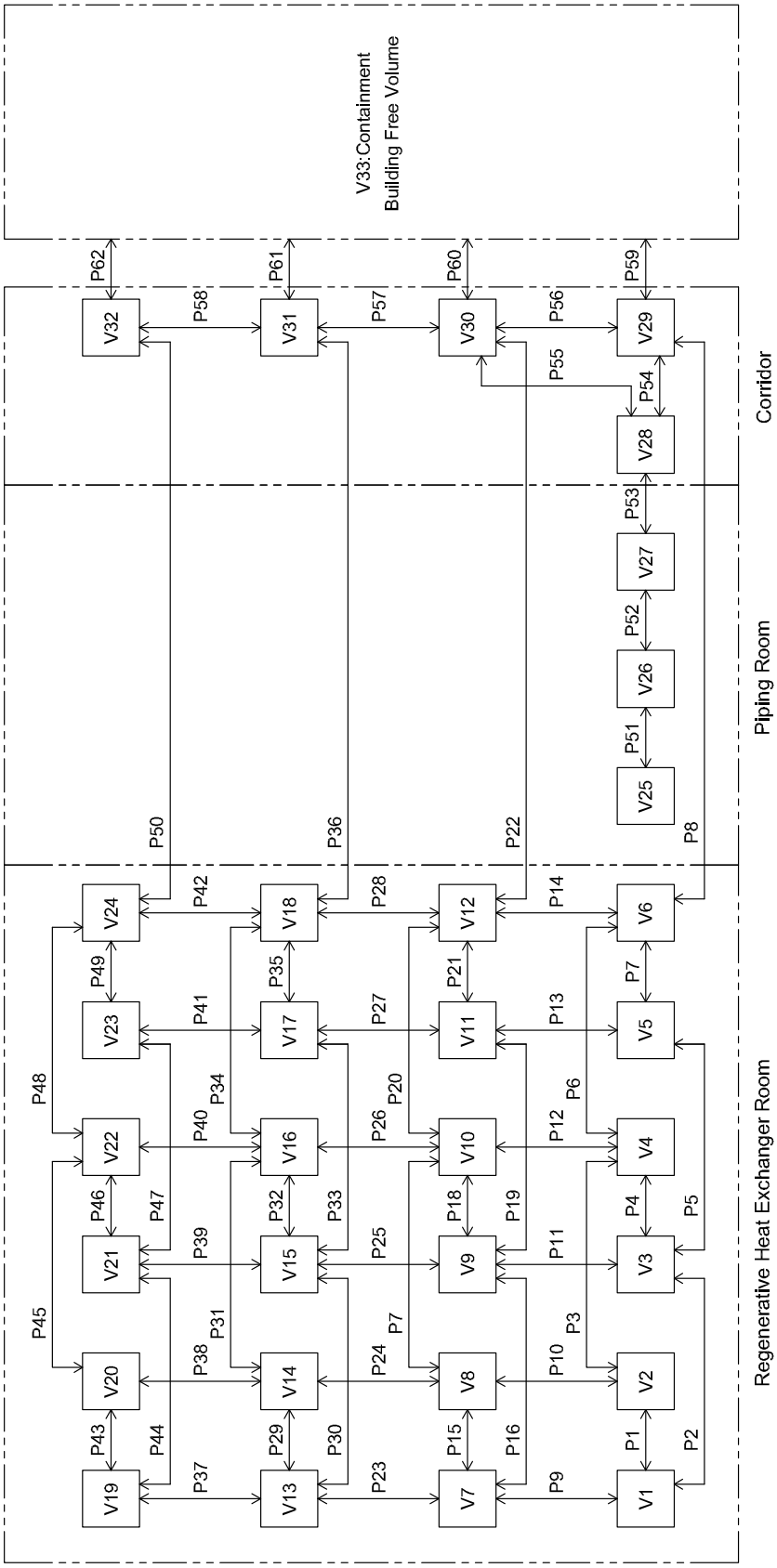

Figure 7.5-4 Nodalization Dagram of Regenerative Heat Exchanger Room and Regenerative Heat Exchanger Valve Room

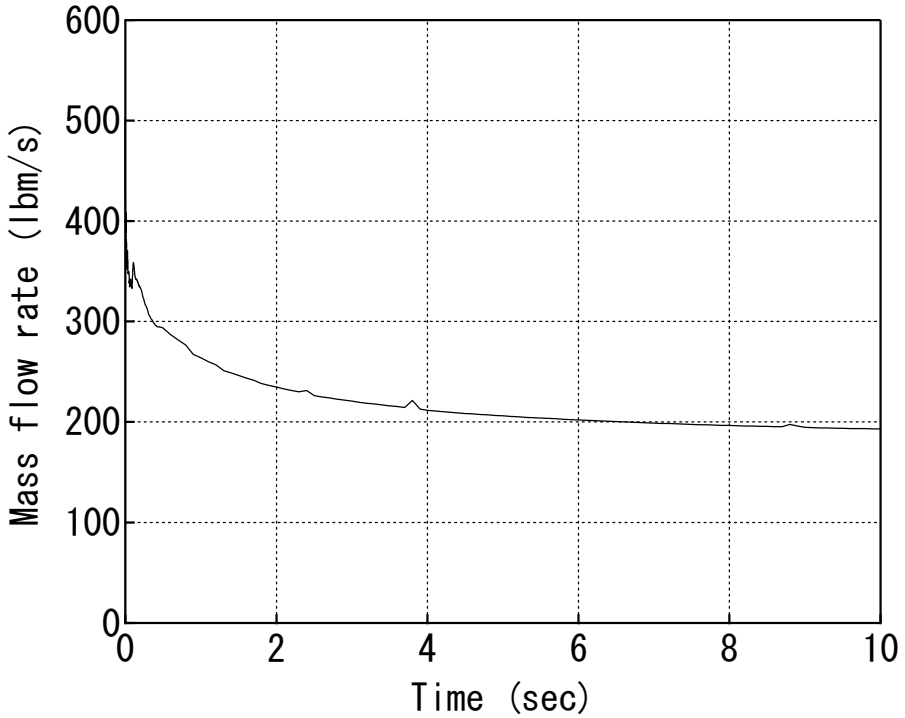

Figure 7.5-5 Short Term Mass and Energy Release Data for Charging Line (4B) Break (1/2)

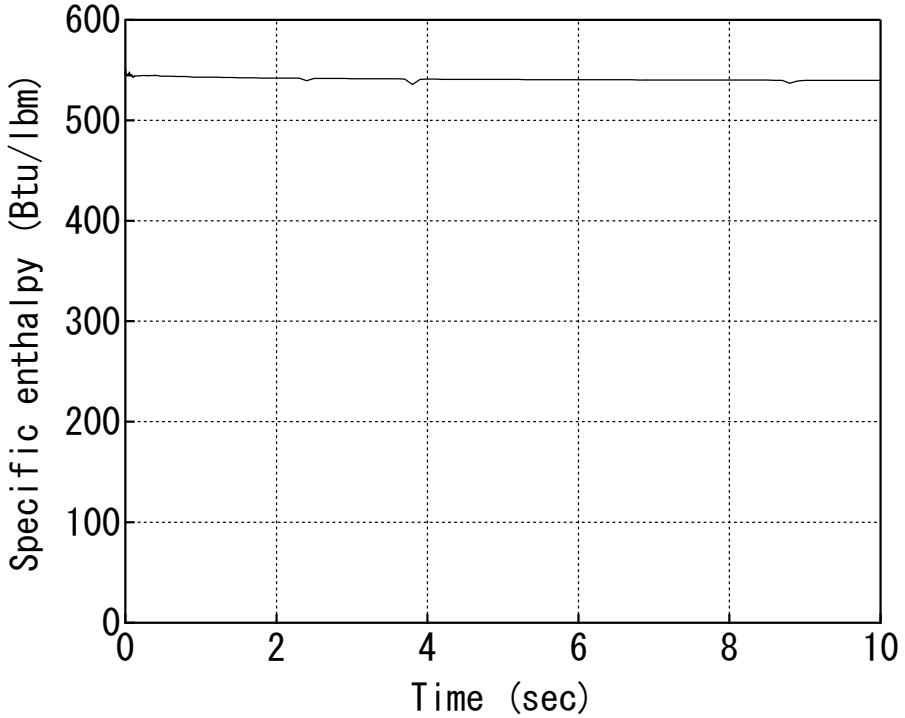

Figure 7.5-6 Short Term Mass and Energy Release Data for Charging Line (4B) Break (2/2)

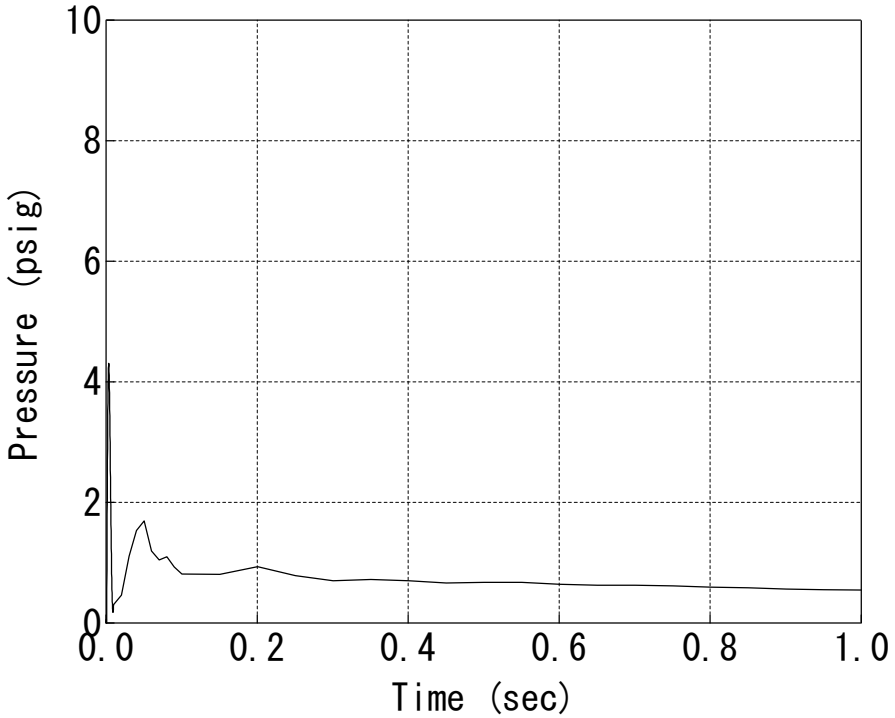

Figure 7.5-7 Pressure Transient at Peak Pressure Node (V6) for Charging Line (4B) Break in Regenerative Heat Exchanger Room Nodal Description

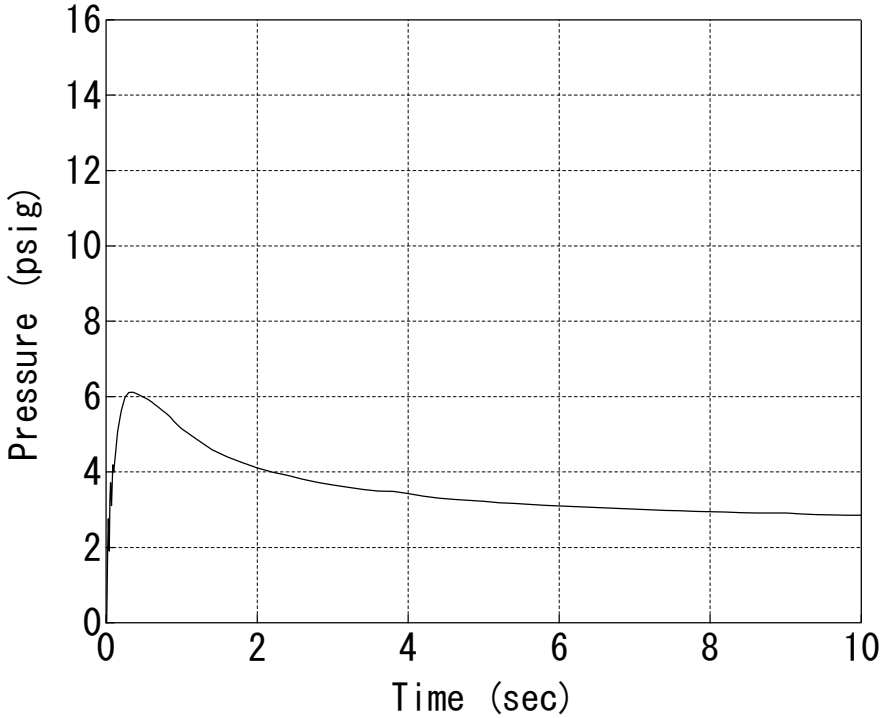

Figure 7.5-8 Pressure Transient at Peak Pressure Node (V25) for Charging Line (4B) Break in Regenerative Heat Exchanger Valve Room Nodal Description

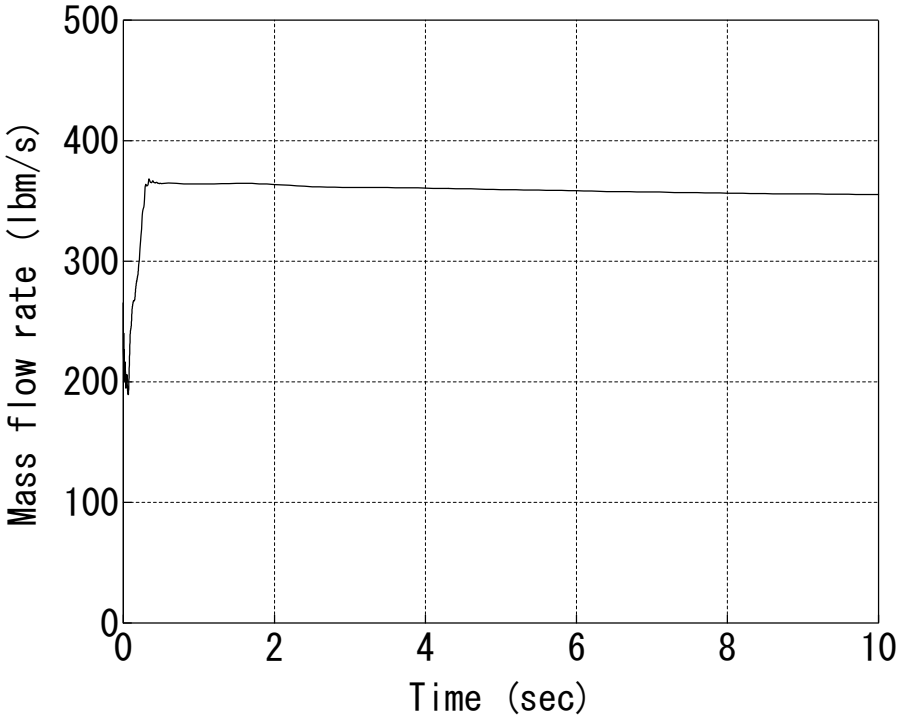

Figure 7.5-9 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (1/2)

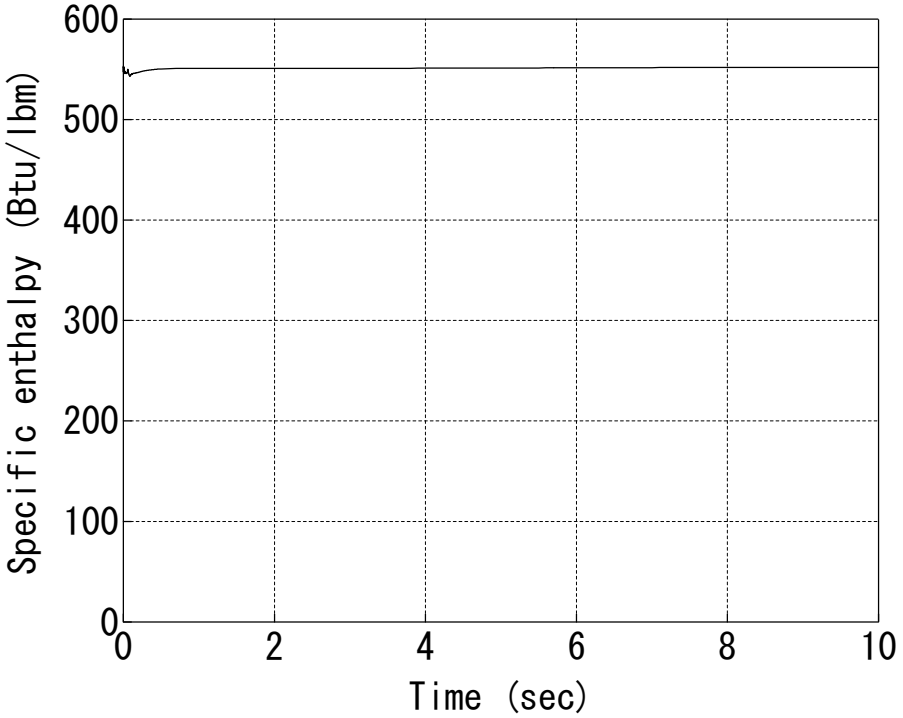

Figure 7.5-10 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (2/2)

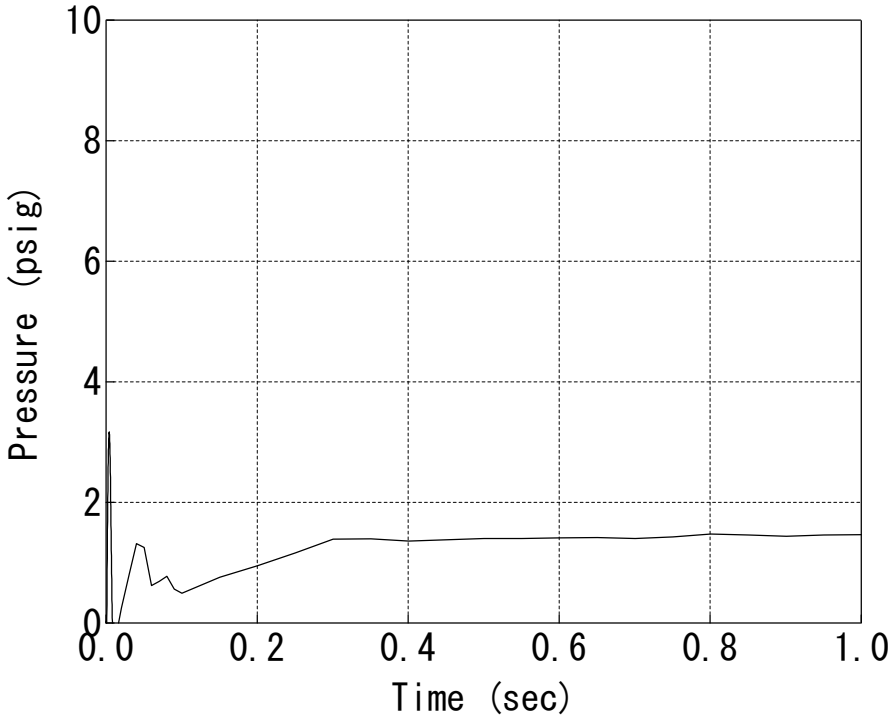

Figure 7.5-11 Pressure Transient at Peak Pressure Node (V20) for Letdown Line (3B) Break in Regenerative Heat Exchanger Room Nodal Description

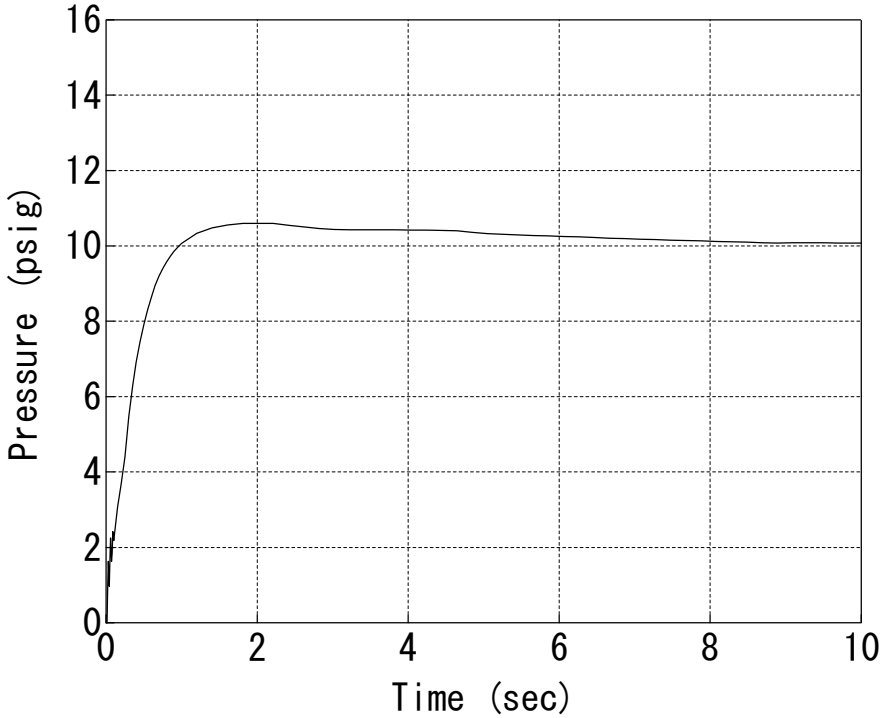

Figure 7.5-12 Pressure Transient at Peak Pressure Node (V25) for Letdown Line (3B) Break in Regenerative Heat Exchanger Valve Room Nodal Description

7.6 Letdown Heat Exchanger Room

7.6.1 Modeling and nodalization sensitivity study

(a) Base Nodal description

The nodalization scheme for US-APWR Letdown heat exchanger room is shown in Figure 7.6-1 and the nodalization diagram is shown in Figure 7.6-2. A total of 10 nodes, including the containment atmosphere node, are used for the regenerative heat exchanger room and regenerative heat exchanger valve room analyses.

The description and geometric parameters for each node are summarized in Table 7.6-1. The free volume of each node was estimated by subtracting the obstructed volume from the room volume. The obstructed volume was estimated from the volume of main components with margin to assure minimum free volume. This assumption generates conservative results.

(b) Nodalization sensitivity study

Nodalization sensitivity study for the letdown heat exchanger room is not necessary because the modeling includes all obstructions that may significantly influence the pressure losses. Additionally all node peak pressures are very small and much less than the design pressure for all nodes for the worst case as shown on Table 7.6-1.

(c) Vent path description

The vent path connection diagram is shown in Figure 7.6-2. Geometric and hydraulic parameters for each vent path are summarized in Table 7.6-2.

Vent path P15 runs from the letdown heat exchanger room to containment atmosphere node.

The flow area of each vent path is conservatively estimated considering the flow obstruction by main components, including margin. The friction length is conservatively estimated considering the length of expected flow line plus margin. The loss coefficient is conservatively estimated considering the effect of obstruction, contraction and expansion.

7.6.2 Short term mass and energy release data

The analysis of short term mass and energy release is performed using M-RELAP5 code which is also used for the small break LOCA analysis for the US-APWR. Nodalization of reactor coolant system for short term mass and energy release is same as the small break LOCA analysis.

(a) Letdown line break

Break mass and energy flow is released from the cross-over leg side and CVCS side. For the cross-over leg side, the pressure at the break location will be less than the cross-over leg due to the pressure drop at the elbows. The letdown line between the cross-over leg and the break location is included in the model to account for the pressure drop in the letdown line. The line to the inlet of the regenerative heat exchanger room was conservatively modeled as the end of the

letdown line and the loss coefficients for the elbows were conservatively assumed at minimum value. The initial pressure and temperature were conservatively set to the maximum values of pressure and temperature in the letdown line. The resultant short term mass and energy release data are shown in Table 7.6-3 and the transient of break mass flow rate and enthalpy are shown in Figure 7.6-3 and Figure 7.6-4.

The mass and energy flow from the CVCS side is the break is relatively small because the temperature and pressure of CVCS are much lower than that of RCS. However, to calculate subcompartment analysis conservatively, the break mass and energy flow from the CVCS side of the break is assumed to be the same as that from the cross-over side.

7.6.3 Calculated pressure responses

The break location is not precisely known so multiple simulations were run. For the run series, the break was sequentially relocated to each of the nodes that the line passes through. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in node V2.

The worst calculated peak pressure was 4.8 psig at the break node V2. The pressure transient at V2 is shown in Figure 7.6-5. The design pressure for all nodes in the letdown heat exchanger room is 10 psig and the calculated peak pressure is much less than the design pressure as shown on Table 7.6-1.

Table 7.6-1 Letdown Heat Exchanger Room Nodal Description

Break Type : Letdown line (4B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
1	Northeast quadrant in letdown Hx room:between EL 50'-2" and 55'-0.73"	4.89	110	120	14.4	0	4.55	10	119.8
2	Southeast quadrant in letdown Hx room:between EL 50'-2" and 55'-0.73"	4.89	62	120	14.4	0	5.14	10	94.6
3	Northwest quadrant in letdown Hx room:between EL 50'-2" and 55'-0.73"	4.89	225	120	14.4	0	4.51	10	121.7
4	Southwest quadrant in letdown Hx room:between EL 50'-2" and 55'-0.73"	4.89	132	120	14.4	0	4.48	10	123.2
5	Northeast quadrant in letdown Hx room:between EL 55'-0.73" and 74'-5"	19.36	437	120	14.4	0	4.51	10	121.7
6	Southeast quadrant in letdown Hx room:between EL 55'-0.73" and 74'-5"	19.36	257	120	14.4	0	4.51	10	121.7

Table 7.6-1 Letdown Heat Exchanger Room Nodal Description

Break Type : Letdown line (4B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions			Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff (psid)	Margin (%)
				Temp. (deg F)	Press. (psia)	Humid. (%)			
7	Northwest quadrant in letdown Hx room:between EL 55'-0.73" and 74'-5"	19.36	869	120	14.4	0	4.50	10	122.2
8	Southwest quadrant in letdown Hx room:between EL 55'-0.73" and 74'-5"	19.36	521	120	14.4	0	4.50	10	122.2
9	Doorway	6.92	166	120	14.4	0	3.95	10	153.2
10	Containment Building Free Volume	200	2740000	120	14.4	0	-	-	-

Table 7.6-2 Letdown Heat Exchanger Room Nodal Description

Break Type : Charging line (4B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 6

Vent Path No.	Volume No.		Description of Vent Path Flow		Area (ft^2)	Inertia Length (ft)	Hydraulic Diameter (ft)	Friction Length (ft)	Loss Coefficient K			
	From	To	Choked	Unchoked					Turning and Obstruction	Expansion	Contraction	Total
1	V1	V2		X	10.28	6.32	2.84	7.58	0.0	1.0	0.5	1.5
2	V1	V3		X	22.51	6.69	4.62	8.03	0.0	1.0	0.5	1.5
3	V2	V4		X	10.28	6.93	2.84	8.32	0.0	1.0	0.5	1.5
4	V3	V4		X	28.22	5.97	5.18	7.16	0.0	1.0	0.5	1.5
5	V1	V5		X	21.88	12.13	4.42	14.56	0.0	1.0	0.5	1.5
6	V2	V6		X	12.09	12.13	3.27	14.56	0.0	1.0	0.5	1.5
7	V3	V7		X	45.41	12.13	6.7	14.56	0.0	1.0	0.5	1.5
8	V4	V8		X	26.45	12.13	4.78	14.56	0.0	1.0	0.5	1.5
9	V5	V6		X	52.07	6.32	4.51	7.58	0.0	1.0	0.5	1.5
10	V5	V7		X	100.46	6.69	7.85	8.03	0.0	1.0	0.5	1.5
11	V6	V8		X	52.07	6.93	4.51	8.32	0.0	1.0	0.5	1.5
12	V7	V8		X	123.04	5.97	9.19	7.16	0.0	1.0	0.5	1.5
13	V4	V9		X	14.68	5.82	5.84	6.98	0.0	0.0	0.5	0.5
14	V8	V9		X	6.07	5.82	1.54	6.98	0.0	0.0	0.5	0.5
15	V9	V10		X	20.75	4.5	4.19	5.4	2.5	1.0	0.0	3.5

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0	0	547.478
0.001	265.636	547.478
0.002	226.818	552.579
0.003	217.104	550.99
0.004	240.192	547.642
0.005	233.745	546.735
0.006	214.337	547.222
0.007	205.432	550.659
0.008	201.788	552.362
0.009	205.368	550.036
0.01	216.964	546.693
0.011	226.881	545.718
0.012	225.618	546.307
0.013	217.658	546.74
0.014	210.022	546.905
0.015	204.953	547.068
0.016	202.222	547.432
0.017	200.889	547.949
0.018	200.642	548.265
0.019	201.552	548.129
0.02	203.853	547.559
0.021	207.341	546.844
0.022	211.17	546.289
0.023	214.556	545.946
0.024	216.457	545.932
0.025	216.229	546.187
0.026	213.988	546.517
0.027	210.651	546.798
0.028	206.993	546.989
0.029	203.637	546.975
0.03	200.694	546.934
0.031	198.308	546.898
0.032	196.543	546.863
0.033	195.401	546.83
0.034	194.836	546.794
0.035	194.779	546.75
0.036	195.152	546.69
0.037	195.875	546.609
0.038	196.877	546.504
0.039	198.083	546.381
0.04	199.419	546.247

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.041	200.808	546.115
0.042	202.165	545.998
0.043	203.408	545.908
0.044	204.458	545.857
0.045	205.245	545.852
0.046	205.709	545.901
0.047	205.812	546.006
0.048	205.521	546.165
0.049	204.795	546.365
0.05	203.626	546.582
0.051	202.084	546.797
0.052	200.275	546.996
0.053	198.311	547.171
0.054	196.289	547.318
0.055	194.289	547.434
0.056	193.465	548.732
0.057	192.847	548.225
0.058	191.541	547.964
0.059	190.327	547.848
0.06	190.804	549.901
0.061	189.851	548.615
0.062	189.516	548.044
0.063	189.416	547.71
0.064	189.319	547.465
0.065	189.354	547.229
0.066	189.682	546.993
0.067	190.309	546.751
0.068	191.213	546.496
0.069	192.371	546.228
0.07	193.76	545.951
0.071	195.362	545.671
0.072	197.162	545.393
0.073	199.14	545.123
0.074	201.226	544.939
0.075	203.526	544.733
0.076	205.979	544.521
0.077	208.521	544.323
0.078	211.103	544.147
0.079	213.662	543.992
0.08	216.109	543.84
0.081	218.465	543.678
0.082	220.814	543.513

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.083	223.208	543.357
0.084	225.639	543.224
0.085	228.057	543.122
0.086	230.393	543.06
0.087	232.58	543.039
0.088	234.568	543.062
0.089	236.324	543.124
0.09	237.837	543.22
0.091	239.116	543.343
0.092	240.182	543.486
0.093	241.061	543.642
0.094	241.783	543.803
0.095	242.382	543.964
0.096	242.888	544.121
0.097	243.328	544.271
0.098	243.729	544.41
0.099	244.112	544.538
0.1	244.496	544.654
0.101	244.9	544.757
0.102	245.338	544.848
0.103	245.826	544.926
0.104	246.376	544.993
0.105	247.004	545.049
0.106	247.723	545.091
0.107	248.599	545.105
0.108	249.731	545.094
0.109	251.102	545.069
0.11	252.623	545.044
0.111	254.184	545.031
0.112	255.684	545.036
0.113	257.058	545.062
0.114	258.268	545.108
0.115	259.304	545.169
0.116	260.183	545.24
0.117	260.923	545.315
0.118	261.536	545.388
0.119	262.049	545.458
0.12	262.487	545.523
0.121	262.876	545.582
0.122	263.238	545.633
0.123	263.589	545.678
0.124	263.942	545.716

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.125	264.285	545.743
0.126	264.659	545.754
0.127	265.069	545.759
0.128	265.46	545.769
0.129	265.812	545.785
0.13	266.127	545.805
0.131	266.409	545.829
0.132	266.66	545.854
0.133	266.879	545.881
0.134	267.064	545.909
0.135	267.21	545.939
0.136	267.313	545.969
0.137	267.376	546
0.138	267.4	546.03
0.139	267.39	546.06
0.14	267.352	546.088
0.141	267.294	546.115
0.142	267.224	546.139
0.143	267.171	546.161
0.144	267.2	546.181
0.145	267.297	546.194
0.146	267.431	546.202
0.147	267.582	546.209
0.148	267.749	546.215
0.149	267.949	546.22
0.15	268.206	546.223
0.151	268.541	546.224
0.152	268.964	546.221
0.153	269.478	546.218
0.154	270.08	546.215
0.155	270.756	546.214
0.156	271.485	546.216
0.157	272.256	546.223
0.158	273.056	546.233
0.159	273.871	546.247
0.16	274.688	546.265
0.161	275.492	546.287
0.162	276.27	546.312
0.163	277.014	546.339
0.164	277.717	546.368
0.165	278.361	546.396
0.166	278.93	546.423

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.167	279.456	546.448
0.168	279.97	546.471
0.169	280.481	546.493
0.17	280.981	546.512
0.171	281.459	546.531
0.172	281.907	546.549
0.173	282.321	546.566
0.174	282.691	546.582
0.175	282.975	546.596
0.176	283.199	546.607
0.177	283.424	546.615
0.178	283.688	546.622
0.179	284	546.627
0.18	284.353	546.631
0.181	284.734	546.637
0.182	285.133	546.645
0.183	285.537	546.654
0.184	285.94	546.665
0.185	286.37	546.678
0.186	286.947	546.699
0.187	287.358	546.723
0.188	287.592	546.749
0.189	287.78	546.774
0.19	288.012	546.797
0.191	288.316	546.817
0.192	288.69	546.835
0.193	289.133	546.852
0.194	289.642	546.87
0.195	290.213	546.887
0.196	290.835	546.905
0.197	291.501	546.924
0.198	292.147	546.942
0.199	292.833	546.958
0.2	293.615	546.976
0.205	297.45	547.074
0.21	301.23	547.14
0.215	306.194	547.298
0.22	310.625	547.44
0.225	314.247	547.563
0.23	317.415	547.681
0.235	320.909	547.793
0.24	326.628	547.887

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.245	332.913	547.985
0.25	338.101	548.069
0.255	340.801	548.143
0.26	342.274	548.211
0.265	343.448	548.275
0.27	344.849	548.338
0.275	346.964	548.404
0.28	350.946	548.476
0.285	356.565	548.555
0.29	361.685	548.636
0.295	363.843	548.708
0.3	363.331	548.768
0.305	362.508	548.823
0.31	362.4	548.877
0.315	362.564	548.932
0.32	362.785	548.985
0.325	363.283	549.039
0.33	364.743	549.095
0.335	367.012	549.154
0.34	368.237	549.211
0.345	367.667	549.261
0.35	366.382	549.307
0.355	365.631	549.353
0.36	365.452	549.399
0.365	365.307	549.446
0.37	365.141	549.491
0.375	365.196	549.537
0.38	365.66	549.583
0.385	366.393	549.629
0.39	366.829	549.675
0.395	366.537	549.718
0.4	365.827	549.759
0.405	365.341	549.799
0.41	365.226	549.839
0.415	365.173	549.878
0.42	365.032	549.917
0.425	364.966	549.955
0.43	365.1	549.993
0.435	365.351	550.03
0.44	365.475	550.067
0.445	365.311	550.102
0.45	364.974	550.136

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.455	364.734	550.169
0.46	364.666	550.202
0.465	364.625	550.234
0.47	364.513	550.265
0.475	364.408	550.295
0.48	364.407	550.325
0.485	364.484	550.354
0.49	364.533	550.382
0.495	364.49	550.41
0.5	364.393	550.436
0.6	364.879	550.699
0.7	364.487	550.791
0.8	364.133	550.811
0.9	364.022	550.81
1	364.088	550.807
1.1	364.07	550.808
1.2	364.157	550.811
1.3	364.335	550.816
1.4	364.418	550.823
1.5	364.459	550.831
1.6	364.532	550.84
1.7	364.457	550.848
1.8	364.083	550.856
1.9	363.946	550.864
2	363.647	550.871
2.1	363.176	550.878
2.2	362.863	550.884
2.3	362.408	550.891
2.4	362.068	550.897
2.5	361.757	550.904
2.6	361.732	550.913
2.7	361.402	550.922
2.8	361.264	550.932
2.9	361.199	550.943
3	361.207	550.956
3.1	361.248	550.97
3.2	361.118	550.985
3.3	361.233	551
3.4	361.159	551.016
3.5	361.137	551.032
3.6	360.957	551.049
3.7	360.867	551.065

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
3.8	360.861	551.081
3.9	360.749	551.097
4	360.537	551.113
4.1	360.456	551.13
4.2	360.277	551.146
4.3	360.227	551.162
4.4	360.083	551.178
4.5	360.071	551.195
4.6	359.961	551.213
4.7	359.729	551.23
4.8	359.627	551.248
4.9	359.422	551.267
5	359.319	551.286
5.1	359.345	551.305
5.2	359.243	551.325
5.3	359.03	551.345
5.4	358.935	551.366
5.5	358.944	551.387
5.6	358.86	551.409
5.7	358.668	551.431
5.8	358.608	551.453
5.9	358.456	551.476
6	358.437	551.498
6.1	358.312	551.521
6.2	358.086	551.544
6.3	357.982	551.566
6.4	357.789	551.589
6.5	357.715	551.612
6.6	357.757	551.635
6.7	357.685	551.657
6.8	357.484	551.679
6.9	357.394	551.701
7	357.416	551.722
7.1	357.312	551.743
7.2	357.07	551.763
7.3	356.941	551.783
7.4	356.907	551.802
7.5	356.965	551.82
7.6	356.889	551.838
7.7	356.681	551.855
7.8	356.561	551.871
7.9	356.54	551.886

Table 7.6-3 Mass and Release Rates
Break Type : Letdown line (3B) guillotine break
Break Area : 0.03755 (ft2)
Break location : Volume number 2

*Mass Release Rate was doubled from the following value for guillotine break.

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
8	356.373	551.9
8.1	356.294	551.914
8.2	356.301	551.926
8.3	356.151	551.938
8.4	356.093	551.949
8.5	356.082	551.959
8.6	355.948	551.969
8.7	355.867	551.977
8.8	355.849	551.985
8.9	355.908	551.992
9	355.773	551.998
9.1	355.714	552.004
9.2	355.708	552.009
9.3	355.53	552.013
9.4	355.627	552.017
9.5	355.535	552.019
9.6	355.502	552.022
9.7	355.286	552.023
9.8	355.334	552.025
9.9	355.209	552.025
10	355.359	552.026

Figure 7.6-1 Nodalization Scheme of Letdown Heat Exchanger Room

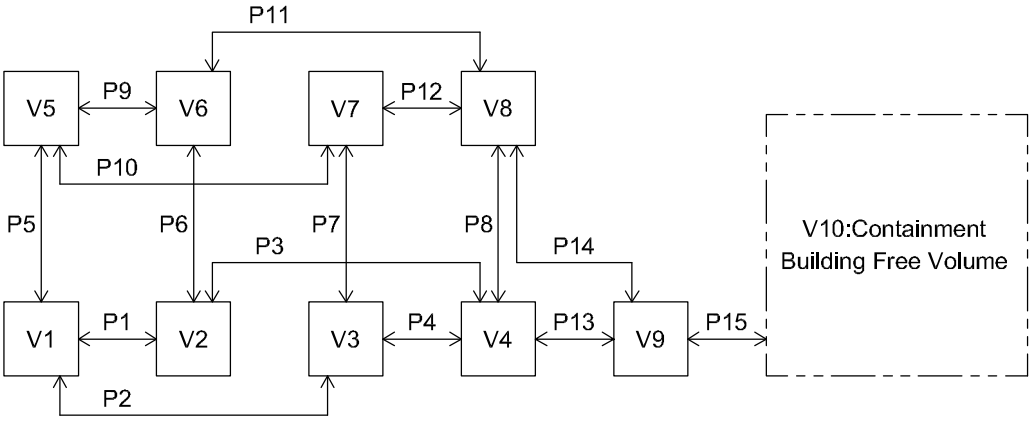

Figure 7.6-2 Nodalization Diagram of Letdown Heat Exchanger Room

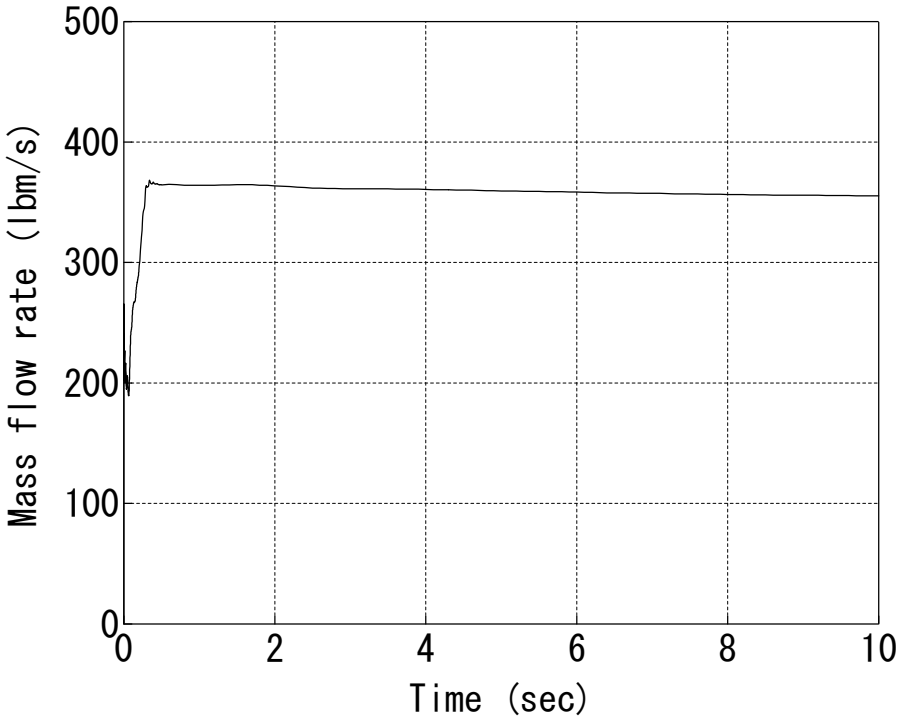

Figure 7.6-3 Short Term Mass and Energy Release Data for Letdown Line (3B) break (1/2)

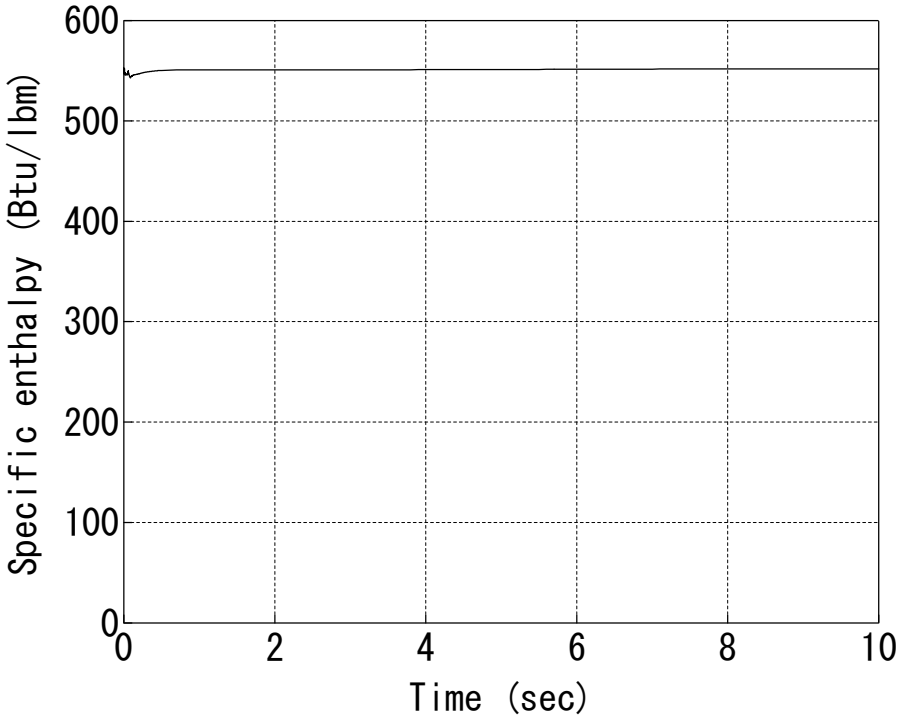

Figure 7.6-4 Short Term Mass and Energy Release Data for Letdown Line (3B) Break (2/2)

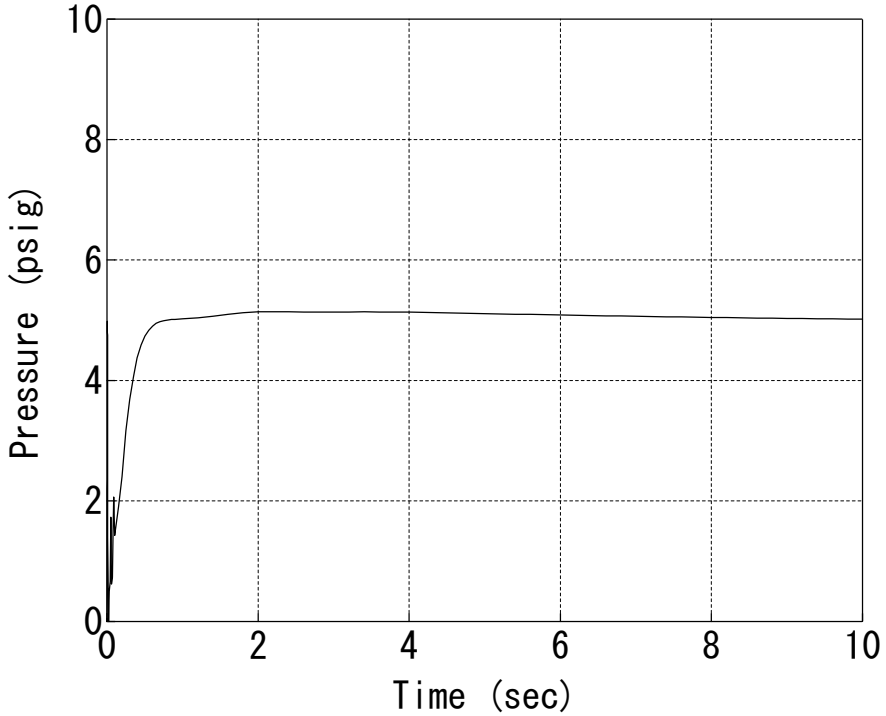

Figure 7.6-5 Pressure Transient at Peak Pressure Node (V2) for Letdown Line (3B) Break in Letdown Heat Exchanger Room

7.7 Time Step Sensitivity Analyses Using Worst Case for Each Subcompartment

Time step sensitivity analyses were performed to confirm that the appropriate time step was selected for the US-APWR subcompartment analyses. The time step selection of the base cases and the sensitivity analyses are shown in Table 7.7-1. The limiting time steps for the sensitivity analyses are a half of those for the base cases.

Time step sensitivity analyses results for reactor cavity compartment, SG compartment, pressurizer compartment, regenerative heat exchanger room, regenerative heat exchanger valve room and the letdown heat exchanger room are shown in Figure 7.7-1 to Figure 7.7-6. The change in results due to the reduce time step and the base case time step limits are considered acceptable.

Table 7.7-1 time step selection for subcompartment analysis

	Base case		Sensitivity analysis	
End time (sec)	Minimum time step (sec)	Maximum time step (sec)	Minimum time step (sec)	Maximum time step (sec)

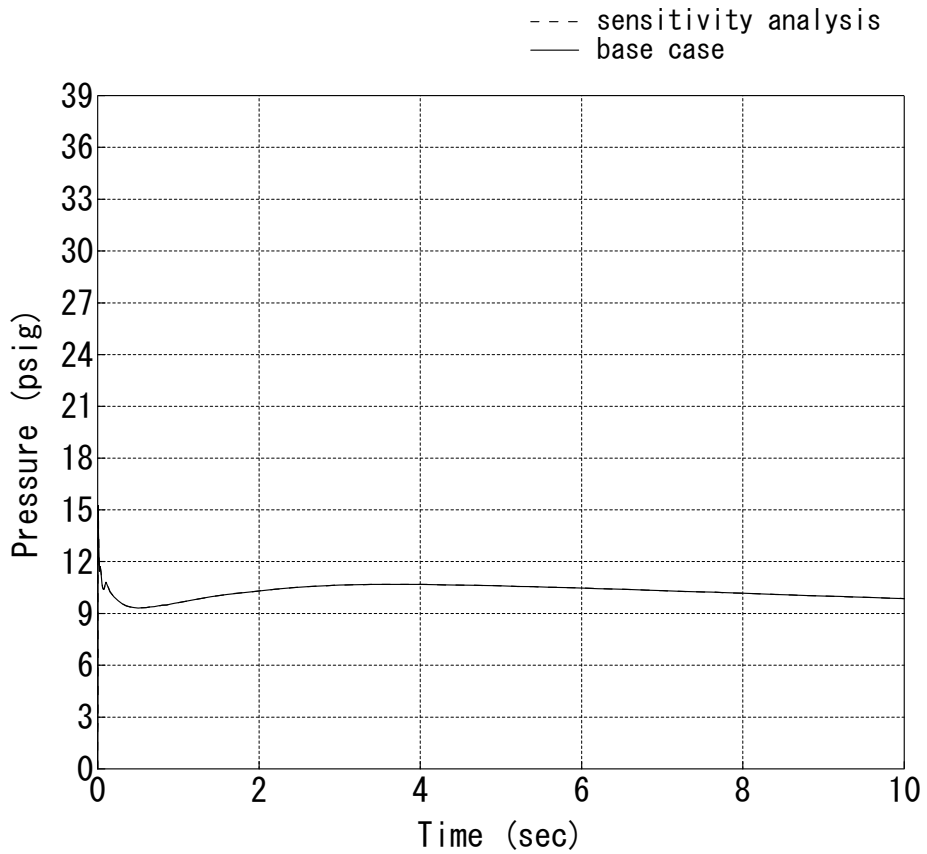

Figure 7.7-1 Time Step Sensitivity Analysis Result for Reactor Cavity Compartment Pressure Transient at Peak Pressure Node (V50)

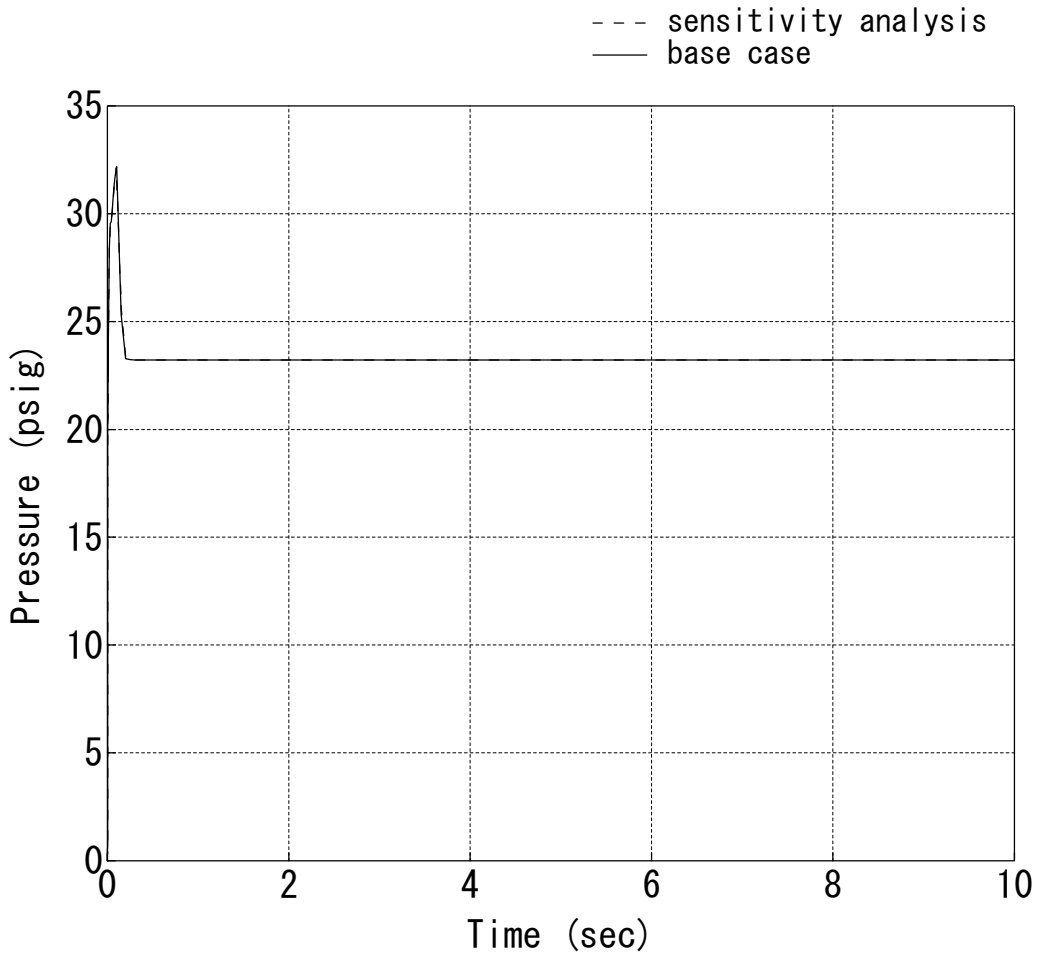

Figure 7.7-2 Time Step Sensitivity Analysis Result for SG Compartment Pressure Transient at Peak Pressure Node (V76)
(Feedwater Line Break, (Just after hot shutdown condition)

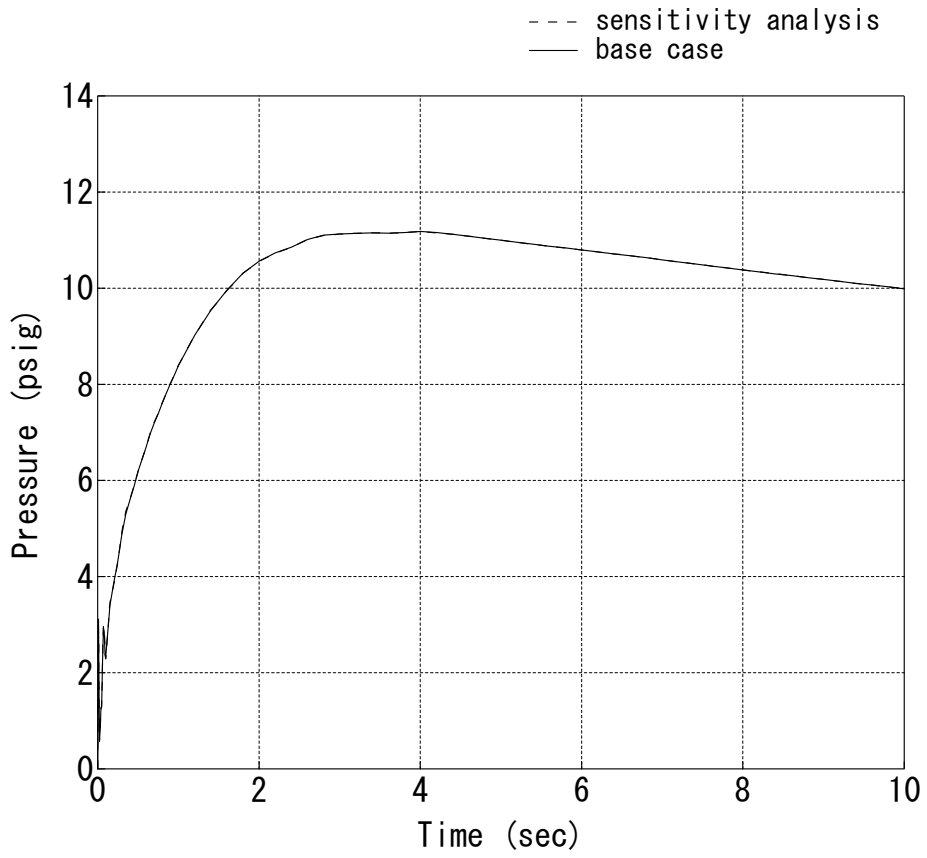

Figure 7.7-3 Time Step Sensitivity Analysis Result for Pressurizer Compartment Pressure Transient at Peak Pressure Node (V27)

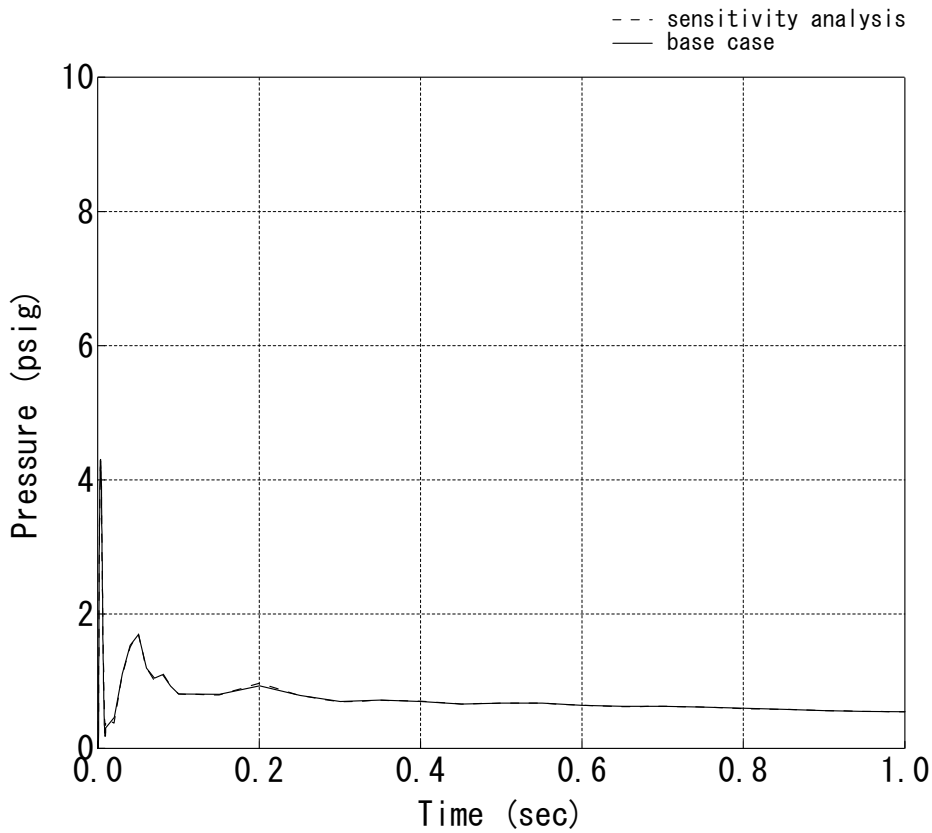

Figure 7.7-4 Result of Sensitivity Analysis on Time Step for Regenerative Heat Exchanger Room
Pressure Transient at Peak Pressure Node (V6)

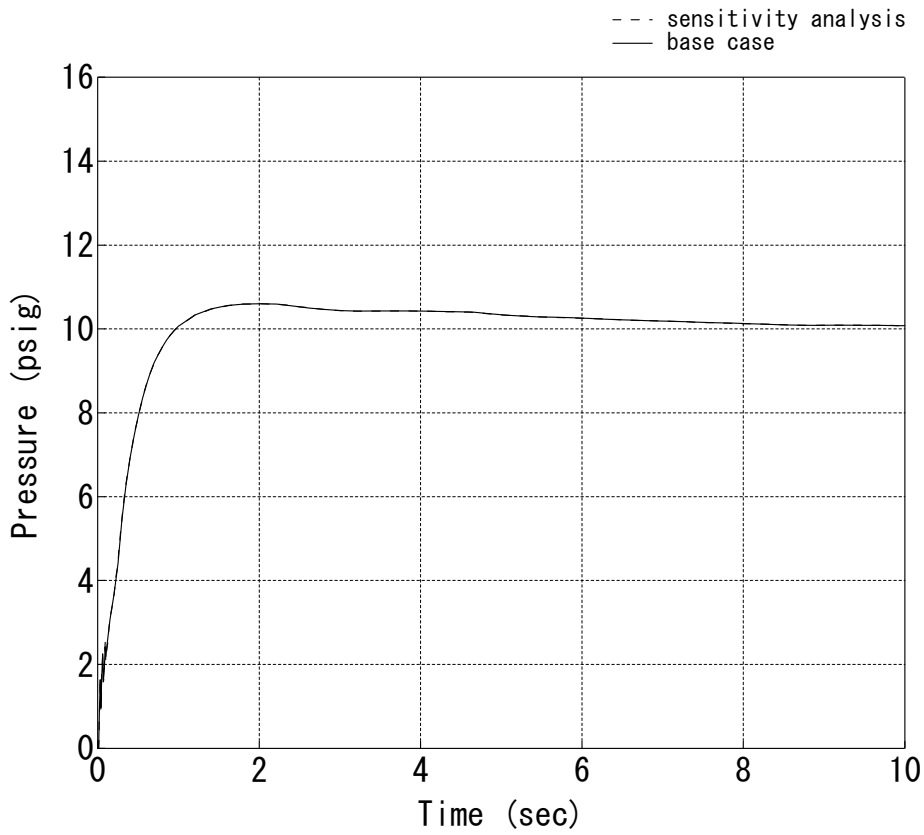

Figure 7.7-5 Result of Sensitivity Analysis on Time Step for Regenerative Heat Exchanger Valve Room
Pressure Transient at Peak Pressure Node (V25)

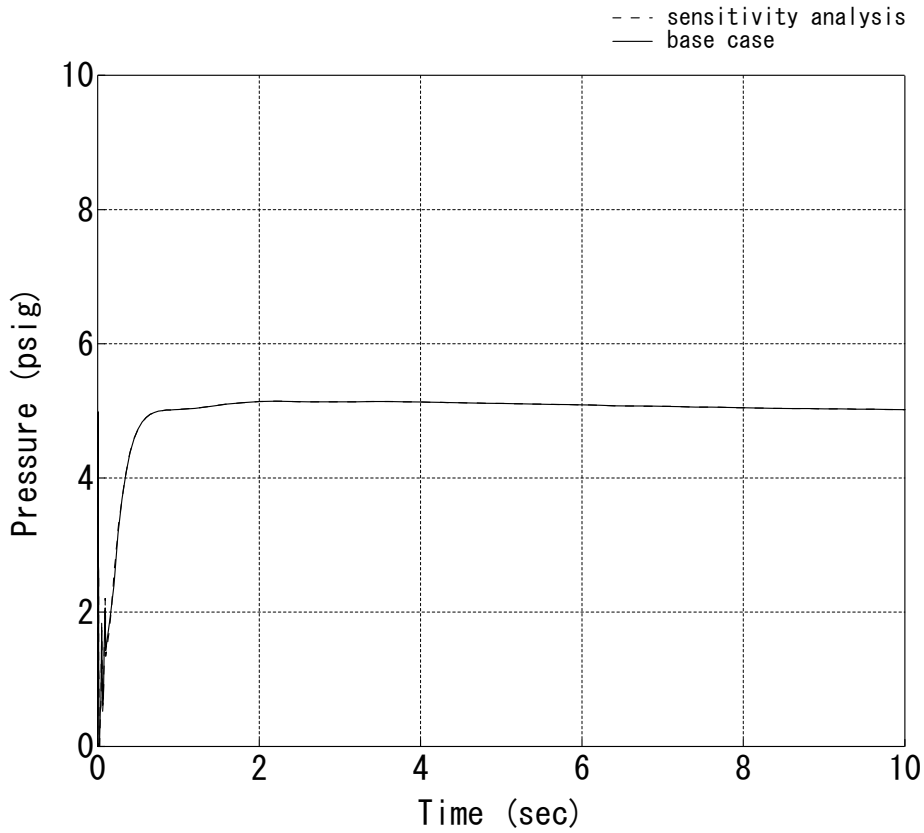

Figure 7.7-6 Result of Sensitivity Analysis on Time Step for Letdown heat Exchanger Room
Pressure Transient at Peak Pressure Node (V2)

8.0 Conclusions

The calculated peak differential pressures during the pipe break transients for each subcompartment were compared favorably to the allowable structural design differential pressures. This comparison demonstrates that the subcompartment walls withstand the peak differential pressures during postulated breaks of any high-pressure line within any subcompartment.

9.0 References

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20. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-2

21. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-3

22. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-4

23. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-5

24. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-6

25. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-7

26. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-8

27. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-10

28. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-11

29. Response to RAI No. 111-932 Rev.0, QUESTION NO. 06.02.01.02-13