Subcompartment Analyses for US-APWR Design Confirmation

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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, the model sensitivity studies and model validations are discussed in detail. In the chapter six, the plant analysis results are shown.

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List of Acronyms

APWR	Advanced Pressurized Water Reactor
B/B	BYRON / BRAIDWOOD Stations
BE	Best estimated
BFMC	Battele-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
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 for confirming 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 a function of several parameters, which include blowdown mass and energy release rates, subcompartment volume, vent area, and vent flow behavior. A transient differential pressure response analysis is done by the GOTHIC code.

This Technical report (TR) provides the plant 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 and conservatism of the analysis models, through the code option, the analysis conditions, the above mentioned several parameters, and the model sensitivity studies.

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 (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. One of the subcompartments that does not need to be analyzed is the pressurizer surge piping room, 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 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) pipes are connected to the reactor vessel at elevation 35 ft. - 3 in. 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 pipe 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 pipe room (EL. 25 ft. - 3 in.), then through the two vertical vent openings and the personnel access. The Pressurizer surge pipe 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 by assuming a 6-inch diameter break of the pressurizer spray line connected to the reactor coolant piping (cold leg at EL. 40 ft.- 4 in.), or a 16-inch feedwater pipe (EL. 90 ft.- 9 in.), as the worst case.

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 worst case postulated pipe break in the subcompartment assumes that the 8-inch pressurizer pressure relief line which connects to the top of the pressurizer fails (EL. 122 ft. - 6 in.).

While the top of the subcompartment is covered by a concrete ceiling, two personnel accesses 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 14-inch pressurizer surge pipe, a postulated pipe break is not considered in this subcompartment.

3.1.5 Other Rooms

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.

3.1.5.1 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. The worst case postulated pipe break in the valve room assumes a 6-inch pressurizer spray pipe break that connects to the top of the pressurizer. The personnel access to the subcompartment is the vent path to the containment atmosphere.

3.1.5.2 Regenerative Heat Exchanger Room (Northwest of SG Subcompartment, EL.50’-2”)

The regenerative heat exchanger room is located outside secondary shield walls, at elevation 50 ft. - 2 in. High-energy lines associated with the Chemical Volume and Control System (CVCS), considered as the postulated pipe break, are routed in the room. The worst case pipe break assumes a 4-inch pipe break at the heat exchanger nozzle. The personnel access to the room and additional openings are the vent paths to the containment atmosphere.

3.1.5.3 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 worst case pipe break was assumed to be a 4-inch pipe at the heat exchanger nozzle. 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 dynamic effects due to application of the LBB criterion discussed in Subsection 3.6.3 of the DCD are excluded from consideration in the subcompartment analysis. 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 SG subcompartment and pressurizer subcompartment. The lines with boldface in Table 3-1 are postulated to break in the subcompartment analyses.

Table 3-1 Steam Generator Subcompartment and Pressurizer Subcompartment Break Line Condition (Sheet 1 of 2)

Subcompartment	Break Line	Line Spec	Press. psi	Temp. °F	fluid
Steam Generator Subcompartment	Main Coolant Pipe-Hot Leg	31ID-RC-2505R	2235	617.0	Subcooled Water
	Main Coolant Pipe-Cold Leg	31ID-RC-2505R	2235	550.6	Subcooled Water
	Main Coolant Pipe-Cross-over Leg	31ID-RC-2505R	2235	550.6	Subcooled Water
	Pressurizer Surge Line	16-RC-2501R	2235	653.0	Subcooled Water
	Accumulator Injection Line	14-RC-2501R	2235	550.6	Subcooled Water
		14-SI-2501R	2235	550.6	Subcooled Water
		14-SI-2511R	2235	120.0	Subcooled Water
	RHR Pump Inlet Line	**10-RC-2501R**	**2235**	**617.0**	**Subcooled Water**
	RHR Pump Outlet Line	**8-RC-2501R**	**2235**	**550.6**	**Subcooled Water**
	Direct Vessel Injection Line	4-RC-2501R	2235	550.6	Subcooled Water
	SI High Head Injection Line	4-RC-2501R	2235	617.0	Subcooled Water
	SI Emergency Letdown Line	2-RC-2501R	2235	617.0	Subcooled Water
	Pressurizer Spray Line	6-RC-2501R	2235	550.6	Subcooled Water
	Loop Drain Line	2-RC-2501R	2235	550.6	Subcooled Water
	Charging Line	4-RC-2501R	2235	550.6	Subcooled Water
		4-CS-2501R	2235	550.6	Subcooled Water
		4-CS-2561R	2235	464.0	Subcooled Water
	Letdown Line	3-RC-2501R	2235	550.6	Subcooled Water
		3-CS-2501R	2235	550.6	Subcooled Water
		3-CS-2561R	2235	550.6	Subcooled Water
		3-CS-601R	350	269.1	Subcooled Water
		4-CS-601R	350	115.0	Subcooled Water
	RCP Seal Water Injection Line	1_1/2-CS-2501R	2600	130.0	Subcooled Water
		1_1/2-CS-2511R	2600	130.0	Subcooled Water
	Feedwater Line	**16-FW-1525N**	**1185**	**568.0**	**Saturated Water**
	Main Steam Line	32-MS-1532N	907	535.0	Steam
	SG Blowdown Line	3-BD-1532N	907	535.0	Steam
		4-BD-1532N	907	535.0	Steam

Table 3-1 Steam Generator Subcompartment and Pressurizer Subcompartment Break Line Condition (Sheet 2 of 2)

Subcompartment	Break Line	Line Spec	Press. psi	Temp. °F	fluid
Subcompartment under Pressurizer Subcompartment	Pressurizer Surge Line	16-RC-2501R	2235	653.0	Subcooled Water
Pressurizer Subcompartment	**Pressurizer Spray Line**	**6-RC-2501R**	2235	550.6	Subcooled Water
	Pressurizer Auxiliary Spray Line	3-RC-2501R	2235	550.6	Subcooled Water
	Pressurizer Safety Valve Inlet Line	6-RC-2501R	2235	653.0	Subcooled Water
	Pressurizer Safety Depressurization Line	**8-RC-2501R**	2235	653.0	Steam Saturated Water
		6-RC-2501R	2235	653.0	
		4-RC-2501R	2235	653.0	
		3-RC-2501R	2235	653.0	

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 of 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, which includes 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

4.1.2.1 Vent Flow Behavior Models

Assumptions with regard to the distribution of mass and energy release are biased towards maximizing the subcompartment pressure, conforming to SRP 6.2.1.2 (Ref. 7). The vent flow behavior through all flow paths within the nodalized compartment model was treated as a homogeneous mixture in thermal equilibrium, with the assumption of 100-percent water entrainment by applying code options to force thermodynamic and velocity equilibrium and to disallow the deposition of drops in the volumes.

Also, the thermal homogeneous equilibrium model for air-steam-water mixtures is used as the vent critical flow correlation.

In addition, the evaluation models do not take credit for the vent areas that change during the transient as a result of insulation collapsing.

4.1.2.2 GOTHIC Input Data

In the GOTHIC input data, the base vent flow behavior model options (thereinafter called as **BASE** options) use all the default values, but the selected vent flow behavior model options that are acceptable according to SRP 6.2.1.2 (thereinafter called as **NRC** options) are realized as follows:

Table 4-1and Table 4-2 show the base options for the vent flow behavior model.

The above mentioned conditions and models are used through the plant subcompartment analyses in Section 7.

4.2 Short term mass and energy release

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

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

Also, the approach to assume a constant blowdown profile using the initial mass and energy release conditions calculated by the computer code M-RELAP5 and with the flow multiplier of 1.0 is used for postulated secondary piping breaks (Ref. 5).

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 Base run options of Run Control

Table 4-2 Base Flow path parameter-3 of each Flow Path

5.0 Model Sensitivity Studies and Validation for Subcompartment Analyses

The base models and the test descriptions provided in section 5.1 and 5.1 are taken directly from the GOTHIC Assessment Report (Ref. 8-3) and the subcompartment analysis descriptions provided in section 5.3 are taken directly from the FSAR chapter 6 of Byron/Braidwood stations (Ref. 8-11) , and repeated here for convenience.

5.1 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 1.2 times or 0.8 times the base values of vent loss coefficients (SS Vent Loss Coefficient) and inertia terms (SS INERTIA). In the explanatory notes of Figure 5.1-6 to Figure 5.1-20 and Figure 5.1-26 to Figure 5.1-35,, the symbol “sensitivity study 1.0 (base)” means that the calculation is conducted by the base option set described in section 4.1.2.2. As well, the symbol “sensitivity study 1.0(NRC)” means that the calculation is conducted by the NRC acceptable option set described in section 4.1.2.2, hereby incorporated by reference. Also, the symbol “sensitivity study 1.2” and symbol “sensitivity studies 0.8” mean that the calculations are conducted by 1.2 times and 0.8 times 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 find their conservatism of the results to the vent flow behavior models described in subsection 4.1.2.

These sensitivity studies were conducted using the applicable test data shown below. These test data and best estimated (BE) results were treated as the base data for the comparisons.

5.1.1 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. 8-3.

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 5.1-1).

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 5.1-1 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.

5.1.2 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 5.1-2. Not made clear in Figure 5.1-2 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 5.1-2 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 5.1-3 and Figure 5.1-4. 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 5.1-3 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 5.1-6 to Figure 5.1-20. 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 5.1-6 through Figure 5.1 -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 5.1-6 and Figure 5.1-7. 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 5.1-11 through Figure 5.1-15, are differential pressures including the inertia sensitivity study. Also, Figure 5.1-16 through Figure 5.1-20, are differential pressures including the run option sensitivity study.

5.1.3 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. 8-3. 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 5.1-21 and Figure 5.1-22. 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 5.1-22, 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 5.1-23.

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 5.1-24 and Figure 5.1-25.

(c) GOTHIC Model Description

5.1.4 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 5.1-26 to Figure 5.1-45. 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 5.1-26 to Figure 5.1-30 show differential pressures for SS Vent Loss Coefficients. Figure 5.1-31 to Figure 5.1-35 show differential pressures for SS INERTIA. Figure 5.1-36 to Figure 5.1-40 show differential pressures for SS RUN OPTIONS. In addition to SS RUN OPTIONS, Sensitivity Study EACH RUN OPTION has been conducted. Table 5.1-2 shows the analysis cases. Figure 5.1-41 to Figure 5.1-45 show differential pressures for SS EACH RUN OPTION.

5.1.5 Conclusions

From Section 5.1.2 and 5.1.4, 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 5.1-1 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 5.1-2 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**

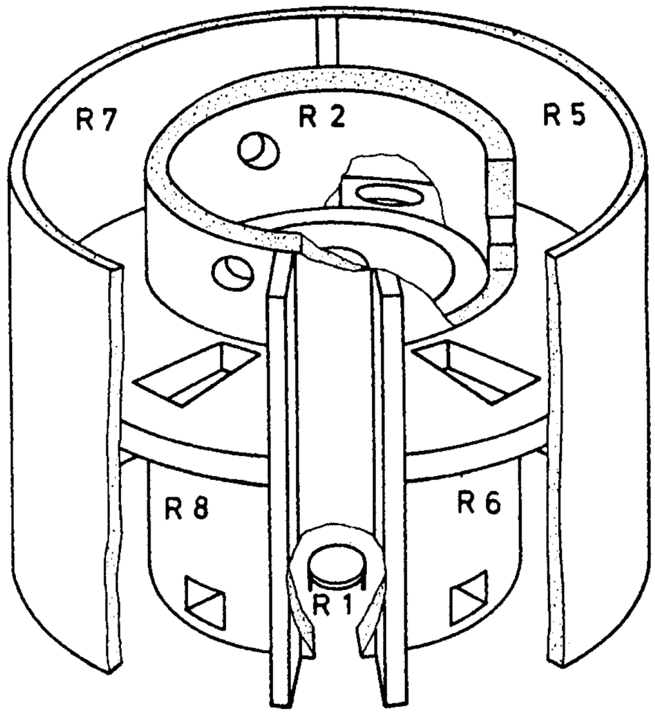
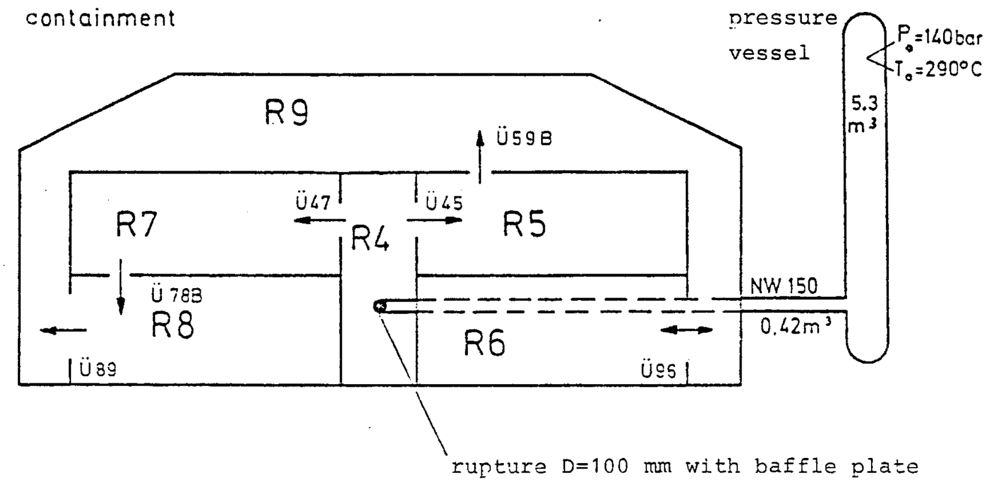


Figure 5.1-1 Cutaway View of Interior Rooms in BFMC.



rupture compartment : R4

vents : : Ü45, Ü47, Ü59B, Ü78B sharp-edged orifices
Ü89, Ü96 wall holes

flow paths :

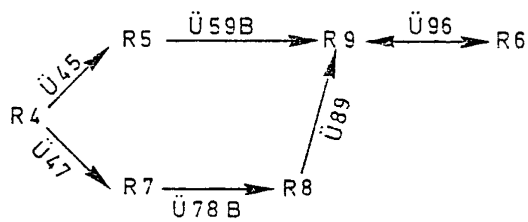


Figure 5.1-2 Room Configuration; BFMC Test D-16.

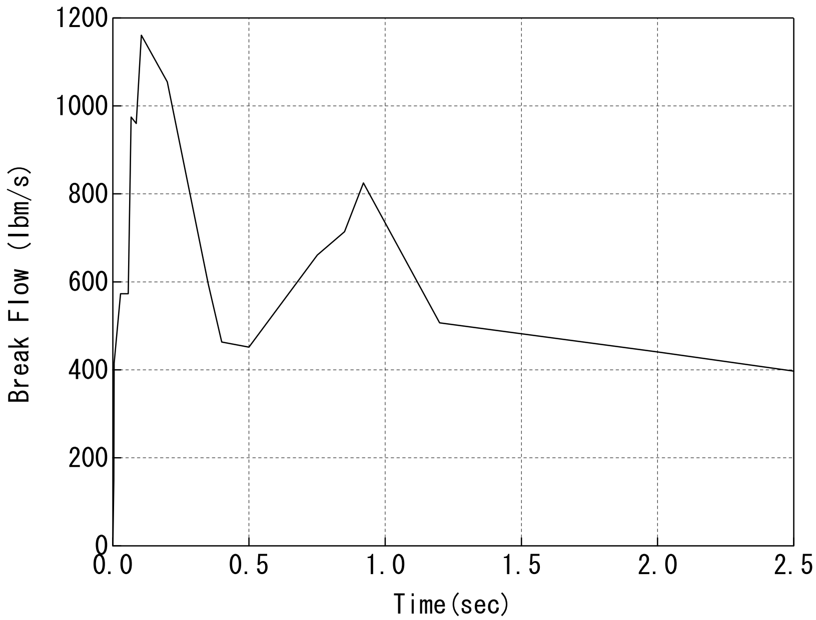


Figure 5.1-3 Break Flow for BFMC Test D-16

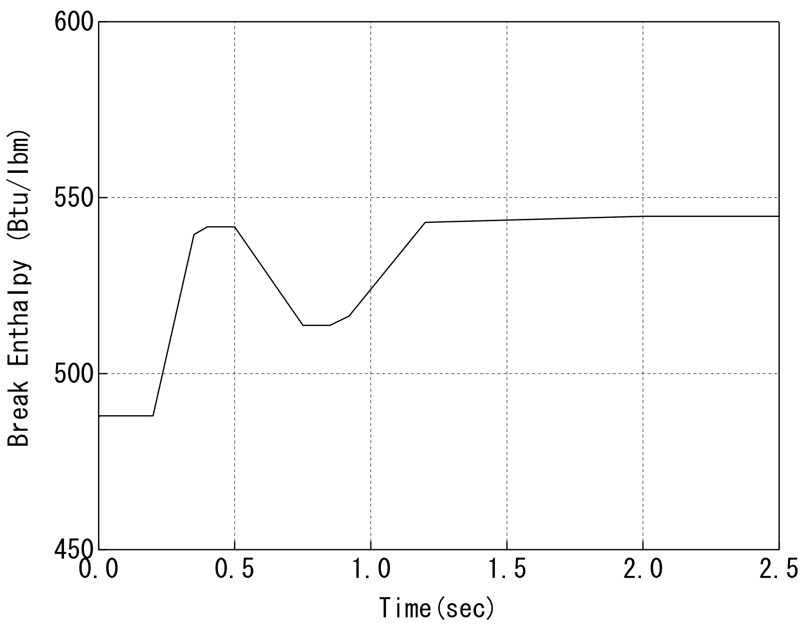


Figure 5.1-4 Break Enthalpy for BFMC Test D-16

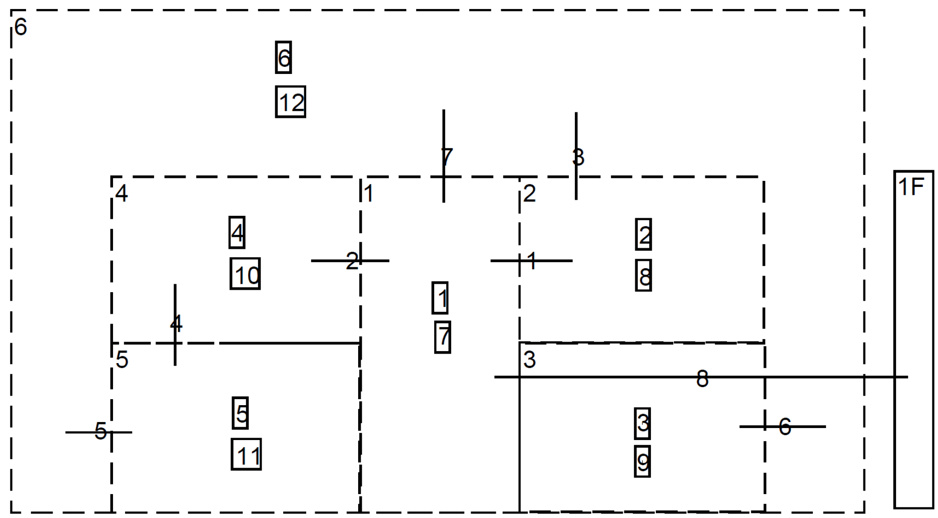


Figure 5.1-5 GOTHIC Model; BFMC Test D-16.

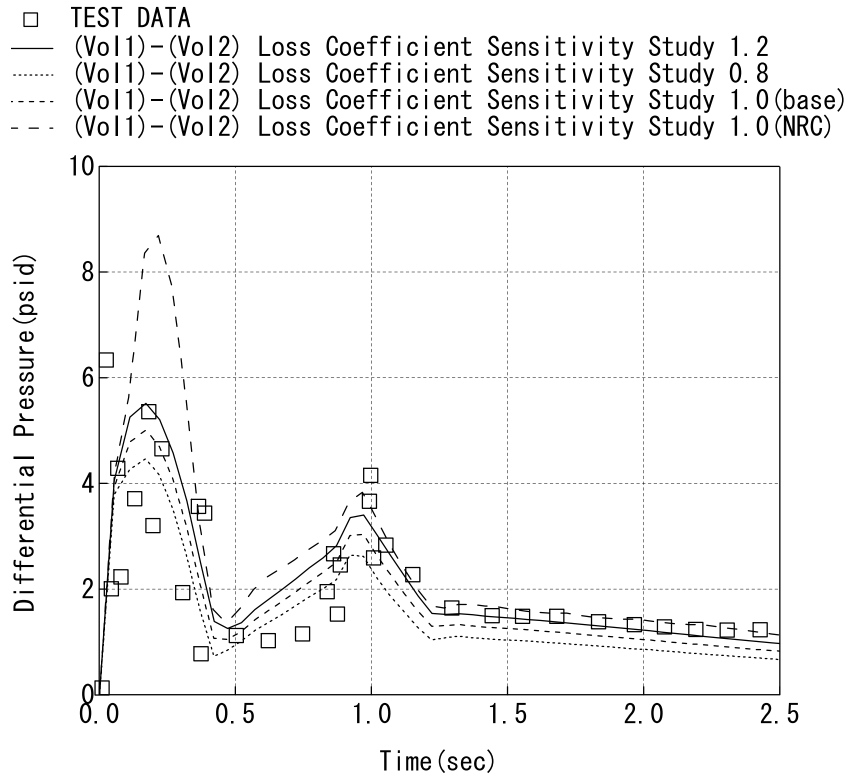


Figure 5.1-6 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Vent Loss Coefficient

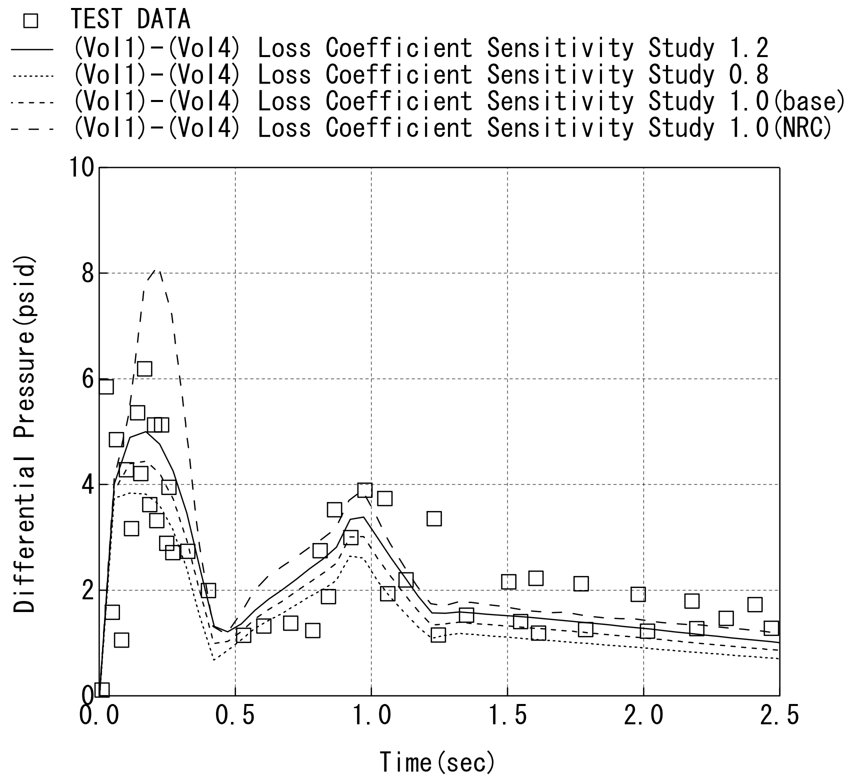


Figure 5.1-7 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Vent Loss Coefficient

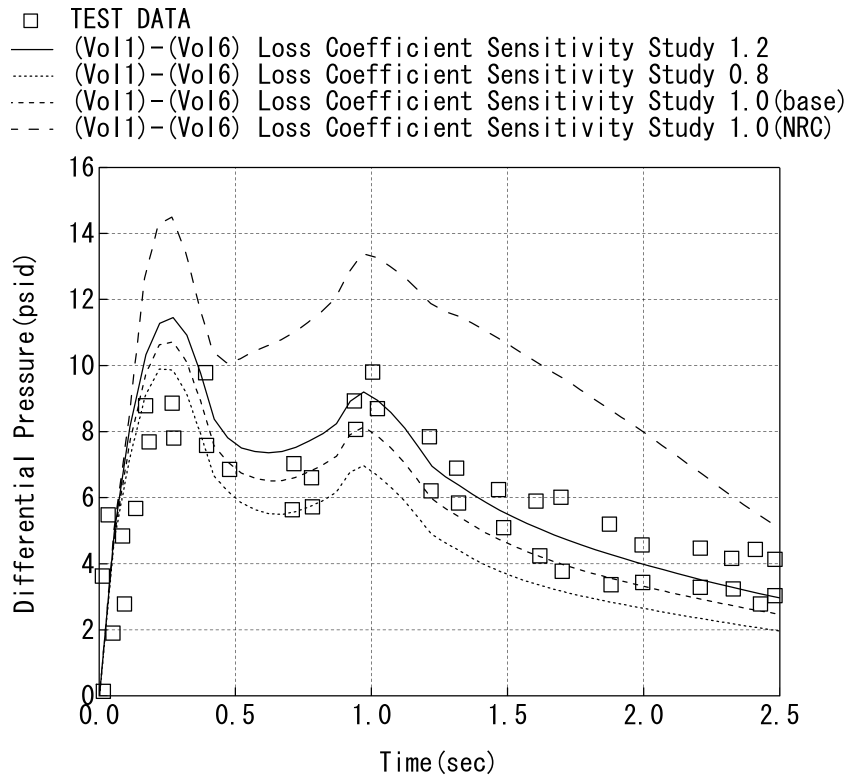


Figure 5.1-8 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Vent Loss Coefficient

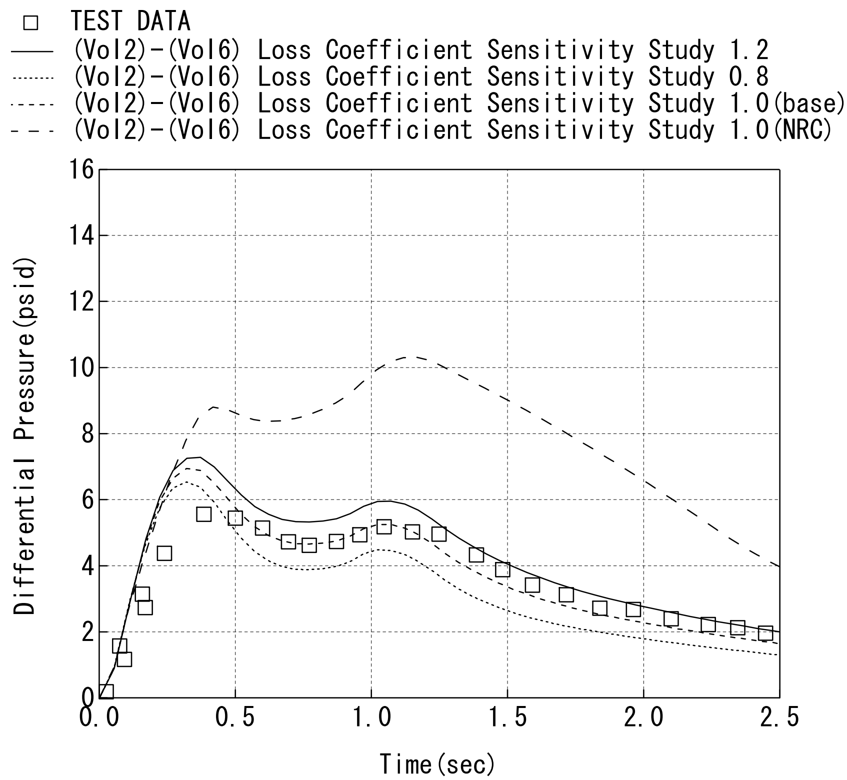


Figure 5.1-9 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Vent Loss Coefficient

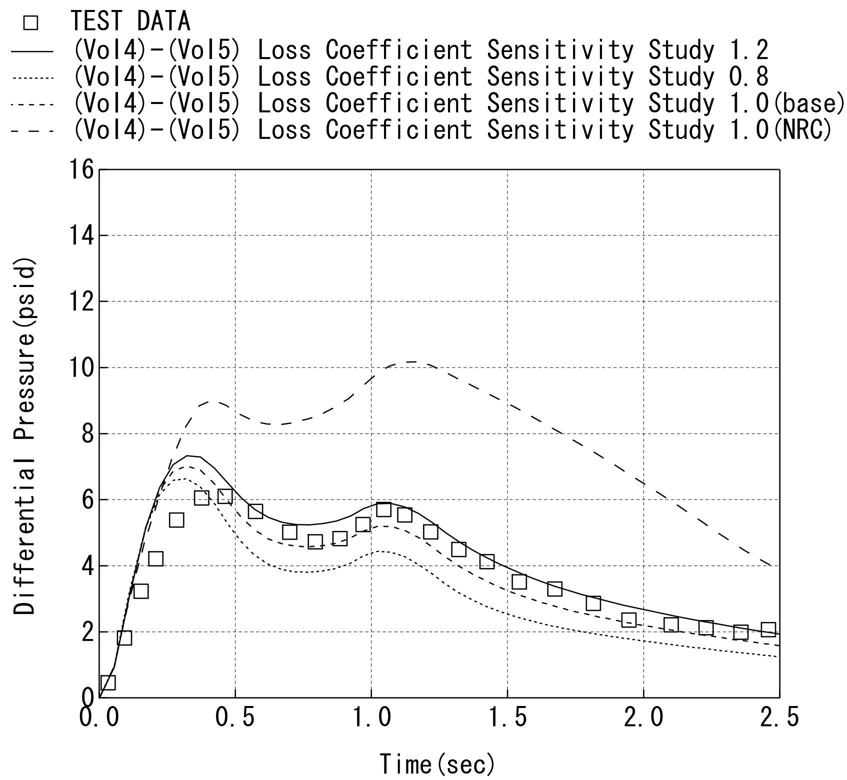


Figure 5.1-10 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Vent Loss Coefficient

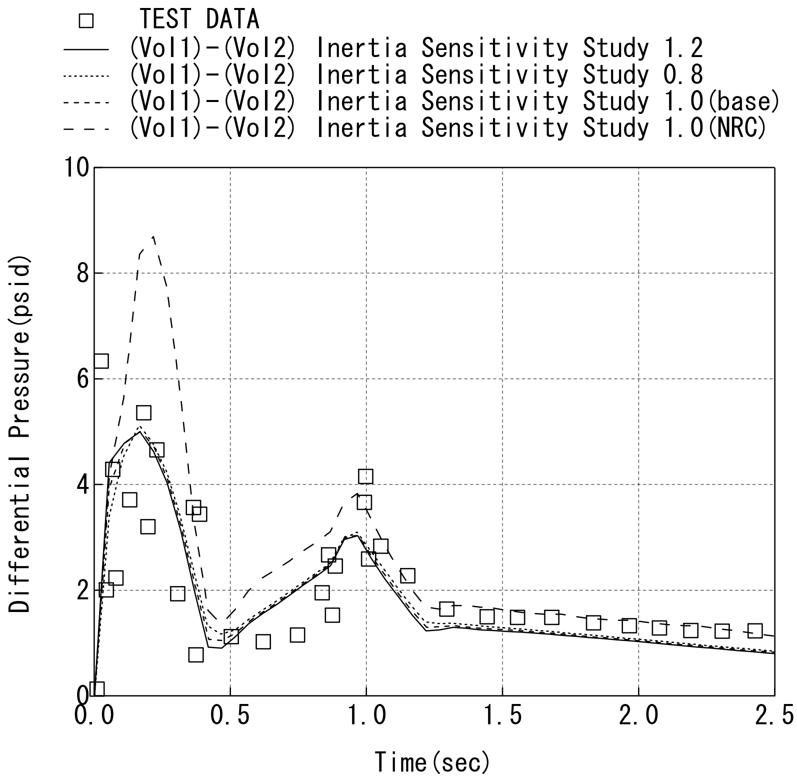


Figure 5.1-11 Differential Pressure, R4 to R5; BFMC Test D-16 for SS INERTIA

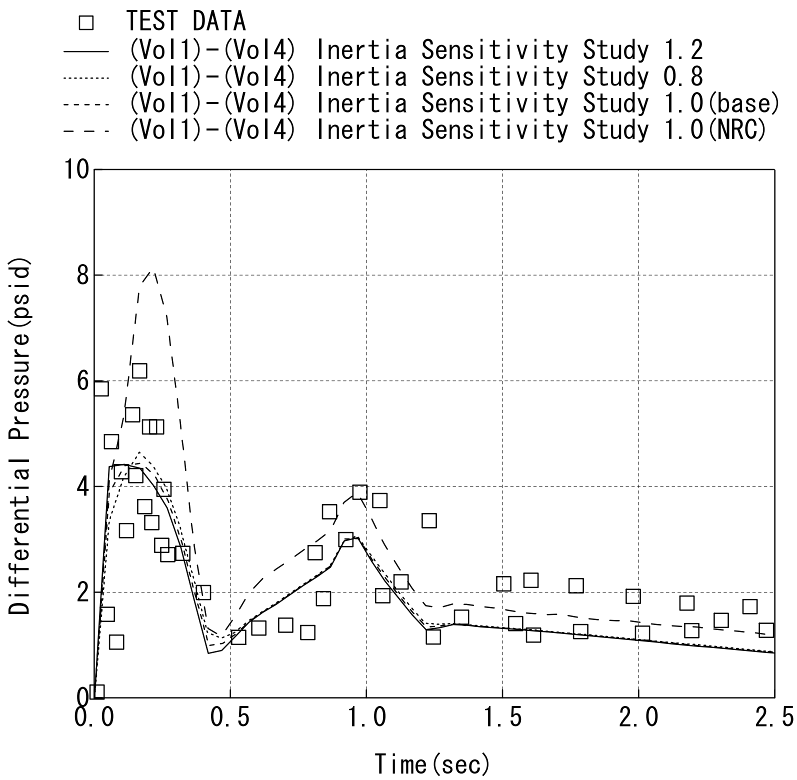


Figure 5.1-12 Differential Pressure, R4 to R7; BFMC Test D-16 for SS INERTIA

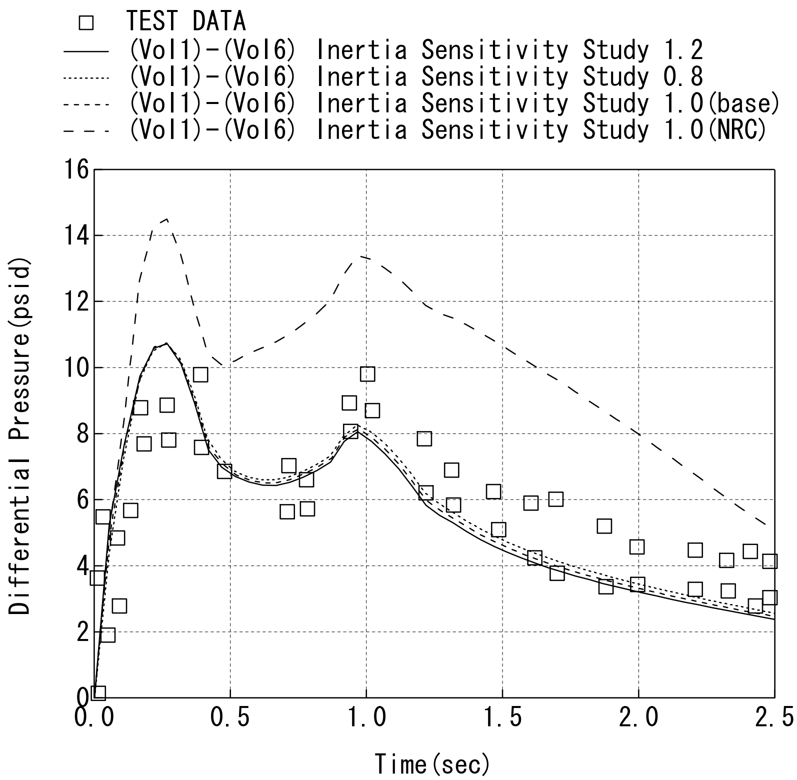


Figure 5.1-13 Differential Pressure, R4 to R9; BFMC Test D-16 for SS INERTIA

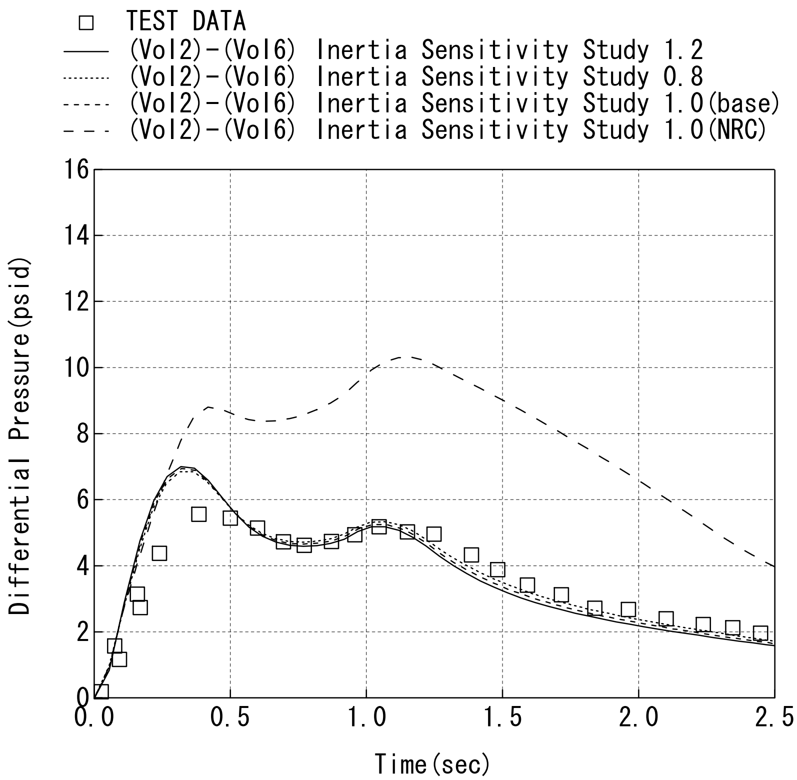


Figure 5.1-14 Differential Pressure, R5 to R9; BFMC Test D-16 for SS INERTIA

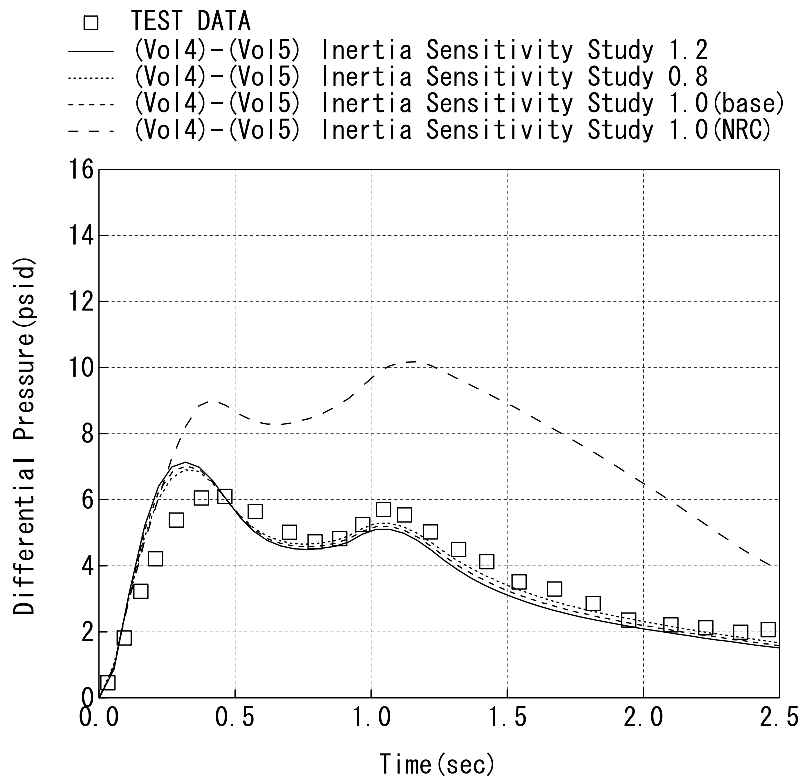


Figure 5.1-15 Differential Pressure, R7 to R8; BFMC Test D-16 for SS INERTIA

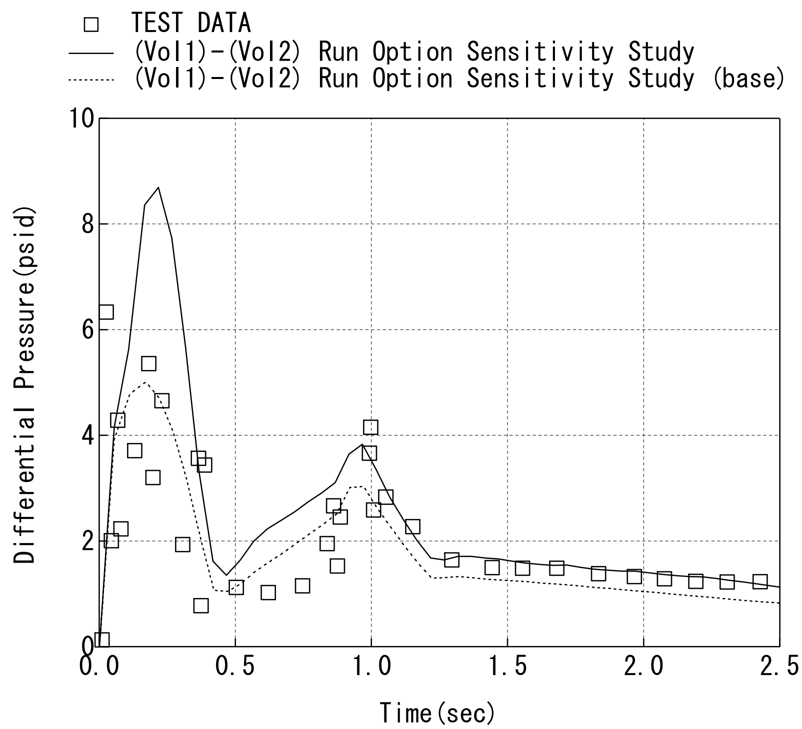


Figure 5.1-16 Differential Pressure, R4 to R5; BFMC Test D-16 for SS RUN OPTIONS

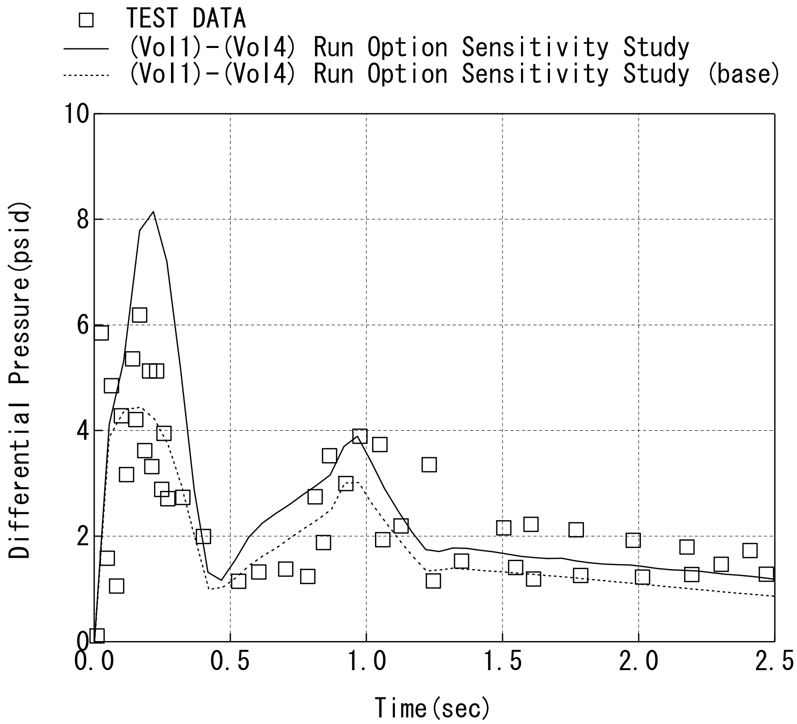


Figure 5.1-17 Differential Pressure, R4 to R7; BFMC Test D-16 for SS RUN OPTIONS

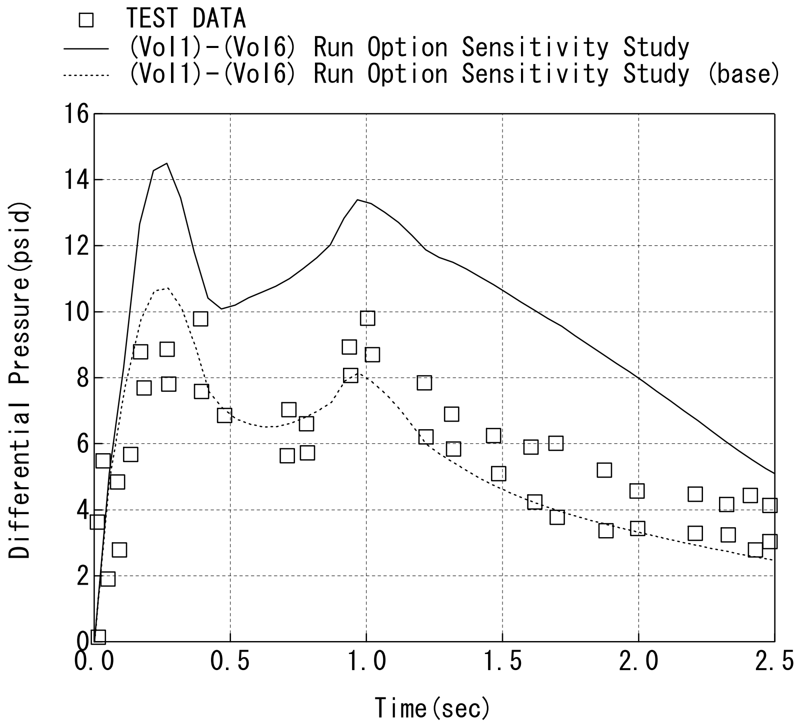


Figure 5.1-18 Differential Pressure, R4 to R9; BFMC Test D-16 for SS RUN OPTIONS

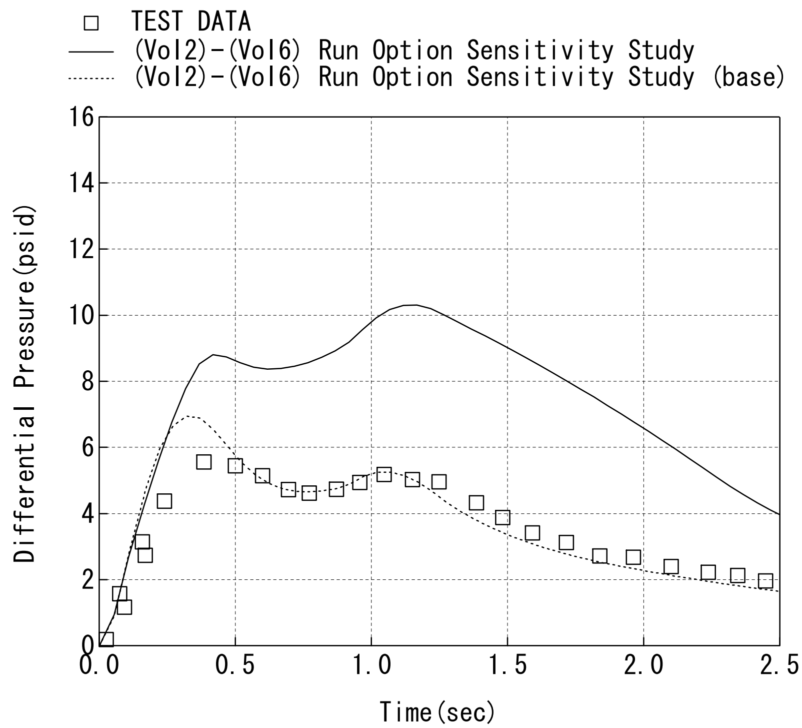


Figure 5.1-19 Differential Pressure, R5 to R9; BFMC Test D-16 for SS RUN OPTIONS

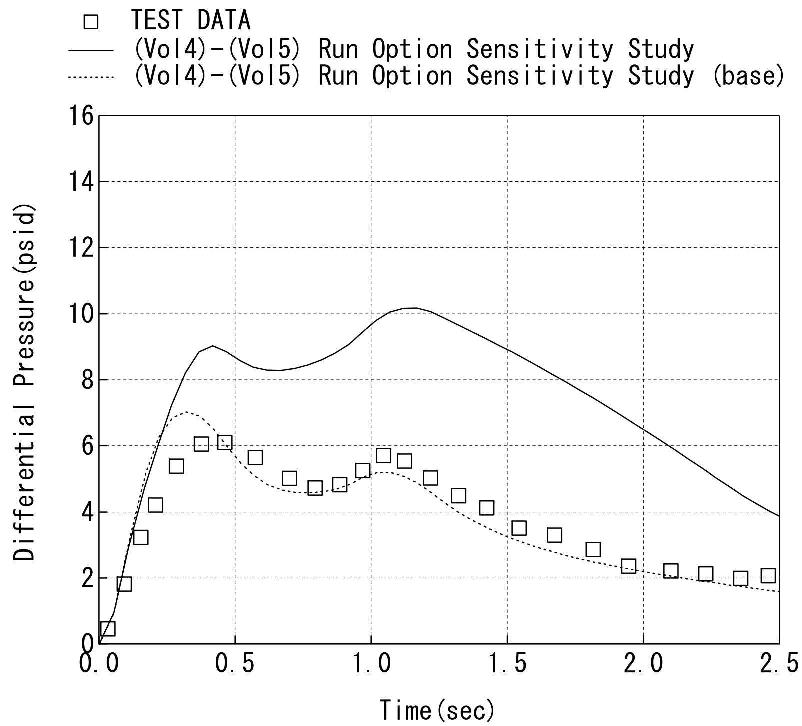


Figure 5.1-20 Differential Pressure, R7 to R8; BFMC Test D-16 for SS RUN OPTIONS

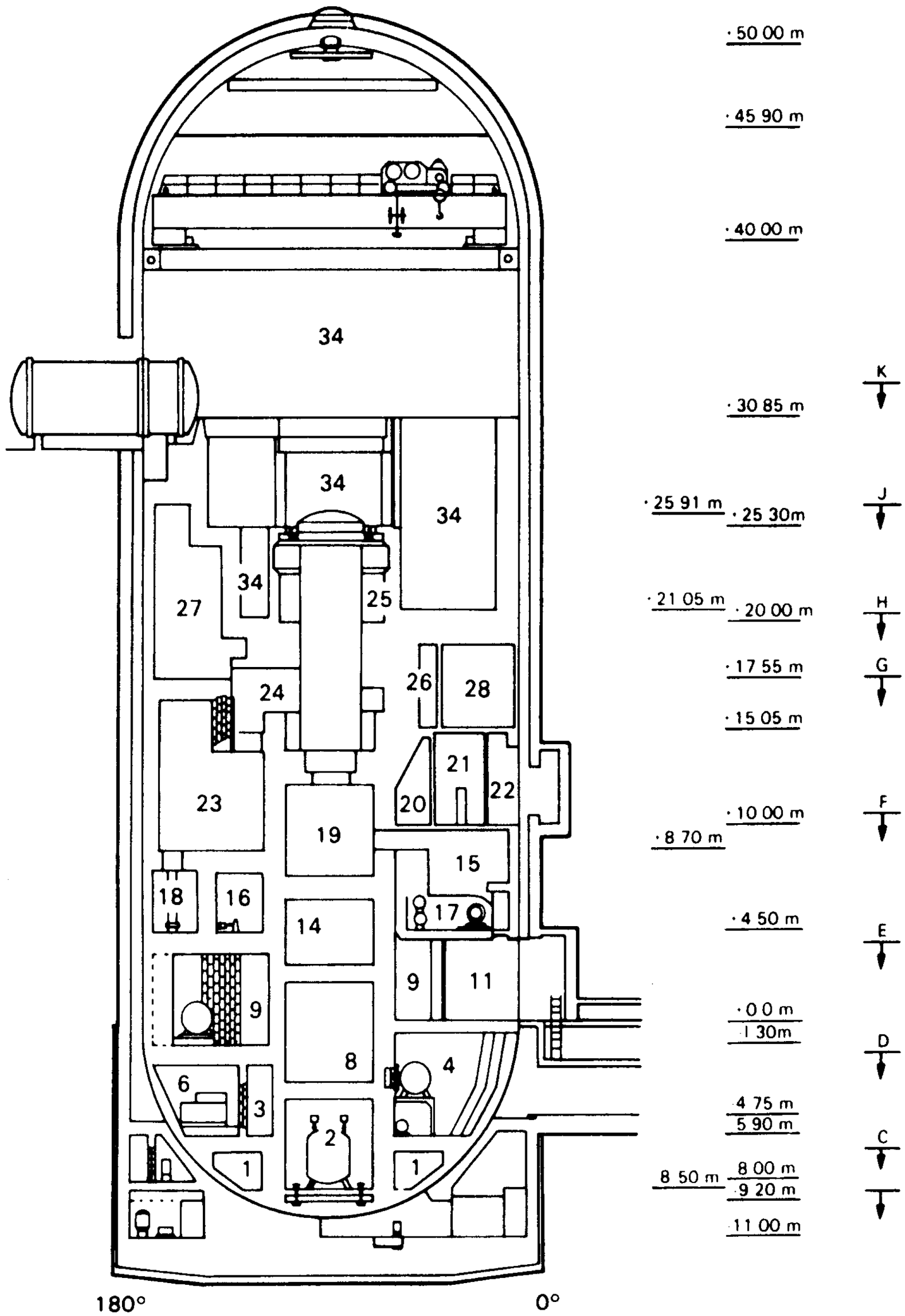


Figure 5.1-21 HDR containment – 0 deg to 180 deg.

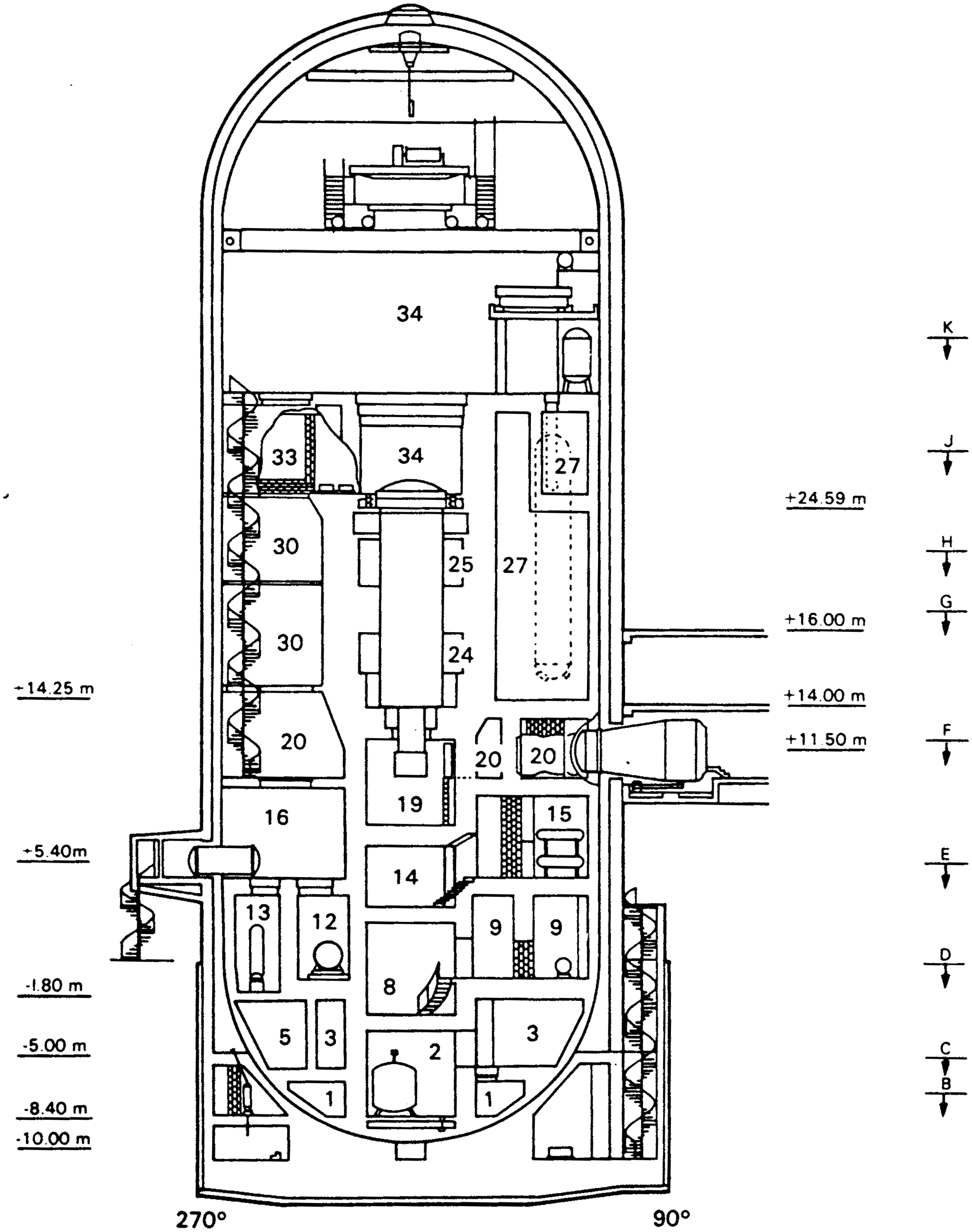


Figure 5.1-22 HDR Containment – 90 deg to 270 deg.

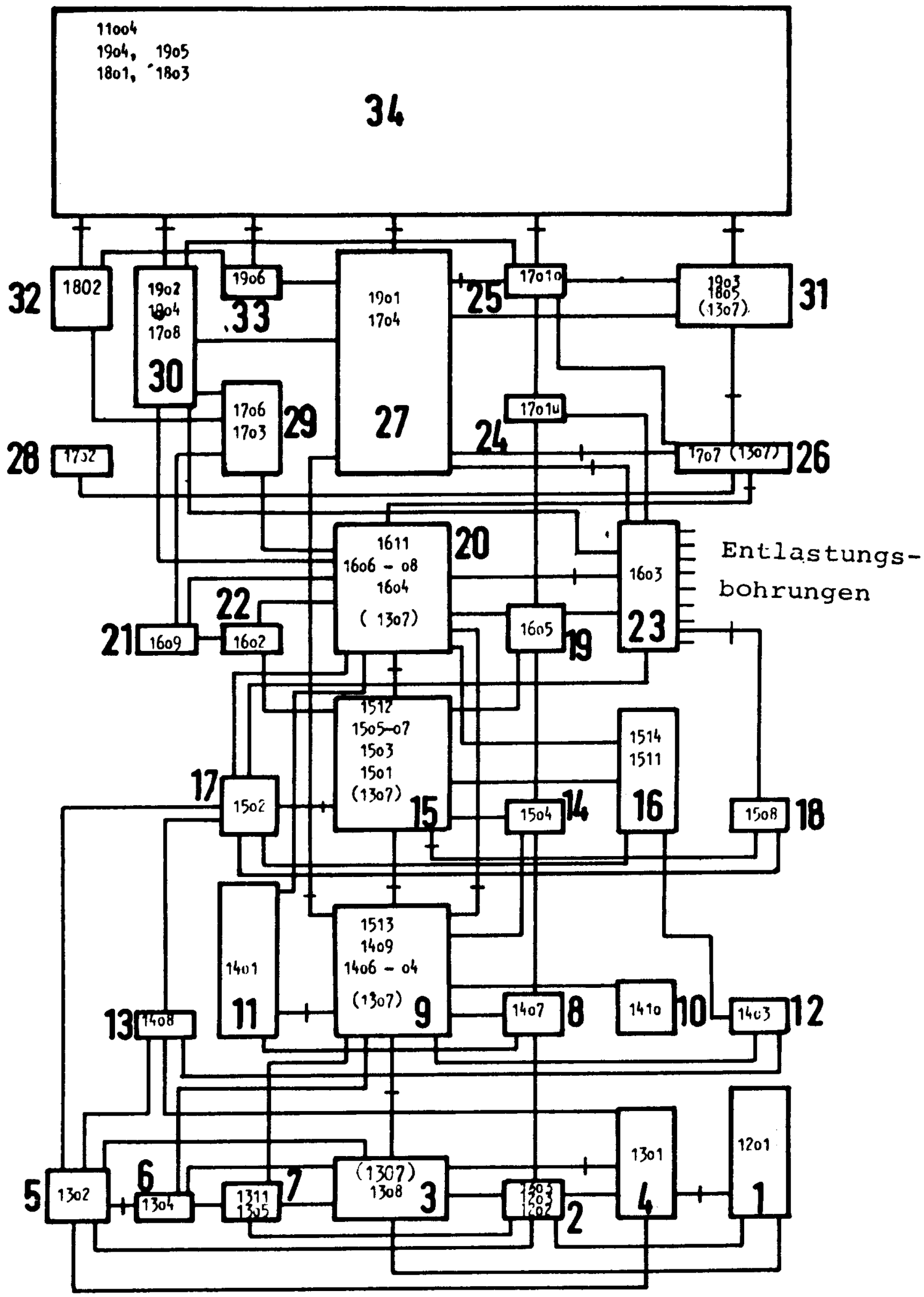


Figure 5.1-23 HDR Room & Zone Numbers and Connections.

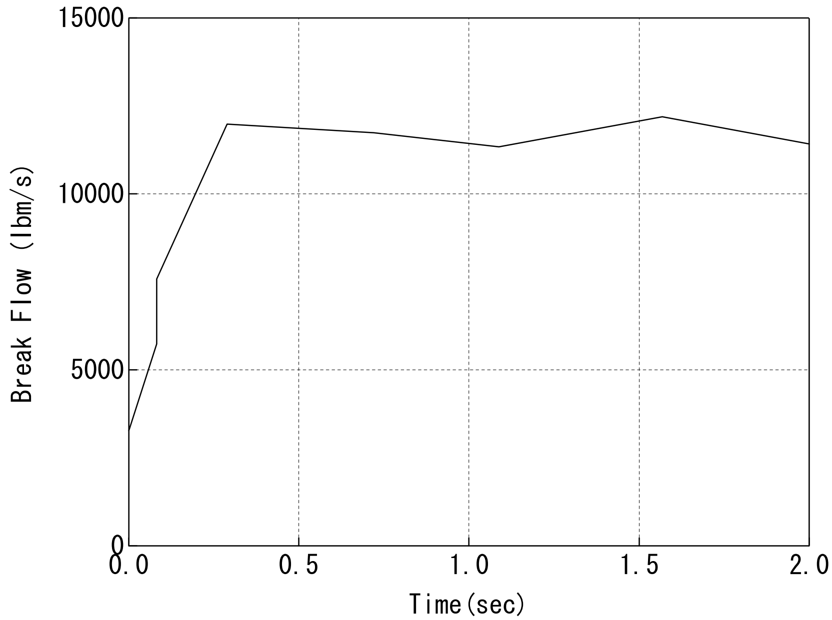


Figure 5.1-24 Break Flow; HDR Test V21.1

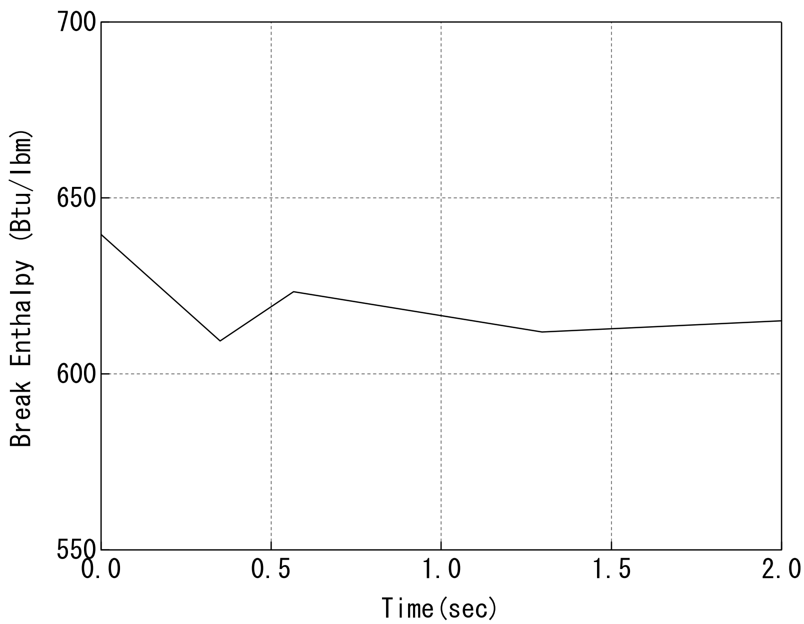


Figure 5.1-25 Break Enthalpy; HDR Test V21.1

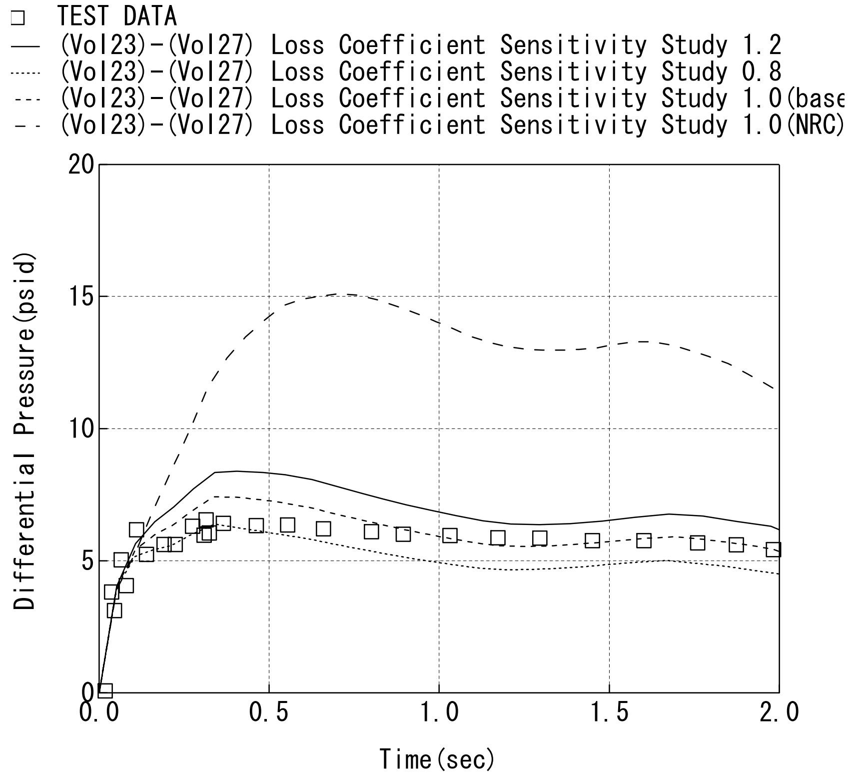


Figure 5.1-26 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Vent Loss coefficient

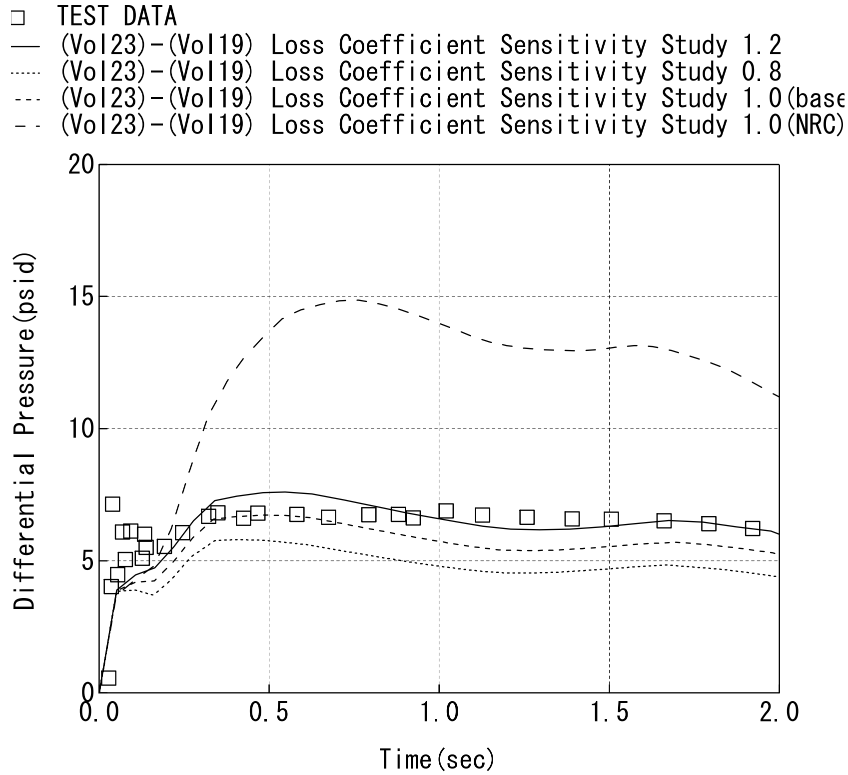


Figure 5.1-27 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS Vent Loss coefficient

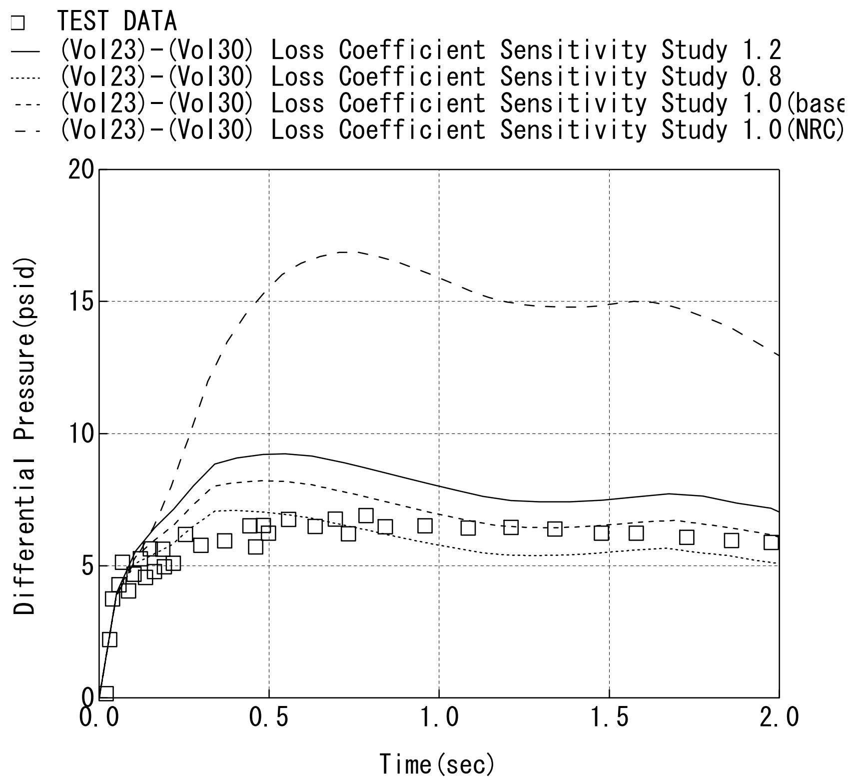


Figure 5.1-28 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Vent Loss coefficient

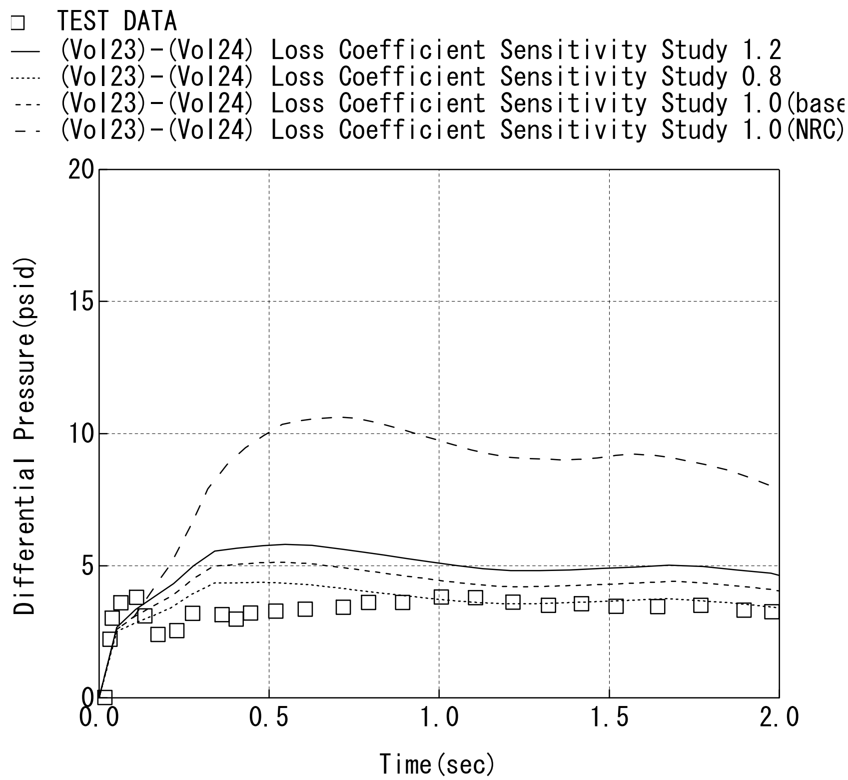


Figure 5.1-29 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Vent Loss coefficient

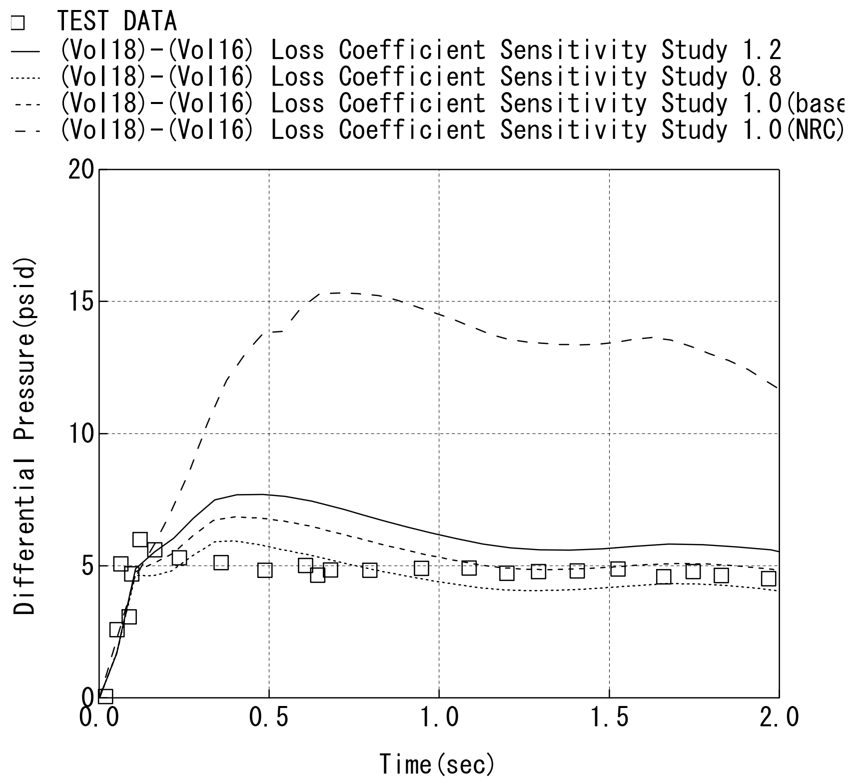


Figure 5.1-30 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Vent Loss coefficient

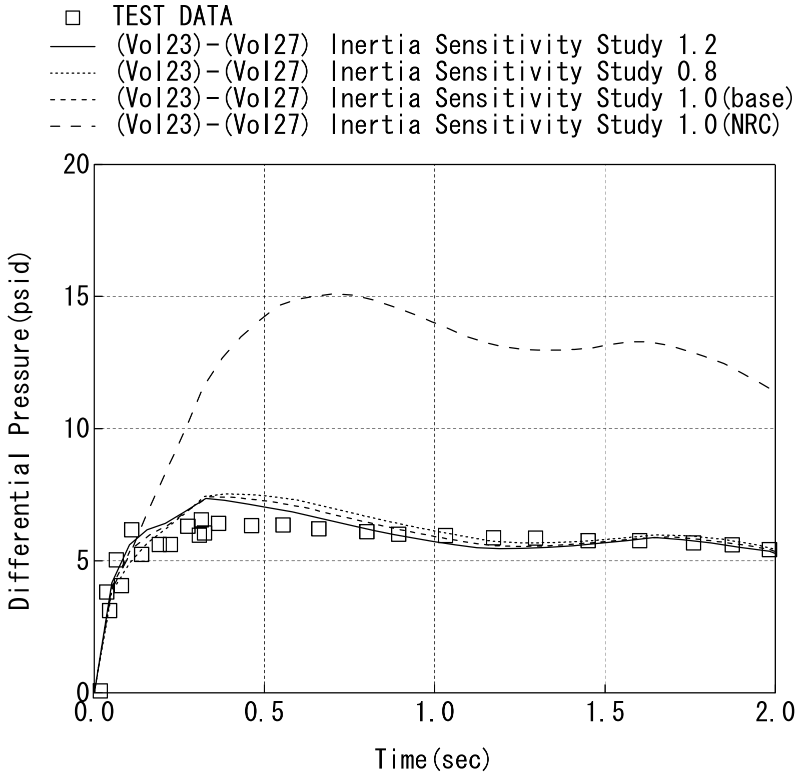


Figure 5.1-31 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS INERTIA

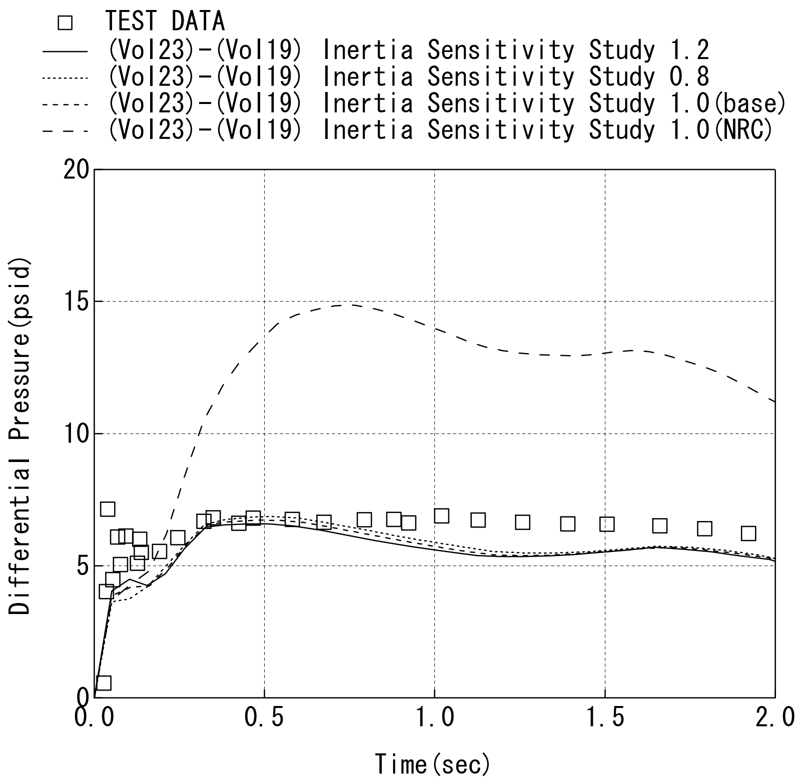


Figure 5.1-32 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS INERTIA

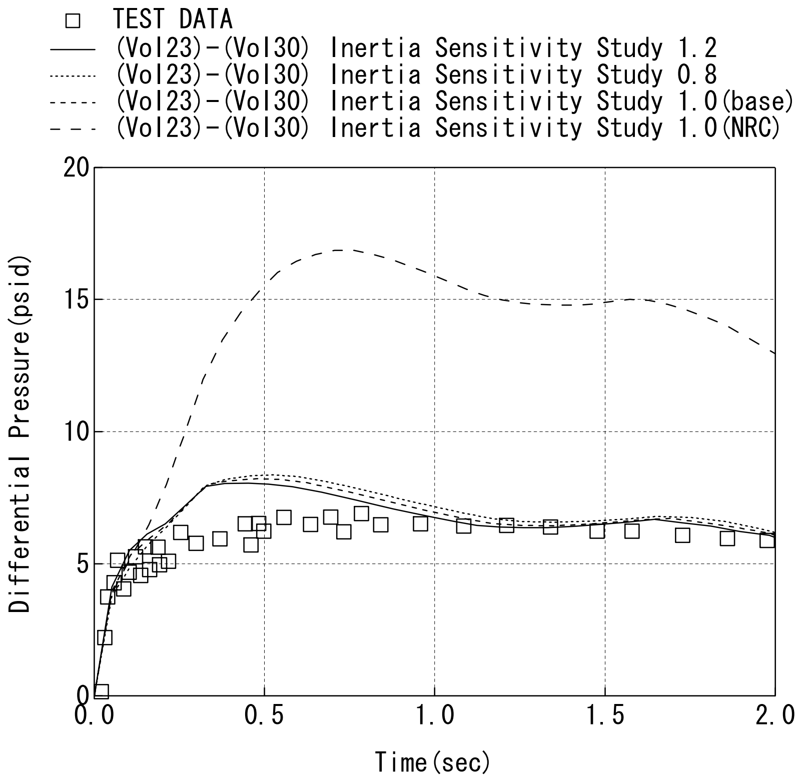


Figure 5.1-33 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS INERTIA

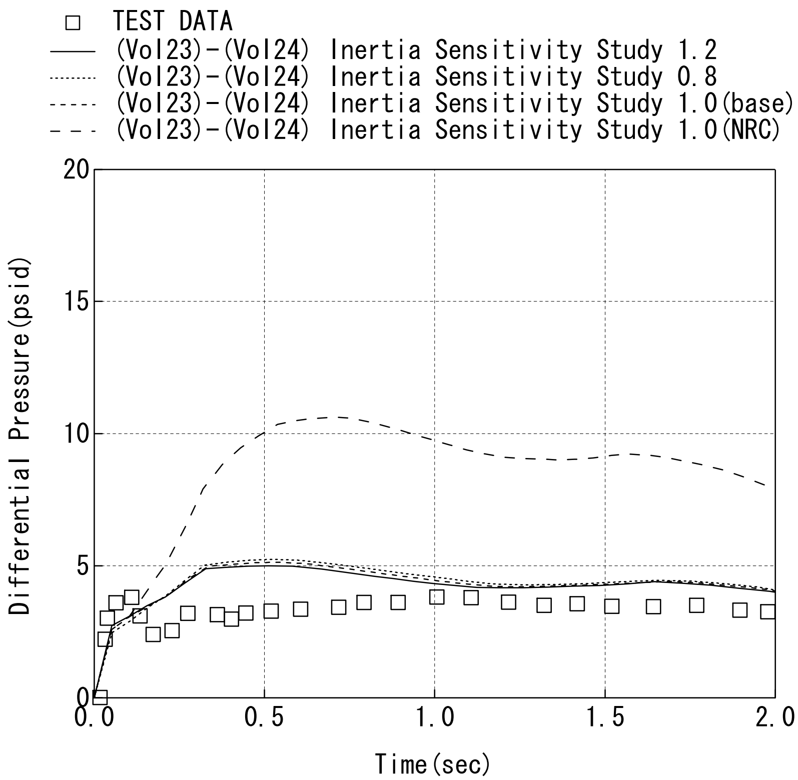


Figure 5.1-34 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS INERTIA

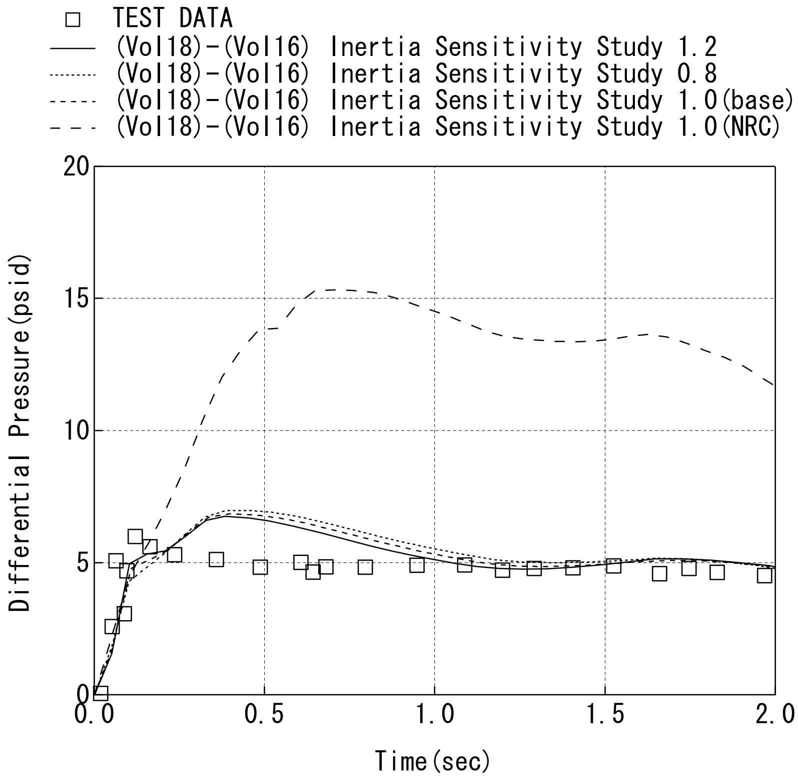


Figure 5.1-35 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS INERTIA

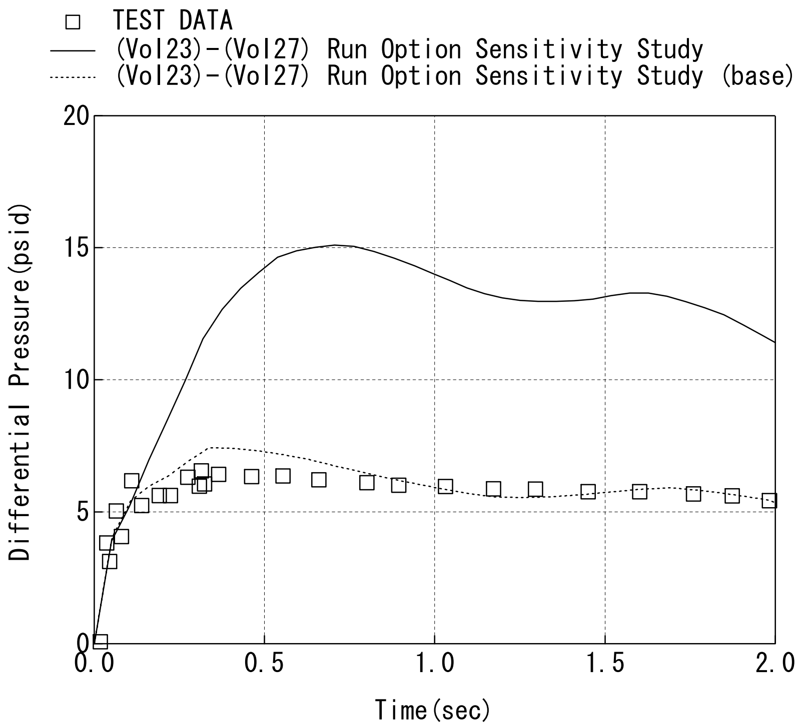


Figure 5.1-36 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS RUN OPTIONS

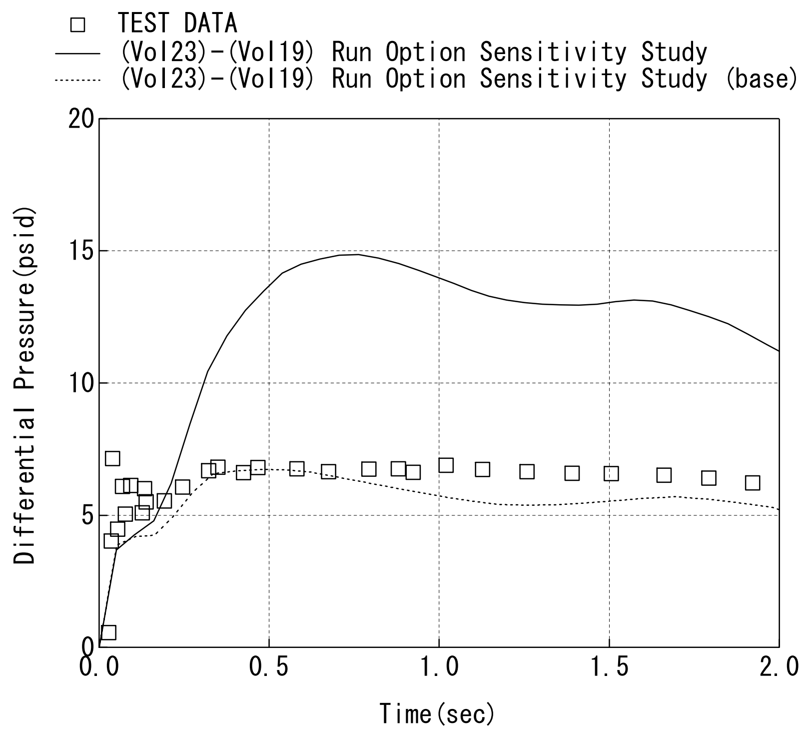


Figure 5.1-37 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS RUN OPTIONS

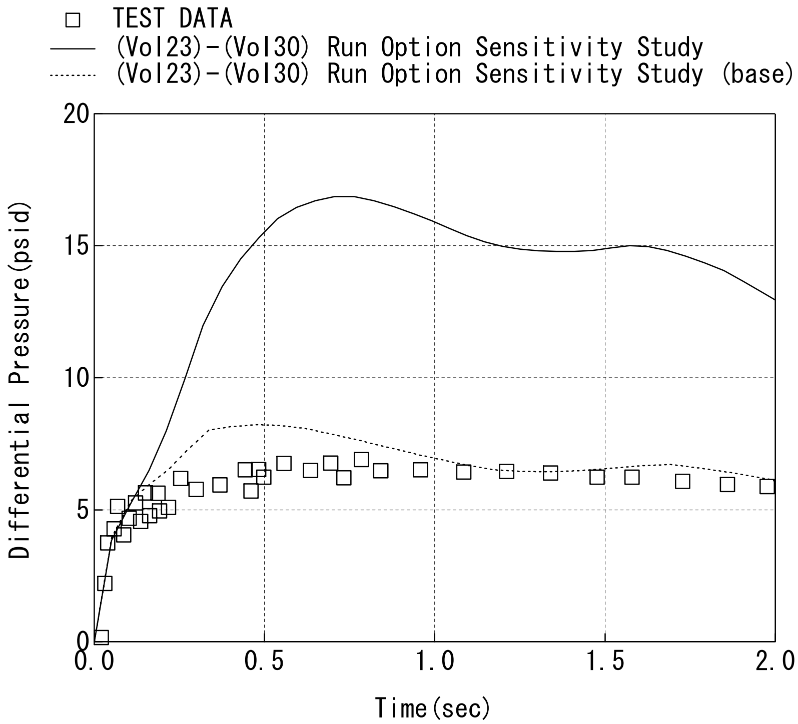


Figure 5.1-38 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS RUN OPTIONS

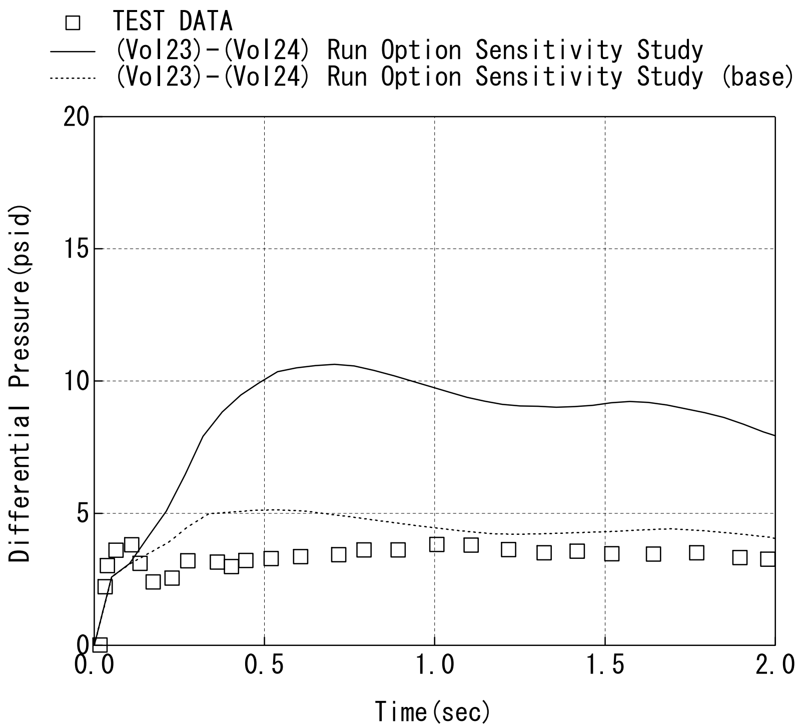


Figure 5.1-39 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS RUN OPTIONS

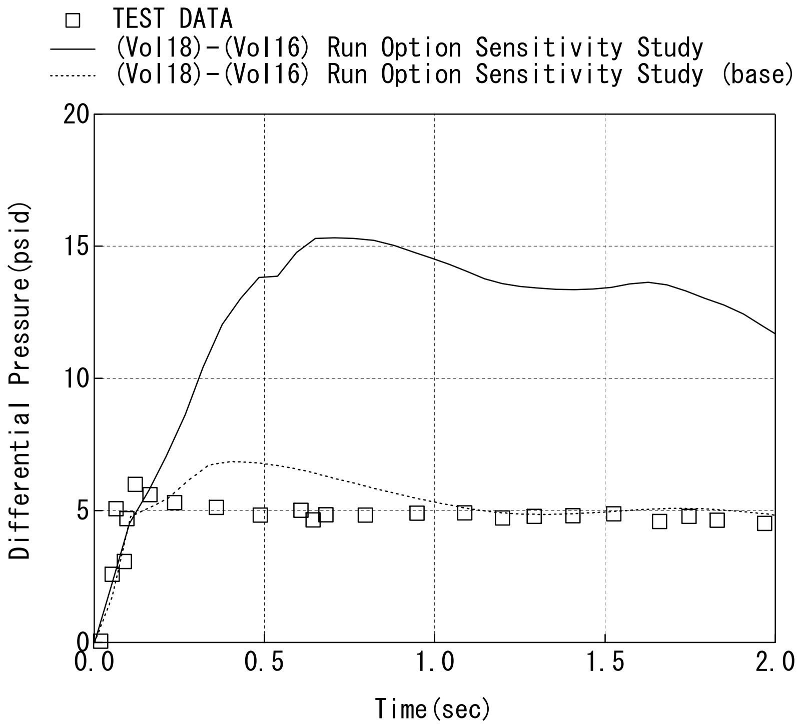


Figure 5.1-40 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS RUN OPTIONS

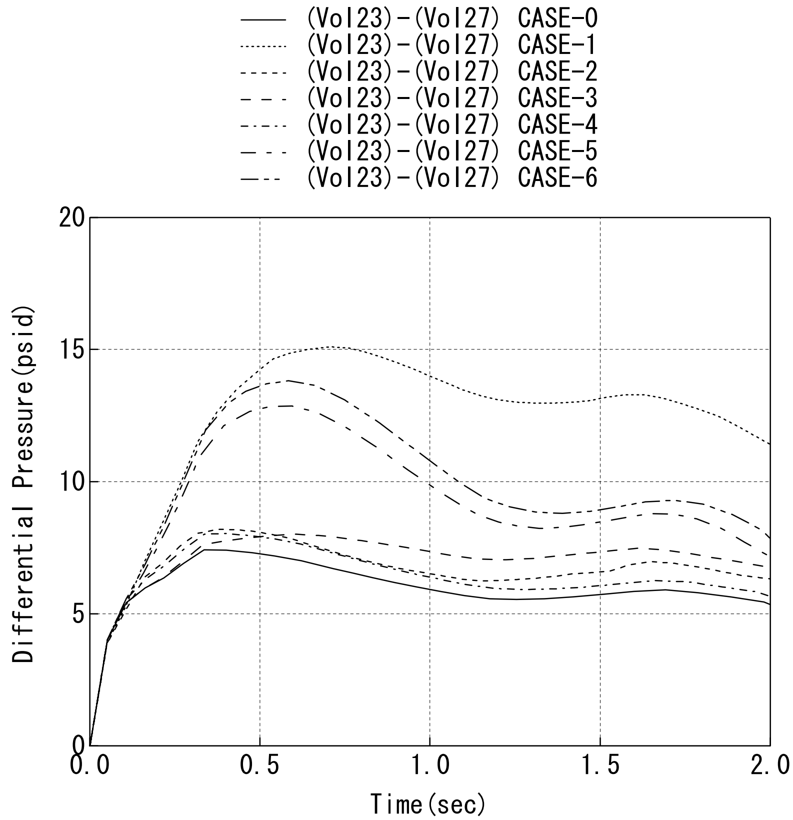


Figure 5.1-41 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS EACH RUN OPTION

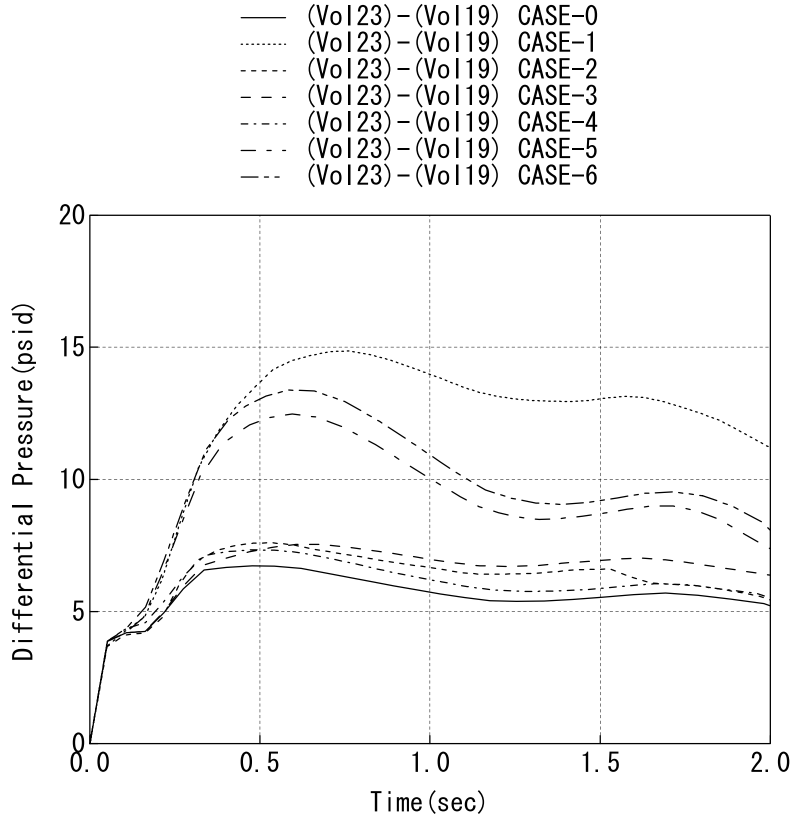


Figure 5.1-42 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS EACH RUN OPTION

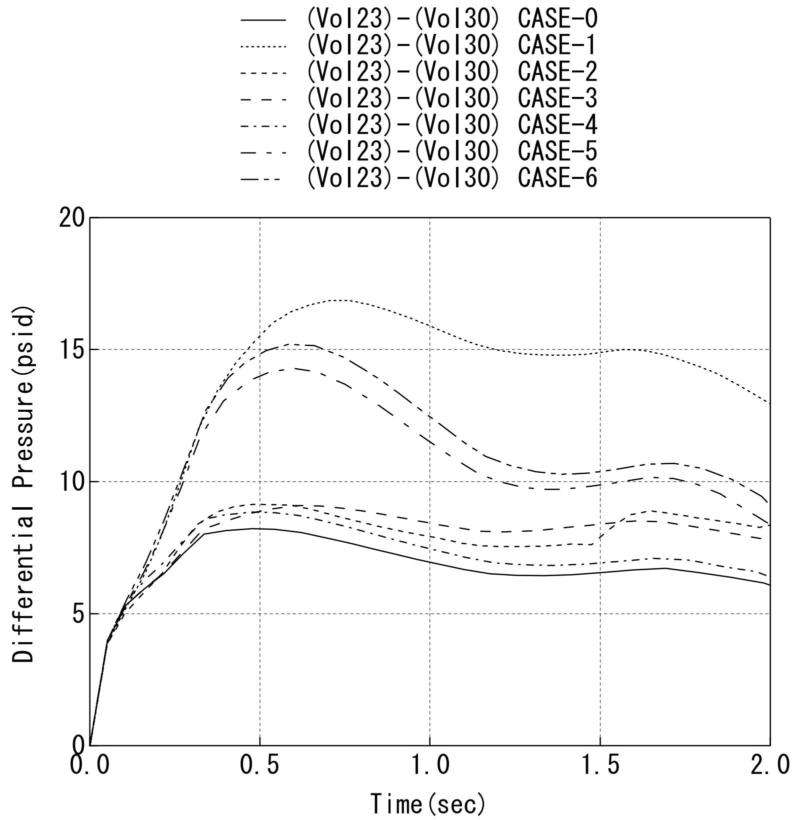


Figure 5.1-43 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS EACH RUN OPTION

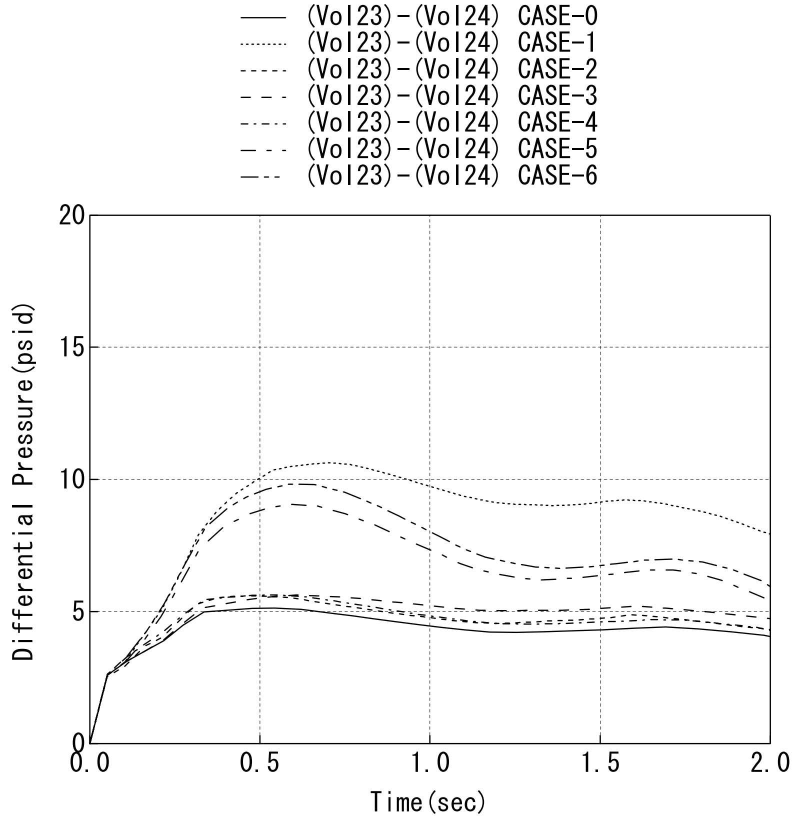


Figure 5.1-44 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS EACH RUN OPTION

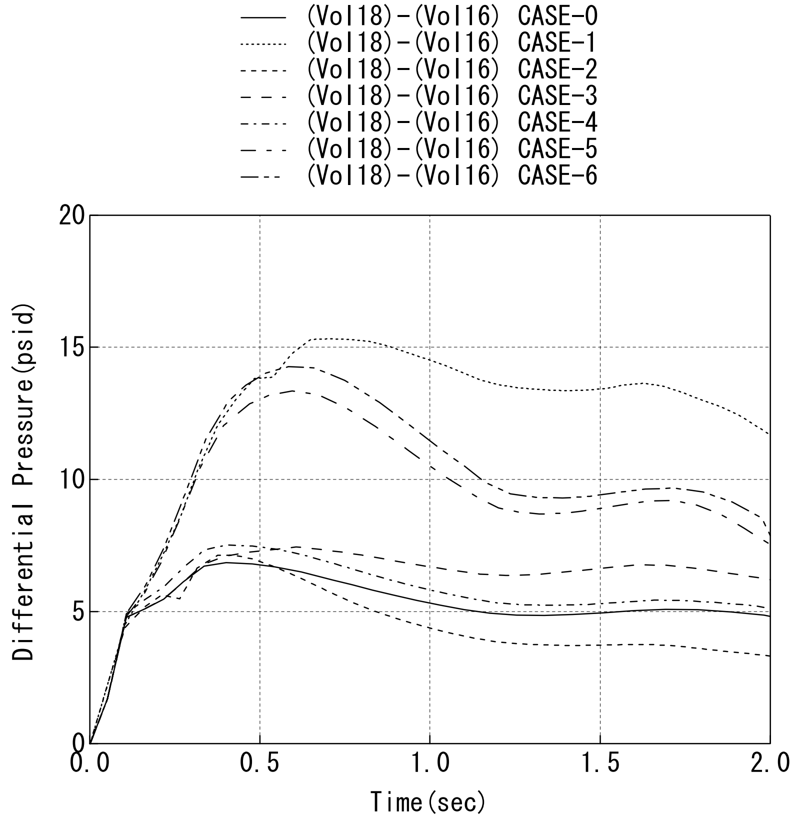


Figure 5.1-45 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS EACH RUN OPTION

5.2 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 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 5.1 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

5.2.1 Result for Test BFMC D-16

Figure 5.2-1 to Figure 5.2-5 show differential pressures for SS Time Step Size of BFMC D-16.

5.2.2 Result for Test HDR V21.1

Figure 5.2-6 to Figure 5.2-10 show differential pressures for SS Time Step Size of HDR V21.1.

5.2.3 Conclusions

From Sections 5.2.1 and 5.2.2, it is concluded that the base time step size selection is suitable for the subcompartment differential pressure analyses.

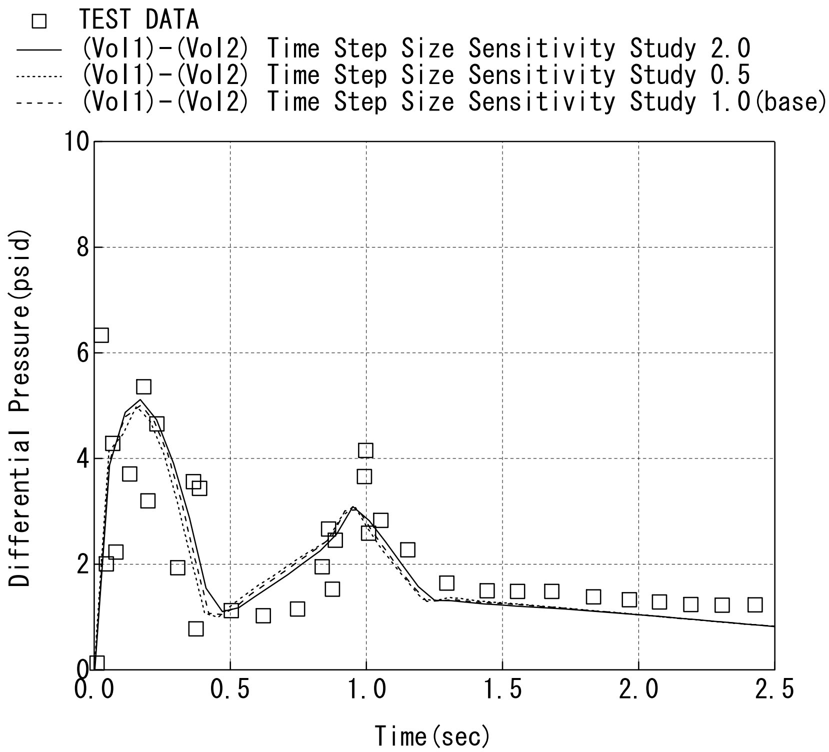


Figure 5.2-1 Differential Pressure, R4 to R5; BFMC Test D-16 for SS Time Step Size

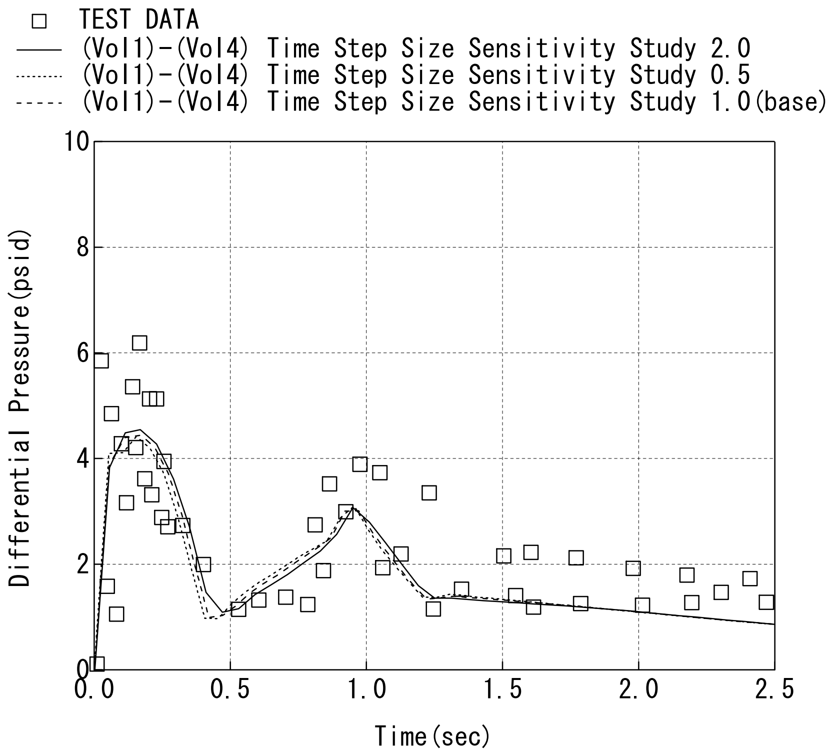


Figure 5.2-2 Differential Pressure, R4 to R7; BFMC Test D-16 for SS Time Step Size

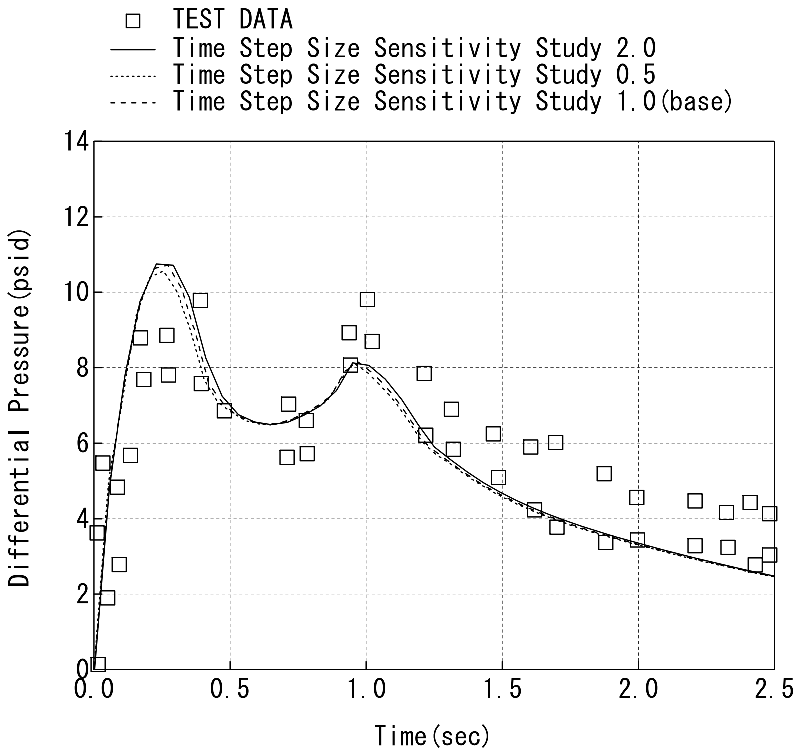


Figure 5.2-3 Differential Pressure, R4 to R9; BFMC Test D-16 for SS Time Step Size

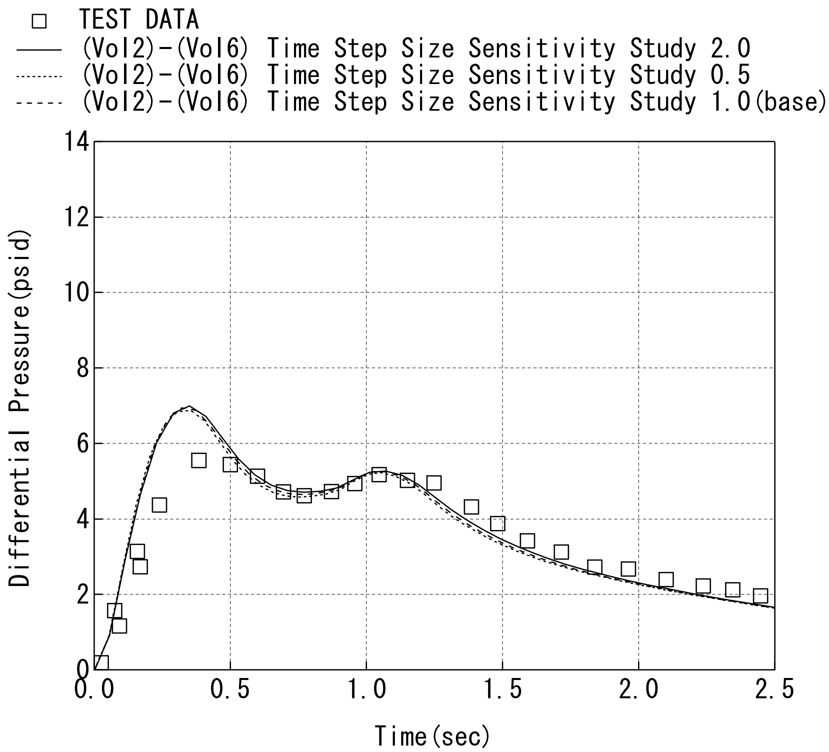


Figure 5.2-4 Differential Pressure, R5 to R9; BFMC Test D-16 for SS Time Step Size

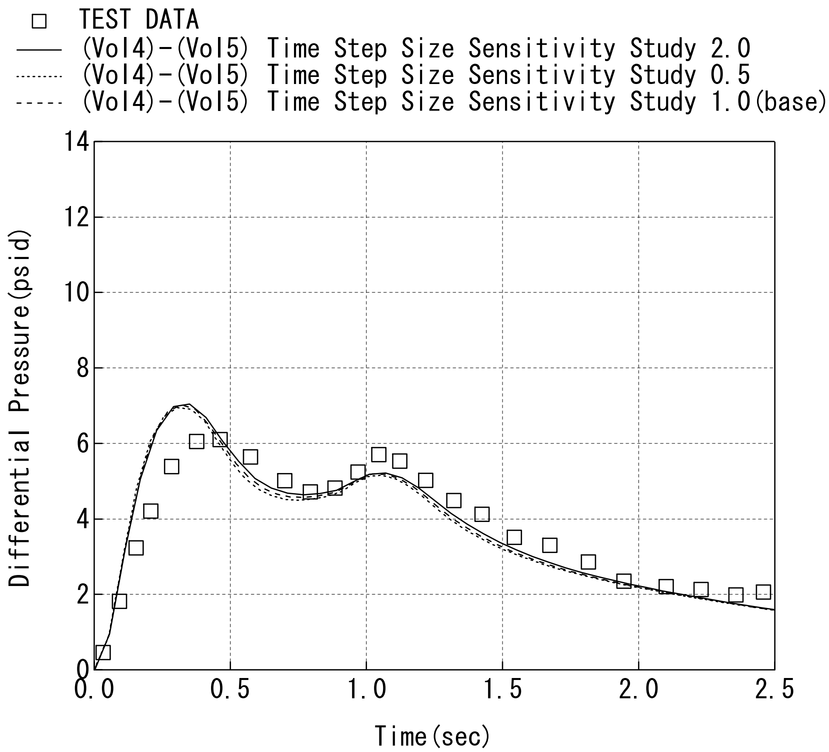


Figure 5.2-5 Differential Pressure, R7 to R8; BFMC Test D-16 for SS Time Step Size

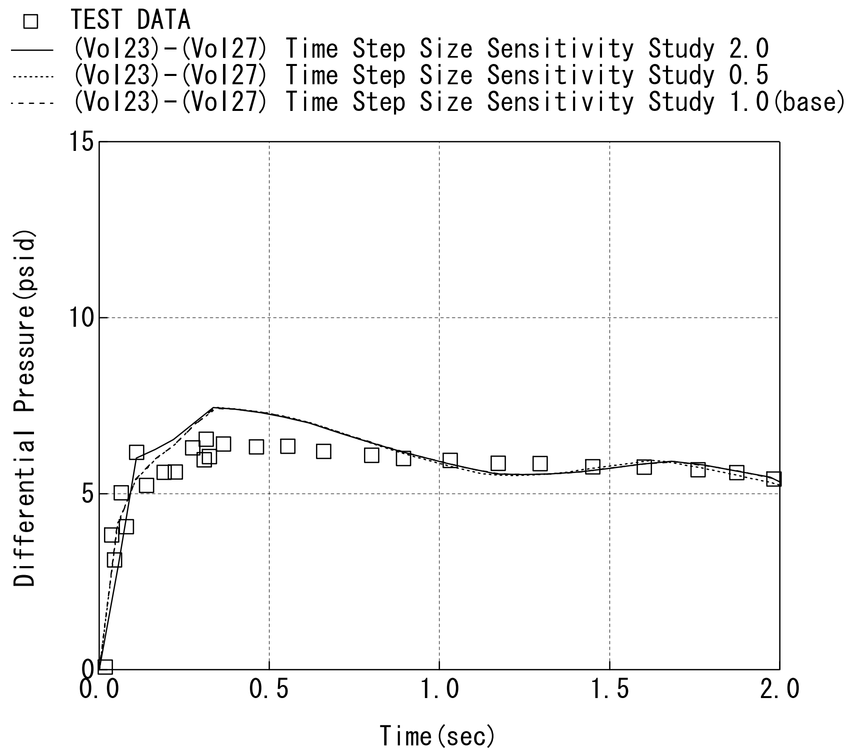


Figure 5.2-6 Differential Pressure from the Break Room to Room 27; HDR V21.1 for SS Time Step Size

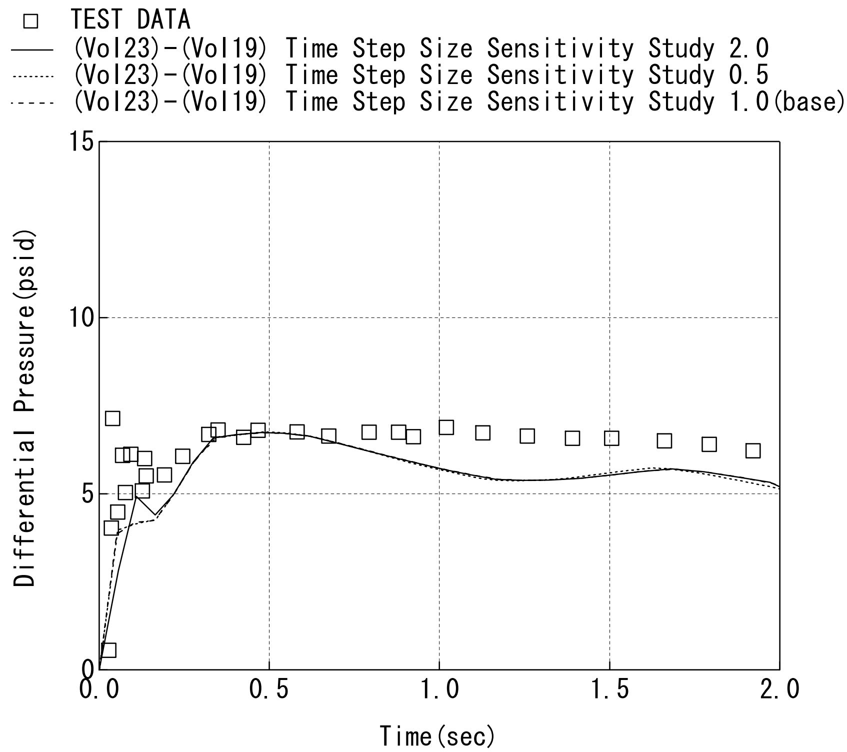


Figure 5.2-7 Differential Pressure from the Break Room to Room 19; HDR V21.1 for SS Time Step Size

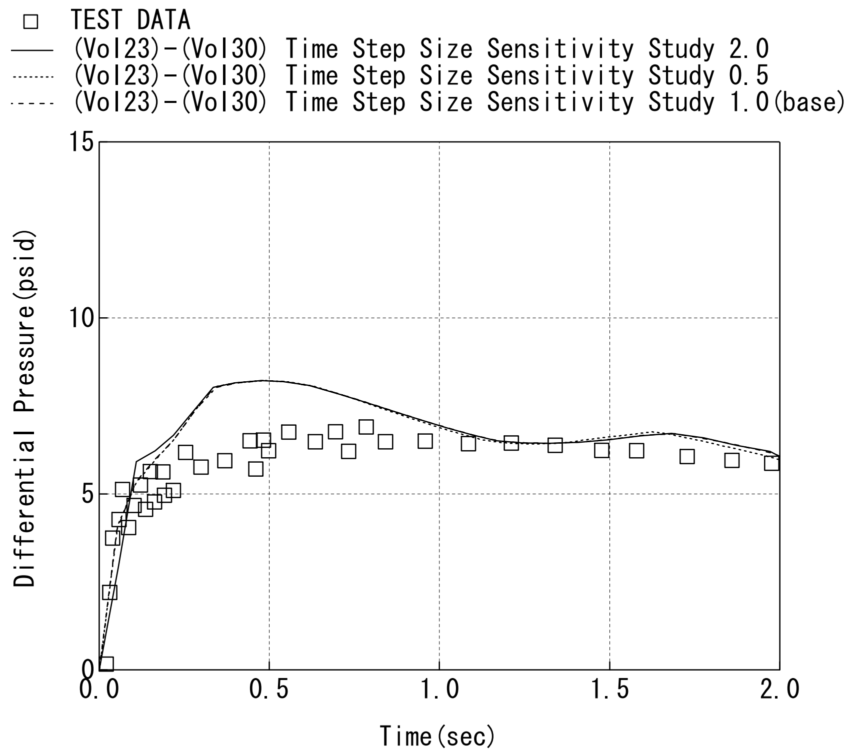


Figure 5.2-8 Differential Pressure from the Break Room to Room 30; HDR V21.1 for SS Time Step Size

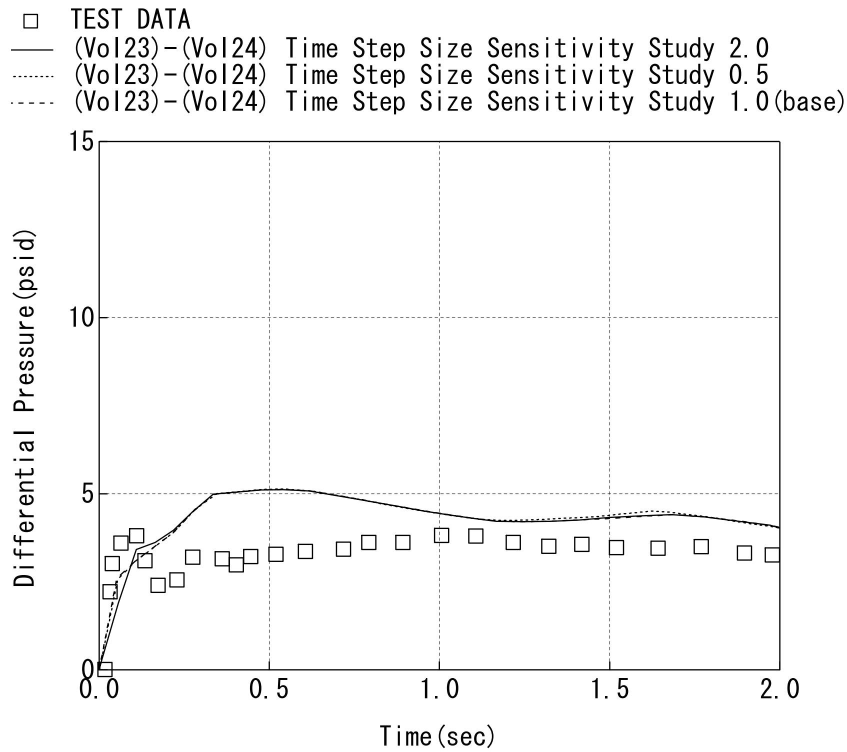


Figure 5.2-9 Differential Pressure from the Break Room to Room 24; HDR V21.1 for SS Time Step Size

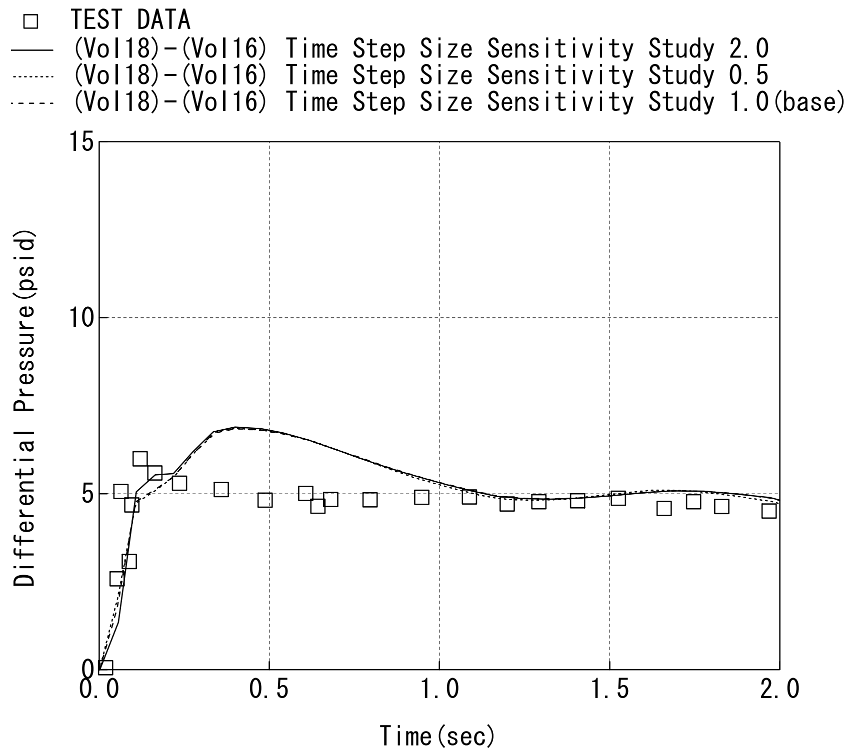


Figure 5.2-10 Differential Pressure from Room 18 to Room 16; HDR V21.1 for SS Time Step Size

5.3 Comparisons with Calculation Results from Another Approved Computer Code

The model verification has been performed by comparisons with calculation results by the TMD computer code, using the same input data described in the subcompartment analysis of FSAR chapter 6 for BYRON/BRAIDWOOD (B/B) Stations (Ref. 8-11).

The TMD code has been reviewed by the NRC and approved for use in subcompartment differential pressure analyses (Ref. 8-13).

5.3.1 Containment Subcompartment Data of B/B Stations

The containment subcompartment nodalization diagram for B/B Stations is presented in Figure 5.3-1. The loop compartments, upper pressurizer cubicle, and steamline pipe chase were analyzed using the above-mentioned code. The subcompartment volume description and initial conditions are listed in Table 5.3-1. The subcompartment flowpath descriptive information is presented in Table 5.3-2.

The pressure transients for the steamline pipe chases were adopted for these comparisons. The steamline double-ended break with flow limiters provides maximum blowdown mass and energy releases to the steamline pipe chases. The steamline mass and energy releases are presented in Table 5.3-5. Breaks in volumes 25 and 26 are considered.Break compartments 25, 26 and upper containment (volume 7) pressure transients are graphed in Figure 5.3-2 and Figure 5.3-3 for TMD calculation results.

5.3.2 Calculation Results with GOTHIC

A GOTHIC model was constructed using the same data for BYRON/BRAIDWOOD Stations listed above. The results with comparison to those from TMD are shown in Figure 5.3-4 and Figure 5.3-5.

5.3.3 Conclusions

From these comparisons, the pressure transient analyses by GOTHIC code reproduce well the pressure responses by TMD. Therefore, it is concluded that GOTHIC code is suitable for the containment subcompartment pressure analyses.

Table 5.3-1 Subcompartment Nodal Description (B/B FSAR)

ELEMENT NO.	VOLUME (ft^3)	INITIAL CONDITIONS TEMP. (°F)	AIR PRESS. (psia)	STEAM PRESS. (psia)
1	36,152	120.00	14.05	0.85
2	33,294	120.00	14.05	0.85
3	35,011	120.00	14.05	0.85
4	41,024	120.00	14.05	0.85
5	38,625	120.00	14.05	0.85
6	36,251	120.00	14.05	0.85
7	2,254,200	120.00	14.05	0.85
8	9,983	120.00	14.05	0.85
9	3,742	120.00	14.05	0.85
10	4,159	120.00	14.05	0.85
11	15,677	120.00	14.05	0.85
12	20,743	120.00	14.05	0.85
13	9,914	120.00	14.05	0.85
14	3,515	120.00	14.05	0.85
15	5,435	120.00	14.05	0.85
16	25,159	120.00	14.05	0.85
17	6,968	120.00	14.05	0.85
18	10,232	120.00	14.05	0.85
19	39,190	120.00	14.05	0.85
20	51,611	120.00	14.05	0.85
21	24,844	120.00	14.05	0.85
22	6,250	120.00	14.05	0.85
23	12,236	120.00	14.05	0.85
24	3,145	120.00	14.05	0.85
25	11,472	120.00	14.05	0.85
26	11,138	120.00	14.05	0.85
27	2,838	120.00	14.05	0.85
28	4,993	120.00	14.05	0.85

Table 5.3-2 Subcompartment flow path description (B/B FSAR)

BETWEEN COMPTS.	FLOW PATH NO.	K-FAC [1]	F-FAC [2]	LENGTH [3]	HYDR. D. [4]	FLOW A [5]	EQUI. A [6]	A/A [7]
1-16	1H	3.6530E+00	2.2000E-02	8.0400E+00	4.2000E+00	2.1000E+01	7.3100E+00	1.5900E-02
2-1	2H	5.9000E-01	2.2000E-02	4.0000E+-1	1.1000E+01	5.7200E+02	4.0000E+01	5.4170E-01
3-4	3H	5. 000E+00	2.2000E-02	8.0000E+01	1.0000E+01	2.2000E+02	7.0000E+01	1.2200E-01
4-28	4H	1.7000E+00	2.2000E-02	9.7100E+00	1.0900E+00	1.9400E+01	2.0000E+00	1.3620E-01
5-6	5H	5.9000E-01	2.2000E-02	4.0000E+01	1.1000E+01	5.7200E+02	4.0000E+01	5.4170E-01
6-1	6H	1.0200E+00	2.2000E-02	5.2000E+01	1.5000E+01	5.7800E+02	5.3000E+01	8.2110E-01
7-6	7H	2.5300E+00	2.2000E-02	8.5400E+01	4.7300E+00	2.3200E+01	5.1510E+01	2.1280E-01
8-15	8H	1.7000E+00	2.2000E-02	4.3000E+01	1.0580E+01	1.3300E+02	4.3000E+01	5.5630E-01
9-8	9H	2.5800E-01	2.2000E-02	2.7250E+01	1.0600E+01	1.1900E+02	3.8500E+01	5.0000E-01
11-10	11H	2.5150E+00	2.2000E-02	3.2530E+01	1.1050E+01	1.8700E+02	2.4940E+01	7.4200E-01
12-20	12H	2.3500E+00	2.2000E-02	1.2940E+01	1.6600E-01	6.3240E+02	6.9500E+00	3.9600E-01
13-12	13H	2.0500E-01	2.2000E-02	3.4110E+01	1.2130E+01	1.8200E+02	3.4070E+01	7.8030E-01
14-15	14H	2.1500E+00	2.2000E-02	3.2450E+01	1.0600E+01	1.1900E+02	2.6310E+01	5.0000E-01
16-17	16H	7.1000E-01	2.2000E-02	4.2630E+01	7.2000E+00	1.4000E+02	3.7940E-01	2.3530E-01
17-18	17H	3.3300E-01	2.2000E-02	1.7380E+01	1.1910E+01	2.6650E+02	1.5430E+01	4.3200E-01
18-19	18H	9.6700E-01	2.2000E-02	3.2420E+01	7.1800E+00	1.4000E+02	2.5900E+01	2.3530E-01
19-20	19H	1.7480E+00	2.2000E-02	7.1800E+01	1.1320E+01	1.3300E+02	5.6370E+01	2.3750E-01
20-21	20H	8.2900E-01	2.2000E-02	4.7420E+01	7.3100E+00	1.4000E+02	3.9700E+01	2.5000E-01
21-22	21H	1.9110E+00	2.2000E-02	9.3800E+00	3.7800E+00	7.0000E+01	3.9700E+00	1.1760E-01
22-23	22H	9.8400E-01	2.2000E-02	4.9180E+01	7.1800E+00	1.4000E+02	4.2230E+01	2.3530E-01
23-16	23H	9.7000E-01	2.2000E-02	3.3930E+01	7.2000E+00	1.4000E+02	2.8170E+01	2.3530E-01
24-18	24H	3.1140E+00	2.2000E-02	3.1500E+00	3.6800E+00	1.7508E+01	2.6300E+00	1.8500E-02
25-17	25H	8.7600E-01	2.2000E-02	8.6900E+00	6.8200E+00	9.4500E+02	6.8200E+00	6.8970E-01
26-22	26H	1.2000E-01	2.2000E-02	9.2000E+00	2.6100E+01	8.4130E+02	8.6000E+00	8.0130E-01
1-7	1R	1.8400E+00	2.2000E-02	4.5000E+01	1.0000E+01	1.9700E+02	4.5000E+01	3.3910E-01
2-7	2R	1.8400E+00	2.2000E-02	6.0000E+01	1.0000E+01	1.8600E+02	6.0000E+01	3.2010E-01
3-7	3R	1.8400E+00	2.2000E-02	4.5000E+01	1.0000E+01	2.1900E+02	4.5000E+01	3.7700E-01
4-7	4R	1.8400E+00	2.2000E-02	4.5000E+01	1.0000E+01	1.7900E+02	4.5000E+01	3.0810E-01
5-7	5R	1.8400E+00	2.2000E-02	6.0000E+01	1.0000E+01	1.9050E+02	6.0000E+01	3.2790E-01
6-7	6R	1.8400E+00	2.2000E-02	4.5000E+01	1.0000E+01	1.9900E+02	4.5000E+01	3.4240E-01
7-15	7R	1.8500E+00	2.2000E-02	1.8000E+00	4.7000E-01	9.6400E+01	4.7000E-02	1.6710E-01
8-7	8R	2.2300E+00	2.2000E-02	1.2200E+00	2.6000E-01	9.0000E+01	2.8000E-02	1.4170E-01
9-10	9R	2.5800E-01	2.2000E-02	2.0000E+01	1.0600E+01	1.1900E+02	1.8000E+01	5.0000E-01

Table 5.3-3 Subcompartment flow path description (cont'd)

BETWEEN COMPTS.	FLOW PATH NO.	K-FAC[1]	F-FAC[2]	LENGTH[3]	HYDR. D.[4]	FLOW A[5]	EQUI. A[6]	A/A[7]
11-7	11R	1.7900E+00	2.2000E-02	2.0900E+00	2.3000E-01	3.3280E+02	1.2000E-01	2.6650E-01
12-7	12R	1.8900E+00	2.2000E-02	2.6600E+00	2.0000E-01	5.0400E+02	2.3000E-01	3.7530E-01
13-7	13R	1.6200E+00	2.2000E-02	3.3500E+00	1.5300E-01	1.7600E+02	1.3500E+00	4.8400E-01
14-7	14R	1.1400E+00	2.2000E-02	1.4800E+01	1.3300E-01	4.8000E+01	3.1770E+00	1.0710E-01
16-8	16R	3.7400E-01	2.2000E-02	2.3770E+01	7.9200E+00	2.9700E+02	2.1160E+01	3.8900E-01
17-9	17R	2.1560E+00	2.2000E-02	2.2270E+01	1.1000E-01	1.1480E+02	2.0760E+01	4.3610E-01
18-10	18R	2.2340E+00	2.2000E-02	1.1800E+00	1.3300E-01	4.5000E+01	5.9000E-01	1.5390E-01
19-11	19R	1.8430E+00	2.2000E-02	1.7080E+01	1.7800E-01	4.7300E+02	1.5480E+01	4.8360E-01
21-13	21R	2.0000E+00	2.2000E-02	1.2500E+01	1.3300E-01	2.0400E+02	6.3900E+00	5.0000E-01
25-7	25R	1.0000E+00	2.2000E-02	4.4710E+01	9.2100E+00	1.9800E+02	3.5500E+01	1.0000E+00
26-14	26R	2.7200E-01	2.2000E-02	1.5100E+01	1.9100E+01	4.2090E+02	1.2840E+01	4.7840E-01
27-7	27R	1.6400E+00	2.2000E-02	2.6000E+01	6.1900E+00	8.2870E+01	8.3800E+00	7.8200E-01
28-7	28R	7.0000E-01	2.2000E-02	2.0070E+01	3.0500E+00	5.8200E+01	1.8700E+01	4.0870E-01
1-7	1A	2.5300E+00	2.2000E-02	8.5400E+01	4.7300E+00	2.3200E+01	5.1510E+01	2.1280E-01
2-3	2A	5.9000E-01	2.2000E-02	4.0000E+01	1.1000E+01	5.7200E+02	4.0000E+01	5.4170E-01
3-7	3A	2.5300E+00	2.2000E-02	8.5400E+01	4.7300E+00	2.3200E+01	5.1510E+01	2.1280E-01
4-7	4A	2.5300E+00	2.2000E-02	8.5400E+01	4.7300E+00	2.3200E+01	5.1510E+01	2.1280E-01
5-4	5A	5.9000E-01	2.2000E-02	4.0000E+01	1.1000E+01	5.7200E+02	4.0000E+01	5.4170E-01
11-12	11A	1.2730E+00	2.2000E-02	3.3590E+01	4.8000E+00	3.6000E+01	1.9070E+01	1.6800E-01
13-14	13A	2.5000E-01	2.2000E-02	2.3000E+01	1.0600E+01	1.1900E+02	1.9500E+01	5.0000E-01
14-22	14A	1.0000E+00	2.2000E-02	7.8200E+00	1.3300E-01	7.8800E+00	3.0000E+00	3.0000E-02
15-23	15A	1.2650E+00	2.2000E-02	6.6300E+00	1.3300E-01	1.3980E+02	1.7200E+00	1.8800E-01
25-9	25A	2.4750E+00	2.2000E-02	2.7040E+01	1.2930E+01	2.2950E+02	2.5840E+01	6.0720E-01
26-7	26A	1.0000E+00	2.2000E-02	4.4710E+01	9.2100E+00	1.9800E+02	3.5500E+01	1.0000E+00

Table 5.3-4 Subcompartment flow path description (cont'd)

1. Factor for form loss and area change pressure drop calculation.
2. Friction factor for frictional pressure drop calculation.
3. Length for inertial pressure drop calculation.
4. Hydraulic diameter for frictional pressure drop calculation.
5. Vent flow area.
6. Equivalent length for frictional pressure drop calculation.
7. [Minimum Area/Maximum Area] for compressibility effects.

Table 5.3-5 Steam line mass and energy release rates (B/B FSAR)

TIME (sec)	MASS FLOW (lbm/sec)	ENERGY FLOW (Btu/sec)	AVE ENTHALPY (Btu/lbm)
0.0	20140.	24.03 (10^6)	1193.15
0.187	20140.	24.03 (10^6)	1193.15
0.1871	14560.	17.31 (10^6)	1188.87
1.03	14560.	17.31 (10^6)	1188.87
1.031	21980.	19.69 (10^6)	895.81
1.480	21980.	19.69 (10^6)	895.81
1.481	42560.	24.84 (10^6)	583.65
4.0	42560.	24.84 (10^6)	583.65

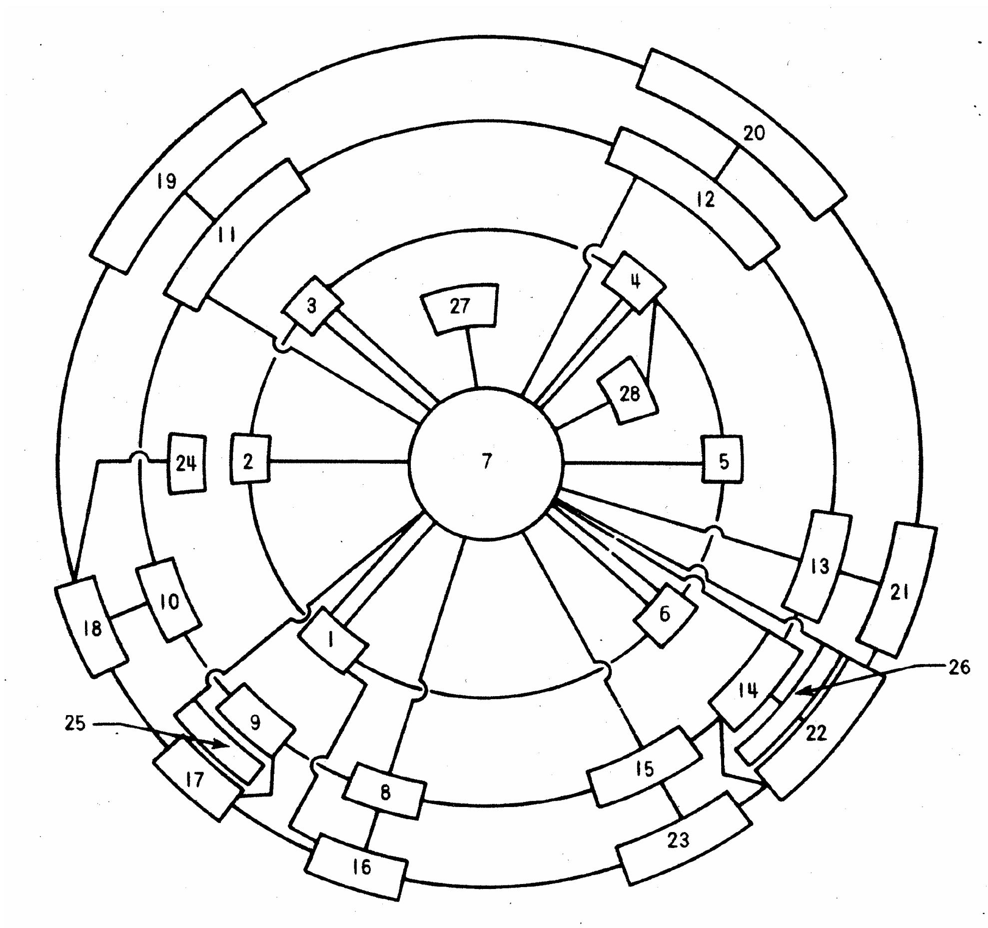


Figure 5.3-1 Containment Subcompartment Nodalization Diagram (B/B FSAR)

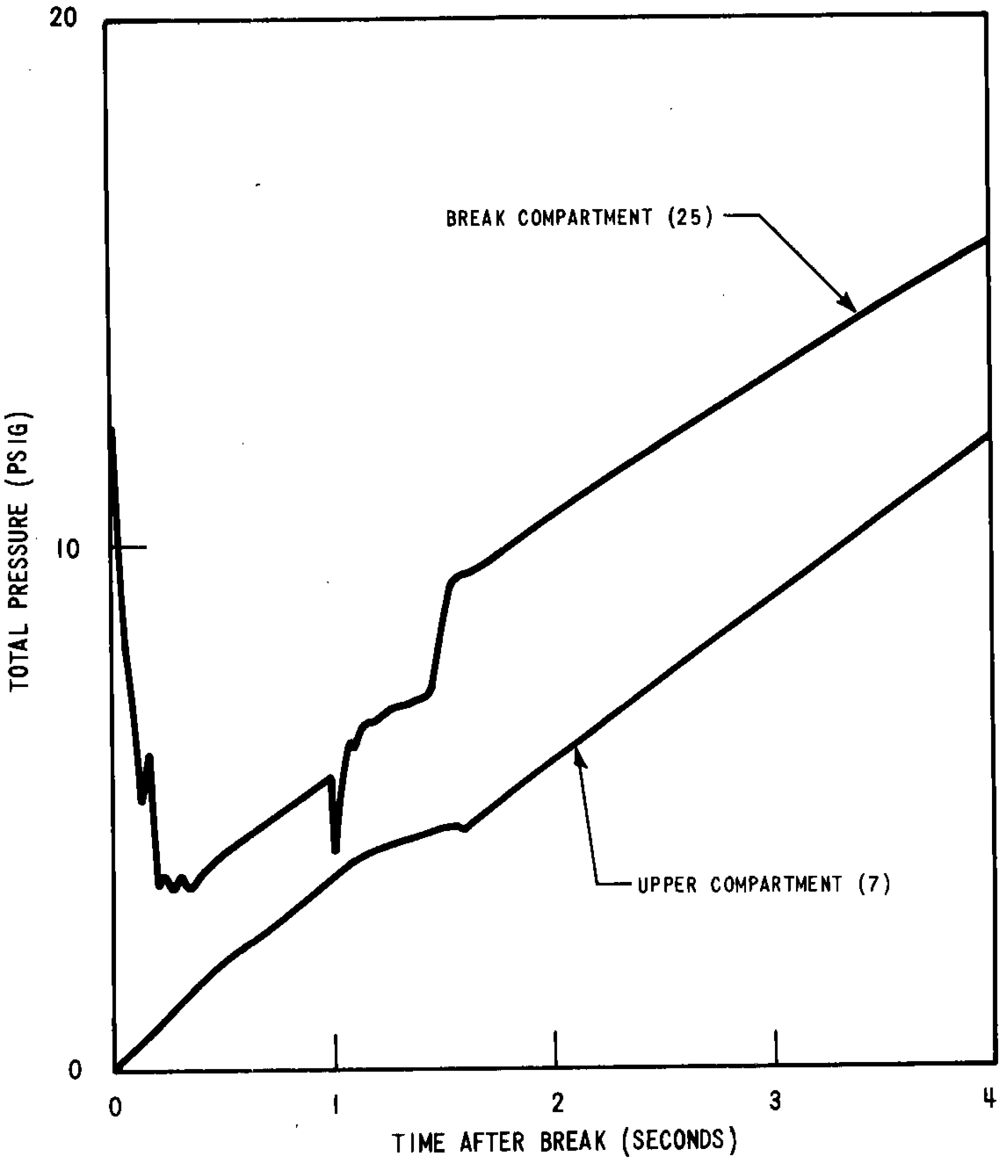


Figure 5.3-2 Steamline compartment and upper compartment pressure transient for steamline break (element 25) from B/B FSAR

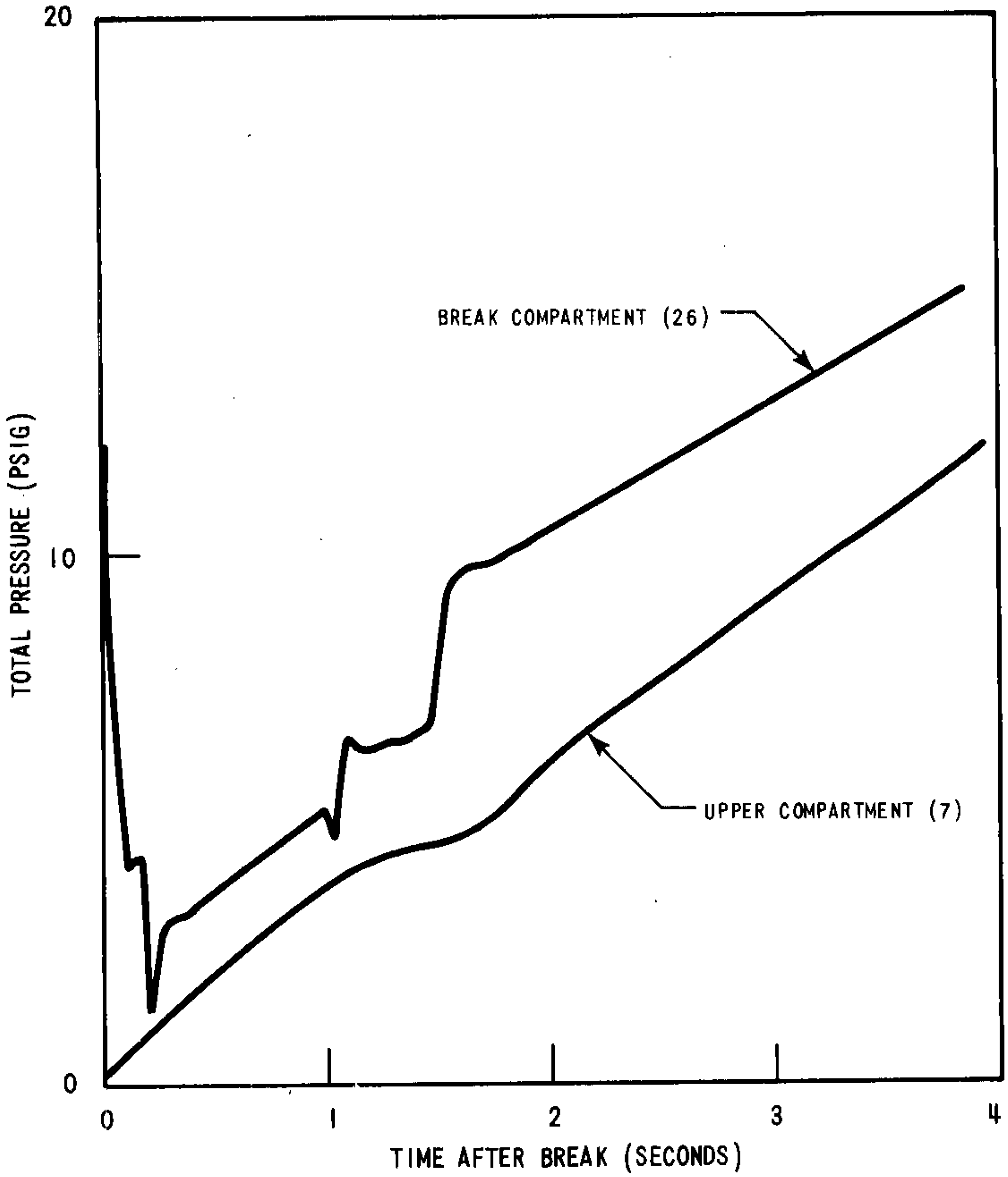


Figure 5.3-3 Steamline compartment and upper compartment pressure transient for steamline break (element 26) from B/B FSAR

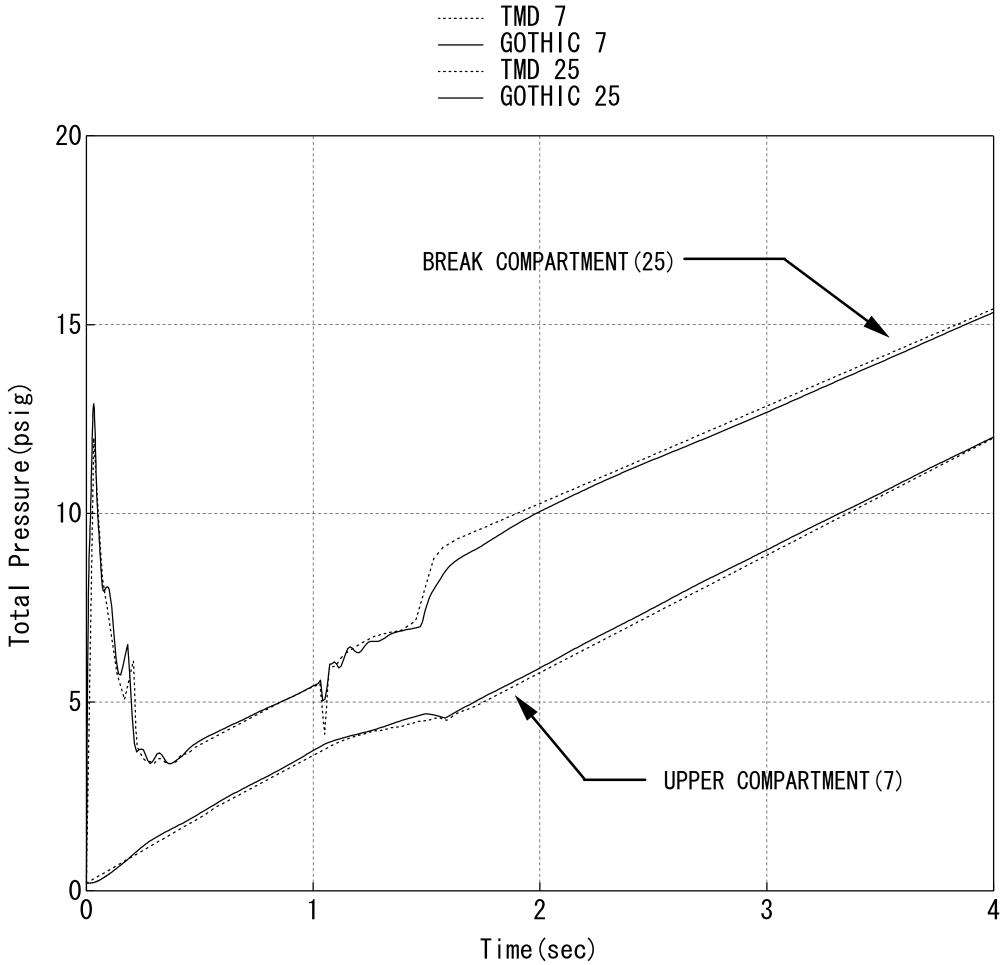


Figure 5.3-4 Steamline compartment and upper compartment pressure transient for steamline break (element 25) by GOTHIC

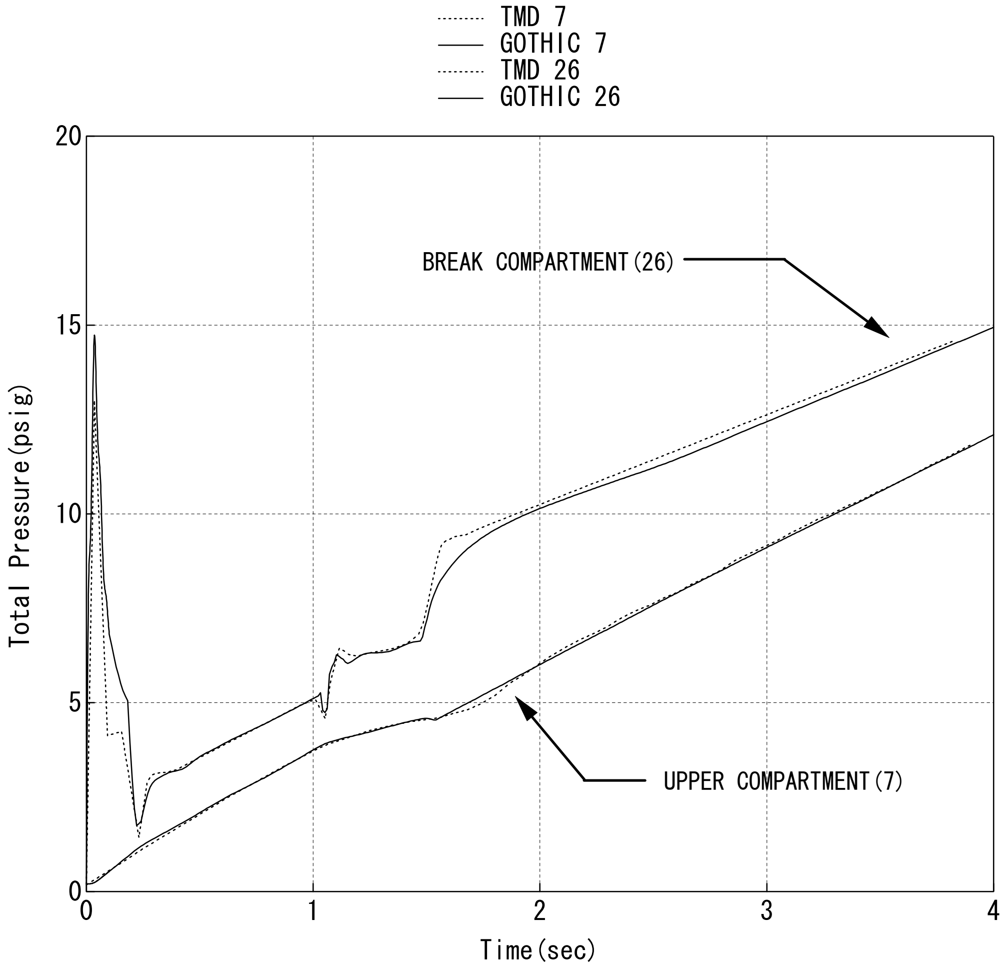


Figure 5.3-5 Steamline compartment and upper compartment pressure transient for steamline break (element 26) by GOTHIC

6.0 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 and feedwater (14-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

6.1 General Analytical Method

6.1.1 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.

The node selection for the reactor cavity analysis is in accordance with section 3.2.2.1 of NUREG-0609 (Ref.9). One approach to development of an acceptable nodalization arrangement for subcompartment analysis of the reactor cavity would be to model the reactor cavity with detailed nodalization accounting for all obstructions. In this case, further sensitivity studies are not required because of the subcompartment analysis based on section 3.2.2 of NUREG-0609.

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

The sensitivity studies for the steam generator subcompartment and the pressurizer subcompartment are described in section 7.

6.1.2 Initial Conditions

The initial atmospheric conditions within a subcompartment are set to maximize the resultant differential pressure. That is, the air at the maximum allowable temperature, minimum absolute pressure, and zero percent relative humidity is assumed according to Standard Review Plan (SRP) 6.2.1.2.

6.1.3 Vent Loss Coefficient

The loss coefficients of 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 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.

6.2 Reactor Cavity

6.2.1 Modeling

(a) 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 used for US-APWR reactor cavity pressure and temperature analysis is shown on Figure 6.2-1 to Figure 6.2-7. 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 6.2-1. Total one hundred and ten nodes are used for the analysis including SG compartment nodes which provide boundary conditions for the analysis.

(b) Vent path description

The vent path connection diagram is shown in Figure 6.2-3 to Figure 6.2-6 for each loop direction respectively. Vent path connections in lower part of the cavity are shown in Figure 6.2-7. Geometric and hydraulic parameters for each vent path are summarized in Table 6.2-2.

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

6.2.2 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 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 basically same as the small break LOCA analysis. The break mass and energy flow from the vessel side break is doubled to account for guillotine break. The resultant short term mass and energy release data are shown in Table 6.2-3.

6.2.3 Calculated pressure responses

The initial temperature and humidity of all nodes are 150 deg F and 0% humidity, respectively. The break was assumed to occur in the node V50 using the short term mass and energy release data shown in Table 6.2-3.

The calculated peak pressure is 7.6 psig at the break node V50 as shown on Figure 6.2-10. The design pressure at the V50 node is 39 psig. The calculated peak pressure is substantially lower than the design pressure. The calculated peak pressure and design pressure for each node are shown on Table 6.2-1. The peak pressure is substantially lower than the design pressure for all nodes.

Table 6.2-1 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	14.7	0	0.81	39	97.9
2	Exhaust duct:direction of A-HL	0.43	6.7	150	14.7	0	0.86	39	97.7
3	Exhaust duct:direction of B-HL	0.43	6.7	150	14.7	0	0.56	39	98.5
4	Exhaust duct:direction of B-CL	0.43	12.0	150	14.7	0	0.58	39	98.5
5	Exhaust duct:direction of C-CL	0.43	12.0	150	14.7	0	0.80	39	97.9
6	Exhaust duct:direction of C-HL	0.43	6.7	150	14.7	0	0.65	39	98.2
7	Exhaust duct:direction of D-HL	0.43	6.7	150	14.7	0	0.49	39	98.7
8	Exhaust duct:direction of D-CL	0.43	12.7	150	14.7	0	0.69	39	98.2
9	Approximately 1/8 of RV ring duct:direction of A-CL	1.65	10.9	150	14.7	0	1.12	39	97.2
10	Approximately 1/8 of RV ring duct:direction of A-HL	1.65	10.9	150	14.7	0	1.33	39	96.7
11	Approximately 1/8 of RV ring duct:direction of B-HL	1.65	10.9	150	14.7	0	1.11	39	97.2

Table 6.2-1 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	14.7	0	1.13	39	97.2
13	Approximately 1/8 of RV ring duct:direction of C-CL	1.65	10.9	150	14.7	0	1.13	39	97.2
14	Approximately 1/8 of RV ring duct:direction of C-HL	1.65	10.9	150	14.7	0	1.13	39	97.2
15	Approximately 1/8 of RV ring duct:direction of D-HL	1.65	10.9	150	14.7	0	1.12	39	97.2
16	Approximately 1/8 of RV ring duct:direction of D-CL	1.65	10.9	150	14.7	0	1.12	39	97.2
17	Approximately 1/8 of the upper inner cavity:direction of A-CL	3.74	11.9	150	14.7	0	3.90	39	90.0
18	Approximately 1/8 of the upper inner cavity:direction of A-HL	3.74	11.6	150	14.7	0	3.93	39	90.0
19	Approximately 1/8 of the upper inner cavity:direction of B-HL	3.74	11.6	150	14.7	0	3.88	39	90.0

Table 6.2-1 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	14.7	0	3.83	39	90.3
21	Approximately 1/8 of the upper inner cavity:direction of C-CL	3.74	11.9	150	14.7	0	3.80	39	90.3
22	Approximately 1/8 of the upper inner cavity:direction of C-HL	3.74	11.6	150	14.7	0	3.79	39	90.3
23	Approximately 1/8 of the upper inner cavity:direction of D-HL	3.74	11.6	150	14.7	0	3.81	39	90.3
24	Approximately 1/8 of the upper inner cavity:direction of D-CL	3.74	11.9	150	14.7	0	3.85	39	90.3
25	Approximately 1/8 of the lower inner cavity:direction of A-CL	4.79	19.5	150	14.7	0	4.66	39	87.9
26	Approximately 1/8 of the lower inner cavity:direction of A-HL	4.79	20.7	150	14.7	0	4.66	39	87.9
27	Approximately 1/8 of the lower inner cavity:direction of B-HL	4.79	20.7	150	14.7	0	4.66	39	87.9

Table 6.2-1 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	14.7	0	4.65	39	87.9
29	Approximately 1/8 of the lower inner cavity:direction of C-CL	4.79	19.5	150	14.7	0	4.65	39	88.2
30	Approximately 1/8 of the lower inner cavity:direction of C-HL	4.79	20.7	150	14.7	0	4.65	39	88.2
31	Approximately 1/8 of the lower inner cavity:direction of D-HL	4.79	20.7	150	14.7	0	4.65	39	88.2
32	Approximately 1/8 of the lower inner cavity:direction of D-CL	4.79	19.5	150	14.7	0	4.65	39	87.9
33	Path of cooling air in R/V support :direction of A-CL	5.46	9.6	150	14.7	0	4.95	39	87.4
34	Path of cooling air in R/V support :direction of A-HL	5.46	9.6	150	14.7	0	5.04	39	87.2
35	Path of cooling air in R/V support :direction of B-HL	5.46	9.6	150	14.7	0	4.85	39	87.7
36	Path of cooling air in R/V support :direction of B-CL	5.46	9.6	150	14.7	0	4.76	39	87.7
37	Path of cooling air in R/V support :direction of C-CL	5.46	9.6	150	14.7	0	4.70	39	87.9

Table 6.2-1 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	14.7	0	4.70	39	87.9
39	Path of cooling air in R/V support :direction of D-HL	5.46	9.6	150	14.7	0	4.72	39	87.9
40	Path of cooling air in R/V support :direction of D-CL	5.46	9.6	150	14.7	0	4.78	39	87.7
41	Approximately 1/8 of the upper inspection annulus:direction of A-CL	3.08	111.6	150	14.7	0	5.86	39	84.9
42	Approximately 1/8 of the upper inspection annulus:direction of A-HL	3.08	91.4	150	14.7	0	6.94	39	82.3
43	Approximately 1/8 of the upper inspection annulus:direction of B-HL	3.08	93.2	150	14.7	0	5.11	39	86.9
44	Approximately 1/8 of the upper inspection annulus:direction of B-CL	3.08	112.5	150	14.7	0	4.74	39	87.9
45	Approximately 1/8 of the upper inspection annulus:direction of C-CL	3.08	112.5	150	14.7	0	4.57	39	88.2
46	Approximately 1/8 of the upper inspection annulus:direction of C-HL	3.08	93.2	150	14.7	0	4.57	39	88.2

Table 6.2-1 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	14.7	0	4.65	39	87.9
48	Approximately 1/8 of the upper inspection annulus:direction of D-CL	3.08	111.6	150	14.7	0	4.81	39	87.7
49	Approximately 1/8 of the lower inspection annulus:direction of A-CL	4.79	199.1	150	14.7	0	5.87	39	84.9
50	Approximately 1/8 of the lower inspection annulus:direction of A-HL	4.79	167.7	150	14.7	0	7.56	39	80.5
51	Approximately 1/8 of the lower inspection annulus:direction of B-HL	4.79	170.8	150	14.7	0	5.11	39	86.9
52	Approximately 1/8 of the lower inspection annulus:direction of B-CL	4.79	200.4	150	14.7	0	4.75	39	87.9
53	Approximately 1/8 of the lower inspection annulus:direction of C-CL	4.79	200.4	150	14.7	0	4.57	39	88.2
54	Approximately 1/8 of the lower inspection annulus:direction of C-HL	4.79	170.8	150	14.7	0	4.57	39	88.2

Table 6.2-1 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	14.7	0	4.66	39	87.9
56	Approximately 1/8 of the lower inspection annulus:direction of D-CL	4.79	199.1	150	14.7	0	4.82	39	87.7
57	Upper portion of primary shield penetration for A-CL	2.21	29.2	150	14.7	0	4.85	39	87.7
58	Upper portion of primary shield penetration for A-HL	2.21	11.6	150	14.7	0	4.08	39	89.5
59	Upper portion of primary shield penetration for B-HL	2.21	11.3	150	14.7	0	3.59	39	90.8
60	Upper portion of primary shield penetration for B-CL	2.21	27.4	150	14.7	0	3.76	39	90.3
61	Upper portion of primary shield penetration for C-CL	2.21	27.4	150	14.7	0	3.58	39	90.8
62	Upper portion of primary shield penetration for C-HL	2.21	11.3	150	14.7	0	3.04	39	92.3

Table 6.2-1 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	14.7	0	3.16	39	91.8
64	Upper portion of primary shield penetration for D-CL	2.21	29.2	150	14.7	0	3.83	39	90.3
65	Lower portion of primary shield penetration for A-CL	2.21	29.2	150	14.7	0	4.85	39	87.7
66	Lower portion of primary shield penetration for A-HL	2.21	11.6	150	14.7	0	4.08	39	89.5
67	Lower portion of primary shield penetration for B-HL	2.21	11.3	150	14.7	0	3.59	39	90.8
68	Lower portion of primary shield penetration for B-CL	2.21	27.4	150	14.7	0	3.76	39	90.3
69	Lower portion of primary shield penetration for C-CL	2.21	27.4	150	14.7	0	3.58	39	90.8
70	Lower portion of primary shield penetration for C-HL	2.21	11.3	150	14.7	0	3.04	39	92.3

Table 6.2-1 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	14.7	0	3.16	39	91.8
72	Lower portion of primary shield penetration for D-CL	2.21	29.2	150	14.7	0	3.83	39	90.3
73	Primary shield penetration for A-DVI line	1.33	5.3	150	14.7	0	1.66	39	95.6
74	Primary shield penetration for B-DVI line	1.33	4.6	150	14.7	0	1.09	39	97.2
75	Primary shield penetration for C-DVI line	1.33	4.6	150	14.7	0	1.05	39	97.4
76	Primary shield penetration for D-DVI line	1.33	5.3	150	14.7	0	1.21	39	96.9
77	Approximately 1/8 of upper cavity annulus:direction of A-CL	7.93	12.4	150	14.7	0	4.89	14	65.0
78	Approximately 1/8 of upper cavity annulus:direction of A-HL	7.93	12.4	150	14.7	0	4.91	14	65.0
79	Approximately 1/8 of upper cavity annulus:direction of B-HL	7.93	12.4	150	14.7	0	4.83	14	65.7
80	Approximately 1/8 of upper cavity annulus:direction of B-CL	7.93	12.4	150	14.7	0	4.76	14	65.7

Table 6.2-1 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	14.7	0	4.71	14	66.4
82	Approximately 1/8 of upper cavity annulus:direction of C-HL	7.93	12.4	150	14.7	0	4.71	14	66.4
83	Approximately 1/8 of upper cavity annulus:direction of D-HL	7.93	12.4	150	14.7	0	4.72	14	66.4
84	Approximately 1/8 of upper cavity annulus:direction of D-CL	7.93	12.4	150	14.7	0	4.78	14	65.7
85	Approximately 1/8 of lower cavity annulus:direction of A-CL	7.93	12.4	150	14.7	0	4.84	14	65.7
86	Approximately 1/8 of lower cavity annulus:direction of A-HL	7.93	12.4	150	14.7	0	4.85	14	65.7
87	Approximately 1/8 of lower cavity annulus:direction of B-HL	7.93	12.4	150	14.7	0	4.82	14	65.7
88	Approximately 1/8 of lower cavity annulus:direction of B-CL	7.93	12.4	150	14.7	0	4.78	14	65.7

Table 6.2-1 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	14.7	0	4.76	14	65.7
90	Approximately 1/8 of lower cavity annulus:direction of C-HL	7.93	12.4	150	14.7	0	4.76	14	65.7
91	Approximately 1/8 of lower cavity annulus:direction of D-HL	7.93	12.4	150	14.7	0	4.77	14	65.7
92	Approximately 1/8 of lower cavity annulus:direction of D-CL	7.93	12.4	150	14.7	0	4.80	14	65.7
93	Operation space of NIS:direction of A-CL	14.78	84.4	150	14.7	0	4.86	18	72.8
94	Operation space of NIS:direction of A-HL	14.78	251.8	150	14.7	0	4.87	18	72.8
95	Operation space of NIS:direction of B-HL	14.78	84.4	150	14.7	0	4.83	18	73.3
96	Operation space of NIS:direction of B-CL	14.78	84.4	150	14.7	0	4.78	18	73.3
97	Operation space of NIS:direction of C-CL	14.78	84.4	150	14.7	0	4.76	18	73.3
98	Operation space of NIS:direction of C-HL	14.78	251.8	150	14.7	0	4.75	18	73.3
99	Operation space of NIS:direction of D-HL	14.78	84.4	150	14.7	0	4.76	18	73.3

Table 6.2-1 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	14.7	0	4.80	18	73.3
101	Lower reactor cavity region EL -1'-2" to EL 19'-8.856"	20.90	4691.3	150	14.7	0	4.82	18	73.3
102	Lower reactor cavity region EL -9'-2" to EL -1'-2"	8.00	2722.2	150	14.7	0	4.83	18	73.3
103	RV cooling air supply duct tunnel horizontal passageway	8.00	2500.3	150	14.7	0	4.83	18	73.3
104	RV cooling air supply duct tunnel horizontal passageway	8.00	968.9	150	14.7	0	4.83	18	73.3
105	Core debris catcher	8.00	2038.5	150	14.7	0	4.83	18	73.3
106	RV cooling air supply duct tunnel	35.25	3920.7	150	14.7	0	4.82	18	73.3
107	A-SG compartment	-	50000.0	150	14.7	0	-	-	-
108	B-SG compartment	-	50000.0	150	14.7	0	-	-	-
109	C-SG compartment	-	50000.0	150	14.7	0	-	-	-
110	D-SG compartment	-	50000.0	150	14.7	0	-	-	-

Table 6.2-2 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	1.0	0.5	1.5
2	V2	V107		X	0.81	8.22	0.695	9.86	0	1.0	0.5	1.5
3	V3	V108		X	0.81	8.22	0.695	9.86	0	1.0	0.5	1.5
4	V4	V108		X	0.81	14.68	0.695	17.62	0	1.0	0.5	1.5
5	V5	V109		X	0.81	14.68	0.695	17.62	0	1.0	0.5	1.5
6	V6	V109		X	0.81	8.22	0.695	9.86	0	1.0	0.5	1.5
7	V7	V110		X	0.81	8.22	0.695	9.86	0	1.0	0.5	1.5
8	V8	V110		X	0.81	15.66	0.695	18.79	0	1.0	0.5	1.5
9	V9	V1		X	0.81	9.13	0.695	10.96	0	1.0	0.5	1.5
10	V10	V2		X	0.81	5.64	0.695	6.77	0	1.0	0.5	1.5
11	V11	V3		X	0.81	5.64	0.695	6.77	0	1.0	0.5	1.5
12	V12	V4		X	0.81	9.13	0.695	10.96	0	1.0	0.5	1.5
13	V13	V5		X	0.81	9.13	0.695	10.96	0	1.0	0.5	1.5
14	V14	V6		X	0.81	5.64	0.695	6.77	0	1.0	0.5	1.5
15	V15	V7		X	0.81	5.64	0.695	6.77	0	1.0	0.5	1.5
16	V16	V8		X	0.81	9.13	0.695	10.96	0	1.0	0.5	1.5
17	V9	V10		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
18	V10	V11		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
19	V11	V12		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
20	V12	V13		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
21	V13	V14		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
22	V14	V15		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
23	V15	V16		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5

Table 6.2-2 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
24	V16	V9		X	0.37	8.1	0.272	9.72	0	1.0	0.5	1.5
25	V17	V9		X	0.41	2.46	0.103	2.95	0	0	0	0
26	V18	V10		X	0.41	2.46	0.103	2.95	0	0	0	0
27	V19	V11		X	0.41	2.46	0.103	2.95	0	0	0	0
28	V20	V12		X	0.41	2.46	0.103	2.95	0	0	0	0
29	V21	V13		X	0.41	2.46	0.103	2.95	0	0	0	0
30	V22	V14		X	0.41	2.46	0.103	2.95	0	0	0	0
31	V23	V15		X	0.41	2.46	0.103	2.95	0	0	0	0
32	V24	V16		X	0.41	2.46	0.103	2.95	0	0	0	0
33	V17	V18		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
34	V18	V19		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
35	V19	V20		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
36	V20	V21		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
37	V21	V22		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
38	V22	V23		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
39	V23	V24		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
40	V24	V17		X	0.32	8.48	0.184	10.18	0	1.0	0.5	1.5
41	V25	V17		X	0.67	9.65	0.168	11.58	0	0	0	0
42	V26	V18		X	0.67	9.16	0.168	10.99	0	0	0	0
43	V27	V19		X	0.67	9.16	0.168	10.99	0	0	0	0
44	V28	V20		X	0.67	9.65	0.168	11.58	0	0	0	0
45	V29	V21		X	0.67	9.65	0.168	11.58	0	0	0	0
46	V30	V22		X	0.67	9.16	0.168	10.99	0	0	0	0
47	V31	V23		X	0.67	9.16	0.168	10.99	0	0	0	0

Table 6.2-2 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
48	V32	V24		X	0.67	9.65	0.168	11.58	0	0	0	0
49	V25	V26		X	5.89	8.14	1.914	9.77	0	1.0	0.5	1.5
50	V26	V27		X	3.69	8.0	1.281	9.6	0	1.0	0.5	1.5
51	V27	V28		X	5.89	8.14	1.914	9.77	0	1.0	0.5	1.5
52	V28	V29		X	3.69	8.0	1.281	9.6	0	1.0	0.5	1.5
53	V29	V30		X	5.89	8.14	1.914	9.77	0	1.0	0.5	1.5
54	V30	V31		X	3.69	8.0	1.281	9.6	0	1.0	0.5	1.5
55	V31	V32		X	5.89	8.14	1.914	9.77	0	1.0	0.5	1.5
56	V32	V25		X	3.69	8.0	1.281	9.6	0	1.0	0.5	1.5
57	V41	V17		X	0.20	3.37	0.064	4.04	0	1.0	0.5	1.5
58	V42	V18		X	0.20	2.94	0.064	3.53	0	1.0	0.5	1.5
59	V43	V19		X	0.20	3.0	0.064	3.6	0	1.0	0.5	1.5
60	V44	V20		X	0.20	3.37	0.064	4.04	0	1.0	0.5	1.5
61	V45	V21		X	0.20	3.37	0.064	4.04	0	1.0	0.5	1.5
62	V46	V22		X	0.20	3.0	0.064	3.6	0	1.0	0.5	1.5
63	V47	V23		X	0.20	2.94	0.064	3.53	0	1.0	0.5	1.5
64	V48	V24		X	0.20	3.37	0.064	4.04	0	1.0	0.5	1.5
65	V49	V25		X	0.30	4.82	0.066	5.78	0	1.0	0.5	1.5
66	V50	V26		X	0.25	4.68	0.064	5.62	0	1.0	0.5	1.5
67	V51	V27		X	0.25	4.74	0.064	5.69	0	1.0	0.5	1.5
68	V52	V28		X	0.30	4.82	0.066	5.78	0	1.0	0.5	1.5
69	V53	V29		X	0.30	4.82	0.066	5.78	0	1.0	0.5	1.5
70	V54	V30		X	0.25	4.74	0.064	5.69	0	1.0	0.5	1.5
71	V55	V31		X	0.25	4.68	0.064	5.62	0	1.0	0.5	1.5

Table 6.2-2 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
72	V56	V32		X	0.30	4.82	0.066	5.78	0	1.0	0.5	1.5
73	V50	V26		X	0.09	10.04	0.063	12.05	0	1.0	0.5	1.5
74	V51	V27		X	0.09	10.08	0.063	12.1	0	1.0	0.5	1.5
75	V54	V30		X	0.09	10.08	0.063	12.1	0	1.0	0.5	1.5
76	V55	V31		X	0.09	10.04	0.063	12.05	0	1.0	0.5	1.5
77	V49	V33		X	1.40	7.73	0.423	9.28	0	1.0	0.5	1.5
78	V50	V34		X	1.40	7.43	0.423	8.92	0	1.0	0.5	1.5
79	V51	V35		X	1.40	7.47	0.423	8.96	0	1.0	0.5	1.5
80	V52	V36		X	1.40	7.73	0.423	9.28	0	1.0	0.5	1.5
81	V53	V37		X	1.40	7.73	0.423	9.28	0	1.0	0.5	1.5
82	V54	V38		X	1.40	7.47	0.423	8.96	0	1.0	0.5	1.5
83	V55	V39		X	1.40	7.43	0.423	8.92	0	1.0	0.5	1.5
84	V56	V40		X	1.40	7.73	0.423	9.28	0	1.0	0.5	1.5
85	V41	V42		X	11.85	10.98	3.422	13.18	0	1.0	0.5	1.5
86	V42	V43		X	9.21	10.73	3.035	12.88	0	1.0	0.5	1.5
87	V43	V44		X	12.08	10.99	3.451	13.19	0	1.0	0.5	1.5
88	V44	V45		X	9.21	10.96	3.035	13.15	0	1.0	0.5	1.5
89	V45	V46		X	12.08	10.99	3.451	13.19	0	1.0	0.5	1.5
90	V46	V47		X	9.21	10.73	3.035	12.88	0	1.0	0.5	1.5
90	V47	V48		X	11.85	10.98	3.422	13.18	0	1.0	0.5	1.5
92	V48	V41		X	9.21	10.96	3.035	13.15	0	1.0	0.5	1.5
93	V49	V41		X	26.97	9.86	3.545	11.83	0	0	0	0
94	V50	V42		X	23.07	9.27	3.277	11.12	0	0	0	0
95	V51	V43		X	23.46	9.29	3.308	11.15	0	0	0	0

Table 6.2-2 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
96	V52	V44		X	27.19	9.88	3.561	11.86	0	0	0	0
97	V53	V45		X	27.19	9.88	3.561	11.86	0	0	0	0
98	V54	V46		X	23.46	9.29	3.308	11.15	0	0	0	0
99	V55	V47		X	23.07	9.27	3.277	11.12	0	0	0	0
100	V56	V48		X	26.97	9.86	3.545	11.83	0	0	0	0
101	V49	V50		X	18.56	11.15	3.873	13.38	0	1.0	0.5	1.5
102	V50	V51		X	12.26	10.87	3.154	13.04	0	1.0	0.5	1.5
103	V51	V52		X	18.92	11.17	3.917	13.4	0	1.0	0.5	1.5
104	V52	V53		X	12.26	11.02	3.154	13.22	0	1.0	0.5	1.5
105	V53	V54		X	18.92	11.17	3.917	13.4	0	1.0	0.5	1.5
106	V54	V55		X	12.26	10.87	3.154	13.04	0	1.0	0.5	1.5
107	V55	V56		X	18.56	11.15	3.873	13.38	0	1.0	0.5	1.5
108	V56	V49		X	12.26	11.02	3.154	13.22	0	1.0	0.5	1.5
109	V41	V57		X	4.75	8.34	1.089	10.01	0	1.0	0.5	1.5
110	V42	V58		X	2.66	3.98	0.784	4.78	0	1.0	0.5	1.5
111	V43	V59		X	2.66	3.99	0.782	4.79	0	1.0	0.5	1.5
112	V44	V60		X	4.75	8.0	1.089	9.6	0	1.0	0.5	1.5
113	V45	V61		X	4.75	8.0	1.089	9.6	0	1.0	0.5	1.5
114	V46	V62		X	2.66	3.99	0.782	4.79	0	1.0	0.5	1.5
115	V47	V63		X	2.66	3.98	0.784	4.78	0	1.0	0.5	1.5
116	V48	V64		X	4.75	8.34	1.089	10.01	0	1.0	0.5	1.5
117	V49	V65		X	4.75	8.68	1.089	10.42	0	1.0	0.5	1.5
118	V50	V66		X	2.66	4.44	0.784	5.33	0	1.0	0.5	1.5
119	V51	V67		X	2.66	4.43	0.782	5.32	0	1.0	0.5	1.5

Table 6.2-2 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
120	V52	V68		X	4.75	8.34	1.089	10.01	0	1.0	0.5	1.5
121	V53	V69		X	4.75	8.34	1.089	10.01	0	1.0	0.5	1.5
122	V54	V70		X	2.66	4.43	0.782	5.32	0	1.0	0.5	1.5
123	V55	V71		X	2.66	4.44	0.784	5.33	0	1.0	0.5	1.5
124	V56	V72		X	4.75	8.68	1.089	10.42	0	1.0	0.5	1.5
125	V57	V65		X	9.24	5.68	1.524	6.82	0	1.0	0	0
126	V58	V66		X	3.68	5.68	1.382	6.82	0	1.0	0	0
127	V59	V67		X	3.58	5.68	1.377	6.82	0	1.0	0	0
128	V60	V68		X	8.67	5.68	1.518	6.82	0	1.0	0	0
129	V61	V69		X	8.67	5.68	1.518	6.82	0	1.0	0	0
130	V62	V70		X	3.58	5.68	1.377	6.82	0	1.0	0	0
131	V63	V71		X	3.68	5.68	1.382	6.82	0	1.0	0	0
132	V64	V72		X	9.24	5.68	1.524	6.82	0	1.0	0	0
133	V49	V73		X	0.82	8.92	0.463	10.7	0	1.0	0.5	1.5
134	V52	V74		X	0.82	8.57	0.463	10.28	0	1.0	0.5	1.5
135	V53	V75		X	0.82	8.57	0.463	10.28	0	1.0	0.5	1.5
136	V56	V76		X	0.82	8.92	0.463	10.7	0	1.0	0.5	1.5
137	V57	V107		X	3.64	11.3	0.881	13.56	0	1.0	0.5	1.5
138	V58	V107		X	2.58	4.5	0.767	5.4	0	1.0	0.5	1.5
139	V59	V108		X	2.59	4.38	0.769	5.26	0	1.0	0.5	1.5
140	V60	V108		X	3.64	10.62	0.881	12.74	0	1.0	0.5	1.5
141	V61	V109		X	3.64	10.62	0.881	12.74	0	1.0	0.5	1.5
142	V62	V109		X	2.59	4.38	0.769	5.26	0	1.0	0.5	1.5
143	V63	V110		X	2.58	4.5	0.767	5.4	0	1.0	0.5	1.5

Table 6.2-2 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
144	V64	V110		X	3.64	11.3	0.881	13.56	0	1.0	0.5	1.5
145	V65	V107		X	3.64	11.3	0.881	13.56	0	1.0	0.5	1.5
146	V66	V107		X	2.58	4.5	0.767	5.4	0	1.0	0.5	1.5
147	V67	V108		X	2.59	4.38	0.769	5.26	0	1.0	0.5	1.5
148	V68	V108		X	3.64	10.62	0.881	12.74	0	1.0	0.5	1.5
149	V69	V109		X	3.64	10.62	0.881	12.74	0	1.0	0.5	1.5
150	V70	V109		X	2.59	4.38	0.769	5.26	0	1.0	0.5	1.5
151	V71	V110		X	2.58	4.5	0.767	5.4	0	1.0	0.5	1.5
152	V72	V110		X	3.64	11.3	0.881	13.56	0	1.0	0.5	1.5
153	V73	V107		X	1.11	6.66	0.525	7.99	0	1.0	0.5	1.5
154	V74	V108		X	1.11	5.9	0.525	7.08	0	1.0	0.5	1.5
155	V75	V109		X	1.11	5.9	0.525	7.08	0	1.0	0.5	1.5
156	V76	V110		X	1.11	6.66	0.525	7.99	0	1.0	0.5	1.5
157	V25	V77		X	0.88	5.2	0.225	6.24	0	0	0	0
158	V26	V78		X	0.88	5.2	0.225	6.24	0	0	0	0
159	V27	V79		X	0.88	5.2	0.225	6.24	0	0	0	0
160	V28	V80		X	0.88	5.2	0.225	6.24	0	0	0	0
161	V29	V81		X	0.88	5.2	0.225	6.24	0	0	0	0
162	V30	V82		X	0.88	5.2	0.225	6.24	0	0	0	0
163	V31	V83		X	0.88	5.2	0.225	6.24	0	0	0	0
164	V32	V84		X	0.88	5.2	0.225	6.24	0	0	0	0
165	V33	V77		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
166	V34	V78		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
167	V35	V79		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5

Table 6.2-2 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
168	V36	V80		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
169	V37	V81		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
170	V38	V82		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
171	V39	V83		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
172	V40	V84		X	4.36	4.4	1.968	5.28	0	1.0	0.5	1.5
173	V77	V78		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
174	V78	V79		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
175	V79	V80		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
176	V80	V81		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
177	V81	V82		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
178	V82	V83		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
179	V83	V84		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
180	V84	V77		X	1.60	7.62	0.395	9.14	0	1.0	0.5	1.5
181	V77	V85		X	1.56	7.94	0.397	9.53	0	0	0	0
182	V78	V86		X	1.56	7.94	0.397	9.53	0	0	0	0
183	V79	V87		X	1.56	7.94	0.397	9.53	0	0	0	0
184	V80	V88		X	1.56	7.94	0.397	9.53	0	0	0	0
185	V81	V89		X	1.56	7.94	0.397	9.53	0	0	0	0
186	V82	V90		X	1.56	7.94	0.397	9.53	0	0	0	0
187	V83	V91		X	1.56	7.94	0.397	9.53	0	0	0	0
188	V84	V92		X	1.56	7.94	0.397	9.53	0	0	0	0
189	V85	V86		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
190	V86	V87		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
191	V87	V88		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5

Table 6.2-2 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
192	V88	V89		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
193	V89	V90		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
194	V90	V91		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
195	V91	V92		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
196	V92	V85		X	1.61	7.62	0.396	9.14	0	1.0	0.5	1.5
197	V77	V93	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
198	V78	V94	X		0.16	13.89	0.164	16.67	0	1.0	0.5	1.5
199	V79	V95	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
200	V80	V96	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
201	V81	V97	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
202	V82	V98	X		0.16	13.89	0.164	16.67	0	1.0	0.5	1.5
203	V83	V99	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
204	V84	V100	X		0.04	13.89	0.119	16.67	0	1.0	0.5	1.5
205	V85	V93	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
206	V86	V94	X		0.32	13.33	0.307	16.0	0	1.0	0.5	1.5
207	V87	V95	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
207	V88	V96	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
209	V89	V97	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
210	V90	V98	X		0.32	13.33	0.307	16.0	0	1.0	0.5	1.5
211	V91	V99	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
212	V92	V100	X		0.08	13.33	0.216	16.0	0	1.0	0.5	1.5
213	V85	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
214	V86	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
215	V87	V101		X	1.56	21.95	0.397	26.34	0	0	0	0

Table 6.2-2 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
216	V88	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
217	V89	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
218	V90	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
219	V91	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
220	V92	V101		X	1.56	21.95	0.397	26.34	0	0	0	0
221	V101	V102		X	305.36	9.8	19.717	11.76	0	0	0	0
222	V102	V103		X	155.64	17.4	11.338	26.1	0	1.0	0.5	1.5
223	V103	V104		X	171.97	10.35	11.659	15.53	0	1.0	0.5	1.5
224	V104	V105	X		171.97	8.74	11.659	13.11	0	1.0	0.5	1.5
225	V104	V106	X		121.11	23.38	8.926	28.06	0	0	0	0

Table 6.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses

A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0	0	553.17
0.1	1463.88	553.143
0.2	1541.46	553.075
0.3	1538.33	553.018
0.4	1532.47	552.976
0.5	1528.36	552.949
0.6	1526.07	552.934
0.7	1525.48	552.932
0.8	1526.17	552.94
0.9	1527.61	552.952
1	1529.28	552.967
1.1	1530.83	552.98
1.2	1532.05	552.991
1.3	1532.86	552.999
1.4	1533.18	553.003
1.5	1533.02	553.004
1.6	1532.39	553.001
1.7	1531.33	552.995
1.8	1529.91	552.988
1.9	1528.24	552.978
2	1526.4	552.969
2.1	1524.45	552.959
2.2	1522.48	552.95
2.3	1520.54	552.942
2.4	1518.69	552.936
2.5	1516.97	552.931
2.6	1515.38	552.927
2.7	1513.93	552.926
2.8	1512.62	552.926
2.9	1511.41	552.927
3	1510.27	552.929
3.1	1509.17	552.931
3.2	1508.06	552.934
3.3	1506.95	552.937
3.4	1505.81	552.94
3.5	1504.66	552.943
3.6	1503.5	552.947
3.7	1502.33	552.951
3.8	1501.14	552.954
3.9	1499.94	552.958
4	1498.71	552.962

Table 6.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses

A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
4.1	1497.56	552.967
4.2	1496.28	552.972
4.3	1494.92	552.976
4.4	1493.63	552.981
4.5	1492.4	552.987
4.6	1491.22	552.994
4.7	1490.07	553.001
4.8	1488.94	553.009
4.9	1487.84	553.018
5	1486.75	553.027
5.1	1485.66	553.037
5.2	1484.56	553.047
5.3	1483.46	553.058
5.4	1482.35	553.07
5.5	1481.22	553.082
5.6	1480.06	553.095
5.7	1478.97	553.109
5.8	1477.85	553.123
5.9	1476.71	553.138
6	1475.56	553.154
6.1	1474.42	553.171
6.2	1473.29	553.189
6.3	1472.17	553.208
6.4	1471.06	553.228
6.5	1469.95	553.249
6.6	1468.84	553.27
6.7	1467.74	553.292
6.8	1466.65	553.315
6.9	1465.55	553.339
7	1464.46	553.364
7.1	1463.37	553.389
7.2	1462.3	553.414
7.3	1461.23	553.44
7.4	1460.16	553.467
7.5	1459.09	553.493
7.6	1458	553.52
7.7	1456.91	553.547
7.8	1455.83	553.574
7.9	1454.74	553.6
8	1453.65	553.627
8.1	1452.57	553.654
8.2	1451.49	553.68

Table 6.2-3 Mass and Release Rates for Reactor Cavity Compartment Peak Pressure Analyses

A. Break Type : DVI(4B) guillotine break
Break Area : 0.065(ft^2)
Break location : Volume number 50

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
8.3	1450.42	553.706
8.4	1449.35	553.731
8.5	1448.3	553.756
8.6	1447.26	553.78
8.7	1446.21	553.804
8.8	1445.17	553.827
8.9	1444.13	553.85
9	1443.1	553.872
9.1	1442.07	553.892
9.2	1441.04	553.912
9.3	1440.02	553.932
9.4	1439.01	553.95
9.5	1438	553.968
9.6	1437	553.984
9.7	1436.01	554
9.8	1435.02	554.015
9.9	1434.02	554.029
10	1433.02	554.042

Figure 6.2-1 Nodalization scheme of reactor cavity

Figure 6.2-2 Nodalization scheme of reactor cavity

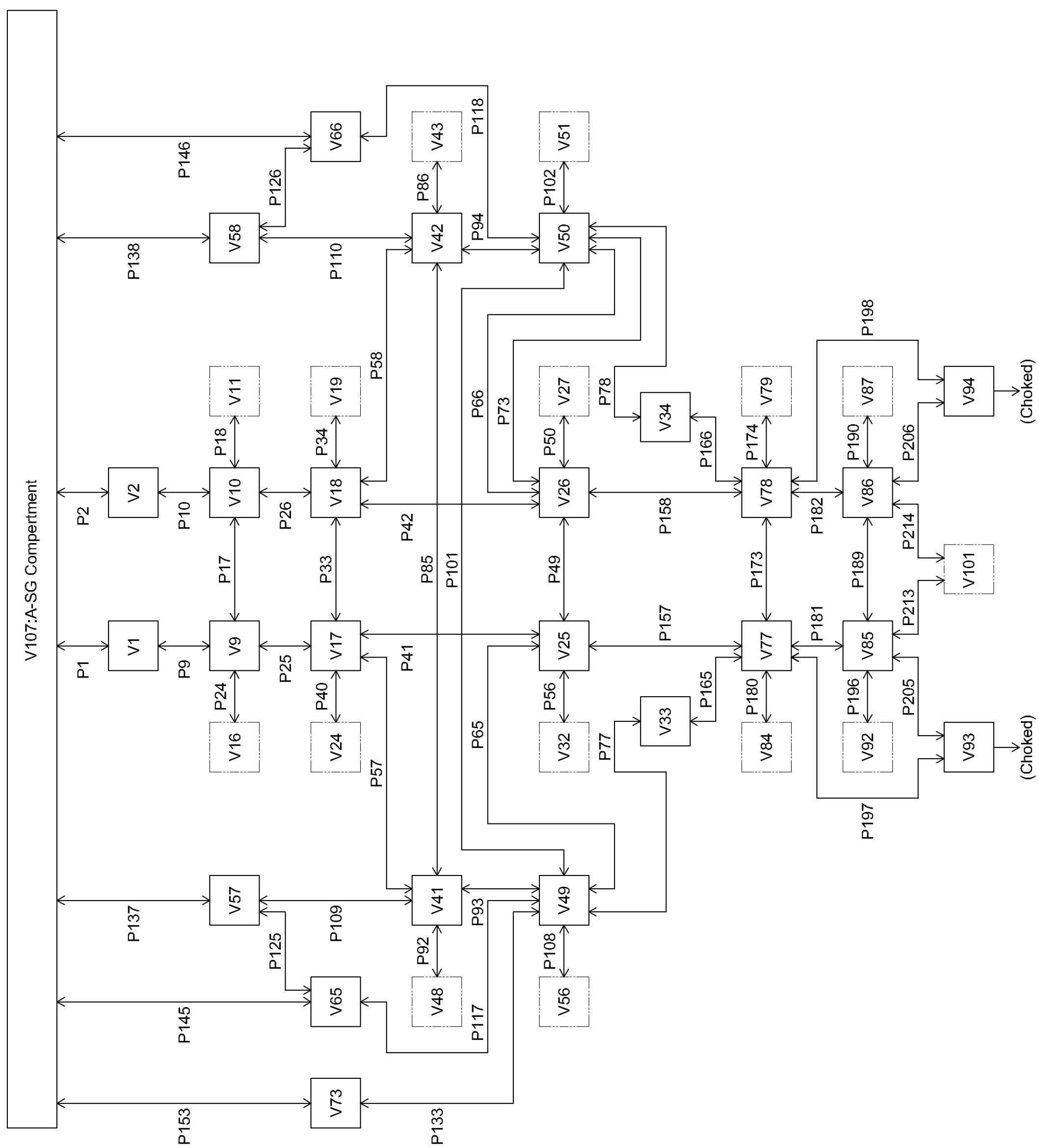


Figure 6.2-3 Nodalization diagram of reactor cavity in A-loop direction

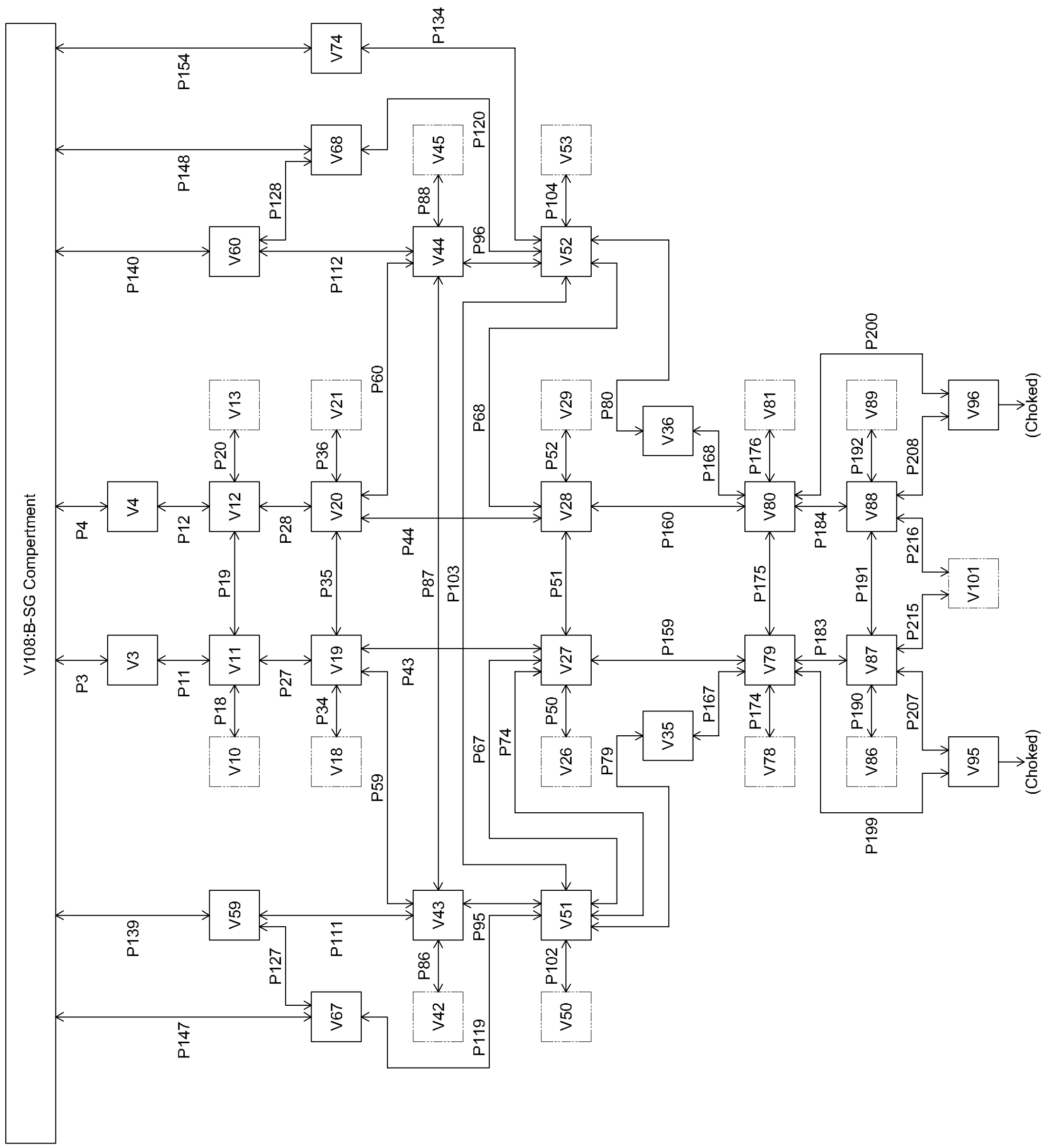


Figure 6.2-4 Nodalization diagram of reactor cavity in B-loop direction

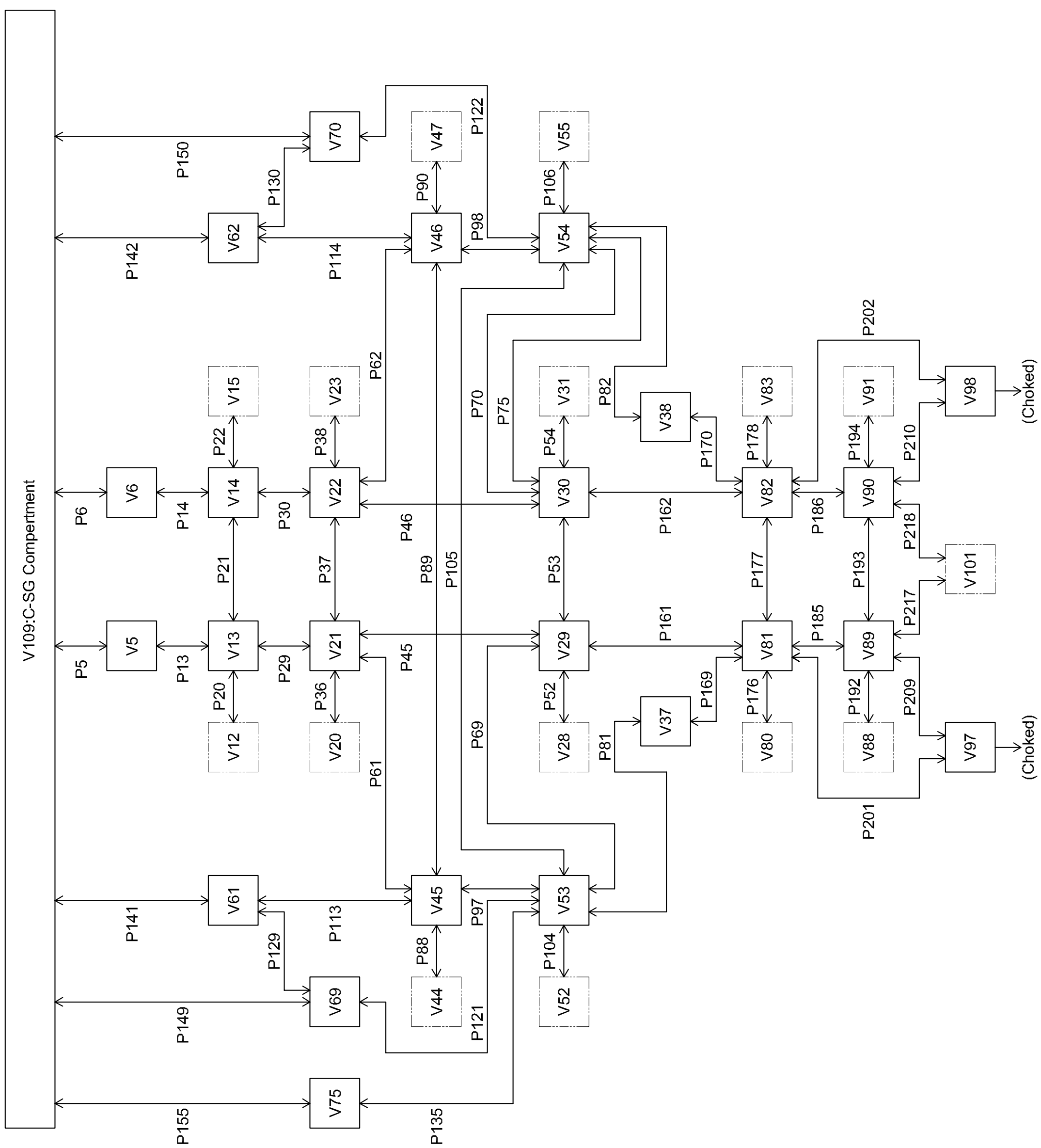


Figure 6.2-5 Nodalization diagram of reactor cavity in C-loop direction

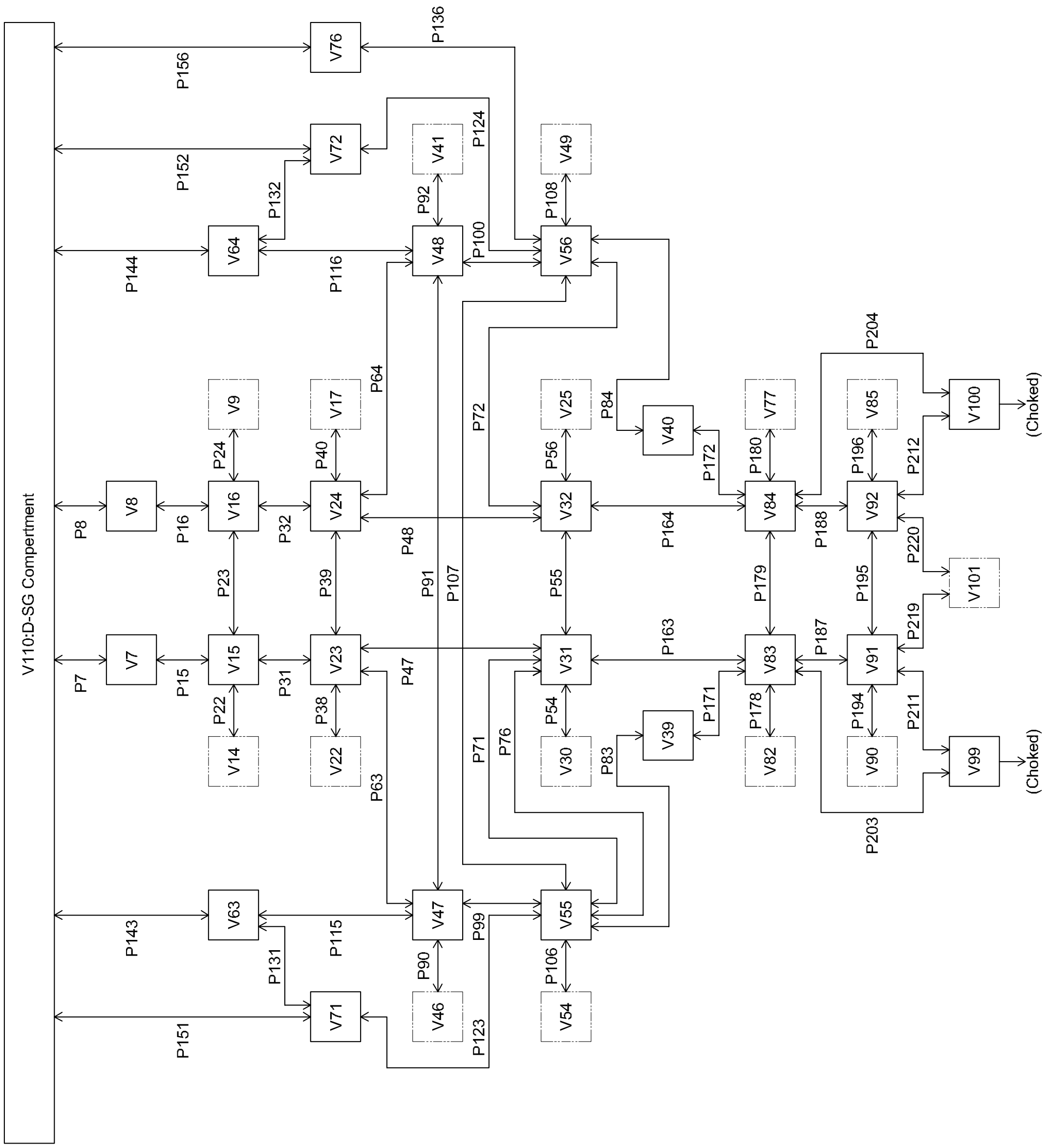


Figure 6.2-6 Nodalization diagram of reactor cavity in D-loop direction

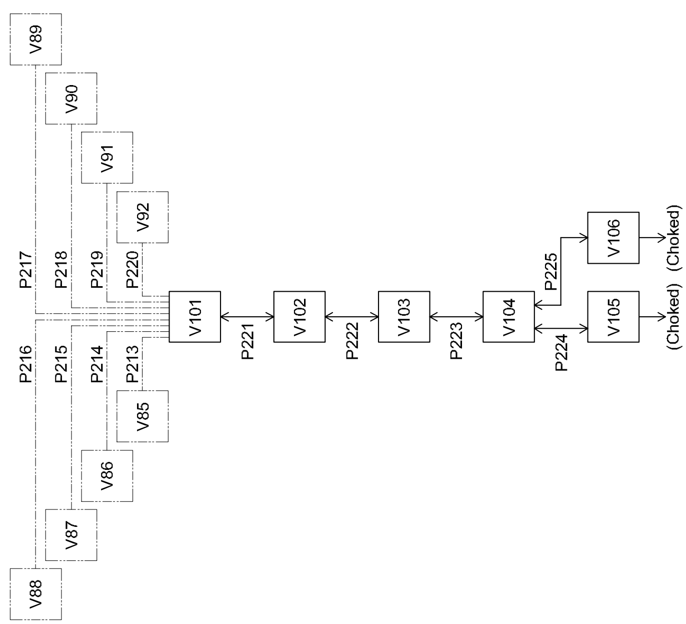


Figure 6.2-7 Nodalization diagram of reactor cavity

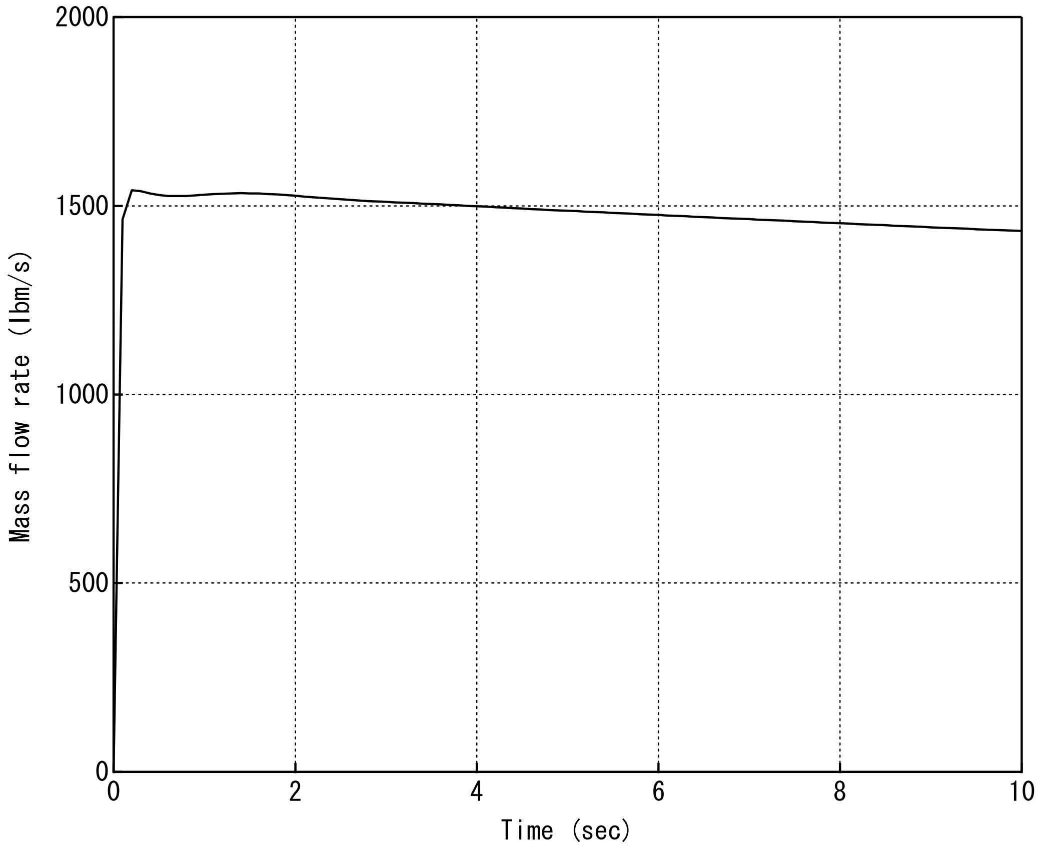


Figure 6.2-8 Short term mass and energy release data for reactor cavity (1/2)

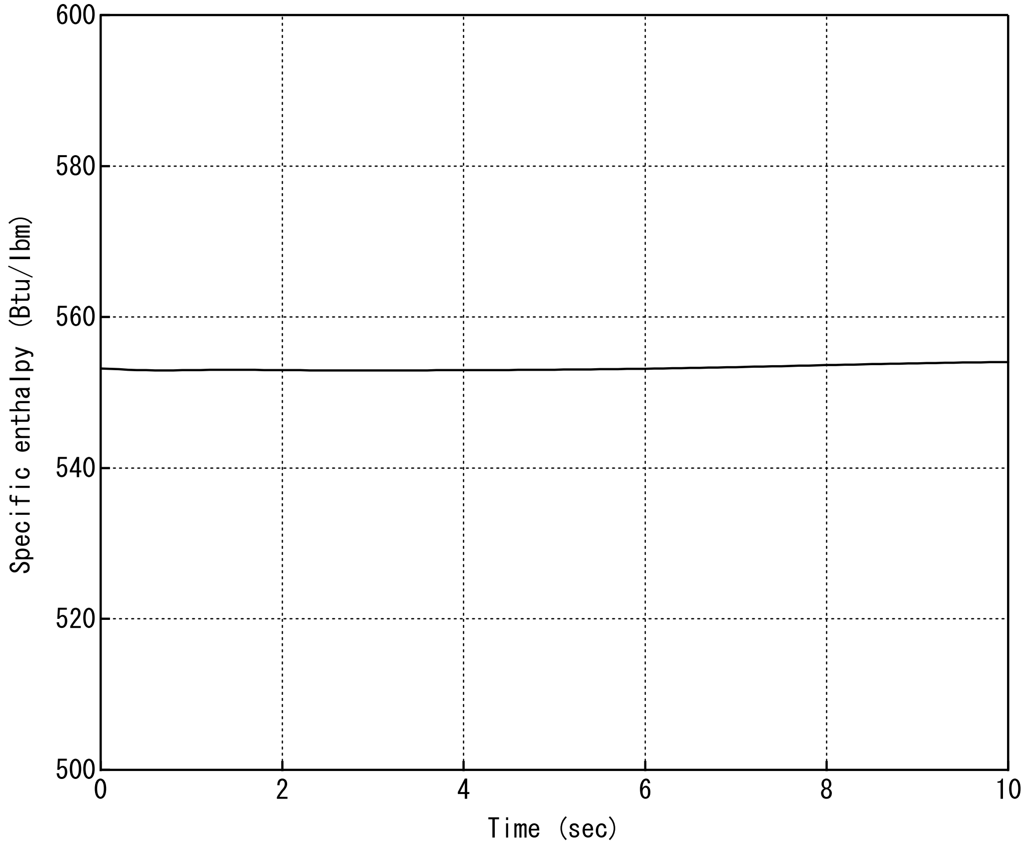


Figure 6.2-9 Short term mass and energy release data for reactor cavity (2/2)

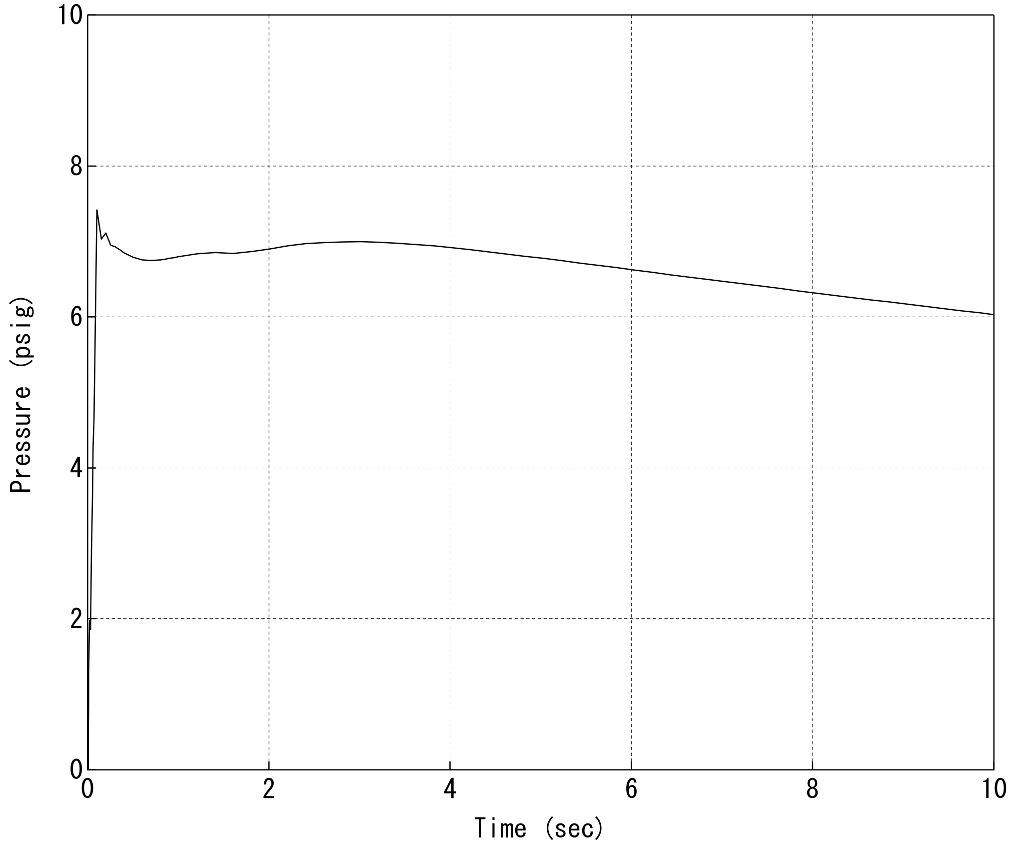


Figure 6.2-10 Pressure transient at the peak pressure node(V50) in reactor cavity analysis

6.3 Steam Generator Subcompartment

6.3.1 Modeling and nodalization sensitivity study

(a) Nodal description

The Steam Generator (SG) compartment consists of the upper region which is nearly a 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, these openings are not modeled as vent paths. This assumption generates conservatively high pressure differentials.

The nodalization scheme for US-APWR SG compartment pressure analysis is shown in Figure 6.3-1 to Figure 6.3-5. 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, 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 6.3-6. A total of 57 nodes, including the containment atmosphere node, are used for the SG compartment analyses. To calculate conservative pressure differences between of the SG compartment nodes and the containment atmosphere node, the pressure of containment atmosphere and adjacent compartments are 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 6.3-2. 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) Vent path description

The vent path connection diagram is shown in Figure 6.3-6. Geometric and hydraulic parameters for each vent path are summarized in Table 6.3-3. Vent paths P7, P49, P68, P111 to P114 and P131 to P134 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 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, all vent paths were connected to containment atmosphere node which is maintained at constant pressure.

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.

6.3.2 Short term mass and energy release data

High energy pipes penetrating the SG compartment are listed in Table3-1. 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 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 break 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 flow from HLG is conservatively doubled. The resultant short term mass and energy release data are shown in Figure 6.3-7 and Figure 6.3-8.

(b) RHR pump outlet line break

A guillotine break of the RHR pump outlet line was assumed. The RHR pump outlet line is connecting to the RCS cold leg (CLG). The mass and energy release from CLG side break 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 flow from CLG was conservatively doubled. The resultant short term mass and energy release data are shown in Figure 6.3-10 and Figure 6.3-11.

(c) Feedwater line break

A guillotine break in the feedwater line was assumed. The feedwater line connects to the secondary side of SG.

For estimating the mass and energy, two operating conditions are considered, full power operation and just after hot shutdown. The parameters for these operating conditions are listed in Table 6.3-1. The resultant short term mass and energy release data are shown in Figure 6.3-13 to Figure 6.3-16 and Figure 6.3-18 to Figure 6.3-22.

6.3.3 Calculated pressure responses

(a) RHR pump inlet line break

The analysis was performed with the pipe break at various locations. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in V16.

The calculated peak pressure was 3.16 psig at the break node V16. The pressure transient at V16 is shown in Figure 6.3-9. The design pressure of this node is 7 psig and the calculated peak pressure is less than the design pressure.

(b) RHR pump outlet line break

The analysis was performed with the pipe break at various locations. The sensitivity studies for break location confirmed that worst case conditions were obtained with the break in V17

The calculated peak pressure was 4.15 psig at the break node V17. The pressure transient at V17 is shown in Figure 6.3-12. The design pressure of this node is 7 psig and the calculated peak pressure is less than the design pressure.

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

The calculated peak pressure was 13.81 psig with the break in node V55. The pressure transient at V55 is shown in Figure 6.3-17. The design pressure of this node is 14 psig and the calculated peak pressure is less than the design pressure.

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

The calculated peak pressure was 11.19 psig with the break in node V55. The pressure transient at V55 is shown in Figure 6.3-22. The design pressure of this node is 14 psig and the calculated peak pressure is less than the design pressure.

Table 6.3-1 Considered Operating Conditions for Feedwater Line Break

Operating condition	Pressure of secondary system (psia)	Temperature of SG secondary side (deg F)
Full power	986	515.4*
Just after hot shutdown	1110	557.1

* This value is not a design value. It is conservatively estimated for sub compartment analysis.

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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	874	120	14.7	0	1.65	18	90.8
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	750	120	14.7	0	1.63	18	90.9
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1346	120	14.7	0	1.82	18	89.9
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1257	120	14.7	0	1.69	18	90.6
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1530	120	14.7	0	1.73	18	90.4
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1820	120	14.7	0	1.84	18	89.8

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
7	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1540	120	14.7	0	1.75	18	90.3
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1370	120	14.7	0	1.77	18	90.2
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	677	120	14.7	0	1.86	18	89.7
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	599	120	14.7	0	1.82	18	89.9
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1183	120	14.7	0	1.74	18	90.3
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1037	120	14.7	0	1.60	18	91.1

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
13	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1283	120	14.7	0	1.73	18	90.4
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1586	120	14.7	0	1.73	18	90.4
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1272	120	14.7	0	1.83	18	89.8
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1108	120	14.7	0	3.16	18	82.4
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	572	120	14.7	0	1.68	7	76.0
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	474	120	14.7	0	1.72	7	75.4

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
19	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	935	120	14.7	0	1.79	7	74.4
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	896	120	14.7	0	1.55	7	77.9
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	1007	120	14.7	0	1.54	7	78.0
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	582	120	14.7	0	1.64	7	76.6
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	954	120	14.7	0	1.68	7	76.0
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	882	120	14.7	0	1.96	7	72.0
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	431	120	14.7	0	1.49	7	78.7

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	350	120	14.7	0	1.45	7	79.3
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	746	120	14.7	0	1.51	7	78.4
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	697	120	14.7	0	1.43	7	79.6
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	843	120	14.7	0	1.50	7	78.6
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	577	120	14.7	0	1.63	7	76.7
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	799	120	14.7	0	1.54	7	78.0
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	739	120	14.7	0	1.50	7	78.6

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	450	120	14.7	0	1.37	7	80.4
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	384	120	14.7	0	1.40	7	80.0
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	739	120	14.7	0	1.43	7	79.6
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	655	120	14.7	0	1.47	7	79.0
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	688	120	14.7	0	1.41	7	79.9
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	822	120	14.7	0	1.31	7	81.3
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	652	120	14.7	0	1.35	7	80.7

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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	603	120	14.7	0	1.31	7	81.3
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	356	120	14.7	0	1.38	7	80.3
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	324	120	14.7	0	1.36	7	80.6
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	387	120	14.7	0	1.38	7	80.3
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	260	120	14.7	0	1.43	7	79.6
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	274	120	14.7	0	1.34	7	80.9
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	508	120	14.7	0	1.21	7	82.7

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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. (%)			
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	523	120	14.7	0	1.17	7	83.3
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	277	120	14.7	0	1.24	7	82.3
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	481	120	14.7	0	1.14	7	83.7
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	960	120	14.7	0	1.05	7	85.0
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	1034	120	14.7	0	1.11	7	84.1
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	517	120	14.7	0	1.11	7	84.1
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	379	120	14.7	0	0.80	14	94.3

Table 6.3-2 Steam Generator Compartment Nodal Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
Break location : Volume number 16

Volume No.	Description	Height (ft)	Free Volume (ft^3)	Initial Conditions Temp. (deg F)	Initial Conditions Press. (psia)	Initial Conditions Humid. (%)	Calculated Peak Press. Diff. (psid)	Design Peak Press. Diff. (psid)	Margin (%)
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	849	120	14.7	0	0.70	14	95.0
55	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	965	120	14.7	0	0.75	14	94.6
56	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	448	120	14.7	0	0.81	14	94.2
57	Containment atmosphere	200	2861000	120	14.7	0	-	-	-

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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	1	2		X	101.35	7.47	9.50	8.96	0	1.0	0.5	1.5
2	1	4		X	135.39	8.68	11.10	10.42	0	1.0	0.5	1.5
3	1	57		X	61.86	14.24	7.86	17.09	0	1.0	0.5	1.5
4	2	3		X	86.79	9.87	8.66	11.84	0	1.0	0.5	1.5
5	3	4		X	79.51	10.36	5.66	12.43	0	1.0	0.5	1.5
6	3	6		X	145.18	11.93	11.44	14.32	0	1.0	0.5	1.5
7	3	57		X	30.94	10.28	5.46	12.34	1.84	1.0	0.5	3.34
8	4	5		X	168.39	12.50	12.26	15.00	0	1.0	0.5	1.5
9	4	57		X	28.87	18.64	5.01	22.37	0	1.0	0.5	1.5
10	5	6		X	84.29	11.69	6.18	14.03	0	1.0	0.5	1.5
11	5	8		X	183.69	10.36	13.30	12.43	0	1.0	0.5	1.5
12	6	7		X	135.63	13.13	11.64	15.76	0	1.0	0.5	1.5
13	7	8		X	133.49	9.97	11.55	11.96	0	1.0	0.5	1.5
14	7	57		X	36.65	14.12	5.90	16.94	0	1.0	0.5	1.5
15	8	57		X	21.94	13.72	4.42	16.46	0	1.0	0.5	1.5
16	1	9		X	49.88	6.39	8.15	24.06	0.7	0	0	0.7
17	2	10		X	42.85	6.39	8.28	24.25	0.7	0	0	0.7
18	3	11		X	80.97	6.39	11.43	28.69	0.7	0	0	0.7
19	4	12		X	71.52	6.39	10.16	26.90	0.7	0	0	0.7
20	5	13		X	86.56	6.39	11.20	28.37	0.7	0	0	0.7
21	6	14		X	109.95	6.39	13.94	32.23	0.7	0	0	0.7
22	7	15		X	87.11	6.39	12.05	29.56	0.7	0	0	0.7
23	8	16		X	77.48	6.39	10.72	27.69	0.7	0	0	0.7

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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
24	9	10		X	68.97	9.96	8.16	11.95	0	1.0	0.5	1.5
25	9	12		X	68.72	10.83	5.13	13.00	0	1.0	0.5	1.5
26	10	11		X	55.92	12.50	7.17	15.00	0	1.0	0.5	1.5
27	11	12		X	74.98	12.76	8.57	15.31	0	1.0	0.5	1.5
28	11	14		X	133.47	10.34	11.43	12.41	0	1.0	0.5	1.5
29	12	13		X	154.26	7.96	12.14	9.55	0	1.0	0.5	1.5
30	13	14		X	54.82	16.62	4.24	19.94	0	1.0	0.5	1.5
31	13	16		X	97.42	14.34	7.36	17.21	0	1.0	0.5	1.5
32	14	15		X	97.75	18.17	8.83	21.80	0	1.0	0.5	1.5
33	15	16		X	95.83	13.89	8.73	16.67	0	1.0	0.5	1.5
34	15	57		X	13.17	9.74	3.07	11.69	0	1.0	0.5	1.5
35	16	57	X		16.46	15.52	3.62	18.62	0	1.0	0.5	1.5
36	9	17		X	44.84	5.64	7.60	21.79	0.7	0	0	0.7
37	10	18		X	37.78	5.64	7.61	21.80	0.7	0	0	0.7
38	11	19		X	72.34	5.64	10.69	26.15	0.7	0	0	0.7
39	12	20		X	67.58	5.64	10.16	25.40	0.7	0	0	0.7
40	13	21		X	69.40	5.64	9.50	24.47	0.7	0	0	0.7
41	14	22		X	42.47	5.64	5.88	19.36	0.7	0	0	0.7
42	15	23		X	69.59	5.64	10.18	25.43	0.7	0	0	0.7
43	16	24		X	64.34	5.64	9.94	25.09	0.7	0	0	0.7
44	17	18		X	57.97	9.96	7.45	11.95	0	1.0	0.5	1.5
45	17	20		X	77.66	10.83	8.35	13.00	0	1.0	0.5	1.5
46	18	19		X	39.97	12.40	5.61	14.88	0	1.0	0.5	1.5
47	19	20		X	62.24	12.67	7.71	15.20	0	1.0	0.5	1.5

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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
48	19	22		X	70.67	12.92	8.40	15.50	0	1.0	0.5	1.5
49	19	57		X	14.75	10.76	3.73	12.91	1.84	1.0	0.5	3.34
50	20	21		X	133.50	7.96	11.09	9.55	0	1.0	0.5	1.5
51	21	22		X	34.51	14.48	5.46	17.38	0	1.0	0.5	1.5
52	21	24		X	89.66	14.34	9.43	17.21	0	1.0	0.5	1.5
53	22	23		X	52.38	16.36	7.12	19.63	0	1.0	0.5	1.5
54	23	24		X	50.72	13.89	6.99	16.67	0	1.0	0.5	1.5
55	17	25		X	37.54	4.82	6.14	18.09	0.7	0	0	0.7
56	18	26		X	30.50	4.82	5.90	17.75	0.7	0	0	0.7
57	19	27		X	64.56	4.82	9.25	22.47	0.7	0	0	0.7
58	20	28		X	60.68	4.82	8.93	22.02	0.7	0	0	0.7
59	21	29		X	73.43	4.82	10.18	23.78	0.7	0	0	0.7
60	22	30		X	70.79	7.96	5.88	9.55	0	0	0	0
61	23	31		X	115.99	7.96	10.18	9.55	0	0	0	0
62	24	32		X	51.33	4.82	7.93	20.61	0.7	0	0	0.7
63	25	26		X	46.64	10.89	6.82	13.07	0	1.0	0.5	1.5
64	25	28		X	55.78	12.50	7.47	15.00	0	1.0	0.5	1.5
65	26	27		X	24.22	13.84	4.57	16.61	0	1.0	0.5	1.5
66	27	28		X	49.21	14.18	6.14	17.02	0	1.0	0.5	1.5
67	27	30		X	65.64	12.95	6.38	15.54	0	1.0	0.5	1.5
68	27	57		X	6.00	9.50	2.40	11.40	1.84	1.0	0.5	3.34
69	28	29		X	111.77	6.33	9.86	7.60	0	1.0	0.5	1.5
70	29	30		X	28.88	14.48	5.14	17.38	0	1.0	0.5	1.5
71	29	32		X	75.05	14.34	8.53	17.21	0	1.0	0.5	1.5

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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
72	30	31		X	43.85	16.36	6.59	19.63	0	1.0	0.5	1.5
73	31	32		X	42.46	13.89	6.48	16.67	0	1.0	0.5	1.5
74	32	57		X	13.17	11.40	3.07	13.68	0	1.0	0.5	1.5
75	25	33		X	62.57	6.59	6.14	7.91	0	0	0	0
76	26	34		X	50.84	6.59	5.90	7.91	0	0	0	0
77	27	35		X	107.60	6.59	8.89	7.91	0	0	0	0
78	28	36		X	101.14	6.59	8.93	7.91	0	0	0	0
79	29	37		X	60.79	4.00	8.43	19.67	0.7	0	0	0.7
80	30	38		X	42.47	4.00	5.39	15.38	0.7	0	0	0.7
81	31	39		X	69.59	4.00	10.18	22.14	0.7	0	0	0.7
82	32	40		X	46.82	4.00	7.23	17.98	0.7	0	0	0.7
83	33	34		X	56.91	10.89	7.07	13.07	0	1.0	0.5	1.5
84	33	36		X	73.39	12.50	7.67	15.00	0	1.0	0.5	1.5
85	34	35		X	47.64	13.93	6.44	16.72	0	1.0	0.5	1.5
86	35	36		X	60.25	14.27	7.22	17.12	0	1.0	0.5	1.5
87	35	38		X	78.92	10.13	8.20	12.16	0	1.0	0.5	1.5
88	36	37		X	91.21	6.33	8.55	7.60	0	1.0	0.5	1.5
89	37	38		X	23.57	16.62	4.76	19.94	0	1.0	0.5	1.5
90	37	40		X	61.25	14.34	7.53	17.21	0	1.0	0.5	1.5
91	38	39		X	35.78	18.17	5.98	21.80	0	1.0	0.5	1.5
92	39	40		X	34.65	13.89	5.89	16.67	0	1.0	0.5	1.5
93	39	57		X	11.83	8.20	2.99	9.84	0	1.0	0.5	1.5
94	33	41		X	83.14	5.38	8.15	6.46	0	0	0	0
95	34	42		X	71.41	5.38	8.28	6.46	0	0	0	0

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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
96	35	43		X	134.95	5.38	14.39	6.46	0	1.0	0.5	1.5
97	36	44		X	119.20	5.38	12.97	6.46	0	1.0	0.5	1.5
98	37	45		X	73.43	3.27	14.06	26.16	0.7	0	0	0.7
99	38	46		X	87.69	3.27	12.18	23.51	0.7	0	0	0.7
100	39	47		X	67.14	3.27	8.70	18.60	0.7	0	0	0.7
101	40	48		X	64.34	3.27	13.31	25.10	0.7	0	0	0.7
102	41	42		X	49.17	7.47	6.55	8.96	0	1.0	0.5	1.5
103	41	44		X	63.91	8.62	7.08	10.34	0	1.0	0.5	1.5
104	42	43		X	42.87	8.22	6.26	9.86	0	1.0	0.5	1.5
105	43	44		X	32.72	7.05	5.64	8.46	0	1.0	0.5	1.5
106	45	46		X	19.26	14.70	4.37	17.64	0	1.0	0.5	1.5
107	45	48		X	20.66	11.54	4.54	13.85	0	1.0	0.5	1.5
108	46	47		X	29.23	17.00	5.37	20.40	0	1.0	0.5	1.5
109	47	48		X	28.31	13.50	5.30	16.20	0	1.0	0.5	1.5
110	47	57		X	1.33	8.20	1.00	9.84	0	1.0	0.5	1.5
111	41	57		X	25.64	1.52	6.39	11.85	2.05	0	0	2.05
112	42	57		X	38.77	1.52	8.11	14.28	2.05	0	0	2.05
113	43	57		X	49.66	1.52	8.82	15.28	2.05	0	0	2.05
114	44	57		X	18.39	1.52	5.45	10.53	2.05	0	0	2.05
115	45	49		X	35.85	4.69	6.86	18.85	0.7	0	0	0.7
116	46	50		X	66.39	4.69	9.22	22.18	0.7	0	0	0.7
117	47	51		X	68.75	4.69	9.21	22.16	0.7	0	0	0.7
118	48	52		X	36.25	4.69	7.50	19.75	0.7	0	0	0.7
119	49	50		X	30.70	16.57	3.98	19.88	0	1.0	0.5	1.5

Table 6.3-3 Steam Generator Compartment Vent Path Description

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
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
120	49	52		X	33.79	13.00	4.52	15.60	0	1.0	0.5	1.5
121	50	51		X	52.71	18.88	6.31	22.66	0	1.0	0.5	1.5
122	51	52		X	50.67	14.96	6.13	17.95	0	1.0	0.5	1.5
123	49	53		X	21.50	6.64	4.24	19.05	0.7	0	0	0.7
124	50	54		X	47.30	6.64	6.57	22.34	0.7	0	0	0.7
125	51	55		X	53.73	6.64	7.34	23.43	0.7	0	0	0.7
126	52	56		X	24.98	6.64	5.48	20.80	0.7	0	0	0.7
127	53	54		X	20.08	16.58	3.06	19.90	0	1.0	0.5	1.5
128	53	56		X	23.37	13.00	3.49	15.60	0	1.0	0.5	1.5
129	54	55		X	43.47	18.89	5.73	22.67	0	1.0	0.5	1.5
130	55	56		X	41.30	14.96	5.51	17.95	0	1.0	0.5	1.5
131	53	57		X	21.50	3.47	4.24	12.72	2.05	0	0	2.05
132	54	57		X	47.30	3.47	6.57	16.01	2.05	0	0	2.05
133	55	57		X	62.19	3.95	8.15	18.23	2.05	0	0	2.05
134	56	57		X	24.98	3.47	5.48	14.47	2.05	0	0	2.05

Table 6.3-4 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
Break location : Volume number 16

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0	0	644.862
0.1	5909.39	644.862
0.2	6054.49	644.586
0.3	5850.24	644.328
0.4	5672.42	644.199
0.5	5570.89	644.203
0.6	5468.55	644.278
0.7	5424.98	644.457
0.8	5372.76	644.663
0.9	5345.04	644.913
1	5062.54	645.178
1.1	4892.86	645.44
1.2	4830.15	645.702
1.3	4800.3	645.949
1.4	4786.47	646.18
1.5	4774.95	646.388
1.6	4766.58	646.574
1.7	4763.21	646.739
1.8	4759.12	646.881
1.9	4756.23	647.003
2	4752.55	647.104
2.1	4749.15	647.187
2.2	4745.48	647.25
2.3	4742.03	647.297
2.4	4738.39	647.326
2.5	4735.05	647.34
2.6	4731.69	647.339
2.7	4728.43	647.325
2.8	4724.59	647.297
2.9	4721.88	647.259
3	4719.88	647.214
3.1	4719.67	647.165
3.2	4720	647.114
3.3	4719.87	647.061
3.4	4718.79	647.003
3.5	4717.39	646.941
3.6	4715.77	646.874
3.7	4714.02	646.803
3.8	4712.2	646.73
3.9	4710.82	646.658

Table 6.3-4 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

A. Break Type : RHR pump inlet line(10B) guillotine break
Break Area : 0.788(ft^2)
Break location : Volume number 16

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
4	4708.46	646.585
4.1	4706.49	646.514
4.2	4704.51	646.445
4.3	4702.14	646.377
4.4	4700.04	646.307
4.5	4698.36	646.238
4.6	4696.66	646.166
4.7	4694.88	646.089
4.8	4693.09	646.006
4.9	4691.38	645.915
5	4689.92	645.813

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	874	120	14.7	0	1.13	18	93.7
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	750	120	14.7	0	1.33	18	92.6
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1346	120	14.7	0	1.31	18	92.7
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1257	120	14.7	0	1.18	18	93.4
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1530	120	14.7	0	1.19	18	93.4
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1820	120	14.7	0	1.15	18	93.6

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1540	120	14.7	0	1.28	18	92.9
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1370	120	14.7	0	1.10	18	93.9
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	677	120	14.7	0	1.75	18	90.3
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	599	120	14.7	0	1.58	18	91.2
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1183	120	14.7	0	1.16	18	93.6
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1037	120	14.7	0	1.39	18	92.3

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1283	120	14.7	0	1.17	18	93.5
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1586	120	14.7	0	1.30	18	92.8
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1272	120	14.7	0	1.20	18	93.3
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1108	120	14.7	0	1.28	18	92.9
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	572	120	14.7	0	4.15	7	40.7
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	474	120	14.7	0	2.02	7	71.1

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	935	120	14.7	0	1.22	7	82.6
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	896	120	14.7	0	1.49	7	78.7
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	1007	120	14.7	0	1.23	7	82.4
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	582	120	14.7	0	1.32	7	81.1
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	954	120	14.7	0	1.13	7	83.9
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	882	120	14.7	0	1.15	7	83.6

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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. (%)			
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	431	120	14.7	0	1.25	7	82.1
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	350	120	14.7	0	1.36	7	80.6
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	746	120	14.7	0	1.20	7	82.9
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	697	120	14.7	0	1.21	7	82.7
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	843	120	14.7	0	1.17	7	83.3
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	577	120	14.7	0	1.27	7	81.9

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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. (%)			
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	799	120	14.7	0	1.08	7	84.6
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	739	120	14.7	0	1.21	7	82.7
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	450	120	14.7	0	1.18	7	83.1
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	384	120	14.7	0	1.14	7	83.7
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	739	120	14.7	0	1.13	7	83.9
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	655	120	14.7	0	1.17	7	83.3

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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. (%)			
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	688	120	14.7	0	1.08	7	84.6
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	822	120	14.7	0	1.04	7	85.1
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	652	120	14.7	0	0.99	7	85.9
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	603	120	14.7	0	1.02	7	85.4
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	356	120	14.7	0	1.13	7	83.9
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	324	120	14.7	0	1.09	7	84.4

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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. (%)			
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	387	120	14.7	0	1.10	7	84.3
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	260	120	14.7	0	1.14	7	83.7
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	274	120	14.7	0	1.06	7	84.9
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	508	120	14.7	0	0.95	7	86.4
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	523	120	14.7	0	0.93	7	86.7
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	277	120	14.7	0	0.98	7	86.0

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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. (%)			
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	481	120	14.7	0	0.93	7	86.7
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	960	120	14.7	0	0.77	7	89.0
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	1034	120	14.7	0	0.80	7	88.6
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	517	120	14.7	0	0.84	7	88.0
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	379	120	14.7	0	0.54	14	96.1
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	849	120	14.7	0	0.51	14	96.4

Table 6.3-5 Steam Generator Compartment Nodal Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	965	120	14.7	0	0.49	14	96.5
56	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	448	120	14.7	0	0.53	14	96.2
57	Containment atmosphere	200	2861000	120	14.7	0	-	-	-

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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	1	2		X	101.35	7.47	9.50	8.96	0	1.0	0.5	1.5
2	1	4		X	135.39	8.68	11.10	10.42	0	1.0	0.5	1.5
3	1	57		X	61.86	14.24	7.86	17.09	0	1.0	0.5	1.5
4	2	3		X	86.79	9.87	8.66	11.84	0	1.0	0.5	1.5
5	3	4		X	79.51	10.36	5.66	12.43	0	1.0	0.5	1.5
6	3	6		X	145.18	11.93	11.44	14.32	0	1.0	0.5	1.5
7	3	57		X	30.94	10.28	5.46	12.34	1.84	1.0	0.5	3.34
8	4	5		X	168.39	12.50	12.26	15.00	0	1.0	0.5	1.5
9	4	57		X	28.87	18.64	5.01	22.37	0	1.0	0.5	1.5
10	5	6		X	84.29	11.69	6.18	14.03	0	1.0	0.5	1.5
11	5	8		X	183.69	10.36	13.30	12.43	0	1.0	0.5	1.5
12	6	7		X	135.63	13.13	11.64	15.76	0	1.0	0.5	1.5
13	7	8		X	133.49	9.97	11.55	11.96	0	1.0	0.5	1.5
14	7	57		X	36.65	14.12	5.90	16.94	0	1.0	0.5	1.5
15	8	57		X	21.94	13.72	4.42	16.46	0	1.0	0.5	1.5
16	1	9		X	49.88	6.39	8.15	24.06	0.7	0	0	0.7
17	2	10		X	42.85	6.39	8.28	24.25	0.7	0	0	0.7
18	3	11		X	80.97	6.39	11.43	28.69	0.7	0	0	0.7
19	4	12		X	71.52	6.39	10.16	26.90	0.7	0	0	0.7
20	5	13		X	86.56	6.39	11.20	28.37	0.7	0	0	0.7
21	6	14		X	109.95	6.39	13.94	32.23	0.7	0	0	0.7
22	7	15		X	87.11	6.39	12.05	29.56	0.7	0	0	0.7

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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
23	8	16		X	77.48	6.39	10.72	27.69	0.7	0	0	0.7
24	9	10		X	68.97	9.96	8.16	11.95	0	1.0	0.5	1.5
25	9	12		X	68.72	10.83	5.13	13.00	0	1.0	0.5	1.5
26	10	11		X	55.92	12.50	7.17	15.00	0	1.0	0.5	1.5
27	11	12		X	74.98	12.76	8.57	15.31	0	1.0	0.5	1.5
28	11	14		X	133.47	10.34	11.43	12.41	0	1.0	0.5	1.5
29	12	13		X	154.26	7.96	12.14	9.55	0	1.0	0.5	1.5
30	13	14		X	54.82	16.62	4.24	19.94	0	1.0	0.5	1.5
31	13	16		X	97.42	14.34	7.36	17.21	0	1.0	0.5	1.5
32	14	15		X	97.75	18.17	8.83	21.80	0	1.0	0.5	1.5
33	15	16		X	95.83	13.89	8.73	16.67	0	1.0	0.5	1.5
34	15	57		X	13.17	9.74	3.07	11.69	0	1.0	0.5	1.5
35	16	57		X	16.46	15.52	3.62	18.62	0	1.0	0.5	1.5
36	9	17	X		44.84	5.64	7.60	21.79	0.7	0	0	0.7
37	10	18		X	37.78	5.64	7.61	21.80	0.7	0	0	0.7
38	11	19		X	72.34	5.64	10.69	26.15	0.7	0	0	0.7
39	12	20		X	67.58	5.64	10.16	25.40	0.7	0	0	0.7
40	13	21		X	69.40	5.64	9.50	24.47	0.7	0	0	0.7
41	14	22		X	42.47	5.64	5.88	19.36	0.7	0	0	0.7
42	15	23		X	69.59	5.64	10.18	25.43	0.7	0	0	0.7
43	16	24		X	64.34	5.64	9.94	25.09	0.7	0	0	0.7
44	17	18		X	57.97	9.96	7.45	11.95	0	1.0	0.5	1.5
45	17	20	X		77.66	10.83	8.35	13.00	0	1.0	0.5	1.5
46	18	19		X	39.97	12.40	5.61	14.88	0	1.0	0.5	1.5

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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
47	19	20		X	62.24	12.67	7.71	15.20	0	1.0	0.5	1.5
48	19	22		X	70.67	12.92	8.40	15.50	0	1.0	0.5	1.5
49	19	57		X	14.75	10.76	3.73	12.91	1.84	1.0	0.5	3.34
50	20	21		X	133.50	7.96	11.09	9.55	0	1.0	0.5	1.5
51	21	22		X	34.51	14.48	5.46	17.38	0	1.0	0.5	1.5
52	21	24		X	89.66	14.34	9.43	17.21	0	1.0	0.5	1.5
53	22	23		X	52.38	16.36	7.12	19.63	0	1.0	0.5	1.5
54	23	24		X	50.72	13.89	6.99	16.67	0	1.0	0.5	1.5
55	17	25	X		37.54	4.82	6.14	18.09	0.7	0	0	0.7
56	18	26		X	30.50	4.82	5.90	17.75	0.7	0	0	0.7
57	19	27		X	64.56	4.82	9.25	22.47	0.7	0	0	0.7
58	20	28		X	60.68	4.82	8.93	22.02	0.7	0	0	0.7
59	21	29		X	73.43	4.82	10.18	23.78	0.7	0	0	0.7
60	22	30		X	70.79	7.96	5.88	9.55	0	0	0	0
61	23	31		X	115.99	7.96	10.18	9.55	0	0	0	0
62	24	32		X	51.33	4.82	7.93	20.61	0.7	0	0	0.7
63	25	26		X	46.64	10.89	6.82	13.07	0	1.0	0.5	1.5
64	25	28		X	55.78	12.50	7.47	15.00	0	1.0	0.5	1.5
65	26	27		X	24.22	13.84	4.57	16.61	0	1.0	0.5	1.5
66	27	28		X	49.21	14.18	6.14	17.02	0	1.0	0.5	1.5
67	27	30		X	65.64	12.95	6.38	15.54	0	1.0	0.5	1.5
68	27	57		X	6.00	9.50	2.40	11.40	1.84	1.0	0.5	3.34
69	28	29		X	111.77	6.33	9.86	7.60	0	1.0	0.5	1.5
70	29	30		X	28.88	14.48	5.14	17.38	0	1.0	0.5	1.5

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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
71	29	32		X	75.05	14.34	8.53	17.21	0	1.0	0.5	1.5
72	30	31		X	43.85	16.36	6.59	19.63	0	1.0	0.5	1.5
73	31	32		X	42.46	13.89	6.48	16.67	0	1.0	0.5	1.5
74	32	57		X	13.17	11.40	3.07	13.68	0	1.0	0.5	1.5
75	25	33		X	62.57	6.59	6.14	7.91	0	0	0	0
76	26	34		X	50.84	6.59	5.90	7.91	0	0	0	0
77	27	35		X	107.60	6.59	8.89	7.91	0	0	0	0
78	28	36		X	101.14	6.59	8.93	7.91	0	0	0	0
79	29	37		X	60.79	4.00	8.43	19.67	0.7	0	0	0.7
80	30	38		X	42.47	4.00	5.39	15.38	0.7	0	0	0.7
81	31	39		X	69.59	4.00	10.18	22.14	0.7	0	0	0.7
82	32	40		X	46.82	4.00	7.23	17.98	0.7	0	0	0.7
83	33	34		X	56.91	10.89	7.07	13.07	0	1.0	0.5	1.5
84	33	36		X	73.39	12.50	7.67	15.00	0	1.0	0.5	1.5
85	34	35		X	47.64	13.93	6.44	16.72	0	1.0	0.5	1.5
86	35	36		X	60.25	14.27	7.22	17.12	0	1.0	0.5	1.5
87	35	38		X	78.92	10.13	8.20	12.16	0	1.0	0.5	1.5
88	36	37		X	91.21	6.33	8.55	7.60	0	1.0	0.5	1.5
89	37	38		X	23.57	16.62	4.76	19.94	0	1.0	0.5	1.5
90	37	40		X	61.25	14.34	7.53	17.21	0	1.0	0.5	1.5
91	38	39		X	35.78	18.17	5.98	21.80	0	1.0	0.5	1.5
92	39	40		X	34.65	13.89	5.89	16.67	0	1.0	0.5	1.5
93	39	57		X	11.83	8.20	2.99	9.84	0	1.0	0.5	1.5
94	33	41		X	83.14	5.38	8.15	6.46	0	0	0	0

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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
95	34	42		X	71.41	5.38	8.28	6.46	0	0	0	0
96	35	43		X	134.95	5.38	14.39	6.46	0	1.0	0.5	1.5
97	36	44		X	119.20	5.38	12.97	6.46	0	1.0	0.5	1.5
98	37	45		X	73.43	3.27	14.06	26.16	0.7	0	0	0.7
99	38	46		X	87.69	3.27	12.18	23.51	0.7	0	0	0.7
100	39	47		X	67.14	3.27	8.70	18.60	0.7	0	0	0.7
101	40	48		X	64.34	3.27	13.31	25.10	0.7	0	0	0.7
102	41	42		X	49.17	7.47	6.55	8.96	0	1.0	0.5	1.5
103	41	44		X	63.91	8.62	7.08	10.34	0	1.0	0.5	1.5
104	42	43		X	42.87	8.22	6.26	9.86	0	1.0	0.5	1.5
105	43	44		X	32.72	7.05	5.64	8.46	0	1.0	0.5	1.5
106	45	46		X	19.26	14.70	4.37	17.64	0	1.0	0.5	1.5
107	45	48		X	20.66	11.54	4.54	13.85	0	1.0	0.5	1.5
108	46	47		X	29.23	17.00	5.37	20.40	0	1.0	0.5	1.5
109	47	48		X	28.31	13.50	5.30	16.20	0	1.0	0.5	1.5
110	47	57		X	1.33	8.20	1.00	9.84	0	1.0	0.5	1.5
111	41	57		X	25.64	1.52	6.39	11.85	2.05	0	0	2.05
112	42	57		X	38.77	1.52	8.11	14.28	2.05	0	0	2.05
113	43	57		X	49.66	1.52	8.82	15.28	2.05	0	0	2.05
114	44	57		X	18.39	1.52	5.45	10.53	2.05	0	0	2.05
115	45	49		X	35.85	4.69	6.86	18.85	0.7	0	0	0.7
116	46	50		X	66.39	4.69	9.22	22.18	0.7	0	0	0.7
117	47	51		X	68.75	4.69	9.21	22.16	0.7	0	0	0.7
118	48	52		X	36.25	4.69	7.50	19.75	0.7	0	0	0.7

Table 6.3-6 Steam Generator Compartment Vent Path Description

B. Break Type : RHR pump outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

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
119	49	50		X	30.70	16.57	3.98	19.88	0	1.0	0.5	1.5
120	49	52		X	33.79	13.00	4.52	15.60	0	1.0	0.5	1.5
121	50	51		X	52.71	18.88	6.31	22.66	0	1.0	0.5	1.5
122	51	52		X	50.67	14.96	6.13	17.95	0	1.0	0.5	1.5
123	49	53		X	21.50	6.64	4.24	19.05	0.7	0	0	0.7
124	50	54		X	47.30	6.64	6.57	22.34	0.7	0	0	0.7
125	51	55		X	53.73	6.64	7.34	23.43	0.7	0	0	0.7
126	52	56		X	24.98	6.64	5.48	20.80	0.7	0	0	0.7
127	53	54		X	20.08	16.58	3.06	19.90	0	1.0	0.5	1.5
128	53	56		X	23.37	13.00	3.49	15.60	0	1.0	0.5	1.5
129	54	55		X	43.47	18.89	5.73	22.67	0	1.0	0.5	1.5
130	55	56		X	41.30	14.96	5.51	17.95	0	1.0	0.5	1.5
131	53	57		X	21.50	3.47	4.24	12.72	2.05	0	0	2.05
132	54	57		X	47.30	3.47	6.57	16.01	2.05	0	0	2.05
133	55	57		X	62.19	3.95	8.15	18.23	2.05	0	0	2.05
134	56	57		X	24.98	3.47	5.48	14.47	2.05	0	0	2.05

Table 6.3-7 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

B. Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0	0	552.936
0.1	5626.29	552.936
0.2	5835.1	552.686
0.3	5727.05	552.466
0.4	5626.61	552.298
0.5	5556.46	552.187
0.6	5504.76	552.113
0.7	5472.89	552.075
0.8	5451.39	552.056
0.9	5438.36	552.051
1	5427.77	552.05
1.1	5419.38	552.052
1.2	5413.03	552.056
1.3	5407.47	552.06
1.4	5401.49	552.064
1.5	5393.52	552.064
1.6	5384.39	552.063
1.7	5373.59	552.061
1.8	5362.21	552.06
1.9	5351.02	552.062
2	5340.51	552.068
2.1	5331.46	552.08
2.2	5322.88	552.096
2.3	5314.43	552.117
2.4	5305.6	552.14
2.5	5296.44	552.165
2.6	5286.9	552.194
2.7	5277.06	552.224
2.8	5267.05	552.257
2.9	5257.04	552.292
3	5247.03	552.329
3.1	5236.48	552.367
3.2	5226.22	552.408
3.3	5216.4	552.45
3.4	5206.83	552.494
3.5	5197.71	552.54
3.6	5189.11	552.588
3.7	5181.22	552.638
3.8	5173.82	552.69
3.9	5166.58	552.743
4	5159.7	552.797

Table 6.3-7 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

B. Break Type : RHR pump Outlet line(8B) guillotine break
Break Area : 0.506(ft^2)
Break location : Volume number 17

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
4.1	5153.03	552.852
4.2	5146.37	552.909
4.3	5139.6	552.966
4.4	5132.7	553.024
4.5	5125.82	553.084
4.6	5118.96	553.144
4.7	5112.12	553.207
4.8	5105.29	553.27
4.9	5098.44	553.336
5	5091.31	553.403

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	874	120	14.7	0	1.60	18	91.1
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	750	120	14.7	0	1.83	18	89.8
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1346	120	14.7	0	1.42	18	92.1
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1257	120	14.7	0	1.45	18	91.9
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1530	120	14.7	0	1.29	18	92.8
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1820	120	14.7	0	1.24	18	93.1

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1540	120	14.7	0	1.04	18	94.2
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1370	120	14.7	0	0.97	18	94.6
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	677	120	14.7	0	1.41	18	92.2
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	599	120	14.7	0	1.50	18	91.7
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1183	120	14.7	0	1.19	18	93.4
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1037	120	14.7	0	1.14	18	93.7

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1283	120	14.7	0	1.10	18	93.9
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1586	120	14.7	0	1.13	18	93.7
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1272	120	14.7	0	1.07	18	94.1
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1108	120	14.7	0	0.99	18	94.5
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	572	120	14.7	0	1.20	7	82.9
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	474	120	14.7	0	1.22	7	82.6

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	935	120	14.7	0	1.10	7	84.3
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	896	120	14.7	0	1.15	7	83.6
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	1007	120	14.7	0	1.16	7	83.4
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	582	120	14.7	0	1.07	7	84.7
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	954	120	14.7	0	1.30	7	81.4
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	882	120	14.7	0	1.23	7	82.4

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	431	120	14.7	0	1.09	7	84.4
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	350	120	14.7	0	1.04	7	85.1
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	746	120	14.7	0	1.05	7	85.0
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	697	120	14.7	0	1.18	7	83.1
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	843	120	14.7	0	1.31	7	81.3
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	577	120	14.7	0	1.53	7	78.1

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	799	120	14.7	0	1.66	7	76.3
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	739	120	14.7	0	1.58	7	77.4
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	450	120	14.7	0	0.93	7	86.7
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	384	120	14.7	0	0.85	7	87.9
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	739	120	14.7	0	0.89	7	87.3
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	655	120	14.7	0	1.09	7	84.4

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	688	120	14.7	0	1.64	7	76.6
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	822	120	14.7	0	2.32	7	66.9
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	652	120	14.7	0	2.57	7	63.3
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	603	120	14.7	0	2.25	7	67.9
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	356	120	14.7	0	0.83	7	88.1
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	324	120	14.7	0	0.73	7	89.6

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	387	120	14.7	0	0.76	7	89.1
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	260	120	14.7	0	0.96	7	86.3
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	274	120	14.7	0	2.44	7	65.1
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	508	120	14.7	0	3.18	7	54.6
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	523	120	14.7	0	3.81	7	45.6
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	277	120	14.7	0	3.05	7	56.4

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	481	120	14.7	0	3.63	7	48.1
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	960	120	14.7	0	3.59	7	48.7
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	1034	120	14.7	0	4.76	7	32.0
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	517	120	14.7	0	4.18	7	40.3
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	379	120	14.7	0	2.70	14	80.7
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	849	120	14.7	0	2.88	14	79.4

Table 6.3-8 Steam Generator Compartment Nodal Description

C. Break Type : Feed Water line(16B) guillotine break **(Full power operating condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	965	120	14.7	0	13.81	14	1.4
56	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	448	120	14.7	0	3.95	14	71.8
57	Containment atmosphere	200	2861000	120	14.7	0	-	-	-

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	1	2		X	101.35	7.47	9.50	8.96	0	1.0	0.5	1.5
2	1	4		X	135.39	8.68	11.10	10.42	0	1.0	0.5	1.5
3	1	57		X	61.86	14.24	7.86	17.09	0	1.0	0.5	1.5
4	2	3		X	86.79	9.87	8.66	11.84	0	1.0	0.5	1.5
5	3	4		X	79.51	10.36	5.66	12.43	0	1.0	0.5	1.5
6	3	6		X	145.18	11.93	11.44	14.32	0	1.0	0.5	1.5
7	3	57		X	30.94	10.28	5.46	12.34	1.84	1.0	0.5	3.34
8	4	5		X	168.39	12.50	12.26	15.00	0	1.0	0.5	1.5
9	4	57		X	28.87	18.64	5.01	22.37	0	1.0	0.5	1.5
10	5	6		X	84.29	11.69	6.18	14.03	0	1.0	0.5	1.5
11	5	8		X	183.69	10.36	13.30	12.43	0	1.0	0.5	1.5
12	6	7		X	135.63	13.13	11.64	15.76	0	1.0	0.5	1.5
13	7	8		X	133.49	9.97	11.55	11.96	0	1.0	0.5	1.5
14	7	57		X	36.65	14.12	5.90	16.94	0	1.0	0.5	1.5
15	8	57		X	21.94	13.72	4.42	16.46	0	1.0	0.5	1.5
16	1	9		X	49.88	6.39	8.15	24.06	0.7	0	0	0.7
17	2	10		X	42.85	6.39	8.28	24.25	0.7	0	0	0.7
18	3	11		X	80.97	6.39	11.43	28.69	0.7	0	0	0.7
19	4	12		X	71.52	6.39	10.16	26.90	0.7	0	0	0.7
20	5	13		X	86.56	6.39	11.20	28.37	0.7	0	0	0.7
21	6	14		X	109.95	6.39	13.94	32.23	0.7	0	0	0.7
22	7	15		X	87.11	6.39	12.05	29.56	0.7	0	0	0.7
23	8	16		X	77.48	6.39	10.72	27.69	0.7	0	0	0.7

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	9	10		X	68.97	9.96	8.16	11.95	0	1.0	0.5	1.5
25	9	12		X	68.72	10.83	5.13	13.00	0	1.0	0.5	1.5
26	10	11		X	55.92	12.50	7.17	15.00	0	1.0	0.5	1.5
27	11	12		X	74.98	12.76	8.57	15.31	0	1.0	0.5	1.5
28	11	14		X	133.47	10.34	11.43	12.41	0	1.0	0.5	1.5
29	12	13		X	154.26	7.96	12.14	9.55	0	1.0	0.5	1.5
30	13	14		X	54.82	16.62	4.24	19.94	0	1.0	0.5	1.5
31	13	16		X	97.42	14.34	7.36	17.21	0	1.0	0.5	1.5
32	14	15		X	97.75	18.17	8.83	21.80	0	1.0	0.5	1.5
33	15	16		X	95.83	13.89	8.73	16.67	0	1.0	0.5	1.5
34	15	57		X	13.17	9.74	3.07	11.69	0	1.0	0.5	1.5
35	16	57		X	16.46	15.52	3.62	18.62	0	1.0	0.5	1.5
36	9	17		X	44.84	5.64	7.60	21.79	0.7	0	0	0.7
37	10	18		X	37.78	5.64	7.61	21.80	0.7	0	0	0.7
38	11	19		X	72.34	5.64	10.69	26.15	0.7	0	0	0.7
39	12	20		X	67.58	5.64	10.16	25.40	0.7	0	0	0.7
40	13	21		X	69.40	5.64	9.50	24.47	0.7	0	0	0.7
41	14	22		X	42.47	5.64	5.88	19.36	0.7	0	0	0.7
42	15	23		X	69.59	5.64	10.18	25.43	0.7	0	0	0.7
43	16	24		X	64.34	5.64	9.94	25.09	0.7	0	0	0.7
44	17	18		X	57.97	9.96	7.45	11.95	0	1.0	0.5	1.5
45	17	20		X	77.66	10.83	8.35	13.00	0	1.0	0.5	1.5
46	18	19		X	39.97	12.40	5.61	14.88	0	1.0	0.5	1.5
47	19	20		X	62.24	12.67	7.71	15.20	0	1.0	0.5	1.5

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	19	22		X	70.67	12.92	8.40	15.50	0	1.0	0.5	1.5
49	19	57		X	14.75	10.76	3.73	12.91	1.84	1.0	0.5	3.34
50	20	21		X	133.50	7.96	11.09	9.55	0	1.0	0.5	1.5
51	21	22		X	34.51	14.48	5.46	17.38	0	1.0	0.5	1.5
52	21	24		X	89.66	14.34	9.43	17.21	0	1.0	0.5	1.5
53	22	23		X	52.38	16.36	7.12	19.63	0	1.0	0.5	1.5
54	23	24		X	50.72	13.89	6.99	16.67	0	1.0	0.5	1.5
55	17	25		X	37.54	4.82	6.14	18.09	0.7	0	0	0.7
56	18	26		X	30.50	4.82	5.90	17.75	0.7	0	0	0.7
57	19	27		X	64.56	4.82	9.25	22.47	0.7	0	0	0.7
58	20	28		X	60.68	4.82	8.93	22.02	0.7	0	0	0.7
59	21	29		X	73.43	4.82	10.18	23.78	0.7	0	0	0.7
60	22	30		X	70.79	7.96	5.88	9.55	0	0	0	0
61	23	31		X	115.99	7.96	10.18	9.55	0	0	0	0
62	24	32		X	51.33	4.82	7.93	20.61	0.7	0	0	0
63	25	26		X	46.64	10.89	6.82	13.07	0	1.0	0.5	1.5
64	25	28		X	55.78	12.50	7.47	15.00	0	1.0	0.5	1.5
65	26	27		X	24.22	13.84	4.57	16.61	0	1.0	0.5	1.5
66	27	28		X	49.21	14.18	6.14	17.02	0	1.0	0.5	1.5
67	27	30		X	65.64	12.95	6.38	15.54	0	1.0	0.5	1.5
68	27	57		X	6.00	9.50	2.40	11.40	1.84	1.0	0.5	3.34
69	28	29		X	111.77	6.33	9.86	7.60	0	1.0	0.5	1.5
70	29	30		X	28.88	14.48	5.14	17.38	0	1.0	0.5	1.5
71	29	32		X	75.05	14.34	8.53	17.21	0	1.0	0.5	1.5

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	30	31		X	43.85	16.36	6.59	19.63	0	1.0	0.5	1.5
73	31	32		X	42.46	13.89	6.48	16.67	0	1.0	0.5	1.5
74	32	57		X	13.17	11.40	3.07	13.68	0	1.0	0.5	1.5
75	25	33		X	62.57	6.59	6.14	7.91	0	0	0	0
76	26	34		X	50.84	6.59	5.90	7.91	0	0	0	0
77	27	35		X	107.60	6.59	8.89	7.91	0	0	0	0
78	28	36		X	101.14	6.59	8.93	7.91	0	0	0	0
79	29	37		X	60.79	4.00	8.43	19.67	0.7	0	0	0.7
80	30	38		X	42.47	4.00	5.39	15.38	0.7	0	0	0.7
81	31	39		X	69.59	4.00	10.18	22.14	0.7	0	0	0.7
82	32	40		X	46.82	4.00	7.23	17.98	0.7	0	0	0.7
83	33	34		X	56.91	10.89	7.07	13.07	0	1.0	0.5	1.5
84	33	36		X	73.39	12.50	7.67	15.00	0	1.0	0.5	1.5
85	34	35		X	47.64	13.93	6.44	16.72	0	1.0	0.5	1.5
86	35	36		X	60.25	14.27	7.22	17.12	0	1.0	0.5	1.5
87	35	38		X	78.92	10.13	8.20	12.16	0	1.0	0.5	1.5
88	36	37		X	91.21	6.33	8.55	7.60	0	1.0	0.5	1.5
89	37	38		X	23.57	16.62	4.76	19.94	0	1.0	0.5	1.5
90	37	40		X	61.25	14.34	7.53	17.21	0	1.0	0.5	1.5
91	38	39		X	35.78	18.17	5.98	21.80	0	1.0	0.5	1.5
92	39	40		X	34.65	13.89	5.89	16.67	0	1.0	0.5	1.5
93	39	57		X	11.83	8.20	2.99	9.84	0	1.0	0.5	1.5
94	33	41		X	83.14	5.38	8.15	6.46	0	0	0	0
95	34	42		X	71.41	5.38	8.28	6.46	0	0	0	0

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
96	35	43		X	134.95	5.38	14.39	6.46	0	1.0	0.5	1.5
97	36	44		X	119.20	5.38	12.97	6.46	0	1.0	0.5	1.5
98	37	45		X	73.43	3.27	14.06	26.16	0.7	0	0	0.7
99	38	46		X	87.69	3.27	12.18	23.51	0.7	0	0	0.7
100	39	47		X	67.14	3.27	8.70	18.60	0.7	0	0	0.7
101	40	48		X	64.34	3.27	13.31	25.10	0.7	0	0	0.7
102	41	42		X	49.17	7.47	6.55	8.96	0	1.0	0.5	1.5
103	41	44		X	63.91	8.62	7.08	10.34	0	1.0	0.5	1.5
104	42	43		X	42.87	8.22	6.26	9.86	0	1.0	0.5	1.5
105	43	44		X	32.72	7.05	5.64	8.46	0	1.0	0.5	1.5
106	45	46		X	19.26	14.70	4.37	17.64	0	1.0	0.5	1.5
107	45	48		X	20.66	11.54	4.54	13.85	0	1.0	0.5	1.5
108	46	47		X	29.23	17.00	5.37	20.40	0	1.0	0.5	1.5
109	47	48		X	28.31	13.50	5.30	16.20	0	1.0	0.5	1.5
110	47	57		X	1.33	8.20	1.00	9.84	0	1.0	0.5	1.5
111	41	57		X	25.64	1.52	6.39	11.85	2.05	0	0	2.05
112	42	57		X	38.77	1.52	8.11	14.28	2.05	0	0	2.05
113	43	57		X	49.66	1.52	8.82	15.28	2.05	0	0	2.05
114	44	57		X	18.39	1.52	5.45	10.53	2.05	0	0	2.05
115	45	49		X	35.85	4.69	6.86	18.85	0.7	0	0	0.7
116	46	50		X	66.39	4.69	9.22	22.18	0.7	0	0	0.7
117	47	51		X	68.75	4.69	9.21	22.16	0.7	0	0	0.7
118	48	52		X	36.25	4.69	7.50	19.75	0.7	0	0	0.7
119	49	50		X	30.70	16.57	3.98	19.88	0	1.0	0.5	1.5

Table 6.3-9 Steam Generator Compartment Vent Path Description

C. Break Type : Feedwater line(16B) guillotine break **(Full power operating condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
120	49	52		X	33.79	13.00	4.52	15.60	0	1.0	0.5	1.5
121	50	51		X	52.71	18.88	6.31	22.66	0	1.0	0.5	1.5
122	51	52		X	50.67	14.96	6.13	17.95	0	1.0	0.5	1.5
123	49	53		X	21.50	6.64	4.24	19.05	0.7	0	0	0.7
124	50	54		X	47.30	6.64	6.57	22.34	0.7	0	0	0.7
125	51	55	X		53.73	6.64	7.34	23.43	0.7	0	0	0.7
126	52	56		X	24.98	6.64	5.48	20.80	0.7	0	0	0.7
127	53	54		X	20.08	16.58	3.06	19.90	0	1.0	0.5	1.5
128	53	56		X	23.37	13.00	3.49	15.60	0	1.0	0.5	1.5
129	54	55	X		43.47	18.89	5.73	22.67	0	1.0	0.5	1.5
130	55	56	X		41.30	14.96	5.51	17.95	0	1.0	0.5	1.5
131	53	57		X	21.50	3.47	4.24	12.72	2.05	0	0	2.05
132	54	57		X	47.30	3.47	6.57	16.01	2.05	0	0	2.05
133	55	57	X		62.19	3.95	8.15	18.23	2.05	0	0	2.05
134	56	57	X		24.98	3.47	5.48	14.47	2.05	0	0	2.05

Table 6.3-10 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

C. Break Type : Feedwater line(16B) guillotine break
(Full power operating condition)
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	506.238	0	438.168
0.002	4906.78	504.977	960.818	438.15
0.004	5367.61	504.977	1795.73	438.15
0.006	6435.88	505.007	2516.12	438.117
0.008	7062.11	505.272	3132.05	438.071
0.01	7866.93	505.332	3652.45	438.013
0.02	10999.1	505.802	5082.04	437.612
0.03	11461.3	505.864	5100.2	437.139
0.04	11627	505.869	4305.39	436.701
0.05	11727.7	505.866	3209.74	436.351
0.06	11801	505.863	3077.81	436.1
0.07	11856.3	505.861	4194.29	436.138
0.08	11898.3	505.859	5027.55	436.139
0.09	11930.3	505.857	5653.94	436.14
0.1	11954.7	505.856	6124.8	436.142
0.12	11987.4	505.855	6744.8	436.145
0.14	12006.4	505.853	7095.08	436.149
0.16	12017.4	505.853	7292.93	436.153
0.18	12023.9	505.852	7404.64	436.156
0.2	12027.6	505.852	7467.66	436.16
0.22	12029.8	505.851	7503.18	436.164
0.24	12031.1	505.851	7523.14	436.168
0.26	12031.8	505.851	7534.32	436.172
0.28	12032.3	505.851	7540.53	436.176
0.3	12032.5	505.851	7543.94	436.179
0.32	12032.7	505.85	7545.76	436.183
0.34	12032.8	505.85	7546.68	436.187
0.36	12032.8	505.85	7547.1	436.191
0.38	12032.9	505.85	7547.23	436.195
0.4	12032.9	505.85	7547.21	436.198
0.42	12032.9	505.85	7547.16	436.202
0.44	12032.9	505.85	7547.07	436.206
0.46	12032.9	505.85	7546.96	436.21
0.48	12032.9	505.85	7546.83	436.213
0.5	12032.9	505.85	7546.68	436.217
0.6	12033	505.85	7545.79	436.236
0.7	12033	505.849	7544.74	436.254

Table 6.3-10 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

C. Break Type : Feedwater line(16B) guillotine break
(Full power operating condition)
Break Area : 2.234(ft^2)
Break location : Volume number 55

Time (s)	SG side		Feedwater Pumps side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.8	12033	505.849	7543.64	436.272
0.9	12033	505.849	7542.52	436.291
1	12033	505.849	7541.39	436.308

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	874	120	14.7	0	1.79	18	90.1
2	North quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	750	120	14.7	0	2.06	18	88.6
3	East quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1346	120	14.7	0	1.58	18	91.2
4	South quadrant around A-RCP in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1257	120	14.7	0	1.62	18	91.0
5	Northwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1530	120	14.7	0	1.46	18	91.9
6	Northeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1820	120	14.7	0	1.36	18	92.4

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Southeast quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1540	120	14.7	0	1.06	18	94.1
8	Southwest quadrant around A-SG in A-SG compartment:between EL 25'-3" and 36'-5"	11.17	1370	120	14.7	0	1.08	18	94.0
9	West quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	677	120	14.7	0	1.55	18	91.4
10	North quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	599	120	14.7	0	1.66	18	90.8
11	East quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1183	120	14.7	0	1.24	18	93.1
12	South quadrant around A-RCP in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1037	120	14.7	0	1.27	18	92.9

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Northwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1283	120	14.7	0	1.23	18	93.2
14	Northeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1586	120	14.7	0	1.17	18	93.5
15	Southeast quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1272	120	14.7	0	1.06	18	94.1
16	Southwest quadrant around A-SG in A-SG compartment:between EL 36'-5" and 46'-5.08"	10.01	1108	120	14.7	0	1.04	18	94.2
17	West quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	572	120	14.7	0	1.34	7	80.9
18	North quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	474	120	14.7	0	1.36	7	80.6

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	East quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	935	120	14.7	0	1.09	7	84.4
20	South quadrant around A-RCP in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	896	120	14.7	0	1.30	7	81.4
21	Northwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	1007	120	14.7	0	1.32	7	81.1
22	Northeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	582	120	14.7	0	1.22	7	82.6
23	Southeast quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	954	120	14.7	0	1.49	7	78.7
24	Southwest quadrant around A-SG in A-SG compartment:between EL 46'-5.08" and 55'-1"	8.66	882	120	14.7	0	1.40	7	80.0

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
25	West quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	431	120	14.7	0	1.21	7	82.7
26	North quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	350	120	14.7	0	1.17	7	83.3
27	East quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	746	120	14.7	0	1.16	7	83.4
28	South quadrant around A-RCP in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	697	120	14.7	0	1.34	7	80.9
29	Northwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	843	120	14.7	0	1.48	7	78.9
30	Northeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	577	120	14.7	0	1.70	7	75.7

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
31	Southeast quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	799	120	14.7	0	1.90	7	72.9
32	Southwest quadrant around A-SG in A-SG compartment:between EL 55'-1" and 62'-4"	7.25	739	120	14.7	0	1.81	7	74.1
33	West quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	450	120	14.7	0	1.03	7	85.3
34	North quadrant around A-RCP in A-SG compartment:betweenEL 62'-4" and 68'-3"	5.92	384	120	14.7	0	0.95	7	86.4
35	East quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	739	120	14.7	0	0.98	7	86.0
36	South quadrant around A-RCP in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	655	120	14.7	0	1.22	7	82.6

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
37	Northwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	688	120	14.7	0	1.82	7	74.0
38	Northeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	822	120	14.7	0	2.55	7	63.6
39	Southeast quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	652	120	14.7	0	2.89	7	58.7
40	Southwest quadrant around A-SG in A-SG compartment:between EL 62'-4" and 68'-3"	5.92	603	120	14.7	0	2.55	7	63.6
41	West quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	356	120	14.7	0	0.92	7	86.9
42	North quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	324	120	14.7	0	0.82	7	88.3

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
43	East quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	387	120	14.7	0	0.79	7	88.7
44	South quadrant around A-RCP in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	260	120	14.7	0	1.03	7	85.3
45	Northwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	274	120	14.7	0	2.67	7	61.9
46	Northeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	508	120	14.7	0	3.48	7	50.3
47	Southeast quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	523	120	14.7	0	4.30	7	38.6
48	Southwest quadrant around A-SG in A-SG compartment:between EL 68'-3" and 73'-1"	4.83	277	120	14.7	0	3.45	7	50.7

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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. (%)			
49	Northwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	481	120	14.7	0	4.01	7	42.7
50	Northeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	960	120	14.7	0	3.98	7	43.1
51	Southeast quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	1034	120	14.7	0	5.51	7	21.3
52	Southwest quadrant around A-SG in A-SG compartment:between EL 73'-1" and 83'-9"	10.67	517	120	14.7	0	4.82	7	31.1
53	Northwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	379	120	14.7	0	2.99	14	78.6
54	Northeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	849	120	14.7	0	3.47	14	75.2

Table 6.3-11 Steam Generator Compartment Nodal Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area :2.234(ft^2)
Break location : Volume number 55

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	Southeast quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	965	120	14.7	0	11.19	14	20.1
56	Southwest quadrant around A-SG in A-SG compartment:between EL 83'-9" and 95'-1"	11.33	448	120	14.7	0	5.08	14	63.7
57	Containment atmosphere	200	2861000	120	14.7	0	-	-	-

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	1	2		X	101.35	7.47	9.50	8.96	0	1.0	0.5	1.5
2	1	4		X	135.39	8.68	11.10	10.42	0	1.0	0.5	1.5
3	1	57		X	61.86	14.24	7.86	17.09	0	1.0	0.5	1.5
4	2	3		X	86.79	9.87	8.66	11.84	0	1.0	0.5	1.5
5	3	4		X	79.51	10.36	5.66	12.43	0	1.0	0.5	1.5
6	3	6		X	145.18	11.93	11.44	14.32	0	1.0	0.5	1.5
7	3	57		X	30.94	10.28	5.46	12.34	1.84	1.0	0.5	3.34
8	4	5		X	168.39	12.50	12.26	15.00	0	1.0	0.5	1.5
9	4	57		X	28.87	18.64	5.01	22.37	0	1.0	0.5	1.5
10	5	6		X	84.29	11.69	6.18	14.03	0	1.0	0.5	1.5
11	5	8		X	183.69	10.36	13.30	12.43	0	1.0	0.5	1.5
12	6	7		X	135.63	13.13	11.64	15.76	0	1.0	0.5	1.5
13	7	8		X	133.49	9.97	11.55	11.96	0	1.0	0.5	1.5
14	7	57		X	36.65	14.12	5.90	16.94	0	1.0	0.5	1.5
15	8	57		X	21.94	13.72	4.42	16.46	0	1.0	0.5	1.5
16	1	9		X	49.88	6.39	8.15	24.06	0.7	0	0	0.7
17	2	10		X	42.85	6.39	8.28	24.25	0.7	0	0	0.7
18	3	11		X	80.97	6.39	11.43	28.69	0.7	0	0	0.7
19	4	12		X	71.52	6.39	10.16	26.90	0.7	0	0	0.7
20	5	13		X	86.56	6.39	11.20	28.37	0.7	0	0	0.7
21	6	14		X	109.95	6.39	13.94	32.23	0.7	0	0	0.7
22	7	15		X	87.11	6.39	12.05	29.56	0.7	0	0	0.7

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
23	8	16		X	77.48	6.39	10.72	27.69	0.7	0	0	0.7
24	9	10		X	68.97	9.96	8.16	11.95	0	1.0	0.5	1.5
25	9	12		X	68.72	10.83	5.13	13.00	0	1.0	0.5	1.5
26	10	11		X	55.92	12.50	7.17	15.00	0	1.0	0.5	1.5
27	11	12		X	74.98	12.76	8.57	15.31	0	1.0	0.5	1.5
28	11	14		X	133.47	10.34	11.43	12.41	0	1.0	0.5	1.5
29	12	13		X	154.26	7.96	12.14	9.55	0	1.0	0.5	1.5
30	13	14		X	54.82	16.62	4.24	19.94	0	1.0	0.5	1.5
31	13	16		X	97.42	14.34	7.36	17.21	0	1.0	0.5	1.5
32	14	15		X	97.75	18.17	8.83	21.80	0	1.0	0.5	1.5
33	15	16		X	95.83	13.89	8.73	16.67	0	1.0	0.5	1.5
34	15	57		X	13.17	9.74	3.07	11.69	0	1.0	0.5	1.5
35	16	57		X	16.46	15.52	3.62	18.62	0	1.0	0.5	1.5
36	9	17		X	44.84	5.64	7.60	21.79	0.7	0	0	0.7
37	10	18		X	37.78	5.64	7.61	21.80	0.7	0	0	0.7
38	11	19		X	72.34	5.64	10.69	26.15	0.7	0	0	0.7
39	12	20		X	67.58	5.64	10.16	25.40	0.7	0	0	0.7
40	13	21		X	69.40	5.64	9.50	24.47	0.7	0	0	0.7
41	14	22		X	42.47	5.64	5.88	19.36	0.7	0	0	0.7
42	15	23		X	69.59	5.64	10.18	25.43	0.7	0	0	0.7
43	16	24		X	64.34	5.64	9.94	25.09	0.7	0	0	0.7
44	17	18		X	57.97	9.96	7.45	11.95	0	1.0	0.5	1.5
45	17	20		X	77.66	10.83	8.35	13.00	0	1.0	0.5	1.5
46	18	19		X	39.97	12.40	5.61	14.88	0	1.0	0.5	1.5

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
47	19	20		X	62.24	12.67	7.71	15.20	0	1.0	0.5	1.5
48	19	22		X	70.67	12.92	8.40	15.50	0	1.0	0.5	1.5
49	19	57		X	14.75	10.76	3.73	12.91	1.84	1.0	0.5	3.34
50	20	21		X	133.50	7.96	11.09	9.55	0	1.0	0.5	1.5
51	21	22		X	34.51	14.48	5.46	17.38	0	1.0	0.5	1.5
52	21	24		X	89.66	14.34	9.43	17.21	0	1.0	0.5	1.5
53	22	23		X	52.38	16.36	7.12	19.63	0	1.0	0.5	1.5
54	23	24		X	50.72	13.89	6.99	16.67	0	1.0	0.5	1.5
55	17	25		X	37.54	4.82	6.14	18.09	0.7	0	0	0.7
56	18	26		X	30.50	4.82	5.90	17.75	0.7	0	0	0.7
57	19	27		X	64.56	4.82	9.25	22.47	0.7	0	0	0.7
58	20	28		X	60.68	4.82	8.93	22.02	0.7	0	0	0.7
59	21	29		X	73.43	4.82	10.18	23.78	0.7	0	0	0.7
60	22	30		X	70.79	7.96	5.88	9.55	0	0	0	0
61	23	31		X	115.99	7.96	10.18	9.55	0	0	0	0
62	24	32		X	51.33	4.82	7.93	20.61	0.7	0	0	0.7
63	25	26		X	46.64	10.89	6.82	13.07	0	1.0	0.5	1.5
64	25	28		X	55.78	12.50	7.47	15.00	0	1.0	0.5	1.5
65	26	27		X	24.22	13.84	4.57	16.61	0	1.0	0.5	1.5
66	27	28		X	49.21	14.18	6.14	17.02	0	1.0	0.5	1.5
67	27	30		X	65.64	12.95	6.38	15.54	0	1.0	0.5	1.5
68	27	57		X	6.00	9.50	2.40	11.40	1.84	1.0	0.5	3.34
69	28	29		X	111.77	6.33	9.86	7.60	0	1.0	0.5	1.5
70	29	30		X	28.88	14.48	5.14	17.38	0	1.0	0.5	1.5

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
71	29	32		X	75.05	14.34	8.53	17.21	0	1.0	0.5	1.5
72	30	31		X	43.85	16.36	6.59	19.63	0	1.0	0.5	1.5
73	31	32		X	42.46	13.89	6.48	16.67	0	1.0	0.5	1.5
74	32	57		X	13.17	11.40	3.07	13.68	0	1.0	0.5	1.5
75	25	33		X	62.57	6.59	6.14	7.91	0	0	0	0
76	26	34		X	50.84	6.59	5.90	7.91	0	0	0	0
77	27	35		X	107.60	6.59	8.89	7.91	0	0	0	0
78	28	36		X	101.14	6.59	8.93	7.91	0	0	0	0
79	29	37		X	60.79	4.00	8.43	19.67	0.7	0	0	0.7
80	30	38		X	42.47	4.00	5.39	15.38	0.7	0	0	0.7
81	31	39		X	69.59	4.00	10.18	22.14	0.7	0	0	0.7
82	32	40		X	46.82	4.00	7.23	17.98	0.7	0	0	0.7
83	33	34		X	56.91	10.89	7.07	13.07	0	1.0	0.5	1.5
84	33	36		X	73.39	12.50	7.67	15.00	0	1.0	0.5	1.5
85	34	35		X	47.64	13.93	6.44	16.72	0	1.0	0.5	1.5
86	35	36		X	60.25	14.27	7.22	17.12	0	1.0	0.5	1.5
87	35	38		X	78.92	10.13	8.20	12.16	0	1.0	0.5	1.5
88	36	37		X	91.21	6.33	8.55	7.60	0	1.0	0.5	1.5
89	37	38		X	23.57	16.62	4.76	19.94	0	1.0	0.5	1.5
90	37	40		X	61.25	14.34	7.53	17.21	0	1.0	0.5	1.5
91	38	39		X	35.78	18.17	5.98	21.80	0	1.0	0.5	1.5
92	39	40		X	34.65	13.89	5.89	16.67	0	1.0	0.5	1.5
93	39	57		X	11.83	8.20	2.99	9.84	0	1.0	0.5	1.5
94	33	41		X	83.14	5.38	8.15	6.46	0	0	0	0

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
95	34	42		X	71.41	5.38	8.28	6.46	0	0	0	0
96	35	43		X	134.95	5.38	14.39	6.46	0	1.0	0.5	1.5
97	36	44		X	119.20	5.38	12.97	6.46	0	1.0	0.5	1.5
98	37	45		X	73.43	3.27	14.06	26.16	0.7	0	0	0.7
99	38	46		X	87.69	3.27	12.18	23.51	0.7	0	0	0.7
100	39	47		X	67.14	3.27	8.70	18.60	0.7	0	0	0.7
101	40	48		X	64.34	3.27	13.31	25.10	0.7	0	0	0.7
102	41	42		X	49.17	7.47	6.55	8.96	0	1.0	0.5	1.5
103	41	44		X	63.91	8.62	7.08	10.34	0	1.0	0.5	1.5
104	42	43		X	42.87	8.22	6.26	9.86	0	1.0	0.5	1.5
105	43	44		X	32.72	7.05	5.64	8.46	0	1.0	0.5	1.5
106	45	46		X	19.26	14.70	4.37	17.64	0	1.0	0.5	1.5
107	45	48		X	20.66	11.54	4.54	13.85	0	1.0	0.5	1.5
108	46	47		X	29.23	17.00	5.37	20.40	0	1.0	0.5	1.5
109	47	48		X	28.31	13.50	5.30	16.20	0	1.0	0.5	1.5
110	47	57		X	1.33	8.20	1.00	9.84	0	1.0	0.5	1.5
111	41	57		X	25.64	1.52	6.39	11.85	2.05	0	0	2.05
112	42	57		X	38.77	1.52	8.11	14.28	2.05	0	0	2.05
113	43	57		X	49.66	1.52	8.82	15.28	2.05	0	0	2.05
114	44	57		X	18.39	1.52	5.45	10.53	2.05	0	0	2.05
115	45	49		X	35.85	4.69	6.86	18.85	0.7	0	0	0.7
116	46	50		X	66.39	4.69	9.22	22.18	0.7	0	0	0.7
117	47	51		X	68.75	4.69	9.21	22.16	0.7	0	0	0.7
118	48	52		X	36.25	4.69	7.50	19.75	0.7	0	0	0.7

Table 6.3-12 Steam Generator Compartment Vent Path Description

D. Break Type : Feedwater line(16B) guillotine break **(just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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
119	49	50		X	30.70	16.57	3.98	19.88	0	1.0	0.5	1.5
120	49	52		X	33.79	13.00	4.52	15.60	0	1.0	0.5	1.5
121	50	51		X	52.71	18.88	6.31	22.66	0	1.0	0.5	1.5
122	51	52		X	50.67	14.96	6.13	17.95	0	1.0	0.5	1.5
123	49	53		X	21.50	6.64	4.24	19.05	0.7	0	0	0.7
124	50	54		X	47.30	6.64	6.57	22.34	0.7	0	0	0.7
125	51	55	X		53.73	6.64	7.34	23.43	0.7	0	0	0.7
126	52	56		X	24.98	6.64	5.48	20.80	0.7	0	0	0.7
127	53	54		X	20.08	16.58	3.06	19.90	0	1.0	0.5	1.5
128	53	56		X	23.37	13.00	3.49	15.60	0	1.0	0.5	1.5
129	54	55	X		43.47	18.89	5.73	22.67	0	1.0	0.5	1.5
130	55	56	X		41.30	14.96	5.51	17.95	0	1.0	0.5	1.5
131	53	57		X	21.50	3.47	4.24	12.72	2.05	0	0	2.05
132	54	57		X	47.30	3.47	6.57	16.01	2.05	0	0	2.05
133	55	57	X		62.19	3.95	8.15	18.23	2.05	0	0	2.05
134	56	57		X	24.98	3.47	5.48	14.47	2.05	0	0	2.05

Table 6.3-13 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

D. Break Type : Feed Water line(16B) guillotine break **(Just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

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	563.377	0	438.168
0.002	6852.31	562.321	960.818	438.15
0.004	10389.3	563.381	1795.73	438.15
0.006	10322.8	563.375	2516.12	438.117
0.008	10209.1	563.363	3132.05	438.071
0.01	10100.6	563.35	3652.45	438.013
0.02	9634	563.289	5082.04	437.612
0.03	9300.21	563.232	5100.2	437.139
0.04	9067.21	563.185	4305.39	436.701
0.05	8854.64	563.151	3209.74	436.351
0.06	8773.26	563.131	3077.81	436.1
0.07	8773.73	563.122	4194.29	436.138
0.08	8816.92	563.121	5027.55	436.139
0.09	8875.75	563.123	5653.94	436.14
0.1	8933.99	563.127	6124.8	436.142
0.12	9023.2	563.135	6744.8	436.145
0.14	9083.53	563.143	7095.08	436.149
0.16	9119.9	563.149	7292.93	436.153
0.18	9136.61	563.154	7404.64	436.156
0.2	9138.5	563.157	7467.66	436.16
0.22	9131.94	563.159	7503.18	436.164
0.24	9122	563.16	7523.14	436.168
0.26	9111.69	563.16	7534.32	436.172
0.28	9102.44	563.161	7540.53	436.176
0.3	9094.63	563.161	7543.94	436.179
0.32	9088.15	563.162	7545.76	436.183
0.34	9082.76	563.162	7546.68	436.187
0.36	9078.21	563.162	7547.1	436.191
0.38	9074.31	563.163	7547.23	436.195
0.4	9070.92	563.163	7547.21	436.198
0.42	9067.93	563.163	7547.16	436.202
0.44	9065.3	563.164	7547.07	436.206
0.46	9062.96	563.164	7546.96	436.21
0.48	9060.89	563.164	7546.83	436.213
0.5	9059.06	563.164	7546.68	436.217
0.6	9052.62	563.165	7545.79	436.236
0.7	9049.15	563.165	7544.74	436.254
0.8	9047.26	563.165	7543.64	436.272

Table 6.3-13 Mass and Energy Release Rates for Steam Generator Compartment Peak Pressure Analyses

D. Break Type : Feed Water line(16B) guillotine break **(Just after hot shutdown condition)**
Break Area : 2.234(ft^2)
Break location : Volume number 55

Time (s)	SG side		Feedwater Pumps side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.9	9046.25	563.165	7542.52	436.291
1	9045.71	563.165	7541.39	436.308

Figure 6.3-1 Nodalization scheme for Steam Generator compartment analysis

Figure 6.3-2 Nodalization scheme for Steam Generator compartment analysis

Figure 6.3-3 Nodalization scheme for Steam Generator compartment analysis

Figure 6.3-4 Nodalization scheme for Steam Generator compartment analysis

Figure 6.3-5 Nodalization scheme for Steam Generator compartment analysis

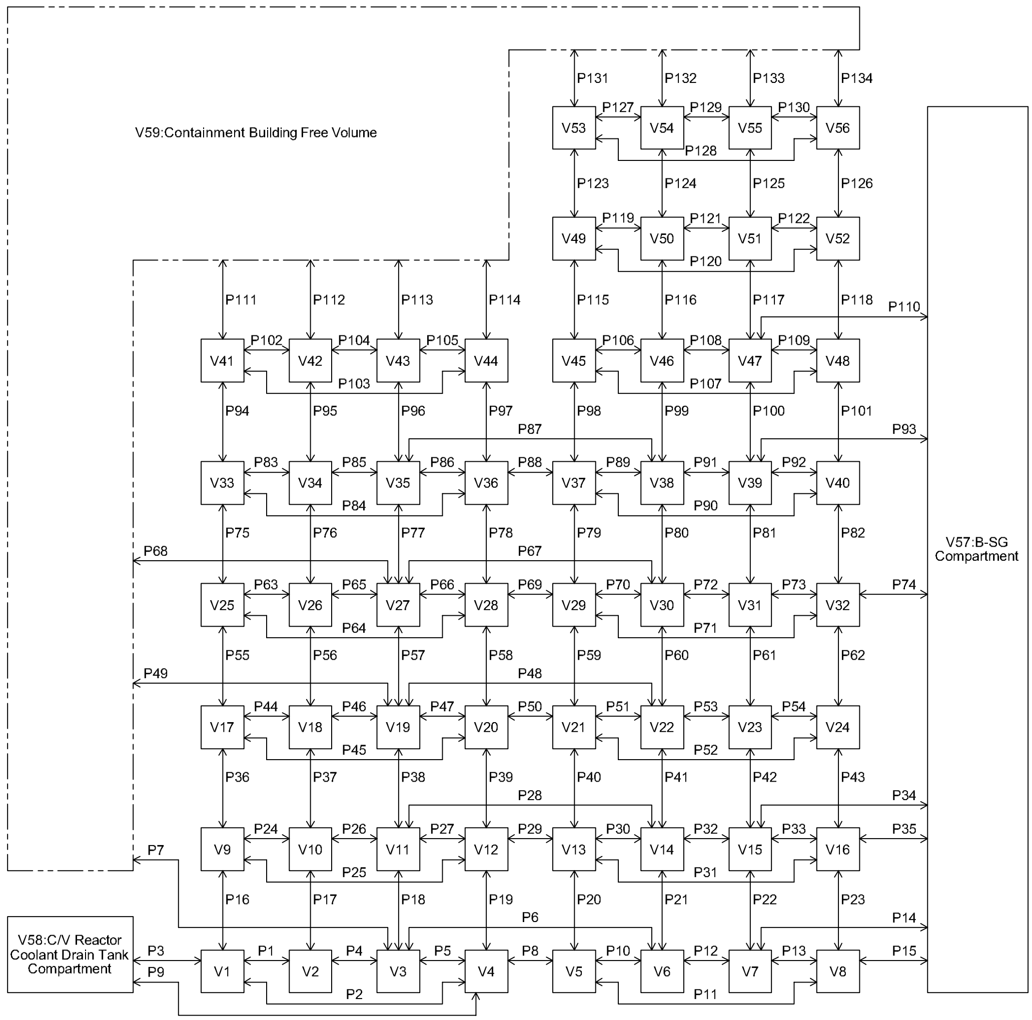


Figure 6.3-6 Nodalization diagram for Steam Generator compartment analysis

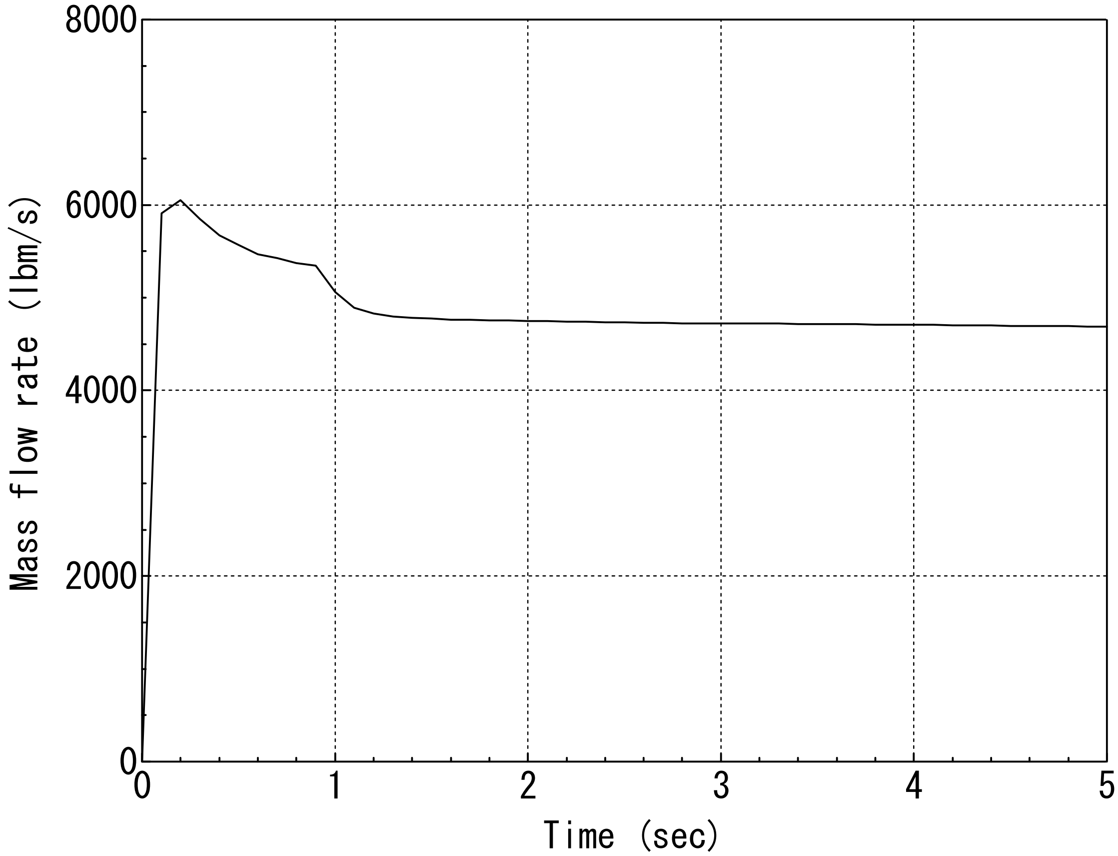


Figure 6.3-7 Short term mass and energy release data for SG compartment RHR pump inlet line break (1/2)

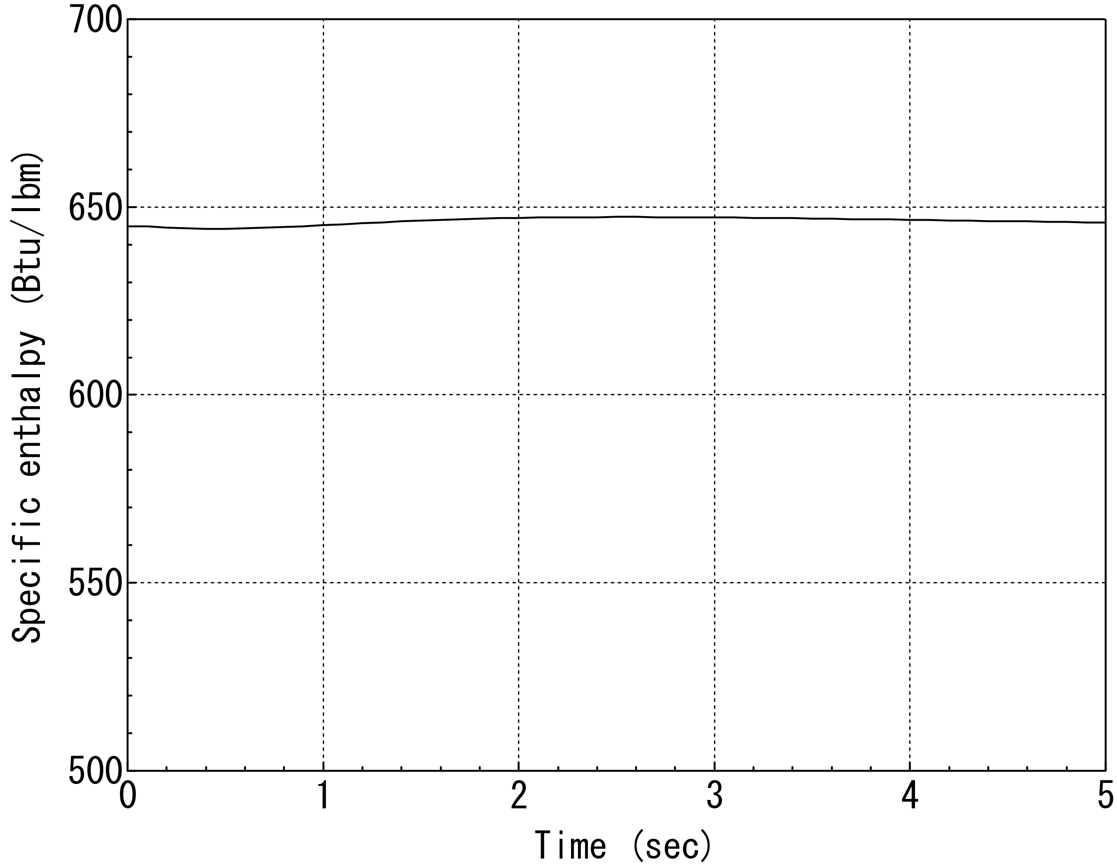


Figure 6.3-8 Short term mass and energy release data for SG compartment
RHR pump inlet line break (2/2)

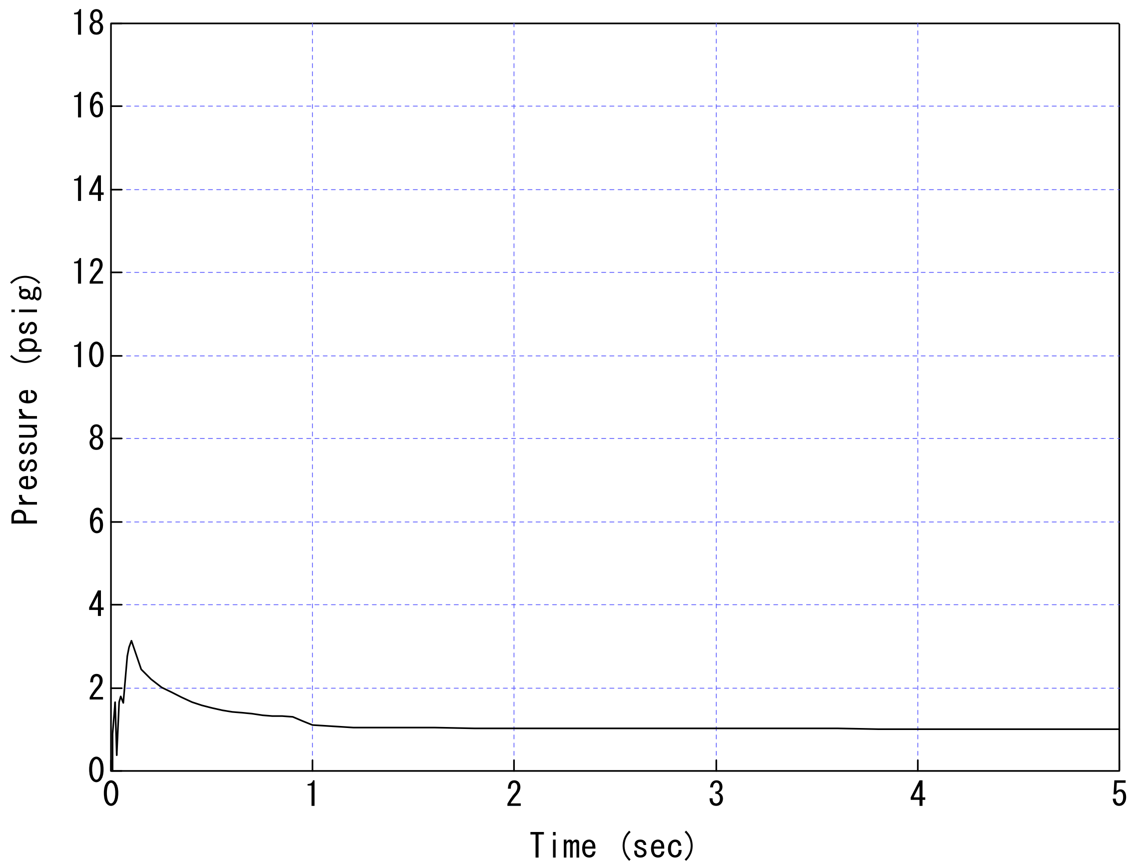


Figure 6.3-9 Pressure transient at the peak pressure node in SG compartment RHR pump inlet line break

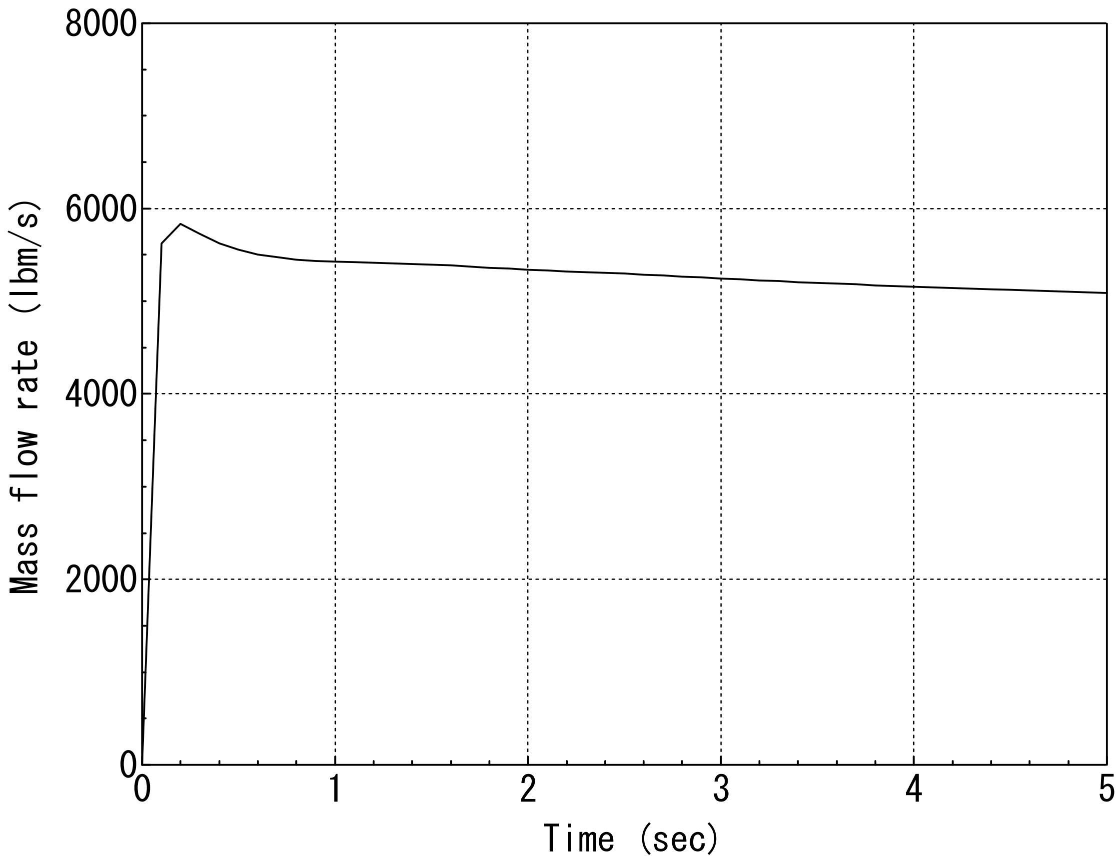


Figure 6.3-10 Short term mass and energy release data for SG compartment RHR pump outlet line break (1/2)

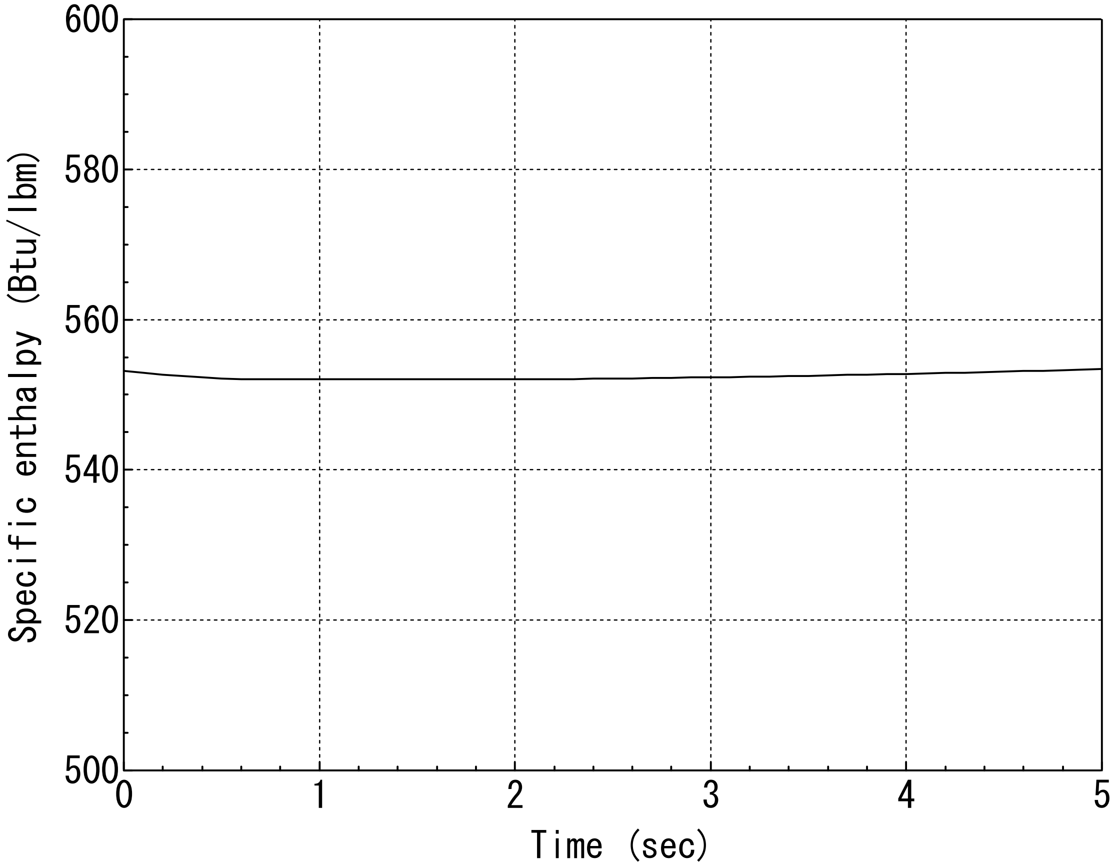


Figure 6.3-11 Short term mass and energy release data for SG compartment
RHR pump outlet line break (2/2)

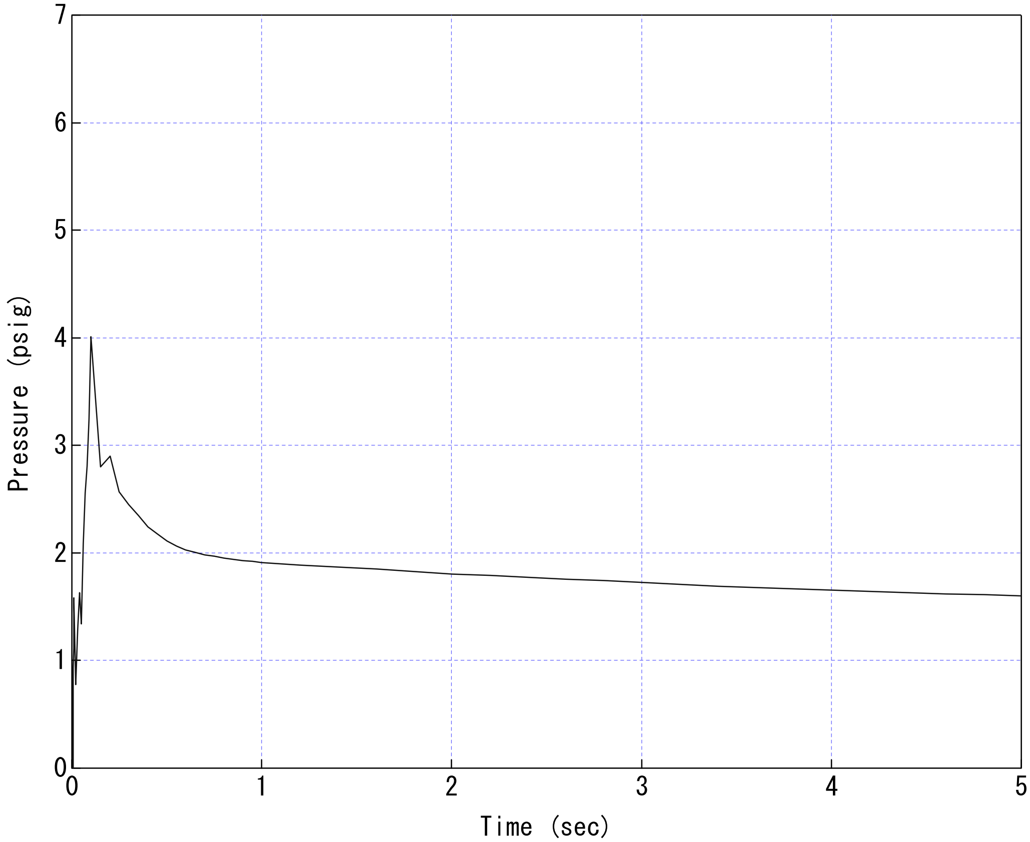


Figure 6.3-12 Pressure transient at the peak pressure node in SG compartment RHR pump outlet line break

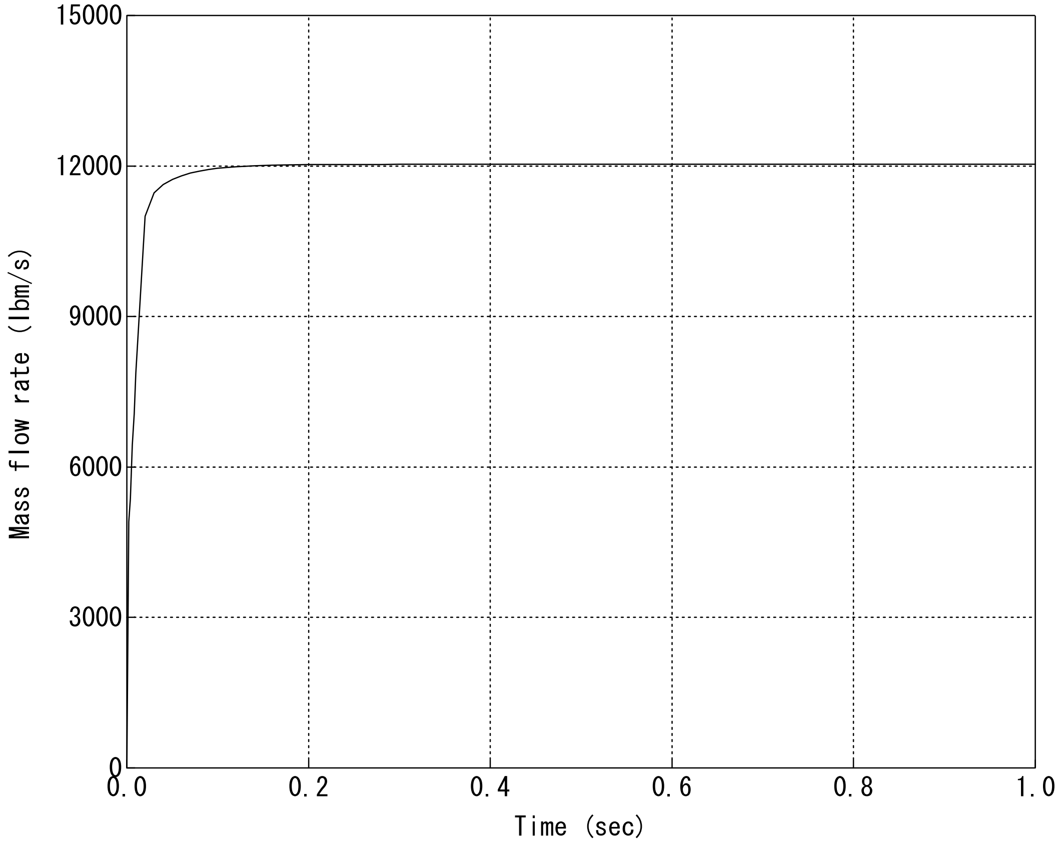


Figure 6.3-13 Short term mass and energy release data for SG compartment Feedwater line break (SG side, full power operating condition) (1/2)

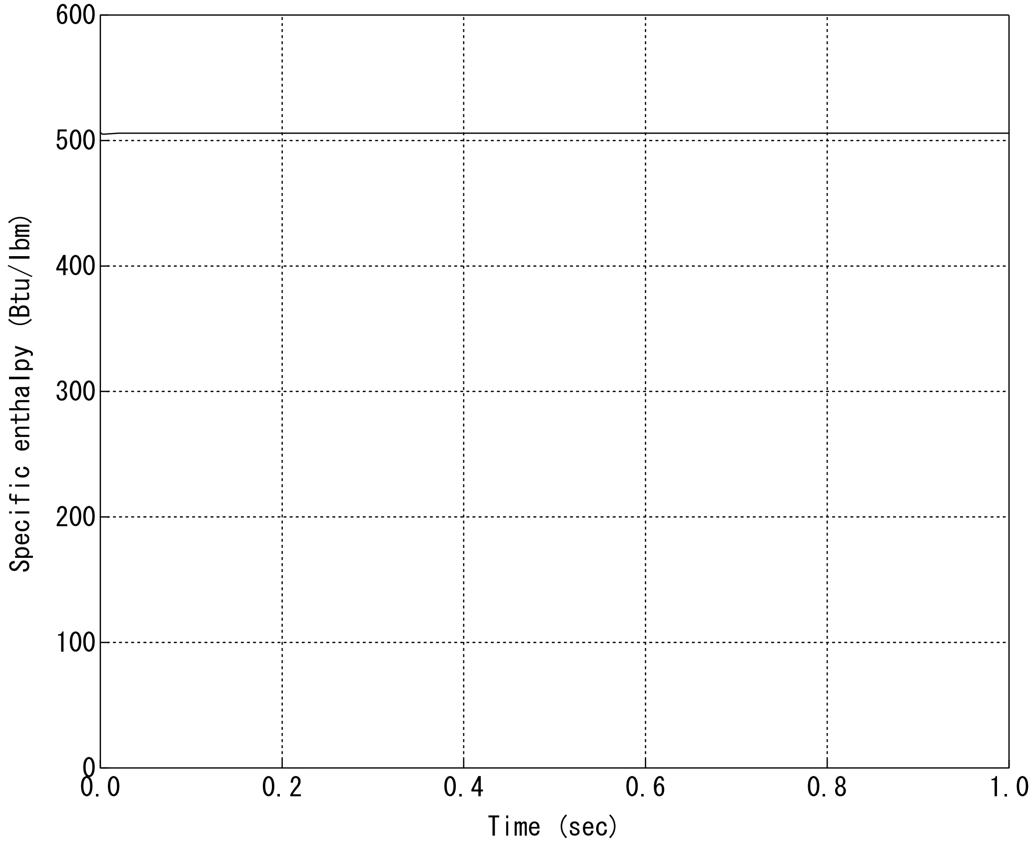


Figure 6.3-14 Short term mass and energy release data for SG compartment Feedwater line break (SG side, full power operating condition) (2/2)

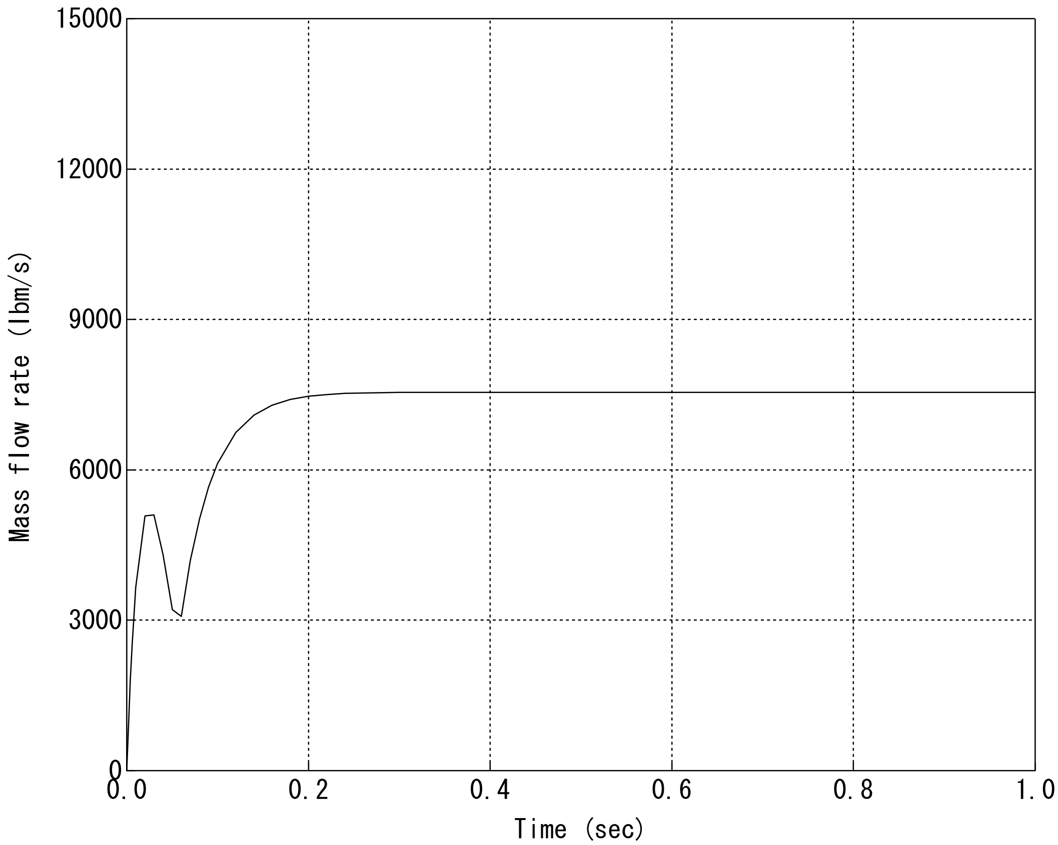


Figure 6.3-15 Short term mass and energy release data for SG compartment Feedwater line break (Feedwater pump side, full power operating condition) (1/2)

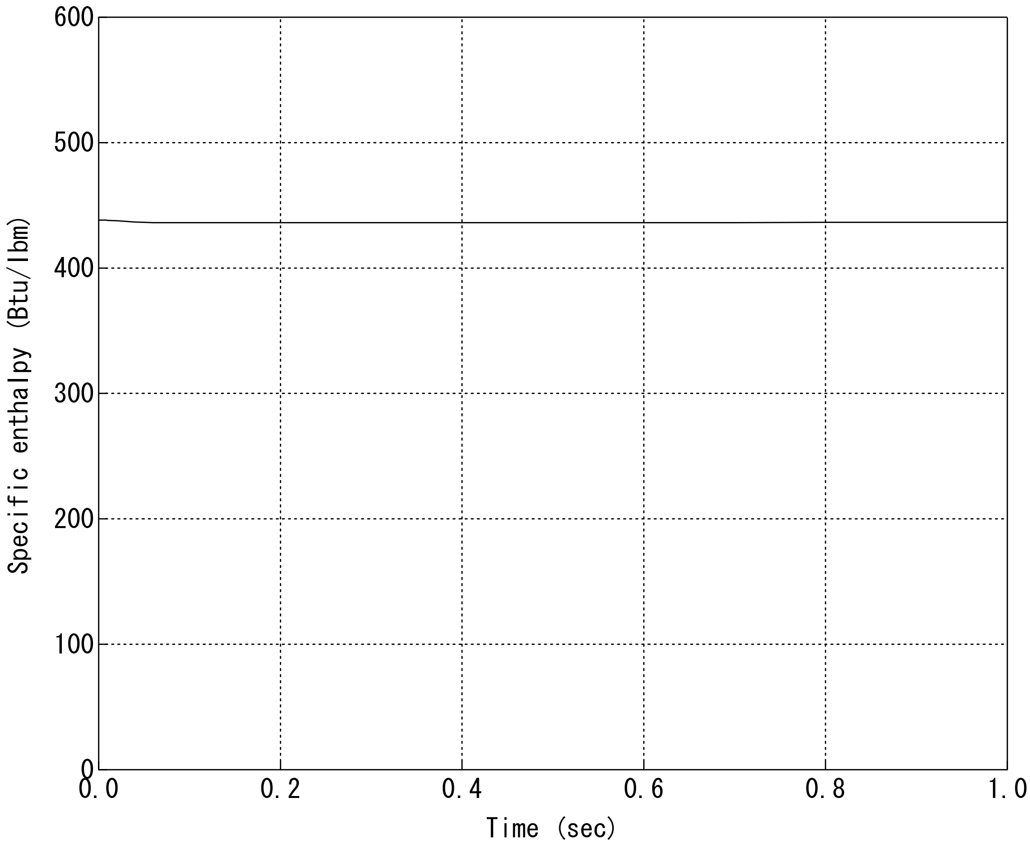


Figure 6.3-16 Short term mass and energy release data for SG compartment Feedwater line break (Feedwater pump side, full power operating condition) (2/2)

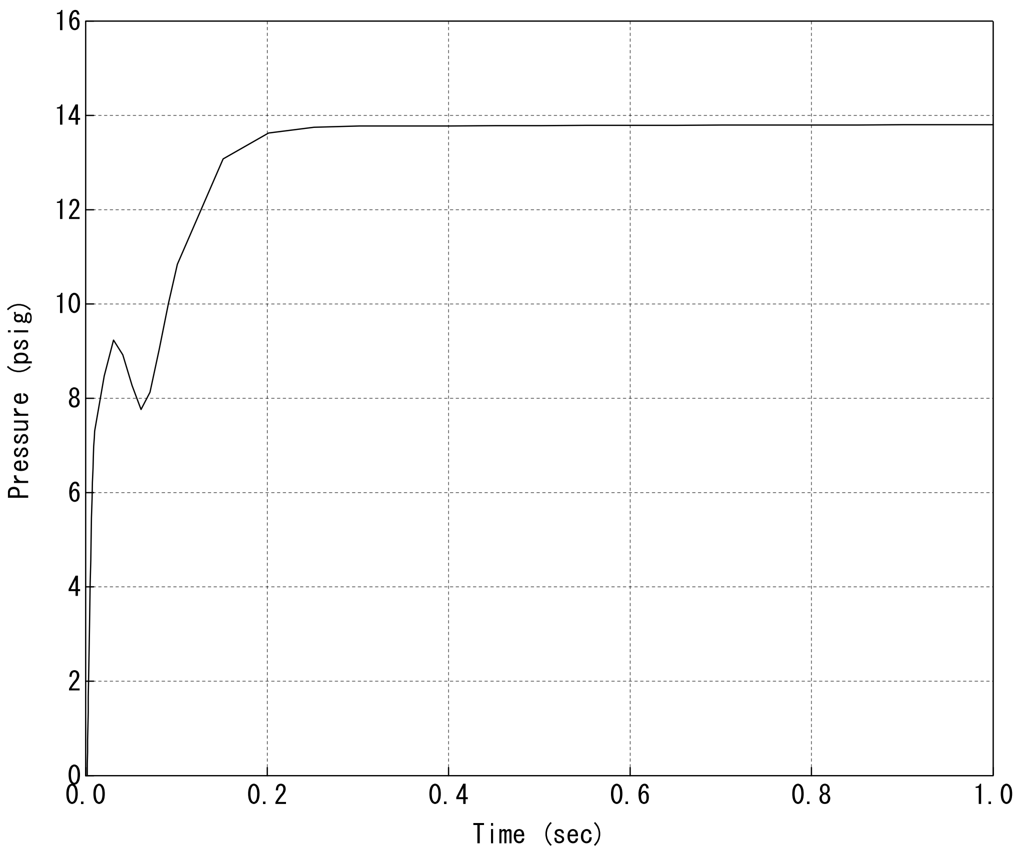


Figure 6.3-17 Pressure transient at the peak pressure node in SG compartment (Feedwater line break, Full power operating condition)

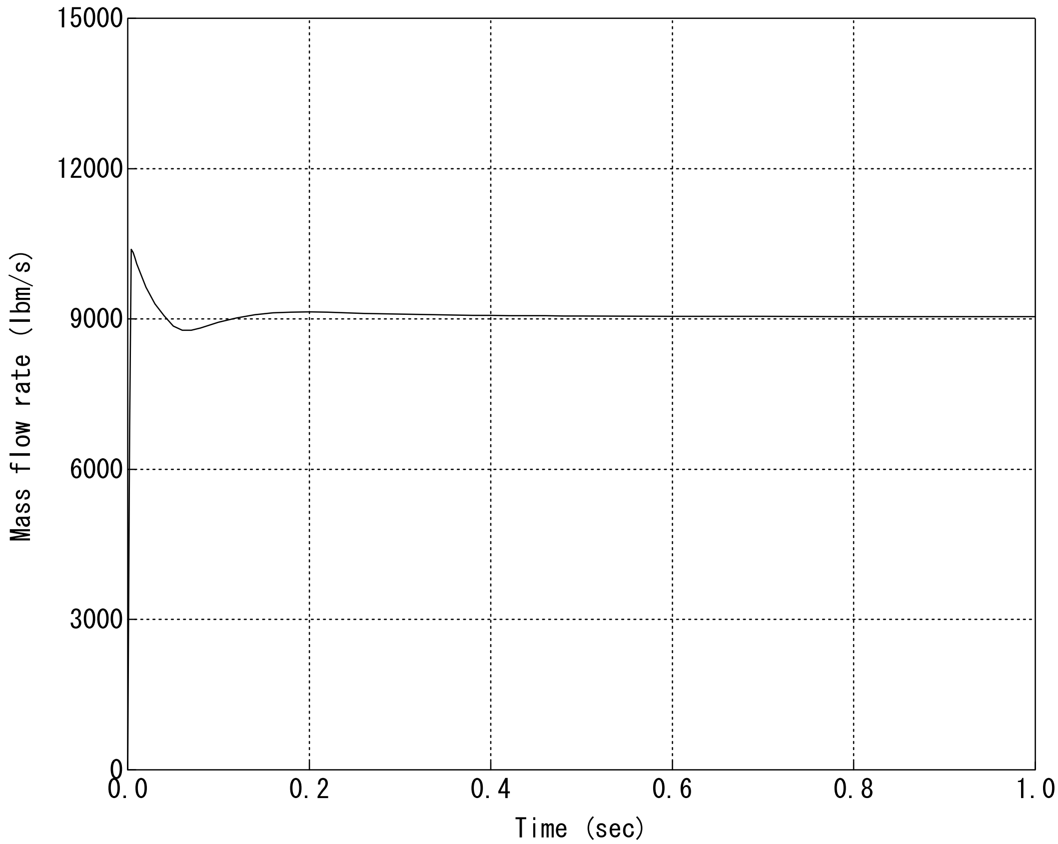


Figure 6.3-18 Short term mass and energy release data for SG compartment Feedwater line break (SG side, just after hot shutdown condition) (1/2)

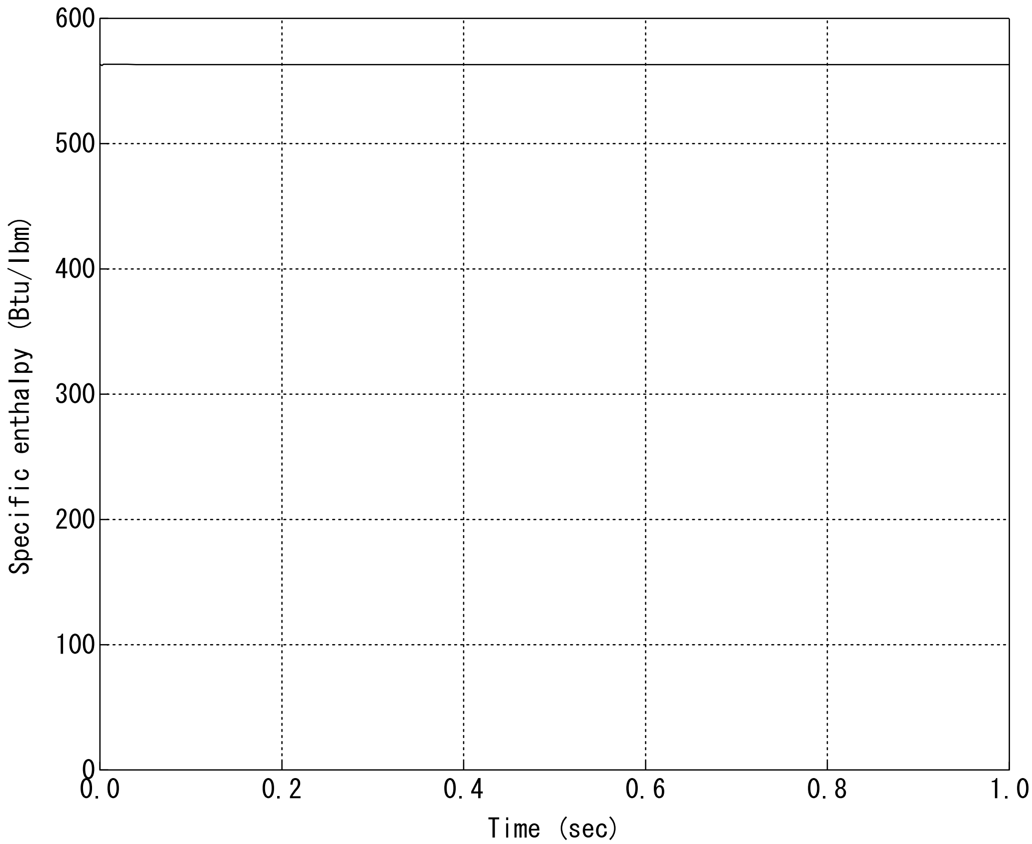


Figure 6.3-19 Short term mass and energy release data for SG compartment Feedwater line break (SG side, just after hot shutdown condition) (2/2)

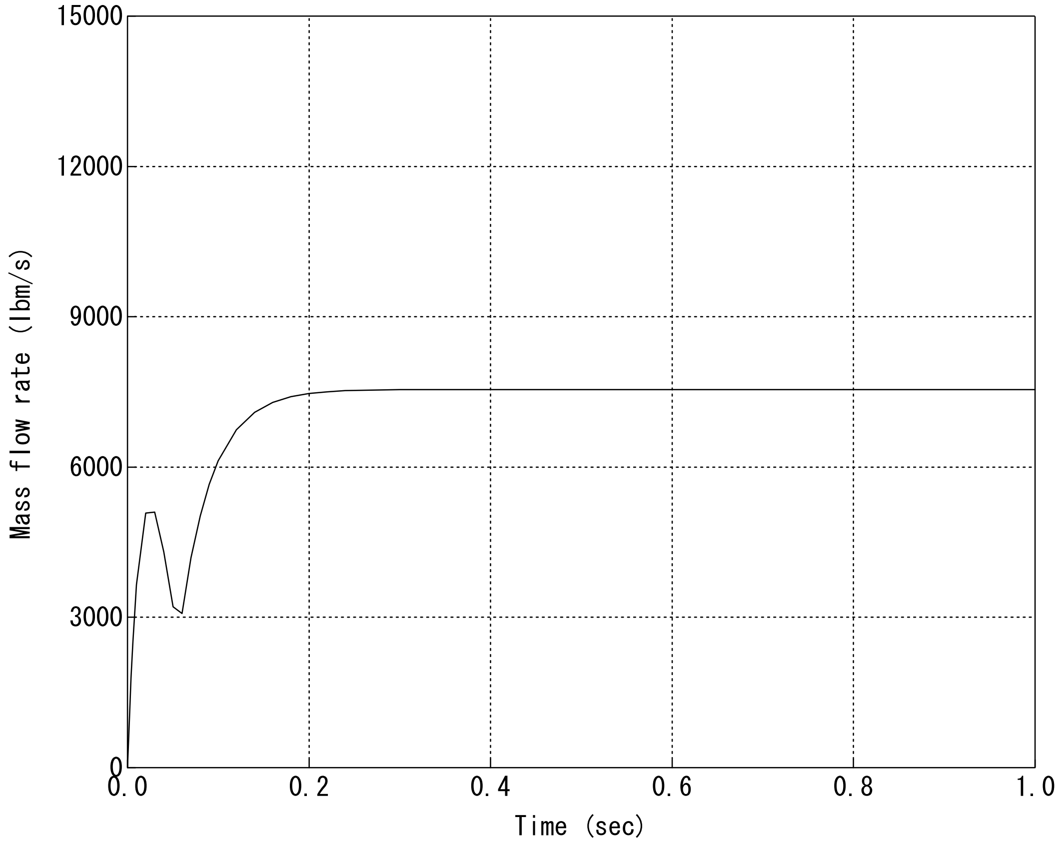


Figure 6.3-20 Short term mass and energy release data for SG compartment Feedwater line break (Feedwater pump side, just after hot shutdown condition) (1/2)

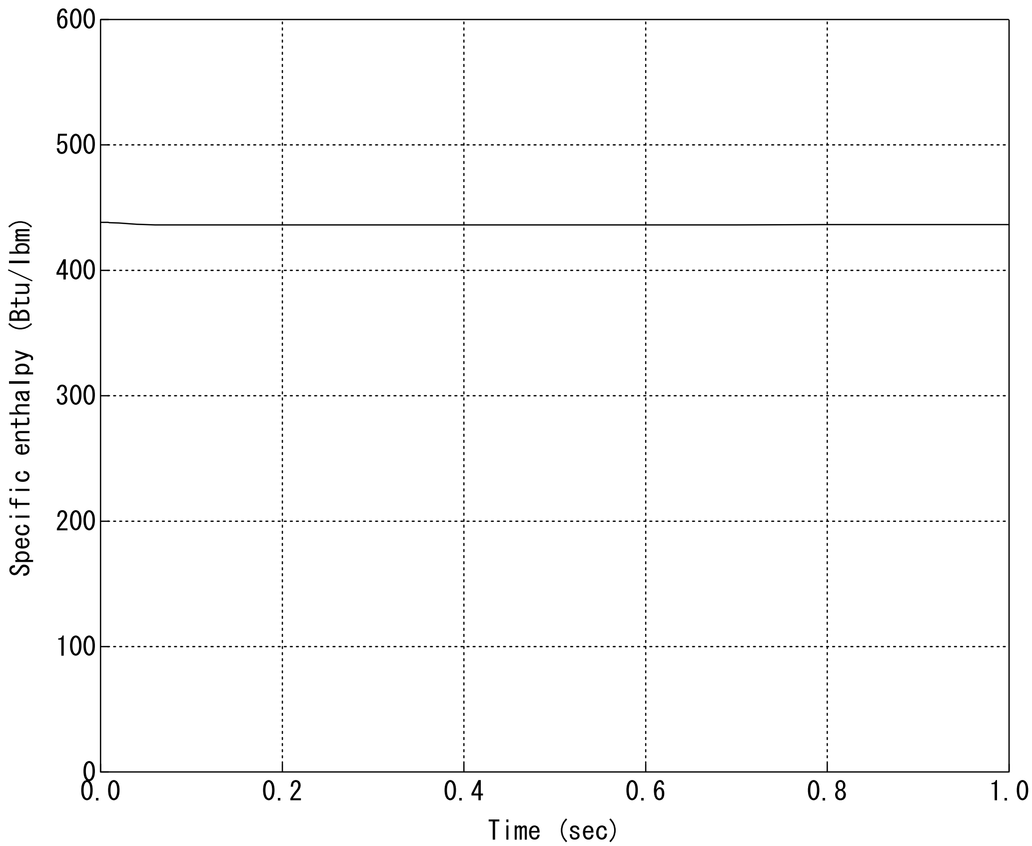


Figure 6.3-21 Short term mass and energy release data for SG compartment Feedwater line break (Feedwater pump side, just after hot shutdown condition) (2/2)

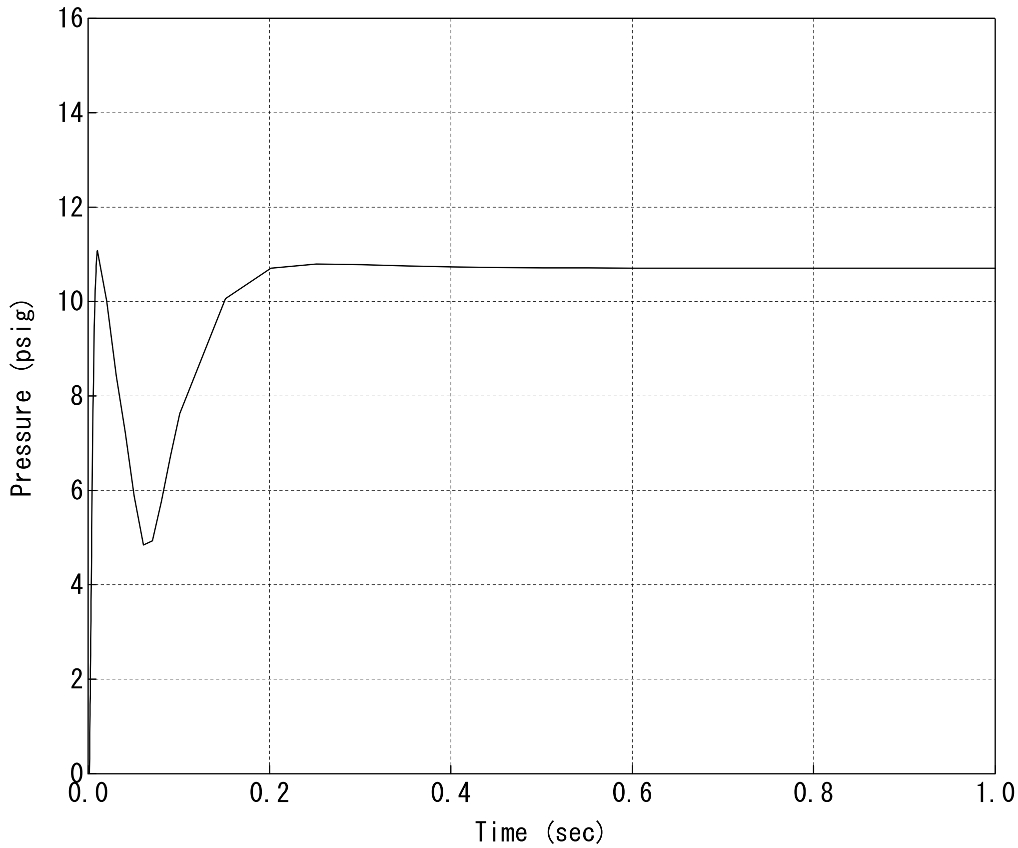


Figure 6.3-22 Pressure transient at the peak pressure node in SG compartment (Feedwater line break, just after hot shutdown condition)

6.4 Pressurizer Subcompartment

6.4.1 Modeling and nodalization sensitivity study

(a) Nodal description

The pressurizer compartment consists of nearly a 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 6.4-1 to Figure 6.4-3. 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 6.4-4. 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 the constant at 0.0 psig.

The description and geometric parameters for each node are summarized in Table 6.4-1. The free volume of each node was estimated by subtracting the obstructed volume from the room volume. The obstructed volume was estimated 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. Specifically the pressurizer compartment was modeled as total 11 nodes. The nodalization scheme for sensitivity study is shown in Figure 6.4-5. The results of sensitivity analysis are shown in Figure 6.4-14 and Figure 6.4-15. 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.

(c) Vent path description

The vent path connection diagram is shown in Figure 6.4-4. Geometric and hydraulic parameters for each vent path are summarized in Table 6.4-2. Vent paths P6 and P7 run from pressurizer compartment to the containment atmosphere. Vent path P5 runs from pressurizer compartment to the C-loop SG compartment. To obtain conservative results, all vent paths were connected 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.

6.4.2 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 of the US-APWR. Nodalization of reactor coolant system for short term mass and energy release is basically same as 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 6.4-3. and the transient of break mass flow rate and enthalpy are shown in Figure 6.4-6 to Figure 6.4-9.

(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 of the US-APWR. Nodalization of reactor coolant system for short term mass and energy release is basically same as 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 break and is calculated by using the M-RELAP5 code.

The resultant short term mass and energy release data are shown in Table 6.4-6 and the transient of break mass flow rate and enthalpy are shown in Figure 6.4-11and Figure 6.4-12.

6.4.3 Calculated pressure responses

(a) Pressurizer spray line break

The pressurizer spray line runs from top of the pressurizer compartment to the bottom of the compartment. Pipe breaks at various locations were analyzed. The worst case for break location was in node V3.

The calculated peak pressure was 6.92 psig at the break node V3. The pressure transient at V3 is shown in Figure 6.4-10. The design pressure for all nodes in pressurizer compartment is 14 psig and the calculated peak pressure is much less than the design pressure.

(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 calculated peak pressure was 2.47 psig at the break node V39. The pressure transient at V39 is shown in Figure 6.4-13. The design pressure for all nodes in pressurizer compartment is 14 psig and the calculated peak pressure is much less than the design pressure.

Table 6.4-1 Pressurizer compartment Nodal Description
A. Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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'	7.67	365	120	14.7	0	6.54	14	53.3
2	Bottom of pressurizer compartment; EL=58''-5'	7.67	365	120	14.7	0	6.73	14	51.9
3	Bottom of pressurizer compartment; EL=58''-5'	7.67	439	120	14.7	0	6.92	14	50.6
4	Bottom of pressurizer compartment; EL=58''-5'	7.67	439	120	14.7	0	6.51	14	53.5
5	EL=66"-1'	10.00	498	120	14.7	0	6.56	14	53.2
6	EL=66"-1'	10.00	498	120	14.7	0	6.77	14	51.6
7	EL=66"-1'	10.00	595	120	14.7	0	6.85	14	51.1
8	EL=66"-1'	10.00	595	120	14.7	0	6.56	14	53.1
9	EL=76"-1' (grating floor)	6.83	348	120	14.7	0	6.48	14	53.7
10	EL=76"-1' (grating floor)	6.83	348	120	14.7	0	6.43	14	54.1
11	EL=76"-1' (grating floor)	6.83	414	120	14.7	0	6.39	14	54.3
12	EL=76"-1' (grating floor)	6.83	414	120	14.7	0	6.50	14	53.6
13	EL=82"-11'	6.83	348	120	14.7	0	6.52	14	53.4
14	EL=82"-11'	6.83	348	120	14.7	0	6.46	14	53.9
15	EL=82"-11'	6.83	414	120	14.7	0	6.45	14	54.0
16	EL=82"-11'	6.83	414	120	14.7	0	6.52	14	53.4
17	EL=89"-9' (grating floor)	6.83	348	120	14.7	0	6.38	14	54.5
18	EL=89"-9' (grating floor)	6.83	348	120	14.7	0	6.29	14	55.1
19	EL=89"-9' (grating floor)	6.83	414	120	14.7	0	6.29	14	55.1
20	EL=89"-9' (grating floor)	6.83	414	120	14.7	0	6.38	14	54.4

Table 6.4-1 Pressurizer compartment Nodal Description

A. Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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’	6.83	348	120	14.7	0	6.35	14	54.6
22	EL=96”-7’	6.83	348	120	14.7	0	6.32	14	54.9
23	EL=96”-7’	6.83	414	120	14.7	0	6.30	14	55.0
24	EL=96”-7’	6.83	414	120	14.7	0	6.36	14	54.6
25	EL=103”-5’ (grating floor)	8.92	449	120	14.7	0	6.21	14	55.7
26	EL=103”-5’ (grating floor)	8.92	449	120	14.7	0	6.17	14	55.9
27	EL=103”-5’ (grating floor)	8.92	536	120	14.7	0	6.17	14	55.9
28	EL=103”-5’ (grating floor)	8.92	536	120	14.7	0	6.21	14	55.7
29	EL=112”-4’	4.33	236	120	14.7	0	6.18	14	55.8
30	EL=112”-4’	4.33	236	120	14.7	0	6.18	14	55.8
31	EL=112”-4’	4.33	278	120	14.7	0	6.19	14	55.8
32	EL=112”-4’	4.33	278	120	14.7	0	6.15	14	56.0
33	EL=116”-8’ (grating floor)	5.80	412	120	14.7	0	6.08	14	56.6
34	EL=116”-8’ (grating floor)	5.80	412	120	14.7	0	6.12	14	56.3
35	EL=116”-8’ (grating floor)	5.80	483	120	14.7	0	6.14	14	56.1
36	EL=116”-8’ (grating floor)	5.80	483	120	14.7	0	6.07	14	56.7
37	Top of Pressurizer; EL=122’’-5.6’	5.37	434	120	14.7	0	6.12	14	56.3
38	Top of Pressurizer; EL=122’’-5.6’	5.37	434	120	14.7	0	6.08	14	56.6
39	Top of Pressurizer; EL=122’’-5.6’	5.37	500	120	14.7	0	6.10	14	56.4
40	Top of Pressurizer; EL=122’’-5.6’	5.37	500	120	14.7	0	6.07	14	56.7

Table 6.4-1 Pressurizer compartment Nodal Description

A. Break Type : Pressurizer spray line(6B) guillotine break
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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)	9.83	839	120	14.7	0	6.19	14	55.8
42	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	839	120	14.7	0	6.04	14	56.9
43	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	959	120	14.7	0	6.02	14	57.0
44	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	959	120	14.7	0	6.06	14	56.7
45	Containment atmosphere	120	2861000	120	14.7	0	-	-	-

Table 6.4-2 Pressurizer Compartment Vent Path Description

A. Break Type : Pressurizer Spray line(6B)

Break Area : 0.14674(ft^2)

Break location : Volume number 3

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	1	2		X	18.81	12.94	3.68	15.53	0	1.0	0.5	1.5
2	1	4		X	47.56	9.28	6.81	11.14	0	1.0	0.5	1.5
3	2	3		X	47.56	9.28	6.81	11.14	0	1.0	0.5	1.5
4	3	4		X	22.00	14.54	4.14	17.45	0	1.0	0.5	1.5
5	4	45	X		19.75	7.70	4.12	9.24	0.45	1.0	0.5	1.95
6	1	5		X	54.36	8.83	6.86	10.60	0	0	0	0
7	2	6		X	54.36	8.83	6.86	10.60	0	0	0	0
8	3	7		X	64.09	8.83	7.45	10.60	0	0	0	0
9	4	8		X	64.09	8.83	7.45	10.60	0	0	0	0
10	5	6		X	25.38	12.94	4.05	15.53	0	1.0	0.5	1.5
11	5	8		X	62.88	9.28	7.72	11.14	0	1.0	0.5	1.5
12	6	7		X	62.88	9.28	7.72	11.14	0	1.0	0.5	1.5
13	7	8		X	29.55	14.54	4.56	17.45	0	1.0	0.5	1.5
14	5	9		X	32.62	5.09	6.86	19.66	0.7	0	0	0.7
15	6	10		X	32.62	5.09	6.86	19.66	0.7	0	0	0.7
16	7	11		X	38.45	5.09	7.45	20.48	0.7	0	0	0.7
17	8	12		X	38.45	5.09	7.45	20.48	0.7	0	0	0.7
18	9	10		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
19	9	12		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
20	10	11		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
21	11	12		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
22	9	13		X	54.36	6.84	6.86	8.21	0	0	0	0

Table 6.4-2 Pressurizer Compartment Vent Path Description

A. Break Type : Pressurizer Spray line(6B)
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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
23	10	14		X	54.36	6.84	6.86	8.21	0	0	0	0
24	11	15		X	64.09	6.84	7.45	8.21	0	0	0	0
25	12	16		X	64.09	6.84	7.45	8.21	0	0	0	0
26	13	14		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
27	13	16		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
28	14	15		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
29	15	16		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
30	13	17		X	32.62	4.15	6.86	17.76	0.7	0	0	0.7
31	14	18		X	32.62	4.15	6.86	17.76	0.7	0	0	0.7
32	15	19		X	38.45	4.15	7.45	18.59	0.7	0	0	0.7
33	16	20		X	38.45	4.15	7.45	18.59	0.7	0	0	0.7
34	17	18		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
35	17	20		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
36	18	19		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
37	19	20		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
38	17	21		X	54.36	6.84	6.86	8.21	0	0	0	0
39	18	22		X	54.36	6.84	6.86	8.21	0	0	0	0
40	19	23		X	64.09	6.84	7.45	8.21	0	0	0	0
41	20	24		X	64.09	6.84	7.45	8.21	0	0	0	0
42	21	22		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
43	21	24		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
44	22	23		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
45	23	24		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
46	21	25		X	32.62	4.77	6.86	19.01	0.7	0	0	0.7

Table 6.4-2 Pressurizer Compartment Vent Path Description

A. Break Type : Pressurizer Spray line(6B)
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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
47	22	26		X	32.62	4.77	6.86	19.01	0.7	0	0	0.7
48	23	27		X	38.45	4.77	7.45	19.83	0.7	0	0	0.7
49	24	28		X	38.45	4.77	7.45	19.83	0.7	0	0	0.7
50	25	26		X	22.63	12.94	3.95	15.53	0	1.0	0.5	1.5
51	25	28		X	56.07	9.28	7.37	11.14	0	1.0	0.5	1.5
52	26	27		X	56.07	9.28	7.37	11.14	0	1.0	0.5	1.5
53	27	28		X	26.35	14.54	4.44	17.45	0	1.0	0.5	1.5
54	25	29		X	54.36	6.63	6.86	7.96	0	1.0	0	1.0
55	26	30		X	54.36	6.63	6.86	7.96	0	1.0	0	1.0
56	27	31		X	64.09	6.63	7.45	7.96	0	1.0	0	1.0
57	28	32		X	64.09	6.63	7.45	7.96	0	1.0	0	1.0
58	29	30		X	11.00	12.94	3.20	15.53	0	1.0	0.5	1.5
59	29	32		X	27.25	9.28	5.13	11.14	0	1.0	0.5	1.5
60	30	31		X	27.25	9.28	5.13	11.14	0	1.0	0.5	1.5
61	31	32		X	12.80	14.54	3.51	17.45	0	1.0	0.5	1.5
62	29	33		X	42.62	3.08	8.04	17.29	0.7	0	0	0.7
63	30	34		X	42.62	3.08	8.04	17.29	0.7	0	0	0.7
64	31	35		X	49.96	3.08	8.67	18.18	0.7	0	0	0.7
65	32	36		X	49.96	3.08	8.67	18.18	0.7	0	0	0.7
66	33	34		X	20.52	13.62	4.39	16.34	0	1.0	0.5	1.5
67	33	36		X	42.27	10.25	6.46	12.30	0	1.0	0.5	1.5
68	34	35		X	42.27	10.25	6.46	12.30	0	1.0	0.5	1.5
69	35	36		X	22.94	15.48	4.70	18.58	0	1.0	0.5	1.5
70	33	37		X	71.04	5.58	8.04	6.70	0	1.0	0	1.0

Table 6.4-2 Pressurizer Compartment Vent Path Description

A. Break Type : Pressurizer Spray line(6B)
Break Area : 0.14674(ft^2)
Break location : Volume number 3

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
71	34	38		X	71.04	5.58	8.04	6.70	0	1.0	0	1.0
72	35	39		X	83.26	5.58	8.67	6.70	0	1.0	0	1.0
73	36	40		X	83.26	5.58	8.67	6.70	0	1.0	0	1.0
74	37	38		X	42.93	9.60	6.42	11.52	0	1.0	0.5	1.5
75	37	40		X	63.06	7.63	7.37	9.16	0	1.0	0.5	1.5
76	38	39		X	63.06	7.63	7.37	9.16	0	1.0	0.5	1.5
77	39	40		X	45.17	11.76	6.55	14.11	0	1.0	0.5	1.5
78	37	41		X	52.01	4.60	9.31	22.12	0.7	0	0	0.7
79	38	42		X	52.01	4.60	9.31	22.12	0.7	0	0	0.7
80	39	43		X	59.34	4.60	9.81	22.83	0.7	0	0	0.7
81	40	44		X	59.34	4.60	9.81	22.83	0.7	0	0	0.7
82	41	42		X	78.67	9.60	8.82	11.52	0	1.0	0.5	1.5
83	41	44		X	115.54	7.63	10.71	9.16	0	1.0	0.5	1.5
84	42	43		X	115.54	7.63	10.71	9.16	0	1.0	0.5	1.5
85	43	44		X	82.76	11.76	9.07	14.11	0	1.0	0.5	1.5
86	43	45	X		20.75	9.00	4.19	10.80	0.84	1.0	0.5	2.34
87	44	45	X		32.78	9.03	4.98	10.84	0.84	1.0	0.5	2.34

Table 6.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses

A. Break Type : Pressurizer Spray line(6B) guillotine break

Break Area : 0.14674(ft^2)

Time (s)	CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.0	0	553.17	0	553.04
0.1	1600.1	548.339	3295.32	553.04
0.2	2006.11	550.733	3452	552.894
0.3	1966.72	551.529	3420.63	552.762
0.4	1929.23	551.594	765.924	1113.79
0.5	1907.49	551.538	750.243	1113.63
0.6	1896.45	551.493	744.831	1113.63
0.7	1891.79	551.471	742.468	1113.69
0.8	1890.68	551.466	740.672	1113.81
0.9	1891.53	551.472	738.839	1113.99
1.0	1893.14	551.483	736.888	1114.21
1.1	1895	551.495	734.873	1114.47
1.2	1896.65	551.508	732.72	1114.76
1.3	1897.9	551.518	730.477	1115.08
1.4	1898.62	551.526	728.163	1115.44
1.5	1898.74	551.531	725.721	1115.84
1.6	1898.32	551.534	723.224	1116.29
1.7	1897.37	551.534	720.879	1116.78
1.8	1895.94	551.532	718.76	1117.31
1.9	1894.12	551.529	717.57	1117.9
2.0	1891.98	551.526	718.88	1118.6
2.1	1889.63	551.522	758.87	1121.43
2.2	1887.17	551.52	728.086	1120.88
2.3	1884.71	551.518	717.414	1120.68
2.4	1882.31	551.518	713.288	1120.72
2.5	1880.02	551.52	710.805	1120.92
2.6	1877.84	551.523	711.128	1121.27
2.7	1875.77	551.528	712.115	1121.75
2.8	1873.79	551.534	708.007	1122.02
2.9	1871.93	551.541	706.03	1122.2
3.0	1870.16	551.55	704.888	1122.5
3.1	1868.47	551.559	703.304	1122.8
3.2	1866.81	551.57	701.574	1123.09
3.3	1865.15	551.58	699.897	1123.38
3.4	1863.51	551.592	698.197	1123.68
3.5	1861.88	551.603	696.451	1123.99
3.6	1860.15	551.615	694.674	1124.29
3.7	1858.4	551.627	692.872	1124.61
3.8	1856.72	551.639	691.015	1124.92

Table 6.4-3 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses

A. Break Type : Pressurizer Spray line(6B) guillotine break
Break Area : 0.14674(ft^2)

Time (s)	CLG side		PZR side	
	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
3.9	1855.07	551.652	689.13	1125.24
4.0	1853.43	551.666	687.215	1125.56
4.1	1851.79	551.68	685.279	1125.89
4.2	1850.13	551.694	683.333	1126.22
4.3	1848.47	551.709	681.364	1126.56
4.4	1846.8	551.725	679.265	1126.9
4.5	1845.13	551.742	677.216	1127.24
4.6	1843.38	551.759	675.176	1127.6
4.7	1841.68	551.776	673.195	1127.97
4.8	1840.03	551.795	670.931	1128.33
4.9	1838.35	551.815	668.663	1128.69
5.0	1836.69	551.836	666.523	1129.08

Table 6.4-4 Pressurizer compartment Nodal description

B. Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2452(ft^2)
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'	7.67	365	120	14.7	0	2.43	14	82.6
2	Bottom of pressurizer compartment; EL=58''-5'	7.67	365	120	14.7	0	2.46	14	82.5
3	Bottom of pressurizer compartment; EL=58''-5'	7.67	439	120	14.7	0	2.46	14	82.5
4	Bottom of pressurizer compartment; EL=58''-5'	7.67	439	120	14.7	0	2.42	14	82.7
5	EL=66"-1'	10.00	498	120	14.7	0	2.42	14	82.7
6	EL=66"-1'	10.00	498	120	14.7	0	2.43	14	82.6
7	EL=66"-1'	10.00	595	120	14.7	0	2.43	14	82.6
8	EL=66"-1'	10.00	595	120	14.7	0	2.41	14	82.8
9	EL=76"-1' (grating floor)	6.83	348	120	14.7	0	2.42	14	82.7
10	EL=76"-1' (grating floor)	6.83	348	120	14.7	0	2.42	14	82.7
11	EL=76"-1' (grating floor)	6.83	414	120	14.7	0	2.42	14	82.7
12	EL=76"-1' (grating floor)	6.83	414	120	14.7	0	2.42	14	82.7

Table 6.4-4 Pressurizer compartment Nodal description

B. Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2452(ft^2)
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	348	120	14.7	0	2.41	14	82.8
14	EL=82"-11'	6.83	348	120	14.7	0	2.40	14	82.8
15	EL=82"-11'	6.83	414	120	14.7	0	2.41	14	82.8
16	EL=82"-11'	6.83	414	120	14.7	0	2.41	14	82.8
17	EL=89"-9' (grating floor)	6.83	348	120	14.7	0	2.42	14	82.7
18	EL=89"-9' (grating floor)	6.83	348	120	14.7	0	2.41	14	82.8
19	EL=89"-9' (grating floor)	6.83	414	120	14.7	0	2.41	14	82.8
20	EL=89"-9' (grating floor)	6.83	414	120	14.7	0	2.42	14	82.7
21	EL=96"-7'	6.83	348	120	14.7	0	2.40	14	82.8
22	EL=96"-7'	6.83	348	120	14.7	0	2.40	14	82.9
23	EL=96"-7'	6.83	414	120	14.7	0	2.40	14	82.9
24	EL=96"-7'	6.83	414	120	14.7	0	2.41	14	82.8
25	EL=103"-5' (grating floor)	8.92	449	120	14.7	0	2.40	14	82.8
26	EL=103"-5' (grating floor)	8.92	449	120	14.7	0	2.42	14	82.8
27	EL=103"-5' (grating floor)	8.92	536	120	14.7	0	2.41	14	82.8
28	EL=103"-5' (grating floor)	8.92	536	120	14.7	0	2.40	14	82.8
29	EL=112"-4'	4.33	236	120	14.7	0	2.41	14	82.8

Table 6.4-4 Pressurizer compartment Nodal description

B. Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2452(ft^2)
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. (%)			
30	EL=112"-4'	4.33	236	120	14.7	0	2.41	14	82.8
31	EL=112"-4'	4.33	278	120	14.7	0	2.41	14	82.8
32	EL=112"-4'	4.33	278	120	14.7	0	2.40	14	82.8
33	EL=116"-8' (grating floor)	5.80	412	120	14.7	0	2.41	14	82.8
34	EL=116"-8' (grating floor)	5.80	412	120	14.7	0	2.41	14	82.8
35	EL=116"-8' (grating floor)	5.80	483	120	14.7	0	2.44	14	82.6
36	EL=116"-8' (grating floor)	5.80	483	120	14.7	0	2.41	14	82.8
37	Top of Pressurizer; EL=122''-5.6'	5.37	434	120	14.7	0	2.41	14	82.8
38	Top of Pressurizer; EL=122''-5.6'	5.37	434	120	14.7	0	2.41	14	82.8
39	Top of Pressurizer; EL=122''-5.6'	5.37	500	120	14.7	0	2.47	14	82.4
40	Top of Pressurizer; EL=122''-5.6'	5.37	500	120	14.7	0	2.41	14	82.8
41	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	839	120	14.7	0	2.40	14	82.9

Table 6.4-4 Pressurizer compartment Nodal description

B. Break Type : Pressurizer relief line(8B) guillotine break

Break Area : 0.2452(ft^2)

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)	9.83	839	120	14.7	0	2.39	14	82.9
43	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	959	120	14.7	0	2.39	14	83.0
44	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	959	120	14.7	0	2.38	14	83.0
45	Containment atmosphere	120	2861000	120	14.7	0	-	-	-

Table 6.4-5 Pressurizer Compartment Vent Path Description

B. Break Type : Pressurizer relief line(6B) guillotine break

Break Area : 0.2452(ft^2)

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	1	2		X	18.81	12.94	3.68	15.53	0	1.0	0.5	1.5
2	1	4		X	47.56	9.28	6.81	11.14	0	1.0	0.5	1.5
3	2	3		X	47.56	9.28	6.81	11.14	0	1.0	0.5	1.5
4	3	4		X	22.00	14.54	4.14	17.45	0	1.0	0.5	1.5
5	4	45		X	19.75	7.70	4.12	9.24	0.45	1.0	0.5	1.95
6	1	5		X	54.36	8.83	6.86	10.60	0	0	0	0
7	2	6		X	54.36	8.83	6.86	10.60	0	0	0	0
8	3	7		X	64.09	8.83	7.45	10.60	0	0	0	0
9	4	8		X	64.09	8.83	7.45	10.60	0	0	0	0
10	5	6		X	25.38	12.94	4.05	15.53	0	1.0	0.5	1.5
11	5	8		X	62.88	9.28	7.72	11.14	0	1.0	0.5	1.5
12	6	7		X	62.88	9.28	7.72	11.14	0	1.0	0.5	1.5
13	7	8		X	29.55	14.54	4.56	17.45	0	1.0	0.5	1.5
14	5	9		X	32.62	5.09	6.86	19.66	0.7	0	0	0.7
15	6	10		X	32.62	5.09	6.86	19.66	0.7	0	0	0.7
16	7	11		X	38.45	5.09	7.45	20.48	0.7	0	0	0.7
17	8	12		X	38.45	5.09	7.45	20.48	0.7	0	0	0.7
18	9	10		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
19	9	12		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
20	10	11		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
21	11	12		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
22	9	13		X	54.36	6.84	6.86	8.21	0	0	0	0
23	10	14		X	54.36	6.84	6.86	8.21	0	0	0	0

Table 6.4-5 Pressurizer Compartment Vent Path Description

B. Break Type : Pressurizer relief line(6B) guillotine break

Break Area : 0.2452(ft^2)

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	11	15		X	64.09	6.84	7.45	8.21	0	0	0	0
25	12	16		X	64.09	6.84	7.45	8.21	0	0	0	0
26	13	14		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
27	13	16		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
28	14	15		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
29	15	16		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
30	13	17		X	32.62	4.15	6.86	17.76	0.7	0	0	0.7
31	14	18		X	32.62	4.15	6.86	17.76	0.7	0	0	0.7
32	15	19		X	38.45	4.15	7.45	18.59	0.7	0	0	0.7
33	16	20		X	38.45	4.15	7.45	18.59	0.7	0	0	0.7
34	17	18		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
35	17	20		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
36	18	19		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
37	19	20		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
38	17	21		X	54.36	6.84	6.86	8.21	0	0	0	0
39	18	22		X	54.36	6.84	6.86	8.21	0	0	0	0
40	19	23		X	64.09	6.84	7.45	8.21	0	0	0	0
41	20	24		X	64.09	6.84	7.45	8.21	0	0	0	0
42	21	22		X	17.34	12.94	3.70	15.53	0	1.0	0.5	1.5
43	21	24		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
44	22	23		X	42.97	9.28	6.55	11.14	0	1.0	0.5	1.5
45	23	24		X	20.19	14.54	4.12	17.45	0	1.0	0.5	1.5
46	21	25		X	32.62	4.77	6.86	19.01	0.7	0	0	0.7
47	22	26		X	32.62	4.77	6.86	19.01	0.7	0	0	0.7

Table 6.4-5 Pressurizer Compartment Vent Path Description

B. Break Type : Pressurizer relief line(6B) guillotine break
Break Area : 0.2452(ft^2)
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	23	27		X	38.45	4.77	7.45	19.83	0.7	0	0	0.7
49	24	28		X	38.45	4.77	7.45	19.83	0.7	0	0	0.7
50	25	26		X	22.63	12.94	3.95	15.53	0	1.0	0.5	1.5
51	25	28		X	56.07	9.28	7.37	11.14	0	1.0	0.5	1.5
52	26	27		X	56.07	9.28	7.37	11.14	0	1.0	0.5	1.5
53	27	28		X	26.35	14.54	4.44	17.45	0	1.0	0.5	1.5
54	25	29		X	54.36	6.63	6.86	7.96	0	1.0	0	1.0
55	26	30		X	54.36	6.63	6.86	7.96	0	1.0	0	1.0
56	27	31		X	64.09	6.63	7.45	7.96	0	1.0	0	1.0
57	28	32		X	64.09	6.63	7.45	7.96	0	1.0	0	1.0
58	29	30		X	11.00	12.94	3.20	15.53	0	1.0	0.5	1.5
59	29	32		X	27.25	9.28	5.13	11.14	0	1.0	0.5	1.5
60	30	31		X	27.25	9.28	5.13	11.14	0	1.0	0.5	1.5
61	31	32		X	12.80	14.54	3.51	17.45	0	1.0	0.5	1.5
62	29	33		X	42.62	3.08	8.04	17.29	0.7	0	0	0.7
63	30	34		X	42.62	3.08	8.04	17.29	0.7	0	0	0.7
64	31	35		X	49.96	3.08	8.67	18.18	0.7	0	0	0.7
65	32	36		X	49.96	3.08	8.67	18.18	0.7	0	0	0.7
66	33	34		X	20.52	13.62	4.39	16.34	0	1.0	0.5	1.5
67	33	36		X	42.27	10.25	6.46	12.30	0	1.0	0.5	1.5
68	34	35		X	42.27	10.25	6.46	12.30	0	1.0	0.5	1.5
69	35	36		X	22.94	15.48	4.70	18.58	0	1.0	0.5	1.5
70	33	37		X	71.04	5.58	8.04	6.70	0	1.0	0	1.0
71	34	38		X	71.04	5.58	8.04	6.70	0	1.0	0	1.0

Table 6.4-5 Pressurizer Compartment Vent Path Description

B. Break Type : Pressurizer relief line(6B) guillotine break

Break Area : 0.2452(ft^2)

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	35	39		X	83.26	5.58	8.67	6.70	0	1.0	0	1.0
73	36	40		X	83.26	5.58	8.67	6.70	0	1.0	0	1.0
74	37	38		X	42.93	9.60	6.42	11.52	0	1.0	0.5	1.5
75	37	40		X	63.06	7.63	7.37	9.16	0	1.0	0.5	1.5
76	38	39		X	63.06	7.63	7.37	9.16	0	1.0	0.5	1.5
77	39	40		X	45.17	11.76	6.55	14.11	0	1.0	0.5	1.5
78	37	41		X	52.01	4.60	9.31	22.12	0.7	0	0	0.7
79	38	42		X	52.01	4.60	9.31	22.12	0.7	0	0	0.7
80	39	43		X	59.34	4.60	9.81	22.83	0.7	0	0	0.7
81	40	44		X	59.34	4.60	9.81	22.83	0.7	0	0	0.7
82	41	42		X	78.67	9.60	8.82	11.52	0	1.0	0.5	1.5
83	41	44		X	115.54	7.63	10.71	9.16	0	1.0	0.5	1.5
84	42	43		X	115.54	7.63	10.71	9.16	0	1.0	0.5	1.5
85	43	44		X	82.76	11.76	9.07	14.11	0	1.0	0.5	1.5
86	43	45		X	20.75	9.00	4.19	10.80	0.84	1.0	0.5	2.34
87	44	45		X	32.78	9.03	4.98	10.84	0.84	1.0	0.5	2.34

Table 6.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses

B. Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2452(ft^2)
Break location : Volume number 39

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
0.0	0	1114.35
0.1	1256.17	1114.35
0.2	1326.07	1113.96
0.3	1275.48	1113.53
0.4	1240.16	1113.23
0.5	1233.33	1113.28
0.6	1226.4	1113.31
0.7	1221.06	1113.53
0.8	1216.62	1113.85
0.9	1210.88	1114.24
1.0	1205.73	1114.69
1.1	1200.24	1115.16
1.2	1194.76	1115.67
1.3	1189.36	1116.2
1.4	1229.29	1117.89
1.5	1231.69	1118.88
1.6	1194.66	1118.09
1.7	1191.56	1118.22
1.8	1181.79	1118.34
1.9	1180.8	1118.76
2.0	1174.85	1119.06
2.1	1167.41	1119.31
2.2	1172.98	1120.04
2.3	1154.24	1120.08
2.4	1156.23	1120.82
2.5	1148.86	1121.33
2.6	1144.06	1121.92
2.7	1138.77	1122.5
2.8	1133.07	1123.08
2.9	1126.84	1123.64
3.0	1120.88	1124.24
3.1	1113.96	1124.84
3.2	1107.65	1125.49
3.3	1101.38	1126.17
3.4	1095.26	1126.88
3.5	1089.52	1127.61
3.6	1084.04	1128.37
3.7	1078.77	1129.13
3.8	1073.75	1129.88
3.9	1068.86	1130.62
4.0	1064.09	1131.33
4.1	1059.46	1132.01

Table 6.4-6 Mass and Release Rates for Pressurizer Compartment Peak Pressure Analyses

B. Break Type : Pressurizer relief line(8B) guillotine break
Break Area : 0.2452(ft^2)
Break location : Volume number 39

Time (s)	Mass Release Rate (lbm/s)	Enthalpy (BTU/lbm)
4.2	1054.95	1132.66
4.3	1050.55	1133.28
4.4	1046.25	1133.88
4.5	1042.04	1134.45
4.6	1037.91	1135
4.7	1033.85	1135.53
4.8	1029.86	1136.04
4.9	1025.92	1136.53
5.0	1022.04	1137.02

Table 6.4-7 Pressurizer compartment Nodal Description (nodalization sensitivity study)

C. Break Type : Pressurizer spray line(6B) guillotine break

Break Area : 0.14674(ft^2)

Break location : Volume number 3

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'	7.67	1609	120	14.696	0	6.60	14	52.9
2	EL=66"-1	10.00	2186	120	14.696	0	6.65	14	52.5
3	EL=76"-1' (grating floor)	6.83	1525	120	14.696	0	6.52	14	53.4
4	EL=82"-11	6.83	1525	120	14.696	0	6.56	14	53.1
5	EL=89"-9' (grating floor)	6.83	1525	120	14.696	0	6.39	14	54.4
6	EL=96"-7'	6.83	1525	120	14.696	0	6.34	14	54.7
7	EL=103"-5' (grating floor)	8.92	1969	120	14.696	0	6.10	14	56.4
8	EL=112"-4'	4.33	1338	120	14.696	0	6.17	14	55.9
9	EL=116"-8' (grating floor)	5.80	1791	120	14.696	0	6.14	14	56.2
10	Top of Pressurizer; EL=122''-5.6'	5.37	1868	120	14.696	0	6.11	14	56.4
11	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	3597	120	14.696	0	6.05	14	56.8
12	Containment atmosphere	120.0	2861000	120	14.696	0	-	-	-

Table 6.4-8 Pressurizer compartment Vent path description (nodalization sensitivity study)

C. Break Type : Pressurizer spray line(6B) guillotine break

Break Area : 0.14674(ft^2)

Break location : Volume number 3

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	1	12	X		19.75	14.97	4.12	17.96	0.45	1.0	0.5	1.95
2	1	2		X	236.91	8.83	9.86	10.60	0	0	0	0.0
3	2	3		X	142.15	5.09	9.86	23.88	0.7	0	0	0.7
4	3	4		X	236.91	6.84	9.86	8.21	0	0	0	0.0
5	4	5		X	142.15	4.15	9.86	21.99	0.7	0	0	0.7
6	5	6		X	236.91	6.84	9.86	8.21	0	0	0	0.0
7	6	7		X	142.15	4.77	9.86	23.24	0.7	0	0	0.7
8	7	8		X	236.91	6.63	9.86	7.96	0	1.0	0	1.0
9	8	9		X	185.16	3.08	11.94	22.80	0.7	0	0	0.7
10	9	10		X	308.60	5.58	11.94	6.70	0	1.0	0	1.0
11	10	11		X	222.69	4.60	19.70	36.78	0.7	0	0	0.7
12	11	12		X	32.78	14.91	4.98	17.89	0.84	1.0	0.5	2.34
13	11	12		X	20.75	14.88	4.19	17.86	0.84	1.0	0.5	2.34

Table 6.4-9 Pressurizer compartment Nodal Description (nodalization sensitivity study)
C. Break Type : Pressurizer relief line(8B) guillotine break
Break Area :
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'	7.67	1609	120	14.696	0	2.64	14	81.1
2	EL=66"-1	10.00	2186	120	14.696	0	2.63	14	81.2
3	EL=76"-1' (grating floor)	6.83	1525	120	14.696	0	2.62	14	81.3
4	EL=82"-11	6.83	1525	120	14.696	0	2.60	14	81.4
5	EL=89"-9' (grating floor)	6.83	1525	120	14.696	0	2.60	14	81.5
6	EL=96"-7'	6.83	1525	120	14.696	0	2.57	14	81.7
7	EL=103"-5' (grating floor)	8.92	1969	120	14.696	0	2.58	14	81.6
8	EL=112"-4'	4.33	1338	120	14.696	0	2.58	14	81.6
9	EL=116"-8' (grating floor)	5.80	1791	120	14.696	0	2.58	14	81.6
10	Top of Pressurizer; EL=122''-5.6'	5.37	1868	120	14.696	0	2.58	14	81.6
11	Top of Pressurizer compartment; EL=127''-10' (grating floor)	9.83	3597	120	14.696	0	2.54	14	81.9
12	Containment atmosphere	120.0	2861000	120	14.696	0	-	-	-

Table 6.4-10 Pressurizer compartment Vent Path Description (nodalization sensitivity study)
C. Break Type : Pressurizer relief line(8B) guillotine break
Break Area :
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	1	12		X	19.75	14.97	4.12	17.96	0.45	1.0	0.5	1.95
2	1	2		X	236.91	8.83	9.86	10.60	0	0	0	0.0
3	2	3		X	142.15	5.09	9.86	23.88	0.7	0	0	0.7
4	3	4		X	236.91	6.84	9.86	8.21	0	0	0	0.0
5	4	5		X	142.15	4.15	9.86	21.99	0.7	0	0	0.7
6	5	6		X	236.91	6.84	9.86	8.21	0	0	0	0.0
7	6	7		X	142.15	4.77	9.86	23.24	0.7	0	0	0.7
8	7	8		X	236.91	6.63	9.86	7.96	0	1.0	0	1.0
9	8	9		X	185.16	3.08	11.94	22.80	0.7	0	0	0.7
10	9	10		X	308.60	5.58	11.94	6.70	0	1.0	0	1.0
11	10	11		X	222.69	4.60	19.70	36.78	0.7	0	0	0.7
12	11	12		X	32.78	14.91	4.98	17.89	0.84	1.0	0.5	2.34
13	11	12		X	20.75	14.88	4.19	17.86	0.84	1.0	0.5	2.34

Figure 6.4-1 Nodalization scheme for pressurizer compartment analysis

Figure 6.4-2 Nodalization scheme for pressurizer compartment analysis

Figure 6.4-3 Nodalization scheme for pressurizer compartment analysis

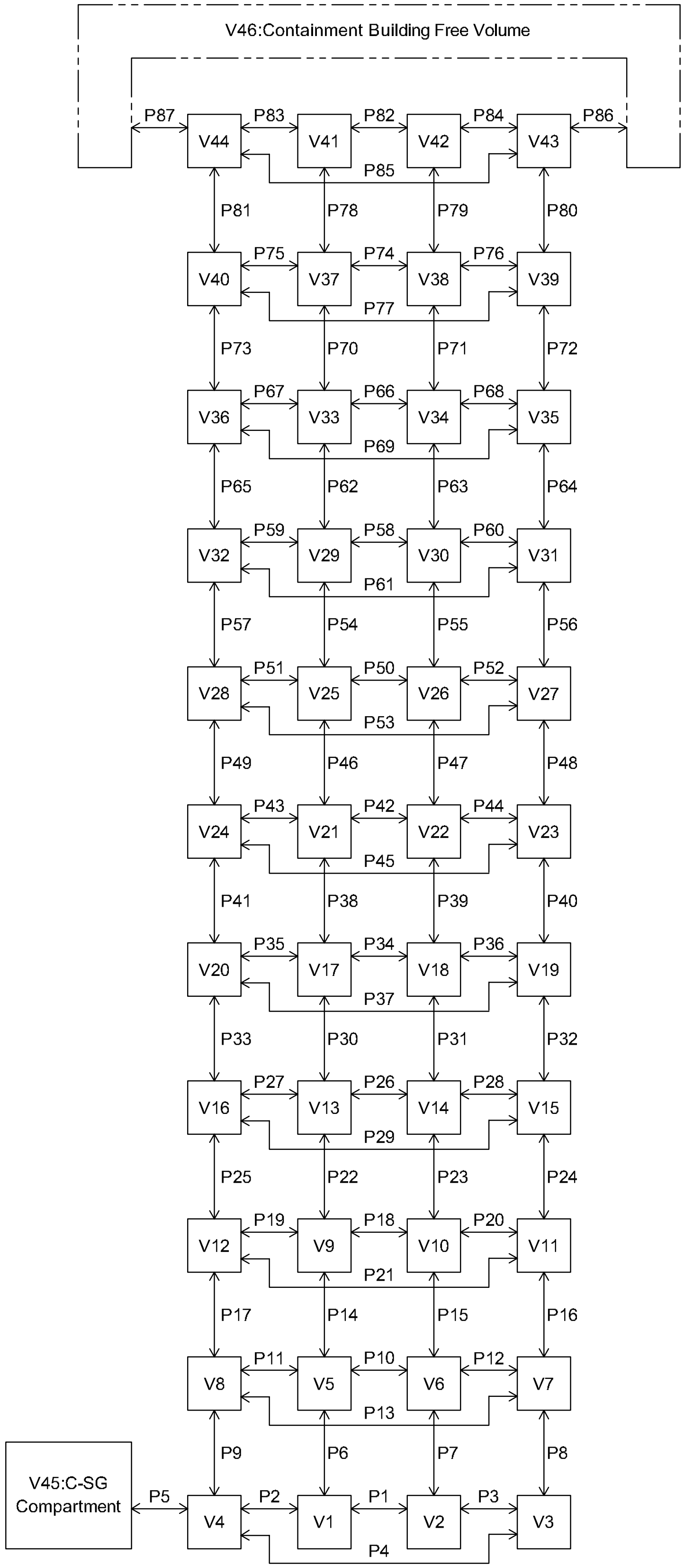


Figure 6.4-4 Nodalization Diagram for Pressurizer Compartment Analysis

Figure 6.4-5 Nodalization scheme for pressurizer compartment sensitivity analysis about nodalization

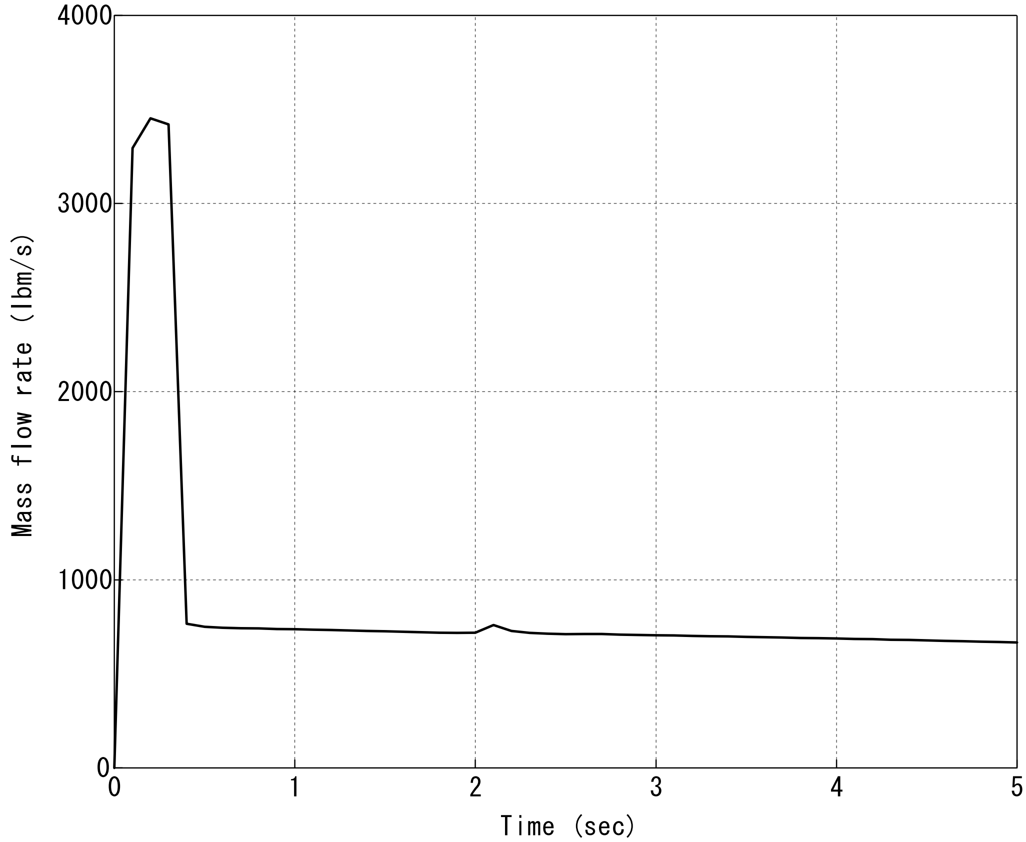


Figure 6.4-6 Short term mass and energy release data for pressurizer compartment
Pressurizer spray line break (pressurizer side) (1/2)

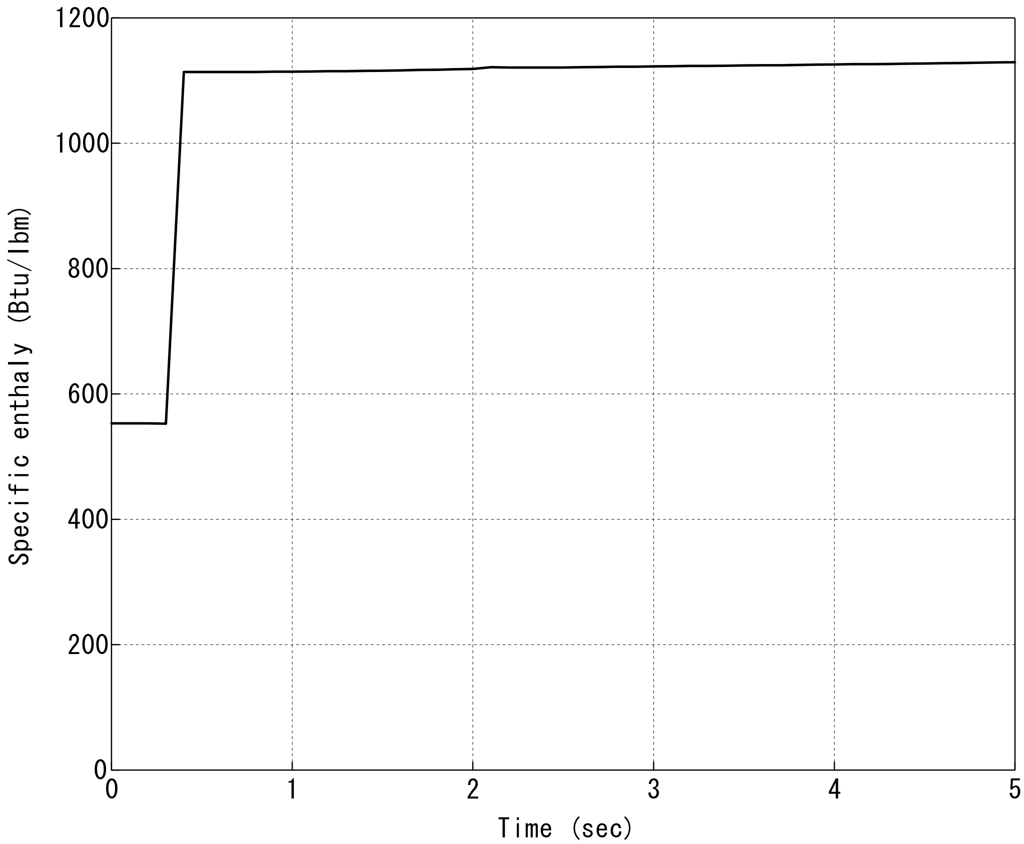


Figure 6.4-7 Short term mass and energy release data for pressurizer compartment
Pressurizer spray line break (pressurizer side) (2/2)

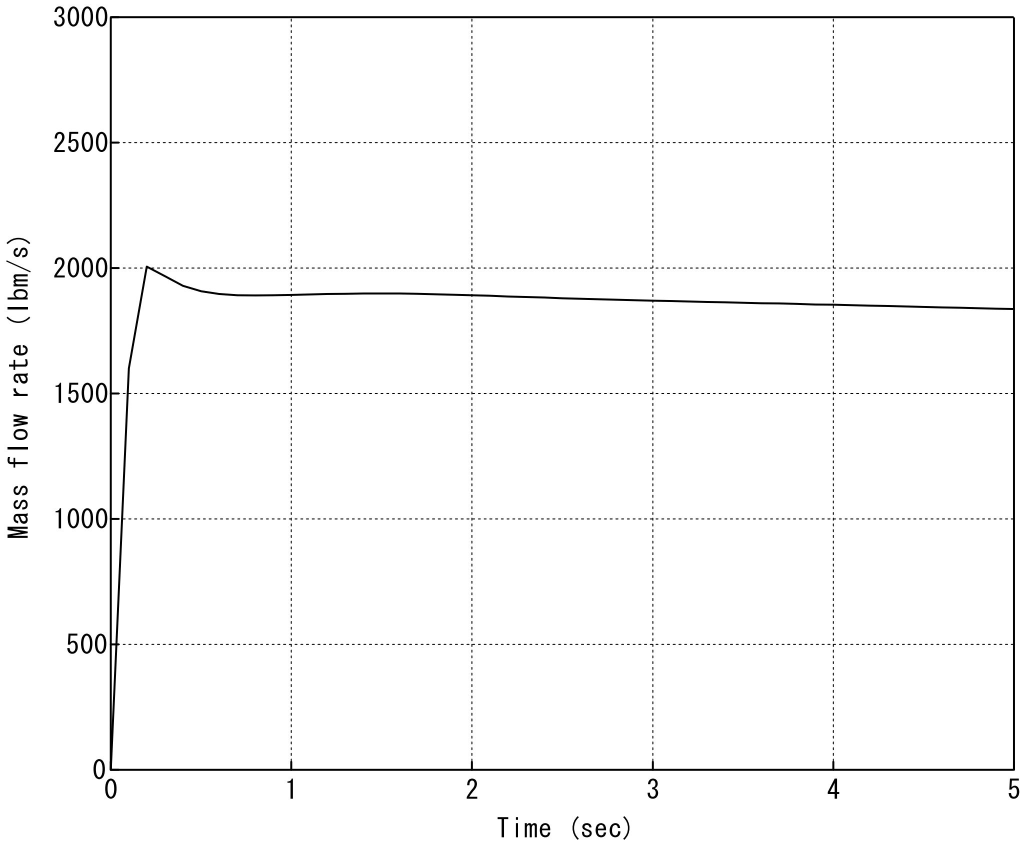


Figure 6.4-8 Short term mass and energy release data for pressurizer compartment
Pressurizer spray line break (cold leg side) (1/2)

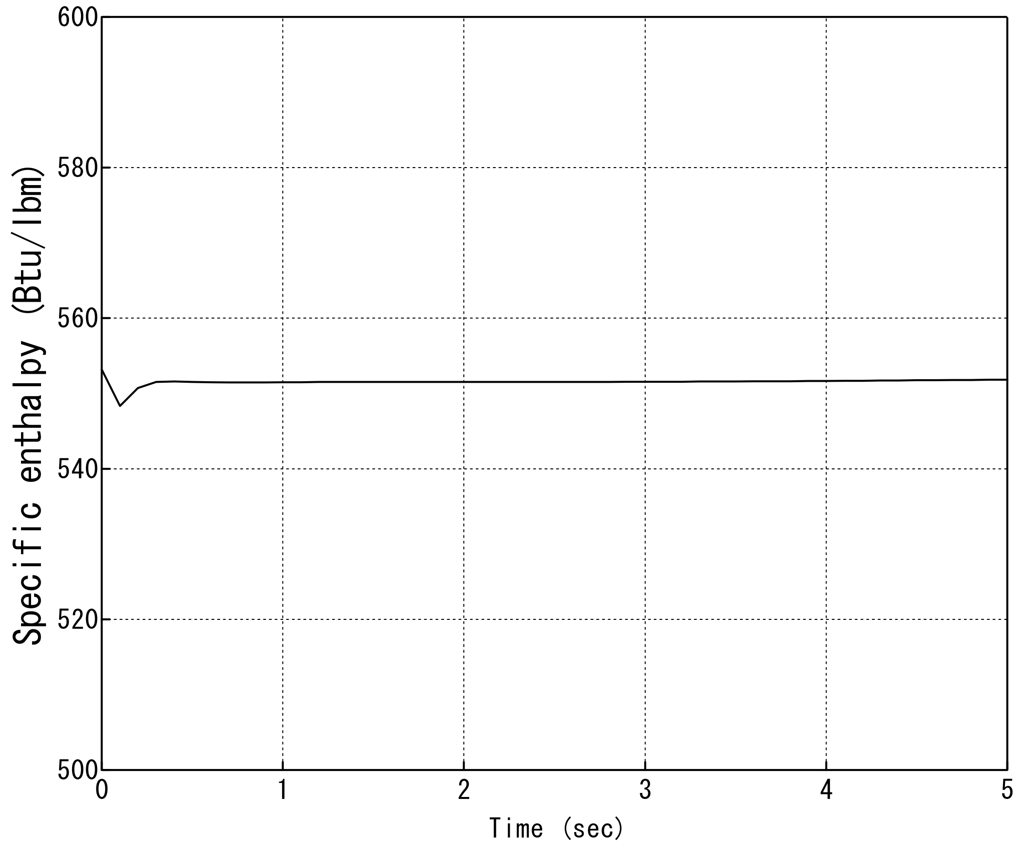


Figure 6.4-9 Short term mass and energy release data for pressurizer compartment
Pressurizer spray line break (cold leg side) (2/2)

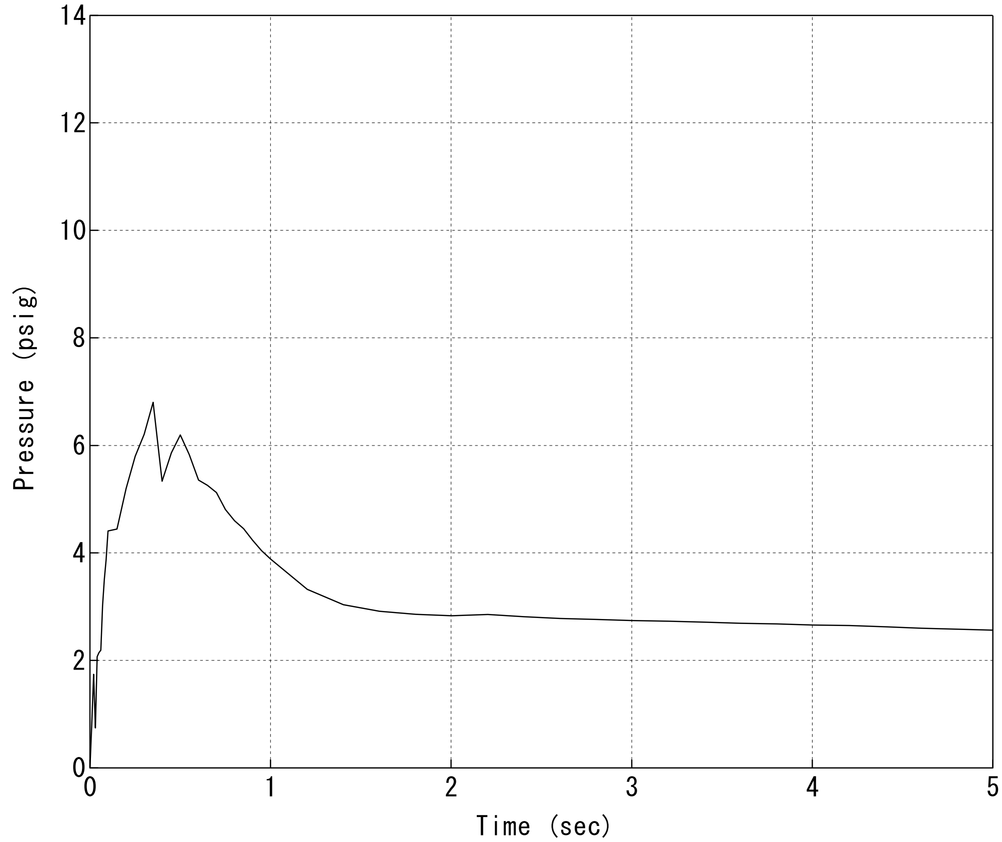


Figure 6.4-10 Pressure transient at the peak pressure node (V3) in pressurizer compartment (Pressurizer spray line break)

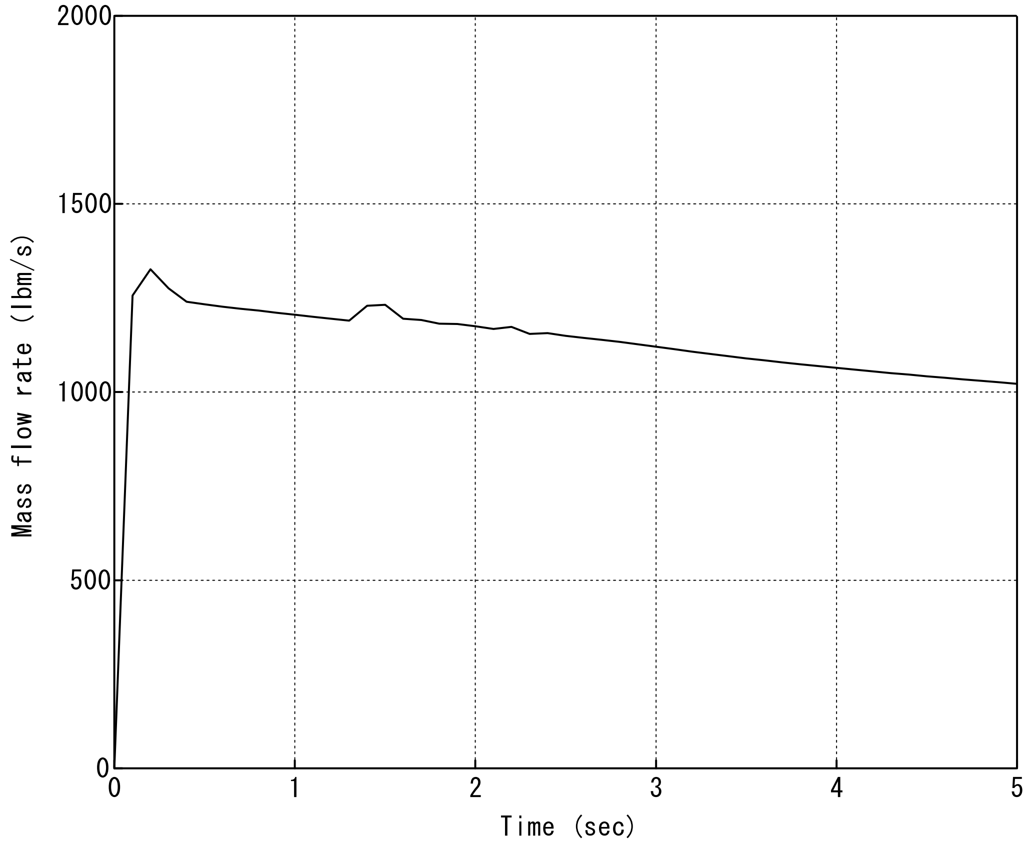


Figure 6.4-11 Short term mass and energy release data for pressurizer compartment
Pressurizer relief line break (1/2)

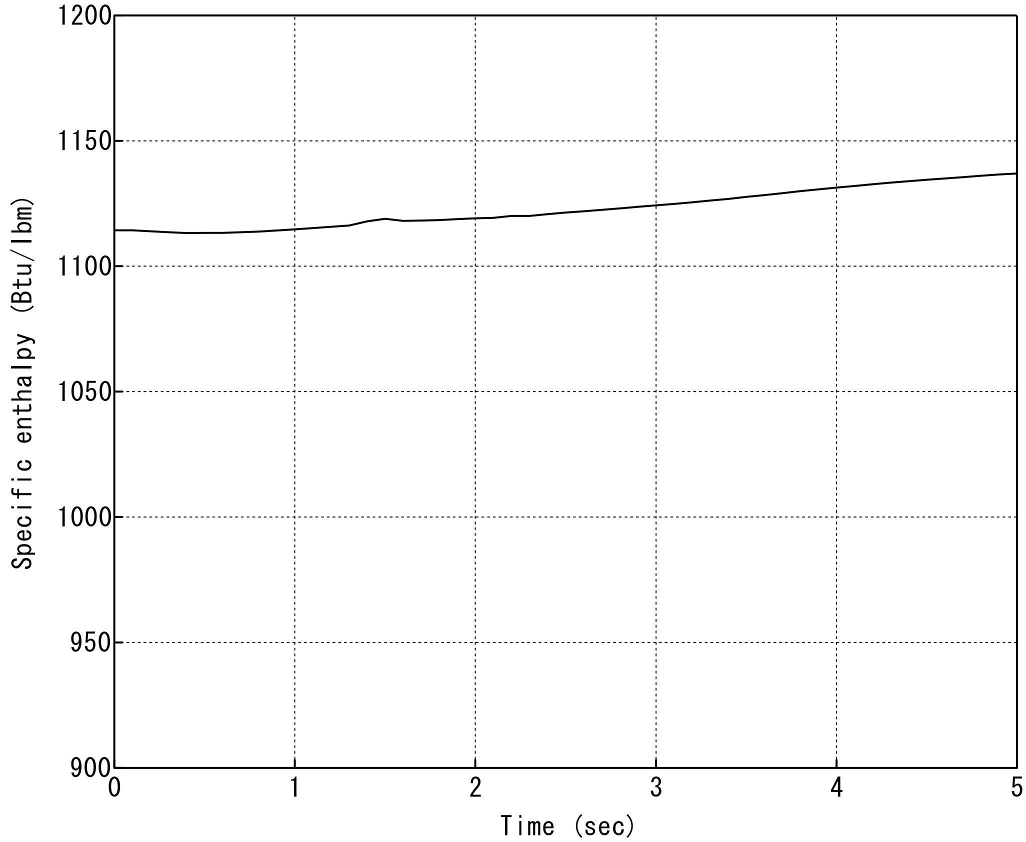


Figure 6.4-12 Short term mass and energy release data for pressurizer compartment
Pressurizer relief line break (2/2)

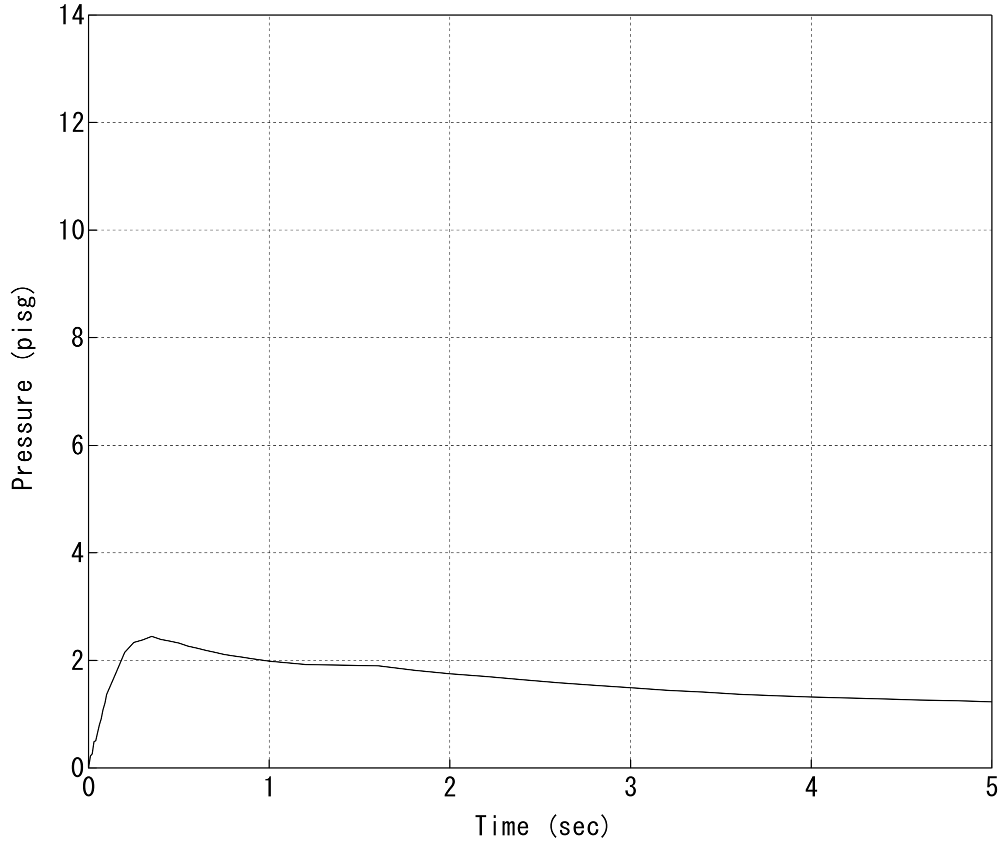


Figure 6.4-13 Pressure transient at the peak pressure node (V39) in pressurizer compartment (Pressurizer relief line break)

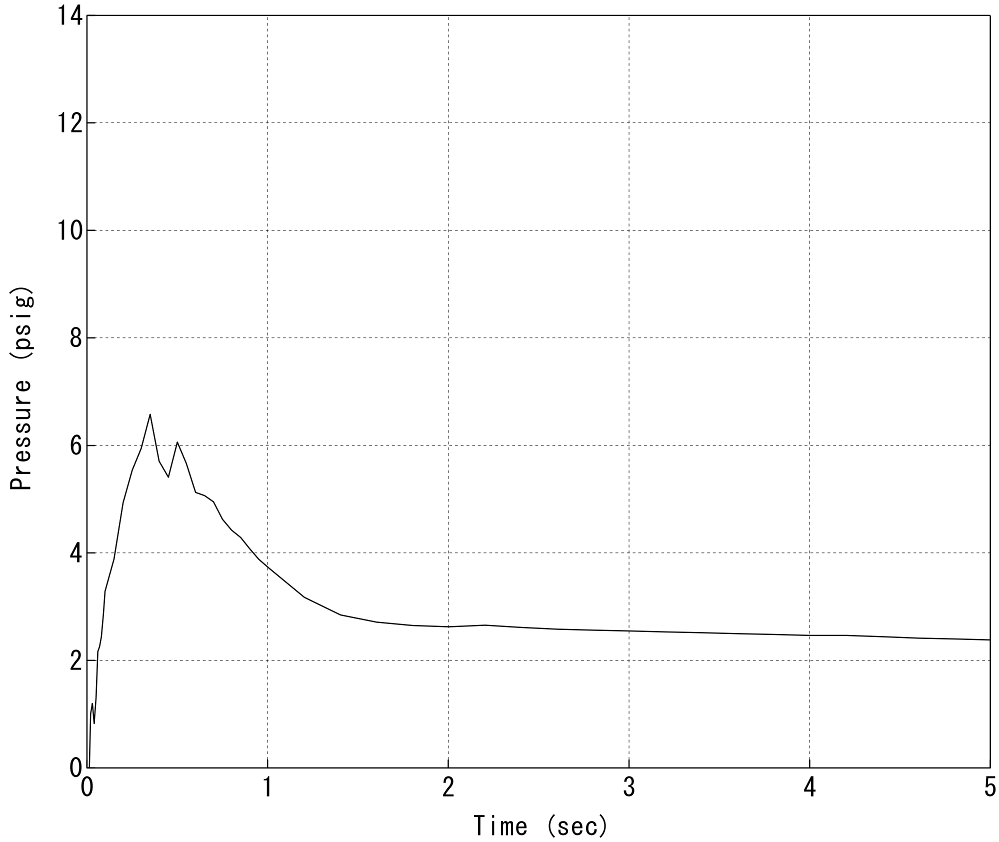


Figure 6.4-14 Pressure transient at the break node in sensitivity study about nodalization (Pressurizer spray line break)

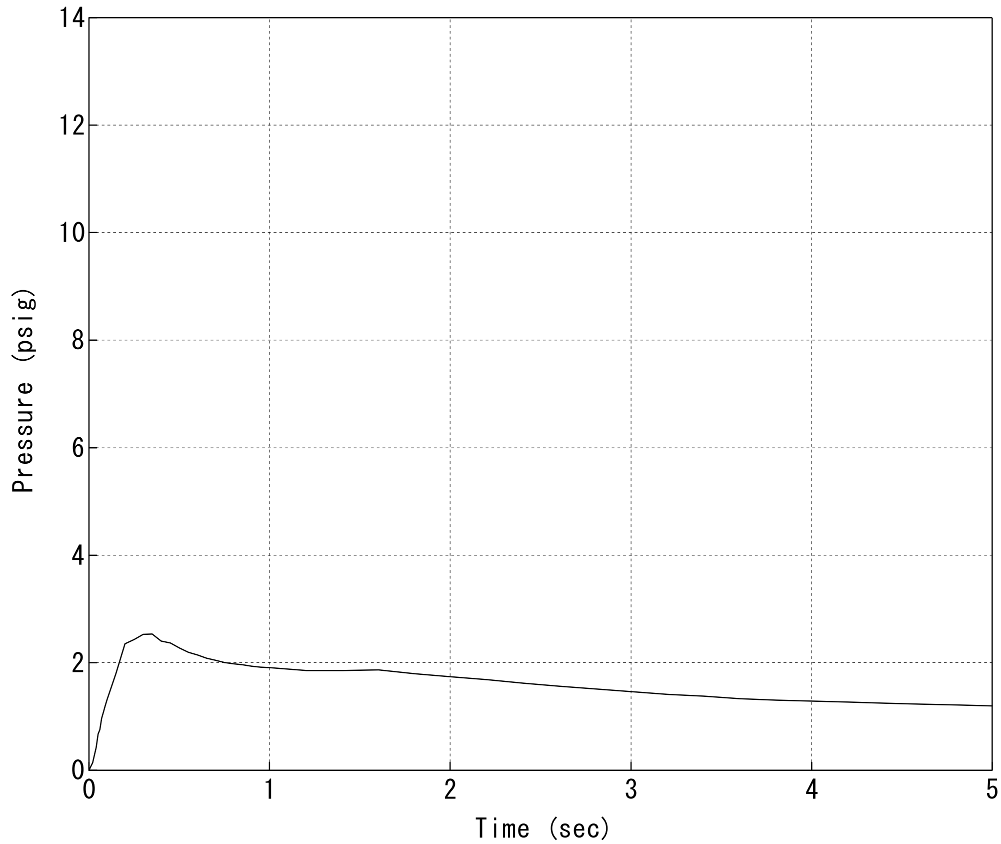


Figure 6.4-15 Pressure transient at the break node in sensitivity study about nodalization (Pressurizer relief line break)

7.0 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.

8.0 References

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