



# International Agreement Report

## Assessment of RELAP5/MOD3.2 With the Semiscale Natural Circulation Experiment, S-NC-8B

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## Abstract

The predictability of RELAP5/MOD3.2 code is assessed for the natural circulation induced by small break loss of coolant accident in the pressurized water reactor by using Semiscale experiment S-NC-8B. The major thermal-hydraulic phenomena observed in the experiment are investigated to evaluate the code predictability for SBLOCA specific thermal-hydraulic phenomena. The Semiscale Mod-2A facility is modeled, as a base case, by using single core channel model. The base case calculation is executed, the result is compared with the experiment data and code predictability on the important thermal-hydraulic phenomena is discussed.

Sensitivity calculations are attempted to figure out the problems in base case prediction, and to find out the effects of two core channel model and ECCMIX component model on the improvement code predictability. The important thermal-hydraulic phenomena include system depressurization, break flow in saturated and stratified conditions, natural circulation in two-phase mode and reflux mode, loop seal behavior at crossover legs, and accumulator injection behavior. The base calculation shows the RELAP5/MOD3.2 can predict the overall thermal-hydraulic behavior such as system depressurization, with the exception of underprediction of saturated break flow, deviation of loop seal behavior, and resultant discrepancy in core thermal response. Two core channel model can improve the predictability on loop seal behavior.

ECCMIX component can improve an early accumulator injection behavior and core thermal response. However, discontinuous accumulator injection is one of the problems in two core channel model calculation. To resolve the accumulator injection problem, the extensive modeling study and/or code model improvement are needed.



## Executive Summary

This document describes an assessment of RELAP5/MOD3.2 code with the Semiscale experiment S-NC-8B. The S-NC-8B experiment simulated a small break loss-of-coolant accident (SBLOCA) without pumped emergency core cooling flow and with recovery procedure using steam generator feed-and-bleed and pressurizer power-operated-relief-valve. The natural circulation flow was a main cooldown mechanism before the recovery procedure.

To evaluate the code predictability for SBLOCA specific thermal-hydraulic phenomena, the major thermal-hydraulic phenomena observed in the experiment were firstly investigated. Those phenomena included the blowdown depressurization in subcooled mode and two-phase mode, the break flow in single, two-phase, and transitional regime, under stratified condition, the natural circulation in single, two-phase, and reflux mode, the loop seal formation and clearing, the associated core heat-up, etc.

The Semiscale Mod-2A facility was modeled as suitable for simulating the experiment, based on the available information on the design and test and on the existing experiences. In preparing the base case input, single core channel model, a stem leak model during steam generator isolation period, a realistic break model using motor valve, etc. were implemented.

The base case calculation was executed, the result was compared with the experiment data, and the code predictability on the important thermal-hydraulic phenomena was discussed. Sensitivity calculations were attempted to identify the problems in prediction, and to find out the effects of two core channel model (Case T01) and ECCMIX component model (Case E01) on the improvement of code predictability. The analysis result are summarized as follows :

- 1) System depressurization, break flow in saturated and stratified condition, loop seal behavior, natural circulation in two-phase mode and reflux mode, core thermal response, and accumulator injection behavior were selected as the important thermal-hydraulic phenomena in this assessment.
- 2) As a base case, one RELAP5 calculation input was developed with adopting single core channel model, steam leak model, etc. And for investigating nodalization sensitivity, additional two RELAP5 calculation input were developed using two core channel model

and ECCMIX component model, respectively.

- 3) RELAP5/MOD3.2 can predict well the overall thermal-hydraulic behavior such as system depressurization and natural circulation through the loops during S-NC-8B experiment, using base case modeling. However, some discrepancies were observed in underprediction of saturated break flow, deviation of loop seal behavior, and resultant discrepancy in core thermal response.
- 4) Two core channel model can improve, especially, loop seal behavior and resultant core thermal response. However, it was found that discontinuous accumulator injection was yet one of the most challengible problem in two core channel model calculation.
- 5) ECCMIX component, to some extent, can also improve an early accumulator injection behavior and core thermal response. However, it cannot basically resolve the accumulator injection problem in this slowly-depressurizing transient.
- 6) Based on the base case calculation and sensitivity study, the current RELAP5/MOD3.2 code with two core channel model and ECCMIX component model has a capability to predict SBLOCA specific phenomena with some consideration on modeling. However, accumulator injection problem should be resolved through the extensive modeling study and/or code model improvement.

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## I. Introduction

The RELAP5/MOD3 [1] code has been extensively used for various areas in reactor safety research since it was developed under the auspices of United States Nuclear Regulatory Commission (USNRC) and by the international effort through the International Code Assessments and Applications Program (ICAP) and Code Applications and Maintenance Program (CAMP). Korea, as one of the CAMP member countries since August 1993, has a responsibility to conduct and report code assessments, as specified in the Agreement on CAMP between USNRC and Korea Institute of Nuclear Safety (KINS).

This report describes an RELAP5 code assessment conducted in KINS, as an in-kind contribution in accordance with the Agreement. The RELAP5/MOD3.2 [2] code was assessed by using the Experiment S-NC-8B [3] of the Semiscale Mod-2A facility [4].

The RELAP5/MOD3.2 code was developed by Idaho National Engineering Laboratory (INEL) and released to CAMP member countries in 1994. It is reported that the RELAP5/MOD3.2 was improved in some thermal-hydraulic(TH) models including condensation model, when compared to the previous versions of RELAP5/MOD3 [5]. It is, however, likely that, the up-to-date validations of the current RELAP5/MOD3.2 were not sufficient to confirm the reliability of the code. And it is still questionable that the major problems reported for the previous version of code are resolved during the development of the current code.

The present study aims to assess the capability of RELAP5/MOD3.2 in predicting the major TH phenomena specific to Small Break Loss-Of-Coolant-Accident (SBLOCA) in pressurized water reactor (PWR), using the S-NC-8B experiment.

The experiment S-NC-8B was conducted at the Semiscale facility to simulate a transient natural circulation induced by 0.4 % equivalent SBLOCA at decay heat power level. Besides natural circulation, the various TH phenomena such as heat removal by steam generator (SG) feed-and-bleed operation and cooldown of primary system by opening pressurizer power operated relief valve (PORV), were observed, which might be occurred at typical PWR in this kind of accident. Since there were so many complicated TH phenomena observed in the experiment [3], the important TH phenomena to be focused in this study were defined. Those phenomena included the blowdown depressurization in subcooled and two-phase

mode, the break flow in single-phase, two-phase, and transitional regime under stratified flow condition, the natural circulation in single-phase, two-phase, and reflux mode, the loop seal formation and clearing, the associated core heat-up, and the effect of accumulator injection. The code predictability will be discussed for the selected TH phenomena.

The S-NC-8B experiment has ever been simulated with RELAP5/MOD1 by Wong and Kmetyk [6] and Loomis and Kulberg [2]. The predictions in both simulations were limited to 2000 sec from the initiation of the test. Therefore, the code predictability could not be evaluated for the major thermal-hydraulic phenomena after 2000 sec such as loop seal clearing, core heat-up and quenching, accumulator behavior, etc. In this study, the prediction on those phenomena was also discussed.

A RELAP5 input model from Wong and Kmetyk's study [6] was adopted in this study as a base case, which employed a single core channel model. And then some modifications were made to the input deck, which included a steam leak model incorporation, which was discussed in Kmetyk's study [6], a realistic break model using motor valve, etc., as well as changes for RELAP5/MOD3 syntax.

Sensitivity calculations are attempted to figure out the problems in base case prediction, and to find out the effects of two core channel model (Case T01) and ECCMIX component model (Case E01) on the improvement of code predictability.

The Chapter II of this document includes the description of the Semiscale Mod-2A facility and S-NC-8B experiment. The modeling of the facility and experiment sequence were described in Chapter III. The Chapter IV was devoted to present and discuss the results from the base calculation and sensitivity study. The run statistics was also described in Chapter IV. The conclusions obtained through the present study were summarized in Chapter V. The Appendix to this document contain RELAP5 input listings for the cases calculated in this assessment.

## II. Description on Facility and Experiment

### II.1 Facility Description

The Semiscale Mod-2A facility was an experimental facility with a volume-scale of  $1/1600$  relative to a typical Westinghouse type four loop PWR [4]. Overall configuration was shown in Figure 1. The system incorporates the major components of a PWR including steam generators, vessel, pumps, pressurizer and loop piping. One loop (intact loop) is scaled to simulate the three intact loops in a PWR, while the other (broken loop) simulate the single loop which a break is assumed to occur. Geometric similarity has been maintained between a PWR and the facility, most notably in the design of a full length ( $3.66\text{ m}$ ) electrically heated core with 25 rods, full length upper head and upper plenum, component layout, and relative elevations of various components. The scaling philosophy followed in the design of Mod-2A system preserves most of the first order effects considered important to small break loss of coolant accident (SBLOCA). To achieve this philosophy, the  $1:1$  elevation scaling of the system was kept in the design, which is an important criterion preserving the factors influencing natural circulation phenomena.

The important features Semiscale Mod-2A facility for the natural circulation (NC) tests are as follows :

- 1) The broken loop pump was installed, but it was used only for heat-up purpose and the pump rotor was locked during test.
- 2) Normally, the Semiscale Mod-2A system includes an intact loop pump; however, this was removed and replaced with a special instrument spool piece. This spool piece was orificed to represent the scaled hydraulic resistance of a PWR primary pump in the locked rotor situation.
- 3) The vessel was modified from the normal Mod-2A configuration for the test S-NC-8 by removing the vessel upper head. A bypass line between the upper plenum and downcomer was installed with the properly scaled hydraulic resistance. This was necessary to ensure a uniform heat-up of the entire system and to avoid condensation on upper head structures.
- 4) The vessel core consists of a  $5 \times 5$  array of internally heated electric rods, 23 of which were equally powered. The heated length and outer diameter of the rods were  $3.66\text{ m}$  and  $1.072\text{ cm}$ , respectively.

- 5) The broken loop also contains a break assembly that is designed to simulate a centerline break. It includes an orifice plate which provides a break area of  $0.009 \text{ cm}^2$  (0.4 % break).
- 6) The intact loop steam generator has two short, two medium and two long tubes representative of the range of bend elevations in a typical PWR steam generator. For the volume scaling of the secondary side, the arrangement of tubes were designed to be "off-center."
- 7) The broken loop steam generator has a long tube and a short tube. The tube stock is  $2.22 \text{ cm}$  OD,  $0.124 \text{ cm}$  thickness wall and tube spacing is  $3.175 \text{ cm}$  triangular pitch, which was identical to a typical PWR.
- 8) Elevations of steam generator nozzles, plenum and tubes are similar to those of a PWR; however, the steam dome is shorter than PWR steam dome.
- 9) External heaters were installed on vessel and loop piping to compensate environmental heat loss and controlled to maintain fluid temperature.
- 10) For measuring the unique characteristics such as low flow in natural circulation test, turbine meters and drag screen were ranged as low as reasonably possible. And several thermocouples was provided to instrument extensively the steam generators both of the intact loop and the broken loop.

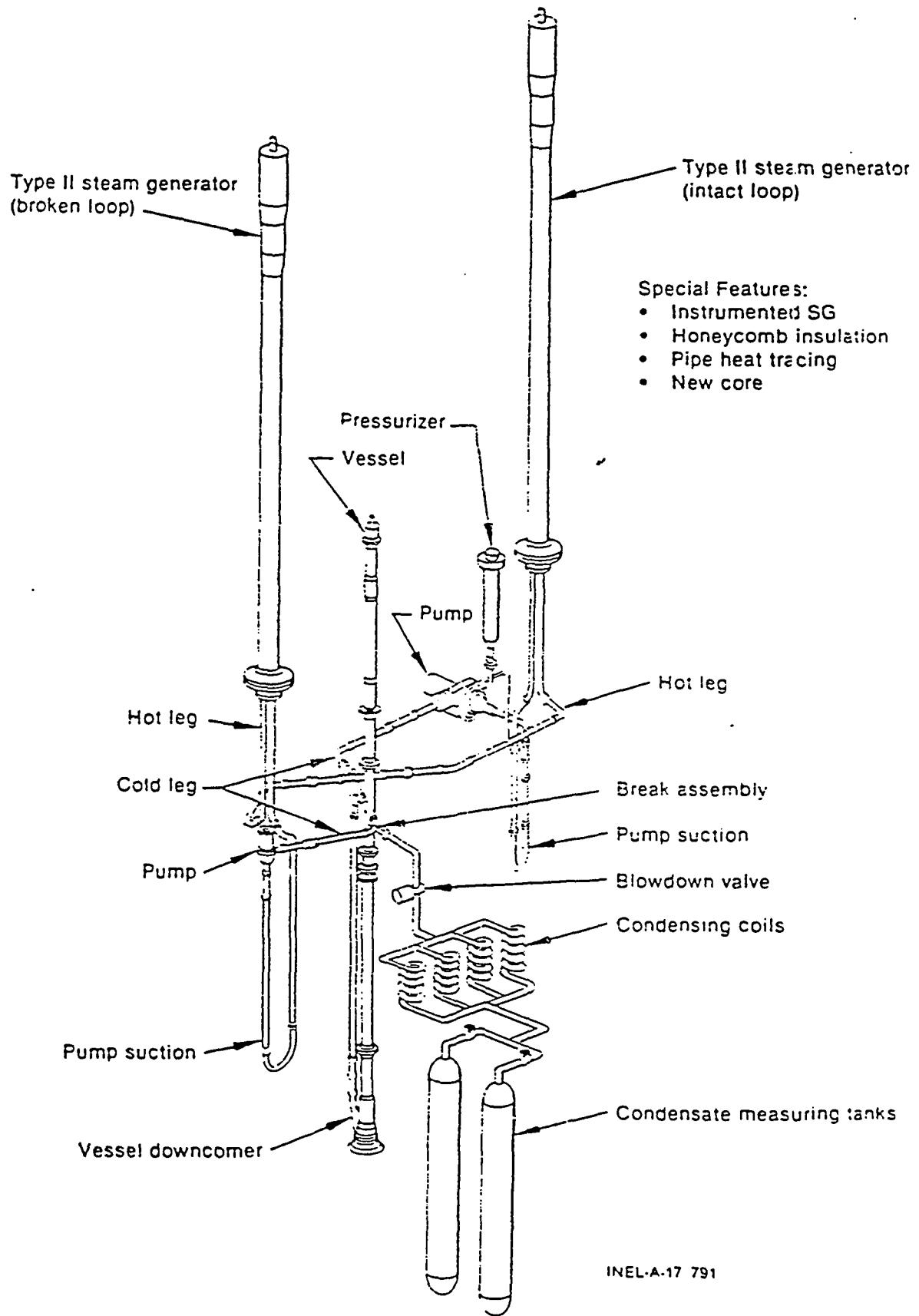


Figure 1 Configuration of Semiscale Mod-2A Facility

## II.2 Experiment Description

The primary objective of the Natural Circulation test series in the Semiscale Mod-2A facility is to provide data that can be used to develop and assess computer models, which are to be used to predict SBLOCA or operational transients involving loss of primary pumping. To achieve this objective, both steady-state, separate effects type experiments and transient small break experiments have been performed.

The experiment S-NC-8B was one of the experiments simulating transient natural circulation during the ultra small break accident. Two independent experiments, S-NC-8A and S-NC-8B were conducted under the single experiment entitled by S-NC-8. Both tests were designed to provide data on natural circulation during a SBLOCA transient without pumped emergency core cooling (ECC) flow (high pressure injection and low pressure injection). The primary difference between two tests is core recovery procedure. The recovery procedure during test S-NC-8A included steam generator (SG) bleed, accumulator injection, and primary coolant vent through power operated relief valve (PORV), while the S-NC-8B experiment included SG auxiliary feed and bleed, accumulator injection, and primary coolant vent through PORV as a recovery procedure.

Prior to initiation of test S-NC-8B, the Semiscale Mod-2A system was filled with pressurized water. The system was heated using core power. Natural circulation flow was used to establish the thermal-hydraulic initial condition of the system specified in reference [7]. Initial conditions are listed in Table 1. The core differential temperature was similar to conditions which would be obtained with the full-scaled 2 MW core power and pumped flow. Since the initial flow rate was lower than for a pumped flow case, the core power was much lower initially to achieve the required core differential temperature, i.e., 95 kW, as shown in Table 1. Figure 2 shows core axial power distribution in S-NC-8B test.

Test was initiated by blowdowning the system through the blowdown valve downstream of the break orifice. Table 2 contains the sequence of events for the test. At the time when the primary system pressure reduced to 12.5 MPa, the reactor scram occurred (low pressure trip). As mentioned above, since the initial core power was much lower than 2 MW, this initial value of the power was allowed to remain after scram until it intersected the nominal 2 MW power decay curve, and then the normal 2 MW decay power curve was followed. At the reactor trip, the steam generator steam valves were closed.

As a result of blowdown, the primary system experienced a rapid subcooled depressurization for about 200 sec after transient, and then a much slower saturated depressurization. The core was gradually uncovered since no high pressure ECC water was injected into the core.

Following core uncovery and heat-up, an attempt was made to reduce the system pressure to low pressure safety injection (LPSI) setpoint. At 2100 sec, SG steam valves was opened and SG auxiliary feedwater injection was initiated. Those recovery action reduced the system pressure to the accumulator injection setpoint (4.2 MPa) at 2460 sec. The core heat-up and uncovery were terminated by accumulator water.

To increase the depressurization rate such that the LPSI setpoint could be achieved earlier the PORV valve was opened at 7550 sec. This operation discharged out the primary coolant, as a result, the core collapsed level was decreased and the second core heat-up was observed. The PORV was closed and SG secondary "dump and fill" was started at 8098 sec to prevent the core heat-up. Due to this operation the core heat-up was stopped and temperature was dropped. At 10700 sec, the core power was tripped and the test was terminated.

Table 1 Initial Conditions for Experiment S-NC-8B

<i>Parameters</i>	<i>Experiment</i>	<i>Calculated (Base Case)</i>
Pressurizer Pressure (MPa)	$15.4 \pm 0.1$	15.41
Core Power (kW)	$95.0 \pm 1.0$	95.0
Intact Loop Hot Leg Temperature (K)	$581 \pm 2.0$	580.6
Intact Loop Cold Leg Temperature (K)	$545.0 \pm 2.0$	547.7
Broken Loop Hot Leg Temperature (K)	$580.0 \pm 2.0$	580.6
Broken Loop Cold Leg Temperature (K)	$538 \pm 2.0$	547.9
Intact Loop Mass Flow Rate (kg/s)	$0.396 \pm 0.05$	0.4158
Broken Loop Mass Flow Rate (kg/s)	$0.121 \pm 0.05$	0.1313
Vessel Downcomer Mass Flow Rate (kg/s)	$0.532 \pm 0.3$	0.590
Pressurizer Liquid Volume (m <sup>3</sup> )	0.0215	0.0214
Intact Loop SG Steam Pressure (MPa)	$5.85 \pm 0.1$	5.85
Broken Loop SG Steam pressure (MPa)	$5.89 \pm 0.1$	5.88
Intact Loop SG Liquid Level (m)	$10.74 \pm 0.1$	10.533
Broke Loop SG Liquid Level (m)	$10.94 \pm 0.1$	10.649

Table 2. Timing of Events and Phenomena for Experiment S-NC-8B

<i>Event</i>	<i>Experiment</i>	<i>Calculated (Base Case)</i>
Blowdown Initiation *	0 sec	0 sec
High Pressure Trip (12.5 MPa) *	103	103
SG Steam Valves Closed *	117	117
Core Power Starts to Decay *	131	131
Hot Leg Flashing	175	220
Vessel Level Reached Hot Leg, 2-φ NC Begin	280	270
Peak 2-φ Natural Circulation Flow at Intact Loop	340	320
Cold Leg Flashing	400	400
Peak 2-φ Natural Circulation Flow at Broken Loop	640	490
First Break Uncovery (visual)	824	---
Reflux in Intact Loop Steam Generator	825	655
Final Break Uncovery	1500	1305
Core Heat-up First Observed	1920	----
Steam Generator Feed-and-Bleed Begins *	2100	2100
Accumulator Setpoint Reached	2460	2500
First Broken Loop Seal Cleared Partially	2650	---
Second Broken Loop Seal Clearing, Core Quenched	3150	---
Broken Loop Accumulator Tank Depleted	3975	---
Intact Loop Accumulator Tank Depleted	4800	---
Calculation Termination	---	5000
Pressurizer PORV Opened	7550	
Second Heat-up Observed	8025	
PORV Closed	8098	
Start Fill and Dump of Steam Generators	8160	

Note \* : Described as Boundary Conditions

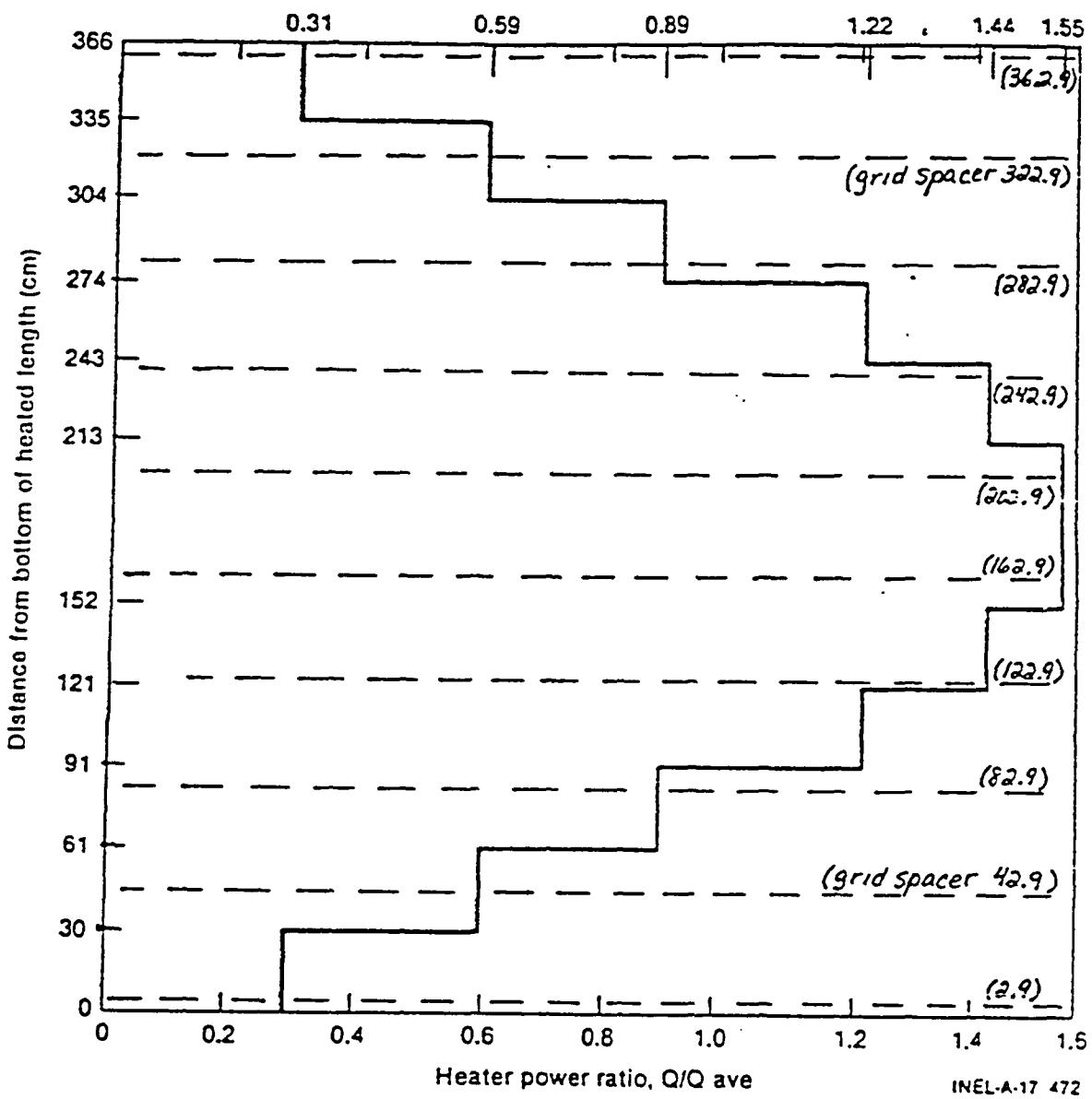


Figure 2 Axial Power Distribution of the Semiscale Mod-2A

## **II.3 Major Thermal-hydraulic Phenomena**

During the experiment S-NC-8B, the various thermal-hydraulic phenomena were observed at the various components of the facility, due to core decay heat, loss of primary inventory, various operations of safety equipment, etc. The document [3] addressed the important thermal-hydraulic phenomena, the causes for the various phenomena, and their influences during the test in detail. Since it is not possible to predict all the phenomena using the RELAP5 code, it is necessary to select and categorize the some important phenomena for assessment purpose. Thermal-hydraulic phenomena observed in the Experiment S-NC-8B are as follows :

### **1. System Depressurization**

- 1) Rapid subcooled depressurization
- 2) Increase in depressurization rate due to core decay heat curve
- 3) Hot leg saturation
- 4) Slower saturated blowdown due to hot leg flashing
- 5) Increase in depressurization rate due to the vessel level down to hot leg elevation
- 6) Cold leg flashing
- 7) Decrease in depressurization rate due to cold leg saturation
- 8) Increase in depressurization rate due to SG feed and bleed

### **2. Break Flow**

- 9) Single phase subcooled break flow
- 10) Saturated break flow under stratified condition
- 11) Uncovery of break

### **3. Natural Circulation**

- 12) Single phase natural circulation
- 13) Two-phase natural circulation flow behavior and peak natural circulation flow
- 14) Reflux condensation at SG and hot leg

### **4. Loop Seal Behavior**

- 15) Loop seal formation at intact loop and broken loop
- 16) Partial loop seal clearing at intact loop
- 17) Increase in liquid level at SG side loop seal of the intact loop due to SG feed-and-bleed operation
- 18) Manometric level decrease at SG side loop seal
- 19) First loop seal clearing at SG side of the broken loop

- 20) Re-buildup of vessel side loop seal at the broken loop due to the injected accumulator water

- 21) Second loop seal clearing at vessel side of the broken loop

#### 5. Core Heat-up

- 22) First core clad heat up due to core uncover

- 23) Decrease of heat-up rate due to the first loop seal blowout

- 24) Core clad quenching at the second loop seal blowout

- 25) Second core clad heat-up due to PORV opening

#### 6. Accumulator Injection Behavior

- 26) Condensation and mixing

#### 7. PORV open

- 27) Inventory redistribution

- 28) Second core heatup

Among the phenomena above, some individual phenomena can be discussed by using the calculation result, directly. However, since the causes and impacts of one phenomenon were linked to those of another phenomenon in complicated mechanism for the most thermal-hydraulic process, the predictability of individual phenomenon cannot be discussed separately, without discussing all the related processes simultaneously. Therefore, instead of a discussion on individual phenomenon, a discussion is provided on the globally-categorized phenomena as follows :

- 1) System depressurization
- 2) Break flow
- 3) Loop seal behavior
- 4) Natural circulation
- 5) Core thermal response
- 6) Accumulator injection behavior

### **III. Code and Modeling**

#### **III.1 Code Description**

A standard frozen version of RELAP5/MOD3.2 code without any modification was used for the present calculation. The version of code has been available for KINS since December 1995. The RELAP5/MOD3.2 code was developed by Idaho National Engineering Laboratory (INEL) under auspices of CAMP. The code was known to improve some deficiencies and errors from the previous version, RELAP5/MOD3.1, in wall condensation model, transport of non-condensable gas, level tracking model, crossflow model, choking model, etc. [5] :

#### **III.2 Modeling Description**

The RELAP5 modeling for simulation of the experiment S-NC-8B was shown in Figure 3. This nodalization represents the intact/broken loop piping, the broken loop pump, the reactor vessel, the steam generators at both the intact loop and the broken loop, the pressurizer, the intact/broken loop accumulators and ECCS (emergency core cooling system) piping, the pressurizer PORV, and the auxiliary feedwater line at intact/broken loop steam generators. This model is regarded as a base case, which was basically the same as one from Kmetyk's one [6]. For the base case calculation, the input deck developed by Sandia National Laboratory was modified to be worked with RELAP5/MOD3 and some corrections were made as follows :

- 1) Separator component was changed to work with RELAP5/MOD3 (volumes 203 and 703).
- 2) Initial conditions at steam dome were changed to be close to the experimental condition (volumes 207 and 707).
- 3) Initial conditions at pressurizer vessel were changed to be close to the experimental condition (volume 301)
- 4) Area of broken loop pump outlet junction was corrected to  $0.0009\ m^2$  for considering the correct geometry (volume 450).
- 5) Rod bundle interfacial drag options were specified at reactor vessel core (volumes 505 and 506).
- 6) Additional boundary condition input of left and right boundaries for all of the heat structures were changed to work with RELAP5/MOD3.

- 7) For heat structures representing the outer wall of steam generator vessel at broken loop, ambient temperature boundary conditions were changed to heat transfer coefficient (HTC) boundary conditions, which was to implement the same boundary conditions as intact loop (heat structures 7053 and 7054).
- 8) Steam leak from both steam generators at broken loop and at intact loop after closing the steam control valve was modeled (junctions 211 and 711).
- 9) Steam pressure boundary condition was corrected for realistic model (volumes 240 and 740).
- 10) Junction area and junction loss factor at upper head bypass line were changed to improve the calculation accuracy (junction 535).
- 11) Break model was changed from a trip valve to motor valve for considering the realistic valve opening behavior (junction 422)
- 12) Feedwater temperature was changed to maintain 330 K (volumes 206 and 706).
- 13) Pressure boundary condition at break downstream was changed for considering the experiment behavior (volume 499)
- 14) Standard (default) model options were used at each volume, junction, and heat structure.

The base case model contains 206 volumes, 206 junctions and 265 heat structures. The RELAP5 input deck for base case was listed in Appendix A. One of the important feature in this modeling is to establish the natural circulation flow path. There is no special modeling scheme deviated from the RELAP5 User Guideline [2].

Besides the base case model, additional two modeling schemes were attempted to improve the calculation predictability. One is to use two parallel flow channels for active core of reactor vessel (Figure 4) and another is to use ECCMIX component for ECCS injection volumes at intact loop and broken loop (Figure 5), as shown in Table 3.

Table 3 Comparison of Input Modes

Item\Run	B01	T01	E01
Description	Base case	Two core channel	ECCMIX testing
Reactor Vessel Core	single channel	double channel	double channel
ECCS injection point	branch	branch	ECCMIX
Others	same as Ref. [5]	same as B01	same as B01

### *Reactor Vessel*

The reactor vessel was modeled with external downcomer (volumes 531, 516, 517, 518 and 519), lower plenum (volumes 502, 503 and 504), lower head (volume 501), active core (volume 505), upper plenum (506, 507, 508, 509 and 510), upper head bypass line (volume 531 and junction 535), simulated guide tubes and support column (volumes 514 and 513). The active core was modeled by a single flow channel and the axial level of the core volumes selected to be same as the axial power profile shown in Figure 2, which is different from the location of the grid spacers in the core. This modeling scheme resulted in avoiding interpolation problems to determine power sources at each heat structure for fuel rods. Besides the core rod heat structures, additional heat structures are used to consider the most of the major vessel structures. Those are pressure vessel itself, the downcomer piping walls, the simulated guide tubes, support column and bypass line piping.

The upper head bypass line (Junction 535) plays an important role to provide a flow path between cold leg and hot leg. In the present calculation, the junction area and loss coefficient were selected to be  $1.62 \times 10^{-5} \text{ m}^2$  and 300.0, respectively.

The base case calculation result, which will be discussed at next chapter, revealed deviations in some thermal-hydraulic phenomena such as loop seal behavior. Since those phenomena may be dependent on steam generation behavior from the core, and steam pressure may be determined by flow in core, two core channel modeling was attempted to improve the calculation predictability (T01). In this case, active core was divided by two parallel channels which contains eight vertically stacked volumes (components 505 and 550). Each channel was connected by multiple junction component (J555). Area ratio of each channel was set to 50:50, while power source ratio was set to 60:40. Figure 1 shows a comparison of reactor vessel core modeling. The RELAP5 input deck for the case T01 was listed in Appendix B.

### *Intact Loop*

The intact loop was modeled with a hot leg (volumes 101, 102, 103, and 104), a crossover leg (volume 105), a pump spool piece (volume 106), and a cold leg (volume 107 and 108). This intact loop hot leg is connected to reactor vessel upper plenum volume 508 and cold leg is connect to the volume at reactor vessel downcomer (volume 517). The pressurizer surge line is connected to volume 103, an intact loop ECCS line is connected to the volume 107

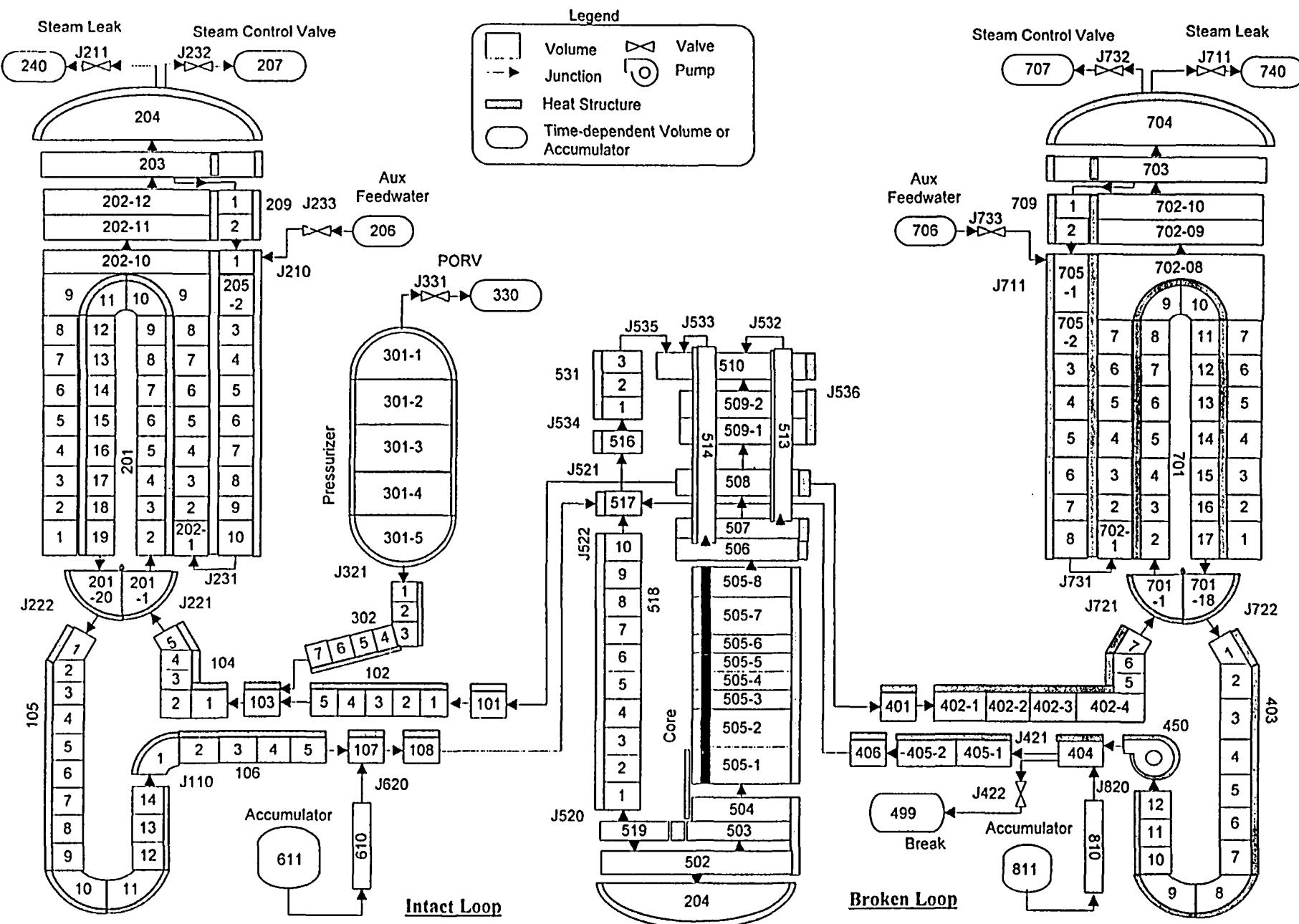


Figure 3 RELAP5 Nodalization of Semiscale Mod-2A for Assessment of Experiment S-NC-8

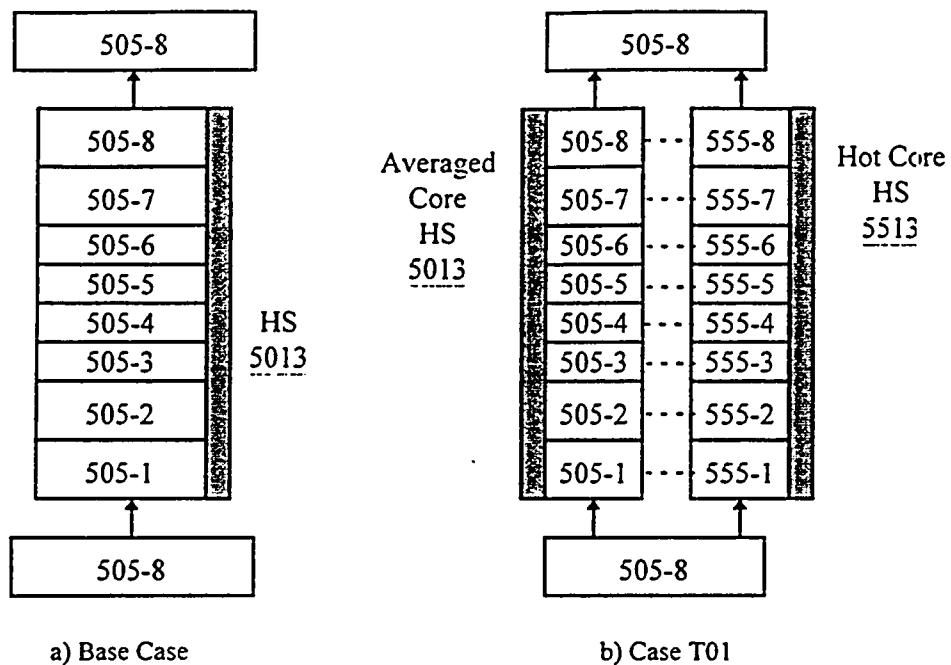


Figure 4. Comparison of Reactor Vessel Core Model

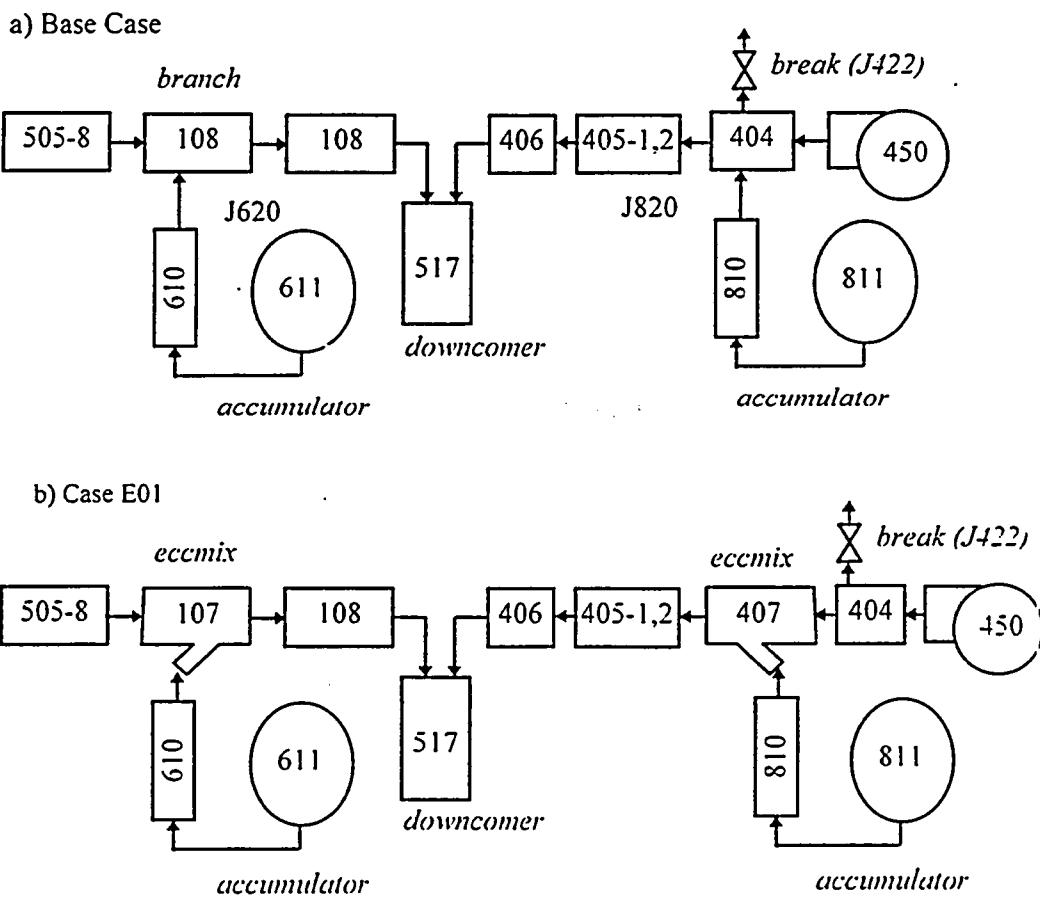


Figure 5. ECCMIX component model

through the junction 620. The intact loop steam generator is connected to hot leg and crossover leg by junctions 221 and 222, respectively.

In nodalization sensitivity study, ECCMIX component was used at intact loop cold leg and broken loop cold leg to improve accumulator injection behavior. Figure 5 shows a comparison of cold leg and ECCS modeling. The RELAP5 input deck for the case E01 was listed in Appendix C.

### Broken Loop

The broken loop was modeled with a hot leg (volumes 401 and 402), a crossover leg (volume 403), a broken loop pump (volume 450), and a cold leg (volumes 404, 405 and 406). This broken loop hot leg is connected to reactor vessel upper plenum volume 508 and cold leg is connect to the volume at reactor vessel downcomer (volume 517). The broken loop ECCS line is connected to the volume 404 through the junction 820. The intact loop steam generator is connected to hot leg and crossover leg by junctions 721 and 722, respectively.

The break junction (J422) was originally modeled by trip valve component [5]. However, the break model was changed from a trip valve to motor valve for considering the realistic valve opening behavior, as mentioned previously. The motor valve was attached to the downstream of the volume 404. The valve open area is set to  $9.0 \times 10^{-3} \text{ cm}^2$ , which simulated 0.1 % equivalent break. The discharge coefficients both for subcooled and for two-phase were set to 1.0. The broken loop pump homologous curves were specified bases on the facility design [4]. As similar to the intact loop, an extensive modeling of heat structure was adopted. The environmental heat loss at broken loop cold leg pipe, which was proved to be important in break flow prediction , was not modeled in the present model.

In the ECCMIX component modeling, a ECCMIX component was inserted at the downstream of the volume 404, and volume of adjacent component were changed to achieve a total volume.

### Pressurizer

The pressurizer vessel and surgeline were modeled by volumes 301 and 302, respectively. The top of the pressurizer vessel was linked to the time-dependent volume (C330) which represent the relief tank. Junction J331, which simulated a pressurizer PORV, was to link those two volumes. The valve open area of the PORV is set to  $1.267 \text{ cm}^2$  according to the facility design. The presurizer heater was also modeled by 2 heat structures. All the vessel walls and piping walls were also modeled by heat structures.

### *Steam Generators*

The intact loop steam generator primary side was modeled with component 201 with 20 volumes. The heat transfer between primary and secondary side was modeled by 18 heat structures. The secondary side was modeled with feedwater downcomer (volume 205), boiling space (volume 202), a separator (volume 203), a liquid return path (volume 209), steam dome (volume 204), a steam leak path (junction 211 and volume 240), a normal steam discharge (junction 232 and volume 207), and a auxiliary feedwater source (junction 233 and volume 206).

The broken loop steam generator primary side was modeled with component 701 with 18 volumes. The heat transfer between primary and secondary side was modeled by 16 heat structures. The secondary side was modeled with feedwater downcomer (volume 705), boiling space (volume 702), a separator (volume 703), a liquid return path (volume 709), steam dome (volume 704), a steam leak path (junction 711 and volume 740), a normal steam discharge (junction 732 and volume 707), and a auxiliary feedwater source (junction 733 and volume 706).

Steam leak from both steam generators at broken loop and at intact loop after closing the steam control valve was modeled (junctions 211 and 711). The junction area was set to  $0.3 \times 10^{-5} m^2$  and loss coefficient to 0.0 for both steam generators.

### *ECCS*

The accumulators of intact loop and broken loop (volumes 611 and 811) and their flow path were modeled (volume 610 and junction 620, volume 810 and junction 820). The accumulator setting pressure was 4.24 MPa at 300 K.

### *Heat Structures*

During the hydrodynamic modeling of the facility, all the loop piping walls are represented as heat structures, but environment heat loss, pipe insulation, tape and band heaters for tracing heating, are ignored. The exterior piping heat structure are assumed to be adiabatic on their outer surfaces. According to the experiment document [3], there was a heat loss from the broken loop cold leg piping to the environment in the experiment. However, for simplicity, such an environmental heat loss was not considered in the present modeling. Table 4 summarizes the input modeling for heat structures.

Table 4. Summary of Heat Structure Modeling

HS #	Description	NH	NA	Left Bndry	Right Bndry
1011	Intact Loop Hot Leg Nozzle	1	5	101-01	Symmetric
1021	Intact Loop Hot Leg Piping	4	5	101-01~04	Symmetric
1022	Intact Loop Hot Leg Piping	2	5	102-05	Symmetric
1032	Intact Loop Hot Leg Piping	1	5	103-01	Symmetric
1042	Piping from Intact Loop Hot Leg to SG Inlet	5	5	104-01~05	Symmetric
1052	Upper Part of Downflow Side of Intact Loop Seal Piping	6	5	105-01~06	Symmetric
1051	U-shaped Bend of Intact Loop Seal Piping	8	5	105-07~14	Symmetric
1063	Intact Loop Cold Leg Piping	4	5	106-01~04	Symmetric
1061	Intact Loop Cold Leg Piping	1	5	106-05	Symmetric
1071	Intact Loop Cold Leg Piping with ECC Nozzle	1	5	107-01	Symmetric
1081	Intact Loop Cold Leg Nozzle	1	5	108-01	Symmetric
2001	Intact Loop Steam Generator U-tube	18	5	201-02~19	202-01~09
2012	Riser Part Shield Structure of Intact Loop SG	10	5	202-01~10	202-01~10
2022	Lower Shroud Wall of Intact Loop Steam Generator	10	5	202-01~10	205-10~01
2032	Internals of Intact Loop Steam Generator Downcomer	10	5	205-01~10	205-01~10
2042	Upper Shroud Wall of Intact Loop Steam Generator	3	5	202-11, 12, 203-01	209-02, 01, 203-01
2053	Lower Part of Intact Loop Steam Generator Outer Wall	10	5	205-01~10	GT205 HTC
2054	Upper Part of Intact Loop Steam Generator Outer Wall	4	5	204, 203, 209	GT204 HTC
2055	Outer Wall of Intact Loop Steam Generator Steam Dome	1	5	204-01	Symmetric
3011	Inner Wall of Pressurizer Vessel	6	5	301-01~05	Symmetric
3012	Pressurizer Heater	2	5	Symmetric	301-05
3022	Inner Wall of Pressurizer Vessel Top	1	3	302-01	Symmetric
3023	Inner Wall of Presseurizer Vessel	6	5	302-02~04	Symmetric
4011	Broken Loop Hot Leg Nozzle	1	5	401-01	Symmetric
4021	Broken Loop Hot Leg Piping	7	5	402-01~07	Symmetric
4031	Broken Loop Loop Seal Piping	12	5	403-01~12	Symmetric

Table 4. Summary of Heat Structure Modeling (continued)

HS #	Description	NH	NA	Left Bndry	Right Bndry
4041	Broken Loop Cold Leg Piping	3	5	404-01, 405	Symmetric
4051	Broken Loop Cold Leg Nozzle	1	5	406-01	Symmetric
5011	Reactor Vessel Lower Plenum Wall	1	5	501-01	Symmetric
5012	Reactor Vessel Lower Part Outer Wall	4	5	Symmetric	501, 502, 503, 504
5013	Active Core Fuel Rods	16	11	Symmetric	505-01-08
5021	Reactor Vessel Lower Part Inner Wall	1	5	501-01	Symmetric
5022	Reactor Vessel Lower Part Inner Wall	1	5	502-01	Symmetric
5023	Reactor Vessel Lower Downcomer Inner Wall	1	5	519-01	Symmetric
5031	Reactor Vessel Downcomer Wall	10	5	518-01~10	Symmetric
5024	Reactor Vessel Downcomer-to-Lower Core Wall	10	5	503-01	519-01
5025	Reactor Vessel Lower Core Support Structure	2	5	504, 505	Symmetric
5014	Reactor Vessel Core Fuel Assembly Structure	8	5	505-01-08	Symmetric
5015	Reactor Vessel Downcomer Upper Annulus Wall	1	5	516-01	Symmetric
5016	Reactor Vessel Cold Leg Nozzle Wall (Half)	2	5	Symmetric	516, 517
5017	Reactor Vessel Cold Leg Nozzle Wall (Half)	2	5	516, 517	Symmetric
5041	Reactor Vessel Upper Plenum Outer Wall	1	5	Symmetric	506-01
5042	Reactor Vessel Upper Plenum Outer Wall	1	5	506-01	Symmetric
5043	Reactor Vessel Upper Plenum Outer Wall	1	5	507-01	Symmetric
5044	Reactor Vessel Upper Plenum Outer Wall	1	5	508-01	Symmetric
5045	Reactor Vessel Upper Plenum Outer Wall	3	5	509, 510	Symmetric
5046	Reactor Vessel Upper Head Outer Wall	4	5	510-01	Symmetric
5062	Reactor Vessel Guide Thimble Tube Wall	4	5	513-01	510, 509, 508
5063	Reactor Vessel Guide Thimble Tube Wall	5	5	514-01	510, 509, 508, 507
5064	Reactor Vessel Downcomer Upper Annulus Wall	3	5	531-01~03	Symmetric
7001	Broken Loop Steam Generator U-tube	16	5	701-02~17	702-01~08
7012	Riser Part Shield Structure of Broken Loop Steam Generator	8	5	702-01~08	702-01~08

Table 4. Summary of Heat Structure Modeling (continued)

HS #	Description	NH	NA	Left Bndry	Right Bndry
7022	Lower Shroud Wall of Broken Loop Steam Generator	8	5	702-01~08	705-01~08
7032	Internals of Broken Loop Steam Generator Downcomer	8	5	705-01~08	705-01~08
7042	Upper Shroud Wall of Broken Loop Steam Generator	3	5	702-09, 10, 703	709-02, 01, 703
7053	Lower Part of Broken Loop Steam Generator Outer Wall	8	5	705-01~08	GT205 HTC
7054	Upper Part of Broken Loop Steam Generator Outer Wall	4	5	704, 703, 709	GT204 HTC
7055	Outer Wall of Broken Loop Steam Generator Steam Dome	1	5	704-01	Symmetric

Note     GT : General Table

HTC : Heat Transfer Coefficient

### **III.3 Initial Conditions**

A RELAP5 steady state run was carried out to provide the thermal-hydraulic initial condition appropriate to the test for all of the volumes and junctions. The calculated results using the base case input at *800 sec* was listed in Table 1, which compared the calculation result with the experimental initial condition. Although the message "steady state reached" was not available at *800 sec* of the steady state run, the calculation result at *800 sec* was acceptable when compared with the measured values. The difference in fluid temperature at broken loop cold leg between calculation and experiment was about *10 K*, which was considered due to neglecting the environmental heat loss [3].

For the cases T01 and E01, the almost similar condition was obtained through steady state calculation, not listed in the table.

### **III.4 Boundary Conditions**

The sequence of event for S-NC-8B experiment was described at earlier chapter. This section describes the RELAP5 modeling scheme to calculate the sequence of the experiment. Six trips were designed to describe the sequence as follows :

Trip 510 : Initiate the blowdown

Trip 511 : Close steam valves at *117 sec* after transient

Trip 512 : Open steam valves at *2100 sec* after transient

Trip 513 : Open pressurizer PORV at *7550 sec* after transient

Trip 514 : Close pressurizer PORV at *8098 sec* after transient

Trip 650 : Open SG steam leak valve during *117 sec* to *2100 sec*

The trips above activate the boundary condition appropriate to the sequence as follows:

- 1) The junctions 232 and 732, i.e., steam outlet valves, were set to open and close under trips 511 and 512.
- 2) The break valve (422) was open by the trip 510 with a ratio *1 %/sec*
- 3) The SG steam leak valve was open by trip 650 during *117 sec* to *2100 sec*. The steam leak downstream pressure was identical to the experimental pressure (Figure 6).

- 4) The auxiliary feed water was set to re-supplied to the SG's after the steam valve opening. The feed water flow rate during the transient was modeled at the junctions J233 and J733 by the time-dependent function with the argument of steam generator liquid level. The curve of flow rate with respect to level was shown at Figure 7, which directly simulated the test condition..
- 5) The variation of thermodynamic state at the tank downstream the pressurizer PORV was modeled. The curve of pressure with respect to time was shown at Figure 8, which realistically simulated the test condition.
- 6) The variation of thermodynamic state at the tank downstream the break was modeled. The curve of pressure with respect to time was shown at Figure 9, which simulated the test condition realistically.
- 7) The variation of reactor core power was modeled, which realistically simulated the test result. The curve of power with respect to time was shown in Figure 10.

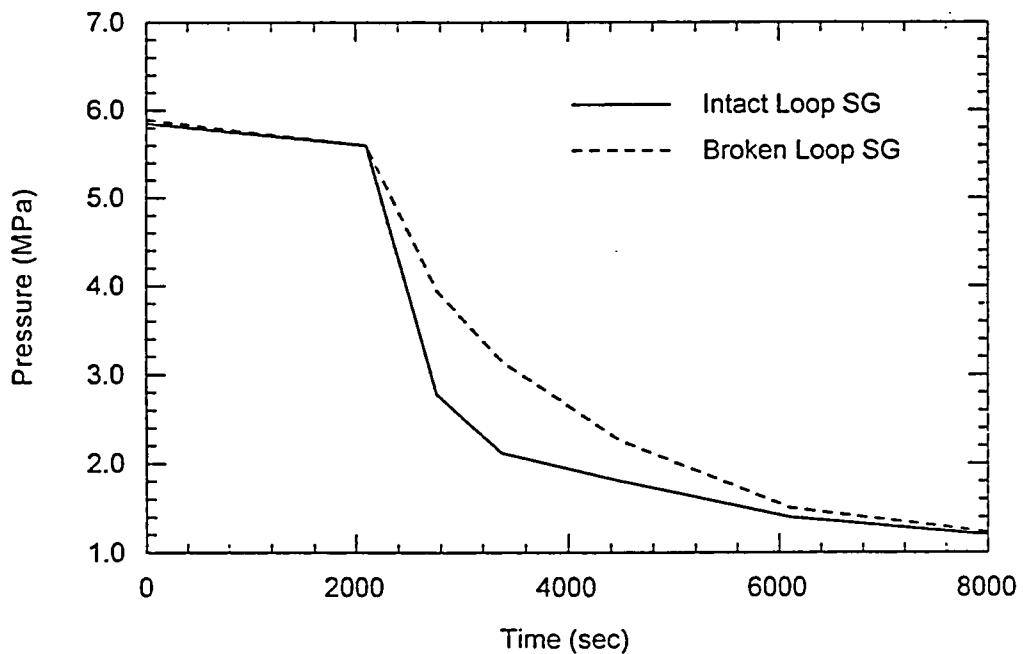


Figure 6 Pressure Boundary Condition at Steam Leak Downstream

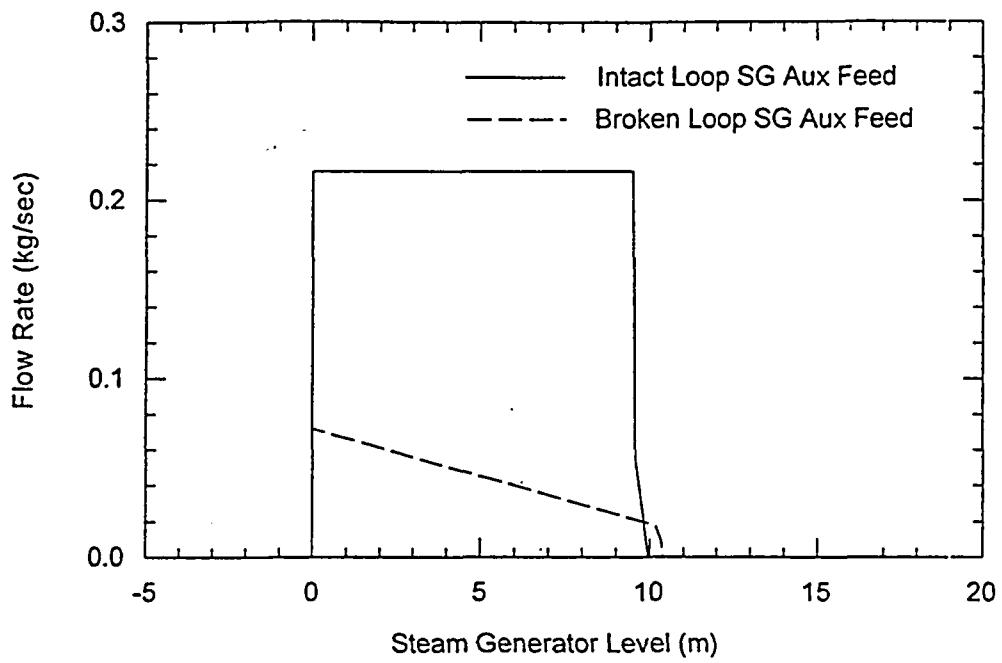


Figure 7 Flow Rate of Auxiliary Feedwater

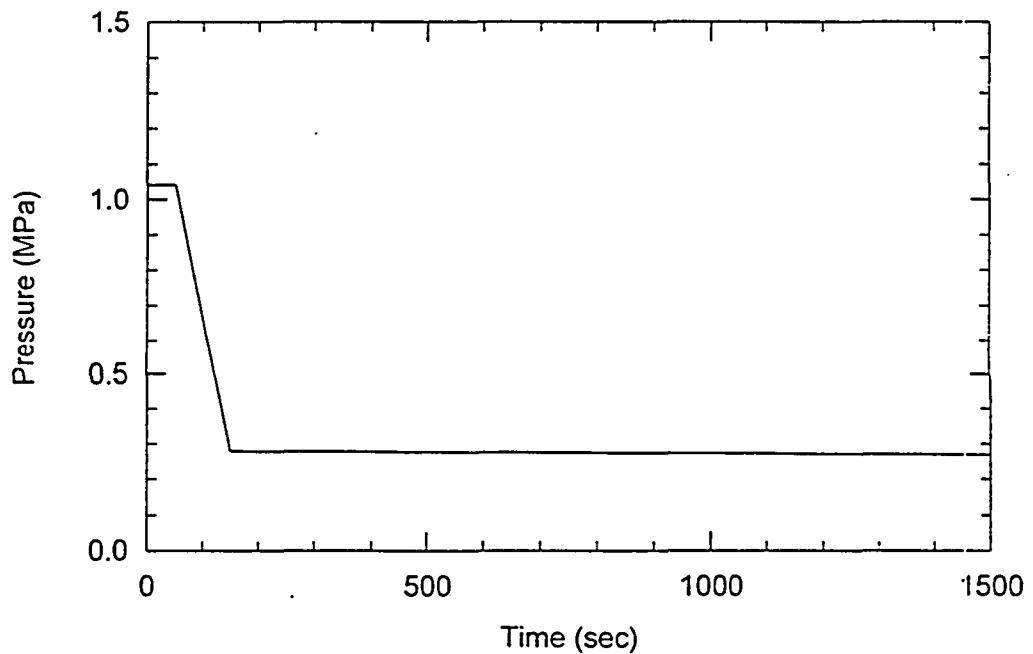


Figure 8 Pressure at Pressurizer PORV Downstream Tank in S-NC-8B Experiment

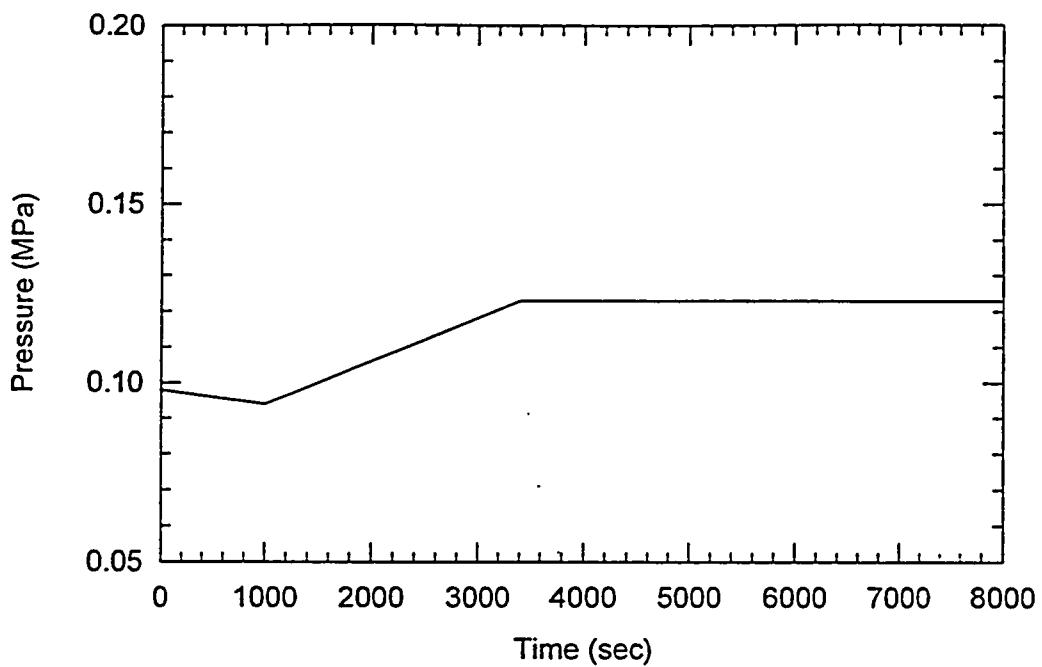


Figure 9 Pressure at Break Downstream Tank in S-NC-8B Experiment

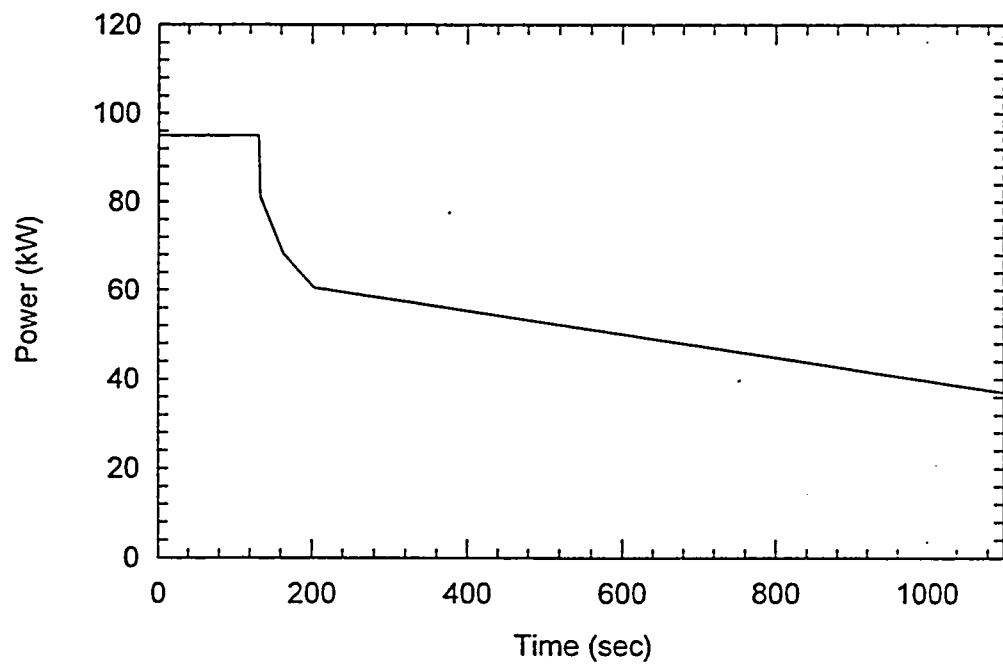


Figure 10 Reactor Core Power in S-NC-8B Experiment

## IV. Results and Discussions

This chapter describes the result of the RELAP5 calculation and the comparison with the experiment data. As mentioned earlier, a result from a base case calculation is described for the major thermal-hydraulic phenomena and the predictability of RELAP5 on those phenomena is discussed. And then some discussions are given for the result from sensitivity studies, which were attempted to find out the effects of modeling at reactor vessel core and of ECCMIX component on the improvement of predictability. Among the various thermal-hydraulic phenomenon, an emphasis was given to an overall depressurization behavior, a break flow, a loop seal behavior, a natural circulation, an accumulator injection behavior, and a thermal response. The run statistics data is also described in this chapter.

The thermal-hydraulics in the experiment data is first described, the result from the calculation is addressed, and then, the predictability, discrepancy and/or causes for the discrepancy considered are explained for each phenomena.

Table 5. lists the calculated parameters and the corresponding experiment data channels selected to explain the thermal-hydraulic phenomena. The uncertainty for each experiment data channel is also listed in the table, which was based on the reference [6].

### IV. 1 Base Case Calculation

#### IV.1.1 Depressurization

Figure 11 shows a comparison of the primary system pressure transient between the RELAP5 calculation result and the experiment data up to 3000 sec after break initiation. As shown in the experimental behavior of Figure 8, the following phenomena were observed :

- 1) A rapid subcooled depressurization following the break initiation
- 2) A slight decrease of depressurization rate due to a core power level change from 95 kW to decay power level (at 131 sec)
- 3) A decrease of depressurization rate due to a hot leg flashing (at 175 sec)
- 4) An increase of depressurization rate due to an increase of heat transfer to secondary side by peak natural circulation flow along the loops (at 280 sec)
- 5) A significant decrease of depressurization rate due to a cold leg flashing (at 400 sec)

- 6) A slow depressurization until initiation of secondary side feed-and-bleed operation (up to 2100 sec)
- 7) A noticeable depressurization by secondary side feed-and-bleed (2100 to 2500 sec)
- 8) A slight change in depressurization rate due to accumulator injection (at 2460 sec)

Table 5. Description of the Measured Parameters and the Calculated Parameters

Description	Measurement ID.	Uncertainty/ Units	RELAPS Parameter
Primary System Pressure	PV*UP-13	$\pm 0.1$ Mpa	p-508010000
Intact Loop SG Secondary Pressure	PIS+1117	$\pm 0.05$ MPa	p-204010000
Broken Loop SG Secondary pressure	PBS+1117	$\pm 0.05$ MPa	p-704010000
Break Mass Flow Rate	Q*BRK*FLOW	a)	mflowj-422000000
Integrated Break Mass	BRMASS	a)	cntrlvar-30
Intact Loop Hot Leg Mass Flow Rate	ILHMF	a)	mflowj-101020000
Broken Loop Hot Leg Mass Flow Rate	BLHMR	a)	mflowj-402020000
Intact Loop Cold Leg Mass Flow Rate	ILCMFR	$\pm 0.03$ kg/s	mflowj-107010000
Broken Loop Cold Leg Mass Flow Rate	BLCMFR	$\pm 0.01$ kg/s	mflowj-405010000
Vessel Downcomer Mass Flow Rate	MDOWN9A	$\pm 0.03$ kg/s	mflowj-518010000
Broken Loop Cold Leg Fluid Density	RB*79M	$\pm 2$ kg/m <sup>3</sup>	rho-405010000
Intact Loop Hot Leg Fluid Temp.	TFI*1	$\pm 2.0$ K	tempf-101010000
Intact Loop Cold Leg Fluid Temp.	TFI*9	$\pm 2.0$ K	tempf-107010000
Broken Loop Hot Leg Fluid Temp.	TFB*57	$\pm 2.0$ K	tempf-401010000
Broken Loop Cold Leg Fluid Temp.	TFB*79	$\pm 2.0$ K	tempf-405010000
Rod Surface Temperature	THV*A3+291	a)	httemp-501300711
Vessel Collapsed Liquid Level	LV-501-105	a)	cntrlvar-218
IL Pump Suction SG side Level	DPI*14*PBA	a)	cntrlvar-214
IL Pump Suction Pump side Level	DPI*9*14	a)	cntrlvar-215
BL Pump Suction SG side Level	DB*64*65	a)	cntrlvar-216
BL Pump Suction Pump side Level	DB*65*79	a)	cntrlvar-217

Note a) Data uncertainty was not described in reference [3].

The RELAP5 calculation result is well-agreed to the experiment behavior, especially in depressurization rate at each event such as a decay heat curve activation, a hot leg flashing, a peak natural circulation, a cold leg flashing, a SG feed-and-bleed initiation, and a accumulator injection, although there were some deviations in timing of each phenomena.

Figures 12 and 13 show comparisons of steam pressure at each steam generator in intact loop and broken loop between RELAP5 calculation and experiment data. In experiment steam pressure was increased from at 117 sec due to closure of steam control valves of both steam generators, however there were leaks in both valves, steam pressure was slowly decreased until re-opening the steam control valves for feed-and-bleed operation. The RELAP5 calculation shows an overall agreement with the experiment data for both steam pressure.

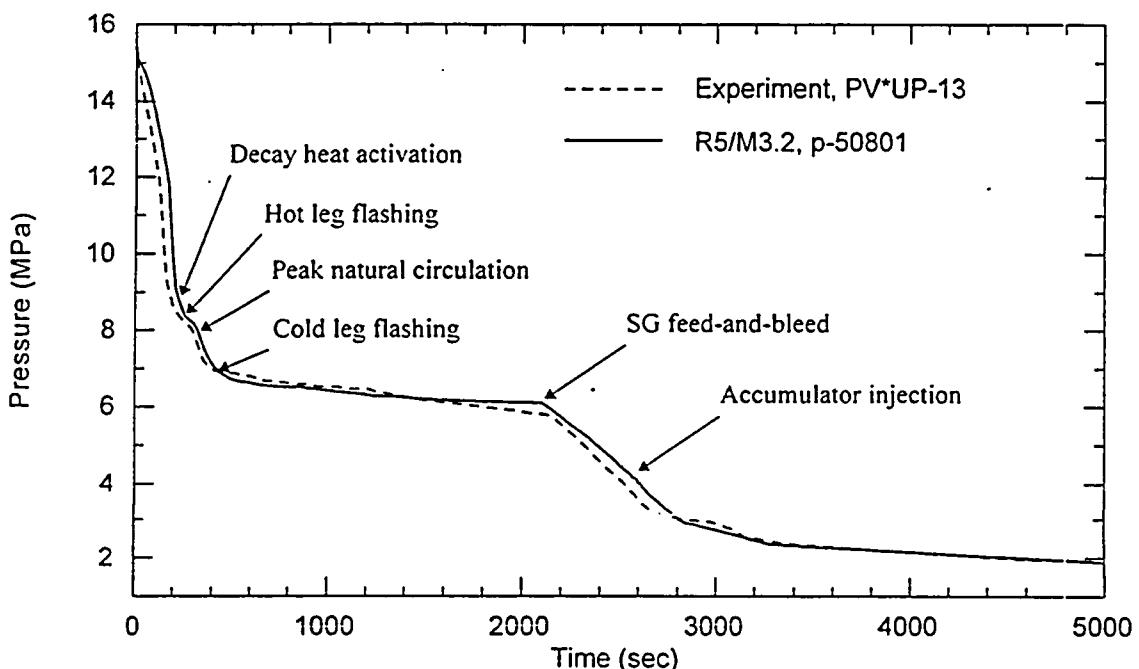


Fig. 11 Comparison of Primary System Pressure

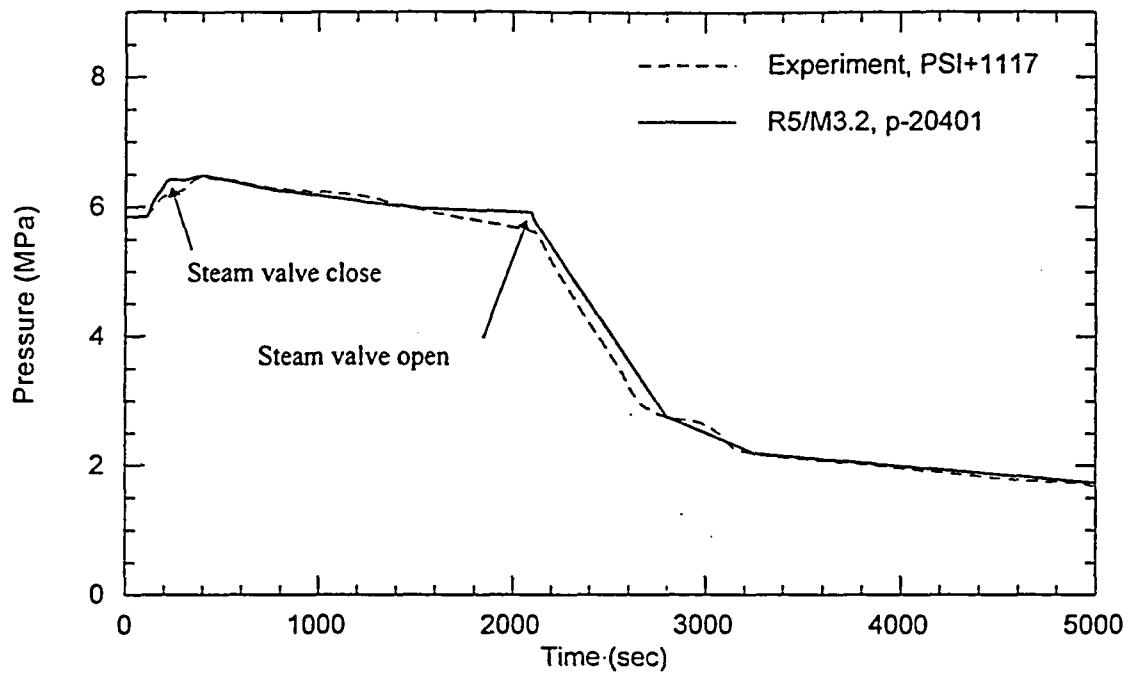


Fig.12 Comparison of Steam Pressure at Intact Loop SG

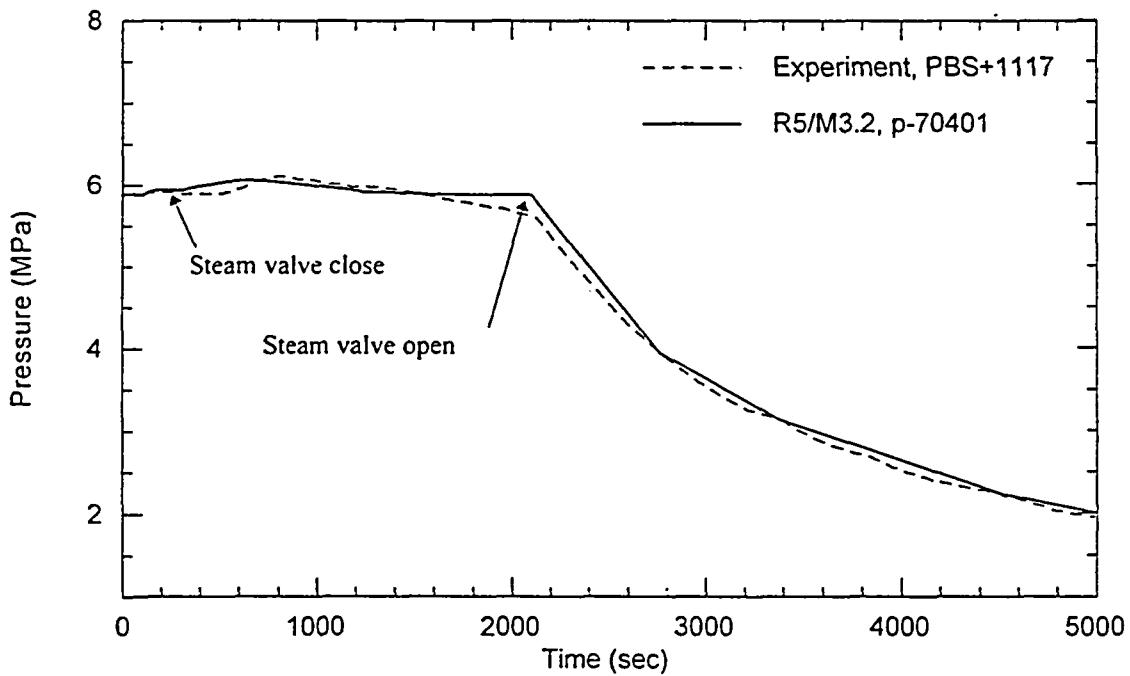


Fig.13 Comparison of Steam Pressure at Broken Loop SG

#### IV.1.2 Break Flow

Figure 14 shows a comparison of break flow. In the experiment, the following phenomena were found :

- 1) Upon the break valve open, the subcooled water discharged out, whose amount exceeded  $0.1 \text{ kg/sec}$ .
- 2) As the primary system pressure decreased, the break flow rate was also reduced, and then, the discharged flow rate remained almost constant (approximately  $0.055 \text{ kg/sec}$ ) at the timing of cold leg flashing ( $400 \text{ sec}$ ).
- 3) The first uncovering of break was found at about  $824 \text{ sec}$ . At this time, the liquid level in broken loop cold leg decreased to the break nozzle elevation. And then, the liquid level was oscillated, and the break nozzle was repeated to be covered and uncovered by liquid level in several times. The final uncovering was observed at about  $1500 \text{ sec}$ .
- 4) After the complete break uncovering, the discharge flow rate was sharply reduced, however, there was still steam-water mixture flow more than  $0.02 \text{ kg/sec}$ .
- 5) After  $2500 \text{ sec}$ , there was a sharp increase of break flow, which was due to the accumulator injection. Such a discharge of the injected water was terminated at  $4700 \text{ sec}$  approximately, when the accumulators were exhausted.

The RELAP5 calculation shows a general agreement with experiment data in initial break flow and in phenomenological trend with the experiment data. However there are some discrepancies as follows :

1. Underprediction of two-phase break flow (approximately  $100 \text{ to } 700 \text{ sec}$  and  $1200 \text{ to } 2200 \text{ sec}$ )
2. Delay in break uncovering and difference in oscillatory behavior
3. Underprediction of break flow after accumulator injection (after  $2500 \text{ sec}$ )

The reason for underprediction of break flow during  $100 \text{ to } 700 \text{ sec}$  was considered as due to a heat loss to the environment through the broken loop cold leg piping. The effect of environmental heat loss can be explained in Figure 15, which shows a comparison of fluid temperature at broken loop cold leg. As shown in this figure, the predicted coolant temperature was initially lower than the measured data by  $10 \text{ K}$ , which was due to environmental heat loss through the cold leg piping. And the difference was continued until

700 sec (break upstream conditions becoming two-phase). The cooler fluid temperature resulted in a larger fluid density and thus larger break flow. Presented in Figure 16 are the measured and calculated fluid density at broken loop cold leg. The existence of cooler fluid can be found during the period, as shown in that figure.

The larger measured break flow resulted in the measured break upstream conditions becoming two-phase at 700 sec while 1100 sec in the calculation, i.e. delay in break uncovering.

The underprediction of break flow during 1200 to 2200 sec (i.e., saturated break flow under stratified condition) was considered as due to code model deficiency on saturated break flow and/or due to break modeling inaccuracy. Figure 16 indicated that there existed much more water in the cold leg volume in calculation than that in experiment, however the calculated break flow was less than the measured one during the period.

Oscillations in break flow during 800 to 1400 sec, were induced by cold leg liquid level oscillations upstream of the break, and they were found in both calculation and experiment. However, the oscillation in prediction has smaller amplitude and shorter frequency than those in experiment. This may be due to the code model inaccuracy in simulating the liquid level behavior at broken loop cold leg under stratified saturated flow.

The underprediction in break flow after 2500 sec was due to inaccurate prediction of accumulator injection flow, which will be discussed later.

An integrated break flow was shown in Figure 17. The amount of water discharged from the break was 100 kg in experiment, while it was 80 kg in calculation until 2000 sec. Such a difference in discharged water has little effect on system depressurization but has a significant effect especially on loop seal behavior and core thermal response.

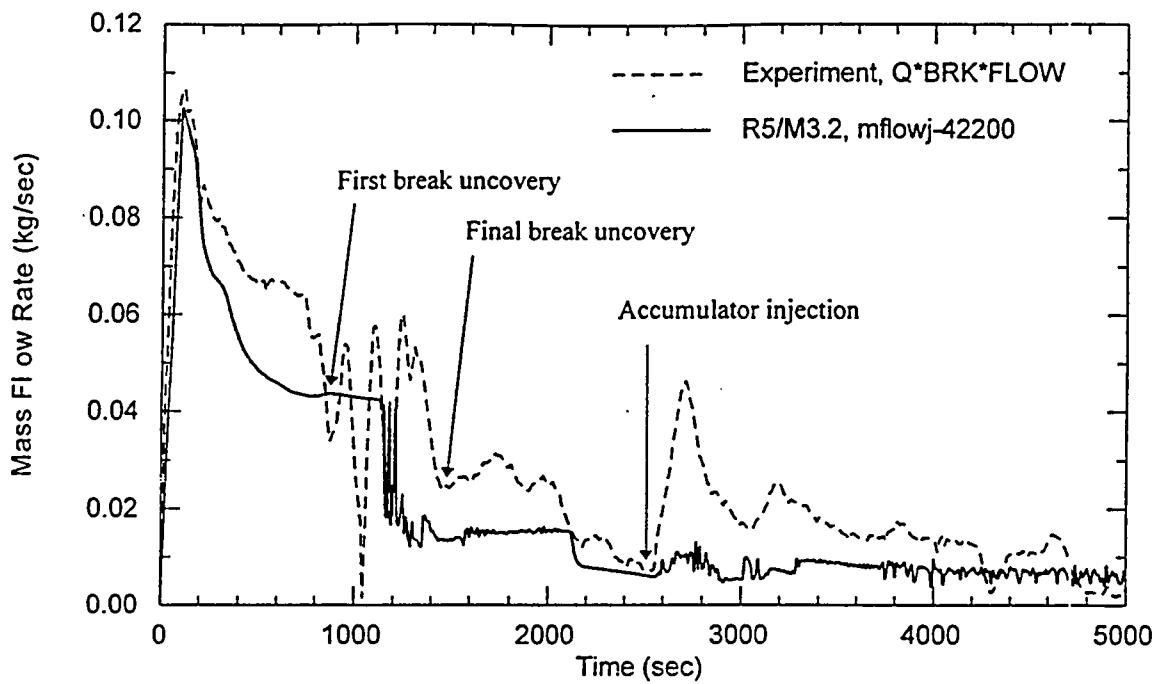


Fig.14 Comparison of Break Flow

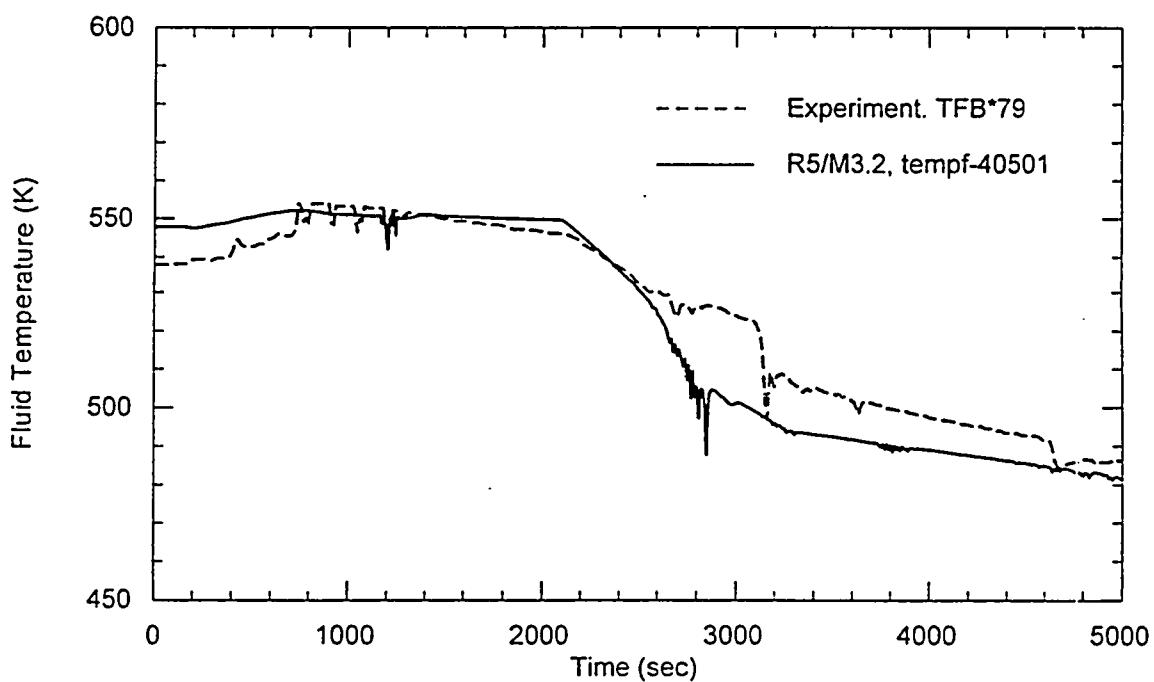


Fig.15 Comparison of Fluid Temperature at Broken Loop Cold Leg

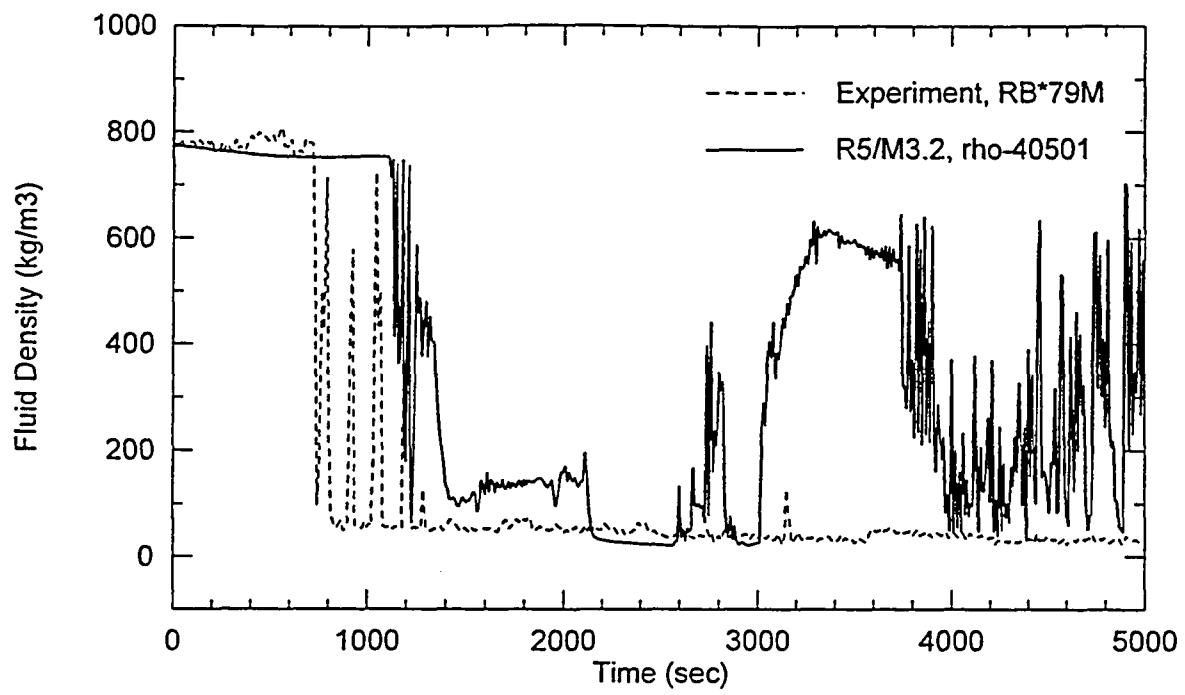


Fig.16 Comparison of Fluid Density at Broken Loop Cold Leg

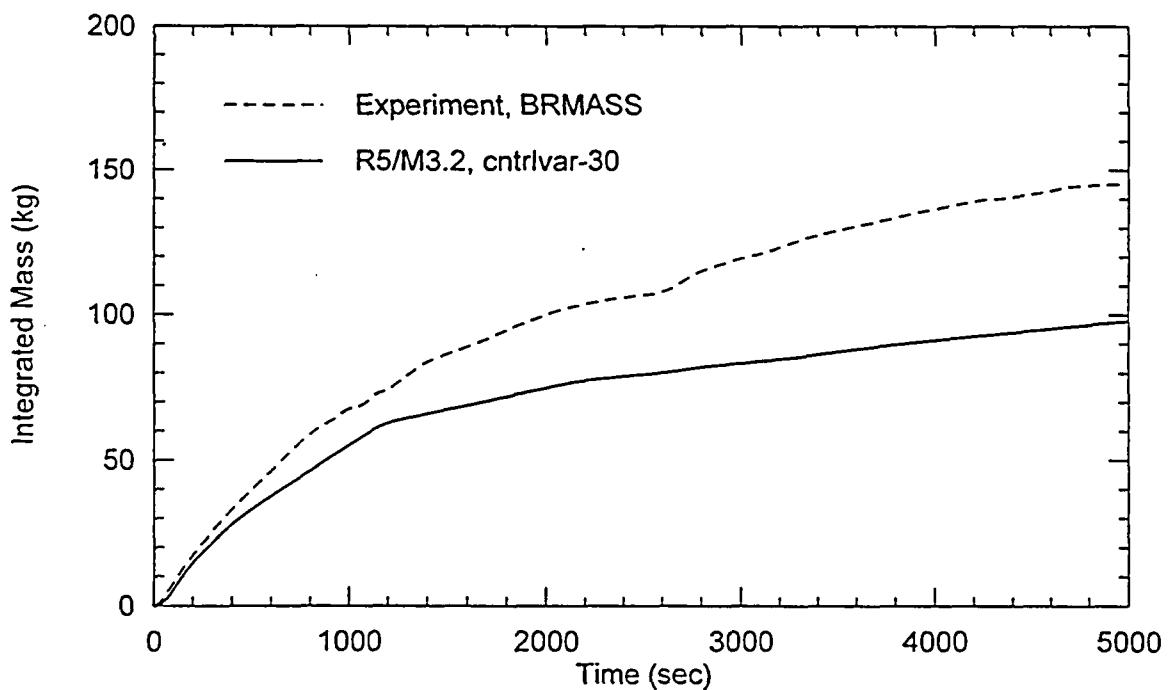


Fig.17 Comparison of Integrated Break Mass Flow

#### IV.1.3 Loop Seal Behavior

Figures 18 to 21 show a comparisons of differential pressure at SG-side and pump-side piping of crossover leg in intact loop and broken loop, respectively. The differential pressure at reactor vessel core was shown in Figure 22. The loop seal behavior observed in experiment are as follows :

- 1) As blowdown continued, the coolant inventory decreased to the point at which the water seal of U-shaped pipe in the intact loop crossover leg was formed ( $500\text{ sec}$ ) as shown in Figures 18 and 20.
- 2) As the steam generating from the reactor core was blocked by pump suction water seal, the resultant steam pressure acted on and pushed the liquid surfaces of the SG-side crossover leg of intact loop ( $1100$  to  $2100\text{ sec}$ ), which led a level decrease, as shown in Figure 18.
- 3) As the water level in SG-side pipe decreased, the water level in pump-side increased a little. However, some of the water pushed from the pump-side pipe was moved to the cold leg and downcomer, as a result, the pump-side level was dropped in a short time, the pump-side water level was recovered by the SG-side water. Such an oscillatory behavior was repeated in several times with pump-side level decrease, i.e., manometric level decrease.
- 4) At  $2000\text{ sec}$ , the pump-side liquid level started to decrease, since the hydrostatic pressure in pump-side pipe was larger than that at SG-side pipe.
- 5) At  $2100\text{ sec}$ , the steam generator feed-and-bleed operation was initiated, which caused an enhancement of SG heat transfer, an increase of steam condensation in U-tubes, and buildup of liquid in the SG-side crossover leg of the intact loop, as shown in Figure 18.
- 6) At  $2650\text{ sec}$ , some water collapsed at SG-side crossover leg was swept into the cold leg and core, i.e., partial loop seal clearing. By this phenomena, the SG-side liquid level was dropped and re-increased. After that, pump-side liquid level was increase by such a partial loop seal clearing.
- 7) Loop seal behavior at the broken loop was quite similar to that at the intact loop (Figures 20 and 21). However, timings of loop seal formation and beginning of level decrease were  $750\text{ sec}$  and  $1800\text{ sec}$ , respectively, which were later than those of intact loop behavior.
- 8) Liquid in broken loop pump-side pipe was not cleared completely at  $2650\text{ sec}$ , since steam flow was not blocked because of break flow. The second loop seal clearing was

observed at 3150 sec at the broken loop pump-side crossover leg.

- 9) The behavior of core liquid level was quite similar to that of intact loop pump-side crossover leg in start of level decrease and loop seal clearing.

Figures 18 and 19 indicate that RELAP5 did not predict the intact loop seal behavior correctly. Liquid level at SG-side crossover leg was not dropped below the cold leg centerline elevation in calculation. The predicted liquid level at pump-side crossover leg also shows a deviation from the experiment, although a loop seal formation, a level drop at 2100 sec, and a sharp increase at 2500 sec were close to the experimental behavior.

As shown in Figures 20 and 21, the predicted loop seal behavior at broken loop was much closer to the experimental behavior than that at intact loop, especially in loop seal formation both SG-side and pump-side pipes, level decrease due to steam pressure, level increase behavior at SG feed-and-bleed, and final loop seal clearing in SG-side piping. However, the final complete loop seal blowout at pump-side pipe was not predicted, which was due to a re-establishment of water seal at broken loop pump-side pipe. It was considered as a result from underestimation of break flow and over-estimation of water inventory at broken loop cold leg.

Predicted loop seal behavior indicates that the pressure difference between hot leg and cold leg was not accurately predicted, although overall depressurization behavior was well predicted in both legs. That pressure difference was primarily determined by steam generation from the core because cold leg was isolated by water seal at core and at crossover leg. However, there was another one communication path between cold leg and hot leg, a upper head bypass line (Junction 535). Differential pressure between the cold leg and hot leg may be affected by flow through this path. Since the detailed geometry of the bypass line was not known, the calculated timing and depth of loop seal behavior may be dependent of loss coefficient and area of the junction. However, it was found in the base case calculation, i.e., single core channel model, that the loop seal behavior explained above was not basically changed with varying the junction loss coefficient and junction area. It was also found to be effective in the case of two core channel model (T01), which will be discussed at the next section.

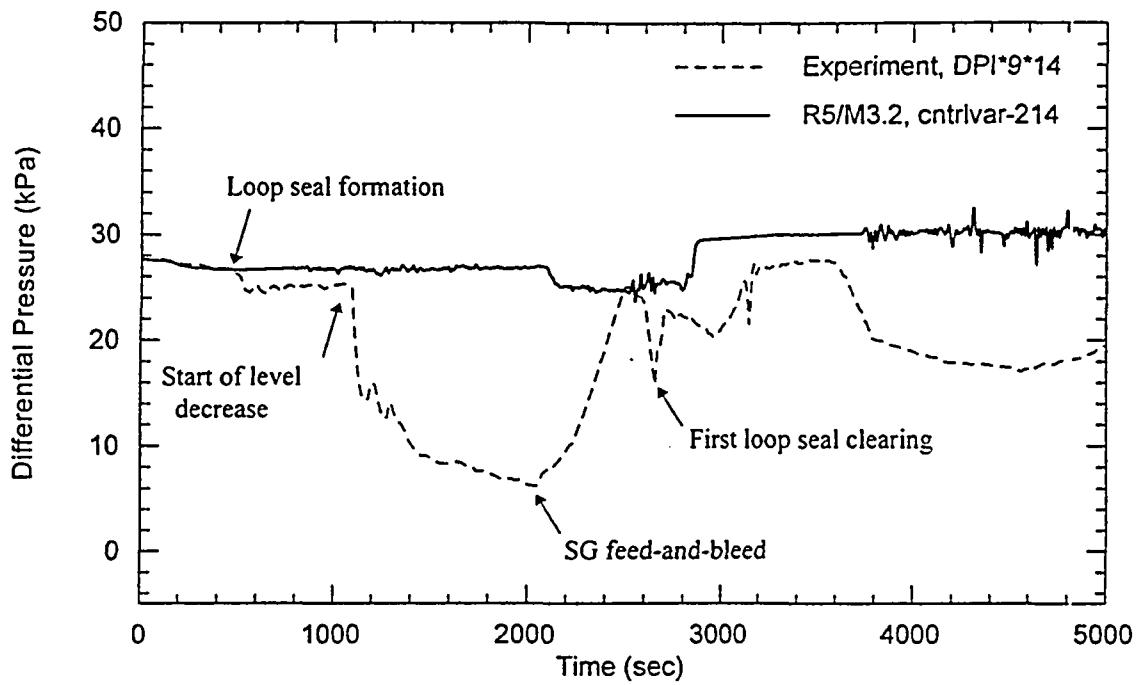


Fig.18 Comparison of Differential Pressure at Intact Loop SG side Crossover Leg

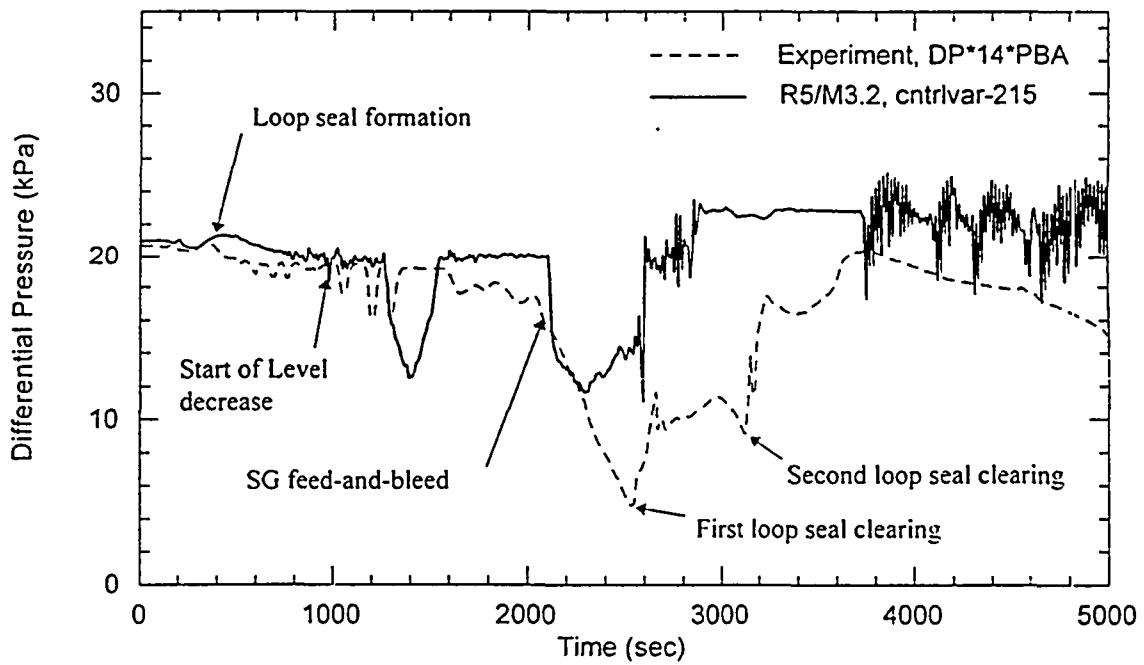


Fig.19 Comparison of Differential Pressure at Intact Loop Pump side Crossover Leg

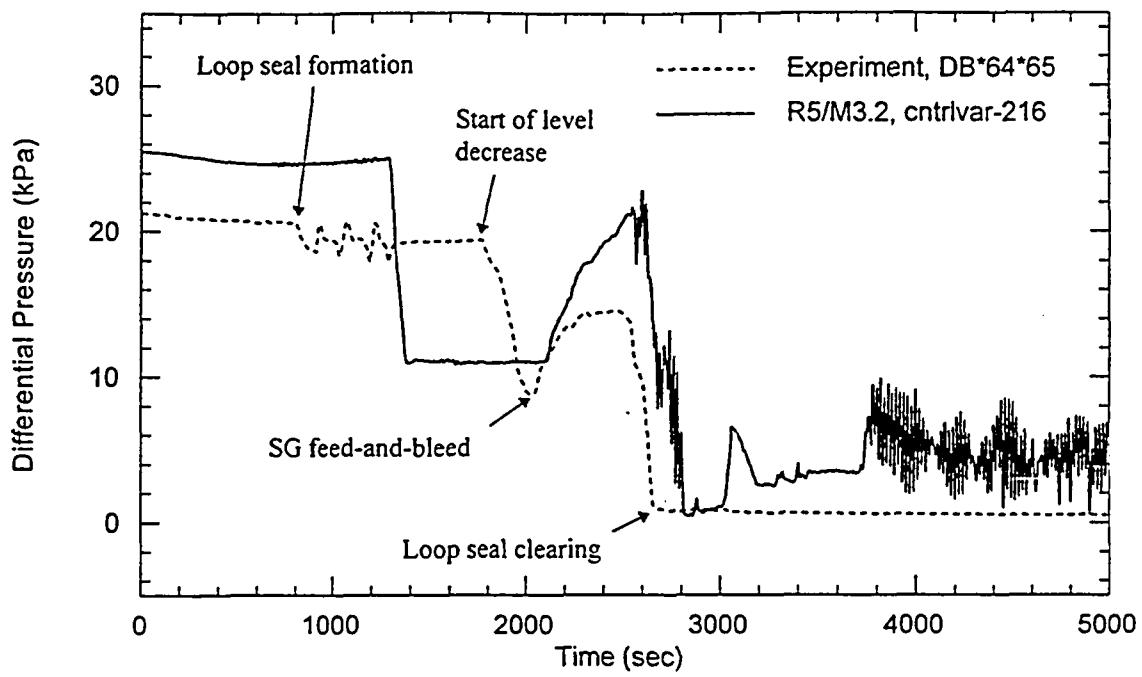


Fig.20 Comparison of Differential Pressure at Broken Loop SG side Crossover Leg

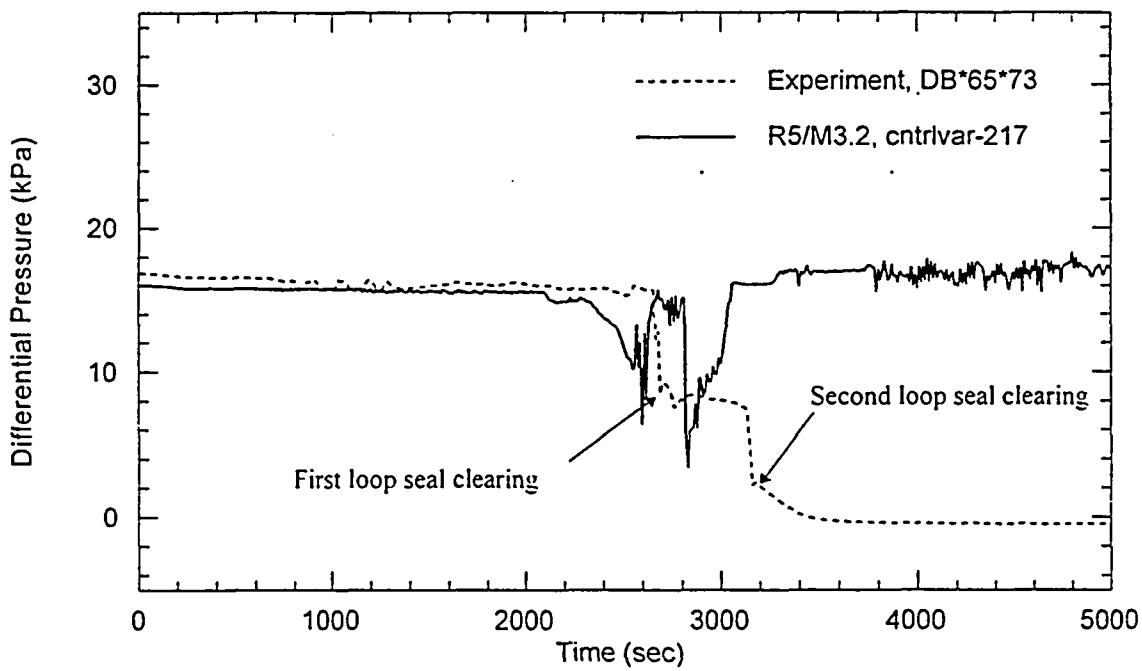


Fig.21 Comparison of Differential Pressure at Broken Loop Pump side Crossover Leg

The RELAP5 calculation on core liquid level behavior (Figure 22) also shows the same deviation as the level behavior of the intact loop, i.e., no level decrease and recovery. It is clear that core level behavior was not correctly predicted with single core channel model.

Based on comparisons above, deviation of prediction in loop seal behavior may be limitation of the code, because the range of differential pressure during the loop seal behavior was less than 20 kPa in experiment, which required an accurate calculation in accuracy range of 10 kPa.

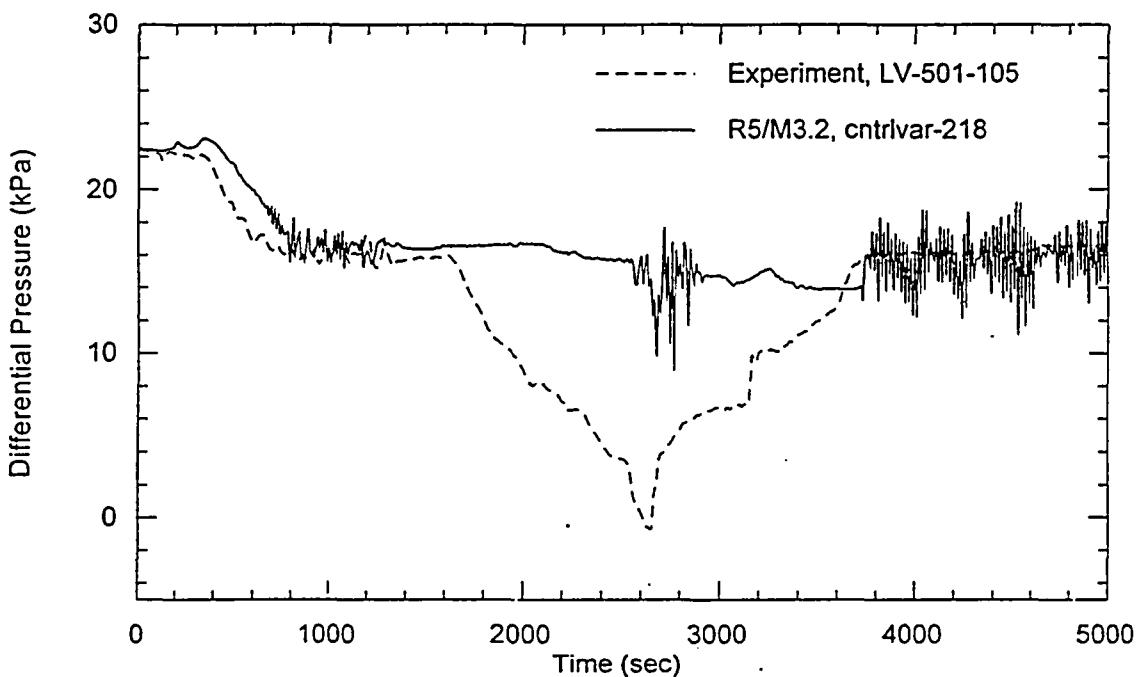


Fig.22 Comparison of Differential Pressure between Core Inlet and Outlet

#### IV.1.4 Natural Circulation

Figure 23 shows comparisons of mass flow rates at downcomer outlet. In experiment, the initial mass flow rate through the downcomer was  $0.578 \text{ kg/sec}$  in a single phase natural circulation mode and remained at about the initial value until the hot legs uncovered at about  $280 \text{ sec}$ . As more coolant was discharged out, the density gradient between fluid in the upside of steam generator and downcomer increased due to a formation of void, which increased the natural circulation driving force. As a result, the flow in the loop increased and eventually peaked at about  $350 \text{ sec}$ . As further mass was expelled out the break, the fluid in the intact loop SG U-tube eventually depleted, which led to a reflux condition in the intact loop. In experiment, the reflux condition was visually observed at about  $825 \text{ sec}$  in the intact loop, but was not observed until  $1900 \text{ sec}$  in the broken loop.

The RELAP5 calculation result shows a generally good agreement with the experiment data. However, the calculation shows some differences in magnitude of peak flow, timing of peak flow occurrence, and duration of two-phase natural circulation flow. And a deviation was also found after  $2500 \text{ sec}$ , i.e., accumulator injection period, which will be described at next section.

The difference in peak flow is considered to be due to a broken loop mass flow, and the difference in peaking time due to intact loop mass flow, as shown in Figures 24. which shows comparisons of mass flow rates at intact loop cold leg and broken loop cold leg. From this figure, one can find that the broken loop cold leg experienced more and longer flow than the experiment. This difference resulted in overprediction of downcomer mass flow rate and duration of natural circulation. This fact indicates that there was more water inventory in the broken loop during this period and that it was due to underprediction of break flow.

Comparison of downcomer mass flow rate as a function of primary system mass inventory was shown in Figure 25. This figure shows there were two peaks in mass flow rate at about 89 % and 80 % inventory both in experiment data and in calculation result. The peak at 89 % inventory corresponds to the point in time when pressurizer empties of fluid. It is possible that steam from the pressurizer entered the hot leg and steam generator U-tubes thus inducing a large density gradient in the loop which led to a momentary peaking in downcomer flow. The peak at 89 % inventory can be regarded as the maximum mass flow rate due to the maximum density gradient during the two-phase natural circulation. From this figure, the natural

circulation flow rate with change in primary system inventory was well predicted for a range from 100 % to 80 % of the normal inventory (single and two-phase regimes). However, there was an little overprediction and oscillations for a less inventory, which was due to broken loop flow rate, as already mentioned.

The flow rate at intact loop hot leg was compared with the corresponding experimental data in Figure 26. In that figure, one can find a beginning of negative hot leg flow at 620 sec in experiment, i.e., reflux condensation. In calculation, the reflux behavior was found after 800 sec, which may due to more primary coolant inventory than the experiment. The highly oscillatory behavior in calculation was due to a excessive condensation in SG-U-tube. A sudden increase after 2600 sec in calculation was due to accumulator injection. It was overestimated when compared to the experimental behavior.

The flow at broken loop hot leg was compared in Figure 27. The figure shows that reflux in was predicted at 1170 sec. The calculation shows a more and larger flow than the experiment, which was consistent with the prediction of cold leg flow. The effect of accumulator was not found in the broken loop cold leg due to break.

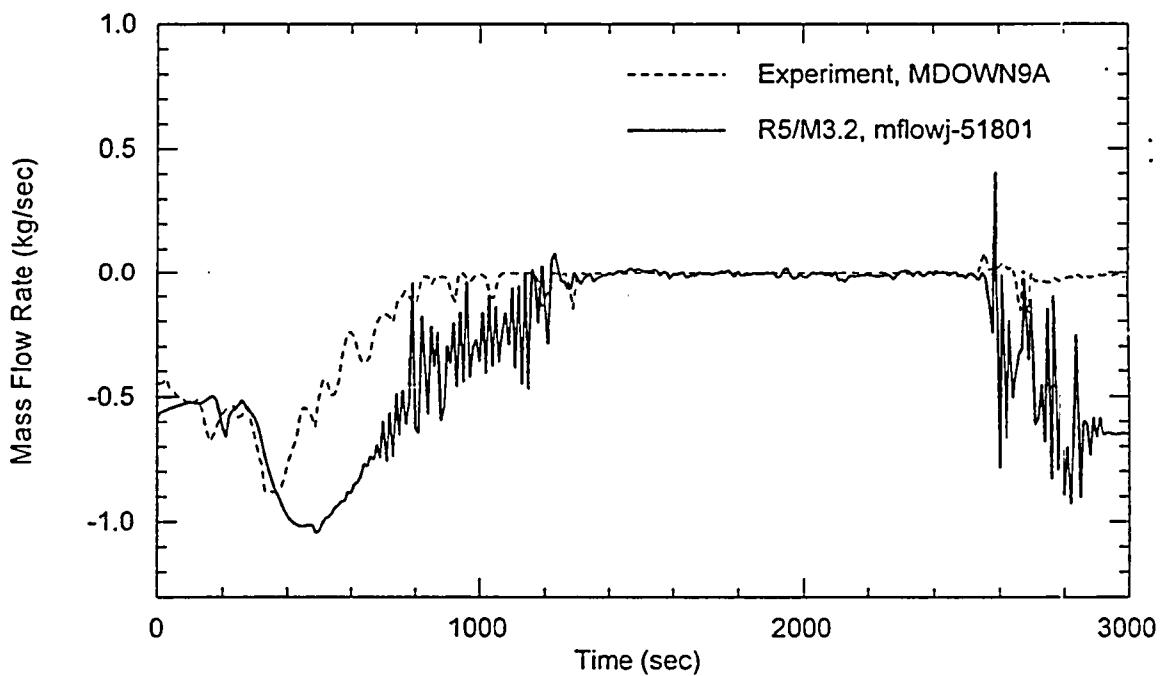


Fig.23 Comparison of Downcomer Mass Flow

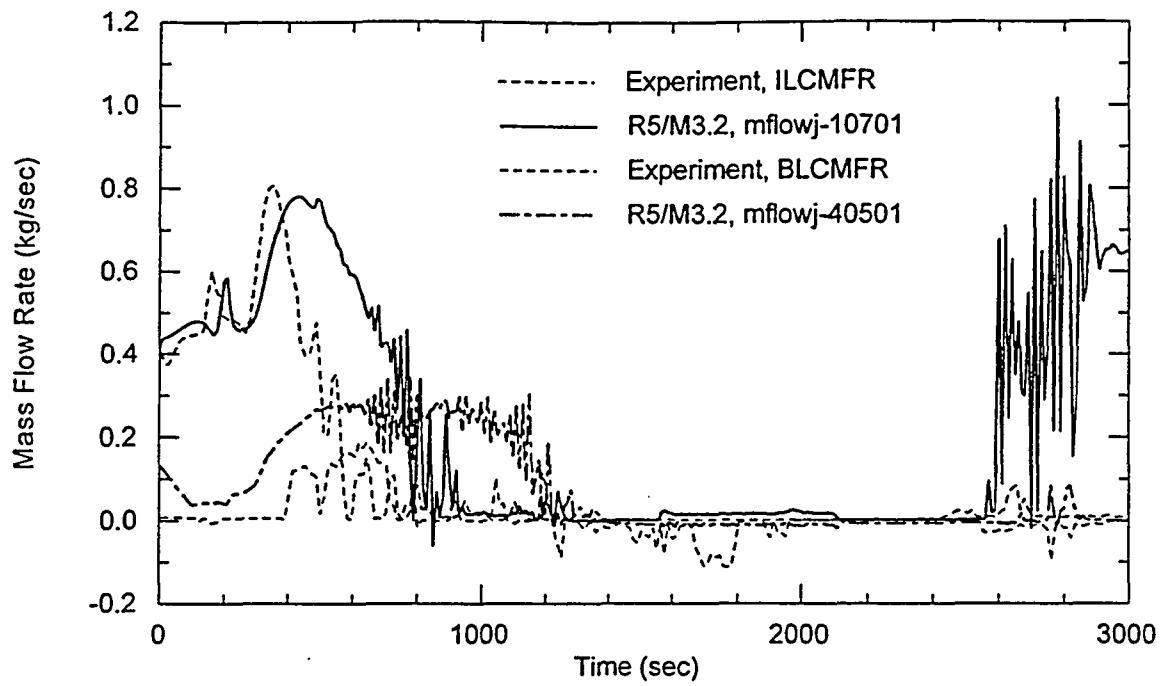


Fig.24 Comparison of Mass Flow Rate at Intact Loop Cold Leg and Broken Loop Cold Leg

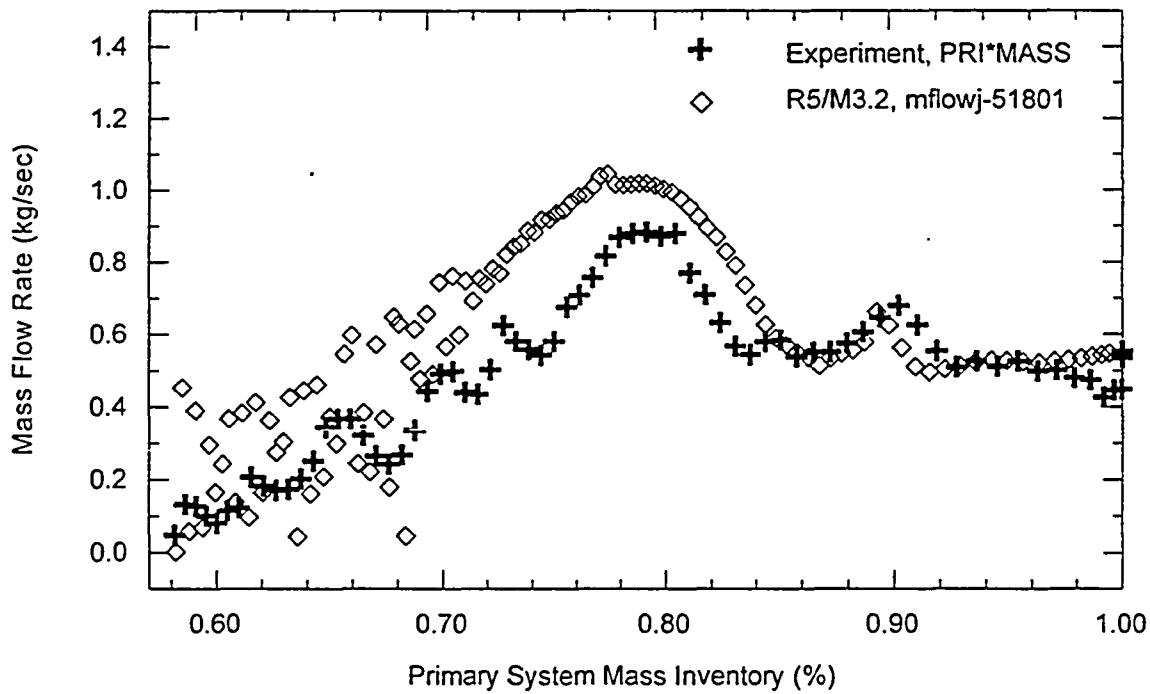


Fig. 25 Comparison of Downcomer Mass Flow Rate versus Primary System Inventory

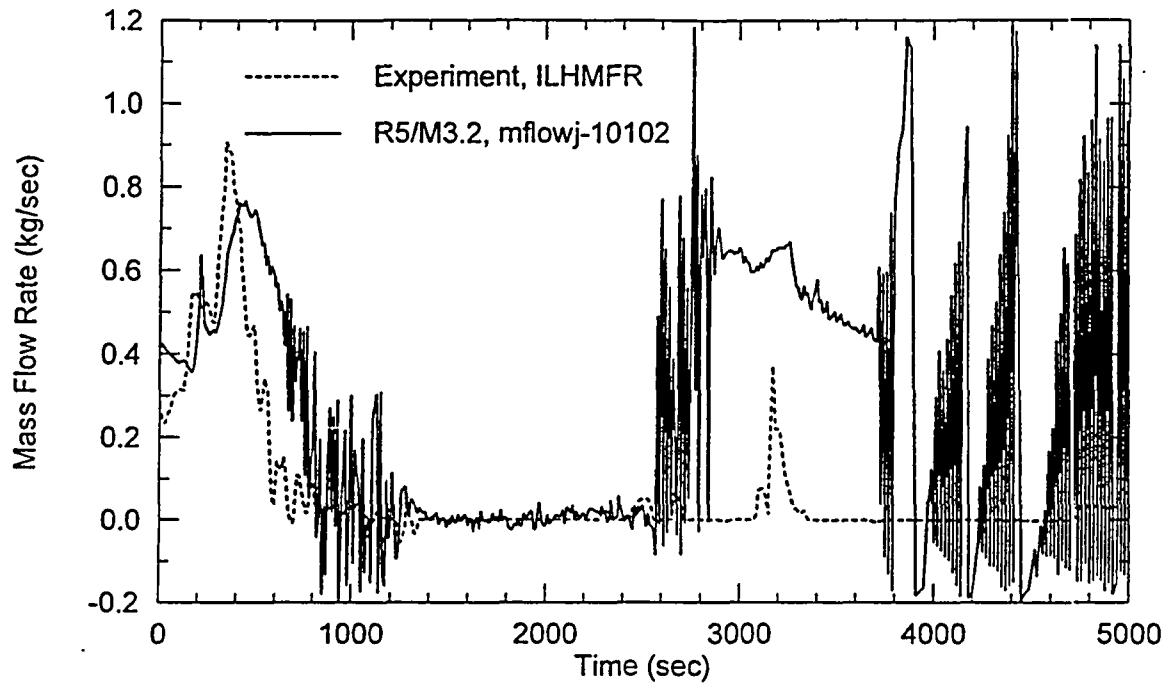


Fig.26 Comparison of Mass Flow Rate at Intact Loop Hot Leg

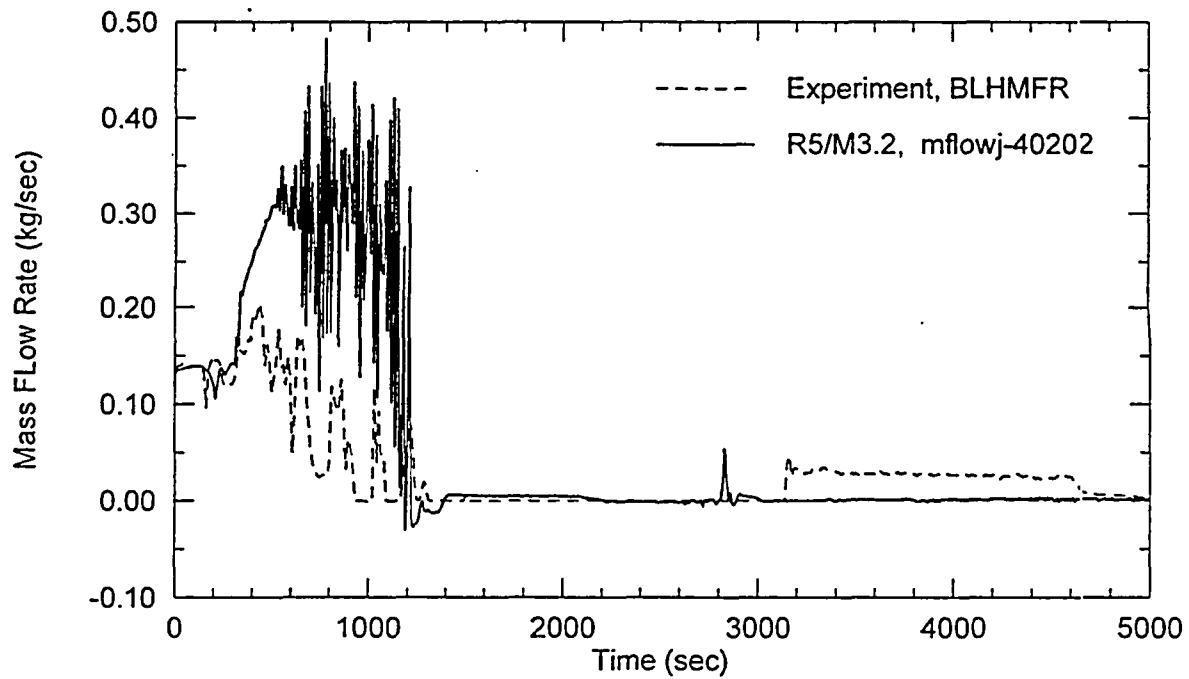


Fig.27 Comparison of Mass Flow Rate at Broken Loop Hot Leg

#### IV.1.5 Accumulator Injection Behavior

Figures 28 shows accumulator injection flows both at intact loop cold and at broken loop cold leg. The RELAP5 calculation shows drastic peaks at the beginning of injection and then oscillatory and discontinuous behavior due to condensation effect. Since the experimental data on accumulator flow was not available, predictability could not be discussed. However, it was believed that the current calculation result was not realistic because loop flow was highly over-estimated after accumulator injection, as mentioned previously. The effect of inaccurate accumulator injection behavior will be discussed at the next section.

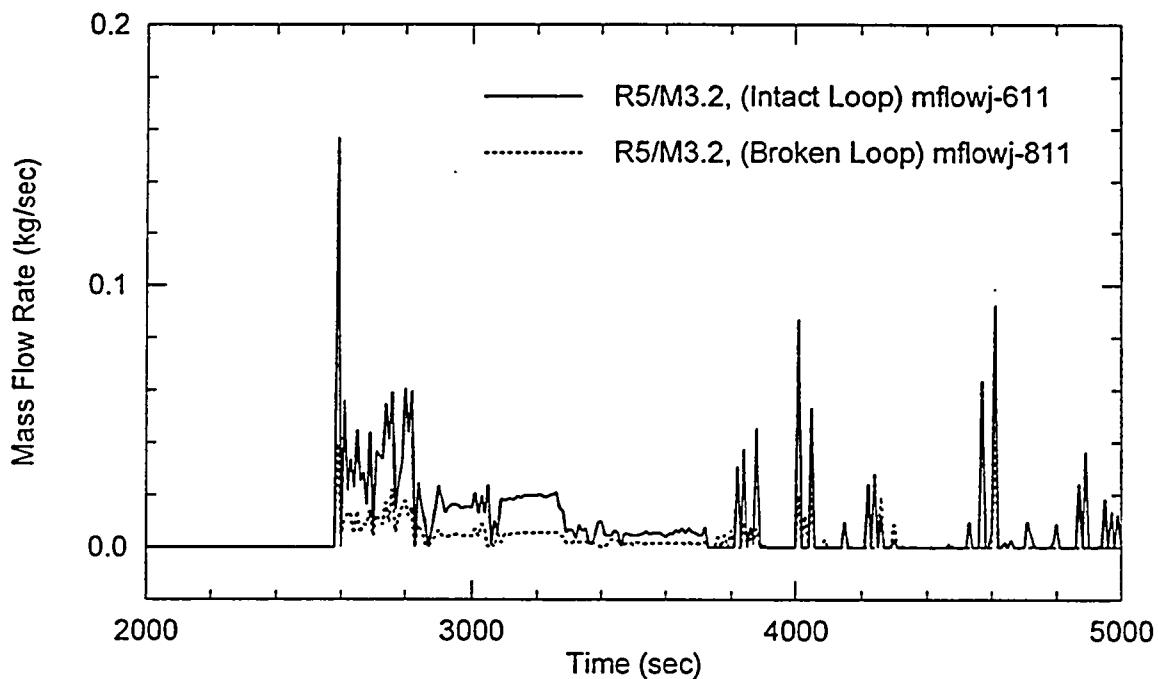


Fig.28 Comparison of Accumulator Injection Flow Rate

#### IV.1.6 Thermal Response

Figures 29 shows a comparison of fluid temperature at the intact loop hot leg between the prediction and the measurement. Prior to the experiment, the intact loop fluid was circulated by a natural convection mechanism. As the break open, a void was formed, the core power reduced to the decay heat level, and then the difference in temperature between hot leg and cold leg was also reduced. After cold leg flashing, the coolant temperature remained almost constant or reduced slightly due to secondary side steam leak. At 2100 sec, the SG feed-and-bleed operation caused the fluid to cooldown.

The RELAP5 prediction shows a good agreement with the experiment data. The small deviation after 2100 sec were believed a difference in data channel. The experiment data was measured at the centerline of hot leg pipe, i.e., mixture temperature, in which a water level behavior was included. However, the calculation result was for averaged liquid temperature.

Figure 30 shows a comparison of fluid temperature at intact loop cold leg. The predicted temperature was well-agreed with the experimental data. Some oscillatory behavior after 2500 sec was due to accumulator injection.

Figures 31 shows comparison of fluid temperatures at broken loop hot leg. This figure shows the broken loop hot leg experienced an almost identical behavior to that at the intact loop. The predicted temperature was well-agreed with the experimental data before 2600 sec. The underprediction after 2600 sec was believed a difference in measurement location, as explained above (i.e. centerline measurement in experiment versus liquid temperature in calculation).

The coolant temperature at broken loop cold leg was already mentioned at Figure 15, which also showed the overall behavior was well predicted.

Figures 32 shows comparison of the core rod temperatures between the prediction and the experiment at elevation of 291 cm. The experiment data shows an initiation of rod heat-up at 2000~2500 sec. Also the experiment data shows a turnaround of rod temperature and quenching at the timing of loop seal clearing of the broken loop. However, in the RELAP5 prediction, no heat-up and quenching were found.

As already mentioned at loop seal behavior and core level behavior, due to the small differential pressure between hot leg and cold leg, the predicted core level was not decreased at 1800 sec, as shown in Figure 22, therefore, the core rod was covered with water, the rod surface temperature remained constant. Also, the calculation did not show a loop seal clearing and the related core level recovery, therefore, no quenching.

Based on the analysis above, it is found that the improvement of loop seal behavior prediction is necessary to predict the core thermal response accurately.

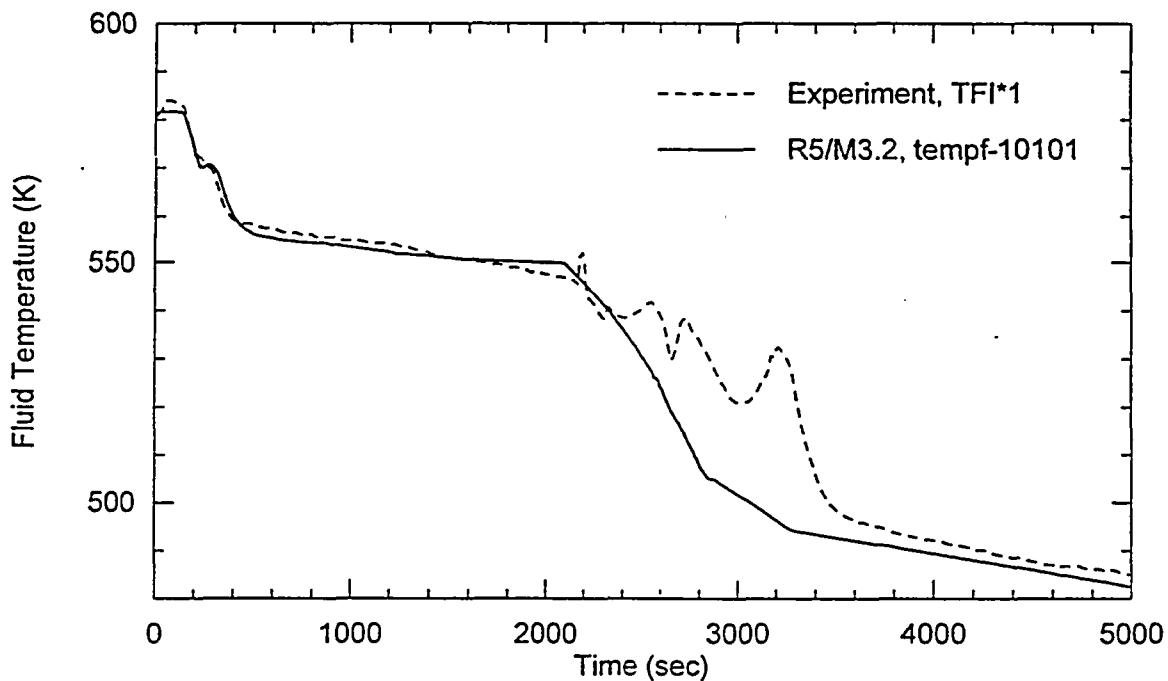


Fig.29 Comparison of Fluid Temperature at Intact Loop Hot Leg

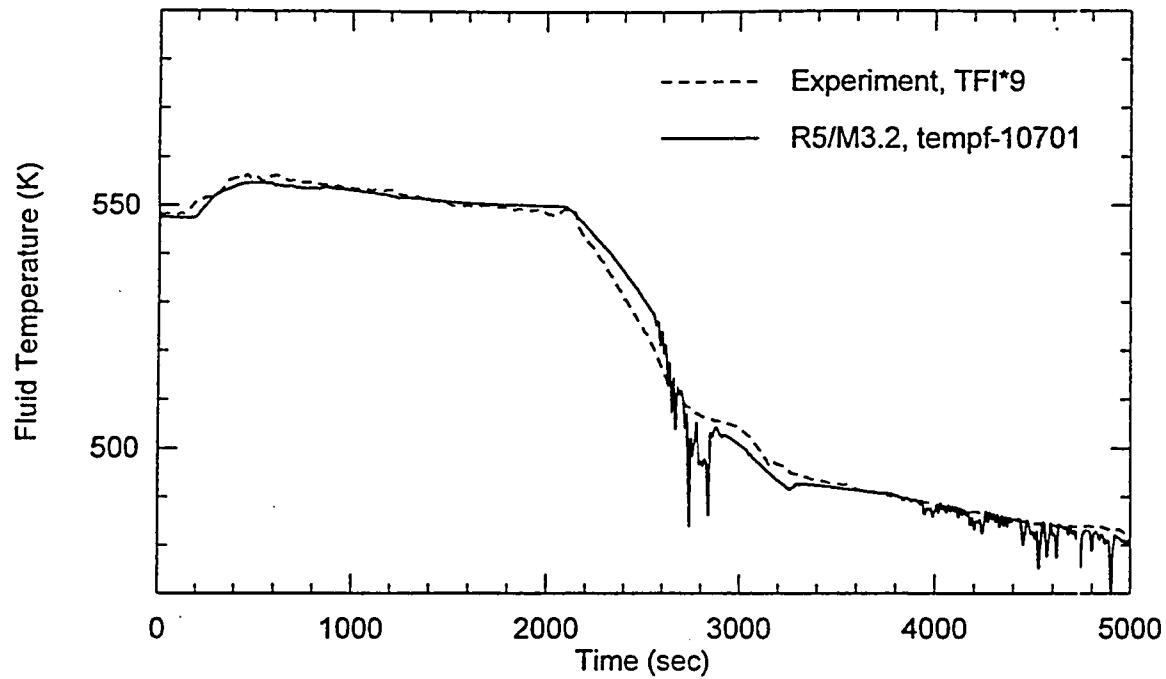


Fig.30 Comparison of Fluid Temperature at Intact Loop Cold Leg

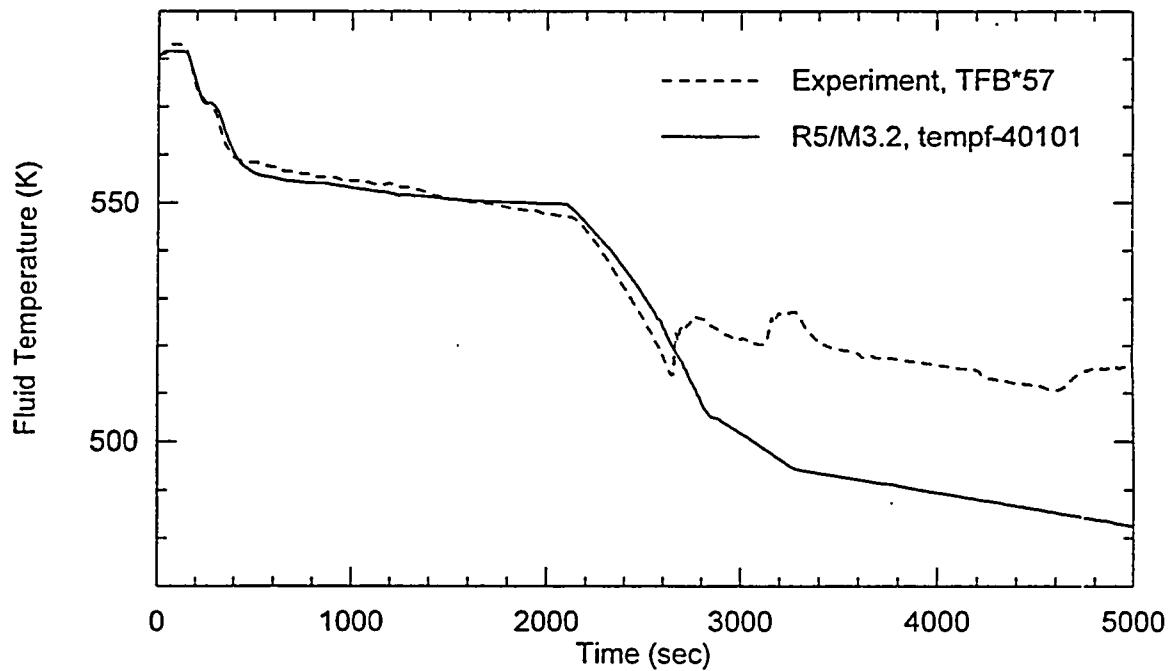


Fig.31 Comparison of Fluid Temperature at Broken Loop Hot Leg

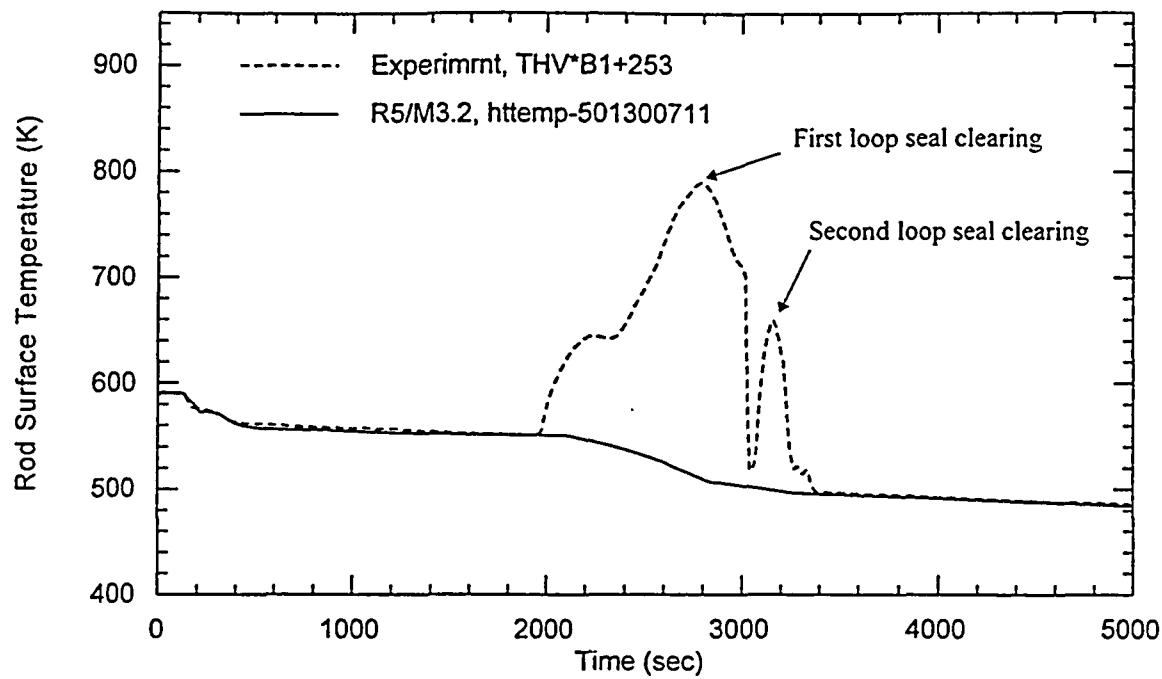


Fig.32 Comparison of Rod Surface Temperature at Elevation of 253 cm

## IV. 2 Sensitivity Study

As mentioned previously, two calculations were additionally attempted to find out effects of reactor vessel core modeling (T01) and of ECCMIX component (E01) on the improvement of code prediction. Each calculation result is described, compared with the base case result, and discussed in this section.

### IV.2.1 Effect of Two Core Channel Model (T01)

The case T01 adopted two parallel flow channels for reactor vessel core, in which crossflow junctions were used to link each channel as shown in Figure 4. This approach is based on that the two parallel channels and crossflow junctions may result in natural circulation flow path in reactor vessel core, which was not considered in single channel model.

Figure 33 shows a comparison of the calculated differential pressure between hot leg and cold leg of the intact loop. Two differential pressures were almost identical until 900 sec, approximately, and then diverged. Even if the difference did not exceed 10 kPa, it had significant effect on loop seal behavior because loop seal behavior was sensitive for differential pressure range of 10~20 kPa.

The difference after 900 sec was considered due to an effect of two core channel model. In single channel model, there was a little difference between hot leg pressure and cold leg pressure, therefore, it was not sufficient to move the fluid in loop seal. However, in two-core channel model, there may exist natural circulation flow path in the core. Those natural circulation flow may enlarge the difference between hot leg and cold leg, due to phase separation within the core. And it is believed as a physical phenomena.

Such an effect can be clearly found in loop seal behavior. Figure 34 shows a comparison of differential pressure at SG-side pipe in the intact loop crossover leg between the base case and the case T01. It is shown that the two core channel model can predict the formation of loop seal, loop seal level decrease due to steam pressure, level re-increase at SG feed-and-bleed, and loop seal clearing much better than the single core channel.

Of course, there were some discrepancies even in two core channel model result such as timing of loop seal formation and depth of loop seal level decrease. However, it is believed

such differences are within allowance limit of accuracy (less than 5 kPa). Also it was found that the timing and depth loop seal behavior can be adjusted through tuning the junction area and loss coefficient at J535, although the result were not presented in this report.

The Case T01 shows a noticeable discrepancy after 2500 sec, i.e., accumulator injection. It may be related not only with accumulator injection behavior, but also with code model such as condensation, and interfacial drag model in the code.

Figure 35 shows a comparison of core liquid level, in which the improvement of level behavior prediction by using two core channel model can be clearly observed. Especially, it is emphasized that the core uncover, which was clearly observed in the experiment, can be predicted by the two core channel model not by single core channel model. And the problem of accumulator injection can be also found in core level behavior.

Figure 34 shows a comparison of core heater rod surface temperature at 253 cm elevation between the base case and the case T01. As mentioned previously, in accordance with core level behavior, core heatup was predicted by two core channel model.

Even in two core channel model result, there were some differences in rod heatup prediction such as the first small peak in rod surface temperature, the overprediction during the second peak, and no quenching in the second peak, which were due to inaccuracy of code prediction of core liquid level behavior. Especially in the second peak, the rod temperature exceed 1200 K, which resulted in calculation failure at 3980 sec.

The failure of two core channel model calculation was due to stop of accumulator injection from 3000 sec as shown in Figure 37. The reason for the stop of accumulator injection was a sudden excursion of primary system pressure from 2960 sec, as shown in Figure 38, which was not currently understood.

Based on the discussion above, the two core channel model can predict a more realistic loop seal behavior than the single core channel model. However, the pressure response problem related to the accumulator injection behavior should be resolved to improve the realistic core heatup prediction.

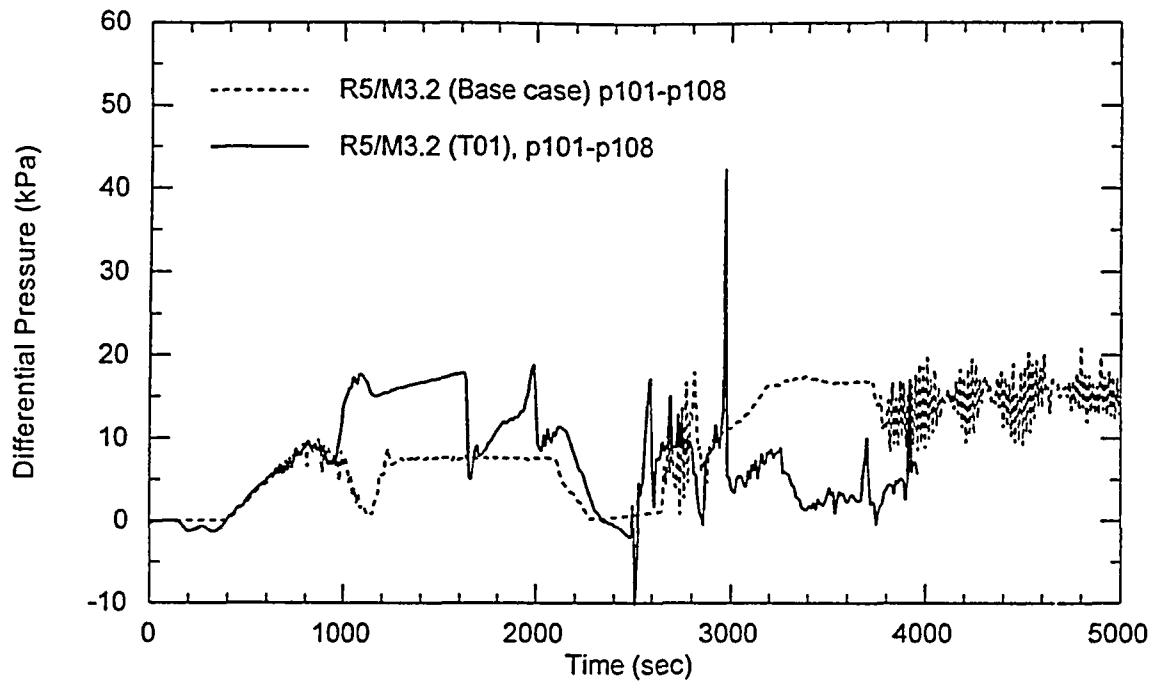


Fig33 Comparison of Hot Leg-to-Cold Leg Differential Pressure Between Base Case and Case T01

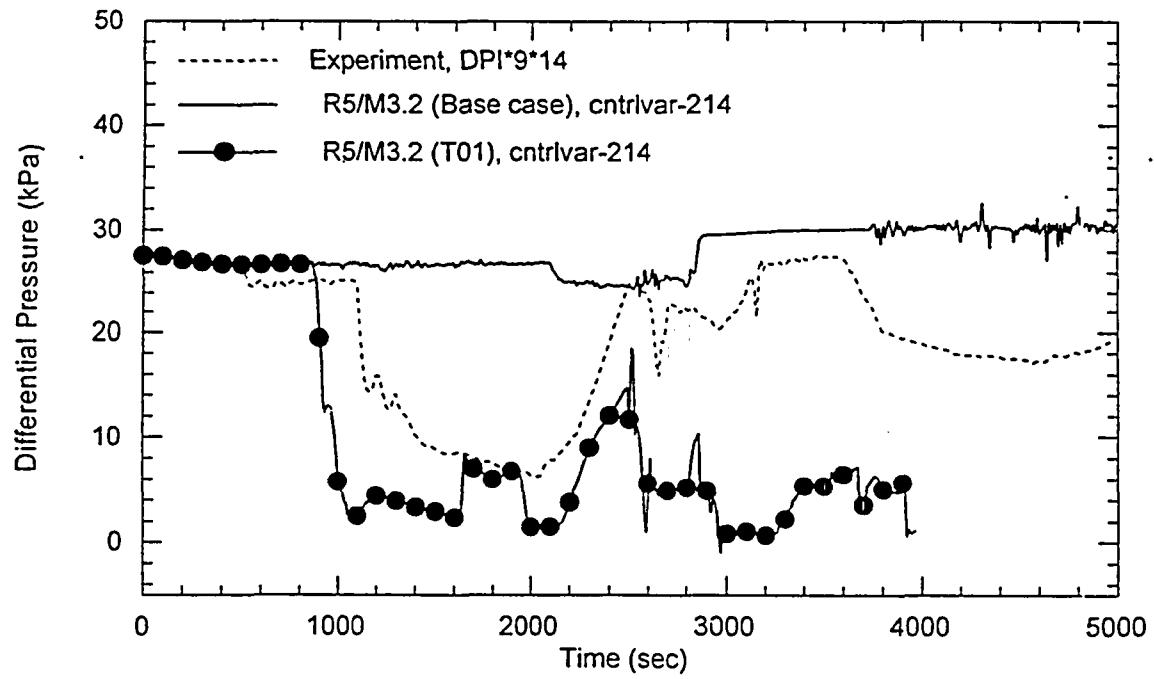


Fig.34 Comparison of Differential Pressure at Intact Loop SG side Crossover Between Base case and Case T01

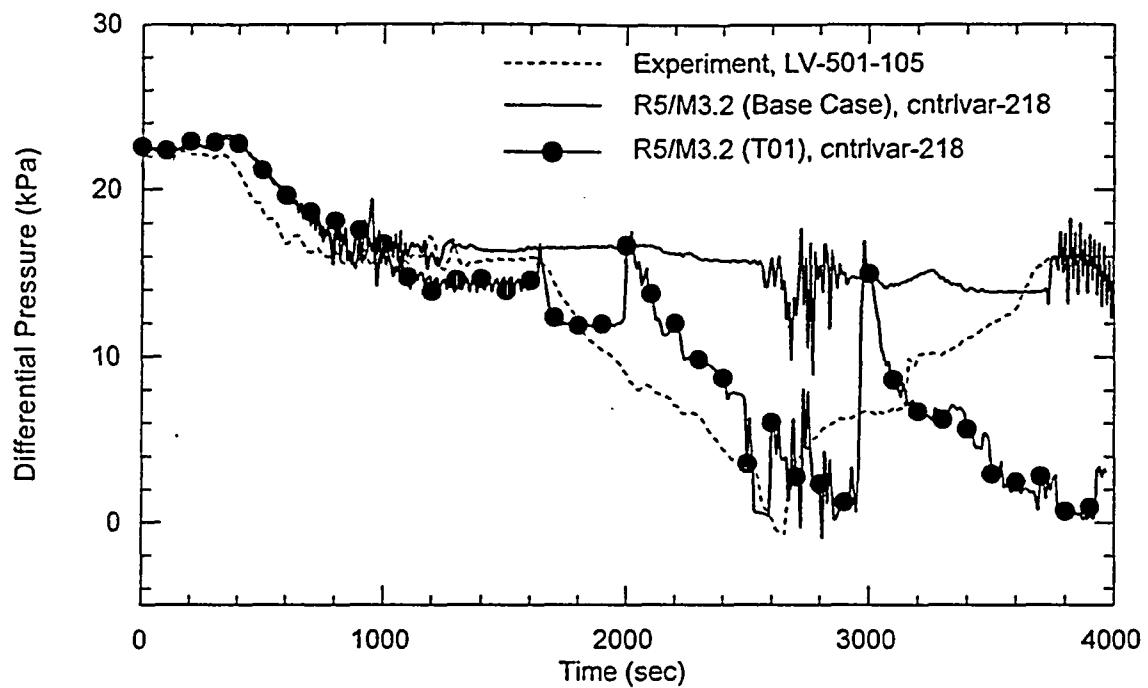


Fig.35 Comparison of Core Liquid Level Between Base Case and Case T01

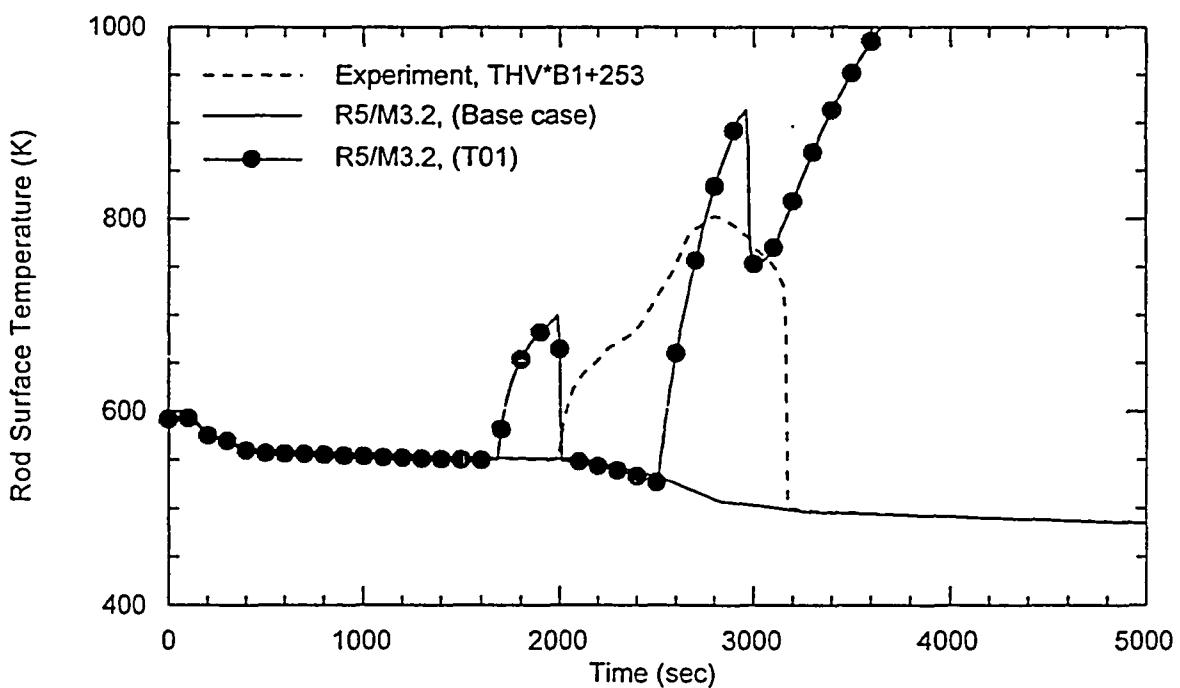


Fig. 36 Comparison of Rod Surface Temperature at Elevation 253 Between Base Case and Case T01

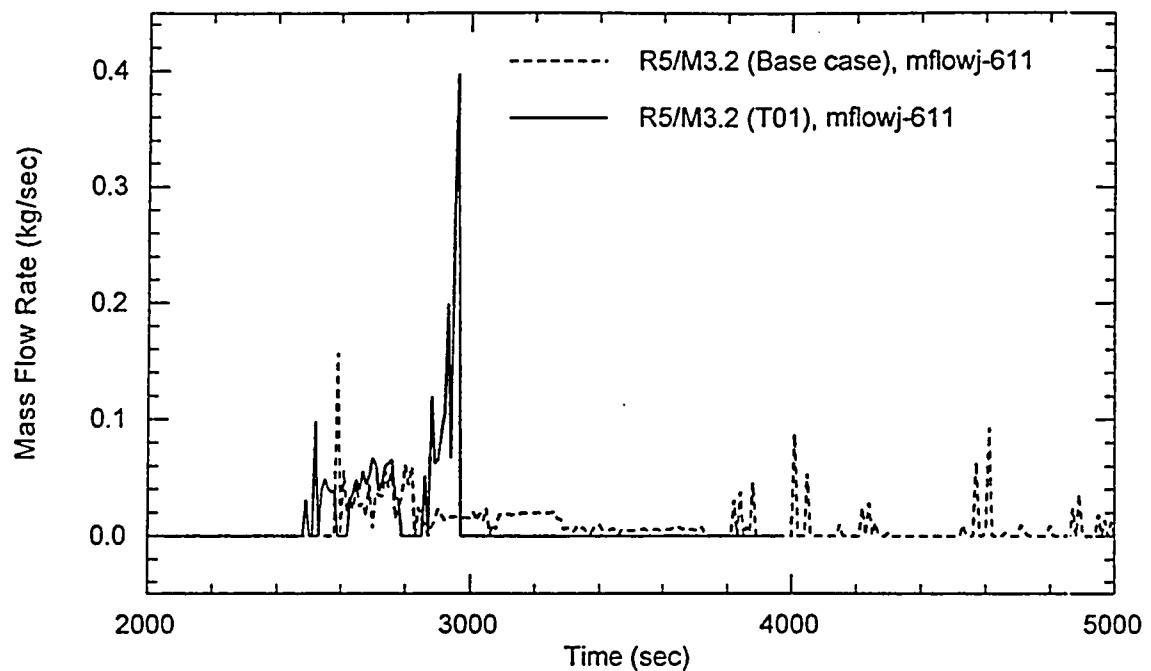


Fig.37 Comparison of Accumulator Injection Flow Rate Between Base Case and Case T01

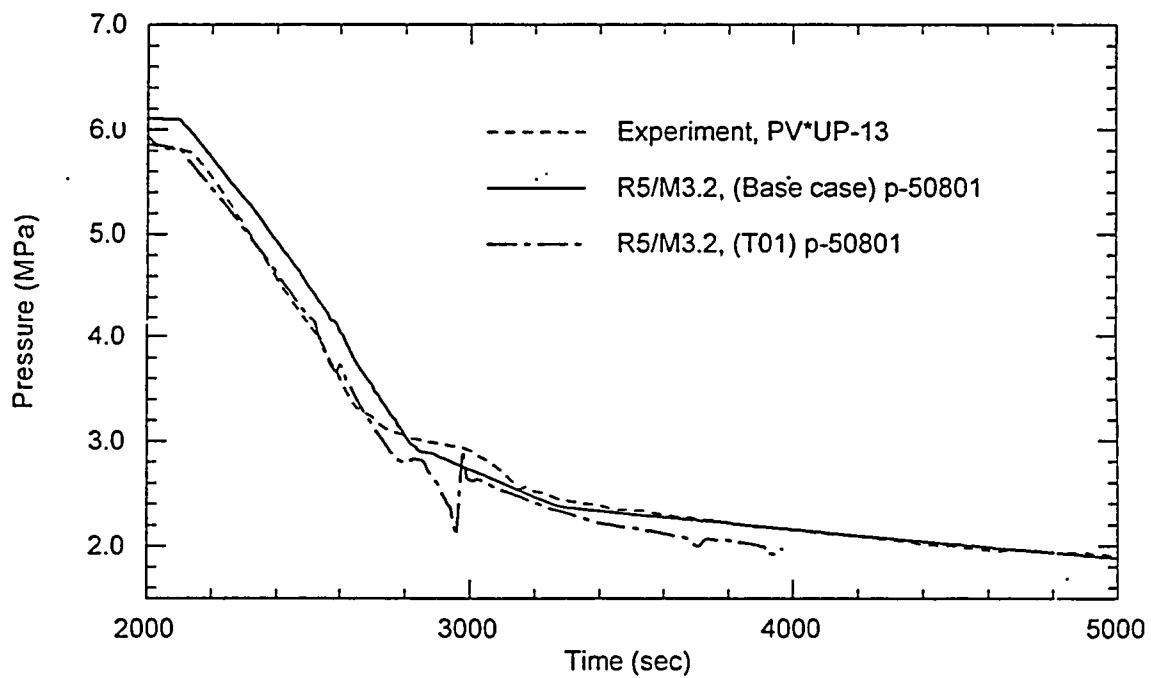


Fig. 38 Comparison of Primary System Pressure Between Base case and Case T01

#### IV.2.2 Effect of ECCMIX Component Model (E01)

To investigate a possibility of improvement in accumulator injection behavior, ECCMIX component was attempted both in intact loop cold leg and in broken loop cold leg. In intact loop cold leg, the ECCMIX component replaced the branch component (volume 107), while a ECCMIX component was added at the outlet of volume 404, and volumes of adjacent components were adjusted. The ECCMIX component has its own flow regime map and the related closure correlations, therefore, it is expected that the different result can be obtained using ECCMIX component on the accumulator injection behavior.

Figures 39 shows a comparison of accumulator injection flow rate between two cases adopting two core channel model (Case T01 and E01). Compared to the case T01, the result of the case E01 shows a more injection water delivery to the core at initial injection stage (*2500 to 2700 sec*). And the peak injection flow of the case E01 was larger than that of the case T01.

Figures 40 and 41 show comparisons of core liquid level behavior and rod surface temperature for two cases, respectively. In core level behavior (Figure 36), big difference between the case E01 and the case T01 is not shown. In Figure 37, the case E01 did not predict an early heatup in rod surface temperature, while the case T01 did. And it was also identified in core level behavior during the same time period. Currently, the reason for the difference was not understood, it can be interpreted the ECCMIX component may change a different inventory distribution.

Figure 42 shows a comparison of differential pressure at intact loop SG side crossover leg. The result from the case E01 shows a more realistic level behavior when compared to T01 case.

As mentioned above, there were more injected water in the case E01 than the case T01, as a result, the case E01 predicted a temporary level increase at *2600 sec* (Figure 40). Consequently, the heatup time was delayed when compared to the case T01.

In the case E01, there was a sudden peak injection (*0.7 kg/sec*) at *3100 sec*. the resultant core heatup was likely to be stopped, and core rod heatup behavior was much close to the experiment one. However, since the case E01 calculation was failed at *3160 sec* due to water

property failure at volume 407 (broken loop ECCMIX component), the upcoming behavior cannot be expected. A additional calculation was attempted with reducing the maximum time step to *0.001 sec*, to avoid the failure, which was not presented this report, the result was almost the same as the case E01.

Based on above discussion, the ECCMIX component model still provided a discontinuous injection behavior, however, a instantaneous injection flow rate was large when compared to the cases not adopting the ECCMIX component. As a result, core heatup behavior could be improved. It can be expected that the use of ECCMIX component may improve core heatup behavior prediction if other TH phenomena was correctly predicted.

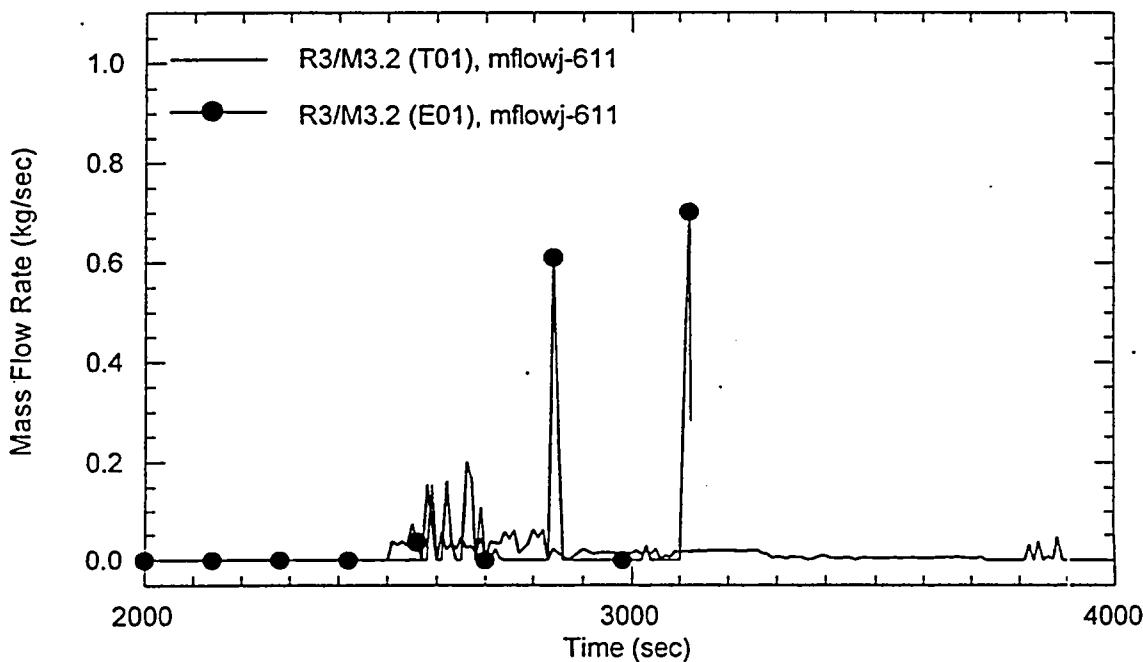


Fig. 39 Comparison of Accumulator Injection Flow Rate (Case T01 and Case E01)

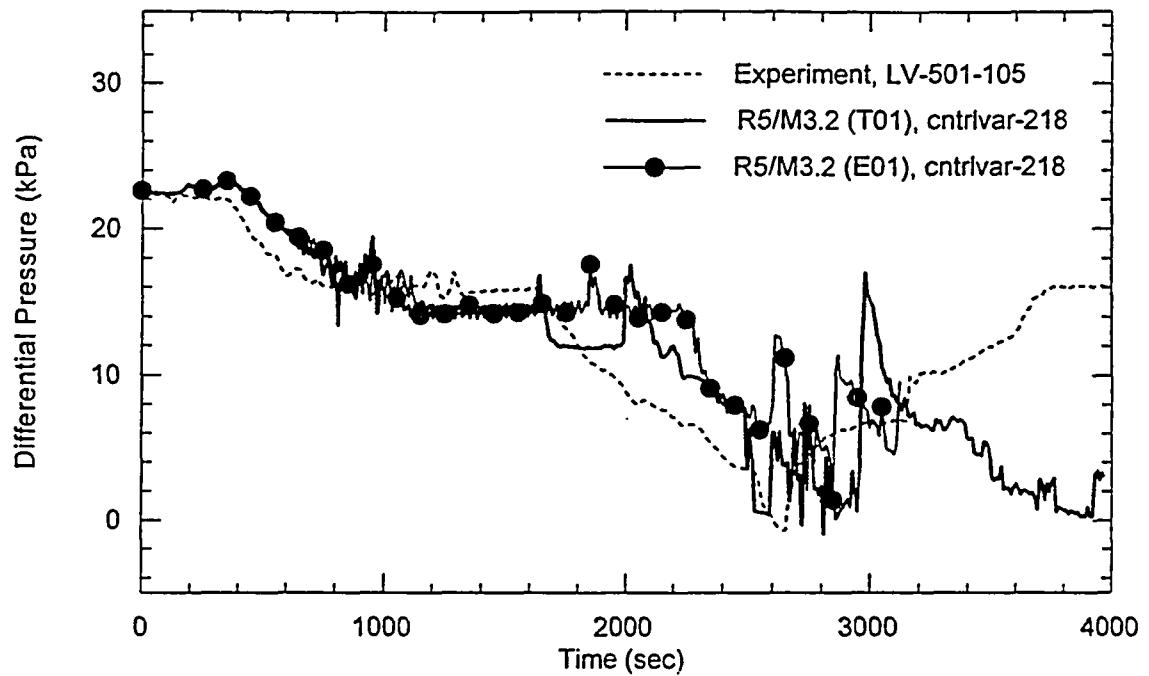


Fig. 40 Comparison of Core Liquid Level (Case T01 and Case E01)

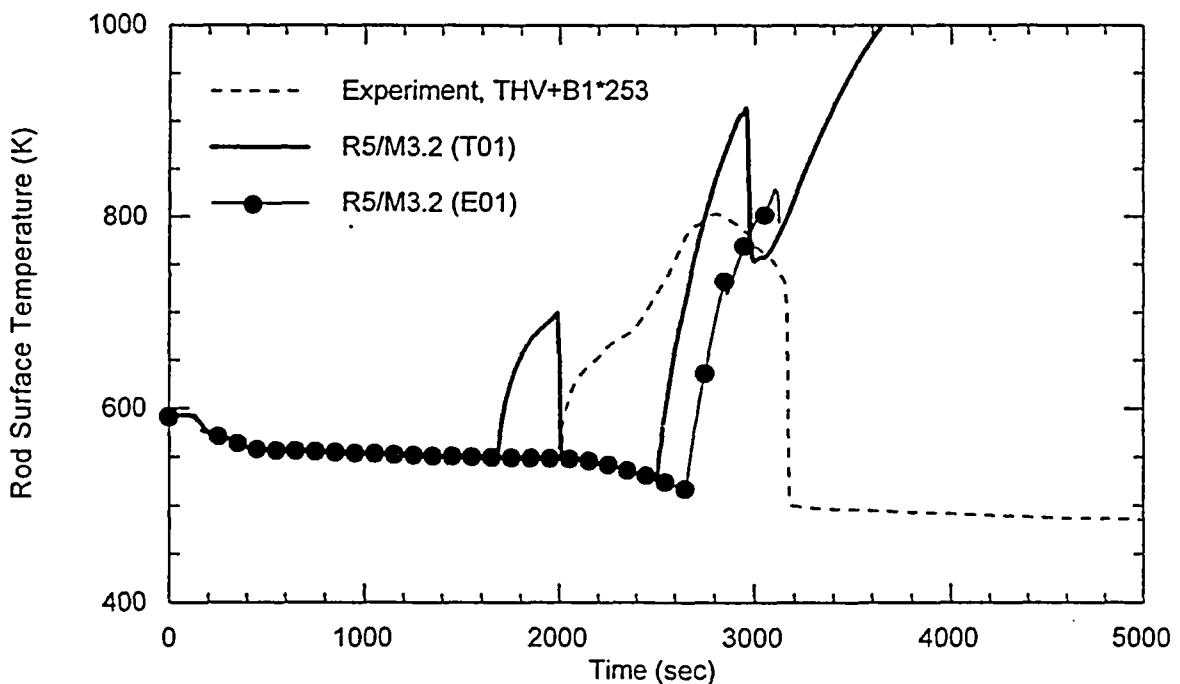


Fig.41 Comparison of Rod Surface Temperature at Elevation 253  
(Case T01 and Case E01)

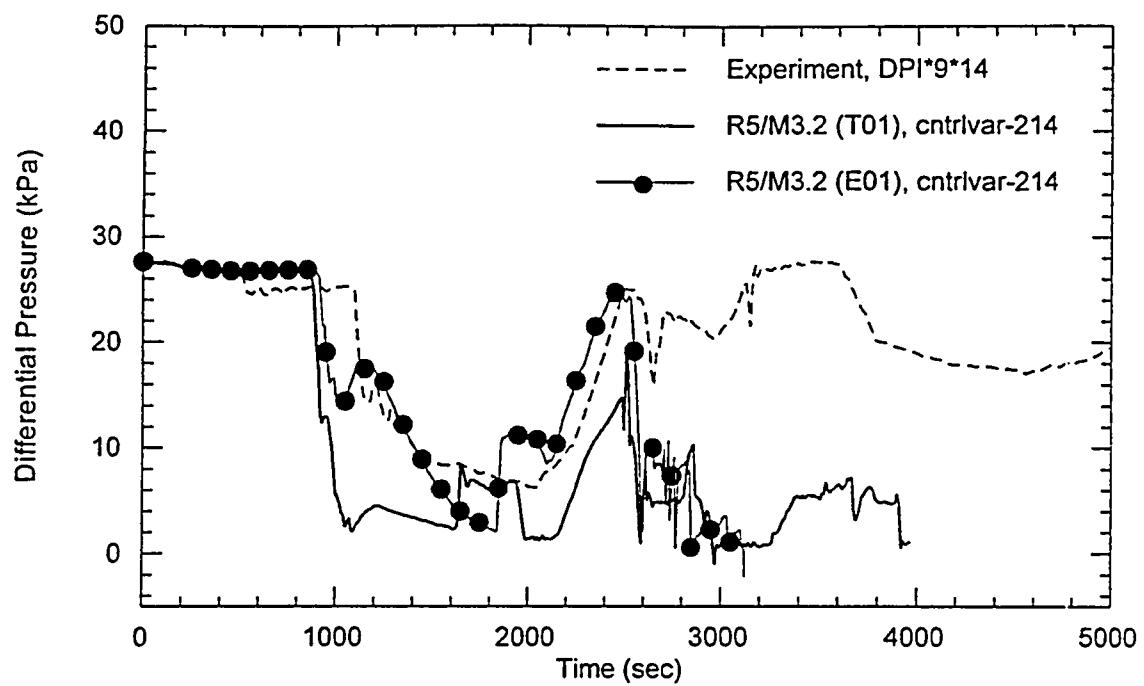


Fig.42 Comparison of Differential Pressure at Intact Loop SG side Crossover  
(Case T01 and Case E01)

### IV. 3 Run Statistics

A HP-715/50 workstation with operating system of HP-UX Version 9.0a was mainly used for the present calculations. The workstation has 32 MB main memory.

All the calculation were attempted to *5000 sec*. The base case run was successfully terminated at *5000 sec*, while the case T01 run was terminated at *3965 sec* due to the material temperature exceeding *1200 K* and the case E01 was terminated at *3122 sec* due to water property failure with minimum time step.

Figure 43 shows a comparison of the required CPU time. Figure 44, 45, and 46 shows a comparison of time step size and Courant time step with respect to the real transient time for three runs. As shown in the figures, the required CPU time was doubled by adopting two core channel model and much increased by using ECCMIX component. The slope of CPU time became steep from *800 sec*, i.e. cold leg flashing for both cases T01 and E01, however, it was not changed for the base case.

The time step size was reduced from the initial value *0.05 sec* down to *0.01 sec* for both cases T01 and E01, however, it was not changed for the base case. All the case, the time step size were less than the Courant time step.

The base case run was terminated at *5000 sec*, the required CPU time in HP workstation was *35722.0 sec* including *4.56 sec* for input processing, and the attempted advancement was 100192 time steps. Therefore, the grind time for the base case can be calculated as follows :

$$CPU\ Time, \quad CP = 35722 - 4.56 = 35717.44$$

$$Number\ of\ Time\ Step, DT = 100192$$

$$Number\ of\ Volume, \quad C = 206$$

$$Transient\ Real\ Time, \quad RT = 5000$$

$$Grind\ Time, \quad GT = (CP \times 1000) / (C \times DT) = 35717.44 \times 1000 / (206 \times 100192) \\ = 1.73\ m\ CPU\ sec/(vol-step)$$

Since the case T01 and E01 required much more CPU time and time steps, the resultant grind time is similar to the base case one.

Figure 47 shows a comparison of mass error for three cases. The mass error for both cases T01 and E01 was rapidly increased from *800 sec*, i.e. cold leg flashing, and they exceeded *70*

*kg* at 4000 sec. However, for the base case, it remained constant (less than 3 kg). Such a big difference in mass error indicated that there were much more flip-flop changes such as a rapid change in velocity during loop seal behavior, for two core channel case than for single core channel case.

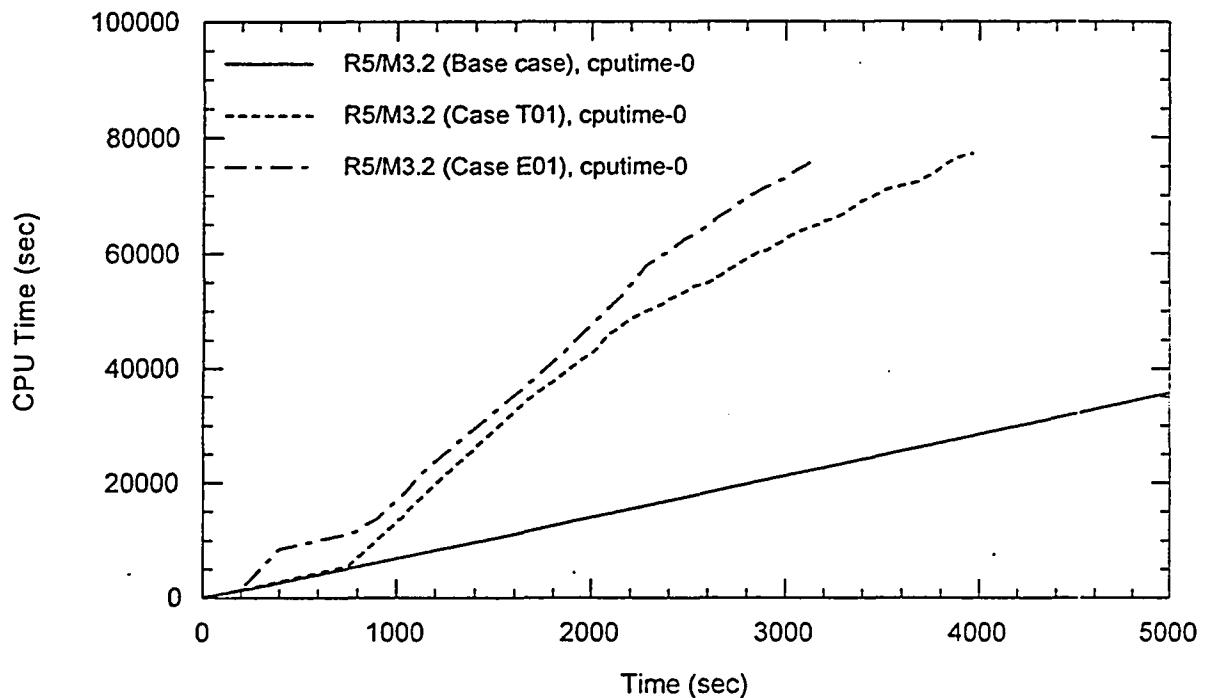


Fig. 43 Comparison of Calculational CPU

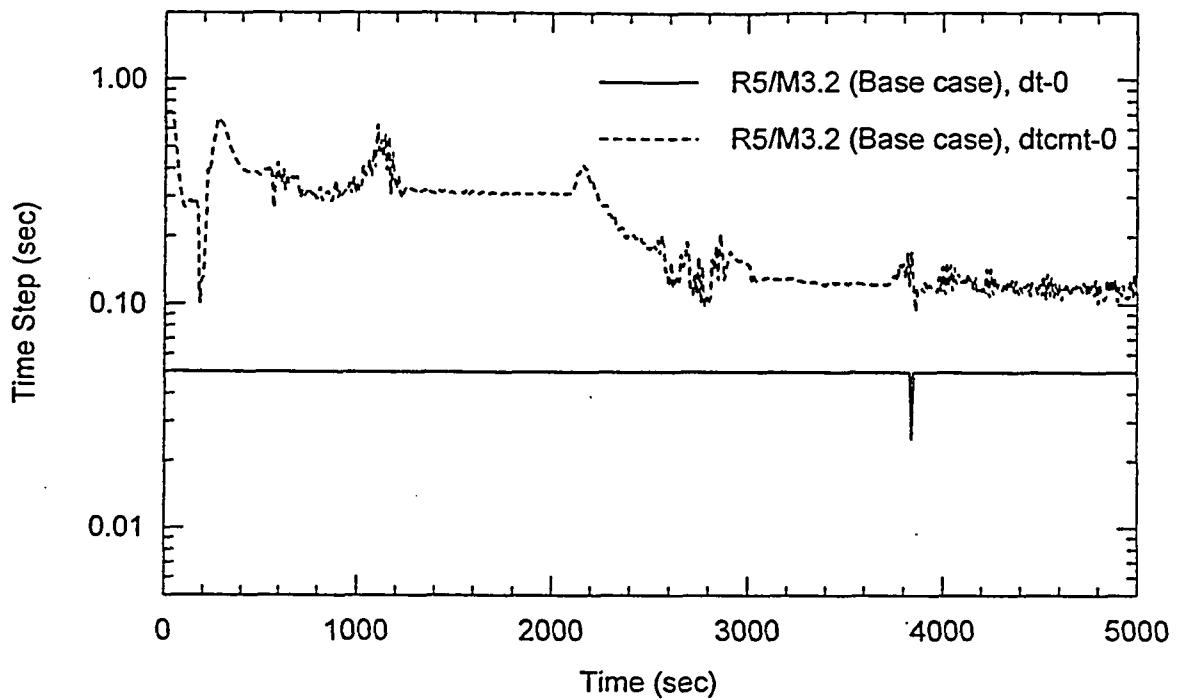


Fig. 44 Comparison of Time Step Size And Courant Time Step (Base Case)

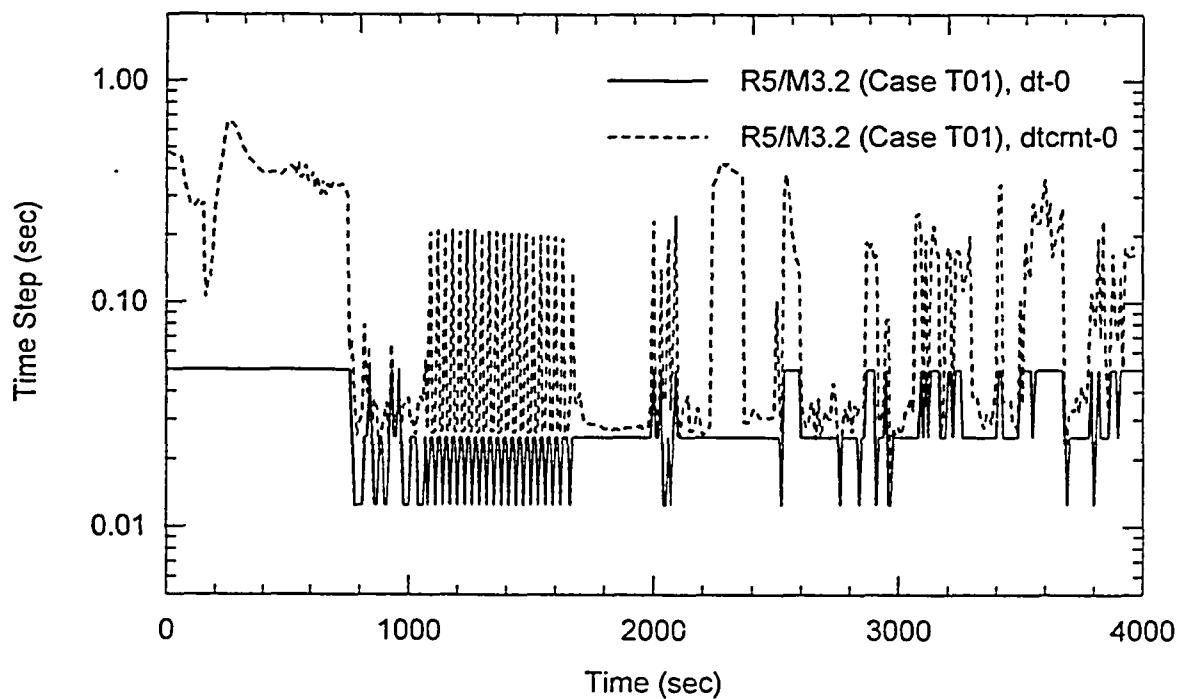


Fig. 45 Comparison of Time Step Size And Courant Time Step (Case T01)

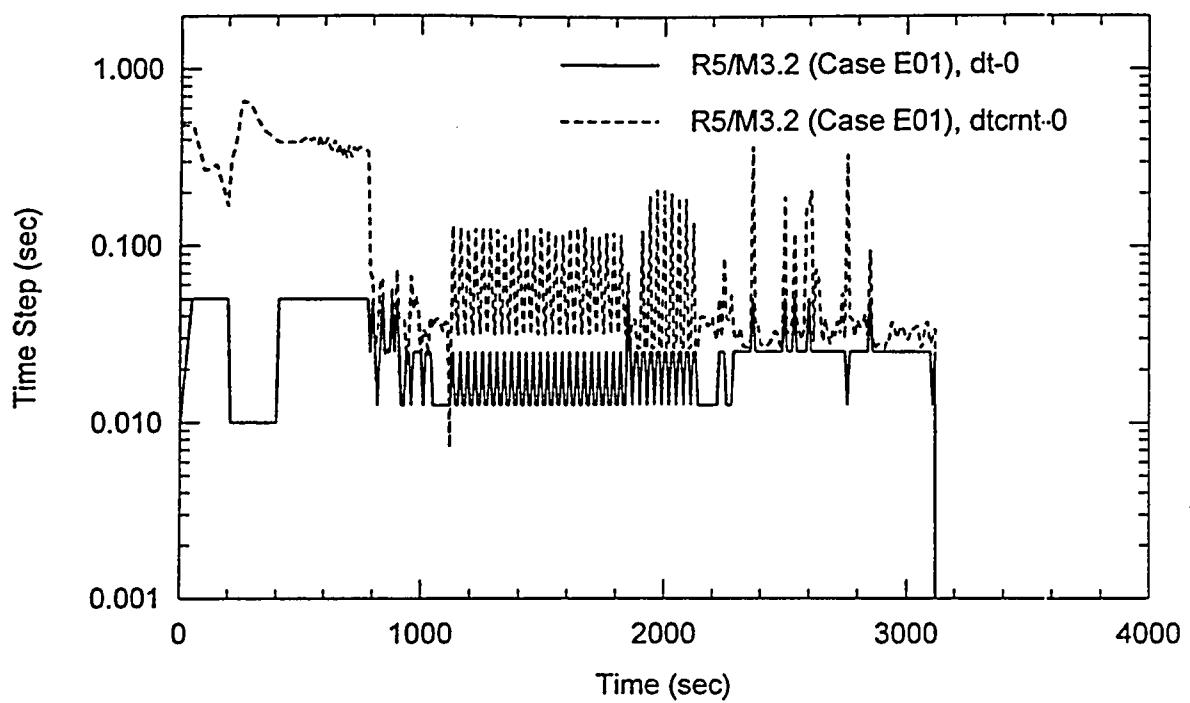


Fig. 46 Comparison of Time Step Size And Courant Time Step (Case E01)

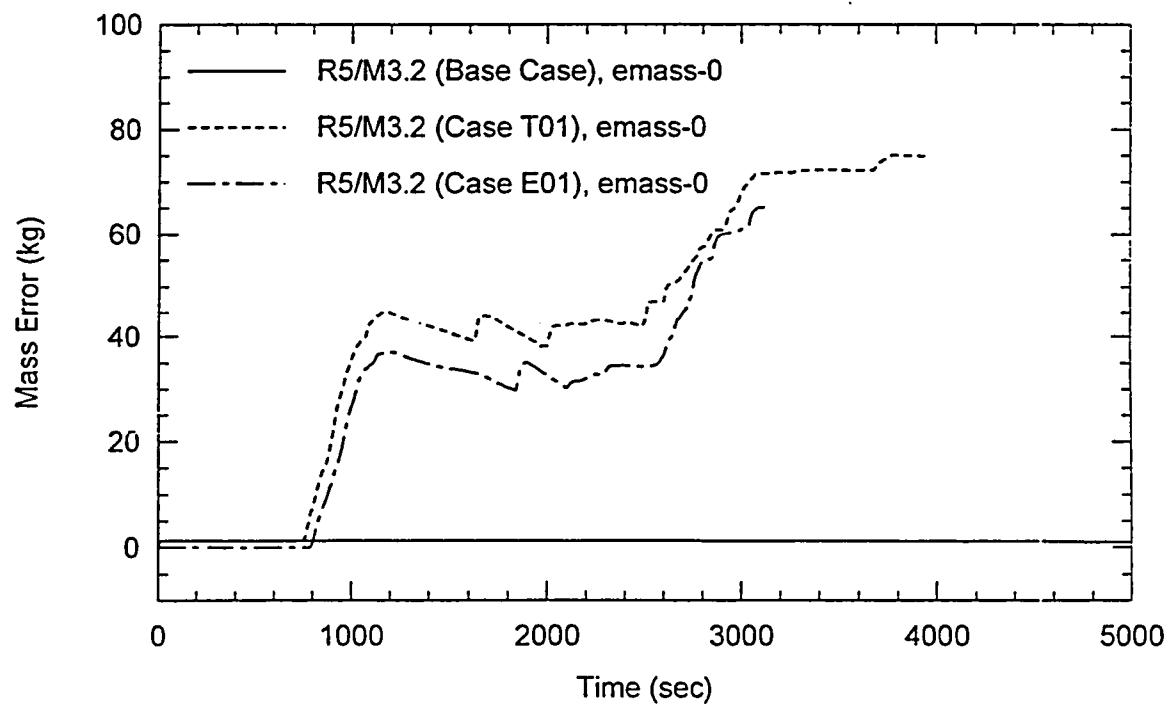


Fig. 47 Comparison of Mass Errors in Calculations

## V. Summary and Conclusions

RELAP5/MOD3.2 code was assessed with the Semiscale experiment S-NC-8B, which simulated the natural circulation induced by small break LOCA in PWR. The major thermal-hydraulic phenomena important to SBLOCA and related natural circulation were addressed. The Semiscale Mod-2A facility was modeled as suitable for simulating the experiment. The base case calculation was executed, the prediction result was compared with the experiment data, and the code predictability on the important thermal-hydraulic phenomena was discussed. Sensitivity calculations were attempted to investigate the problems identified in base case calculation and to find out the effects of two core channel model and of ECCMIX component model on the improvement of predictability. The followings are obtained from this study:

- 1) The important thermal-hydraulic phenomena in this kind of SBLOCA and related natural circulation were identified as system depressurization, break flow in saturated and stratified condition, loop seal behavior, natural circulation in two-phase mode and reflux mode, core thermal response, and accumulator injection behavior.
- 2) As a base case a RELAP5 calculation input was developed with adopting single core channel model, steam leak model, etc. And for investigating nodalization sensitivity, additional two RELAP5 calculation input were developed using two core channel model and ECCMIX component model, respectively.
- 3) RELAP5 MOD3.2 can predict well the overall thermal-hydraulic behavior such as system depressurization and natural circulation through the loops during S-NC8B experiment, using base case modeling. However, some discrepancies were identified in underprediction of saturated break flow, deviation of loop seal behavior, and resultant discrepancy in core thermal response were identified.
- 4) Two core channel model can provide an improvement in prediction of major thermal-hydraulic phenomena, especially of loop seal behavior and resultant core thermal response. However, it was found that discontinuous accumulator injection was yet one of the most challengible problem in two core channel model calculation.
- 5) ECCMIX component, to some extent, can also improve an early accumulator injection

behavior and core thermal response. However, it cannot basically resolve the accumulator injection problem in this slowly-depressurizing transient.

- 6) Based on the base case calculation and sensitivity study, the current RELAP5/MOD3.2 code with two core channel model and ECCMIX component model has an general capability to predict SBLOCA specific phenomena. However, accumulator injection problem should be resolved through the extensive modeling study and/or appropriate code model improvement.

## References

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- [2] The RELAP5 Development Team, *RELAP5/MOD3 Code Manual*, NUREG/CR-5535, January 1992.
- [3] G.G.Loomis, et.al., *Quick-Look-Report for Semiscale Mod-2A Tests S-NC-8A and S\_NC-8B*, EGG-SENI-5678, December 1981.
- [4] M.T.Leonard, *RELAP5 Standard Model Description for the Semiscale Mod-2A System*, EGG-SEMI-5692, December 1981
- [5] Gary Johnsen, *RELAP5 Code Development Status*, Spring CAMP Meeting, Madrid, May 1996
- [6] C.C.Wang and L.N.Kmetyk, *RELAP5 Assessment : Semiscale Natural Circulation S-NC-3, S-NC-4 and S-NC-8*, NUREG/CR-3690, May 1984
- [7] G.G.Loomis, K.Soda, *Experimental Operating Specification for the Natural Circulation Test Series (Series NC) Semiscale Mod-2A*, EGG-SEMI-5427, April 1981.

**Appendix A**

**RELAP5 Input Listing for Base Case**



## Steady State Input Deck for Base Case Run

```

= semiscale mod 2a -- nc8 configuration (2-loop)
0000100 new stdy-st
0000101 run
0000105 30.0 32.0
0000110 nitrogen
*0000201 1.0 1.0e-06 0.01 2 10 250 4000
0000202 800.0 1.0e-06 0.1 2 8000 8000 8000
0000501 time 0 ge null 0 -1.0 1 * always true
0000502 time 0 lt null 0 -1.0 n * always false
*
* steady state trip : alway true
*
0000599 time 0 ge null 0 0.0 1 *always true
*****
*** intact loop piping
* intact loop piping
*
***** cntrlvar 917 * pqr liquid volume
*301 cntrlvar 918 * pqr liquid volume error
*302 cntrlvar 921 * letdown error
*303 cntrlvar 937 * intact loop hot temperatur error
*304 cntrlvar 947 * broken loop hot temp error
*305 cntrlvar 961 * intact loop sg level
*306 cntrlvar 971 * broken loop sg level
*307 cntrlvar 962 * IL SG Level error
*308 cntrlvar 963 * BL SG Level error
310 mflowj 101020000 * intact loop mass flow
311 mflowj 401020000 * broken loop mass flow
312 p 301010000 * pressurizer top pressure
313 p 204010000 * IL SG steam pressure
314 p 704010000 * BL SG steam pressure
315 cntrlvar 101 * intact loop hot leg mass
316 cntrlvar 102 * intact loop crossover leg mass
317 cntrlvar 103 * intactloop cold leg mass
318 cntrlvar 104 * intact loop s/g primary mass
319 cntrlvar 105 * broken loop hot leg mass
320 cntrlvar 106 * broken loop sg primary mass
321 cntrlvar 107 * broken loop crossover leg mass
322 cntrlvar 108 * broken loop cold leg mass
323 cntrlvar 109 * reactor vessel core and etc mass
324 cntrlvar 110 * reactor downcomer mass
325 cntrlvar 201 * intact loop secondary mass
326 cntrlvar 202 * broken loop secondary mass
327 cntrlvar 301 * pressurizer mass
328 cntrlvar 111 * total primary mass
329 cntrlvar 205 * total secondary mass
**
1010000 hotleg branch
1010001 2 1
1010101 0.00420 0.21971 0.0 0.0 0.0 0.0 4.0e-05 0.0
+ 00000
1010200 3 15.4e06 581.4 * 0.0 0.0 0.0
1011101 508010000 101000000 0.0 0.5 1.0 0100
1012101 101010000 102000000 0.0 0.0 0.0 0100
1011201 0.26 0.0 0.0
1012201 0.26 0.0 0.0
*
1020000 pclal8 pipe
1020001 6
1020101 0.00349,4
1020102 0.00229,6
1020301 0.57074,1
1020302 0.17145,3
1020303 0.22504,4
1020304 0.38748,6
1020601 0.0,6
1020801 4.0e-05,0.0,6
1020901 0.0,0,0,1
1020902 0.288,0.288,2
1020903 0.0,0,0,3
1020904 0.0,0,0,5
1021001 00,6
1021101 0000,3
1021102 0100,4
1021103 0000,5
1021201 3 15.4e06 518.4 0.0 0.0 0.0 0.0 06
1021300 1
1021301 0.260 0.0 0.0 05
*
1030000 newspol branch
1030001 3 1
1030101 0.00229 0.55880 0.0 0.0 0.0 0.0 4.0e-05 0.0
+ 00
1030200 3 15.4e06 581.4
1031101 102010000 103000000 0.0 0.18 0.18 0000
1032101 103010000 104000000 0.0 0.18 0.18 0000
1033101 302010000 103000000 0.0 0.90 0.90 0100
1031201 0.260 0.0 0.0
1032201 0.260 0.0 0.0
1033201 0.260 0.0 0.0
*
1040000 newspol pipe
1040001 5
1040101 0.00229,5
1040301 0.23825,1
1040302 0.42494,2

```

1040303	0.35560.4	1051101	0000.5
1040304	0.64808.5	1051102	0100.6
1040601	0.0.1	1051103	0000.13
1040602	90.0.4	1051201	3 15.4e06 545.0 0.0 0.0 0.0 14
1040603	55.0.5	1051300	1
1040701	0.0.1	1051301	0.260 0.0 0.0 13
1040702	0.42494.2	*	
1040703	0.35560.4	1060000	pmpsiml pipe
1040704	0.52680.5	1060001	5
1040801	4.0e-05.0.0.5	1060101	0.00091.4
1040901	0.540.0.540.1	1060102	0.00349.5
1040902	0.0.0.0.3	1060201	0.00091.1
1040903	0.288.0.288.4	1060202	0.00030.2
1041001	00.5	1060203	0.00091.4
1041101	0000.4	1060301	0.44805.1
1041201	3 15.4e06 581.4 0.0 0.0 0.0 05	1060302	1.14808.2
1041300	1	1060303	0.60046.3
1041301	0.260 0.0 0.0 04	1060304	0.74320.4
*		1060305	0.75565.5
1050000	pmpsuc pipe	1060601	90.0.1.
1050001	14	1060602	0.0.5
1050101	0.00229.6	1060801	4.0e-05.0.0.5
1050102	0.00349.14	1060901	0.966.0.966.1
1050301	0.44488.1	1060902	1.260.1.260.2
1050302	0.40640.2	1060903	0.0.0.0.4
1050303	0.35560.5	1061001	00.5
1050304	0.49301.6	1061101	0000.1
1050305	0.58572.7	1061102	0100.2
1050306	0.78740.9	1061103	0000.3
1050307	0.26200.11	1061104	0100.4
1050308	0.78740.13	1061201	3 15.4e06 545.0 0.0 0.0 0.0 05
1050309	0.58572.14	1061300	1
1050601	-55.0.1	1061301	0.260 0.0 0.0 04
1050602	-90.0.9	*	
1050603	-45.0.10	1070000	pc19-3 branch
1050604	45.0.11	1070001	2
1050605	90.0.14	1070101	0.00349 0.79126 0.0 0.0 0.0 0.0 4.0e-05 0.0
1050701	-0.36068.1	+ 00	
1050702	-0.40640.2	1070200	3 15.4e06 545.0
1050703	-0.35560.5	1071101	106010000 107000000 0.0 0.288 0.288 0000
1050704	-0.49301.6	1072101	107010000 108000000 0.0 0.0 0.0 0100
1050705	-0.58572.7	1071201	0.260 0.0 0.0
1050706	-0.78740.9	1072201	0.260 0.0 0.0
1050707	-0.1968.10	*	
1050708	0.1968.11	1080000	dcmrinl branch
1050709	0.78740.13	1080001	1
1050710	0.58572.14	1080101	0.00420 0.18161 0.0 0.0 0.0 0.0 4.0e-05 0.0
1050801	4.0e-05.0.0.14	+ 00	
1050901	0.288.0.288.1	1080200	3 15.4e06 545.0
1050902	0.0.0.0.9	1081101	108010000 517010000 0.0 0.0 0.0 0100
1050903	0.450.0.450.11	1081201	0.260 0.0 0.0
1050904	0.0.0.0.13	*	
1051001	00.14	1100000	pmpsimi sngljun

1100101	105010000	106000000	0.0	0.0	0.0	0100	2020205	0.01342,10
1100201	1	0.260	0.0	0.0			2020206	0.03515,11
*							*2020207	0.05502,12
*****							2020301	1.21831,1
*							2020302	1.20561,7
* steam generator							2020303	0.48578,8
*							2020304	0.58737,9
*****							2020305	0.41891,10
*							2020306	0.37827,11
*							2020307	0.50635,12
2010000	sgprim	pipe					* andy modified 2020401 to 2020413 4/21/83	
2010001	20						2020401	0.014264,1
2010101	0.00783.1						2020402	0.016574,2
2010102	0.00184.19						2020403	0.013183,3
2010103	0.00783.20						2020404	0.016789,4
2010301	0.20955.1						2020405	0.013532,5
2010302	1.21831.2						2020406	0.012870,6
2010303	1.20561.8						2020407	0.012850.7
2010304	0.48578.9						2020408	0.005849.8
2010305	0.34411.11						2020409	0.009278.9
2010306	0.48578.12						2020410	0.007631.10
2010307	1.20561.18						2020411	0.015420.11
2010308	1.21831.19						2020412	0.026025.12
2010309	0.20955.20						*2020413	0.028815.13
2010601	90.0.9						2020601	90.0.12
2010602	70.0.10						2020801	5.0e-06.0.03108.7
2010603	-70.0.11						2020802	5.0e-06.0.04063.8
2010604	-90.0.20						2020803	5.0e-06.0.05956.9
* andy modified 4/21/83 roughness from 4.0e-05 to 5.0e-05							2020804	5.0e-06.0.06729.10
2010801	4.0e-05.0.08386.1						2020805	5.0e-06.0.0.12
2010802	4.0e-05.0.01974.19						2021001	00.12
2010803	4.0e-05.0.08386.20						2021101	0100.9
2010901	0.0.0.0.8						2021102	0000.11
2010902	0.3375.0.3375.9						2021201	2 5.85e06 0.0 0.0 0.0 0.0 12
2010903	0.675.0.675.10						2021300	1
2010904	0.3375.0.3375.11						2021301	0.0 0.0 0.0 11
2010905	0.0.0.0.19						*	
2011001	00.20						*2030000	separatr separatr
2011101	0100.1						*2030001	3 0
2011102	0000.18						*2030101	0.0 0.50635 0.030848 0.0 -90.0 -0.50635 5.0e-06 0.1365 00
2011103	0100.19						*2030200	2 5.85e06 0.0
2011201	3 15.4e06 563.2	0.0 0.0 0.0 20					*2031101	203000000 204000000 0.0 0.0 0.0 0100
2011300	1						*2032101	202010000 203000000 0.0 0.0 0.0 0100
2011301	0.260 0.0 0.0 19						*2033101	203010000 209000000 0.0 0.0 0.0 0100
*							*2031201	0.0 0.0 0.0
2020000	sgshr	pipe					*2032201	0.0 0.0 0.0
2020001	12						*2033201	0.0 0.0 0.0
2020101	0.0.12						*	
2020201	0.00399.6						2030000	separatr separatr
2020202	0.00371.7						2030001	3 0
* andy modified 2020203 4/21/83							2030101	0.0 0.50635 0.059663 0.0 90.0 0.50635 5.0e-06 0.1365 00
2020203	0.00477.8							
2020204	0.00555.9							

2030200 2 5.85e+6 0.9 \*  
 \*2030200 2 5.85e+6 0.0 2090000 sepbyps pipe  
 \* \* modified by ysbang at 93/9/6 2090001 2  
 \* to match test initial condition 2090101 0.0.2  
 \* 2090301 0.50635.1  
 2090302 0.37827.2  
 2090401 to 2090402 4/21/63  
 2031101 203010000 204000000 0.06729 0.0 0.0 00100  
 2032101 203000000 209000000 0.058963 0.0 0.0 00100  
 2033101 202010000 203000000 0.05139 0.0 0.0 00100  
 2031201 0.0 0.0 0.0 2090601 -90.0.2  
 2032201 0.0 0.0 0.0 2090801 5.0e-06,0.13170.1  
 2033201 0.0 0.0 0.0 2090802 5.0e-06,0.08490.2  
 \* 2091001 00.2  
 2040000 steamdom snglvol 2091101 0000.1  
 2040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0-6 \*2091201 2 5.85e06 0.0 0.0 0.0 0.0 02  
 + 0.32849 00 2091201 2 5.85e+06 0.01 0.0 0.0 0.0 02  
 2040200 2 5843600.0 1.0 \*  
 \* \* modified by ysbang at 93/9/6  
 \* to match test initial condition \*  
 2050000 stdome pipe 2091300 1  
 2050001 10 2091301 0.0 0.0 0.0 01  
 2050101 0.0,10 \*  
 2050301 0.41891,1 2100000 sepbyps sngljun  
 2050302 0.58737,2 2100101 209010000 205000000 0.0 0.0 0.0 0000  
 2050303 0.48578.3 2100201 1 0.260 0.0 0.0  
 2050304 1.20561.9 \*  
 2050305 1.21831.10 2210000 sginlp sngljun  
 \* a. modified 2050101, 2050401 to 2050405 4/21/83 2210101 104010000 201000000 0.00229 0.288 0.288 0100  
 2050401 0.006337.1 2210201 1 0.260 0.0 0.0  
 2050402 0.003252.2 \*  
 2050403 0.001322.3 2220000 sgout-p sngljun  
 2050404 0.003279.9 2220101 201010000 105000000 0.00229 0.288 0.288 0100  
 2050405 0.003314.10 2220201 1 0.260 0.0 0.0  
 2050601 -90.0.10 \*  
 2050801 5.0e-06,0.01023.10 2310000 dcrrout sngljun  
 2051001 00.10 2310101 205010000 202000000 0.0 0.0 0.0 0100  
 2051101 0000.9 2310201 1 0.0 0.0 0.0  
 2051201 2 5.85e06 0.0 0.0 0.0 0.0 10 \*  
 2051300 1 2320000 steamout sngljun  
 2051301 0.0 0.0 0.0 09 2320101 204010000 207000000 0.0 0.0 0.0 0100  
 \* 2320201 1 0.0 0.0 0.0  
 2060000 feedinl tmdpvol 2330000 feedinlp tmdpjun  
 2060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00 2330101 206000000 205000000 0.00043  
 2060200 3 \*2330200 1 501 cntrivar 2  
 2060201 0.0 5.85e06 495.0 2330201 -1.0 0.0 0.0 0.0  
 \* 2070000 steamout tmdpvol 2330202 0.0 2.0 0.0 0.0  
 2070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00 2330203 10.0 0.0 0.0 0.0  
 2070200 2 \* 2330204 20.0 0.0 0.0 0.0  
 \* \* modified by ysbang at 93/9/6 \*  
 \* to match test initial condition \*

\* pressurizer  
 \*  
 \*\*\*\*  
 \*  
 3010000 preizer pipe  
 3010001 6  
 3010101 0.0,6  
 3010201 2.69125e-02,2  
 3010202 6.72832e-03,3  
 3010203 2.69125e-02,5  
 3010301 0.240915,2  
 3010302 0.21967,5  
 3010303 0.066294,6  
 3010401 0.0064825,2  
 3010402 0.0059118,5  
 3010403 0.001136,6  
 3010601 -90,0,6  
 3010801 4.0e-05,0,0,6  
 3011001 00,6  
 3011101 0000,2  
 3011102 0100,3  
 3011103 0000,5  
 3011201 2 15.4e06 1.0 0.0 0.0 0.0 01  
 \*3011202 2 15.4e06 0.1728 0.0 0.0 0.0 02  
 3011202 2 15.4e06 0.15 0.0 0.0 0.0 02  
 \*  
 \* Modified by ysbang at 93/9/6  
 \* to match test initial condition  
 \*  
 3011203 2 15.4e06 0.0 0.0 0.0 0.0 06  
 3011300 1  
 3011301 0.0 0.0 0.0 05  
 \*  
 3020000 pzsurge pipe  
 3020001 7  
 3020101 0.0,7  
 3020301 0.20574,1  
 3020302 0.17780,2  
 3020303 0.48895,3  
 3020304 0.67310,7  
 3020401 7.1837-04,1  
 3020402 2.32141-04,2  
 3020403 1.64577-04,3  
 3020404 4.4046-05,7  
 3020601 -90,0,3  
 3020602 -45,0,7  
 3020701 -0.20574,1  
 3020702 -0.17780,2  
 3020703 -0.48895,3  
 3020704 -0.16380,7  
 3020801 4.0e-05,0,0,7  
 3020901 502.8,502.8,1  
 3020902 33.42,33.42,2  
 3020903 0.0,0,0,3  
 3020904 1.42,1.42,5  
 3020905 0.0,0,0,6  
 3021001 00,7  
 3021101 0000,6  
 3021201 3 15.4e06 581.4 0.0 0.0 0.0 0.0 07  
 3021300 1  
 3021301 0.0 0.0 0.0 06  
 \*  
 3210000 pzrout sngljun  
 3210101 301010000 302000000 0.00349 0.0 0.0 0100  
 3210201 1 0.0 0.0 0.0  
 \*  
 \* need to modify this  
 \*  
 3300000 pctrl trndpvol  
 3300101 10.0 10.0 0.0 0.0 0.0 0.0 5.3e-06 0.0 00  
 3300200 2  
 3300201 0.0 15.4e06 1.0  
 \*  
 3310000 pcontviv sngljun  
 3310101 301000000 330000000 0.005 0.0 0.0 0100  
 3310201 1 0.0 0.0 0.0  
 \*  
 \*\*\*\*  
 \*  
 \* broken loop piping  
 \*  
 \*\*\*\*

4020602	90.0,6		4031201	3	15.4e06	545.0	0.0	0.0	0.0	12
4020603	50.0,7		4031300	1						
4020701	0.0,3		4031301	0.260	0.0	0.0	11			
4020702	0.41783,4		*							
4020703	0.35235,5		4040000	bcldsb	snglvol					
4020704	0.34925,6		4040101	0.00091	0.83083	0.0	0.0	0.0	0.0	4.0e-05
4020705	0.46711,7		+ 0.0							0.0
4020801	4.0e-05,0.0,7		4040200	3	15.4e06	545.0				
4020901	0.0,0.0,1		*							
4020902	0.525,0.525,2		4050000	coldleg	pipe					
4020903	0.630,0.630,3		4050001	2						
4020904	0.0,0.0,5		4050101	0.00091,2						
4020905	0.336,0.336,6		4050301	0.27178,1						
4021001	00000 7		4050302	0.71145,2						
4021101	0000,6		4050601	0.0,2						
4021201	3 15.4e06 581.4	0.0 0.0 0.0 07	4050801	4.0e-05,0.0,2						
4021300	1		4050901	0.138,0.138,1						
4021301	0.260 0.0 0.0 06		4051001	00,2						
*			4051101	0000,1						
4030000	pmpsucn	pipe	4051201	3 15.4e06 545.0	0.0 0.0 0.0 02					
4030001	12		4051300	1						
4030101	0.00091,12		4051301	0.260 0.0 0.0 01						
4030301	0.49424,1		*							
4030302	0.34925,2		4060000	vsslinit	branch					
4030303	0.35235,3		4060001	2 1						
4030304	0.34925,4		4060101	0.00349 0.38898	0.0 0.0 0.0 0.0	4.0e-05	0.0			
4030305	1.08318,5		00							
4030306	0.78512,7		4060200	3 15.4e06 545.0						
4030307	0.48944,9		4061101	405010000 406000000	0.0 0.0 0.0 0100					
4030308	0.78512,11		4062101	406010000 517010000	0.0 1.0 0.5 0100					
4030309	0.70002,12		4061201	0.260 0.0 0.0						
4030601	-60.0,1		4062201	0.260 0.0 0.0						
4030602	-90.0,7		*							
4030603	-45.0,8		4500000	brkppmp	pump					
4030604	45.0,9		4500101	0.0 0.59847 0.00086	0.0 90.0 0.03137 00					
4030605	90.0,12		4500108	403010000 0.00090	0.0 0.0 0.0 000100					
4030701	-0.39980,1		*4500109	404000000 0.00010	0.0 0.0 0.0 000000					
4030702	-0.34925,2		*							
4030703	-0.35235,3		* Junction Area Modified by ysbang at April 8, 1996							
4030704	-0.34925,4		* to correct unbalance of void distribution							
4030705	-1.08318,5		*							
4030706	-0.78512,7		4500109	404000000 0.00090	0.0 0.0 0.0 000000					
4030707	-0.376936,8		*							
4030708	0.376936,9		* end of modification							
4030709	0.78512,11		*							
4030710	0.70002,12		4500200	3 15.4e06 545.0						
4030801	4.0e-05,0.0,12		4500201	1 0.26 0.0 0.0						
4030901	0.336,0.336,1		4500202	1 0.26 0.0 0.0						
4030902	0.0,0.0,6		4500301	0 0 0 -1 0 501 0						
4030903	0.525,0.525,8		4500302	1597.0000 0.1 .003240000	79.553000					
4030904	0.0,0.0,11		2.9810000 .00925000							
4031001	00,12		4500303	998.400 .00000 .00000 2.4800 .00000 .00000						
4031101	0000,11		*							

4210000 blcl-lg sngljun  
 4210101 404010000 405000000 0.00091 0.0 0.0 0000  
 4210201 1 0.260 0.0 0.0  
 \*  
 \*\*\*\*  
 \*  
 \* vessel  
 \*  
 \*\*\*\*  
 \*  
 5010000 lowpln1 snglvol  
 5010101 0.0 0.14224 0.00674 0.0 90.0 0.14224 4.0e-05  
 + 0.1162 00  
 5010200 3 15.4e06 545.0  
 \*  
 5020000 lowpln2 branch  
 5020001 3 1  
 5020101 0.0 0.22004 0.00659 0.0 90.0 0.22004 4.0e-05  
 + 0.0699 00  
 5020200 3 15.4e06 545.0  
 5021101 501010000 502000000 0.0 0.0 0.0 0000  
 5022101 502010000 503000000 0.00431 0.0 0.0 0100  
 5023101 502010000 519000000 0.0 0.5 1.0 0100  
 5021201 0.0 0.0 0.0  
 5022201 0.52 0.0 0.0  
 5023201 0.52 0.0 0.0  
 \*  
 5030000 lowpln3 snglvol  
 5030101 0.0 0.31725 0.00296 0.0 90.0 0.31725 4.0e-05  
 0.0101 00  
 5030200 3 15.4e06 545.0  
 \*  
 5040000 lowpln4 branch  
 5040001 2 1  
 5040101 0.0 0.18136 0.00052 0.0 90.0 0.18136 4.0e-05  
 + 0.0101 00  
 5040200 3 15.4e06 545.0  
 5041101 503010000 504000000 0.0 0.0 0.0 0100  
 5042101 504010000 505000000 0.0 0.0 0.0 0100  
 5041201 0.52 0.0 0.0  
 5042201 0.52 0.0 0.0  
 \*  
 5050000 core pipc  
 5050001 8  
 5050101 0.00286.8  
 5050301 0.6096.2  
 5050302 0.3048.6  
 5050303 0.6096.8  
 5050601 90.0.8  
 \* andy modified volume 5050801 to 5.0e-05 5/4/83  
 5050801 2 0e-05.0.01.8

5050901 1.5.1.5.7  
 5051001 00,8  
 \*5051101 0000,7  
 \* rod bundle interfacial drag option by ysbang  
 5051101 00100 7  
 5051201 3 15.4e06 563.2 0.0 0.0 0.0 08  
 5051300 1  
 5051301 0.520 0.0 0.0 7  
 \*  
 5060000 upprpln1 branch  
 5060001 2 1  
 5060101 0.0 0.30505 0.00164 0.0 90.0 0.30505 2.0e-05  
 + 0.023 00  
 5060200 3 15.4e06 581.4  
 5061101 505010000 506000000 0.0 0.0 0.0 0100  
 5062101 506010000 507000000 0.00321 0.0 0.0 0100  
 5061201 0.520 0.0 0.0  
 5062201 0.520 0.0 0.0  
 \*  
 5070000 upprpln2 snglvol  
 5070101 0.0 0.68910 0.00281 0.0 90.0 0.68910 4.0e-05  
 + 0.0401 00  
 5070200 3 15.4e06 581.4  
 \*  
 5080000 upprpln3 branch  
 5080001 2 1  
 5080101 0.0 0.52070 0.00218 0.0 90.0 0.52070 4.0e-05  
 + 0.483 00  
 5080200 3 15.4e06 581.4  
 5081101 507010000 508000000 0.00277 0.0 0.0 0100  
 5082101 508010000 509000000 0.00415 0.0 0.0 0100  
 5081201 0.520 0.0 0.0  
 5082201 0.0 0.0 0.0  
 \*  
 5090000 upprpln4 pipe  
 5090001 2  
 5090101 0.0.2  
 5090301 0.2761.1  
 5090302 0.7786.2  
 5090401 0.00143.1  
 5090402 0.004047.2  
 5090601 90.0.2  
 5090801 4.0e-05.0.04.1  
 5090802 4.0e-05.0.0509.2  
 5091001 00.2  
 5091101 0000.1  
 5091201 3 15.4e06 581.4 0.0 0.0 0.0 02  
 5091301 0.0 0.0 0.0 01  
 \*  
 5100000 upprpln5 snglvol  
 5100101 0.0 0.0756 0.000393 0.0 90.0 0.0756 4.0e-05  
 + 0.0509 00  
 5100200 3 15.4e06 581.4

\*  
 5130000 guidtub branch  
 5130001 1 0  
 5130101 0.0 1.651 0.00034 0.0 90.0 1.651 5.0e-06  
 + 0.0160 00  
 5130200 3 15.4e06 581.4  
 5131101 507010000 513000000 0.0 0.0 0.0 0100  
 5131201 0.0 0.0 0.0  
 \*  
 5140000 sufcoln branch  
 5140001 1 0  
 5140101 0.0 2.3401 0.00034525 0.0 90.0 2.3401 5.0e-06  
 + 0.00975 00  
 5141101 506010000 514000000 0.0 0.0 0.0 0100  
 5140200 0 15415300.0 1356030.0 0.0 0.0  
 5141201 0.0 0.0 0.0  
 \*  
 5160000 upprdcm1 annulus  
 5160001 1  
 5160101 0.00982.1  
 5160301 0.26670.1  
 5160601 90.0.1  
 5160801 4.0e-05.0.004351.1  
 5161001 00.1  
 5161201 3 15.4e06 560.0 0.0 0.0 0.0 1  
 \*  
 5170000 upprdcm2 annulus  
 5170001 1  
 5170101 0.00982.1  
 5170301 0.38418.1  
 5170601 90.0.1  
 5170801 4.0e-05.0.04351.1  
 5171001 00.1  
 5171201 3 15.4e06 560.0 0.0 0.0 0.0 1  
 \*  
 5180000 lowdcmr pipe  
 5180001 10  
 5180101 0.00242.10  
 5180301 0.4890.9  
 5180302 0.37661 10  
 5180601 90.0.10  
 5180801 4.0e-05.0.0.10  
 5180901 0.3.0.3.1  
 5180902 0.0.0.0.8  
 5180903 0.114.0.114.9  
 5181001 00.10  
 5181101 0000.9  
 5181201 3 15.4e06 550.0 0.0 0.0 0.0 10  
 5181300 1  
 5181301 -0.26.0.0.0.0.9  
 \*  
 5190000 lowdem annulus  
 5190001 1

5360201	0	0.0	0.0	0.0		7020101	0.010	
*						7020201	0.00462,7	
*****						7020202	0.09	
* broken loop steam generator						7020301	1.19609,1	
*						7020302	1.23101,2	
*****						7020303	1.15481,3	
*						7020304	1.23101,4	
7010000	btlpsign pipe					7020305	1.25641,5	
7010001	18					7020306	1.15481,6	
7010101	0.00516,1					7020307	1.06591,7	
7010102	0.00061,17					7020308	1.65398,8	
7010103	0.00516,18					7020309	0.37827,9	
7010301	0.26035,1					7020310	0.50635,10	
7010302	1.19609,2					* andy modified volumes 7020401 to 7020411 4/21/83		
7010303	1.23101,3					7020401	0.013509,1	
7010304	1.15481,4					7020402	0.009036,2	
7010305	1.23101,5					7020403	0.008470,3	
7010306	1.25641,6					7020404	0.010739,4	
7010307	1.15481,7					7020405	0.009615,5	
7010308	1.06591,8					7020406	0.008474,6	
7010309	0.98206,10					7020407	0.008425,7	
7010310	1.06591,11					7020408	0.015782,8	
7010311	1.15481,12					7020409	0.016807,9	
7010312	1.25641,13					7020410	0.025882,10	
7010313	1.23101,14					*7020411 0.025882,11		
7010314	1.15481,15					7020601	90.0.10	
7010315	1.23101,16					7020801	5.0e-06.0.1999.8	
7010316	1.19609,17					7020802	5.0e-06.0.0.10	
7010317	0.26035,18					7021001	00.10	
7010601	90.0,8					7021101	0100.7	
7010602	77.0,9					7021102	0000.9	
7010603	-77.0,10					7021201	2 5.89e06 0.0 0.0 0.0 0.0 10	
7010604	-90.0,18					7021300	1	
* andy modified roughness to 5.0e-05 4/21/84						7021301	0.0 0.0 0.0 9	
7010801	4.0e-05.0.07797,1					*		
7010802	4.0e-05.0.01974,17					*7030000 separatr separatr		
7010803	4.0e-05.0.07797,18					7030001	3 0	
7010901	0.0.0.0.7					** modified 4/21/83		
7010902	0.3375,0.3375,8					7030101	0.0 0.50635 0.030854 0.0 -90.0 0.50635	
7010903	0.675,0.675,9					*+ 5.0e- 06 0.13650 00		
7010904	0.3375,0.3375,10					7030200	2 5.89e06 0.0	
7010905	0.0.0.0.17					*7031101	703000000 704000000 0.0 0.0 0.0 0100	
7011001	00.18					*7032101	702010000 703000000 0.0 0.0 0.0 0100	
7011101	0100.1					*7033101	703010000 709000000 0.0 0.0 0.0 0100	
7011102	0000.16					*7031201	0.0 0.0 0.0	
7011103	0100.17					*7032201	0.0 0.0 0.0	
7011201	3 15.4e06 581.4 0.0 0.0 0.0 18					*7033201	0.0 0.0 0.0	
7011300	1					*		
7011301	0.260 0.0 0.0 17					7030000	separatr separatr	
*						7030001	3 0	
7020000	sgroud pipe					7030101	0.0 0.50635 0.056736 0.0 90.0 0.50635 5.0e-6	
*7020001	11					*+ 0.1365 00		
7020001	10					*7030200	2 5.89e+6 0.0	

7030200 2 5.89e+06 0.9  
 \*  
 \* modified by ysbang at 93/9/6  
 \* to match test initial condition  
 \*  
 7031101 703010000 704000000 0.0547542 0.0 0.0 00100  
 7032101 703000000 709000000 0.05299024 0.0 0.0 00100  
 7033101 702010000 703000000 0.04593079 0.0 0.0 00100  
 7031201 0.0 0.0 0.0  
 7032201 0.0 0.0 0.0  
 7033201 0.0 0.0 0.0  
 \*  
 \*  
 7040000 steamdom snglvol  
 7040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0e-06  
 + 0.32849 00  
 7040200 2 5.89e06 1.  
 \*  
 7050000 sgdcmer pipe  
 7050001 8  
 \* andy deleted this input; 7050101 0.00164.8  
 7050101 0.0.8  
 7050301 1.65398.1  
 7050302 1.06591.2  
 7050303 1.15481.3  
 7050304 1.25641.4  
 7050305 1.23101.5  
 7050306 1.15481.6  
 7050307 1.23101.7  
 7050308 1.19609.8  
 \* andy modified volumes 7050401 to 7050408 4/21/83  
 7050401 0.014458.1  
 7050402 0.002241.2  
 7050403 0.002435.3  
 7050404 0.002639.4  
 7050405 0.002589.5  
 7050406 0.002431.6  
 7050407 0.002593.7  
 7050408 0.002514.8  
 7050601 -90.0.8  
 7050801 5.0e-06.0.01016.8  
 7051001 00.8  
 7051101 0000.7  
 7051201 2 5.89e06 0.0 0.0 0.0 0.0 08  
 7051300 1  
 7051301 0.0 0.0 0.0 07  
 \*  
 7060000 feedinle tmdpvol  
 7060101 0.00114 1.0 0.0 0.0 0.0 5.0e-06 0.0 00  
 7060200 3  
 7060201 0.0 5.89e06 495.0

\*  
 7070000 steamotl tmdpvol  
 7070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00  
 7070200 1  
 7070201 0.0 547.4245 1.0  
 \*  
 7090000 sepbyps pipe  
 7090001 2  
 7090101 0.0.2  
 7090301 0.50635.1  
 7090302 0.37827.2  
 \* andy modified volumes 7090401 to 7090402 4/21/83  
 7090401 0.029860.1  
 7090402 0.020686.2  
 7090601 -90.0.2  
 7090801 5.0e-06.0.13170.1  
 7090802 5.0e-06.0.08490.2  
 7091001 00.2  
 7091101 0000.1  
 \*7091201 2 5.89e06 0.0 0.0 0.0 0.0 0.0 02  
 7091201 2 5.89e+06 0.01 0.0 0.0 0.0 0.0 02  
 \*  
 \* modified by ysbang at 93/9/6  
 \* to match test initial condition  
\*  
 7091300 1  
 7091301 0.0 0.0 0.0 01  
\*  
 7100000 sepbyps sngljun  
 7100101 709010000 705000000 0.0 0.0 0.0 0000  
 7100201 1 0.26 0.0 0.0  
\*  
 7210000 sgnt sngljun  
 7210101 402010000 701000000 0.00091 0.336 0.336 0100  
 7210201 1 0.26 0.0 0.0  
\*  
 7220000 sg-ouri sngljun  
 7220101 701010000 403000000 0.00091 0.336 0.336 0100  
 7220201 1 0.26 0.0 0.0  
\*  
 7310000 dcomeut sngljun  
 7310101 705010000 702000000 0.0 0.0 0.0 0100  
 7310201 1 0.0 0.0 0.0  
\*  
 7320000 steamuts sngljun  
 7320101 704010000 707000000 0.0 0.0 0.0 0100  
 7320201 1 0.0 0.0 0.0  
\*  
 7330000 feed-ltp tmdpjun  
 7330101 706000000 705000000 0.00043  
 7330200 1 501 cntrlvar 12  
 7330201 -1.0 0.0 0.0 0.0  
 7330202 0.0 2.0 0.0 0.0

7330203	10.0	0.0	0.0	0.0	0.0	*
7330204	20.0	0.0	0.0	0.0	0.0	11022000 2 5 2 1 0.02699
*						11022100 0 2
*9000000 envirmt tmdpvol						11022101 0.00238.4
*9000101	1.0	1.0	0.0	0.0	0.0	11022201 0001,4
*9000200	3					11022301 0.0,4
*9000201	0.0	8.48e05	310.0			11022401 568.0.5
*						11022501 102050000,10000,1,1,0.38748.2
*****						11022601 0,0,0.1,0.38748.2
*						11022701 0,0,0.0,0.0,2
* heat structures						11022801 0. 10. 10. 0. 0. 0. 0. 1.2
*						11022901 0. 10. 10. 0. 0. 0. 0. 1.2
*****						*11022801 0.0.0.0.0.38748.2
*						*11022901 0.0.0.0.0.38748.2
*						*
11011000	1	5	2	1	0.03625	11032000 1 5 2 1 0.02699
11011100	0	2				*11032100 1022
11011101	0.00278.4					11032100 0 2
11011201	0001,4					11032101 0.00238 4
11011301	0.0,4					11032201 0001 4
11011401	568.0,5					11032301 0.0 4
11011501	101010000.0.1,1,0.21971.1					11032401 568.0.5
11011601	0, 0. 0. 1, 0.21971,1					11032501 103010000.0.1.1.0.55880.1
11011701	0.0,0,0.0,0.0,1					11032601 0.0.0.1.0.55880.1
11011801	0. 10. 10. 0. 0. 0. 0. 1.1					11032701 0.0.0.0.0.0.1
11011901	0. 10. 10. 0. 0. 0. 0. 1.1					11032801 0. 10. 10. 0. 0. 0. 0. 1.1
*11011801	0.0.0.0.0.0.21971.1					11032901 0. 10. 10. 0. 0. 0. 0. 1.1
*11011901	0.0.0,0.0.0.21971.1					*11032801 0.0.0.0.0.55880.1
*						*11032901 0.0.0.0.0.55880.1
11021000	4	5	2	1	0.03332	*
11021100	0	2				11042000 5 5 2 1 0.02699
11021101	0.00278.4					*11042100 1022
11021201	0001,4					11042100 0 2
11021301	0.0,4					11042101 0.00238.4
11021401	568.0,5					11042201 0001,4
11021501	102010000.0.1.1.0.57074.1					11042301 0.0,4
11021502	102020000.0.1.1.0.17145.2					11042401 568.0.5
11021503	102030000.0.1.1.0.17145.3					11042501 104010000.0.1.1.0.23825.1
11021504	102040000.0.1.1.0.22504.4					11042502 104020000.0.1.1.0.42494.2
11021601	0,0,0.1.0.57074.1					11042503 104030000.10000.1,1.0.35560.4
11021602	0,0,0.1.0.17145.2					11042504 104050000.0,1,1.0.64808.5
11021603	0,0,0.1,0.17145.3					11042601 0.0.0.1.0.23825.1
11021604	0.0.0.1.0.22504.4					11042602 0.0.0.1.0.42494.2
11021701	0.0,0,0.0.0.0.4					11042603 0.0.0.1.0.35560.4
11021801	0. 10. 10. 0. 0. 0. 0. 1.4					11042604 0.0.0.1.0.64808.5
11021901	0. 10. 10. 0. 0. 0. 0. 1.4					11042701 0.0.0.0.0.0.5
*11021801	0.0.0.0.0.0.57074.1					11042801 0. 10. 10. 0. 0. 0. 0. 1.5
*11021802	0.0.0.0.0.0.17145.2					11042901 0. 10. 10. 0. 0. 0. 0. 1.5
*11021803	0.0.0.0.0.0.17145.3					*11042801 0.0.0.0.0.23825.1
*11021804	0.0.0.0.0.0.22504.4					*11042802 0.0.0.0.0.42494.2
*11021901	0.0.0.0.0.0.57074.1					*11042803 0.0.0.0.0.35560.4
*11021902	0.0.0.0.0.0.17145.2					*11042804 0.0.0.0.0.64808.5
*11021903	0.0.0.0.0.0.17145.3					*11042901 0.0.0.0.0.23825.1
*11021604	0.0.0.0.0.0.22504.4					

*11042902	0.0.0.0.0.42494.2	*11051805	0.0.0.0.0.58572.8
*11042903	0.0.0.0.0.35560.3	*11051901	0.0.0.0.0.58572.1
*11042904	0.0.0.0.0.64808.5	*11051902	0.0.0.0.0.78740.3
*		*11051903	0.0.0.0.0.26200.5
11052000	6 5 2 1 0.02699	*11051904	0.0.0.0.0.78740.7
*11052100	1022	*11051905	0.0.0.0.0.58572.8
11052100	0 2	11051801	0. 10. 10. 0. 0. 0. 0. 1.8
11052101	0.00238.4	11051901	0. 10. 10. 0. 0. 0. 0. 1.8
11052201	0001.4	**	
11052301	0.0.4	11063000	4 5 2 1 0.01699
11052401	350.0.5	11063100	0 2
11052501	105010000.0.1.1.0.44488.1	11063101	0.00178.4
11052502	105020000.0.1.1.0.40640.2	11063201	0001.4
11052503	105030000.10000.1.1.0.35560.5	11063301	0.0.4
11052504	105060000.0.1.1.0.49301.6	11063401	550.0.5
11052601	0.0.0.1.0.44488.1	11063501	106010000.0.1.1.0.44805.1
11052602	0.0.0.1.0.40640.2	11063502	106020000.0.1.1.1.14808.2
11052603	0.0.0.1.0.35560.5	11063503	106030000.0.1.1.0.60046.3
11052604	0.0.0.1.0.49301.6	11063504	106040000.0.1.1.0.74320.4
11052701	0.0.0.0.0.0.6	11063601	0.0.0.1.0.44805.1
11052801	0. 10. 10. 0. 0. 0. 0. 1.6	11063602	0.0.0.1.1.14808.2
11052901	0. 10. 10. 0. 0. 0. 0. 1.6	11063603	0.0.0.1.0.60046.3
*11052801	0.0.0.0.0.0.44488.1	11063604	0.0.0.1.0.74320.4
*11052802	0.0.0.0.0.0.40640.2	11063701	0.0.0.0.0.0.4
*11052803	0.0.0.0.0.0.35560.5	*11063801	0.0.0.0.0.0.44805.1
*11052804	0.0.0.0.0.0.49301.6	*11063802	0.0.0.0.0.1.14808.2
*11052901	0.0.0.0.0.0.44488.1	*11063803	0.0.0.0.0.0.60046.3
*11052902	0.0.0.0.0.0.40640.2	*11063804	0.0.0.0.0.0.74320.4
*11052903	0.0.0.0.0.0.35560.5	*11063901	0.0.0.0.0.0.44805.1
*11052904	0.0.0.0.0.0.49301.6	*11063902	0.0.0.0.0.1.14808.2
*		*11063903	0.0.0.0.0.0.60046.3
11051000	8 5 2 1 0.03332	*11063904	0.0.0.0.0.0.74320.4
*11051100	1021	11063801	0. 10. 10. 0. 0. 0. 0. 1.4
11051100	0 2	11063901	0. 10. 10. 0. 0. 0. 0. 1.4
11051101	0.00278.4	*	
11051201	0001.4	11061000	1 5 2 1 0.03332
11051301	0.0.4	*11061100	1021
11051401	550.0.5	11061100	0 2
11051501	105070000.0.1.1.0.58572.1	11061101	0.00278.4
11051502	105080000.0.1.1.0.78740.3	11061201	0001.4
11051503	105100000.0.1.1.0.26200.5	11061301	0.0.4
11051504	105120000.10000.1.1.0.78740.7	11061401	550.0.5
11051505	105140000.0.1.1.0.58572.8	11061501	106050000.0.1.1.0.75565.1
11051601	0.0.0.1.0.58572.1	11061601	0.0.0.1.0.75565.1
11051602	0.0.0.1.0.78740.3	11061701	0.0.0.0.0.0.1
11051603	0.0.0.1.0.26200.5	*11061801	0.0.0.0.0.0.75565.1
11051604	0.0.0.1.0.78740.7	*11061901	0.0.0.0.0.0.75565.1
11051605	0.0.0.1.0.58572.8	11061801	0. 10. 10. 0. 0. 0. 0. 1.1
11051701	0.0.0.0.0.0.8	11061901	0. 10. 10. 0. 0. 0. 0. 1.1
*11051801	0.0.0.0.0.0.58572.1	*	
*11051802	0.0.0.0.0.0.78740.3	11071000	1 5 2 1 3.332000e-02
*11051803	0.0.0.0.0.0.26200.5	*11071100	1021
*11051804	0.0.0.0.0.0.78740.7	11071100	0 2

11071101	0.00278,4	*12001804	0.01974,0.01974,0.34411,10
11071201	0001,4	*12001805	0.01974,0.01974,0.48578,11
11071301	0.4	*12001806	0.01974,0.01974,1.20561,17
11071401	550.0,5	*12001807	0.01974,0.01974,1.21831,18
11071501	107010000,0,1,1,0.79126,1	*12001901	0.00635,0.00635,1.21831,1
11071601	0,0,0,1,0.79126,1	*12001902	0.00635,0.00635,1.20561,7
11071701	0,0,0,0,0,0,1	*12001903	0.00635,0.00635,0.48578,8
*11071801	0,0,0,0,0.79126,1	*12001904	0.00635,0.00635,0.34411,10
*11071901	0,0,0,0,0.79126,1	*12001905	0.00635,0.00635,0.48578,11
11071801	0. 10. 10. 0. 0. 0. 0. 1. 1	*12001906	0.00635,0.00635,1.20561,17
11071901	0. 10. 10. 0. 0. 0. 0. 1. 1	*12001907	0.00635,0.00635,1.21831,18
*		12001801	0. 10. 10. 0. 0. 0. 0. 1. 1. 13
11081000	1 5 2 1 0.03625	12001901	0. 10. 10. 0. 0. 0. 0. 1. 1. 18
*11081100	1011	*	
11081100	0 2	12012000	10 5 2 1 0.07479
11081101	0.00238,4	12012100	0 2
11081201	0001,4	12012101	0.00937,4
11081301	0.4	12012201	0006.4
11081401	550.0,5	12012301	0.4
11081501	108010000,0,1,1,0.18161,1	12012400	2001
11081601	0,0,0,1,0.18161,1	12012501	202010000,0,1,1,1.21831,1
11081701	0,0,0,0,0,0,1	12012502	202020000,10000,1,1,1.20561,7
*11081801	0,0,0,0,0.18161,1	12012503	202080000,0,1,1,0.48578,8
*11081901	0,0,0,0,0.18161,1	12012504	202090000,0,1,1,0.58737,9
11081801	0. 10. 10. 0. 0. 0. 0. 1. 1	12012505	202100000,0,1,1,0.41891,10
11081901	0. 10. 10. 0. 0. 0. 0. 1. 1	12012601	202010000,0,1,1,1.21831,1
*		12012602	202020000,10000,1,1,1.20561,7
* intact loop sg piping		12012603	202080000,0,1,1,0.48578,8
*		12012604	202090000,0,1,1,0.58737,9
12001000	18 5 2 1 0.00987	12012605	202100000,0,1,1,0.41891,10
12001100	0 2	12012701	0.000.0.0.0.10
12001101	0.00031,4	*12012801	0.0.0.0.1.21831,1
12001201	0002.4	*12012802	0.0.0.0.1.20561,7
12001301	0.4	*12012803	0.0.0.0.0.48578,8
12001401	550.0,5	*12012804	0.0.0.0.0.58737,9
12001501	201020000,0,1,1,7.30986,1	*12012805	0.0.0.0.0.41891,10
12001502	201030000,10000,1,1,7.23366,7	*12012901	0.0.0.0.1.21831,1
12001503	201090000,0,1,1,2.91468,8	*12012902	0.0.0.0.1.20561,7
12001504	201100000,10000,1,1,2.06466,10	*12012903	0.0.0.0.0.48578,8
12001505	201120000,0,1,1,2.91468,11	*12012904	0.0.0.0.0.58737,9
12001506	201130000,0,1,1,7.23366,17	*12012905	0.0.0.0.0.41891,10
12001507	201190000,0,1,1,7.30986,18	12012801	0. 10. 10. 0. 0. 0. 0. 1. 10
12001601	202010000,0,1,1,7.30986,1	12012901	0. 10. 10. 0. 0. 0. 0. 1. 10
12001602	202020000,10000,1,1,7.23366,7	*	
12001603	202080000,0,1,1,2.91468,8	12022000	10 5 2 1 0.10578
12001604	202090000,0,1,1,2.06466,10	12022100	0 2
12001605	202080000,0,1,1,2.91468,11	12022101	0.00094,4
12001606	202070000,-10000,1,1,7.23366,17	12022201	0001,4
12001607	202010000,0,1,1,7.30986,18	12022301	0.4
12001701	0.0.0.0.0.0.18	12022400	2001
*12001801	0.0.01974,0.01974,1.21831,1	12022501	202010000,0,1,1,1.21831,1
*12001802	0.0.01974,0.01974,1.20561,7	12022502	202020000,10000,1,1,1.20561,7
*12001803	0.0.01974,0.01974,0.48578,8	12022503	202080000,0,1,1,0.48578,8

12022504	202090000.0.1.1.0.58737.9	12042101	0.00105.4
12022505	202100000.0.1.1.0.41891.10	12042201	0001.4
12022601	205100000.0.1.1.1.21831.1	12042301	0.0.4
12022602	205090000.-10000.1.1.1.20561.7	12042400	2001
12022603	205030000.0.1.1.0.48578.8	12042501	202110000.0.1.1.0.37827.1
12022604	205020000.0.1.1.0.58737.9	12042502	202120000.0.1.1.0.50635.2
12022605	205010000.0.1.1.0.41891.10	*	
12022701	0.0.0.0.0.0.10	12042503	203010000.0.1.1.0.50635.3
*12022801	0.0.03108.0.04968.1.21831.1	12042601	209020000.0.1.1.0.37827.1
*12022802	0.0.03108.0.04968.1.20561.7	12042602	209010000.0.1.1.0.50635.2
*12022803	0.0.04063.0.07265.0.48578.8	12042603	203010000.0.1.1.0.50635.3
*12022804	0.0.05956.0.11346.0.58737.9	12042701	0.0.0.0.0.0.0.3
*12022805	0.0.06729.0.18133.0.41891.10	*12042801	0.0.0.0.0.0.37827.1
*12022901	0.0.0.0.0.1.21831.1	*12042802	0.0.0.0.0.0.50635.3
*12022902	0.0.0.0.0.1.20561.7	*12042901	0.0.0.0.0.0.37827.1
*12022903	0.0.0.0.0.0.40578.8	*12042902	0.0.0.0.0.0.50635.3
*12022904	0.0.0.0.0.0.58737.9	12042801	0. 10. 10. 0. 0. 0. 0. 0. 1.3
*12022905	0.0.0.0.0.0.41891.10	12042901	0. 10. 10. 0. 0. 0. 0. 0. 1.3
12022801	0. 10. 10. 0. 0. 0. 0. 1.10	*	
12022901	0. 10. 10. 0. 0. 0. 0. 0. 1.10	12053000	10 5 2 1 0.12146
*		12053100	0 2
12032000	10 5 2 1 0.11074	12053101	0.00377.4
12032100	0 2	12053201	0001.4
12032101	0.00238.4	12053301	0.0.4
12032201	0001.4	12053400	2001
12032301	0.0.4	12053501	205010000.0.1.1.0.41891.1
12032400	2001	12053502	205020000.0.1.1.0.58737.2
12032501	205010000.0.1.1.0.35840.1	12053503	205030000.0.1.1.0.48578.3
12032502	205020000.0.1.1.0.50253.2	12053504	205040000.10000.1.1.1.20561.9
12032503	205030000.0.1.1.0.41561.3	12053505	205100000.0.1.1.1.21831.10
12032504	205040000.10000.1.1.1.03147.9	12053601	-200.0.3205.1.0.41891.1
12032505	205100000.0.1.1.1.04234.10	12053602	-200.0.3205.1.0.58737.2
12032601	205010000.0.1.1.0.35840.1	12053603	-200.0.3205.1.0.48578.3
12032602	205020000.0.1.1.0.50253.2	12053604	-200.0.3205.1.1.20561.9
12032603	205030000.0.1.1.0.41561.3	12053605	-200.0.3205.1.1.21831.10
12032604	205040000.10000.1.1.1.03147.9	12053701	0.0.0.0.0.0.0.10
12032605	205100000.0.1.1.1.04234.10	*12053801	0.0.0.0.0.0.41891.1
12032701	0.0.0.0.0.0.10	*12053802	0.0.0.0.0.0.58737.2
*12032801	0.0.0.0.0.41891.1	*12053803	0.0.0.0.0.0.48578.3
*12032802	0.0.0.0.0.58737.2	*12053804	0.0.0.0.0.1.20561.9
*12032803	0.0.0.0.0.0.48578.3	*12053805	0.0.0.0.0.1.21831.10
*12032804	0.0.0.0.0.1.20561.9	*12053901	0.0.0.0.0.0.41891.1
*12032805	0.0.0.0.0.1.21831.10	*12053902	0.0.0.0.0.0.58737.2
*12032901	0.0.0.0.0.0.41891.1	*12053903	0.0.0.0.0.0.48578.3
*12032902	0.0.0.0.0.0.58737.2	*12053904	0.0.0.0.0.1.20561.9
*12032903	0.0.0.0.0.0.48578.3	*12053905	0.0.0.0.0.1.21831.10
*12032904	0.0.0.0.0.1.20561.9	12053801	0. 10. 10. 0. 0. 0. 0. 1.10
*12032905	0.0.0.0.0.1.21831.10	12053901	0. 10. 10. 0. 0. 0. 0. 0. 1.10
12032801	0. 10. 10. 0. 0. 0. 0. 1.10	*	
12032901	0. 10. 10. 0. 0. 0. 0. 0. 1.10	12054000	4 5 2 1 0.20477
**		12054100	0 2
12042000	3 5 2 1 0.13233	12054101	0.00396.4
12042100	0 2	12054201	0001.4

12054301	0.0,4	*13011902	0.0.0.0.0.2549,5
12054400	2001	*13011903	0.0.0.0.0.0.00686,6
12054501	204010000.0.1,1,0.40005,1	13011801	0. 10. 10. 0. 0. 0. 0. 0. 1.6
12054502	203010000,0.1,1,0.50635,2	13011901	0. 10. 10. 0. 0. 0. 0. 0. 1.6
12054503	209010000.0.1,1,0.50635,3	*	
12054504	209020000.0.1,1,0.37827,4	130120002	5 2 1 0.0
12054601	-200, 0, 3204, 1,0.40005,1	13012100	0 2
12054602	-200, 0, 3204, 1,0.50635,2	13012101	0.00210,4
12054603	-200, 0, 3204, 1,0.50635,3	13012201	0001,4
12054604	-200, 0, 3204, 1,0.37827,4	13012301	1,0,1
12054701	0,0,0,0,0,0,4	13012302	0,0,4
*12054801	0,0,0,0,0,40005,1	13012401	615,0,5
*12054802	0,0,0,0,0,50635,3	13012501	0,0,0,1,5,91312,2
*12054803	0,0,0,0,0,37827,4	13012601	301050000,-10000,1,1,5,91312,2
*12054901	0,0,0,0,0,40005,1	13012701	300,0,5,0,0,0,0,2
*12054902	0,0,0,0,0,50635,3	*13012901	0,0,0,0,0,168,0,24638,2
*12054903	0,0,0,0,0,37827,4	13012801	0. 10. 10. 0. 0. 0. 0. 0. 1.2
12054801	0. 10. 10. 0. 0. 0. 0. 0. 1.4	13012901	0. 10. 10. 0. 0. 0. 0. 0. 1.2
12054901	0. 10. 10. 0. 0. 0. 0. 0. 1.4	*	
*		130220001	5 2 1 1.560000e-02
12055000	1 5 1 1 0.0	13022100	0 2
12055100	-0 2	13022101	0.00178,4
12055101	0.00596,4	13022201	0001,4
12055201	0001,4	13022301	0,0,4
12055301	0,0,4	13022400	3011
12055401	543,0,5	13022501	302010000.0.1,1,0.36713,1
12055501	204010000.0.1,0,0.13174,1	13022601	0,0,0,1,0.36713,1
12055601	0,0,0,0,0.13174,1	13022701	0,0,0,0,0,0,0,1
12055701	0,0,0,0,0,0,1	*13022801	0,0,0,0,0,0,22860,1
*12055801	0,0,0,0,0,40955,1	*13022901	0,0,0,0,0,0,22860,1
*12055901	0,0,0,0,0,40955,1	13022801	0. 10. 10. 0. 0. 0. 0. 0. 1.1
12055801	0. 10. 10. 0. 0. 0. 0. 0. 1.1	13022901	0. 10. 10. 0. 0. 0. 0. 0. 1.1
12055901	0. 10. 10. 0. 0. 0. 0. 0. 1.1	*	
*		130230006	5 2 1 4.70000e-03
* pressurizer walls		13023100	0 2
*		13023101	0.00098,4
130111006	5 2 1 1.0795e-01	13023201	0001,4
13011100	0 2	13023301	0,0,4
13011101	0.007144,4	13023400	3011
13011201	0001,4	13023501	302020000.0.1,1,0.1778,1
13011301	0,0,4	13023502	302030000.0.1,1,0.48895,2
13011401	600,0,5	13023503	302040000.10000.1,1,0.6731,6
13011501	301010000.0.1,1,0.183565,1	13023601	0,0,0,1,0.1778,1
13011502	301020000.10000.1,1,0.2549,5	13023602	0,0,0,1,0.48895,2
13011503	301050000.0.1,1,0.00686,6	13023603	0,0,0,1,0.6731,6
13011601	0,0,0,1,0.183565,1	13023701	0,0,0,0,0,0,6
13011602	0,0,0,1,0.2549,5	*13023801	0,0,0,0,0,0,1778,1
13011603	0,0,0,1,0.00686,6	*13023802	0,0,0,0,0,0,48895,2
13011701	0,0,0,0,0,0,6	*13023803	0,0,0,0,0,0,6731,6
*13011801	0,0,0,0,0,183564,2	*13023901	0,0,0,0,0,0,1778,1
*13011802	0,0,0,0,0,2549,5	*13023902	0,0,0,0,0,0,48895,2
*13011803	0,0,0,0,0,0,0686,6	*13023903	0,0,0,0,0,0,6731,6
*13011901	0,0,0,0,0,183564,2	13023801	0. 10. 10. 0. 0. 0. 0. 0. 1.6

13023901	0.	10.	10.	0.	0.	0.	0.	1.6	*14021907	0.0.0.0.0.60879.7							
*									14021801	0.	10.	10.	0.	0.	0.	0.	1.7
* broken loop piping walls									14021901	0.	10.	10.	0.	0.	0.	0.	1.7
*									*								
14011000	1	5	2	1	0.03332	*14031000	1	5	2	1	0.01699						
*14011100	1021					14031000	12	5	2	1	0.01699						
14011100	0	2				*14031100	4021										
14011101	0.00278,4					14031100	0	2									
14011201	0001,4					14031101	0.00178,4										
14011301	0.0,4					14031201	0001,4										
14011401	568,0,5					14031301	0.0,4										
14011501	401010000,0,1,1,0.40818,1					14031401	557,0,5										
14011601	0,0,0,1,0.40818,1					14031501	403010000,0,1,1,0.49424,1										
14011701	0.0,0,0.0,0.1					14031502	403020000,0,1,1,0.34925,2										
*14011801	0.0,0,0.0,0.40818,1					14031503	403030000,0,1,1,0.35235,3										
*14011901	0.0,0,0.0,0.40818,1					14031504	403040000,0,1,1,0.34925,4										
14011801	0.	10.	10.	0.	0.	0.	0.	1.1	14031505	403050000,0,1,1,0.08318,5							
14011901	0.	10.	10.	0.	0.	0.	0.	1.1	14031506	403060000,10000,1,1,0.78512,7							
*						14031507	403080000,10000,1,1,0.48944,9										
14021000	7	5	2	1	0.01699	14031508	403100000,10000,1,1,0.78512,11										
14021100	0	2				14031509	403120000,0,1,1,0.70002,12										
14021101	0.00178,4					14031601	0,0,0,1,0.49424,1										
14021201	0001,4					14031602	0,0,0,1,0.34925,2										
14021301	0.0,4					14031603	0,0,0,1,0.35235,3										
14021401	568,0,5					14031604	0,0,0,1,0.34925,4										
14021501	402010000,0,1,1,0.60985,1					14031605	0,0,0,1,1,0.08318,5										
14021502	402020000,0,1,1,0.40860,2					14031606	0,0,0,1,0.78512,7										
14021503	402030000,0,1,1,0.98572,3					14031607	0,0,0,1,0.48944,9										
14021504	402040000,0,1,1,0.41783,4					14031608	0,0,0,1,0.78512,11										
14021505	402050000,0,1,1,0.35235,5					14031609	0,0,0,1,0.70002,12										
14021506	402060000,0,1,1,0.34925,6					14031701	0,0,0,0,0,0,0,0,12										
14021507	402070000,0,1,1,0.60879,7					*14031801	0,0,0,0,0,0,0,0,49424,1										
14021601	0,0,0,1,0,60985,1					*14031802	0,0,0,0,0,0,0,0,34925,2										
14021602	0,0,0,1,0,40860,2					*14031803	0,0,0,0,0,0,0,0,35235,3										
14021603	0,0,0,1,0,98572,3					*14031804	0,0,0,0,0,0,0,0,34925,4										
14021604	0,0,0,1,0,41783,4					*14031805	0,0,0,0,0,0,0,0,108318,5										
14021605	0,0,0,1,0,35235,5					*14031806	0,0,0,0,0,0,0,0,0,78512,7										
14021606	0,0,0,1,0,34925,6					*14031807	0,0,0,0,0,0,0,0,0,48944,9										
14021607	0,0,0,1,0,60879,7					*14031808	0,0,0,0,0,0,0,0,0,78512,11										
14021701	0,0,0,0,0,0,0,7					*14031809	0,0,0,0,0,0,0,0,0,70002,12										
*14021801	0,0,0,0,0,0,0,60985,1					*14031901	0,0,0,0,0,0,0,0,0,49424,1										
*14021802	0,0,0,0,0,0,0,40860,2					*14031902	0,0,0,0,0,0,0,0,0,34925,2										
*14021803	0,0,0,0,0,0,0,98572,3					*14031903	0,0,0,0,0,0,0,0,0,35235,3										
*14021804	0,0,0,0,0,0,0,41783,4					*14031904	0,0,0,0,0,0,0,0,0,34925,4										
*14021805	0,0,0,0,0,0,0,35235,5					*14031905	0,0,0,0,0,0,0,0,0,108318,5										
*14021806	0,0,0,0,0,0,0,34925,6					*14031906	0,0,0,0,0,0,0,0,0,78512,7										
*14021807	0,0,0,0,0,0,0,60879,7					*14031907	0,0,0,0,0,0,0,0,0,48944,9										
*14021901	0,0,0,0,0,0,0,60985,1					*14031908	0,0,0,0,0,0,0,0,0,78512,11										
*14021902	0,0,0,0,0,0,0,40860,2					*14031909	0,0,0,0,0,0,0,0,0,70002,12										
*14021903	0,0,0,0,0,0,0,98572,3					14031801	0.	10.	10.	0.	0.	0.	0.	1.12			
*14021904	0,0,0,0,0,0,0,41783,4					14031901	0.	10.	10.	0.	0.	0.	0.	1.12			
*14021905	0,0,0,0,0,0,0,35235,5					*											
*14021906	0,0,0,0,0,0,0,34925,6					14041000	3	5	2	1	1.699000e-02						

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14041100	0 2	15012000	4 5 2 1 0
14041101	0.00178,4	15012100	0 2
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14041301	0,0,4	15012201	0003, 4
*14041400	4031	15012301	0,0,4
14041401	557.0 5	15012400	5011
14041501	404010000,0,1,1,0.60046,1	15012501	0,0,0,1,3.556,1
14041502	405010000,0,1,1,0.50216,2	15012502	0,0,0,1,5.501,2
14041503	405020000,0,1,1,0.71145,3	15012503	0,0,0,1,7.93125,3
14041601	0,0,0,1,0.60046,1	15012504	0,0,0,1,4.534,4
14041602	0,0,0,1,0.50216,2	15012601	501010000, 0, 1, 1, 3.556, 1
14041603	0,0,0,1,0.71145,3	15012602	502010000, 0, 1, 1, 5.501, 2
14041701	0,0,0,0,0,0,3	15012603	503010000, 0, 1, 1, 7.93125, 3
*14041801	0,0,0,0,0,0.60046,1	15012604	504010000, 0, 1, 1, 4.534, 4
*14041802	0,0,0,0,0,0.50216,2	15012701	0,0,0,0,0,0,4
*14041803	0,0,0,0,0,0.71145,3	*15012901	0,0,0,0,0,0,14224,1
*14041901	0,0,0,0,0,0.60046,1	*15012902	0,0,0,0,0,0,22004,2
*14041902	0,0,0,0,0,0.50216,2	*15012903	0,0,0,0,0,0,31725,3
*14041903	0,0,0,0,0,0.71145,3	*15012904	0,0,0,0,0,0,18136,4
14041801	0. 10. 10. 0. 0. 0. 0. 1.3	15012801	0. 10. 10. 0. 0. 0. 0. 0. 1.4
14041901	0. 10. 10. 0. 0. 0. 0. 1.3	15012901	0. 10. 10. 0. 0. 0. 0. 0. 1.4
*		*	
14051000	1 5 2 1 0.03332	15013000	16 11 2 1 0
*14051100	1021	15013100	0 2
14051100	0 2	15013101	0.000529 3
14051101	0.00278,4	15013102	0.000406 5
14051201	0001,4	15013103	0.000656 8
14051301	0,0,4	15013104	0.000495 10
14051401	557. 5	15013201	0004. 3
14051501	406010000 0 1 1 0.47168 1	15013202	0005. 5
14051601	0 0 0 1 0.47168 1	15013203	0004. 8
14051701	0 0.0 0.0 0.0 1	15013204	0001. 10
*14051801	0 0.0 0.0 0.47168 1	15013301	0.0.3
*14051901	0 0.0 0.0 0.47168 1	15013302	1.0.5
14051801	0. 10. 10. 0. 0. 0. 0. 1.1	15013303	0.0. 10
14051901	0. 10. 10. 0. 0. 0. 0. 1.1	15013401	557.0. 11
*		15013501	0.0.0.0.0.0.16
* vessel structure		15013601	505010000, 10000, 1, 1, 13.4112, 2
*		15013602	505030000, 10000, 1, 1, 6.7056, 6
15011000	1 5 1 1 0	15013603	505070000, 10000, 1, 1, 13.4112, 8
15011100	0 2	15013604	505010000, 10000, 1, 1, 1.8288, 10
15011101	0.0370 4	15013605	505030000, 10000, 1, 1, 0.9144, 14
15011201	0001,4	15013606	505070000, 10000, 1, 1, 1.8288, 16
15011301	0,0,4	15013701	500. 0.07500. 0.0. 0.1
15011401	557.0 5	15013702	500. 0.17583. 0.0. 0.2
15011501	501010000, 0. 1. 0. 0.05200, 1	15013703	500. 0.12000. 0.0. 0.3
15011601	0. 0. 0. 0. 0.05200, 1	15013704	500. 0.12917. 0.0. 0.4
15011701	0. 0. 0. 0. 0. 1	15013705	500. 0.12917. 0.0. 0.5
*15011801	0. 0. 0.0.0.0.25730, 1	15013706	500. 0.12000. 0.0. 0.6
*15011901	0. 0. 0.0.0.0.25730, 1	15013707	500. 0.17583. 0.0. 0.7
15011801	0. 10. 10. 0. 0. 0. 0. 1.1	15013708	500. 0.07500. 0.0. 0.8
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*15013901	0. 0. 0. 0.01357. 0.6096. 2	15031201	0001, 4
*15013902	0. 0. 0. 0.01357, 0.3048, 6	15031301	0.0, 4
*15013903	0. 0. 0. 0.01357. 0.6096,10	15031401	557.0 5
*15013904	0. 0. 0. 0.01357. 0.3048,14	15031501	518010000, 10000, 1, 1. 0.4890, 9
*15013905	0. 0. 0. 0.01357. 0.6096,16	15031502	518100000, 0, 1.1, 0.37661,10
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15013901	0. 10. 10. 0. 0. 0. 0. 1.16	15031602	0, 0, 0, 1, 0.37661,10
*		15031701	0, 0.0, 0.0, 0.0, 10
15021000	1 5 2 1 1.286500e-01	*15031801	0, 0.0, 0.0, 0.4890, 9
15021100	0 2	*15031802	0, 0.0, 0.0, 0.37661,10
15021101	0.01568 4	*15031901	0, 0.0, 0.0, 0.4890, 9
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15021301	0.0.4	15031801	0. 10. 10. 0. 0. 0. 0. 1.10
15021401	557.0 5	15031901	0. 10. 10. 0. 0. 0. 0. 1.10
15021501	501010000. 0, 1. 1, 0.14224, 1	*	
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15021701	0, 0.0, 0.0, 0.0, 1	15024000	1 5 2 1 0.05121
*15021801	0, 0.0, 0.0, 0.0, 1	15024100	0 2
*15021901	0, 0.0, 0.0, 0.0, 1	15024101	0.00160 4
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15021901	0. 10. 10. 0. 0. 0. 0. 1.1	15024301	0.0.4
*		15024401	557.0 5
15022000	1 5 2 1 9.771000e-02	15024501	503010000. 0, 1. 1, 0.31725, 1
15022100	0 2	15024601	519010000. 0, 1. 1, 0.31725, 1
15022101	0.01588 4	15024701	0, 0.0, 0.0, 0.0, 1
15022201	0001. 4	*15024801	0, 0.0, 0.0, 0.31725, 1
15022301	0.0.4	*15024901	0, 0.0, 0.0, 0.31725, 1.
15022401	557.0 5	15024801	0. 10. 10. 0. 0. 0. 0. 1.1
15022501	502010000. 0, 1. 1, 0.22004, 1	15024901	0. 10. 10. 0. 0. 0. 0. 1.1
15022601	0. 0. 0.1. 0.22004, 1	*	
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*15022801	0. 0.0.0.0.22004, 1	15025100	0 2
*15022901	0. 0.0.0.0.22004, 1.	15025101	0.01765 4 . .
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*		15025401	557.0 5
15023000	1 5 2 1 7.621000e-02	15025501	504010000. 0, 1. 1, 0.18136, 1
15023100	0 2	15025502	505010000. 0, 1. 1, 0.0762, 2
15023101	0.01588 4	15025601	0, 0, 0.1. 0.18136, 1
15023201	0001. 4	15025602	0, 0, 0.1. 0.0762, 2
15023301	0.0.4	15025701	0, 0.0, 0.0, 0.0, 2
15023401	557.0 5	*15025801	0, 0.0, 0.0, 0.18136, 1
15023501	519010000. 0, 1. 1, 0.29337, 1	*15025802	0, 0.0, 0.0, 0.0762, 2
15023601	0. 0. 0.1. 0.29337, 1	*15025901	0, 0.0, 0.0, 0.18136, 1
15023701	0. 0.0.0.0.0. 1	*15025902	0, 0.0, 0.0, 0.0762, 2
*15023801	0. 0.0.0.0.29337, 1	15025801	0. 10. 10. 0. 0. 0. 0. 1.2
*15023901	0. 0.0.0.0.29337, 1	15025901	0. 10. 10. 0. 0. 0. 0. 1.2
15023801	0. 10. 10. 0. 0. 0. 0. 1.1	*	
15023901	0. 10. 10. 0. 0. 0. 0. 1.1	15014000	8 5 2 1 4.041000e-02
*		15014100	0 2
15031000	10 5 2 1 0.02775	15014101	0.01093 4
15031100	0 2	15014201	0001. 4
15031101	0.00471 4	15014301	0.0.4

15014401	575.5. 5		15017000	2	5	2	1	0.08272
15014501	505010000. 0. 1.	1, 0.5334. 1	15017100	0	2			
15014502	505020000. 0. 1.	1, 0.6096. 2	15017101	0.00671	4			
15014503	505030000. 10000.	1, 1. 0.3048. 6	15017201	0001.	4			
15014504	505070000. 10000.	1, 1, 0.6096. 8	15017301	0.0.4				
15014601	0. 0, 0. 1, 0.5334.	1	15017400	5011				
15014602	0, 0, 0, 1. 0.6096,	2	15017501	516010000. 0, 1,	1, 0.26670.	1		
15014603	0, 0, 0, 1. 0.3048.	6	15017502	517010000. 0, 1,	1, 0.38418	2		
15014604	0, 0, 0, 1, 0.6096,	8	15017601	0, 0. 0. 1, 0.26670,	1			
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*15014801	0. 0.0.0. 0.5334,	1	15017701	0, 0.0.0.0.0. 2				
*15014802	0, 0.0.0. 0.6096,	2	*15017801	0, 0.0.0. 0.26670,	1			
*15014803	0. 0.0.0. 0.3048.	6	*15017802	0. 0.0.0. 0.38418,	2			
*15014804	0. 0.0.0. 0.6096.	8	*15017901	0, 0.0.0. 0.26670,	1			
*15014901	0, 0.0.0. 0.5334,	1	*15017902	0, 0.0.0. 0.38418,	2			
*15014902	0, 0.0.0. 0.6096,	2	15017801	0. 10. 10. 0. 0. 0. 0.	0. 1.2			
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*15014904	0. 0.0.0. 0.6096,	8	*					
15014801	0. 10. 10. 0. 0. 0. 0.	1.8	15041000	1	5	2	1	0.
15014901	0. 10. 10. 0. 0. 0. 0.	1.8	*15041100	5012				
*			15041100	0	2			
*15015000	1 5 2 1 0.		15041101	0.00134.	4			
*15015100	0 2		15041201	0003.4				
*15015101	0.02858 4		15041301	0.0.4				
*15015201	0001. 4		15041401	594.0. 5				
*15015301	0.0.4		15041501	0. 0. 0. 1. 5.08.	1			
*15015400	5011		15041601	506010000. 0.1.	1. 5.08.	1		
*15015501	516010000. 0. 1.	1. 0.3765.	1	15041701	0. 0.0.0.0.0.	1		
*15015601	0, 0. 0. 1. 0.3765.	1	*15041801	0. 0.0.0. 0.2032.	1			
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**15015801	0, 0.0.0. 0.54381.	1	15041801	0. 10. 10. 0. 0. 0.	0. 1.1			
**15015901	0. 0.0.0. 0.54381.	1	15041901	0. 10. 10. 0. 0. 0.	0. 1.1			
*15015801	0. 10. 10. 0. 0. 0. 0.	1.1	*					
*15015901	0. 10. 10. 0. 0. 0. 0.	1.1	15042000	1	5	2	1	0.04166
*			15042100	0	2			
15016000	2 5 2 1	3.810000e-02	15042101	0.01816	4			
15016100	0 2		15042201	0001.	4			
15016101	0.00572 4		15042301	0.0.4				
15016201	0001. 4		15042400	5041				
15016301	0.0.4		15042501	506010000. 0.1.	1. 0.30505.	1		
15016400	5011		15042601	0. 0. 0. 1. 0.30505.	1			
15016501	0. 0. 0. 1. 0.26670.	1	15042701	0, 0.0.0.0.0.	1			
15016502	0. 0. 0. 1. 0.38418.	2	*15042801	0. 0.0.0. 0.30505.	1			
15016601	516010000. 0. 1.	1. 0.26670.	1	*15042901	0. 0.0.0. 0.30505.	1		
15016602	517010000. 0. 1.	1. 0.38418.	2	15042801	0. 10. 10. 0. 0.	0. 0. 1.1		
15016701	0. 0.0.0.0.0. 2		15042901	0. 10. 10. 0. 0.	0. 0. 1.1			
*15016801	0. 0.0.0. 0.26670.	1	*					
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*15016902	0. 0.0.0. 0.38418.	2	15043101	0.01153	4			
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*			15043400	5041				

15043501	507010000.0.	1.	1.	0.68910,	1		15046701	0,	0.0.0.0.0.	1					
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15043701	0,	0.0.0.0.	0.0.	1			*15046901	0,	0.0.0.0.	0.26670,	1				
*15043801	0,	0.0.0.0.	0.	0.68910,	1		15046801	0.	10.	10.	0.	0.	0.	0.	1.1
*15043901	0,	0.0.0.0.	0.	0.68910,	1		15046901	0.	10.	10.	0.	0.	0.	0.	1.1
15043801	0.	10.	10.	0.	0.	0.	*								
15043901	0.	10.	10.	0.	0.	0.	15062000	4	5	2	1	8.050000e-03			
*							15062100	0	2						
15044000	1	5	2	1	3.826000e-02		15062101	0.00037	4						
15044100	0	2					15062201	0001,	4						
15044101	0.01742	4					15062301	0.0,	4						
15044201	0001,	4					15062401	568.0,	5						
15044301	0.0,	4					15062501	513010000.	0.1,	1,	0.0756,	1			
15044400	5041						15062502	513010000.	0.1,	1.	0.7786,	2			
15044501	508010000.	0.1,	1,	0.52070,	1		15062503	513010000.	0.1,	1.	0.2761,	3			
15044601	0,	0,	0.	1.	0.52070,	1	15062504	513010000.	0.1,	1.	0.5207,	4			
15044701	0,	0.0.0.0.	0.0.	1			15062601	510010000.	0.1,	1.	0.0756,	1			
*15044801	0,	0.0.0.0.	0.	0.52070,	1		15062602	509020000.	0.1,	1.	0.7786,	2			
*15044901	0,	0.0.0.0.	0.	0.52070,	1		15062603	509010000.	0.1,	1.	0.2761,	3			
15044801	0.	10.	10.	0.	0.	0.	15062604	508010000.	0.1,	1.	0.5207,	4			
15044901	0.	10.	10.	0.	0.	0.	*	15062701	0,	0.0.0.0.	0.0.	4			
*							*15062801	0.	0.0.0.0.	0.0756,	1				
15045000	3	5	2	1	4.299000e-02		*15062802	0,	0.0.0.0.	0.7786,	2				
*15045100	5043						*15062803	0,	0.0.0.0.	0.2761,	3				
15045100	0	2					*15062804	0.	0.0.0.0.	0.5207,	4				
15045101	0.01153.4						*15062901	0.	0.0.0.0.	0.0756,	1				
15045201	0001.4						*15062902	0.	0.0.0.0.	0.7786,	2				
15045301	0.0.4						*15062903	0.	0.0.0.0.	0.2761,	3				
15045400	5041						*15062904	0.	0.0.0.0.	0.5207,	4				
15045501	509010000.	0.1.	1.	0.2761,	1		15062801	0.	10.	10.	0.	0.	0.	0.	1.4
15045502	509020000.	0.1.	1.	0.7786,	2		15062901	0.	10.	10.	0.	0.	0.	0.	1.4
15045503	510010000.	0.1.	1.	0.0756,	3	*	*								
15045601	0.	0.	0.	1.	0.2761,	1	15063000	5	5	2	1	4.880000e-03			
15045602	0.	0.	0.	1.	0.7786,	2	15063100	0	2						
15045603	0.	0.	0.	1.	0.0756,	3	15063101	0.00037	4						
15045701	0.	0.0.0.0.	0.0.	3			15063201	0001,	4						
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*15045802	0.	0.0.0.0.	0.7786,	2			15063401	568.0,	5						
*15045803	0.	0.0.0.0.	0.0756,	3			15063501	514010000.	0.1,	1,	0.1512,	1			
*15045901	0.	0.0.0.0.	0.2761,	1			15063502	514010000.	0.1,	1.	0.5572,	2			
*15045902	0.	0.0.0.0.	0.7786,	2			15063503	514010000.	0.1,	1.	0.5522,	3			
*15045903	0.	0.0.0.0.	0.0756,	3			15063504	514010000.	0.1,	1.	1.0414,	4			
15045801	0.	10.	10.	0.	0.	0.	15063505	514010000.	0.1,	1.	1.3782,	5			
15045901	0.	10.	10.	0.	0.	0.	*	15063601	510010000.	0.1,	1.	0.1512,	1		
*							15063602	509020000.	0.1,	1.	0.5572,	2			
15046000	1	5	1	1	0.		15063603	509010000.	0.1,	1.	0.5522,	3			
15046100	0	2					15063604	508010000.	0.1,	1.	1.0414,	4			
15046101	0.04976	4					15063605	507010000.	0.1,	1.	1.3782,	5			
15046201	0001.	4					15063701	0.	0.0.0.0.	0.0.	5				
15046301	0.0.	4					*15063801	0.	0.0.0.0.	0.0756,	1				
15046400	5043						*15063802	0.	0.0.0.0.	0.7786,	2				
15046501	510010000.	0.1.	0.	0.00575,	1		*15063803	0.	0.0.0.0.	0.2761,	3				
15046601	0.	0.	0.	0.	0.00575,	1									

*15063804	0,	0.0.0.0,	0.5207.	4	17001607	702070000, 0.1,	1.	2.13182,	7							
*15063805	0,	0.0.0.0,	0.6891.	5	17001608	702080000, 10000,	1.	1,	1.96412,	9						
*15063901	0,	0.0.0.0,	0.0756,	1	17001609	702070000, 0.1,	1.	2.13182,	10							
*15063902	0,	0.0.0.0,	0.7786,	2	17001610	702060000, 0.1.	1,	2.30962,	11							
*15063903	0,	0.0.0.0,	0.2761.	3	17001611	702050000, 0.1,	1,	2.51282,	12							
*15063904	0,	0.0.0.0,	0.5207,	4	17001612	702040000, 0.1,	1,	2.46202,	13							
*15063905	0,	0.0.0.0,	0.6891,	5	17001613	702030000, 0.1,	1,	2.30962,	14							
15063801	0.	10.	10.	0.	0.	0.	0.	1.5	17001614	702020000, 0.1,	1,	2.46202,	15			
15063901	0.	10.	10.	0.	0.	0.	0.	1.5	17001615	702010000, 0.1,	1,	2.39218,	15			
*					17001701	0.	0.0.0.0,	0.0.16								
15064000	3	5	2	1	0.00470				*17001801	0,	0.01974,	0.01974,	1.19609,	1		
15064100	0	2							*17001802	0,	0.01974,	0.01974,	1.23101,	2		
15064101	0.00041	4							*17001803	0.	0.01974,	0.01974,	1.15481,	3		
15064201	0001,	4							*17001804	0.	0.01974,	0.01974,	1.23101,	4		
15064301	0.0,	4							*17001805	0,	0.01974,	0.01974,	1.25641,	5		
15064401	557.0	5							*17001806	0,	0.01974,	0.01974,	1.15481,	6		
15064501	531010000,	0.1,	1,	0.38247,	3				*17001807	0,	0.01974,	0.01974,	1.06591,	7		
15064601	0,	0.0,	1,	0.38247,	3				*17001808	0.	0.01974,	0.01974,	0.98206,	9		
15064701	0,	0.0.0.0,	0.0,	3					*17001809	0.	0.01974,	0.01974,	1.06591,	10		
*15064801	0.	0.0.0.0,	0.38247,	3					*17001810	0.	0.01974,	0.01974,	1.15481,	11		
*15064901	0.	0.0.0.0,	0.38247,	3					*17001811	0.	0.01974,	0.01974,	1.25641,	12		
15064801	0.	10.	10.	0.	0.	0.	0.	1.3	*17001812	0.	0.01974,	0.01974,	1.23101,	13		
15064901	0.	10.	10.	0.	0.	0.	0.	1.3	*17001813	0.	0.01974,	0.01974,	1.15481,	14		
*									*17001814	0.	0.01974,	0.01974,	1.23101,	15		
* broken-loop steam generator									*17001815	0.	0.01974,	0.01974,	1.19609,	16		
*									*17001901	0.	0.00635,	0.00635,	1.19609,	1		
17001000	16	5	2	1	0.00987				*17001902	0.	0.00635,	0.00635,	1.23101,	2		
17001100	0	2							*17001903	0.	0.00635,	0.00635,	1.15481,	3		
17001101	0.00031	4							*17001904	0.	0.00635,	0.00635,	1.23101,	4		
17001201	0002.	4							*17001905	0.	0.00635,	0.00635,	1.25641,	5		
17001301	0.0.	4							*17001906	0.	0.00635,	0.00635,	1.15481,	6		
17001401	495.0.	5							*17001907	0.	0.00635,	0.00635,	1.06591,	7		
17001501	701020000.	0.1,	1.	2.39218,	1				*17001908	0.	0.00635,	0.00635,	0.98206,	9		
17001502	701030000.	0.1,	1.	2.46202,	2				*17001909	0.	0.00635,	0.00635,	1.06591,	10		
17001503	701040000.	0.1,	1.	2.30962,	3				*17001910	0.	0.00635,	0.00635,	1.15481,	11		
17001504	701050000.	0.1,	1.	2.46202,	4				*17001911	0.	0.00635,	0.00635,	1.25641,	12		
17001505	701060000.	0.1,	1.	2.51282,	5				*17001912	0.	0.00635,	0.00635,	1.23101,	13		
17001506	701070000.	0.1,	1.	2.30962,	6				*17001913	0.	0.00635,	0.00635,	1.15481,	14		
17001507	701080000.	0.1,	1.	2.13182,	7				*17001914	0.	0.00635,	0.00635,	1.23101,	15		
17001508	701100000,	10000,	1.	1.	1.96412,	9			*17001915	0.	0.00635,	0.00635,	1.19609,	16		
17001509	701110000.	0.1,	1.	2.13182,	10				17001801	0.	10.	10.	0.	0.	0.	1.15
17001510	701120000.	0.1,	1.	2.30962,	11				17001901	0.	10.	10.	0.	0.	0.	1.16
17001511	701130000.	0.1,	1.	2.51282,	12				*							
17001512	701140000.	0.1,	1.	2.46202,	13				17012000	8	5	2	1	0.05255		
17001513	701150000.	0.1,	1.	2.30962,	14				17012100	0	2					
17001514	701160000.	0.1,	1.	2.46202,	15				17012101	0.01403	4					
17001515	701170000.	0.1,	1.	2.39218,	16				17012201	0006.	4					
17001601	702010000.	0.1,	1.	2.39218,	1				17012301	0.0.	4					
17001602	702020000.	0.1,	1.	2.46202,	2				17012400	7001						
17001603	702030000.	0.1,	1.	2.30962,	3				17012501	702010000.	0.1,	1.	1.19609,	1		
17001604	702040000.	0.1,	1.	2.46202,	4				17012502	702020000.	0.1,	1.	1.23101,	2		
17001605	702050000.	0.1,	1.	2.51282,	5				17012503	702030000.	0.1,	1.	1.15481,	3		
17001606	702060000.	0.1,	1.	2.30962,	6				17012504	702040000.	0.1,	1.	1.23101,	4		

17012505	702050000.0.1.	1.	1.25641.	5	*17022608	702080000.0.1.	1.	1.65398.	8
17012506	702060000.0.1.	1.	1.15481.	6	17022601	705010000.0.1.	1.	1.19609.	1
17012507	702070000.0.1.	1.	1.06591.	7	17022602	705020000.0.1.	1.	1.23101.	2
17012508	702080000.0.1.	1.	1.65398.	8	17022603	705030000.0.1.	1.	1.15481.	3
17012601	702010000.0.1.	1.	1.19609.	1	17022604	705040000.0.1.	1.	1.23101.	4
17012602	702020000.0.1.	1.	1.23101.	2	17022605	705050000.0.1.	1.	1.25641.	5
17012603	702030000.0.1.	1.	1.15481.	3	17022606	705060000.0.1.	1.	1.15481.	6
17012604	702040000.0.1.	1.	1.23101.	4	17022607	705070000.0.1.	1.	1.06591.	7
17012605	702050000.0.1.	1.	1.25641.	5	17022608	705080000.0.1.	1.	1.65398.	8
17012606	702060000.0.1.	1.	1.15481.	6	17022701	0. 0.0.0.0.0.	8		
17012607	702070000.0.1.	1.	1.06591.	7	*17022801	0. 0.01999.	0.05963.	1.19609.	1
17012608	702080000.0.1.	1.	1.65398.	8	*17022802	0. 0.01999.	0.05963.	1.23101.	2
17012701	0. 0.0.0.0.0.	8		*17022803	0. 0.01999.	0.05963.	1.15481.	3	
*17012801	0. 0.0.0.0.	1.19609.	1	*17022804	0. 0.01999.	0.05963.	1.23101.	4	
*17012802	0. 0.0.0.0.	1.23101.	2	*17022805	0. 0.01999.	0.05963.	1.25641.	5	
*17012803	0. 0.0.0.0.	1.15481.	3	*17022806	0. 0.01999.	0.05963.	1.15481.	6	
*17012804	0. 0.0.0.0.	1.23101.	4	*17022807	0. 0.01999.	0.05963.	1.06591.	7	
*17012805	0. 0.0.0.0.	1.25641.	5	*17022808	0. 0.01999.	0.05963.	1.65398.	8	
*17012806	0. 0.0.0.0.	1.15481.	6	*17022901	0. 0.0.0.0.	1.19609.	1		
*17012807	0. 0.0.0.0.	1.06591.	7	*17022902	0. 0.0.0.0.	1.23101.	2		
*17012808	0. 0.0.0.0.	1.65398.	8	*17022903	0. 0.0.0.0.	1.15481.	3		
*17012901	0. 0.0.0.0.	1.19609.	1	*17022904	0. 0.0.0.0.	1.23101.	4		
*17012902	0. 0.0.0.0.	1.23101.	2	*17022905	0. 0.0.0.0.	1.25641.	5		
*17012903	0. 0.0.0.0.	1.15481.	3	*17022906	0. 0.0.0.0.	1.15481.	6		
*17012904	0. 0.0.0.0.	1.23101.	4	*17022907	0. 0.0.0.0.	1.06591.	7		
*17012905	0. 0.0.0.0.	1.25641.	5	*17022908	0. 0.0.0.0.	1.65398.	8		
*17012906	0. 0.0.0.0.	1.15481.	6	17022801	0. 10. 10. 0. 0. 0. 0.	1.8			
*17012907	0. 0.0.0.0.	1.06591.	7	17022901	0. 10. 10. 0. 0. 0. 0.	1.8			
*17012908	0. 0.0.0.0.	1.65398.	8	*					
17012801	0. 10. 10. 0. 0. 0. 0.	1.8		17032000	8 5 2 1	0.11074			
17012901	0. 10. 10. 0. 0. 0. 0.	1.8		17032100	0 2				
*				17032101	0.00238 4				
17022000	8 5 2 1	0.10578		17032201	0001. 4				
17022100	0 2			17032301	0.0.4				
17022101	0.00094 4			17032400	7001				
17022201	0001. 4			17032501	705010000.0.1.	1.	1.33972.	1	
17022301	0.0.4			17032502	705020000.0.1.	1.	0.86339.	2	
17022400	7001			17032503	705030000.0.1.	1.	0.93540.	3	
17022501	702010000.0.1.	1.	1.19609.	1	17032504	705040000.0.1.	1.	1.01769.	4
17022502	702020000.0.1.	1.	1.23101.	2	17032505	705050000.0.1.	1.	0.99712.	5
17022503	702030000.0.1.	1.	1.15481.	3	17032506	705060000.0.1.	1.	0.93540.	6
17022504	702040000.0.1.	1.	1.23101.	4	17032507	705070000.0.1.	1.	0.99712.	7
17022505	702050000.0.1.	1.	1.25641.	5	17032508	705080000.0.1.	1.	0.96883.	8
17022506	702060000.0.1.	1.	1.15481.	6	17032601	705010000.0.1.	1.	1.33972.	1
17022507	702070000.0.1.	1.	1.06591.	7	17032602	705020000.0.1.	1.	0.86339.	2
17022508	702080000.0.1.	1.	1.65398.	8	17032603	705030000.0.1.	1.	0.93540.	3
*17022601	702010000.0.1.	1.	1.19609.	1	17032604	705040000.0.1.	1.	1.01769.	4
*17022602	702020000.0.1.	1.	1.23101.	2	17032605	705050000.0.1.	1.	0.99712.	5
*17022603	702030000.0.1.	1.	1.15481.	3	17032606	705060000.0.1.	1.	0.93540.	6
*17022604	702040000.0.1.	1.	1.23101.	4	17032607	705070000.0.1.	1.	0.99712.	7
*17022605	702050000.0.1.	1.	1.25641.	5	17032608	705080000.0.1.	1.	0.96883.	8
*17022606	702060000.0.1.	1.	1.15481.	6	17032701	0. 0.0.0.0.0.	8		
*17022607	702070000.0.1.	1.	1.06591.	7	*17032801	0. 0.0.0.0.	1.65398.	1	

\*17032802 0, 0.0,0.0, 1.06591, 2  
 \*17032803 0, 0.0,0.0, 1.25481, 3  
 \*17032804 0, 0.0,0.0, 1.25641, 4  
 \*17032805 0, 0.0,0.0, 1.23101, 5  
 \*17032806 0, 0.0,0.0, 1.15481, 6  
 \*17032807 0, 0.0,0.0, 1.23101, 7  
 \*17032808 0, 0.0,0.0, 1.19609, 8  
 \*17032901 0, 0.0,0.0, 1.65398, 1  
 \*17032902 0, 0.0,0.0, 1.06591, 2  
 \*17032903 0, 0.0,0.0, 1.25481, 3  
 \*17032904 0, 0.0,0.0, 1.25641, 4  
 \*17032905 0, 0.0,0.0, 1.23101, 5  
 \*17032906 0, 0.0,0.0, 1.15481, 6  
 \*17032907 0, 0.0,0.0, 1.23101, 7  
 \*17032908 0, 0.0,0.0, 1.19609, 8  
 17032801 0. 10. 10. 0. 0. 0. 0. 1.8  
 17032901 0. 10. 10. 0. 0. 0. 0. 1.8  
 \*  
 17042000 3 5 2 1 0.23233  
 17042100 0 2  
 17042101 0.00105 4  
 17042201 0001, 4  
 17042301 0.0,4  
 17042400 7001  
 17042501 702090000.0.1. 1. 0.37827, 1  
 17042502 702100000.0.1. 1. 0.30635, 2  
 \*17042503 702110000.0.1. 1. 0.30635, 3  
 17042503 703010000.0.1. 1. 0.30635, 3  
 17042601 709010000.0.1. 1. 0.37827, 1  
 17042602 709010000.0.1. 1. 0.30635, 2  
 17042603 703010000.0.1. 1. 0.30635, 3  
 17042701 0. 0.0.0.0.0. 3  
 \*17042801 0. 0.0.0. 0.37827, 1  
 \*17042802 0. 0.0.0. 0.50635, 2  
 \*17042901 0. 0.0.0. 0.37827, 1  
 \*17042902 0. 0.0.0. 0.50635, 2  
 17042801 0. 10. 10. 0. 0. 0. 0. 1.3  
 17042901 0. 10. 10. 0. 0. 0. 0. 1.3  
 \*  
 17053000 8 5 2 1 0.12146  
 17053100 0 2  
 17053101 0.00377 4  
 17053201 0001, 4  
 17053301 0.0,4  
 17053400 7001  
 17053501 705010000.0.1. 1. 1.65398, 1  
 17053502 705020000.0.1. 1. 1.10659, 2  
 17053503 705030000.0.1. 1. 1.15481, 3  
 17053504 705040000.0.1. 1. 1.25641, 4  
 17053505 705050000.0.1. 1. 1.23101, 5  
 17053506 705060000.0.1. 1. 1.15481, 6  
 17053507 705070000.0.1. 1. 1.23101, 7  
 17053508 705080000.0.1. 1. 1.19609, 8

\*  
 \* Modify Right Boundary Condition identical to  
 \* Intact Loop S/G  
 \*  
 \*17053601 -200,0,1000, 1, 1.65398, 1  
 \*17053602 -200,0,1000, 1, 1.10659, 2  
 \*17053603 -200,0,1000, 1, 1.15481, 3  
 \*17053604 -200,0,1000, 1, 1.25641, 4  
 \*17053605 -200,0,1000, 1, 1.23101, 5  
 \*17053606 -200,0,1000, 1, 1.15481, 6  
 \*17053607 -200,0,1000, 1, 1.23101, 7  
 \*17053608 -200,0,1000, 1, 1.19609, 8  
 \*  
 17053601 -200,0,3205, 1, 1.65398, 1  
 17053602 -200,0,3205, 1, 1.10659, 2  
 17053603 -200,0,3205, 1, 1.15481, 3  
 17053604 -200,0,3205, 1, 1.25641, 4  
 17053605 -200,0,3205, 1, 1.23101, 5  
 17053606 -200,0,3205, 1, 1.15481, 6  
 17053607 -200,0,3205, 1, 1.23101, 7  
 17053608 -200,0,3205, 1, 1.19609, 8  
 \*  
 \* End of modification by Y.S Bnag at Aug 31, 1994  
 \*

17054504	709020000.	0.	1.	0.37827,	4		20100101	273.15	12.98
*17054601	-200,	0,	1000,	1.	0.40005,	1	20100102	1199.82	25.1
*17054602	-200,	0,	1000,	1.	0.50635,	2	*		
*17054603	-200,	0,	1000,	1.	0.50635,	3	* thermal conductivity incoloy 600		
*17054604	-200,	0,	1000,	1.	0.37827,	4	*		
*							20100201	366.5	13.85
* modify right boundary condition							20100202	477.6	15.92
* identical to intact loop sg							20100203	588.7	18.17
* by ysbang at 94.9.6							20100204	700.0	20.42
*							20100205	810.9	22.50
17054601	-200,	0,	3204,	1,	0.40005,	1	20100206	922.0	24.92
17054602	-200,	0,	3204,	1,	0.50635,	2	20100207	1033.2	26.83
17054603	-200,	0,	3204,	1,	0.50635,	3	20100208	1144.3	29.42
17054604	-200,	0,	3204,	1.	0.37827,	4	20100209	1477.6	36.06
*							*		
17054701	0,	0.0,	0.0,	0.0,	4		* thermal conductivity copper		
*17054801	0,	0.0,	0.0,	0.40005,	1		*		
*17054802	0,	0.0,	0.0,	0.50635,	3		20100301	273.15	387.546
*17054803	0,	0.0,	0.0,	0.37827,	4		20100302	373.15	377.577
*17054901	0,	0.0,	0.0,	0.40005.	1		20100303	573.15	366.985
*17054902	0,	0.0,	0.0,	0.50635,	3		20100304	773.15	358.262
*17054903	0,	0.0,	0.0,	0.37827,	4		20100305	2477.60	358.262
17054801	0.	10.	10.	0.	0.	0.	*		
17054901	0.	10.	10.	0.	0.	0.	* thermal conductivity boron nitride		
*							*		
17055000	1	5	1	1	0.0		20100401	273.15	15.888
17055100	0	2					20100402	366.48	15.016
17055101	0.00596	4					20100403	533.15	13.458
17055201	0001.	4					20100404	810.93	10.841
17055301	0.0.	4					20100405	1088.71	8.287
17055400	7001						20100406	1366.48	5.664
17055501	704010000.	0.1.	0.	0.13174.	1		20100407	1644.26	3.059
17055601	0.	0.	0.0.	0.13174.	1		20100408	1922.04	0.461
17055701	0.	0.0.	0.0.0.	0.	1		20100409	2199.82	0.461
*17055801	0.	0.0.	0.0.	0.40955.	1		20100410	2477.602	0.461
*17055901	0.	0.0.	0.0.	0.49055.	1		*		
17055801	0.	10.	10.	0.	0.	0.	* thermal conductivity inconel 600		
17055901	0.	10.	10.	0.	0.	0.	*		
*							20100501	273.15	14.7043
*****							20100502	310.93	14.7043
* heat structure thermal property data (si units)							20100503	422.04	16.6358
*****							20100504	533.15	18.3181
*							20100505	644.26	20.0627
20100100	tbl/fctn	1	1	*	s-steel		20100506	755.37	21.8073
20100200	tbl/fctn	1	1	*	incoly 600		20100507	866.48	23.5518
20100300	tbl/fctn	1	1	*	copper		20100508	2477.60	23.5518
20100400	tbl/fctn	1	1	*	boron nitride		*		
20100500	tbl/fctn	1	1	*	inconel 600		* thermal conductivity fillers (air)		
20100600	tbl/lctn	1	1	*	filler pieces		*		
*							20100601	300.0	0.02622
*							20100602	400.0	0.03362
* thermal conductivity S-Steel							20100603	500.0	0.04035
*							20100604	600.0	0.04565

20100605	700.0	0.05227	20230001	-1.0	0.0
*			20230002	0.0	0.0
* volumetric heat capacity s-steel			20230003	0.0	12000.
*			20230004	1.0e06	12000.
20100151	273.15	3.830e6	*		
20100152	366.5	3.830e6	* reactor core power		
20100153	1466.5	5.376e6	*		
*			20250000	power	
* volumetric heat capacity incoloy 600			20250001	0.0	95.0e03
*			*		
20100251	366.5	3.908e5	20220000	temp	
20100252	477.6	4.084e5	20220001	0.0	300.
20100253	588.7	4.260e5	*		
20100254	700.0	4.436e5	20270500	htc-t	
20100255	810.9	4.665e5	20270501	0.0	6.086
20100256	922.0	4.929e5	*		
20100257	1033.2	5.105e5	20220500	htc-t	
20100258	1477.6	5.727e5	20220501	0.0	6.086
*			*		
* volumetric heat capacity copper			20220400	htc-t	
*			20220401	0.0	5.98
20100351	273.15	3.6429e06	*		
20100352	2477.60	3.4429e06	20270400	htc-t	
*			20270401	0.0	5.98
* volumetric heat capacity boron nitride			*		
*			*****		
20100451	273.15	2.5150e06	*		
20100452	477.59	2.515e06	* homogeneous pump curves		
20100453	699.82	3.2393e06	*		
20100454	922.04	3.661e06	*****		
20100455	1144.26	3.9100e06	*		
20100456	1366.48	4.0240e06	* broken loop single-phase head curves		
20100457	1588.71	4.1172e06	*		
20100458	2144.26	4.1916e06	4501100	1.1	
20100459	2477.60	4.1916e06	4501101	0.0	1.7821
*			4501102	0.2845	1.7059
* volumetric heat capacity inconel 600			4501103	0.569	1.627
*			4501104	0.8535	1.1878
20100551	273.15	3.50253e06	4501105	1.0	1.0
20100552	2477.60	3.50253e06	*		
*			4501200	1.2	
* volumetric heat capacity filers			4501201	0.0	-1.6359
*			4501202	0.713	0.0
20100651	200.0	1.1595e06	4501203	0.8271	0.2959
20100652	1000.0	1.1595e06	4501204	1.0	1.0
*			*		
*****			4501300	1.3	
* tabulat data			4501301	-1.0	1.5
*****			4501302	-0.8	1.275
*			4501303	-0.6	1.375
* power for pressurizer			4501304	-0.4	1.375
*			4501305	0.0	1.2
20230000	power	502	*		

4501400	1 4	*	
4501401	-1.0	1.5	4502100 2 3
4501402	-0.8	1.15	4502101 -1.0 0.62
4501403	-0.6	0.95	4502102 -0.8 0.68
4501404	-0.4	0.83	4502103 -0.6 0.53
4501405	-0.2	0.775	4502104 -0.4 0.46
4501406	0.0	0.725	4502105 -0.2 0.49
*			4502106 0.0 0.54
4501500	1 5	*	
4501501	0.0	0.975	4502200 2 4
4501502	0.5	1.33	4502201 -1.0 0.62
4501503	1.0	1.95	4502202 -0.8 0.53
*			4502203 -0.6 0.46
4501600	1 6		4502204 -0.4 0.42
4501601	0.0	0.725	4502205 -0.2 0.39
4501602	0.2	0.725	4502206 0.0 0.36
4501603	0.4	0.8	*
4501604	0.6	1.025	4502300 2 5
4501605	1.0	1.95	4502301 0.0 -0.63
*			4502302 0.2 -0.51
4501700	1 7		4502303 0.4 -0.39
4501701	-1.0	0.175	4502304 0.6 -0.29
4501702	-0.5	0.65	4502305 0.8 -0.16
4501703	0.0	0.975	4502306 1.0 -0.13
*			*
4501800	1 8		4502400 2 6
4501801	-1.0	0.175	4502401 0.0 0.36
4501802	-0.75	-0.15	4502402 0.2 0.32
4501803	-0.55	-0.3	4502403 0.4 0.27
4501804	-0.275	-0.4	4502404 0.6 0.18
4501805	0.0	-0.35	4502405 0.8 0.05
*			4502406 1.0 -0.13
*			*
* broken loop single-phase torque curves			
*			4502500 2 7
4501900	2 1		4502501 -1.0 -1.44
4501901	0.0	0.54	4502502 -0.8 -1.25
4501902	0.2	0.59	4502503 -0.6 -1.08
4501903	0.4	0.65	4502504 -0.4 -0.92
4501904	0.6	0.77	4502505 -0.2 -0.77
4501905	0.8	0.95	4502506 0.0 -0.63
4501906	0.9	0.98	*
4501907	0.95	0.96	4502600 2 8
4501908	1.0	0.87	4502601 -1.0 -1.44
*			4502602 -0.8 -1.12
4502000	2 2		4502603 -0.6 -0.79
4502001	0.0	-0.15	4502604 -0.4 -0.52
4502002	0.2	0.02	4502605 -0.2 -0.31
4502003	0.4	0.22	4502606 0.0 -0.15
4502004	0.6	0.46	*
4502005	0.8	0.71	* two-phase head multiplier
4502006	0.9	0.81	*
4502007	0.95	0.85	4503000 0
4502008	1.0	0.87	4503001 0.0 0.0

4503002	0.1	0.0	4504308	-0.25	-1.69
4503003	0.15	0.05	4504309	-0.1	-0.5
4503004	0.24	0.8	4504310	0.0	0.0
4503005	0.3	0.96	*		
4503006	0.4	0.98	4504400	1.4	
4503007	0.6	0.97	4504401	-1.0	-1.16
4503008	0.8	0.90	4504402	-0.9	-0.78
4503009	0.9	0.8	4504403	-0.8	-0.5
4503010	0.96	0.5	4504404	-0.7	-0.31
4503011	1.0	0.0	4504405	-0.6	-0.17
*			4504406	-0.5	-0.08
* two-phase torque multiplier			4504407	-0.35	0.0
*			4504408	-0.2	0.05
4503100	0		4504409	-0.1	0.08
4503101	0.0	-0.17	4504410	0.0	0.11
4503102	0.0001	-0.17	*		
4503103	0.006	0.0	4504500	1.5	
4503104	0.1	0.0	4504501	0.0	0.0
4503105	0.15	0.05	4504502	0.2	-0.34
4503106	0.24	0.56	4504503	0.4	-0.65
4503107	0.8	0.56	4504504	0.6	-0.93
4503108	0.96	0.45	4504505	0.8	-1.19
4503109	1.0	0.0	4504506	1.0	-1.47
*			*		
* two-phase head difference curves			4504600	1.6	
*			4504601	0.0	0.11
4504100	1.1		4504602	0.1	0.13
4504101	0.0	0.0	4504603	0.25	0.15
4504102	0.1	0.85	4504604	0.4	0.13
4504103	0.2	1.09	4504605	0.5	0.07
4504104	0.5	1.02	4504606	0.6	-0.04
4504105	0.7	1.01	4504607	0.7	-0.23
4504106	0.9	0.94	4504608	0.8	-0.51
4504107	1.0	1.0	4504609	0.9	-0.91
*			4504610	1.0	-1.47
4504200	1.2		*		
4504201	0.0	0.0	4504700	1.7	
4504202	0.1	-0.04	4504701	-1.0	0.0
4504203	0.2	0.0	4504702	0.0	0.0
4504204	0.3	0.1	*		
4504205	0.4	0.21	4504800	1.8	
4504206	0.8	0.67	4504801	-1.0	0.0
4504207	0.9	0.8	4504802	0.0	0.0
4504208	1.0	1.0	*		
*			* two-phase torque difference curves		
4504300	1.3		*		
4504301	-1.0	-1.16	4504900	2.1	
4504302	-0.9	-1.24	4504901	0.0	0.54
4504303	-0.8	-1.77	4504902	0.2	0.59
4504304	-0.7	-2.36	4504903	0.4	0.65
4504305	-0.6	-2.79	4504904	0.6	0.77
4504306	-0.5	-2.91	4504905	0.8	0.95
4504307	-0.4	-2.67	4504906	0.9	0.98

4504907	0.95	0.96	*
4504908	1.0	0.87	4505600    2.8
*			4505601    -1.0   -1.44
4505000	2.2		4505602    -0.8   -1.12
4505001	0.0	-0.15	4505603    -0.6   -0.79
4505002	0.2	0.02	4505604    -0.4   -0.52
4505003	0.4	0.22	4505605    -0.2   -0.31
4505004	0.6	0.46	4505606    0.0   -0.15
4505005	0.8	0.71	*
4505006	0.9	0.81	4506100    501
4505007	0.95	0.85	4506101    0.0   0.0
4505008	1.0	0.87	4506102    1.0e06 0.0
*			*
4505100	2.3		*****
4505101	-1.0	0.62	*
4505102	-0.8	0.68	* control components
4505103	-0.6	0.53	*
4505104	-0.4	0.46	*****
4505105	-0.2	0.49	*
4505106	0.0	0.54	*
*			20500100 sgdc-lvl sum 1.0 0.0 1
4505200	2.4		20500101 0.0 1.21831 voidf 205100000
4505201	-1.0	0.62	20500102 1.20561 voidf 205090000
4505202	-0.8	0.53	20500103 1.20561 voidf 205080000
4505203	-0.6	0.46	20500104 1.20561 voidf 205070000
4505204	-0.4	0.42	20500105 1.20561 voidf 205060000
4505205	-0.2	0.39	20500106 1.20561 voidf 205050000
4505206	0.0	0.36	20500107 1.20561 voidf 205040000
*			20500108 0.48578 voidf 205030000
4505300	2.5		20500109 0.58737 voidf 205020000
4505301	0.0	-0.63	20500110 0.41891 voidf 205010000
4505302	0.2	-0.51	20500111 0.37827 voidf 209020000
4505303	0.4	-0.39	20500112 0.50633 voidf 209010000
4505304	0.6	-0.29	20500113 0.50635 voidf 203010000
4505305	0.8	-0.20	20500114 0.40005 voidf 204010000
4505306	0.9	-0.16	*
4505307	1.0	-0.13	20500200 sgsd-lvl sum 1.0 0.0 1
*			20500201 0.0 1.21831 voidf 202010000
4505400	2.6		20500202 1.20561 voidf 202020000
4505401	0.0	0.36	20500203 1.20561 voidf 202030000
4505402	0.2	0.32	20500204 1.20561 voidf 202040000
4505403	0.4	0.27	20500205 1.20561 voidf 202050000
4505404	0.6	0.18	20500206 1.20561 voidf 202060000
4505405	0.8	0.05	20500207 1.20561 voidf 202070000
4505406	1.0	-0.13	20500208 0.48578 voidf 202080000
*			20500209 0.58737 voidf 202090000
4505500	2.7		20500210 0.41891 voidf 202100000
4505501	-1.0	-1.44	20500211 0.37827 voidf 202110000
4505502	-0.8	-1.25	20500212 0.50635 voidf 202120000
4505503	-0.6	-1.08	20500213 0.50635 voidf 203010000
4505504	-0.4	-0.92	20500214 0.40005 voidf 204010000
4505505	-0.2	-0.77	*
4505506	0.0	-0.63	*20500300 il-mass sum 1.0 0.0 1

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*20500301 0.0 1.0 cmpmass 101
*20500302 1.0 cmpmass 102
*20500303 1.0 cmpmass 103
*20500304 1.0 cmpmass 104
*20500305 1.0 cmpmass 105
*20500306 1.0 cmpmass 106
*20500307 1.0 cmpmass 107
*20500308 1.0 cmpmass 108
*20500309 1.0 cmpmass 201
*20500310 1.0 cmpmass 301
*20500311 1.0 cmpmass 302
*
*20500400 vsslmass sum 1.0 0.0 1
*20500401 0.0 1.0 cmpmass 501
*20500402 1.0 cmpmass 502
*20500403 1.0 cmpmass 503
*20500404 1.0 cmpmass 504
*20500405 1.0 cmpmass 505
*20500406 1.0 cmpmass 506
*20500407 1.0 cmpmass 507
*20500408 1.0 cmpmass 508
*20500409 1.0 cmpmass 509
*20500410 1.0 cmpmass 513
*20500411 1.0 cmpmass 514
*20500412 1.0 cmpmass 516
*20500413 1.0 cmpmass 517
*20500414 1.0 cmpmass 518
*20500415 1.0 cmpmass 519
*20500416 1.0 cmpmass 531
*20500417 1.0 cmpmass 510
*
*20500500 bl-mass sum 1.0 0.0 1
*20500501 0.0 1.0 cmpmass 401
*20500502 1.0 cmpmass 402
*20500503 1.0 cmpmass 403
*20500504 1.0 cmpmass 404
*20500505 1.0 cmpmass 405
*20500506 1.0 cmpmass 406
*20500507 1.0 cmpmass 450
*20500508 1.0 cmpmass 701
*
*20500600 totmass sum 1.0 0.0 1
*20500601 0.0 1.0 cntrlvar 3
*20500602 1.0 cntrlvar 4
*20500603 1.0 cntrlvar 5
*
20500700 sg-delt sum 1.0 20.0 1
20500701 0. 1. tempf 201010000
20500702 -1. tempf 201200000
*
* calculate system inventory
* the first number on the following card is the full system mass
*20500800 invn div 144. 1. 0
*20500801 cntrlvar 6
*20500900 invent div 1. 1. i
*20500901 cntrlvar 8
*
* calculate the core liquid collapsed height
*
20501000 cord-lvl sum 1. 0. 1
20501001 0. .6096 voidf 505010000
20501002 .6096 voidf 505020000
20501003 .3048 voidf 505030000
20501004 .3048 voidf 505040000
20501005 .3048 voidf 505050000
20501006 .3048 voidf 505060000
20501007 .6096 voidf 505070000
20501008 .6096 voidf 505080000
*
20501100 sgsr-lvl sum 1.0 0.0 1
20501101 0.0 1.9609 voidf 702010000
20501102 1.23101 voidf 702020000
20501103 1.15481 voidf 702030000
20501104 1.23101 voidf 702040000
20501105 1.25641 voidf 702050000
20501106 1.15481 voidf 702060000
20501107 1.06591 voidf 702070000
20501108 1.65398 voidf 702080000
20501109 1.37827 voidf 702090000
20501110 0.50635 voidf 702100000
20501111 0.50635 voidf 703010000
20501112 0.40005 voidf 704010000
*
20501200 sgdc-lvl sum 1.0 0.0 1
20501201 0.0 1.19009 voidf 705080000
20501202 1.25101 voidf 705070000
20501203 1.15481 voidf 705060000
20501204 1.23101 voidf 705050000
20501205 1.25641 voidf 705040000
20501206 1.13481 voidf 705030000
20501207 1.06591 voidf 705020000
20501208 1.65398 voidf 705010000
20501209 0.37827 voidf 709020000
20501210 0.50635 voidf 709010000
20501211 0.50635 voidf 703010000
20501212 0.40005 voidf 704010000
*
* calculate the broken leg generator upflow collapsed liquid level
*20501300 blguc1 sum 1. 9.532 0
*20501301 0. 1. voidf 701010000
*20501302 1. voidf 701020000
*20501303 1. voidf 701030000
*20501304 1. voidf 701040000
*20501305 1. voidf 701050000
*20501306 1. voidf 701060000
*20501307 1. voidf 701070000

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*20501308 1. voidf 701080000
*20501309 1. voidf 701090000
*
* calculate the broken leg generator downflow collapsed liquid
* level
*20501400 blgdgl sum 1. 9.53 0
*20501401 0. 1. voidf 701100000
*20501402 1. voidf 701110000
*20501403 1. voidf 701120000
*20501404 1. voidf 701130000
*20501405 1. voidf 701140000
*20501406 1. voidf 701150000
*20501407 1. voidf 701160000
*20501408 1. voidf 701170000
*20501409 1. voidf 701180000
*
20502300 przrlvl sum 1.0 0.0 1
20502301 0.0 0.3671 voidf 301010000
20502302 0.2549 voidf 301020000
20502303 0.2549 voidf 301030000
20502304 0.2549 voidf 301040000
20502305 0.0663 voidf 301050000
*
* heat losses to environment - pl sg
*
20502400 blsgpl sum 1. 0. 0
20502401 0. 1.41896 htrnr 705300101
20502402 0.91445 htrnr 705300201
20502403 0.99072 htrnr 705300301
20502404 0.07788 htrnr 705300401
20502405 0.05609 htrnr 705300501
20502406 0.99072 htrnr 705300601
20502407 0.05609 htrnr 705300701
20502408 0.02613 htrnr 705300801
20502409 0.57463 htrnr 705400101
20502410 0.72732 htrnr 705400201
20502411 0.72732 htrnr 705400301
20502412 0.54335 htrnr 705400401
*
* power losses to environment - il sg
*
20502500 ilsgpl sum 1. 0. 0
20502501 0. .35939 htrnr 205300101
20502502 .50391 htrnr 205300201
20502503 .41675 htrnr 205300301
20502504 1.03430 htrnr 205300401
20502505 1.03430 htrnr 205300501
20502506 1.03430 htrnr 205300601
20502507 1.03430 htrnr 205300701
20502508 1.03430 htrnr 205300801
20502509 1.03430 htrnr 205300901
20502510 1.04520 htrnr 205301001
20502511 .57463 htrnr 205400101
20502512 .72732 htrnr 205400201
20502513 .72732 htrnr 205400301
20502514 .54335 htrnr 205400401
*
* energy loss to environment - il sg
*
20502600 blsgel integral 1. 0. 0
20502601 cntrivar 24
*
* energy loss to environment - il sg
20502700 ilsgel integral 1. 0. 0
20502701 cntrivar 25
*
* power loss to environment from sg
*
20502800 sgfl sum 1. 0. 0
20502801 0. 1. cntrivar 24
20502802 1. cntrivar 25
*
* energy loss to environment from sg
*
20502900 sgel sum 1. 0. 0
20502901 0. 1. cntrivar 26
20502902 1. cntrivar 27
*
* integ of bl hot leg mass flow
*
20503000 blm integral 1. 0. 0
20503001 mflowj 402010000
*
* integ of il hot leg mass flow
*
20503100 ilm integral 1. 0. 0
20503101 mflowj 102020000
*
20510100 ilhlmass sum 1.0 0.0 1
20510101 0.0 9.2278200-04 rho 101010000
20510102 1.9918830-03 rho 102010000
20510103 5.9836050-04 rho 102020000
20510104 5.9836050-04 rho 102030000
20510105 7.8538960-04 rho 102040000
20510106 8.8732920-04 rho 102050000
20510107 8.8732920-04 rho 102060000
20510108 1.2796520-03 rho 103010000
20510109 5.4559250-04 rho 104010000
20510110 9.7311260-04 rho 104020000
20510111 8.1432400-04 rho 104030000
20510112 8.1432400-04 rho 104040000
20510113 1.4841030-03 rho 104050000
*

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20510200	crossms	sum	1.0	0.0	1	20520106	1.2870000-02	rho	202060000		
20510201	0.0	1.0187750-03	rho	105010000		20520107	1.2850000-02	rho	202070000		
20510202	9.3065600-04	rho	105020000			20520108	5.8490000-03	rho	202080000		
20510203	8.1432400-04	rho	105030000			20520109	9.2780000-03	rho	202090000		
20510204	8.1432400-04	rho	105040000			20520110	7.6310000-03	rho	202100000		
20510205	8.1432400-04	rho	105050000			20520111	1.5420000-02	rho	202110000		
20510206	1.1289930-03	rho	105060000			20520112	2.6025000-02	rho	202120000		
20510207	2.0441630-03	rho	105070000			20520113	5.9663000-02	rho	203010000		
20510208	2.7480260-03	rho	105080000			20520114	3.3900000-02	rho	204010000		
20510209	2.7480260-03	rho	105090000		*						
20510210	9.1438000-04	rho	105100000			20520300	iilsgsec	sum	1.0	0.0	1
20510211	9.1438000-04	rho	105110000			20520301	0.0	6.3370000-03	rho	205010000	
20510212	2.7480260-03	rho	105120000			20520302	3.2520000-03	rho	205020000		
20510213	2.7480260-03	rho	105130000			20520303	1.3220000-03	rho	205030000		
20510214	2.0441630-03	rho	105140000			20520304	3.2790000-03	rho	205040000		
*						20520305	3.2790000-03	rho	205050000		
20510300	iilclmass	sum	1.0	0.0	1	20520306	3.2790000-03	rho	205060000		
20510301	0.0	4.0772550-04	rho	106010000		20520307	3.2790000-03	rho	205070000		
20510302	1.0447530-03	rho	106020000			20520308	3.2790000-03	rho	205080000		
20510303	5.4641860-04	rho	106030000			20520309	3.2790000-03	rho	205090000		
20510304	6.7631200-04	rho	106040000			20520310	3.3140000-03	rho	205100000		
20510305	2.6372190-03	rho	106050000			20520311	1.1400000-03	rho	206010000		
20510306	2.7614970-03	rho	107010000			20520312	2.9856000-02	rho	209010000		
20510307	7.6276200-04	rho	108010000			20520313	2.0686000-02	rho	209020000		
*						*					
20510400	iilsgpr	sum	1.0	0.0	1	20530100	pressms	sum	1.0	0.0	1
20510401	0.0	1.6407770-03	rho	201010000		20530101	0.0	6.4825000-03	rho	301010000	
20510402	2.2416900-03	rho	201020000			20530102	6.4825000-03	rho	301020000		
20510403	2.2183220-03	rho	201030000			20530103	5.9118000-03	rho	301030000		
20510404	2.2183220-03	rho	201040000			20530104	5.9118000-03	rho	301040000		
20510405	2.2183220-03	rho	201050000			20530105	5.9118000-03	rho	301050000		
20510406	2.2183220-03	rho	201060000			20530106	1.1360000-03	rho	301060000		
20510407	2.2183220-03	rho	201070000			20530107	7.1837000-04	rho	302010000		
20510408	2.2183220-03	rho	201080000			20530108	2.3214100-04	rho	302020000		
20510409	8.9383520-04	rho	201090000			20530109	1.6457700-04	rho	302030000		
20510410	6.3316240-04	rho	201100000			20530110	4.4046000-05	rho	302040000		
20510411	6.3316240-04	rho	201110000			20530111	4.4046000-05	rho	302050000		
20510412	8.9383520-04	rho	201120000			20530112	4.4046000-05	rho	302060000		
20510413	2.2183220-03	rho	201130000			20530113	4.4046000-05	rho	302070000		
20510414	2.2183220-03	rho	201140000		*						
20510415	2.2183220-03	rho	201150000			20510500	blihimss	sum	1.0	0.0	1
20510416	2.2183220-03	rho	201160000			20510501	0.0	1.4245480-03	rho	401010000	
20510417	2.2183220-03	rho	201170000			20510502	5.5496350-04	rho	402010000		
20510418	2.2183220-03	rho	201180000			20510503	3.7182600-04	rho	402020000		
20510419	2.2416900-03	rho	201190000			20510504	8.9706890-04	rho	402030000		
20510420	1.6407770-03	rho	201200000			20510505	3.8022530-04	rho	402040000		
*						20510506	3.2063850-04	rho	402050000		
20520100	blsgpr	sum	1.0	0.0	1	20510507	3.1781750-04	rho	402060000		
20520101	0.0	1.4264000-02	rho	202010000		20510508	5.5399890-04	rho	402070000		
20520102	1.6574000-02	rho	202020000		*						
20520103	1.3183000-02	rho	202030000			20510700	blcross	sum	1.0	0.0	1
20520104	1.6789000-02	rho	202040000			20510701	0.0	4.4975840-04	rho	403010000	
20520105	1.3532000-02	rho	202050000			20510702	3.1781750-04	rho	403020000		

20510703	3.2063850-04	rho	403030000		20511013	2.0770600-03	rho	519010000
20510704	3.1781750-04	rho	403040000		20511014	2.6772900-05	rho	531010000
20510705	9.8569380-04	rho	403050000		20511015	2.6772900-05	rho	531020000
20510706	7.1445920-04	rho	403060000		20511016	2.6772900-05	rho	531030000
20510707	7.1445920-04	rho	403070000	*				
20510708	4.4539040-04	rho	403080000		20510600	b1sgpr	sum	1.0 0.0 1
20510709	4.4539040-04	rho	403090000		20510601	0.0	1.3434060-03	rho 701010000
20510710	7.1445920-04	rho	403100000		20510602	7.2961490-04	rho	701020000
20510711	7.1445920-04	rho	403110000		20510603	7.5091610-04	rho	701030000
20510712	6.3701820-04	rho	403120000		20510604	7.0443410-04	rho	701040000
*					20510605	7.5091610-04	rho	701050000
20510800	blclmass	sum	1.0 0.0 1		20510606	7.6641010-04	rho	701060000
20510801	0.0	7.5605530-04	rho	404010000	20510607	7.0443410-04	rho	701070000
20510802	2.4731980-04	rho	405010000		20510608	6.5020510-04	rho	701080000
20510803	6.4741950-04	rho	405020000		20510609	5.9905660-04	rho	701090000
20510804	1.3575400-03	rho	406010000		20510610	5.9905660-04	rho	701100000
20510805	8.6000000-04	rho	450010000		20510611	6.5020510-04	rho	701110000
*					20510612	7.0443410-04	rho	701120000
20510900	rvcore	sum	1.0 0.0 1		20510613	7.6641010-04	rho	701130000
20510901	0.0	6.7400000-03	rho	501010000	20510614	7.5091610-04	rho	701140000
20510902	6.5900000-03	rho	502010000		20510615	7.0443410-04	rho	701150000
20510903	2.9600000-03	rho	503010000		20510616	7.5091610-04	rho	701160000
20510904	5.2000000-04	rho	504010000		20510617	7.2961490-04	rho	701170000
20510905	1.7434560-03	rho	505010000		20510618	1.3434060-03	rho	701180000
20510906	1.7434560-03	rho	505020000	*				
20510907	8.7172800-04	rho	505030000		20520200	b1sgsec	sum	1.0 0.0 1
20510908	8.7172800-04	rho	505040000		20520201	0.0	1.3509000-02	rho 702010000
20510909	8.7172800-04	rho	505050000		20520202	9.0360000-03	rho	702020000
20510910	8.7172800-04	rho	505060000		20520203	8.4700000-03	rho	702030000
20510911	1.7434560-03	rho	505070000		20520204	1.0739000-02	rho	702040000
20510912	1.7434560-03	rho	505080000		20520205	9.6150000-03	rho	702050000
20510913	1.6400000-03	rho	506010000		20520206	8.4740000-03	rho	702060000
20510914	2.8100000-03	rho	507010000		20520207	8.4250000-03	rho	702070000
20510915	2.1800000-03	rho	508010000		20520208	1.5782000-02	rho	702080000
20510916	1.4300000-03	rho	509010000		20520209	1.6807000-02	rho	702090000
20510917	4.0470000-03	rho	509020000		20520210	2.5882000-02	rho	702100000
20510918	3.9300000-04	rho	510010000		20520211	5.6736000-02	rho	703010000
20510919	3.4000000-04	rho	513010000		20520212	3.3900000-02	rho	704010000
20510920	3.4525000-04	rho	514010000	*				
*					20520400	b1sgsec	sum	1.0 0.0 1
20511000	rvdcnr	sum	1.0 0.0 1		20520401	0.0	1.4458000-02	rho 705010000
20511001	0.0	2.6189940-03	rho	516010000	20520402	2.2410000-03	rho	705020000
20511002	3.7726480-03	rho	517010000		20520403	2.4350000-03	rho	705030000
20511003	1.1833800-03	rho	518010000		20520404	2.6390000-03	rho	705040000
20511004	1.1833800-03	rho	518020000		20520405	2.5890000-03	rho	705050000
20511005	1.1833800-03	rho	518030000		20520406	2.4310000-03	rho	705060000
20511006	1.1833800-03	rho	518040000		20520407	2.5930000-03	rho	705070000
20511007	1.1833800-03	rho	518050000		20520408	2.5140000-03	rho	705080000
20511008	1.1833800-03	rho	518060000		20520409	2.9860000-02	rho	709010000
20511009	1.1833800-03	rho	518070000		20520410	2.0686000-02	rho	709020000
20511010	1.1833800-03	rho	518080000	*				
20511011	1.1833800-03	rho	518090000	*	*	total primary inventory		
20511012	9.1139620-04	rho	518100000	*				

20511100	totalpr	sum	1.0	0.0	1	20505110	2.06466	htmr	200101000		
20511101	0.0	1.0	cntrivar	101		20505111	2.91468	htmr	200101100		
20511102	1.0	cntrivar	102			20505112	7.23366	htmr	200101200		
20511103	1.0	cntrivar	103			20505113	7.23366	htmr	200101300		
20511104	1.0	cntrivar	104			20505114	7.23366	htmr	200101400		
20511105	1.0	cntrivar	105			20505115	7.23366	htmr	200101500		
20511106	1.0	cntrivar	106			20505116	7.23366	htmr	200101600		
20511107	1.0	cntrivar	107			20505117	7.23366	htmr	200101700		
20511108	1.0	cntrivar	108			20505118	7.30986	htmr	200101800		
20511109	1.0	cntrivar	109		*						
20511110	1.0	cntrivar	110			*					
20511111	1.0	cntrivar	301			*					
*						*					
*						*					
*						*					
20520500	totalsec	sum	1.0	0.0	1	20505200	bsgheat	sum	1.0	0.0	1
20520501	0.0	1.0	cntrivar	201		20505201	0.0	2.39218	htmr	700100100	
20520502	1.0	cntrivar	202			20505202	2.46202	htmr	700100200		
20520503	1.0	cntrivar	203			20505203	2.30962	htmr	700100300		
20520504	1.0	cntrivar	204			20505204	2.46202	htmr	700100400		
*						20505205	2.51282	htmr	700100500		
*						20505206	2.30962	htmr	700100600		
*						20505207	2.13182	htmr	700100700		
*						20505208	1.96412	htmr	700100800		
*						20505209	1.96412	htmr	700100900		
*						20505210	2.13182	htmr	700101000		
20505000	thcore	sum	1.0	0.0	1	20505211	2.30962	htmr	700101100		
20505001	0.0	13.4112	htmr	501300101		20505212	2.51282	htmr	700101200		
20505002	13.4112	htmr	501300201			20505213	2.46202	htmr	700101300		
20505004	6.7056	htmr	501300301			20505214	2.30962	htmr	700101400		
20505005	6.7056	htmr	501300401			20505215	2.46202	htmr	700101500		
20505006	6.7056	htmr	501300501			20505216	2.39218	htmr	700101600		
20505007	6.7056	htmr	501300601		*						
20505008	13.4112	htmr	501300701			*					
20505009	13.4112	htmr	501300801			*					
20505010	1.8288	htmr	501300901			*					
20505011	1.8288	htmr	501301001			*					
20505012	0.9144	htmr	501301101			*					
20505013	0.9144	htmr	501301201			*					
20505014	0.9144	htmr	501301301			*					
20505015	0.9144	htmr	501301401			*					
20505016	1.8288	htmr	501301501			*					
20505017	1.8288	htmr	501301601			*					
*						*					
*						*					
*						*					
20505100	isgheat	sum	1.0	0.0	1	20505100	isgheat	sum	1.0	0.0	1
20505101	0.0	7.30986	htmr	200100100		20505101	0.0	2.91468	htmr	200100100	
20505102	7.23366	htmr	200100200			20505102	7.23366	htmr	200100200		
20505103	7.23366	htmr	200100300			20505103	7.23366	htmr	200100300		
20505104	7.23366	htmr	200100400			20505104	7.23366	htmr	200100400		
20505105	7.23366	htmr	200100500			20505105	7.23366	htmr	200100500		
20505106	7.23366	htmr	200100600			20505106	7.23366	htmr	200100600		
20505107	7.23366	htmr	200100700			20505107	7.23366	htmr	200100700		
20505108	2.91468	htmr	200100800			20505108	2.91468	htmr	200100800		
20505109	2.06466	htmr	200100900			20505109	2.06466	htmr	200100900		

## Transient Input Deck for Base Case Run

```

*      the next input deck is for the transient calculation
*      of the semiscale natural circulation experiment 8. *
= semiscale mod 2a - nc8 configuration (2-loop)
0000100 restart transnt
0000101 run
0000103 8001
*0000104 none
0000105 10.0 12.0
0000201 1.0 1.0e-06 0.01 2 50 250 1000
0000201 5000.0 1.0e-06 0.05 2 200 20000 20000
*
20800001 dt 0
20800002 dtcrnt 0
20800003 cputime
20800004 tmass 0
20800005 emass 0
20800006 cntrivar 211 * primary system pressure
20800007 cntrivar 212 * ilsg pressure
20800008 cntrivar 213 * blsg pressure
20800009 cntrivar 214 * ilcrossoverleg sg side dp
20800010 cntrivar 215 * ilcrossover leg pump
sideJp
20800011 cntrivar 216 * blcrossover leg sg side dp
20800012 cntrivar 217 * blcrossover leg pump side
dp
20800013 cntrivar 218 * ector vessel core dp
*20800014 cntrivar 228 * total acculator flow
(intact)
*20800015 cntrivar 229 * total accumulator flow
(broken)
20800016 cntrivar 101 * ilhl mass
20800017 cntrivar 102 * ilcl mass
20800018 cntrivar 103 * ilcl mass
20800019 cntrivar 104 * ilsg primary mass
20800020 cntrivar 105 * blhl mass
20800021 cntrivar 106 * blsg primary mass
20800022 cntrivar 107 * blcl mass
20800023 cntrivar 108 * blcl mass
20800024 cntrivar 109 * rv core mass
20800025 cntrivar 110 * rv downcomer mass
20800026 cntrivar 111 * total primary side
inventory
20800027 cntrivar 201 * ilsg secondary side mass
20800028 cntrivar 202 * blsg secondary side mass
20800029 cntrivar 203 * ilsg secondary mass
20800030 cntrivar 204 * blsg secondary mass
20800031 cntrivar 205 * total seconady mass
20800032 mflowj 101010000
20800033 mflowj 107010000
20800034 mflowj 401010000
20800035 mflowj 405010000
20800036 mflowj 518010000
20800037 mflowj 233000000
20800038 mflowj 733000000
20800039 mflowj 232000000
20800040 mflowj 732000000
20800041 mflowj 620000000
20800042 mflowj 820000000
*
20800043 tempf 101010000
20800044 tempf 107010000
20800045 tempf 401010000
20800046 tempf 405010000
20800047 httemp 501300711
20800048 httemp 501300811
*
*
0000501 time 0 ge null 0 -1.0 l * always true
0000502 time 0 lt null 0 -1.0 n * always false
0000510 time 0 ge null 0 0.0 l * induce
blowdown after 0 s
0000511 time 0 ge null 0 117.0 l * close steam
valve after 117 s
0000512 time 0 ge null 0 2100.0 l * open steam
valve after 2100 s
0000513 time 0 ge null 0 7550.0 l * open porv
valve after 7550 s
0000514 time 0 ge null 0 8098.0 l * close porv
valve after 8098 s
*
0000601 -511 or 512 n
0000602 513 and 514 n
0000610 -510 and -510 n
*
* modified by ysbang at 96/1/19
* to implement sg steam leak both at iSG bSG
*
0000550 time 0 gt null 0 117.0 n
0000551 time 0 le null 0 2100.0 n
*
0000650 550 and 551 n
*
* insert bypass steam junction 211 and 711
*
2110000 isteam1 valve
2110101 204010000 210000000 0.3-s 0.0 0.0
0100 l. l.
2110201 0 0.0 0.0
2110300 trpv1v
2110301 650

```

\*  
 7110000 isteaml valve  
 7110101 704010000 710000000 0.3-5 0.0 0.0 2330205 9.58 0.054 0.0 0.0  
 0100 1. 1. 2330206 9.7149 0.036 0.0 0.0  
 2330207 9.7800 0.027 0.0 0.0  
 2330208 9.8500 0.0 0.0 0.0  
 2330209 20.0 0.0 0.0 0.0  
 \*  
 7110201 0 0.0 0.0  
 7110300 trpvlv  
 7110301 650  
 \*  
 \* pressurizer porv downstream tank  
 \* insert tmdpvol 210 and 710  
 \*  
 2100000 envir tmdpvol 3300000 pressup tmdpvol  
 2100101 1.0 1.0 0.0 0.0 90.0 1.0 5.-6 0.0 00 3300101 1.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0  
 3300200 3  
 2100200 2 3300201 0.0 1.041e06 455.  
 2100201 0.0 5.89e06 1.0 3300202 49.0 1.041e06 455.  
 2100202 2100.0 5.89e06 1.0 3300203 50.0 1.041e06 455.  
 2100203 2763.0 3.96e06 1.0 3300204 150.0 0.280e06 406.  
 2100204 3380.0 3.15e06 1.0 3300205 1500.0 0.270e06 403.  
 2100205 4500.0 2.26e06 1.0  
 2100206 6110.0 1.50e06 1.0  
 2100207 8000.0 1.25e06 1.0 3310000 porv valve  
 \* 3310101 301000000 330000000 0.0001267 0.0 0.0  
 0100 1.0 1.0  
 3310201 0 0.0 0.0 0.0  
 3310300 trpvlv  
 3310301 602  
 \*  
 \* broken loop break junction  
 \*  
 \*4220000 brk-jun valve  
 \*4220101 404010000 499000000 9.0e-07 0.0 0.0  
 0100 1.0 1.0  
 \*4220201 0 0.0 0.0 0.0  
 \*4220300 trpvlv  
 \*4220304 510  
 \*  
 \* modified by ysbang to model smooth open  
 \* of break valve for 100 sec. Sep.30. 1996  
 \*  
 2320000 steamout valve 4220000 brk-jun valve  
 2320101 204010000 207000000 0.0 0.0 0.0 0100 4220101 404010000 499000000 9.0e-07 0.0 0.0  
 \*2320201 0 -2.166700 .01040770 0.0 0100 0100 1.0 1.0  
 \*  
 \* modified by ysbang at 94/9/14  
 \* to implement the steady state result  
 \*  
 2320201 0 0.0379918 0.0139507 0.0 4220201 0 0.0 0.0 0.0  
 2320300 trpvlv 4220300 mtrvly  
 2320301 601 4220304 510 610 0.01 0.0 0  
 \*  
 2330000 feedint tmdpjun  
 2330101 206000000 205000000 0.00043 4990000 pressup tmdpvol  
 2330200 1 512 cntrlvvar 1 4990101 1.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0  
 2330201 -1.0 0.0 0.0 0.0 4990200 3  
 2330202 0.0 0.0 0.0 0.0 4990201 0.0 1.041e06 455.  
 2330203 0.0 0.216 0.0 0.0 4990202 49.0 1.041e06 455.  
 2330204 9.5 0.216 0.0 0.0 4990203 50.0 1.041e06 455.

*4990204	150.0	0.280e06	404.		8100801	5.0e-04	0.0	1				
*4990205	1500.0	0.270e06	403.		8101001	00	1					
*					8101201	1	300.0	0.0	0.0	0.0	0.0	1
*					*							
* modified by y.s.bang for realistic modeling					8110000	blcl-acc	accum					
* of condensate tank pressure					8110101	0.0	0.36027	0.02371	0.0	90.0	0.36027	
*					5.0-04	0.0	0.00000					
4990201	0.0	0.098e06	455.		8110200	4.240e06	300.0					
4990202	1000.0	0.094e06	455.		8111101	810000000	2.50e-04	0.0	0.0	0.000		
4990203	3400.0	0.123e06	455.		8112200	0.01776	0.0	6.096	0.0	1.45e-03	0	
4990204	8000.0	0.123e06	455.		0	0						
*					*							
*												
5350000	byps-up	sngljun			8200000	blcl-ecc	sngljun					
5350101	531010000	510010000	1.62-5	300.300.0100	8200101	810010000	404000000	4.64e-04	0.0	0.0		
5350201	0	0.0	0.0	0.0	0000							
*					8200201	0	0.0	0.0	0.0			
*					*							
*****												
*					*							
* ecc system					7320000	steamou	valve					
*					7320101	704010000	707000000	0.0	0.0	0.0	0100	
*					*							
*					7320201	0	-0.599056	.333999-3	0.0			
6100000	ilcl-ecc	pipe			*							
6100001	1				*							
6100101	0.000464	1			*							
6100301	3.048	1			*							
6100401	0.0	1			7320201	0	0.02012	0.001473	0.0			
6100601	0.0	1			7320300	trpvlv						
6100701	0.0	1			7320301	601						
6100801	5.0e-04	0.0	1		*							
6101001	00	1			7330000	feedin	tmdpjn					
6101201	1	300.0	0.0	0.0	7330101	706000000	705000000	0.00043				
*					7330200	1	512	cntrvar	12			
6110000	ilcl-acc	accum			7330201	-1.0	0.0	0.0	0.0			
6110101	0.0	1.08032	0.071142	0.0	7330202	0.0	0.0	0.0	0.0			
5.0-04	0.0	0.00000			7330203	0.0	0.072	0.0	0.0			
6110200	4.240e06	300.0			7330204	10.17	0.018	0.0	0.0			
6111101	610000000	4.66e-04	0.0	0.0	7330205	10.28	0.012	0.0	0.0			
6112200	0.049043	0.0	9.144	0.0	7330206	10.34	0.009	0.0	0.0			
0	0				7330207	10.40	0.0	0.0	0.0			
*					7330208	20.00	0.0	0.0	0.0			
6200000	ilcl-ecc	sngljun			*							
6200101	610010000	107000000	4.64e-04	0.0	0.0	*9000000	envirnmnt	tmdpvol				
0000					*	9000101	1.0	1.0	0.0	0.0	0.0	
6200201	0	0.0	0.0	0.0	*	9000200	3					
*					*	9000201	0.0	8.48e05	310.0			
8100000	blcl-ccc	pipe			**							
8100001	1				*****							
8100101	0.000250	1			*							
8100301	3.048	1			*							
8100401	0.0	1			*							
8100601	0.0	1			*****							
8100701	0.0	1			*							

* power for pressurizer		20500113	0.50635	voidf	203010000
*		20500114	0.40005	voidf	204010000
20230000 power 502		*			
20230001 -1.0 0.0		20500200 sgsrlvl sum 1.0 0.0 1			
20230002 0.0 0.0		20500201 0.0 1.21831 voidf 202010000			
20230003 0.0 12000.		20500202 1.20561 voidf 202020000			
20230004 1.0e06 12000.		20500203 1.20561 voidf 202030000			
*		20500204 1.20561 voidf 202040000			
* reactor core power		20500205 1.20561 voidf 202050000			
*		20500206 1.20561 voidf 202060000			
20250000 power		20500207 1.20561 voidf 202070000			
20250001 0.0 95.000e03		20500208 0.48578 voidf 202080000			
20250002 131.0 95.000e03		20500209 0.58737 voidf 202090000			
20250003 133.0 81.320e03		20500210 0.41891 voidf 202100000			
20250004 163.0 68.305e03		20500211 0.37827 voidf 202110000			
20250005 203.0 60.610e03		20500212 0.50635 voidf 202120000			
20250006 1103.0 36.955e03		*20500213 0.50635 voidf 202130000			
20250007 10103.0 17.575e03		20500214 0.40005 voidf 204010000			
*		*			
20220000 temp		*20500300 fi-mass sum 1.0 0.0 1			
20220001 0.0 300.		*20500301 0.0 1.0 cmpmass 501			
*		*20500302 1.0 cmpmass 502			
20270500 htc-t		*20500303 1.0 cmpmass 503			
20270501 0.0 6.806		*20500304 1.0 cmpmass 504			
*		*20500305 1.0 cmpmass 505			
20220500 htc-t		*20500306 1.0 cmpmass 506			
20220501 0.0 6.806		*20500307 1.0 cmpmass 507			
*		*20500308 1.0 cmpmass 508			
20220400 htc-t		*20500309 1.0 cmpmass 509			
20220401 0.0 5.98		*20500310 1.0 cmpmass 510			
*		*20500311 1.0 cmpmass 511			
20270400 htc-t		**			
20270401 0.0 5.98		*20500400 vssl-mass sum 1.0 0.0 1			
*		*20500401 0.0 1.0 cmpmass 501			
*****		*20500402 1.0 cmpmass 502			
*		*20500403 1.0 cmpmass 503			
* control components		*20500404 1.0 cmpmass 504			
*		*20500405 1.0 cmpmass 505			
*****		*20500406 1.0 cmpmass 506			
*		*20500407 1.0 cmpmass 507			
*		*20500408 1.0 cmpmass 508			
20500100 sgdlvl sum 1.0 0.0 1		*20500409 1.0 cmpmass 509			
20500101 0.0 1.21831 voidf 205100000		*20500410 1.0 cmpmass 513			
20500102 1.20561 voidf 205090000		*20500411 1.0 cmpmass 514			
20500103 1.20561 voidf 205080000		*20500412 1.0 cmpmass 516			
20500104 1.20561 voidf 205070000		*20500413 1.0 cmpmass 517			
20500105 1.20561 voidf 205060000		*20500414 1.0 cmpmass 518			
20500106 1.20561 voidf 205050000		*20500415 1.0 cmpmass 519			
20500107 1.20561 voidf 205040000		*20500416 1.0 cmpmass 531			
20500108 0.48578 voidf 205030000		*20500417 1.0 cmpmass 510			
20500109 0.58737 voidf 205020000		**			
20500110 0.41891 voidf 205010000		*20500500 bi-mass sum 1.0 0.0 1			
20500111 0.37827 voidf 205020000		*20500501 0.0 1.0 cmpmass 401			
20500112 0.50635 voidf 205010000		*20500502 1.0 cmpmass 402			

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*20500503    1.0  cmpmass  403          20501204    1.23101  voidf  705050000
*20500504    1.0  cmpmass  404          20501205    1.25641  voidf  705040000
*20500505    1.0  cmpmass  405          20501206    1.15481  voidf  705030000
*20500506    1.0  cmpmass  406          20501207    1.06591  voidf  705020000
*20500507    1.0  cmpmass  450          20501208    0.65398  voidf  705010000
*20500508    1.0  cmpmass  701          20501209    0.37827  voidf  709020000
**
*20500600  tot-p-mass  sum  1.0  0.0  1  20501210    0.50635  voidf  709010000
*20500601  0.0  1.0  cntrvar  3          20501211    0.50635  voidf  703010000
*20500602    1.0  cntrvar  4          20501212    0.40005  voidf  704010000
*20500603    1.0  cntrvar  5          *
* calculate the broken leg generator upflow collapsed liquid
level
*
*205007600 sg-delt  sum  1.0  20.0  1  *
*205007601  0.  1.  temp  201010000  20501300  blgu-cl sum  1.  9.532   0
*205007602  -1.  temp  201200000  20501301  0.  1.19609  voidf  701020000
*
* calculate system inventory
* the first number on the following card is the full system
mass
*20500800  invn  div  144.  1.  0  20501302  1.23101  voidf  701030000
*20500801  cntrvar 6  20501303  1.15481  voidf  701040000
*20500900  invext  div  1.  1.  1  20501304  1.23101  voidf  701050000
*20500901  cntrvar 8  20501305  1.25641  voidf  701060000
*
* calculate the core liquid collapsed height
*
20501000 core-lvl  sum  1.  0.  1  20501306  1.15481  voidf  701070000
20501001 0. .6096  voidf  505010000  20501307  1.06591  voidf  701080000
20501002  .6096  voidf  505020000  20501308  0.98206  voidf  701090000
20501003  .3048  voidf  505030000  *
20501004  .3048  voidf  505040000  * calculate the broken leg generator downflow collapsed liquid
20501005  .3048  voidf  505050000  level
20501006  .3048  voidf  505060000
20501007  .6096  voidf  505070000
20501008  .6096  voidf  505080000
*
20501100 sgshlvl  sum  1.0  0.0  1  20501400  slgd-cl sum  1.  9.532   0
20501101 0.  1.9609  voidf  702010000  20501401  0.  0.98206  voidf  701100000
20501102    1.23101  voidf  702020000  20501402  1.06591  voidf  701110000
20501103    1.15481  voidf  702030000  20501403  1.15481  voidf  701120000
20501104    1.23101  voidf  702040000  20501404  1.25641  voidf  701130000
20501105    1.25641  voidf  702050000  20501405  1.23101  voidf  701140000
20501106    1.15481  voidf  702060000  20501406  1.15481  voidf  701150000
20501107    1.06591  voidf  702070000  20501407  1.23101  voidf  701160000
20501108    0.65398  voidf  702080000  20501408  0.19609  voidf  701170000
20501109    0.37827  voidf  702090000  *
20501110    0.50635  voidf  702100000  * calculate the intact leg generator upflow collapsed liquid
20501111    0.50635  voidf  702110000  level
20501112    0.40005  voidf  704010000  *
*
20501200 sgdclevl  sum  1.0  0.0  1  20501500  ileu-cl sum  1.0 9.525   1
20501201 0.  1.9609  voidf  705080000  20501501  0.  1.21831  voidf  201020000
20501202    1.23101  voidf  705070000  20501502  1.20561  voidf  201030000
20501203    1.15481  voidf  705060000  20501503  1.20561  voidf  201040000
*
20501600 blgd-cl sum  1.0 9.525   1

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20501601	0.	0.34411	voidf	201110000	20502601	cntrlvar 24
20501602		0.48578	voidf	201120000	*	
20501603		1.20561	voidf	201130000	* energy losses to environment - il sg	
20501604		1.20561	voidf	201140000	*	
20501605		1.20561	voidf	201150000	20502700 ilsgel integral 1. 0. 0	
20501606		1.20561	voidf	201160000	20502701 cntrlvar 25	
20501607		1.20561	voidf	201170000	*	
20501608		1.20561	voidf	201180000	* power losses to environment from sg	
20501609		1.21381	voidf	201190000	*	
*					20502800 sgpl sum 1. 0. 0	
20502300	pzlevel	sum	1.0	0.0 1	20502801 0. 1. cntrlvar 24	
20502301	0.0	0.3671	voidf	301010000	20502802 1. cntrlvar 25	
20502302		0.2549	voidf	301020000	*	
20502303		0.2549	voidf	301030000	* energy losses to environment from sg	
20502304		0.2549	voidf	301040000	*	
20502305		0.0663	voidf	301050000	20502900 blsgel sum 1. 0. 0	
*					20502901 0. 1. cntrlvar 26	
* heat losses to environment - bl sg					20502902 1. cntrlvar 27	
*					*	
20502400			blsgpl sum 1. 0. 0		* integ of bl hot leg mass flow	
20502401	0.	1.41896	htmr	705300101	*	
20502402		0.91455	htmr	705300201	20503000 blm integral 1. 0. 0	
20502403		0.99072	htmr	705300301	20503001 mflowj 402010000	
20502404		1.07788	htmr	705300401	*	
20502405		1.05609	htmr	705300501	* integ of il hot leg mass flow	
20502406		0.99072	htmr	705300601	*	
20502407		1.05609	htmr	705300701	20503000 ilm integral 1. 0. 0	
20502408		1.02613	htmr	705300801	20503001 mflowj 102020000	
20502409		0.57463	htmr	705400101	*	
20502410		0.72732	htmr	705400201	* integ of break mass flow	
20502411		0.72732	htmr	705400301	*	
20502412		0.54335	htmr	705400401	20503000 brm integral 1. 0. 0	
*					20503001 mflowj 422000000	
* power losses to environment - il sg					*	
*					20510100 ilhlmass sum 1.0 0.0 1	
20502500			ilsgpl sum 1. 0. 0		20510101 0.0 9.2278200-04 rho 101010000	
20502501	0.	.35939	htmr	205300101	20510102 1.9918830-03 rho 102010000	
20502502		.50391	htmr	205300201	20510103 5.9836050-04 rho 102020000	
20502503		.41679	htmr	205300301	20510104 5.9836050-04 rho 102030000	
20502504		1.03430	htmr	205300401	20510105 7.8538960-04 rho 102040000	
20502505		1.03430	htmr	205300501	20510106 8.8732920-04 rho 102050000	
20502506		1.03430	htmr	205300601	20510107 8.8732920-04 rho 102060000	
20502507		1.03430	htmr	205300701	20510108 1.2796520-03 rho 103010000	
20502508		1.03430	htmr	205300801	20510109 5.4559250-04 rho 104010000	
20502509		1.03430	htmr	205300901	20510110 9.7311260-04 rho 104020000	
20502510		1.04520	htmr	205301001	20510111 8.1432400-04 rho 104030000	
20502511		.57463	htmr	205400101	20510112 8.1432400-04 rho 104040000	
20502512		.72732	htmr	205400201	20510113 1.4841030-03 rho 104050000	
20502513		.72732	htmr	205400301	*	
20502514		.54335	htmr	205400401	20510200 crossms sum 1.0 0.0 1	
*					20510201 0.0 1.0187750-03 rho 105010000	
* energy losses to environment - bl sg					20510202 9.3065600-04 rho 105020000	
*					20510203 8.1432400-04 rho 105030000	
20502600			blsgel integral 1. 0. 0		20510204 8.1432400-04 rho 105040000	

20510205	8.1432400-04 rho 105050000	20520112	2.6025000-02 rho 202120000
20510206	1.1289930-03 rho 105060000	20520113	5.9663000-02 rho 203010000
20510207	2.0441630-03 rho 105070000	20520114	3.3900000-02 rho 204010000
20510208	2.7480260-03 rho 105080000	*	
20510209	2.7480260-03 rho 105090000	20520300	ilsgsec sum 1.0 0.0 1
20510210	9.1438000-04 rho 105100000	20520301	0.0 6.3370000-03 rho 205010000
20510211	9.1438000-04 rho 105110000	20520302	3.2520000-03 rho 205020000
20510212	2.7480260-03 rho 105120000	20520302	1.3220000-03 rho 205030000
20510213	2.7480260-03 rho 105130000	20520304	3.2790000-03 rho 205040000
20510214	2.0441630-03 rho 105140000	20520305	3.2790000-03 rho 205050000
*		20520306	3.2790000-03 rho 205060000
20510300	ilclmass sum 1.0 0.0 1	20520307	3.2790000-03 rho 205070000
20510301	0.0 4.0772550-04 rho 106010000	20520308	3.2790000-03 rho 205080000
20510302	1.0447530-03 rho 106020000	20520309	3.2790000-03 rho 205090000
20510303	5.4641860-04 rho 106030000	20520310	3.3140000-03 rho 205100000
20510304	6.7631200-04 rho 106040000	20520311	1.1400000-03 rho 206010000
20510305	2.6372190-03 rho 106050000	20520312	2.9856000-02 rho 209010000
20510306	2.7614970-03 rho 107010000	20520313	2.0686000-02 rho 209020000
20510307	7.6276200-04 rho 108010000	*	
*		20530100	pressms sum 1.0 0.0 1
20510400	ilsgpr sum 1.0 0.0 1	20530101	0.0 6.4825000-03 rho 301010000
20510401	0.0 1.6407770-03 rho 201010000	20530102	6.4825000-03 rho 301020000
20510402	2.2416900-03 rho 201020000	20530103	5.9118000-03 rho 301030000
20510403	2.2183220-03 rho 201030000	20530104	5.9118000-03 rho 301040000
20510404	2.2183220-03 rho 201040000	20530105	5.9118000-03 rho 301050000
20510405	2.2183220-03 rho 201050000	20530106	1.1360000-03 rho 301060000
20510406	2.2183220-03 rho 201060000	20530107	7.1837000-04 rho 302010000
20510407	2.2183220-03 rho 201070000	20530108	2.3214100-04 rho 302020000
20510408	2.2183220-03 rho 201080000	20530109	1.6457700-04 rho 302030000
20510409	8.9383520-04 rho 201090000	20530110	4.4046000-05 rho 302040000
20510410	6.3316240-04 rho 201100000	20530111	4.4046000-05 rho 302050000
20510411	6.3316240-04 rho 201110000	20530112	4.4046000-05 rho 302060000
20510412	8.9383520-04 rho 201120000	20530113	4.4046000-05 rho 302070000
20510413	2.2183220-03 rho 201130000	*	
20510414	2.2183220-03 rho 201140000	20510500	bhlmss sum 1.0 0.0 1
20510415	2.2183220-03 rho 201150000	20510501	0.0 1.4245480-03 rho 401010000
20510416	2.2183220-03 rho 201160000	20510502	5.5496350-04 rho 402010000
20510417	2.2183220-03 rho 201170000	20510503	3.7182600-04 rho 402020000
20510418	2.2183220-03 rho 201180000	20510504	8.9706890-04 rho 402030000
20510419	2.2416900-03 rho 201190000	20510505	3.8022530-04 rho 402040000
20510420	1.6407770-03 rho 201200000	20510506	3.2063850-04 rho 402050000
*		20510507	3.1781750-04 rho 402060000
20520100	blsgpr sum 1.0 0.0 1	20510508	5.5399890-04 rho 402070000
20520101	0.0 1.4264000-02 rho 202010000	*	
20520102	1.6574000-02 rho 202020000	20510700	blcross sum 1.0 0.0 1
20520103	1.3183000-02 rho 202030000	20510701	0.0 4.4975840-04 rho 403010000
20520104	1.6789000-02 rho 202040000	20510702	3.1781750-04 rho 403020000
20520105	1.3532000-02 rho 202050000	20510703	3.2063850-04 rho 403030000
20520106	1.2870000-02 rho 202060000	20510704	3.1781750-04 rho 403040000
20520107	1.2850000-02 rho 202070000	20510705	9.8569380-04 rho 403050000
20520108	5.8490000-03 rho 202080000	20510706	7.1445920-04 rho 403060000
20520109	9.2780000-03 rho 202090000	20510707	7.1445920-04 rho 403070000
20520110	7.6310000-03 rho 202100000	20510708	4.4539040-04 rho 403080000
20520111	1.5420000-02 rho 202110000	20510709	4.4539040-04 rho 403090000

20510710	7.1445920-04 rho 403100000	20510603	7.5091610-04 rho 701030000
20510711	7.1445920-04 rho 403110000	20510604	7.0443410-04 rho 701040000
20510712	6.3701820-04 rho 403120000	20510605	7.5091610-04 rho 701050000
*		20510606	7.6641010-04 rho 701060000
20510800	bclmass sum 1.0 0.0 1	20510607	7.0443410-04 rho 701070000
20510801	0.0 7.5605530-04 rho 404010000	20510608	6.5020510-04 rho 701080000
20510802	2.4731980-04 rho 405010000	20510609	5.9905660-04 rho 701090000
20510803	6.4741950-04 rho 405020000	20510610	5.9905660-04 rho 701100000
20510804	1.3575400-03 rho 406010000	20510611	6.5020510-04 rho 701110000
20510805	8.6000000-04 rho 450010000	20510612	7.0443410-04 rho 701120000
*		20510613	7.6641010-04 rho 701130000
20510900	rvcore sum 1.0 0.0 1	20510614	7.5091610-04 rho 701140000
20510901	0.0 6.7400000-03 rho 501010000	20510615	7.0443410-04 rho 701150000
20510902	6.5900000-03 rho 502010000	20510616	7.5091610-04 rho 701160000
20510903	2.9600000-03 rho 503010000	20510617	7.2961490-04 rho 701170000
20510904	5.2000000-04 rho 504010000	20510618	1.3434060-03 rho 701180000
20510905	1.7434560-03 rho 505010000	*	
20510906	1.7434560-03 rho 505020000	20520200	b1sgsec sum 1.0 0.0 1
20510907	8.7172800-04 rho 505030000	20520201	0.0 1.3509000-02 rho 702010000
20510908	8.7172800-04 rho 505040000	20520202	9.0360000-03 rho 702020000
20510909	8.7172800-04 rho 505050000	20520203	8.4700000-03 rho 702030000
20510910	8.7172800-04 rho 505060000	20520204	1.0739000-02 rho 702040000
20510911	1.7434560-03 rho 505070000	20520205	9.6150000-03 rho 702050000
20510912	1.7434560-03 rho 505080000	20520206	8.4740000-03 rho 702060000
20510913	1.6400000-03 rho 506010000	20520207	8.4250000-03 rho 702070000
20510914	2.8100000-03 rho 507010000	20520208	1.5782000-02 rho 702080000
20510915	2.1800000-03 rho 508010000	20520209	1.6807000-02 rho 702090000
20510916	1.4300000-03 rho 509010000	20520210	2.5882000-02 rho 702100000
20510917	4.0470000-03 rho 509020000	20520211	5.6736000-02 rho 703010000
20510918	3.9300000-04 rho 510010000	20520212	3.3900000-02 rho 704010000
20510919	3.4000000-04 rho 513010000	*	
20510920	3.4525000-04 rho 514010000	20520400	b1sgsec sum 1.0 0.0 1
*		20520401	0.0 1.4458000-02 rho 705010000
20511000	rvdcnr sum 1.0 0.0 1	20520402	2.2410000-03 rho 705020000
20511001	0.0 2.6189940-03 rho 516010000	20520403	2.4350000-03 rho 705030000
20511002	3.7726480-03 rho 517010000	20520404	2.6390000-03 rho 705040000
20511003	1.1833800-03 rho 518010000	20520405	2.5890000-03 rho 705050000
20511004	1.1833800-03 rho 518020000	20520406	2.4310000-03 rho 705060000
20511005	1.1833800-03 rho 518030000	20520407	2.5930000-03 rho 705070000
20511006	1.1833800-03 rho 518040000	20520408	2.5140000-03 rho 705080000
20511007	1.1833800-03 rho 518050000	20520409	2.9860000-02 rho 709010000
20511008	1.1833800-03 rho 518060000	20520410	2.0686000-02 rho 709020000
20511009	1.1833800-03 rho 518070000	*	
20511010	1.1833800-03 rho 518080000	*	* total primary inventory
20511011	1.1833800-03 rho 518090000	*	
20511012	9.1139620-04 rho 518100000	20511100	totalpr sum 1.0 0.0 1
20511013	2.0770600-03 rho 519010000	20511101	0.0 1.0 cntrlvar 101
20511014	2.6772900-05 rho 531010000	20511102	1.0 cntrlvar 102
20511015	2.6772900-05 rho 531020000	20511103	1.0 cntrlvar 103
20511016	2.6772900-05 rho 531030000	20511104	1.0 cntrlvar 104
*		20511105	1.0 cntrlvar 105
20510600	b1sgpr sum 1.0 0.0 1	20511106	1.0 cntrlvar 106
20510601	0.0 1.3434060-03 rho 701010000	20511107	1.0 cntrlvar 107
20510602	7.2961490-04 rho 701020000	20511108	1.0 cntrlvar 108

20511109	1.0	cntrivar	109	*
20511110	1.0	cntrivar	110	7070000 steamou tmdpvol
20511111	1.0	cntrivar	301	7070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.000
*				7070200 2
* total secondary inventory				7070201 0.0 5.89e06 1.0
*				7070202 2100.0 5.89e06 1.0
20520500	totalsec	sum	1.0 0.0 1	7070203 2763.0 3.96e06 1.0
20520501	0.0	1.0	cntrivar 201	7070204 3380.0 3.15e06 1.0
20520502		1.0	cntrivar 202	7070205 4500.0 2.26e06 1.0
20520503		1.0	cntrivar 203	7070206 6110.0 1.50e06 1.0
20520504		1.0	cntrivar 204	7070207 8000.0 1.25e06 1.0
*				*
2060000	feedin!	tmdpvol		* following items added to make easy postprocessing
2060101	0.00114	1.0 0.0 0.0 0.0 0.0 5.0e-06		* at june 17, 1995 by ysbang.
0.0 0.0				*
2060200	1			* control variables
*				*
* modified by ys.bang				* pressure in mpa
* maintaining 310 K				*
*				20521100 ppre mult 0.000001 0.0 1
2060201	0.0 310.0 0.0			20521101 p 508010000
*2060201	0.0 460.0 0.0			*
*2060202	2100.0 460.0 0.0			20521200 isgp mult 0.000001 0.0 1
*2060203	3000.0 400.0 0.0			20521201 p 204010000
*2060204	4500.0 300.0 0.0			*
*2060205	6000.0 220.0 0.0			20521300 bsgp mult 0.000001 0.0 1
*2060206	8000.0 130.0 0.0			20521301 p 704010000
*				*
2070000	steamout	tmdpvol		20503000 ibrfw integral 1. 0.0 1
2070101	1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.000			20503001 mflowj 422000000
2070200	2			*
2070201	0.0 5.85e06 1.0			* differential pressure in kpa
2070202	2100.0 5.85e06 1.0			*
2070203	2800.0 2.75e06 1.0			20521400 icrsg sum 0.001 0.0 1
2070204	3260.0 2.18e06 1.0			20521401 0. 1. p 105100000
2070205	5600.0 1.58e06 1.0			20521402 -1. p 105030000
2070206	8000.0 1.25e06 1.0			*
*				20521500 icrpm sum 0.001 0.0 1
7060000	feedin!	tmdpvol		20521501 0. 1. p 105110000
7060101	0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06			20521502 -1. p 106020000
0.0 0.0				*
7060200	1			20521600 bcrgs sum 0.001 0.0 1
*				20521601 0. 1. p 403080000
* modified by ys.bang				20521602 -1. p 403120000
* maintaining 310 K				*
*				20521700 bcrpm sum 0.001 0.0 1
7060201	0.0 310.0 0.0			20521701 0. 1. p 403080000
*7060201	0.0 460.0 0.0			20521702 -1. p 403120000
*7060202	2100.0 460.0 0.0			*
*7060203	3000.0 400.0 0.0			20521800 cordif sum 0.001 0.0 1
*7060204	4500.0 300.0 0.0			20521801 0. 1. p 505010000
*7060205	6000.0 220.0 0.0			20521802 -1. p 505080000
*7060206	8000.0 130.0 0.0			*
*				*20523000 isglvl sum 0.001 0.0 1

```

*20523001 0. 1. p 202010000
*20523002 -1. p 202120000
*
*20523100 bsglvl sum 0.001 0.0 1
*20523101 0. 1. p 702010000
*20523102 -1. p 702100000
*
* heat flux total
*
*20522800 tihf sum 1.0 0.0 1
*20522801 0. 1.0 htmr 201010101
*20522802 1.0 htmr 201010201
*20522803 1.0 htmr 201010301
*20522804 1.0 htmr 201010401
*20522805 1.0 htmr 201010501
*20522806 1.0 htmr 201010601
*20522807 1.0 htmr 201010701
*20522808 1.0 htmr 201010801
*20522809 1.0 htmr 201010901
*20522810 1.0 htmr 201010001
*20522811 1.0 htmr 201010101
*20522812 1.0 htmr 201010201
*20522813 1.0 htmr 201010301
*20522814 1.0 htmr 201010401
*20522815 1.0 htmr 201010501
*20522816 1.0 htmr 201010601
*20522817 1.0 htmr 201010701
*20522818 1.0 htmr 201010801
*
*20522900 tbff sum 1.0 0.0 1
*20522901 0. 1.0 htmr 701010101
*20522902 1.0 htmr 701010201
*20522903 1.0 htmr 701010301
*20522904 1.0 htmr 701010401
*20522905 1.0 htmr 701010501
*20522906 1.0 htmr 701010601
*20522907 1.0 htmr 701010701
*20522908 1.0 htmr 701010801
*20522909 1.0 htmr 701010901
*20522910 1.0 htmr 701010001
*20522911 1.0 htmr 701010101
*20522912 1.0 htmr 701010201
*20522913 1.0 htmr 701010301
*20522914 1.0 htmr 701010401
*20522915 1.0 htmr 701010501
*20522916 1.0 htmr 701010601
*
20523000 tilacc integral 1. 0.0 1
20523001 mflowj 620000000
*
20523100 tbacc integral 1. 0.0 1
20523101 mflowj 820000000
*

```



**Appendix B**  
**RELAP5 Input Listing for Case T01**



## Steady State Input Deck for Case T01

```

= semiscale mod 2a - nc8 configuration (2-loop)
*
* implementing 2-core channel model at may 18, 1996
*
0000100 new stdy-st
0000101 run
0000105 30.0 32.0
0000110 nitrogen
*0000201 1.0 1.0e-06 0.01 2 10 250 4000
*0000202 800.0 1.0e-06 0.1 2 10 2000 4000
*
0000202 800.0 1.0e-06 0.1 2 200 8000 8000
*
0000501 time 0 ge null 0 -1.0 l * always true
0000502 time 0 lt null 0 -1.0 n * always false
*
* steady state trip : alway true
*
0000599 time 0 ge null 0 0.0 l * always true
*****
*** *
* intact loop piping
*
*****
*** *
*301 cntrlvar 917 * pqr liquid volume
*302 cntrlvar 918 * pqr liquid volume error
*303 cntrlvar 921 * letdown error
*304 cntrlvar 937 * intact loop hot temperatur error
*305 cntrlvar 947 * broken loop hot temp error
*306 cntrlvar 961 * intact loop sg level
*307 cntrlvar 971 * broken loop sg level
*308 cntrlvar 962 * IL SG Level error
*309 cntrlvar 963 * BL SG Level error
310 mflowj 101020000 * intact loop mass flow
311 mflowj 401020000 * broken loop mass flow
312 p 301010000 * pressurizer top pressure
313 p 204010000 * IL SG steam pressure
314 p 704010000 * BL SG steam pressure
315 cntrlvar 101 * intact loop hot leg mass
316 cntrlvar 102 * intact loop crossover leg mass
317 cntrlvar 103 * intactloop cold leg mass
318 cntrlvar 104 * intact loop s/g primary mass
319 cntrlvar 105 * broken loop hot leg mass
320 cntrlvar 106 * broken loop sg primary mass
321 cntrlvar 107 * broken loop crossover leg mass
322 cntrlvar 108 * broken loop cold leg mass
323 cntrlvar 109 * reactor vessel core and etc mass
324 cntrlvar 110 * reactor downcomer mass
325 cntrlvar 201 * intact loop secondary mass
326 cntrlvar 202 * broken loop secondary mass
327 cntrlvar 301 * pressurizer mass
328 cntrlvar 111 * total primary mass
329 cntrlvar 205 * total secondary mass
**
1010000 hotleg branch
1010001 2 1
1010101 0.00420 0.21971 0.0 0.0 0.0 0.0 4.0e-05 0.0
+ 00000
1010200 3 15.4e06 581.4 * 0.0 0.0 0.0
1011101 508010000 101000000 0.0 0.5 1.0 0100
1012101 101010000 102000000 0.0 0.0 0.0 0100
1011201 0.26 0.0 0.0
1012201 0.26 0.0 0.0
*
1020000 pclal8 pipe
1020001 6
1020101 0.00349.4
1020102 0.00229.6
1020301 0.57074.1
1020302 0.17145.3
1020303 0.22504.4
1020304 0.38748.6
1020601 0.0.6
1020801 4.0e-05.0.0.6
1020901 0.0.0.0.1
1020902 0.288.0.288.2
1020903 0.0.0.0.3
1020904 0.0.0.0.5
1021001 00.6
1021101 0000.3
1021102 0100.4
1021103 0000.5
1021201 3 15.4e06 518.4 0.0 0.0 0.0 0.0 06
1021300 1
1021301 0.260 0.0 0.0 05
*
1030000 newspol branch
1030001 3 1
1030101 0.00229 0.55880 0.0 0.0 0.0 0.0 4.0e-05 0.0
+ 00
1030200 3 15.4e06 581.4
1031101 102010000 103000000 0.0 0.18 0.18 0000
1032101 103010000 104000000 0.0 0.18 0.18 0000
1033101 302010000 103000000 0.0 0.90 0.90 0100
1031201 0.260 0.0 0.0
1032201 0.260 0.0 0.0
1033201 0.260 0.0 0.0

```

```

*
1040000 newspol    pipe
1040001 5
1040101 0.00229,5
1040301 0.23825,1
1040302 0.42494,2
1040303 0.35560,4
1040304 0.64808,5
1040601 0.0,1
1040602 90.0,4
1040603 55.0,5
1040701 0.0,1
1040702 0.42494,2
1040703 0.35560,4
1040704 0.52680,5
1040801 4.0e-05,0.0,5
1040901 0.540,0.540,1
1040902 0.0,0.0,3
1040903 0.288,0.288,4
1041001 00,5
1041101 0000,4
1041201 3 15.4e06 581.4     0.0     0.0   0.0   05
1041300 1
1041301 0.260      0.0      0.0      04
*
1050000 pmpsuc    pipe
1050001 14
1050101 0.00229,6
1050102 0.00349,14
1050301 0.44488,1
1050302 0.40640,2
1050303 0.35560,5
1050304 0.49301,6
1050305 0.58572,7
1050306 0.78740,9
1050307 0.26200,11
1050308 0.78740,13
1050309 0.58572,14
1050601 -55.0,1
1050602 -90.0,9
1050603 -45.0,10
1050604 45.0,11
1050605 90.0,14
1050701 -0.36068,1
1050702 -0.40640,2
1050703 -0.35560,5
1050704 -0.49301,6
1050705 -0.58572,7
1050706 -0.78740,9
1050707 -0.1968,10
1050708 0.1968,11
1050709 0.78740,13
1050710 0.58572,14

1050801 4.0e-05,0.0,14
1050901 0.288,0.288,1
1050902 0.0,0.0,9
1050903 0.450,0.450,11
1050904 0.0,0.0,13
1051001 00.14
1051101 0000,5
1051102 0100,6
1051103 0000,13
1051201 3 15.4e06 545.0     0.0     0.0   0.0   14
1051300 1
1051301 0.260      0.0      0.0      13
*
1060000 pmpsml    pipe
1060001 5
1060101 0.00091,4
1060102 0.00349,5
1060201 0.00091,1
1060202 0.00030,2
1060203 0.00091,4
1060301 0.44805,1
1060302 1.14808,2
1060303 0.60046,3
1060304 0.74320,4
1060305 0.75565,5
1060601 90.0,1.
1060602 0.0,5
1060801 4.0e-05,0.0,5
1060901 0.966,0.966,1
1060902 1.260,1.260,2
1060903 0.0,0.0,4
1061001 00,5
1061101 0000,1
1061102 0100,2
1061103 0000,3
1061104 0100,4
1061201 3 15.4e06 545.0     0.0     0.0   0.0   05
1061300 1
1061301 0.260      0.0      0.0      04
*
1070000 pc19-3    branch
1070001 2
1070101 0.00349  0.79126  0.0  0.0  0.0  0.0  4.0e-05  0.0
+ 00
1070200 3 15.4e06 545.0
1071101 106010000 107000000 0.0  0.288  0.288  0000
1072101 107010000 108000000 0.0  0.0  0.0  0.0  0100
1071201 0.260      0.0      0.0
1072201 0.260      0.0      0.0
*
1080000 dcminl    branch
1080001 1
1080101 0.00420  0.18161  0.0  0.0  0.0  0.0  4.0e-05  0.0

```

+ 00		2020000	sgshr	pipe
1080200 3 15.4e06	545.0	2020001	12	
1081101 108010000	517010000 0.0 0.0 0.0 0100	2020101	0.0,12	
1081201 0.260 0.0 0.0		2020201	0.00399,6	
*		2020202	0.00371,7	
1100000 pmpsimi	sngljun	* andy modified 2020203	4/21/83	
1100101 105010000	106000000 0.0 0.0 0.0 0100	2020203	0.00477,8	
1100201 1 0.260 0.0 0.0		2020204	0.00555,9	
*		2020205	0.01342,10	
*****		2020206	0.03515,11	
*****		2020207	0.05502,12	
*****		2020301	1.21831,1	
*		2020302	1.20561,7	
* steam generator		2020303	0.48578,8	
*		2020304	0.58737,9	
*****		2020305	0.41891,10	
*****		2020306	0.37827,11	
*		2020307	0.50635,12	
2010000 sgprim	pipe	* andy modified 2020401 to 2020413	4/21/83	
2010001 20		2020401	0.014264,1	
2010101 0.00783,1		2020402	0.016574,2	
2010102 0.00184,19		2020403	0.013183,3	
2010103 0.00783,20		2020404	0.016789,4	
2010301 0.20955,1		2020405	0.013532,5	
2010302 1.21831,2		2020406	0.012870,6	
2010303 1.20561,8		2020407	0.012850,7	
2010304 0.48578,9		2020408	0.005849,8	
2010305 0.34411,11		2020409	0.009278,9	
2010306 0.48578,12		2020410	0.007631,10	
2010307 1.20561,18		2020411	0.015420,11	
2010308 1.21831,19		2020412	0.026025,12	
2010309 0.20955,20		*2020413 0.028815,13		
2010601 90.0.9		2020601	90.0.12	
2010602 70.0.10		2020801	5.0e-06.0.03108.7	
2010603 -70.0.11		2020802	5.0e-06.0.04063.8	
2010604 -90.0.20		2020803	5.0e-06.0.05956.9	
* andy modified 4/21/83 roughness from 4.0e-05 to 5.0e-05		2020804	5.0e-06.0.06729.10	
2010801 4.0e-05.0.08386.1		2020805	5.0e-06.0.0.12	
2010802 4.0e-05.0.01974.19		2021001	00.12	
2010803 4.0e-05.0.08386.20		2021101	0100.9	
2010901 0.0.0.0.8		2021102	0000.11	
2010902 0.3375.0.3375.9		2021201	2 5.85e06 0.0 0.0 0.0 0.0 12	
2010903 0.675.0.675.10		2021300	1	
2010904 0.3375.0.3375.11		2021301	0.0 0.0 0.0 11	
2010905 0.0.0.0.19		*		
2011001 00.20		*2030000 separatr	separatr	
2011101 0100.1		*2030001 3 0		
2011102 0000.18		*2030101 0.0 0.50635 0.030848 0.0 -90.0 -0.50635 5.0e-		
2011103 0100.19		*+ 06 0.1365 00		
2011201 3 15.4e06 563.2 0.0 0.0 0.0 20		*2030200 2 5.85e06 0.0		
2011300 1		*2031101 203000000 204000000 0.0 0.0 0.0 0100		
2011301 0.260 0.0 0.0 19		*2032101 202010000 203000000 0.0 0.0 0.0 0100		
*		*2033101 203010000 209000000 0.0 0.0 0.0 0100		

*2031201 0.0 0.0 0.0	2070000 steamout tmdpvol
*2032201 0.0 0.0 0.0	2070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00
*2033201 0.0 0.0 0.0	2070200 2 * 1
*	*2070201 0.0 546.98 1.0
2030000 separatr separatr	2070201 0.0 5.85e+6 1.0
2030001 3 0	*
2030101 0.0 0.50635 0.059663 0.0 90.0 0.50635 5.0e-6	* modified by ysbang at 93/9/6
+ 0.1365 00	* to match test initial condition
2030200 2 5.85e+6 0.9	*
*2030200 2 5.85e+6 0.0	2090000 sepbyps pipe
*	2090001 2
* modified by ysbang at 93/9/6	2090101 0.0.2
* to match test initial condition	2090301 0.50635,1
*	2090302 0.37827,2
2031101 203010000 204000000 0.06729 0.0 0.0 00100	* andy modified volumes 2090401 to 2090402 4/21/63
2032101 203000000 209000000 0.058963 0.0 0.0 00100	2090401 0.029856,1
2033101 202010000 203000000 0.05139 0.0 0.0 00100	2090402 0.020686,2
2031201 0.0 0.0 0.0	2090601 -90.0.2
2032201 0.0 0.0 0.0	2090801 5.0e-06,0.13170,1
2033201 0.0 0.0 0.0	2090802 5.0e-06,0.08490,2
*	2091001 00.2
2040000 steamdom snglvol	2091101 0000,1
2040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0-6	*2091201 2 5.85e06 0.0 0.0 0.0 0.0 02
0.32849 00	2091201 2 5.85e+06 0.01 0.0 0.0 0.0 02
2040200 2 5843600.0 1.0	*
*	* modified by ysbang at 93/9/6
2050000 stdome pipe	* to match test initial condition
2050001 10	*
2050101 0.0.10	2091300 1
2050301 0.41891,1	2091301 0.0 0.0 0.0 01
2050302 0.58737,2	*
2050303 0.48578,3	2100000 sepbyps sngljun
2050304 1.20561,9	2100101 209010000 205000000 0.0 0.0 0.0 0000
2050305 1.21831,10	2100201 1 0.260 0.0 0.0
* a. modified 2050101, 2050401 to 2050405 4/21/83	*
2050401 0.006337,1	2210000 sginlp sngljun
2050402 0.003252,2	2210101 104010000 201000000 0.00229 0.288 0.288 0100
2050403 0.001322,3	2210201 1 0.260 0.0 0.0
2050404 0.003279,9	*
2050405 0.003314,10	2220000 sgout-p sngljun
2050601 -90.0,10	2220101 201010000 105000000 0.00229 0.288 0.288 0100
2050801 5.0e-06,0.01023,10	2220201 1 0.260 0.0 0.0
2051001 00.10	*
2051101 0000,9	2310000 dcrrorut sngljun
2051201 2 5.85e06 0.0 0.0 0.0 10	2310101 205010000 202000000 0.0 0.0 0.0 0100
2051300 1	2310201 1 0.0 0.0 0.0
2051301 0.0 0.0 0.0 09	*
*	2320000 steamout sngljun
2060000 feedinlp tmdpvol	2320101 204010000 207000000 0.0 0.0 0.0 0100
2060101 0.00114 1.0 0.0 0.0 0.0 5.0e-06 0.0 00	2320201 1 0.0 0.0 0.0
2060200 3	2330000 feedinlp tmdpjn
2060201 0.0 5.85e06 495.0	2330101 206000000 205000000 0.00043
*	*2330200 1 501 cntrvar 2

2330201	-1.0	0.0	0.0	0.0		3020601	-90.0,3
2330202	0.0	2.0	0.0	0.0		3020602	-45.0,7
2330203	10.0	0.0	0.0	0.0		3020701	-0.20574,1
2330204	20.0	0.0	0.0	0.0		3020702	-0.17780,2
*						3020703	-0.48895,3
*****						3020704	-0.16380,7
*						3020801	4.0e-05,0.0,7
*						3020901	502.8,502.8,1
* pressurizer						3020902	33.42,33.42,2
*						3020903	0.0,0.0,3
*****						3020904	1.42,1.42,5
*						3020905	0.0,0.0,6
*						3021001	00,7
3010000	preizer	pipe				3021101	0000,6
3010001	6					3021201	3 15.4e06 581.4 0.0 0.0 0.0 07
3010101	0.0,6					3021300	1
3010201	2.69125e-02,2					3021301	0.0 0.0 0.0 06
3010202	6.72832e-03,3					*	
3010203	2.69125e-02,5					3210000	pzrout sngljun
3010301	0.240915,2					3210101	301010000 302000000 0.00349 0.0 0.0 0100
3010302	0.21967,5					3210201	1 0.0 0.0 0.0
3010303	0.066294,6					*	
3010401	0.0064825,2					* need to modify this	
3010402	0.0059118,5					*	
3010403	0.001136,6					3300000	pcontrol tmddpvol
3010601	-90.0,6					3300101	10.0 10.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00
3010801	4.0e-05,0.0,6					3300200	2
3011001	00,6					3300201	0.0 15.4e06 1.0
3011101	0000,2					*	
3011102	0100,3					3310000	pcontvlv sngljun
3011103	0000,5					3310101	301000000 330000000 0.005 0.0 0.0 0100
3011201	2 15.4e06 1.0 0.0 0.0 0.0 01					3310201	1 0.0 0.0 0.0
*3011202	2 15.4e06 0.1728 0.0 0.0 0.0 02					*	
3011202	2 15.4e06 1.0 0.0 0.0 0.0 02					*****	
*						*****	
* Modified by ysbang at 96/9/18							
* to match test initial condition							
*						*	
3011203	2 15.4e06 0.0 0.0 0.0 0.0 06					* broken loop piping	
3011300	1					*	
3011301	0.0 0.0 0.0 05					*****	
*						*****	
3020000	pzrsurge	pipe				4010000	vsslout branch
3020001	7					4010001	2 1
3020101	0.0,7					4010101	0.00349 0.40818 0.0 0.0 0.0 0.0 4.0e-05 0.0
3020301	0.20574,1					+ 00	
3020302	0.17780,2					4010200	3 15.4e06 581.4
3020303	0.48895,3					4011101	508010000 401000000 0.0 0.5 1.0 0100
3020304	0.67310,7					4012101	401010000 402000000 0.0 0.0 0.0 0100
3020401	7.1837-04,1					4011201	0.260 0.0 0.0
3020402	2.32141-04,2					4012201	0.260 0.0 0.0
3020403	1.64577-04,3					*	
3020404	4.4046-05,7					4020000	hotleg pipe
						4020001	7

4020101	0.00091,7	4030709	0.78512,11
4020301	0.60985,1	4030710	0.70002,12
4020302	0.40860,2	4030801	4.0e-05,0.0,12
4020303	0.98579,3	4030901	0.336,0.336,1
4020304	0.41783,4	4030902	0.0,0.0,6
4020305	0.35235,5	4030903	0.525,0.525,8
4020306	0.34925,6	4030904	0.0,0.0,11
4020307	0.60879,7	4031001	00,12
4020601	0.0,3	4031101	0000,11
4020602	90,0,6	4031201	3 15.4e06 545.0 0.0 0.0 0.0 12
4020603	50,0,7	4031300	1
4020701	0.0,3	4031301	0.260 0.0 0.0 11
4020702	0.41783,4	*	
4020703	0.35235,5	4040000	blcldsb snglvol
4020704	0.34925,6	4040101	0.00091 0.83083 0.0 0.0 0.0 0.0 4.0e-05 0.0
4020705	0.46711,7	*	0.0
4020801	4.0e-05,0.0,7	4040200	3 15.4e06 545.0
4020901	0.0,0,1	*	
4020902	0.525,0.525,2	4050000	coldleg pipe
4020903	0.630,0.630,3	4050001	2
4020904	0.0,0.0,5	4050101	0.00091,2
4020905	0.336,0.336,6	4050301	0.27178,1
4021001	00000 7	4050302	0.71145,2
4021101	0000,6	4050601	0.0,2
4021201	3 15.4e06 581.4 0.0 0.0 0.0 07	4050801	4.0e-05,0.0,2
4021300	1	4050901	0.138,0.138,1
4021301	0.260 0.0 0.0 06	4051001	00,2
*		4051101	0000,1
4030000	pmpsucn pipe	4051201	3 15.4e06 545.0 0.0 0.0 0.0 02
4030001	12	4051300	1
4030101	0.00091,12	4051301	0.260 0.0 0.0 01
4030301	0.49424,1	*	
4030302	0.34925,2	4060000	vsslnt branch
4030303	0.35235,3	4060001	2 1
4030304	0.34925,4	4060101	0.00349 0.38898 0.0 0.0 0.0 0.0 4.0e-05 0.0
4030305	1.08318,5	*	00
4030306	0.78512,7	4060200	3 15.4e06 545.0
4030307	0.48944,9	4061101	405010000 406000000 0.0 0.0 0.0 0100
4030308	0.78512,11	4062101	406010000 517010000 0.0 1.0 0.5 0100
4030309	0.70002,12	4061201	0.260 0.0 0.0
4030601	-60,0,1	4062201	0.260 0.0 0.0
4030602	-90,0,7	*	
4030603	-45,0,8	4500000	brkppmp pump
4030604	45,0,9	4500101	0.0 0.59847 0.00086 0.0 90.0 0.03137 00
4030605	90,0,12	4500108	403010000 0.00090 0.0 0.0 000100
4030701	-0.39980,1	*4500109	404000000 0.00010 0.0 0.0 000000
4030702	-0.34925,2	*	
4030703	-0.35235,3	*	Junction Area Modified by ysbang at April 8, 1996
4030704	-0.34925,4	*	to correct unbalance of void distribution
4030705	-1.08318,5	*	
4030706	-0.78512,7	4500109	404000000 0.00090 0.0 0.0 000000
4030707	-0.376936,8	*	
4030708	0.376936,9	*	end of modification

\*  
 4500200 3 15.4e06 545.0  
 4500201 1 0.26 0.0 0.0  
 4500202 1 0.26 0.0 0.0  
 4500301 0 0 0 -1 0 501 0  
 4500302 1597.0000 0.1 .003240000 79.553000  
 + 2.9810000 .00925000  
 4500303 998.400 .00000 .0000 2.4800 .00000 .00000  
 \*  
 4210000 blcl-lg sngljun  
 4210101 404010000 405000000 0.00091 0.0 0.0 0000  
 4210201 1 0.260 0.0 0.0  
 \*  
 \*\*\*\*  
 \*\*\*\*\*  
 \*  
 \* vessel  
 \*  
 \*\*\*\*  
 \*\*\*\*\*  
 \*  
 5010000 lowpln1 snglvol  
 5010101 0.0 0.14224 0.00674 0.0 90.0 0.14224 4.0e-05  
 + 0.1162 00  
 5010200 3 15.4e06 545.0  
 \*  
 5020000 lowpln2 branch  
 5020001 3 1  
 5020101 0.0 0.22004 0.00659 0.0 90.0 0.22004 4.0e-05  
 + 0.0699 00  
 5020200 3 15.4e06 545.0  
 5021101 501010000 502000000 0.0 0.0 0.0 0000  
 5022101 502010000 503000000 0.00431 0.0 0.0 0100  
 5023101 502010000 519000000 0.0 0.5 1.0 0100  
 5021201 0.0 0.0 0.0  
 5022201 0.52 0.0 0.0  
 5023201 0.52 0.0 0.0  
 \*  
 5030000 lowpln3 snglvol  
 5030101 0.0 0.31725 0.00296 0.0 90.0 0.31725 4.0e-05  
 + 0.0101 00  
 5030200 3 15.4e06 545.0  
 \*  
 5040000 lowpln4 branch  
 \*5040001 2 1  
 \* modified by ysbang at may 18. 1996  
 \* to implement two core channel model  
 \*  
 5040001 3 1  
 5040101 0.0 0.18136 0.00052 0.0 90.0 0.18136 4.0e-05  
 + 0.0101 00  
 5040200 3 15.4e06 545.0  
 5041101 503010000 504000000 0.0 0.0 0.0 0100  
 5042101 504010000 505000000 0.0 0.0 0.0 0100  
 5043101 504010000 555000000 0.0 0.0 0.0 0100  
 5041201 0.52 0.0 0.0  
 5042201 0.52 0.0 0.0  
 5043201 0.52 0.0 0.0  
 \*  
 \* average core channel  
 \*  
 \* two-core channel model area ratio=50:50  
 \*  
 5050000 core pipe  
 5050001 8  
 \*5050101 0.00286.8  
 \* modified by ysbang at may 18, 1996  
 \* to implement two core channel model  
 \*  
 5050101 0.00143 8  
 \*  
 5050301 0.6096.2  
 5050302 0.3048.6  
 5050303 0.6096.8  
 5050601 90.0,8  
 \* andy modified volume 5050801 to 5.0e-05 5/4/83  
 5050801 2.0e-05.0.01.8  
 5050901 1.5.1.5.7  
 5051001 00,8  
 5051101 00100.7  
 \*  
 \* modified by ysbang at may 18, 1996  
 \* to use rod bundle interfacial drag corr.  
 5051201 3 15.4e06 563.2 0.0 0.0 0.0 08  
 5051300 1  
 5051301 0.520 0.0 0.0 7  
 \*  
 \* hot core channel  
 \*  
 5550000 core pipe  
 5550001 8  
 5550101 0.00143 8  
 \*  
 5550301 0.6096.2  
 5550302 0.3048.6  
 5550303 0.6096.8  
 5550601 90.0,8  
 \* andy modified volume 5050801 to 5.0e-05 5/4/83  
 5550801 2.0e-05.0.01.8  
 5550901 1.5.1.5.7  
 5551001 00.8  
 5551101 00100.7  
 5551201 3 15.4e06 563.2 0.0 0.0 0.0 08  
 5551300 1  
 5551301 0.520 0.0 0.0 7  
 \*

```

*
*   multiple junction connection between hot and
*   average channel core volume by crossflow
*
5600000  corecros  mtpljun
5600001  8 1
5600011  505010003  555010004  0.0  0.0  0.0  000003
+ 1.0  1.0  1.0  10000 10000  0  8
*5600211  505020003  555020004  0.0  0.0  0.0  000003
*5600311  505030003  555030004  0.0  0.0  0.0  000003
*5600411  505040003  555040004  0.0  0.0  0.0  000003
*5600511  505050003  555050004  0.0  0.0  0.0  000003
*5600611  505060003  555060004  0.0  0.0  0.0  000003
*5600711  505070003  555070004  0.0  0.0  0.0  000003
*5600811  505080003  555080004  0.0  0.0  0.0  000003
5601011  0.0  0.0  8
*5601012  0.0  0.0  2
*5601013  0.0  0.0  3
*5601014  0.0  0.0  4
*5601015  0.0  0.0  5
*5601016  0.0  0.0  6
*5601017  0.0  0.0  7
*5601018  0.0  0.0  8
*
5060000  upprpln1  branch
*5060001  2 1
* modified by ysbang at may 18. 1996
* to use rod bundle interfacial drag corr.
5060001  3 1
5060101  0.0  0.30505  0.00164  0.0  90.0  0.30505  2.0e-05
+ 0.023  00
5060200  3 15.4e06  581.4
5061101  505010000  506000000  0.0  0.0  0.0  0100
5062101  555010000  506000000  0.0  0.0  0.0  0100
5063101  506010000  507000000  0.00321  0.0  0.0  0100
5061201  0.520  0.0  0.0
5062201  0.520  0.0  0.0
5063201  0.52  0.0  0.0
*
5070000  upprpln2  snglvol
5070101  0.0  0.68910  0.00281  0.0  90.0  0.68910  4.0e-05
+ 0.0401  00
5070200  3 15.4e06  581.4
*
5080000  upprpln3 branch
5080001  2 1
5080101  0.0  0.52070  0.00218  0.0  90.0  0.52070  4.0e-05
+ 0.483  00
5080200  3 15.4e06  581.4
5081101  507010000  508000000  0.00277  0.0  0.0  0100
5082101  508010000  509000000  0.00415  0.0  0.0  0100
5081201  0.520  0.0  0.0
5082201  0.0 0.0  0.0
5090000  upprpln4  pipe
5090001  2
5090101  0.0,2
5090301  0.2761,1
5090302  0.7786,2
5090401  0.00143,1
5090402  0.004047,2
5090601  90.0,2
5090801  4.0e-05,0.04,1
5090802  4.0e-05,0.0509,2
5091001  00,2
5091101  0000,1
5091201  3 15.4e06  581.4  0.0  0.0  0.0  02
5091301  0.0  0.0  0.0  01
*
5100000  upprpln5  snglvol
5100101  0.0  0.0756  0.000393  0.0  90.0  0.0756  4.0e-05
+ 0.0509  00
5100200  3 15.4e06  581.4
*
5130000  guidtub  branch
5130001  1 0
5130101  0.0  1.651  0.00034  0.0  90.0  1.651  5.0e-06
+ 0.0160  00
5130200  3 15.4e06  581.4
5131101  507010000  513000000  0.0  0.0  0.0  0100
5131201  0.0  0.0  0.0
*
5140000  sufcoln  branch
5140001  1 0
5140101  0.0  2.3401  0.00034525  0.0  90.0  2.3401  5.0e-06
+ 0.00975  00
5141101  506010000  514000000  0.0  0.0  0.0  0100
5140200  0  15415300.0  1356030.0  0.0  0.0
5141201  0.0  0.0  0.0
*
5160000  upprdcm1  annulus
5160001  1
5160101  0.00982,1
5160301  0.26670,1
5160601  90.0,1
5160801  4.0e-05,0.004351,1
5161001  00,1
5161201  3 15.4e06  560.0  0.0  0.0  0.0  1
*
5170000  upprdcm2 annulus
5170001  1
5170101  0.00982,1
5170301  0.38418,1
5170601  90.0,1
5170801  4.0e-05,0.004351,1

```

5171001	00,I		5311300	1
5171201	3 15.4e06	560.0 0.0 0.0 0.0 1	5311301	0, 0.0, 0.0, 2
*			*	
5180000	lowdcmr	pipe	5320000	gt-up sngljun
5180001	10		5320101	513010000 510010000 0.0 0.3 0.0 0.0 0100
5180101	0.00242,10		5320201	0 0.0 0.0 0.0
5180301	0.4890,9		*	
5180302	0.37661	10	5330000	sc-up sngljun
5180601	90.0,10		5330101	514010000 510010000 0.0 0.0 0.0 0.0 0100
5180801	4.0e-05,0.0,10		5330201	0 0.0 0.0 0.0
5180901	0.3,0.3,1		*	
5180902	0.0,0.0,8		5340000	dc-byps sngljun
5180903	0.114,0.114,9		5340101	516010000 531000000 0.0 0.3 0.0 0.0 0100
5181001	00.10		5340201	0 0.0 0.0 0.0
5181101	0000,9		*	
5181201	3 15.4e06	550.0 0.0 0.0 0.0 10	5350000	byps-up sngljun
5181300	1		5350101	531010000 510010000 0.0 0.0 0.0 0.0 0100
5181301	-0.26,0.0,0.0,9		5350201	0 0.0 0.0 0.0
*			*	
5190000	lowdcm	annulus	5360000	up-cnct sngljun
5190001	1		5360101	509010000 510000000 0.0 0.0 0.0 0.0 0100
5190101	0.00708,1		5360201	0 0.0 0.0 0.0
5190301	0.29337,1		*	
5190601	90.0,1		*****	
5190801	4.0e-05 0.0341,1		*****	
5191001	00.1		*	
5191201	3 15.4e06	550.0 0.0 0.0 0.0 1	* ecc system	
*			*	
5200000	dcmrann	sngljun	*****	
5200101	519010000	518000000 0.0 0.3 0.3 0100	*****	
5200201	1 -0.26 0.0 0.0		*	
*			*****	
5210000	upprdcmr	sngljun	*****	
5210101	517010000	516000000 0.0 0.0 0.0 0100	*	
5210201	1 0.0 0.0 0.0		* broken loop steam generator	
*			*	
5220000	uplowcm	sngljun	*****	
5220101	518010000	517000000 0.0 0.0 0.0 0100	*****	
5220201	1 -0.26 0.0 0.0		*	
*			7010000 brlpsign pipe	
5310000	bypslne	pipe	7010001 :S	
5310001	3		7010101 0.00516,1	
5310101	0.00007,3		7010102 0.00061,17	
5310301	0.38247,3		7010103 0.00516,18	
5310601	90.0,2		7010301 0.26035,1	
5310602	55.33,3		7010302 1.19609,2	
5310701	0.38247,2		7010303 1.23101,3	
5310702	0.31456,3		7010304 1.15481,4	
5310801	5.0c-06,0.0094,3		7010305 1.23101,5	
5310901	0.0,0.0,2		7010306 1.25641,6	
5311001	00,3		7010307 1.15481,7	
5311101	0000,2		7010308 1.06591,8	
5311201	3 15.4e06	550.0 0.0 0.0 0.0 3	7010309 0.98206,10	

7010310	1.06591,11		7020408	0.015782,8
7010311	1.15481,12		7020409	0.016807,9
7010312	1.25641,13		7020410	0.025882,10
7010313	1.23101,14		*7020411	0.025882,11
7010314	1.15481,15		7020601	90.0,10
7010315	1.23101,16		7020801	5.0e-06,0.1999,8
7010316	1.19609,17		7020802	5.0e-06,0.0,10
7010317	0.26035,18		7021001	00,10
7010601	90.0,8		7021101	0100,7
7010602	77.0,9		7021102	0000,9
7010603	-77.0,10		7021201	2.5.89e06 0.0 0.0 0.0 0.0 10
7010604	-90.0,18		7021300	1
* andy modified roughness to 5.0e-05 4/21/84				7021301 0.0 0.0 0.0 9
7010801	4.0e-05,0.07797,1		*	
7010802	4.0e-05,0.01974,17		*7030000 separatr separatr	
7010803	4.0e-05,0.07797,18		*7030001 3 0	
7010901	0.0,0.0,7		** modified 4/21/83	
7010902	0.3375,0.3375,8		*7030101 0.0 0.50635 0.030854 0.0 -90.0 0.50635 5.0e-6	
7010903	0.675,0.675,9		+ 0.13650 00	
7010904	0.3375,0.3375,10		*7030200 2 5.89e06 0.0	
7010905	0.0,0.0,17		*7031101 703000000 704000000 0.0 0.0 0.0 0100	
7011001	00,18		*7032101 702010000 703000000 0.0 0.0 0.0 0100	
7011101	0100,1		*7033101 703010000 709000000 0.0 0.0 0.0 0100	
7011102	0000,16		*7031201 0.0 0.0 0.0	
7011103	0100.17		*7032201 0.0 0.0 0.0	
7011201	3 15.4e06 581.4 0.0 0.0 0.0 18		*7033201 0.0 0.0 0.0	
7011300	1		*	
7011301	0.260 0.0 0.0 17		7030000 separatr separatr	
*			7030001 3 0	
7020000	sgroud pipe		*7030101 0.0 0.50635 0.056736 0.0 90.0 0.50635 5.0e-6	
*7020001	11		+ 0.1365 00	
7020001	10		*7030200 2 5.89e+6 0.0	
7020101	0.0.10		7030200 2 5.89e+6 0.9	
7020201	0.00462.7		*	
7020202	0.0.9		* modified by ysbang at 93.9'6	
7020301	1.19609.1		* to match test initial condition	
7020302	1.23101.2		*	
7020303	1.15481.3		7031101 703010000 704000000 0.0547542 0.0 0.0 00100	
7020304	1.23101.4		7032101 703000000 709000000 0.05299024 0.0 0.0	
7020305	1.25641.5		+ 00100	
7020306	1.15181.6		7033101 702010000 703000000 0.04593079 0.0 0.0	
7020307	1.06591.7		+ 00100	
7020308	1.65398.8		7031201 0.0 0.0 0.0	
7020309	0.37827.9		7032201 0.0 0.0 0.0	
7020310	0.50635.10		7033201 0.0 0.0 0.0	
* andy modified volumes 7020401 to 7020411 4/21/83				*
7020401	0.013509.1		*	
7020402	0.009036.2		7040000 steamdom snglvol	
7020403	0.008470.3		7040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0e-06	
7020404	0.010739.4		+ 0.32849 00	
7020405	0.009615.5		7040200 2 5.89e06 1.	
7020406	0.008474.6		*	
7020407	0.008425.7		7050000 sgdcomer pipe	

7050001 8  
 \* andy deleted this input; 7050101 0.00164,8  
 7050101 0,0,8  
 7050301 1.65398,1  
 7050302 1.06591,2  
 7050303 1.15481,3  
 7050304 1.25641,4  
 7050305 1.23101,5  
 7050306 1.15481,6  
 7050307 1.23101,7  
 7050308 1.19609,8  
 \* andy modified volumes 7050401 to 7050408 4/21/83  
 7050401 0.014458,1  
 7050402 0.002241,2  
 7050403 0.002435,3  
 7050404 0.002639,4  
 7050405 0.002589,5  
 7050406 0.002431,6  
 7050407 0.002593,7  
 7050408 0.002514,8  
 7050601 -90,0,8  
 7050801 5.0e-06,0.01016,8  
 7051001 00,8  
 7051101 0000,7  
 7051201 2 5.89e06 0.0 0.0 0.0 0.0 0.0 08  
 7051300 1  
 7051301 0.0 0.0 0.0 07  
 \*  
 7060000 feedinle tmdpvol  
 7060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00  
 7060200 3  
 7060201 0.0 5.89e06 495.0  
 \*  
 7070000 steamotl tmdpvol  
 7070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00  
 7070200 1  
 7070201 0.0 547.4245 1.0  
 \*  
 7090000 sepbyps pipe  
 7090001 2  
 7090101 0.0,2  
 7090301 0.50635,1  
 7090302 0.37827,2  
 \* andy modified volumes 7090401 to 7090402 4/21/83  
 7090401 0.029860,1  
 7090402 0.020686,2  
 7090601 -90,0,2  
 7090801 5.0c-06,0.13170,1  
 7090802 5.0c-06,0.08490,2  
 7091001 00,2  
 7091101 0000,1  
 \*7091201 2 5.89e06 0.0 0.0 0.0 0.0 02  
 7091201 2 5.89e+06 0.01 0.0 0.0 0.0 02  
 \*  
 \* modified by ysbang at 93/9/6  
 \* to match test initial condition  
 \*  
 7091300 1  
 7091301 0.0 0.0 0.0 01  
 \*  
 7100000 sepbyps sngljun  
 7100101 709010000 705000000 0.0 0.0 0.0 0000  
 7100201 1 0.26 0.0 0.0  
 \*  
 7210000 sgnlt sngljun  
 7210101 402010000 701000000 0.00091 0.336 0.336 0100  
 7210201 1 0.26 0.0 0.0  
 \*  
 7220000 sg-ouri sngljun  
 7220101 701010000 403000000 0.00091 0.336 0.336 0100  
 7220201 1 0.26 0.0 0.0  
 \*  
 7310000 dcmeut sngljun  
 7310101 705010000 702000000 0.0 0.0 0.0 0100  
 7310201 1 0.0 0.0 0.0  
 \*  
 7320000 steamuts sngljun  
 7320101 704010000 707000000 0.0 0.0 0.0 0100  
 7320201 1 0.0 0.0 0.0  
 \*  
 7330000 feed-lip tmdpjn  
 7330101 706000000 705000000 0.00043  
 7330200 1 501 cntrlvar 12  
 7330201 -1.0 0.0 0.0 0.0  
 7330202 0.0 2.0 0.0 0.0  
 7330203 10.0 0.0 0.0 0.0  
 7330204 20.0 0.0 0.0 0.0  
 \*  
 \*9000000 envirmnt tmdpvol  
 \*9000101 1.0 1.0 0.0 0.0 0.0 0.0 0.0 00  
 \*9000200 3  
 \*9000201 0.0 8.48e05 310.0  
 \*  
 \*\*\*\*  
 \*\*\*\*  
 \* heat structures  
 \*  
 \*\*\*\*  
 \*\*\*\*  
 \*  
 1101100 1 5 2 1 0.03625  
 11011100 0 2  
 11011101 0.00278.4  
 11011201 0001.4  
 11011301 0.0,4

11011401	568.0,5		11032201	0001 4										
11011501	101010000.	0,	1,	1,	0.21971,	1	11032301	0.0 4						
11011601	0,	0,	0,	1,	0.21971,	1	11032401	568.0,5						
11011701	0,0,0,0,0,0,1		11032501	103010000,0,1,1,0.55880,1										
11011801	0.	10.	10.	0.	0.	0.	1.1	11032601	0,0,0,1,0.55880,1					
11011901	0.	10.	10.	0.	0.	0.	1.1	11032701	0,0,0,0,0,0,1					
*11011801	0,	0.0,	0.0,	0.21971,	1		11032801	0.	10.	10.	0.	0.	0.	1.1
*11011901	0,	0.0,	0.0,	0.21971,	1		11032901	0.	10.	10.	0.	0.	0.	1.1
*							*11032801	0,0,0,0,0,0.55880,1						
11021000	4	5	2	1	0.03332		*11032901	0,0,0,0,0,0.55880,1						
11021100	0	2					*							
11021101	0.00278,4						11042000	5	5	2	1	0.02699		
11021201	0001,4						*11042100	1022						
11021301	0,0,4						11042100	0	2					
11021401	568.0,5						11042101	0.00238,4						
11021501	102010000,	0,	1,	1,	0.57074,	1	11042201	0001,4						
11021502	102020000,	0,	1,	1,	0.17145,	2	11042301	0,0,4						
11021503	102030000,	0,	1,	1,	0.17145,	3	11042401	568.0,5						
11021504	102040000,	0,	1,	1,	0.22504,	4	11042501	104010000,0,1,1,0.23825,1						
11021601	0,	0,	0,	1,	0.57074,	1	11042502	104020000,0,1,1,0.42494,2						
11021602	0,	0,	0,	1,	0.17145,	2	11042503	104030000,10000,1,1,0.35560,4						
11021603	0,	0,	0,	1,	0.17145,	3	11042504	104050000,0,1,1,0.64808,5						
11021604	0,	0,	0,	1,	0.22504,	4	11042601	0,0,0,1,0.23825,1						
11021701	0,0,0,0,0,0,	4					11042602	0,0,0,1,0.42494,2						
11021801	0.	10.	10.	0.	0.	0.	1.4	11042603	0,0,0,1,0.35560,4					
11021901	0.	10.	10.	0.	0.	0.	1.4	11042604	0,0,0,1,0.64808,5					
*11021801	0,0,0,0,0,0.57074,1						11042701	0,0,0,0,0,0,5						
*11021802	0,0,0,0,0,0.17145,2						11042801	0.	10.	10.	0.	0.	0.	1.5
*11021803	0,0,0,0,0,0.17145,3						11042901	0.	10.	10.	0.	0.	0.	1.5
*11021804	0,0,0,0,0,0.22504,4						*11042801	0,0,0,0,0,0.23825,1						
*11021901	0,0,0,0,0,0.57074,1						*11042802	0,0,0,0,0,0.42494,2						
*11021902	0,0,0,0,0,0.17145,2						*11042803	0,0,0,0,0,0.35560,4						
*11021903	0,0,0,0,0,0.17145,3						*11042804	0,0,0,0,0,0.64808,5						
*11021604	0,0,0,0,0,0.22504,4						*11042901	0,0,0,0,0,0.23825,1						
*							*11042902	0,0,0,0,0,0.42494,2						
11022000	2	5	2	1	0.02699		*11042903	0,0,0,0,0,0.35560,3						
11022100	0	2					*11042904	0,0,0,0,0,0.64808,5						
11022101	0.00238,4						*							
11022201	0001,4						11052000	6	5	2	1	0.02699		
11022301	0,0,4						*11052100	1022						
11022401	568.0,5						11052100	0	2					
11022501	102050000.10000,1,1,0.38748,2						11052101	0.00238,4						
11022601	0,0,0,1,0.38748,2						11052201	0001,4						
11022701	0,0,0,0,0,0,2						11052301	0,0,4						
11022801	0.	10.	10.	0.	0.	0.	1.2	11052401	350,0,5					
11022901	0.	10.	10.	0.	0.	0.	1.2	11052501	105010000,0,1,1,0.44488,1					
*11022801	0,0,0,0,0,0.38748,2						11052502	105020000,0,1,1,0.40640,2						
*11022901	0,0,0,0,0,0.38748,2						11052503	105030000.10000,1,1,0.35560,5						
*							11052504	105060000,0,1,1,0.49301,6						
11032000	1	5	2	1	0.02699		11052601	0,0,0,1,0.44488,1						
*11032100	1022						11052602	0,0,0,1,0.40640,2						
11032100	0	2					11052603	0,0,0,1,0.35560,5						
11032101	0.00238	4					11052604	0,0,0,1,0.49301,6						

11052701	0,0,0,0,0,0,6	11063601	0,0,0,1,0,44805,1
11052801	0. 10. 10. 0. 0. 0. 0. 1.6	11063602	0,0,0,1,1,14808,2
11052901	0. 10. 10. 0. 0. 0. 0. 1.6	11063603	0,0,0,1,0,60046,3
*11052801	0,0,0,0,0,44488,1	11063604	0,0,0,1,0,74320,4
*11052802	0,0,0,0,0,40640,2	11063701	0,0,0,0,0,0,4
*11052803	0,0,0,0,0,35560,5	*11063801	0,0,0,0,0,44805,1
*11052804	0,0,0,0,0,49301,6	*11063802	0,0,0,0,0,1,14808,2
*11052901	0,0,0,0,0,44488,1	*11063803	0,0,0,0,0,60046,3
*11052902	0,0,0,0,0,40640,2	*11063804	0,0,0,0,0,74320,4
*11052903	0,0,0,0,0,35560,5	*11063901	0,0,0,0,0,44805,1
*11052904	0,0,0,0,0,49301,6	*11063902	0,0,0,0,0,1,14808,2
*		*11063903	0,0,0,0,0,60046,3
11051000	8 5 2 1 0.03332	*11063904	0,0,0,0,0,74320,4
*11051100	1021	11063801	0. 10. 10. 0. 0. 0. 0. 1.4
11051100	0 2	11063901	0. 10. 10. 0. 0. 0. 0. 1.4
11051101	0.00278,4	*	
11051201	0001,4	11061000	1 5 2 1 0.03332
11051301	0,0,4	*11061100	1021
11051401	550,0,5	11061100	0 2
11051501	105070000,0,1,1,0.58572,1	11061101	0.00278,4
11051502	105080000,0,1,1,0.78740,3	11061201	0001,4
11051503	105100000,0,1,1,0.26200,5	11061301	0,0,4
11051504	105120000,10000,1,1,0.78740,7	11061401	550,0,5
11051505	105140000,0,1,1,0.58572,8	11061501	106050000,0,1,1,0.75565,1
11051601	0,0,0,1,0.58572,1	11061601	0,0,0,1,0.75565,1
11051602	0,0,0,1,0.78740,3	11061701	0,0,0,0,0,0,1
11051603	0,0,0,1,0.26200,5	*11061801	0,0,0,0,0,0,75565,1
11051604	0,0,0,1,0.78740,7	*11061901	0,0,0,0,0,0,75565,1
11051605	0,0,0,1,0.58572,8	11061801	0. 10. 10. 0. 0. 0. 0. 1.1
11051701	0,0,0,0,0,0,8	11061901	0. 10. 10. 0. 0. 0. 0. 1.1
*11051801	0,0,0,0,0,58572,1	*	
*11051802	0,0,0,0,0,0,78740,3	11071000	1 5 2 1 3.332000e-02
*11051803	0,0,0,0,0,0,26200,5	*11071100	1021
*11051804	0,0,0,0,0,0,78740,7	11071100	0 2
*11051805	0,0,0,0,0,0,58572,8	11071101	0.00278,4
*11051901	0,0,0,0,0,0,58572,1	11071201	0001,4
*11051902	0,0,0,0,0,0,78740,3	11071301	0,0,4
*11051903	0,0,0,0,0,0,26200,5	11071401	550,0,5
*11051904	0,0,0,0,0,0,78740,7	11071501	107010000,0,1,1,0.79126,1
*11051905	0,0,0,0,0,0,58572,8	11071601	0,0,0,1,0.79126,1
11051801	0. 10. 10. 0. 0. 0. 0. 1.8	11071701	0,0,0,0,0,0,1
11051901	0. 10. 10. 0. 0. 0. 0. 1.8	*11071801	0,0,0,0,0,0,79126,1
**		*11071901	0,0,0,0,0,0,79126,1
11063000	4 5 2 1 0.01699	11071801	0. 10. 10. 0. 0. 0. 0. 1.1
11063100	0 2	11071901	0. 10. 10. 0. 0. 0. 0. 1.1
11063101	0.00178,4	*	
11063201	0001,4	11081000	1 5 2 1 0.03625
11063301	0,0,4	*11081100	1011
11063401	550,0,5	11081100	0 2
11063501	106010000,0,1,1,0.44805,1	11081101	0.00238,4
11063502	106020000,0,1,1,1,14808,2	11081201	0001,4
11063503	106030000,0,1,1,0.60046,3	11081301	0,0,4
11063504	106040000,0,1,1,0.74320,4	11081401	550,0,5

11081501	108010000,0,1,1,0.18161,1	12001901	0. 10. 10. 0. 0. 0. 0. 1.18
11081601	0,0,1,0.18161,1	*	
11081701	0,0,0,0,0,0,1	12012000	10 5 2 1 0.07479
*11081801	0,0,0,0,0.18161,1	12012100	0 2
*11081901	0,0,0,0,0.18161,1	12012101	0.00937,4
11081801	0. 10. 10. 0. 0. 0. 0. 1.1	12012201	0006,4
11081901	0. 10. 10. 0. 0. 0. 0. 1.1	12012301	0.0,4
*		12012400	2001
* intact loop sg piping		12012501	202010000, 0, 1, 1, 1.21831, 1
*		12012502	202020000, 10000, 1, 1, 1.20561, 7
12001000	18 5 2 1 0.00987	12012503	202080000, 0, 1, 1, 0.48578, 8
12001100	0 2	12012504	202090000, 0, 1, 1, 0.58737, 9
12001101	0.00031, 4	12012505	202100000, 0, 1, 1, 0.41891, 10
12001201	0002,4	12012601	202010000, 0, 1, 1, 1.21831, 1
12001301	0,0,4	12012602	202020000, 10000, 1, 1, 1.20561, 7
12001401	550.0, 5	12012603	202080000, 0, 1, 1, 0.48578, 8
*		12012604	202090000, 0, 1, 1, 0.58737, 9
* left bndry incre B.C typ factor no		12012605	202100000, 0, 1, 1, 0.41891, 10
*		12012701	0,0,0,0,0,0,10
12001501	201020000, 0, 1, 1, 7.30986, 1	*12012801	0,0,0,0,1.21831,1
12001502	201030000, 10000, 1, 1, 7.23366, 7	*12012802	0,0,0,0,1.20561,7
12001503	201090000, 0, 1, 1, 2.91468, 8	*12012803	0,0,0,0,0.48578,8
12001504	201100000, 10000, 1, 1, 2.06466, 10	*12012804	0,0,0,0,0.58737,9
12001505	201120000, 0, 1, 1, 2.91468, 11	*12012805	0,0,0,0,0.41891,10
12001506	201130000, 10000, 1, 1, 7.23366, 17	*12012901	0,0,0,0,1.21831,1
12001507	201190000, 0, 1, 1, 7.30986, 18	*12012902	0,0,0,0,1.20561,7
*		*12012903	0,0,0,0,0.48578,8
* rightbndry incre B.C typ factor no		*12012904	0,0,0,0,0.58737,9
*		*12012905	0,0,0,0,0.41891,10
12001601	202010000, 0, 1, 1, 7.30986, 1	12012801	0. 10. 10. 0. 0. 0. 0. 1.10
12001602	202020000, 10000, 1, 1, 7.23366, 7	12012901	0. 10. 10. 0. 0. 0. 0. 1.10
12001603	202080000, 0, 1, 1, 2.91468, 8	*	
12001604	202090000, 0, 1, 1, 2.06466, 10	12022000	10 5 2 1 0.10578
12001605	202080000, 0, 1, 1, 2.91468, 11	12022100	0 2
12001606	202070000, -10000, 1, 1, 7.23366, 17	12022101	0.00094.4
12001607	202010000, 0, 1, 1, 7.30986, 18	12022201	0001.4
*		12022301	0.0,4
12001701	0. 0. 0. 0. 0. 18	12022400	2001
*12001801	0. 0.01974, 0.01974, 1.21831, 1	12022501	202010000,0,1,1,1.21831,1
*12001802	0. 0.01974, 0.01974, 1.20561, 7	12022502	202020000,10000,1,1,1.20561,7
*12001803	0. 0.01974, 0.01974, 0.48578, 8	12022503	202080000,0,1,1,0.48578,8
*12001804	0. 0.01974, 0.01974, 0.34411, 10	12022504	202090000,0,1,1,0.58737,9
*12001805	0. 0.01974, 0.01974, 0.48578, 11	12022505	202100000,0,1,1,0.41891,10
*12001806	0. 0.01974, 0.01974, 1.20561, 17	12022601	205100000,0,1,1,1.21831,1
*12001807	0. 0.01974, 0.01974, 1.21831, 18	12022602	205090000,-10000,1,1,1.20561,7
*12001901	0. 0.00635, 0.00635, 1.21831, 1	12022603	205030000,0,1,1,0.48578,8
*12001902	0. 0.00635, 0.00635, 1.20561, 7	12022604	205020000,0,1,1,0.58737,9
*12001903	0. 0.00635, 0.00635, 0.48578, 8	12022605	205010000,0,1,1,0.41891,10
*12001904	0. 0.00635, 0.00635, 0.34411, 10	12022701	0,0,0,0,0,0,10
*12001905	0. 0.00635, 0.00635, 0.48578, 11	*12022801	0,0,0,108,0,04968,1.21831,1
*12001906	0. 0.00635, 0.00635, 1.20561, 17	*12022802	0,0,0,108,0,04968,1.20561,7
*12001907	0. 0.00635, 0.00635, 1.21831,18	*12022803	0,0,0,4063,0,07265,0.48578,8
12001801	0. 10. 10. 0. 0. 0. 1.18	*12022804	0,0,05956,0,11346,0.58737,9

*12022805	0,0.06729,0.18133,0.41891,10	*12042801	0,0,0,0,0.37827,1
*12022901	0,0,0,0,1.21831,1	*12042802	0,0,0,0,0.50635,3
*12022902	0,0,0,0,1.20561,7	*12042901	0,0,0,0,0.37827,1
*12022903	0,0,0,0,0.40578,8	*12042902	0,0,0,0,0.50635,3
*12022904	0,0,0,0,0.58737,9	12042801	0. 10. 10. 0. 0. 0. 0. 1.3
*12022905	0,0,0,0,0.41891,10	12042901	0. 10. 10. 0. 0. 0. 0. 1.3
12022801	0. 10. 10. 0. 0. 0. 0. 1.10	*	
12022901	0. 10. 10. 0. 0. 0. 0. 1.10	12053000	10 5 2 1 0.12146
*		12053100	0 2
12032000	10 5 2 1 0.11074	12053101	0.00377,4
12032100	0 2	12053201	0001,4
12032101	0.00238,4	12053301	0,0,4
12032201	0001,4	12053400	2001
12032301	0,0,4	12053501	205010000,0,1,1,0.41891,1
12032400	2001	12053502	205020000,0,1,1,0.58737,2
12032501	205010000,0,1,1,0.35840,1	12053503	205030000,0,1,1,0.48578,3
12032502	205020000,0,1,1,0.50253,2	12053504	205040000,10000,1,1,1.20561,9
12032503	205030000,0,1,1,0.41561,3	12053505	205100000,0,1,1,1.21831,10
12032504	205040000,10000,1,1,1.03147,9	12053601	-200,0.3205,1,0.41891,1
12032505	205100000,0,1,1,1.04234,10	12053602	-200,0.3205,1,0.58737,2
12032601	205010000,0,1,1,0.35840,1	12053603	-200,0.3205,1,0.48578,3
12032602	205020000,0,1,1,0.50253,2	12053604	-200,0.3205,1,1.20561,9
12032603	205030000,0,1,1,0.41561,3	12053605	-200,0.3205,1,1.21831,10
12032604	205040000,10000,1,1,1.03147,9	12053701	0,0,0,0,0,0,10
12032605	205100000,0,1,1,1.04234,10	*12053801	0,0,0,0,0,41891,1
12032701	0,0,0,0,0,0,10	*12053802	0,0,0,0,0,58737,2
*12032801	0,0,0,0,0,41891,1	*12053803	0,0,0,0,0,48578,3
*12032802	0,0,0,0,0,58737,2	*12053804	0,0,0,0,0,1.20561,9
*12032803	0,0,0,0,0,48578,3	*12053805	0,0,0,0,0,1.21831,10
*12032804	0,0,0,0,0,1.20561,9	*12053901	0,0,0,0,0,41891,1
*12032805	0,0,0,0,0,1.21831,10	*12053902	0,0,0,0,0,58737,2
*12032901	0,0,0,0,0,41891,1	*12053903	0,0,0,0,0,48578,3
*12032902	0,0,0,0,0,58737,2	*12053904	0,0,0,0,0,1.20561,9
*12032903	0,0,0,0,0,48578,3	*12053905	0,0,0,0,0,1.21831,10
*12032904	0,0,0,0,0,1.20561,9	12053801	0. 10. 10. 0. 0. 0. 0. 1.10
*12032905	0,0,0,0,0,1.21831,10	12053901	0. 10. 10. 0. 0. 0. 0. 1.10
12032801	0. 10. 10. 0. 0. 0. 0. 1.10	*	
12032901	0. 10. 10. 0. 0. 0. 0. 1.10	12054000	4 5 2 1 0.20477
**		12054100	0 2
12042000	3 5 2 1 0.13233	12054101	0.00596,4
12042100	0 2	12054201	0001,4
12042101	0.00105,4	12054301	0,0,4
12042201	0001,4	12054400	2001
12042301	0,0,4	12054501	204010000,0,1,1,0.40005,1
12042400	2001	12054502	203010000,0,1,1,0.50635,2
12042501	202110000,0,1,1,0.37827,1	12054503	209010000,0,1,1,0.50635,3
12042502	202120000,0,1,1,0.50635,2	12054504	209020000,0,1,1,0.37827,4
*		12054601	-200, 0, 3204, 1,0.40005,1
12042503	203010000,0,1,1,0.50635,3	12054602	-200, 0, 3204, 1,0.50635,2
12042601	209020000,0,1,1,0.37827,1	12054603	-200, 0, 3204, 1,0.50635,3
12042602	209010000,0,1,1,0.50635,2	12054604	-200, 0, 3204, 1,0.37827,4
12042603	203010000,0,1,1,0.50635,3	12054701	0,0,0,0,0,0,4
12042701	0,0,0,0,0,0,3	*12054801	0,0,0,0,0,40005,1

*12054802	0,0,0,0,0,0.50635,3	13012501	0,0,0,1,5.91312,2
*12054803	0,0,0,0,0,0.37827,4	13012601	301050000,-10000,1,1,5.91312,2
*12054901	0,0,0,0,0,0.40005,1	13012701	300,0.5,0,0,0,0,2
*12054902	0,0,0,0,0,0.50635,3	*13012901	0,0,0,0.0168,0.24638,2
*12054903	0,0,0,0,0,0.37827,4	13012801	0. 10. 10. 0. 0. 0. 0. 1.2
12054801	0. 10. 10. 0. 0. 0. 0. 1.4	13012901	0. 10. 10. 0. 0. 0. 0. 1.2
12054901	0. 10. 10. 0. 0. 0. 0. 1.4	*	
*		13022000	1 5 2 1 1.560000e-02
12055000	1 5 1 1 0.0	13022100	0 2
12055100	0 2	13022101	0.00178,4
12055101	0.00596,4	13022201	0001,4
12055201	0001,4	13022301	0.0,4
12055301	0.0,4	13022400	3011
12055401	543,0,5	13022501	302010000,0,1,1,0.36713,1
12055501	204010000,0,1,0,0.13174,1	13022601	0,0,0,1,0.36713,1
12055601	0,0,0,0,0.13174,1	13022701	0,0,0,0,0,0,1
12055701	0,0,0,0,0,0,1	*13022801	0,0,0,0,0,0.22860,1
*12055801	0,0,0,0,0,0.40955,1	*13022901	0,0,0,0,0,0.22860,1
*12055901	0,0,0,0,0,0.40955,1	13022801	0. 10. 10. 0. 0. 0. 0. 1.1
12055801	0. 10. 10. 0. 0. 0. 0. 1.1	13022901	0. 10. 10. 0. 0. 0. 0. 1.1
12055901	0. 10. 10. 0. 0. 0. 0. 1.1	*	
*		13023000	6 5 2 1 4.70000e-03
* pressurizer walls		13023100	0 2
*		13023101	0.00098,4
13011000	6 5 2 1 1.0795e-01	13023201	0001,4
13011100	0 2	13023301	0.0,4
13011101	0.007144,4	13023400	3011
13011201	0001,4	13023501	302020000,0,1,1,0.1778,1
13011301	0.0,4	13023502	302030000,0,1,1,0.48895,2
13011401	600,0,5	13023503	302040000,10000,1,1,0.6731,6
13011501	301010000,0,1,1,0.183565,1	13023601	0,0,!,0.1778,1
13011502	301020000,10000,1,1,0.2549,5	13023602	0,0,0,1,0.48895,2
13011503	301050000,0,1,1,0.00686,6	13023603	0,0,0,!,0.6731,6
13011601	0,0,0,1,0.183565,1	13023701	0,0,0,0,0,0,6
13011602	0,0,0,1,0.2549,5	*13023801	0,0,0,0,0,0.1778,1
13011603	0,0,0,1,0.00686,6	*13023802	0,0,0,0,0,0.48895,2
13011701	0,0,0,0,0,0,6	*13023803	0,0,0,0,0,0.6731,6
*13011801	0,0,0,0,0,0.183564,2	*13023901	0,0,0,0,0,0.1778,1
*13011802	0,0,0,0,0,0.2549,5	*13023902	0,0,0,0,0,0.48895,2
*13011803	0,0,0,0,0,0.00686,6	*13023903	0,0,0,0,0,0.6731,6
*13011901	0,0,0,0,0,0.183564,2	13023801	0. 10. 10. 0. 0. 0. 0. 1.6
*13011902	0,0,0,0,0,0.2549,5	13023901	0. 10. 10. 0. 0. 0. 0. 1.6
*13011903	0,0,0,0,0,0.00686,6	*	
13011801	0. 10. 10. 0. 0. 0. 0. 1.6	* broken loop piping walls	
13011901	0. 10. 10. 0. 0. 0. 0. 1.6	*	
*		14011000	1 5 2 1 0.03332
13012000	2 5 2 1 0.0	*14011100	1021
13012100	0 2	14011100	0 2
13012101	0.00210,4	14011101	0.00278,4
13012201	0001,4	14011201	0001,4
13012301	1.0,1	14011301	0.0,4
13012302	0.0,4	14011401	568,0,5
13012401	615,0,5	14011501	401010000,0,1,1,0.40818,1

14011601	0,0,0,1,0.40818,1	14031501	403010000,0,1,1,0.49424,1
14011701	0,0,0,0,0,0,1	14031502	403020000,0,1,1,0.34925,2
*14011801	0,0,0,0,0,40818,1	14031503	403030000,0,1,1,0.35235,3
*14011901	0,0,0,0,0,40818,1	14031504	403040000,0,1,1,0.34925,4
14011801	0. 10. 10. 0. 0. 0. 0. 1.1	14031505	403050000,0,1,1,1.08318,5
14011901	0. 10. 10. 0. 0. 0. 0. 1.1	14031506	403060000,10000,1,1,0.78512,7
*		14031507	403080000,10000,1,1,0.48944,9
14021000	7 5 2 1 0.01699	14031508	403100000,10000,1,1,0.78512,11
14021100	0 2	14031509	403120000,0,1,1,0.70002,12
14021101	0.00178,4	14031601	0,0,0,1,0.49424,1
14021201	0001,4	14031602	0,0,0,1,0.34925,2
14021301	0,0,4	14031603	0,0,0,1,0.35235,3
14021401	568,0,5	14031604	0,0,0,1,0.34925,4
14021501	402010000,0,1,1,0.60985,1	14031605	0,0,0,1,1.08318,5
14021502	402020000,0,1,1,0.40860,2	14031606	0,0,0,1,0.78512,7
14021503	402030000,0,1,1,0.98572,3	14031607	0,0,0,1,0.48944,9
14021504	402040000,0,1,1,0.41783,4	14031608	0,0,0,1,0.78512,11
14021505	402050000,0,1,1,0.35235,5	14031609	0,0,0,1,0.70002,12
14021506	402060000,0,1,1,0.34925,6	14031701	0,0,0,0,0,0,12
14021507	402070000,0,1,1,0.60879,7	*14031801	0,0,0,0,0,0.49424,1
14021601	0,0,0,1,0.60985,1	*14031802	0,0,0,0,0,0.34925,2
14021602	0,0,0,1,0.40860,2	*14031803	0,0,0,0,0,0.35235,3
14021603	0,0,0,1,0.98572,3	*14031804	0,0,0,0,0,0.34925,4
14021604	0,0,0,1,0.41783,4	*14031805	0,0,0,0,0,1.08318,5
14021605	0,0,0,1,0.35235,5	*14031806	0,0,0,0,0,0.78512,7
14021606	0,0,0,1,0.34925,6	*14031807	0,0,0,0,0,0.48944,9
14021607	0,0,0,1,0.60879,7	*14031808	0,0,0,0,0,0.78512,11
14021701	0,0,0,0,0,0,7	*14031809	0,0,0,0,0,0.70002,12
*14021801	0,0,0,0,0,60985,1	*14031901	0,0,0,0,0,0.49424,1
*14021802	0,0,0,0,0,40860,2	*14031902	0,0,0,0,0,0.34925,2
*14021803	0,0,0,0,0,98572,3	*14031903	0,0,0,0,0,0.35235,3
*14021804	0,0,0,0,0,41783,4	*14031904	0,0,0,0,0,0.34925,4
*14021805	0,0,0,0,0,35235,5	*14031905	0,0,0,0,0,1.08318,5
*14021806	0,0,0,0,0,34925,6	*14031906	0,0,0,0,0,0.78512,7
*14021807	0,0,0,0,0,60879,7	*14031907	0,0,0,0,0,0.48944,9
*14021901	0,0,0,0,0,60985,1	*14031908	0,0,0,0,0,0.78512,11
*14021902	0,0,0,0,0,40860,2	*14031909	0,0,0,0,0,0.70002,12
*14021903	0,0,0,0,0,98572,3	14031801	0. 10. 10. 0. 0. 0. 0. 1.12
*14021904	0,0,0,0,0,41783,4	14031901	0. 10. 10. 0. 0. 0. 0. 1.12
*14021905	0,0,0,0,0,35235,5	*	
*14021906	0,0,0,0,0,34925,6	14041000 3 5 2 1 1.699000e-02	
*14021907	0,0,0,0,0,60879,7	*14041100 4021	
14021801	0. 10. 10. 0. 0. 0. 0. 1.7	14041100 0 2	
14021901	0. 10. 10. 0. 0. 0. 0. 1.7	14041101 0.00178,4	
*		14041201 0001,4	
*14031000	1 5 2 1 0.01699	14041301 0,0,4	
14031000	12 5 2 1 0.01699	*14041400 4031	
*14031100	4021	14041401 557,0 5	
14031100	0 2	14041501 404010000,0,1,1,0.60046,1	
14031101	0.00178,4	14041502 405010000,0,1,1,0.50216,2	
14031201	0001,4	14041503 405020000,0,1,1,0.71145,3	
14031301	0,0,4	14041601 0,0,0,1,0.60046,1	
14031401	557,0,5	14041602 0,0,0,1,0.50216,2	

14041603	0,0,0,1,0.71145,3	15012602	502010000,0,1,1,5.501,2
14041701	0,0,0,0,0,0,3	15012603	503010000,0,1,1,7.93125,3
*14041801	0,0,0,0,0,0.60046,1	15012604	504010000,0,1,1,4.534,4
*14041802	0,0,0,0,0.50216,2	15012701	0,0,0,0,0,0,4
*14041803	0,0,0,0,0,0.71145,3	*15012901	0,0,0,0,0,0.14224,1
*14041901	0,0,0,0,0,0.60046,1	*15012902	0,0,0,0,0,0.22004,2
*14041902	0,0,0,0,0.50216,2	*15012903	0,0,0,0,0,0.31725,3
*14041903	0,0,0,0,0,0.71145,3	*15012904	0,0,0,0,0,0.18136,4
14041801	0. 10. 10. 0. 0. 0. 0. 1.3	15012801	0. 10. 10. 0. 0. 0. 0. 0. 1.4
14041901	0. 10. 10. 0. 0. 0. 0. 0. 1.3	15012901	0. 10. 10. 0. 0. 0. 0. 0. 1.4
*		*	
14051000	1 5 2 1 0.03332	* Implementing two core channel model	
*14051100	1021	* power ratio avg:hot=60:40	
14051100	0 2	*	
14051101	0.00278,4	* average core	
14051201	0001,4	*	
14051301	0,0,4	15013000	16 11 2 1 0
14051401	557. 5	15013100	0 2
14051501	406010000 0 1 1 0.47168 1	15013101	0.000529 3
14051601	0 0 0 1 0.47168 1	15013102	0.000406 5
14051701	0 0.0 0.0 0.0 1	15013103	0.000656 8
*14051801	0 0.0 0.0 0.47168 1	15013104	0.000495 10
*14051901	0 0.0 0.0 0.47168 1	15013201	0004, 3
14051801	0. 10. 10. 0. 0. 0. 0. 1.1	15013202	0005, 5
14051901	0. 10. 10. 0. 0. 0. 0. 0. 1.1	15013203	0004, 8
*		15013204	0001, 10
* vessel structure		15013301	0., 3
*		15013302	1., 5
15011000	1 5 1 1 0	15013303	0., 10
15011100	0 2	15013401	557., 11
15011101	0.0370 4	15013501	0, 0, 0, 0, 0, 16
15011201	0001,4	*15013601	505010000, 10000, 1, 1, 13.4112, 2
15011301	0, 4	*15013602	505030000, 10000, 1, 1, 6.7056, 6
15011401	557.0 5	*15013603	505070000, 10000, 1, 1, 13.4112, 8
15011501	501010000, 0, 1, 0, 0.05200, 1	*15013604	505010000, 10000, 1, 1, 1.8288, 10
15011601	0, 0, 0, 0.05200, 1	*15013605	505030000, 10000, 1, 1, 0.9144, 14
15011701	0, 0.0 0.0 0.0 1	*15013606	505070000, 10000, 1, 1, 1.8288, 16
*15011801	0, 0, 0.0.0.0.25730, 1	*	
*15011901	0, 0, 0.0.0.0.25730, 1	* implement 50:50 heat transfer area	
15011801	0. 10. 10. 0. 0. 0. 0. 1.1	*	
15011901	0. 10. 10. 0. 0. 0. 0. 0. 1.1	15013601	505010000, 10000, 1, 1, 6.70560, 2
*		15013602	505030000, 10000, 1, 1, 3.35280, 6
15012000	4 5 2 1 0	15013603	505070000, 10000, 1, 1, 6.70560, 8
15012100	0 2	15013604	505010000, 10000, 1, 1, 0.91440, 10
15012101	0.00134, 4	15013605	505030000, 10000, 1, 1, 0.45720, 14
15012201	0003, 4	15013606	505070000, 10000, 1, 1, 0.91440, 16
15012301	0., 4	15013701	500, 0.07500, 0.0, 0.0, 1
15012400	5011	15013702	500, 0.17583, 0.0, 0.0, 2
15012501	0, 0, 0, 1, 3.556, 1	15013703	500, 0.12000, 0.0, 0.0, 3
15012502	0, 0, 0, 1, 5.501, 2	15013704	500, 0.12917, 0.0, 0.0, 4
15012503	0, 0, 0, 1, 7.93125, 3	15013705	500, 0.12917, 0.0, 0.0, 5
15012504	0, 0, 0, 1, 4.534, 4	15013706	500, 0.12000, 0.0, 0.0, 6
15012601	501010000, 0, 1, 1, 3.556, 1	15013707	500, 0.17583, 0.0, 0.0, 7

15013708	500, 0.07500, 0.0, 0.0, 8	15021101	0.01568	4
15013709	0, 0.0, 0.0, 0.0, 16	15021201	0001,	4
*15013901	0, 0.0, 0.01357, 0.6096, 2	15021301	0.0,	4
*15013902	0, 0.0, 0.01357, 0.3048, 6	15021401	557.0	5
*15013903	0, 0.0, 0.01357, 0.6096, 10	15021501	501010000, 0,	1, 1, 0.14224, 1
*15013904	0, 0.0, 0.01357, 0.3048, 14	15021601	0, 0, 0.1,	0.14224, 1
*15013905	0, 0.0, 0.01357, 0.6096, 16	15021701	0, 0.0, 0.0, 0.0,	1
15013801	0. 10. 10. 0. 0. 0. 0. 1.16	*15021801	0, 0.0, 0.0, 0.0,	1
15013901	0. 10. 10. 0. 0. 0. 0. 1.16	*15021901	0, 0.0, 0.0, 0.0,	1
*		15021801	0. 10. 10. 0. 0. 0. 0. 1.1	
* hot channel core		15021901	0. 10. 10. 0. 0. 0. 0. 1.1	
*		*		
15513000	16 11 2 1 0	15022000	1 5 2 1	9.77100e-02
15513100	0 2	15022100	0 2	
15513101	0.000529 3	15022101	0.01588	4
15513102	0.000406 5	15022201	0001,	4
15513103	0.000656 8	15022301	0.0,	4
15513104	0.000495 10	15022401	557.0	5
15513201	0004, 3	15022501	502010000, 0,	1, 1, 0.22004, 1
15513202	0005, 5	15022601	0.	0, 0.1, 0.22004, 1
15513203	0004, 8	15022701	0, 0.0, 0.0, 0.0,	1
15513204	0001, 10	*15022801	0, 0.0, 0.0, 0.22004, 1	
15513301	0.0. 3	*15022901	0, 0.0, 0.0, 0.22004, 1	
15513302	1.0. 5	15022801	0. 10. 10. 0. 0. 0. 0. 1.1	
15513303	0.0. 10	15022901	0. 10. 10. 0. 0. 0. 0. 1.1	
15513401	557.0. 11	*		
15513501	0, 0, 0, 0.0. 16	15023000	1 5 2 1	7.62100e-02
15513601	555010000. 10000, 1, 1, 6.70560, 2	15023100	0 2	
15513602	555030000. 10000, 1, 1, 3.35280 6	15023101	0.01588	4
15513603	555070000. 10000, 1, 1, 6.70560, 8	15023201	0001,	4
15513604	555010000, 10000, 1, 1, 0.91440 10	15023301	0.0.	4
15513605	555030000, 10000, 1, 1, 0.45720 14	15023401	557.0	5
15513606	555070000. 10000, 1, 1, 0.91440 16	15023501	519010000, 0.	1, 1, 0.29337, 1
*		15023601	0. 0.	0.1, 0.29337, 1
15513701	550. 0.07500. 0.0. 0.0. 1	15023701	0. 0.0. 0.0. 0.0.	1
15513702	550. 0.17583. 0.0. 0.0. 2	*15023801	0. 0.0. 0.0. 0.29337, 1	
15513703	550. 0.12000, 0.0. 0.0. 3	*15023901	0. 0.0. 0.0. 0.29337, 1	
15513704	550. 0.12917. 0.0, 0.0. 4	15023801	0. 10. 10. 0. 0. 0. 0. 1.1	
15513705	550. 0.12917, 0.0, 0.0, 5	15023901	0. 10. 10. 0. 0. 0. 0. 1.1	
15513706	550. 0.12000, 0.0, 0.0, 6	*		
15513707	550. 0.17583, 0.0, 0.0, 7	15031000	10 5 2 1	0.02775
15513708	550. 0.07500. 0.0. 0.0. 8	15031100	0 2	
15513709	0. 0.0. 0.0, 0.0. 16	15031101	0.00471	4
*15513901	0. 0.0. 0.01357, 0.6096, 2	15031201	0001,	4
*15513902	0. 0.0. 0.01357, 0.3048, 6	15031301	0.0.	4
*15513903	0. 0.0. 0.01357, 0.6096, 10	15031401	557.0	5
*15513904	0. 0.0. 0.01357, 0.3048, 14	15031501	518010000. 10000, 1, 1,	0.4890, 9
*15513905	0. 0.0. 0.01357, 0.6096, 16	15031502	518100000. 0.	1, 1, 0.37661, 10
15513801	0. 10. 10. 0. 0. 0. 0. 1.16	15031601	0. 0.	0.1, 0.4890, 9
15513901	0. 10. 10. 0. 0. 0. 0. 1.16	15031602	0. 0.	0.1, 0.37661, 10
*		15031701	0. 0.0. 0.0. 0.0.	10
15021000	1 5 2 1 1.286500e-01	*15031801	0. 0.0. 0.0. 0.4890,	9
15021100	0 2	*15031802	0. 0.0. 0.0. 0.37661, 10	

*15031901	0.0.0.0.0.4890.	9	*15014801	0.	0.0.0.0.	0.5334,	1									
*15031902	0.0.0.0.0.37661.	10	*15014802	0.	0.0.0.0.	0.6096,	2									
15031801	0.	10.	10.	0.	0.	0.	1.10	*15014803	0.	0.0.0.0.	0.3048,	6				
15031901	0.	10.	10.	0.	0.	0.	1.10	*15014804	0.	0.0.0.0.	0.6096,	8				
*			*15014901	0.	0.0.0.0.	0.5334,	1									
*15024000	10	5	2	1	0.05121			*15014902	0.	0.0.0.0.	0.6096,	2				
15024000	1	5	2	1	0.05121			*15014903	0.	0.0.0.0.	0.3048,	6				
15024100	0	2						*15014904	0.	0.0.0.0.	0.6096,	8				
15024101	0.00160	4						15014801	0.	10.	10.	0.	0.	0.	0.	1.8
15024201	0001,	4						15014901	0.	10.	10.	0.	0.	0.	0.	1.8
15024301	0.0.	4						*								
15024401	557.0	5						*15015000	1	5	2	1	0.			
15024501	503010000.	0.	1.	1.	0.31725.	1		*15015100	0	2						
15024601	519010000.	0.	1.	1.	0.31725.	1		*15015101	0.02858	4						
15024701	0.	0.0.	0.0.	0.0.	1			*15015201	0001,	4						
*15024801	0.	0.0.	0.0.	0.31725.	1			*15015301	0.0.	4						
*15024901	0.	0.0.	0.0.	0.31725.	1			*15015400	5011							
15024801	0.	10.	10.	0.	0.	0.	1.1	*15015501	516010000.	0.1.	1.	0.3765,	1			
15024901	0.	10.	10.	0.	0.	0.	1.1	*15015601	0.	0.	0.	1.	0.3765,	1		
*								*15015701	0.	0.0.0.0.	0.0.	1				
15025000	2	5	2	1	4.041000e-02			**15015801	0.	0.0.0.0.	0.54381,	1				
15025100	0	2						**15015901	0.	0.0.0.0.	0.54381,	1				
15025101	0.01765	4						*15015801	0.	10.	10.	0.	0.	0.	1.1	
15025201	0001.	4						*15015901	0.	10.	10.	0.	0.	0.	1.1	
15025301	0.0.	4						*								
15025401	557.0	5						15016000	2	5	2	1	3.810000e-02			
15025501	504010000.	0.	1.	1.	0.18136.	1		15016100	0	2						
15025502	505010000.	0.	1.	1.	0.0762.	2		15016101	0.00572	4						
15025601	0.	0.0.	1.	0.18136.	1			15016201	0001,	4						
15025602	0.	0.	1.	0.0762.	2			15016301	0.0.	4						
15025701	0.	0.0.	0.0.	0.0.	2			15016400	5011							
*15025801	0.	0.0.	0.0.	0.18136.	1			15016501	0.	0.	0.1.	0.26670.	1			
*15025802	0.	0.0.	0.0.	0.0762.	2			15016502	0.	0.	0.1.	0.38418.	2			
*15025901	0.	0.0.	0.0.	0.18136.	1			15016601	516010000.	0.1.	1.	0.26670.	1			
*15025902	0.	0.0.	0.0.	0.0762.	2			15016602	517010000.	0.1.	1.	0.38418.	2			
15025801	0.	10.	10.	0.	0.	0.	1.2	15016701	0.	0.0.0.	0.0.	2				
15025901	0.	10.	10.	0.	0.	0.	1.2	*15016801	0.	0.0.0.	0.	0.26670.	1			
*								*15016802	0.	0.0.0.	0.	0.38418.	2			
15014000	8	5	2	1	4.041000e-02			*15016901	0.	0.0.0.	0.	0.26670.	1			
15014100	0	2						*15016902	0.	0.0.0.	0.	0.38418.	2			
15014101	0.01093	4						15016801	0.	10.	10.	0.	0.	0.	1.2	
15014201	0001.	4						15016901	0.	10.	10.	0.	0.	0.	1.2	
15014301	0.0.	4						*								
15014401	575.5.	5						15017000	2	5	2	1	0.08272			
15014501	505010000.	0.1.	1.	0.5334.	1			15017100	0	2						
15014502	505020000.	0.1.	1.	0.6096.	2			15017101	0.00671	4						
15014503	505030000.	10000.	1.	1.	0.3048.	6		15017201	0001.	4						
15014504	505070000.	10000.	1.	1.	0.6096.	8		15017301	0.0.	4						
15014601	0.	0.	0.	1.	0.5334.	1		15017400	5011							
15014602	0.	0.	0.	1.	0.6096.	2		15017501	516010000.	0.1.	1.	0.26670.	1			
15014603	0.	0.	0.	1.	0.3048.	6		15017502	517010000.	0.1.	1.	0.38418.	2			
15014604	0.	0.	0.	1.	0.6096.	8		15017601	0.	0.	0.	1.	0.26670.	1		
15014701	0.	0	0.0.0.	0.0.	8			15017602	0.	0.	0.	1.	0.38418.	2		

15017701	0,	0.0,0.0,0.0,	2		15044101	0.01742	4							
*15017801	0,	0.0,0.0,	0.26670,	1	15044201	0001,	4							
*15017802	0,	0.0,0.0,	0.38418,	2	15044301	0.,	4							
*15017901	0,	0.0,0.0,	0.26670,	1	15044400	5041								
*15017902	0,	0.0,0.0,	0.38418,	2	15044501	508010000,0,1,	1, 0.52070,	1						
15017801	0.	10.	10.	0.	0.	0.	0.	1.2						
15017901	0.	10.	10.	0.	0.	0.	0.	1.2						
*					15044601	0,	0,	0,	1,	0.52070,	1			
15041000	1	5	2	1	0.	15044701	0,	0.0,0.0,	0.0,	1				
*15041100	5012					*15044801	0,	0.0,0.0,	0.52070,	1				
15041100	0	2				*15044901	0,	0.0,0.0,	0.52070,	1				
15041101	0.00134,	4				15044801	0.	10.	10.	0.	0.	0.	0.	1.1
15041201	0003,4					15044901	0.	10.	10.	0.	0.	0.	0.	1.1
15041301	0.0,4					*								
15041401	594,0,5					15045000	3	5	2	1	4.299000e-02			
15041501	0,	0,	0,	1,	5.08,	1	*15045100	5043						
15041601	506010000,0,1,	1,	5.08,	1		15045100	0	2						
15041701	0,	0.0,0.0,	0.0,	1		15045101	0.01153,4							
*15041801	0.	0.0,0.0,	0.2032,	1		15045201	0001,4							
*15041901	0,	0.0,0.0,	0.2032,	1		15045301	0.0,4							
15041801	0.	10.	10.	0.	0.	0.	0.	1.1						
15041901	0.	10.	10.	0.	0.	0.	0.	1.1						
*						15045400	5041							
15042000	1	5	2	1	0.04166	15045501	509010000,0,1,	1,	0.2761,	1				
15042100	0	2				15045502	509020000,0,1,	1,	0.7786,	2				
15042101	0.01816	4				15045503	510010000,0,1,	1,	0.0756,	3				
15042201	0001,	4				15045601	0,	0,	0,	1,	0.2761,	1		
15042301	0.0,	4				15045602	0,	0,	0,	1,	0.7786,	2		
15042400	5041					15045603	0,	0,	0,	1,	0.0756,	3		
15042501	506010000,0,1,	1,	1,	0.30505,	1	15045701	0.	0.0,0.0,	0.0,	3				
15042601	0,	0,	0,	1,	0.30505,	1	*15045801	0,	0.0,0.0,	0.2761,	.1			
15042701	0.	0.0,0.0,	0.0,	1		*15045802	0.	0.0,0.0,	0.7786,	2				
*15042801	0,	0.0,0.0,	0.30505,	1		*15045803	0,	0.0,0.0,	0.0756,	3				
*15042901	0,	0.0,0.0,	0.30505,	1		*15045901	0,	0.0,0.0,	0.2761,	1				
15042801	0.	10.	10.	0.	0.	0.	0.	1.1						
15042901	0.	10.	10.	0.	0.	0.	0.	1.1						
*						*15045902	0.	0.0,0.0,	0.7786,	2				
15043000	1	5	2	1	4.299000e-02	*15045903	0,	0.0,0.0,	0.0756,	3				
15043100	0	2				15045801	0.	10.	10.	0.	0.	0.	0.	1.3
15043101	0.01153	4				15045901	0.	10.	10.	0.	0.	0.	0.	1.3
15043201	0001,	4				*								
15043301	0.0,	4				15046000	1	5	1	1	0.			
15043400	5041					15046100	0	2						
15043501	507010000,0,1,	1,	1,	0.68910,	1	15046101	0.04976	4						
15043601	0,	0,	0,	1,	0.68910,	1	15046201	0001,	4					
15043701	0.	0.0,0.0,	0.0,	1		15046301	0.,	4						
*15043801	0.	0.0,0.0,	0.68910,	1		15046400	5043							
*15043901	0.	0.0,0.0,	0.68910,	1		15046501	510010000,0,1,	0,	0.00575,	1				
15043801	0.	10.	10.	0.	0.	0.	0.	1.1						
15043901	0.	10.	10.	0.	0.	0.	0.	1.1						
*						15046601	0.	0,	0,	0.	0.00575,	1		
15044000	1	5	2	1	3.826000e-02	15046701	0.	0.0,0.0,	0.0,	1				
15044100	0	2				*15046801	0.	0.0,0.0,	0.26670,	1				

15062301	0.0,	4													15064000	3	5	2	1	0.00470		
15062401	568.0,	5													15064100	0	2					
15062501	513010000,	0.1,	1,	0.0756,	1										15064101	0.00041	4					
15062502	513010000,	0.1,	1,	0.7786,	2										15064201	0001,	4					
15062503	513010000,	0.1,	1,	0.2761,	3										15064301	0.0,	4					
15062504	513010000,	0.1,	1,	0.5207,	4										15064401	557.0	5					
15062601	510010000,	0.1,	1,	0.0756,	1										15064501	531010000,	0.1,	1,	0.38247,	3		
15062602	509020000,	0.1,	1,	0.7786,	2										15064601	0,0,0,	1,	0.38247,	3			
15062603	509010000,	0.1,	1,	0.2761,	3										15064701	0,	0.0,0,0,	0.0,	3			
15062604	508010000,	0.1,	1,	0.5207,	4										*15064801	0,	0.0,0,0,	0.38247,	3			
15062701	0,	0.0,0,0,	0.0,	4											*15064901	0,	0.0,0,0,	0.38247,	3			
*15062801	0,	0.0,0,0,	0.0756,	1											15064801	0.	10.	10.	0.	0.	0.	1.3
*15062802	0,	0.0,0,0,	0.7786,	2											15064901	0.	10.	10.	0.	0.	0.	1.3
*15062803	0,	0.0,0,0,	0.2761,	3											*							
*15062804	0,	0.0,0,0,	0.5207,	4											* broken-loop steam generator							
*15062901	0,	0.0,0,0,	0.0756,	1											*							
*15062902	0,	0.0,0,0,	0.7786,	2											17001000	16	5	2	1	0.00987		
*15062903	0,	0.0,0,0,	0.2761,	3											17001100	0	2					
*15062904	0,	0.0,0,0,	0.5207,	4											17001101	0.00031	4					
15062801	0.	10.	10.	0.	0.	0.	0.	0.	1.4						17001201	0002.	4					
15062901	0.	10.	10.	0.	0.	0.	0.	0.	1.4						17001301	0.0,	4					
*															17001401	495.0,	5					
*															17001501	701020000,	0.1,	1,	2.39218,	1		
15063000	5	5	2	1	4.880000e-03										17001502	701030000,	0.1,	1,	2.46202,	2		
15063100	0	2													17001503	701040000,	0.1,	1,	2.30962,	3		
15063101	0.00037	4													17001504	701050000.	0.1,	1,	2.46202,	4		
15063201	0001,	4													17001505	701060000.	0.1,	1,	2.51282,	5		
15063301	0.0,	4													17001506	701070000,	0.1,	1,	2.30962,	6		
15063401	568.0,	5													17001507	701080000,	0.1,	1,	2.13182,	7		
15063501	514010000,	0.1,	1,	0.1512,	1										17001508	701100000,	10000,	1,	1,	1.96412,	9	
15063502	514010000,	0.1,	1,	0.5572,	2										17001509	701110000.	0.1,	1,	2.13182,	10		
15063503	514010000,	0.1,	1,	0.5522,	3										17001510	701120000.	0.1,	1,	2.30962,	11		
15063504	514010000.	0.1,	1,	1.0414,	4										17001511	701130000,	0.1,	1,	2.51282,	12		
15063505	514010000.	0.1,	1,	1.3782,	5										17001512	701140000.	0.1,	1,	2.46202,	13		
15063601	510010000.	0.1,	1,	0.1512,	1										17001513	701150000,	0.1,	1,	2.30962,	14		
15063602	509020000.	0.1,	1,	0.5572,	2										17001514	701160000.	0.1,	1,	2.46202,	15		
15063603	509010000,	0.1,	1,	0.5522,	3										17001515	701170000.	0.1,	1,	2.39218,	16		
15063604	508010000,	0.1,	1,	1.0414,	4										17001601	702010000.	0.1,	1,	2.39218,	1		
15063605	507010000,	0.1,	1,	1.3782,	5										17001602	702020000,	0.1,	1,	2.46202,	2		
15063701	0.	0.0,0,0,	0.0,	5											17001603	702030000,	0.1,	1,	2.30962,	3		
*15063801	0.	0.0,0,0,	0.0756,	1											17001604	702040000,	0.1,	1,	2.46202,	4		
*15063802	0,	0.0,0,0,	0.7786,	2											17001605	702050000.	0.1,	1,	2.51282,	5		
*15063803	0.	0.0,0,0,	0.2761,	3											17001606	702060000.	0.1,	1,	2.30962,	6		
*15063804	0.	0.0,0,0,	0.5207,	4											17001607	702070000.	0.1,	1,	2.13182,	7		
*15063805	0.	0.0,0,0,	0.6891,	5											17001608	702080000.	10000,	1,	1,	1.96412,	9	
*15063901	0.	0.0,0,0,	0.0756,	1											17001609	702070000.	0.1,	1,	2.13182,	10		
*15063902	0.	0.0,0,0,	0.7786,	2											17001610	702060000.	0.1,	1,	2.30962,	11		
*15063903	0.	0.0,0,0,	0.2761,	3											17001611	702050000.	0.1,	1,	2.51282,	12		
*15063904	0.	0.0,0,0,	0.5207,	4											17001612	702040000.	0.1,	1,	2.46202,	13		
*15063905	0.	0.0,0,0,	0.6891,	5											17001613	702030000.	0.1,	1,	2.30962,	14		
15063801	0.	10.	10.	0.	0.	0.	0.	0.	1.5						17001614	702020000.	0.1,	1,	2.46202,	15		
15063901	0.	10.	10.	0.	0.	0.	0.	0.	1.5						17001615	702010000.	0.1,	1,	2.39218,	16		
*															17001701	0.	0.0.	0.0.	0.0.	16		

*17001801	0,	0.01974,	0.01974,	1.19609,	1	17012607	702070000,	0.	1,	1,	1.06591,	7		
*17001802	0,	0.01974,	0.01974,	1.23101,	2	17012608	702080000,	0.	1,	1,	1.65398,	8		
*17001803	0,	0.01974,	0.01974,	1.15481,	3	17012701	0.	0.0,	0.0,	0.0,	8			
*17001804	0,	0.01974,	0.01974,	1.23101,	4	*17012801	0.	0.0,	0.0,	1.19609,	1			
*17001805	0,	0.01974,	0.01974,	1.25641,	5	*17012802	0,	0.0,	0.0,	1.23101,	2			
*17001806	0,	0.01974,	0.01974,	1.15481,	6	*17012803	0.	0.0,	0.0,	1.15481,	3			
*17001807	0,	0.01974,	0.01974,	1.06591,	7	*17012804	0,	0.0,	0.0,	1.23101,	4			
*17001808	0,	0.01974,	0.01974,	0.98206,	9	*17012805	0,	0.0,	0.0,	1.25641,	5			
*17001809	0,	0.01974,	0.01974,	1.06591,	10	*17012806	0,	0.0,	0.0,	1.15481,	6			
*17001810	0,	0.01974,	0.01974,	1.15481,	11	*17012807	0,	0.0,	0.0,	1.06591,	7			
*17001811	0,	0.01974,	0.01974,	1.25641,	12	*17012808	0,	0.0,	0.0,	1.65398,	8			
*17001812	0,	0.01974,	0.01974,	1.23101,	13	*17012901	0,	0.0,	0.0,	1.19609,	1			
*17001813	0,	0.01974,	0.01974,	1.15481,	14	*17012902	0.	0.0,	0.0,	1.23101,	2			
*17001814	0,	0.01974,	0.01974,	1.23101,	15	*17012903	0.	0.0,	0.0,	1.15481,	3			
*17001815	0,	0.01974,	0.01974,	1.19609,	16	*17012904	0,	0.0,	0.0,	1.23101,	4			
*17001901	0,	0.00635,	0.00635,	1.19609,	1	*17012905	0,	0.0,	0.0,	1.25641,	5			
*17001902	0,	0.00635,	0.00635,	1.23101,	2	*17012906	0,	0.0,	0.0,	1.15481,	6			
*17001903	0,	0.00635,	0.00635,	1.15481,	3	*17012907	0,	0.0,	0.0,	1.06591,	7			
*17001904	0,	0.00635,	0.00635,	1.23101,	4	*17012908	0.	0.0,	0.0,	1.65398,	8			
*17001905	0.	0.00635,	0.00635,	1.25641,	5	17012801	0.	10.	10.	0.	0.	0.	1.8	
*17001906	0,	0.00635,	0.00635,	1.15481,	6	17012901	0.	10.	10.	0.	0.	0.	1.8	
*17001907	0,	0.00635,	0.00635,	1.06591,	7	*								
*17001908	0,	0.00635,	0.00635,	0.98206,	9	17022000	8	5	2	1	0.10578			
*17001909	0.	0.00635,	0.00635,	1.06591,	10	17022100	0	2						
*17001910	0.	0.00635,	0.00635,	1.15481,	11	17022101	0.00094	4						
*17001911	0,	0.00635,	0.00635,	1.25641,	12	17022201	0001.	4						
*17001912	0.	0.00635,	0.00635,	1.23101,	13	17022301	0.0.	4						
*17001913	0.	0.00635,	0.00635,	1.15481,	14	17022400	7001							
*17001914	0,	0.00635,	0.00635,	1.23101,	15	17022501	702010000,	0.	1,	1,	1.19609,	1		
*17001915	0.	0.00635,	0.00635,	1.19609,	16	17022502	702020000,	0.	1,	1,	1.23101,	2		
17001801	0.	10.	10.	0.	0.	0.	1.16	17022503	702030000,	0.	1,	1,	1.15481,	3
17001901	0.	10.	10.	0.	0.	0.	1.16	17022504	702040000,	0.	1,	1,	1.23101,	4
*						17022505	702050000,	0.	1,	1,	1.25641,	5		
17012000	8	5	2	1	0.05255	17022506	702060000,	0.	1,	1,	1.15481,	6		
17012100	0	2				17022507	702070000,	0.	1,	1,	1.06591,	7		
17012101	0.01403	4				17022508	702080000,	0.	1,	1,	1.65398,	8		
17012201	0006,	4				*17022601	702010000,	0.	1,	1,	1.19609,	1		
17012301	0.0.	4				*17022602	702020000,	0.	1,	1,	1.23101,	2		
17012400	7001					*17022603	702030000,	0.	1,	1,	1.15481,	3		
17012501	702010000,	0.	1,	1,	1.19609,	*17022604	702040000,	0.	1,	1,	1.23101,	4		
17012502	702020000,	0.	1,	1,	1.23101,	*17022605	702050000,	0.	1,	1,	1.25641,	5		
17012503	702030000,	0.	1,	1,	1.15481,	*17022606	702060000,	0.	1,	1,	1.15481,	6		
17012504	702040000,	0.	1,	1,	1.23101,	*17022607	702070000,	0.	1,	1,	1.06591,	7		
17012505	702050000,	0.	1,	1,	1.25641,	*17022608	702080000,	0.	1,	1,	1.65398,	8		
17012506	702060000,	0.	1,	1,	1.15481,	17022601	705010000,	0.	1,	1,	1.19609,	1		
17012507	702070000,	0.	1,	1,	1.06591,	17022602	705020000,	0.	1,	1,	1.23101,	2		
17012508	702080000,	0.	1,	1,	1.65398,	17022603	705030000,	0.	1,	1,	1.15481,	3		
17012601	702010000,	0.	1,	1,	1.19609,	17022604	705040000,	0.	1,	1,	1.23101,	4		
17012602	702020000,	0.	1,	1,	1.23101,	17022605	705050000,	0.	1,	1,	1.25641,	5		
17012603	702030000,	0.	1,	1,	1.15481,	17022606	705060000,	0.	1,	1,	1.15481,	6		
17012604	702040000,	0.	1,	1,	1.23101,	17022607	705070000,	0.	1,	1,	1.06591,	7		
17012605	702050000,	0.	1,	1,	1.25641,	17022608	705080000,	0.	1,	1,	1.65398,	8		
17012606	702060000,	0.	1,	1,	1.15481,	17022701	0.	0.0.	0.0.	0.0.	8			

*17022801	0,	0.01999,	0.05963,	1.19609,	1	*17032904	0.	0.0.0.0,	1.25641,	4				
*17022802	0,	0.01999,	0.05963,	1.23101,	2	*17032905	0,	0.0.0.0,	1.23101,	5				
*17022803	0,	0.01999,	0.05963,	1.15481,	3	*17032906	0,	0.0.0.0,	1.15481,	6				
*17022804	0,	0.01999,	0.05963,	1.23101,	4	*17032907	0,	0.0.0.0,	1.23101,	7				
*17022805	0,	0.01999,	0.05963,	1.25641,	5	*17032908	0,	0.0.0.0,	1.19609,	8				
*17022806	0,	0.01999,	0.05963,	1.15481,	6	17032801	0.	10.	10.	0.	0.	0.	1.8	
*17022807	0,	0.01999,	0.05963,	1.06591,	7	17032901	0.	10.	10.	0.	0.	0.	1.8	
*17022808	0,	0.01999,	0.05963,	1.65398,	8	*								
*17022901	0,	0.0.0.0,	1.19609,	1	17042000	3	5	2	1	0.23233				
*17022902	0,	0.0.0.0,	1.23101,	2	17042100	0	2							
*17022903	0,	0.0.0.0,	1.15481,	3	17042101	0.00105	4							
*17022904	0,	0.0.0.0,	1.23101,	4	17042201	0001,	4							
*17022905	0,	0.0.0.0,	1.25641,	5	17042301	0.0,	4							
*17022906	0,	0.0.0.0,	1.15481,	6	17042400	7001								
*17022907	0,	0.0.0.0,	1.06591,	7	17042501	702090000,	0,1,	1,	0.37827,	1				
*17022908	0,	0.0.0.0,	1.65398,	8	17042502	702100000,	0,1,	1,	0.30635,	2				
17022801	0.	10.	10.	0.	0.	0.	1.8	*17042503	702110000,	0,1,	1,	0.30635,	3	
17022901	0.	10.	10.	0.	0.	0.	1.8	17042503	703010000,	0,	1,	1,	0.30635,	3
*								17042601	709010000,	0,1,	1,	0.37827,	1	
17032000	8	5	2	1	0.11074	17042602	709010000,	0,1,	1,	0.30635,	2			
17032100	0	2				17042603	703010000,	0,1,	1,	0.30635,	3			
17032101	0.00238	4				17042701	0.	0.0.0.0.0.	3					
17032201	0001.	4				*17042801	0,	0.0.0.0,	0.37827,	1				
17032301	0.0.	4				*17042802	0.	0.0.0.0,	0.50635,	2				
17032400	7001					*17042901	0.	0.0.0.0,	0.37827,	1				
17032501	705010000,	0,1,	1.	1.33972,	1	*17042902	0.	0.0.0.0.	0.50635,	2				
17032502	705020000,	0,1,	1.	0.86339,	2	17042801	0.	10.	10.	0.	0.	0.	1.3	
17032503	705030000,	0,1,	1.	0.93540,	3	17042901	0.	10.	10.	0.	0.	0.	1.3	
17032504	705040000,	0,1,	1,	1.01769,	4	*								
17032505	705050000.	0,1,	1.	0.99712,	5	17053000	8	5	2	1	0.12146			
17032506	705060000.	0,1,	1.	0.93540,	6	17053100	0	2						
17032507	705070000,	0,1,	1.	0.99712,	7	17053101	0.00377	4						
17032508	705080000.	0,1,	1.	0.96883,	8	17053201	0001,	4						
17032601	705010000.	0,1,	1.	1.33972,	1	17053301	0.0.	4						
17032602	705020000.	0,1,	1.	0.86339,	2	17053400	7001							
17032603	705030000.	0,1,	1.	0.93540,	3	17053501	705010000.	0,1,	1.	1.65398,	1			
17032604	705040000,	0,1,	1.	1.01769,	4	17053502	705020000.	0,1,	1.	1.10659,	2			
17032605	705050000.	0,1,	1.	0.99712,	5	17053503	705030000,	0,1,	1.	1.15481,	3			
17032606	705060000,	0,1,	1.	0.93540,	6	17053504	705040000,	0,1,	1,	1.25641,	4			
17032607	705070000.	0,1,	1.	0.99712,	7	17053505	705050000.	0,1,	1.	1.23101,	5			
17032608	705080000.	0,1,	1.	0.96883,	8	17053506	705060000,	0,1,	1,	1.15481,	6			
17032701	0.	0.0.0.0.0.	8			17053507	705070000.	0,1,	1.	1.23101,	7			
*17032801	0.	0.0.0.0,	1.65398,	1		17053508	705080000,	0,1,	1.	1.19609,	8			
*17032802	0.	0.0.0.0,	1.06591,	2	*									
*17032803	0.	0.0.0.0,	1.25481,	3	* Modify Right Boundary Condition identical to									
*17032804	0.	0.0.0.0,	1.25641,	4	* Intact Loop S/G									
*17032805	0.	0.0.0.0,	1.23101,	5	*									
*17032806	0.	0.0.0.0,	1.15481,	6	*17053601	-200.	0.1000.	1.	1.65398,	1				
*17032807	0.	0.0.0.0,	1.23101,	7	*17053602	-200.	0.1000.	1.	1.10659,	2				
*17032808	0.	0.0.0.0,	1.19609,	8	*17053603	-200.	0.1000.	1.	1.15481,	3				
*17032901	0.	0.0.0.0,	1.65398,	1	*17053604	-200.	0.1000.	1.	1.25641,	4				
*17032902	0.	0.0.0.0,	1.06591,	2	*17053605	-200.	0.1000.	1.	1.23101,	5				
*17032903	0.	0.0.0.0,	1.25481,	3	*17053606	-200.	0.1000.	1.	1.15481,	6				

*17053607	-200,	0,1000,	1,	1.23101,	7	17054601	-200,	0,3204,	1,	0.40005,	1		
*17053608	-200,	0,1000,	1,	1.19609,	8	17054602	-200,	0,3204,	1,	0.50635,	2		
*						17054603	-200,	0,3204,	1,	0.50635,	3		
17053601	-200,	0,3205,	1,	1.65398,	1	17054604	-200,	0,3204,	1,	0.37827,	4		
17053602	-200,	0,3205,	1,	1.10659,	2	*							
17053603	-200,	0,3205,	1,	1.15481,	3	17054701	0,	0.0,0.0,0.0,	4				
17053604	-200,	0,3205,	1,	1.25641,	4	*17054801	0,	0.0,0.0,	0.40005,	1			
17053605	-200,	0,3205,	1,	1.23101,	5	*17054802	0,	0.0,0.0,	0.50635,	3			
17053606	-200,	0,3205,	1,	1.15481,	6	*17054803	0,	0.0,0.0,	0.37827,	4			
17053607	-200,	0,3205,	1,	1.23101,	7	*17054901	0,	0.0,0.0,	0.40005,	1			
17053608	-200,	0,3205,	1,	1.19609,	8	*17054902	0,	0.0,0.0,	0.50635,	3			
*						*17054903	0,	0.0,0.0,	0.37827,	4			
* End of modification by Y.S.Bnag at Aug 31, 1994						17054801	0.	10.	10.	0.	0.	0.	1.4
*						17054901	0.	10.	10.	0.	0.	0.	1.4
17053701	0,	0.0,0.0,0.0,	8			*							
*17053801	0,	0.0,0.0,	1.65398,	1		17055000	1	5	1	1	0.0		
*17053802	0,	0.0,0.0,	1.06591,	2		17055100	0	2					
*17053803	0,	0.0,0.0,	1.15481,	3		17055101	0.00596	4					
*17053804	0,	0.0,0.0,	1.25641,	4		17055201	0001,	4					
*17053805	0,	0.0,0.0,	1.23101,	5		17055301	0.0,	4					
*17053806	0,	0.0,0.0,	1.15481,	6		17055400	7001						
*17053807	0,	0.0,0.0,	1.23101,	7		17055501	704010000,0,1,	0,	0.13174,	1			
*17053808	0,	0.0,0.0,	1.19609,	8		17055601	0,	0,	0,	0.13174,	1		
*17053901	0,	0.0,0.0,	1.65398,	1		17055701	0.	0.0,0.0,0.0,	1				
*17053902	0,	0.0,0.0,	1.06591,	2		*17055801	0.	0.0,0.0,	0.40955,	1			
*17053903	0,	0.0,0.0,	1.15481,	3		*17055901	0.	0.0,0.0,	0.49055,	1			
*17053904	0,	0.0,0.0,	1.25641,	4		17055801	0.	10.	10.	0.	0.	0.	1.1
*17053905	0,	0.0,0.0,	1.23101,	5		17055901	0.	10.	10.	0.	0.	0.	1.1
*17053906	0,	0.0,0.0,	1.15481,	6		*							
*17053907	0,	0.0,0.0,	1.23101,	7		*****							
*17053908	0,	0.0,0.0,	1.19609,	8		* heat structure thermal property data (si units)							
17053801	0.	10.	10.	0.	0.	0.	0.	1.8					
17053901	0.	10.	10.	0.	0.	0.	0.	1.8					
*						*							
17054000	4	5	2	1	0.20477	20100100	tbl/fctn	1	1	*	s-steel		
17054100	0	2				20100200	tbl/fctn	1	1	*	incoly 600		
17054101	0.00596	4				20100300	tbl/fctn	1	1	*	copper		
17054201	0001,	4				20100400	tbl/fctn	1	1	*	boron nitride		
17054301	0.0,	4				20100500	tbl/fctn	1	1	*	inconel 600		
17054400	7001					20100600	tbl/fctn	1	1	*	filler pieces		
17054501	704010000,0,1,	1.	0.40005,	1		*							
17054502	703010000,0,1,	1.	0.50635,	2		*							
17054503	709010000,0,1,	1.	0.50635,	3		* thermal conductivity S-Steel							
17054504	709020000,0,1,	1.	0.37827,	4		*							
*17054601	-200,	0,1000,	1,	0.40005,	1	20100101	273.15	12.98					
*17054602	-200,	0,1000,	1,	0.50635,	2	20100102	1199.82	25.1					
*17054603	-200,	0,1000,	1,	0.50635,	3	*							
*17054604	-200,	0,1000,	1,	0.37827,	4	* thermal conductivity incoloy 600							
*						*							
* modify right boundary condition						20100201	366.5	13.85					
* identical to intact loop sg						20100202	477.6	15.92					
* by yshang at 94.9.6						20100203	588.7	18.17					
*						20100204	700.0	20.42					
						20100205	810.9	22.50					

20100206	922.0	24.92		20100251	366.5	3.908e5
20100207	1033.2	26.83		20100252	477.6	4.084e5
20100208	1144.3	29.42		20100253	588.7	4.260e5
20100209	1477.6	36.06		20100254	700.0	4.436e5
*				20100255	810.9	4.665e5
* thermal conductivity copper				20100256	922.0	4.929e5
*				20100257	1033.2	5.105e5
20100301	273.15	387.546		20100258	1477.6	5.727e5
20100302	373.15	377.577		*		
20100303	573.15	366.985		* volumetric heat capacity copper		
20100304	773.15	358.262		*		
20100305	2477.60	358.262		20100351	273.15	3.6429e06
*				20100352	2477.60	3.4429e06
* thermal conductivity boron nitride				*		
*				* volumetric heat capacity boron nitride		
20100401	273.15	15.888		*		
20100402	366.48	15.016		20100451	273.15	2.5150e06
20100403	533.15	13.458		20100452	477.59	2.515e06
20100404	810.93	10.841		20100453	699.82	3.2393e06
20100405	1088.71	8.287		20100454	922.04	3.661e06
20100406	1366.48	5.664		20100455	1144.26	3.9100e06
20100407	1644.26	3.059		20100456	1366.48	4.0240e06
20100408	1922.04	0.461		20100457	1588.71	4.1172e06
20100409	2199.82	0.461		20100458	2144.26	4.1916e06
20100410	2477.602	0.461		20100459	2477.60	4.1916e06
*				*		
* thermal conductivity inconel 600				* volumetric heat capacity inconel 600		
*				*		
20100501	273.15	14.7043		20100551	273.15	3.50253e06
20100502	310.93	14.7043		20100552	2477.60	3.50253e06
20100503	422.04	16.6358		*		
20100504	533.15	18.3181		* volumetric heat capacity filers		
20100505	644.26	20.0627		*		
20100506	755.37	21.8073		20100651	200.0	1.1595e06
20100507	866.48	23.5518		20100652	1000.0	1.1595e06
20100508	2477.60	23.5518		*		
*				*****		
* thermal conductivity fillers (air)				* tabulat data		
*				*****		
20100601	300.0	0.02622		*		
20100602	400.0	0.03362		* power for pressurizer		
20100603	500.0	0.04035		*		
20100604	600.0	0.04565		20230000 power 502		
20100605	700.0	0.05227		20230001 -1.0 0.0		
*				20230002 0.0 0.0		
* volumetric heat capacity s-steel				20230003 0.0 12000.		
*				20230004 1.0e06 12000.		
20100151	273.15	3.830e6		*		
20100152	366.5	3.830e6		* reactor core power		
20100153	1466.5	5.376e6		*		
*				* power ratio of aver/hot = 70/30		
* volumetric heat capacity incoloy 600				*		
*				*20250000 power		

*20250001	0.0	66.5e03	4501301	-1.0	1.5
*			4501302	-0.8	1.275
*20255000	power		4501303	-0.6	1.375
*20255001	0.0	28.5e03	4501304	-0.4	1.375
*			4501305	0.0	1.2
* modified by ysbang at Sep. 18, 1996					
* to adjusting rod temp increase					
*			4501400	1.4	
*			4501401	-1.0	1.5
*	power ratio of aver/hot = 60/40		4501402	-0.8	1.15
*			4501403	-0.6	0.95
20250000	power		4501404	-0.4	0.83
20250001	0.0	57.0e03	4501405	-0.2	0.775
*			4501406	0.0	0.725
20255000	power		*		
20255001	0.0	38.0e03	4501500	1.5	
*			4501501	0.0	0.975
20220000	temp		4501502	0.5	1.33
20220001	0.0	300.	4501503	1.0	1.95
*			*		
20270500	htc-t		4501600	1.6	
20270501	0.0	6.086	4501601	0.0	0.725
*			4501602	0.2	0.725
20220500	htc-t		4501603	0.4	0.8
20220501	0.0	6.086	4501604	0.6	1.025
*			4501605	1.0	1.95
20220400	htc-t		*		
20220401	0.0	5.98	4501700	1.7	
*			4501701	-1.0	0.175
20270400	htc-t		4501702	-0.5	0.65
20270401	0.0	5.98	4501703	0.0	0.975
*			*		
*****			4501800	1.8	
*			4501801	-1.0	0.175
* homogeneous pump curves			4501802	-0.75	-0.15
*			4501803	-0.55	-0.3
*****			4501804	-0.275	-0.4
*			4501805	0.0	-0.35
* broken loop single-phase head curves			*		
*			* broken loop single-phase torque curves		
4501100	1 1		*		
4501101	0.0	1.7821	4501900	2 1	
4501102	0.2845	1.7059	4501901	0.0	0.54
4501103	0.569	1.627	4501902	0.2	0.59
4501104	0.8535	1.1878	4501903	0.4	0.65
4501105	1.0	1.0	4501904	0.6	0.77
*			4501905	0.8	0.95
4501200	1 2		4501906	0.9	0.98
4501201	0.0	-1.6359	4501907	0.95	0.96
4501202	0.713	0.0	4501908	1.0	0.87
4501203	0.8271	0.2939	*		
4501204	1.0	1.0	4502000	2 2	
*			4502001	0.0	-0.15
4501300	1 3		4502002	0.2	0.02

4502003	0.4	0.22		4502606	0.0	-0.15
4502004	0.6	0.46	*			
4502005	0.8	0.71	* two-phase head multiplier			
4502006	0.9	0.81	*			
4502007	0.95	0.85		4503000	0	
4502008	1.0	0.87		4503001	0.0	0.0
*				4503002	0.1	0.0
4502100	2.3			4503003	0.15	0.05
4502101	-1.0	0.62		4503004	0.24	0.8
4502102	-0.8	0.68		4503005	0.3	0.96
4502103	-0.6	0.53		4503006	0.4	0.98
4502104	-0.4	0.46		4503007	0.6	0.97
4502105	-0.2	0.49		4503008	0.8	0.90
4502106	0.0	0.54		4503009	0.9	0.8
*				4503010	0.96	0.5
4502200	2.4			4503011	1.0	0.0
4502201	-1.0	0.62	*			
4502202	-0.8	0.53	* two-phase torque multiplier			
4502203	-0.6	0.46	*			
4502204	-0.4	0.42		4503100	0	
4502205	-0.2	0.39		4503101	0.0	-0.17
4502206	0.0	0.36		4503102	0.0001	-0.17
*				4503103	0.006	0.0
4502300	2.5			4503104	0.1	0.0
4502301	0.0	-0.63		4503105	0.15	0.05
4502302	0.2	-0.51		4503106	0.24	0.56
4502303	0.4	-0.39		4503107	0.8	0.56
4502304	0.6	-0.29		4503108	0.96	0.45
4502305	0.8	-0.16		4503109	1.0	0.0
4502306	1.0	-0.13	*			
*			* two-phase head difference curves			
4502400	2.6		*			
4502401	0.0	0.36		4504100	1 1	
4502402	0.2	0.32		4504101	0.0	0.0
4502403	0.4	0.27		4504102	0.1	0.85
4502404	0.6	0.18		4504103	0.2	1.09
4502405	0.8	0.05		4504104	0.5	1.02
4502406	1.0	-0.13		4504105	0.7	1.01
*				4504106	0.9	0.94
4502500	2.7			4504107	1.0	1.0
4502501	-1.0	-1.44	*			
4502502	-0.8	-1.25		4504200	1 2	
4502503	-0.6	-1.08		4504201	0.0	0.0
4502504	-0.4	-0.92		4504202	0.1	-0.04
4502505	-0.2	-0.77		4504203	0.2	0.0
4502506	0.0	-0.63		4504204	0.3	0.1
*				4504205	0.4	0.21
4502600	2.8			4504206	0.8	0.67
4502601	-1.0	-1.44		4504207	0.9	0.8
4502602	-0.8	-1.12		4504208	1.0	1.0
4502603	-0.6	-0.79	*			
4502604	-0.4	-0.52		4504300	1 3	
4502605	-0.2	-0.31		4504301	-1.0	-1.16

4504302	-0.9	-1.24		4504901	0.0	0.54
4504303	-0.8	-1.77		4504902	0.2	0.59
4504304	-0.7	-2.36		4504903	0.4	0.65
4504305	-0.6	-2.79		4504904	0.6	0.77
4504306	-0.5	-2.91		4504905	0.8	0.95
4504307	-0.4	-2.67		4504906	0.9	0.98
4504308	-0.25	-1.69		4504907	0.95	0.96
4504309	-0.1	-0.5		4504908	1.0	0.87
4504310	0.0	0.0	*			
*				4505000	2	2
4504400	1	4		4505001	0.0	-0.15
4504401	-1.0	-1.16		4505002	0.2	0.02
4504402	-0.9	-0.78		4505003	0.4	0.22
4504403	-0.8	-0.5		4505004	0.6	0.46
4504404	-0.7	-0.31		4505005	0.8	0.71
4504405	-0.6	-0.17		4505006	0.9	0.81
4504406	-0.5	-0.08		4505007	0.95	0.85
4504407	-0.35	0.0		4505008	1.0	0.87
4504408	-0.2	0.05	*			
4504409	-0.1	0.08		4505100	2	3
4504410	0.0	0.11		4505101	-1.0	0.62
*				4505102	-0.8	0.68
4504500	1	5		4505103	-0.6	0.53
4504501	0.0	0.0		4505104	-0.4	0.46
4504502	0.2	-0.34		4505105	-0.2	0.49
4504503	0.4	-0.65		4505106	0.0	0.54
4504504	0.6	-0.93	*			
4504505	0.8	-1.19		4505200	2	4
4504506	1.0	-1.47		4505201	-1.0	0.62
*				4505202	-0.8	0.53
4504600	1	6		4505203	-0.6	0.46
4504601	0.0	0.11		4505204	-0.4	0.42
4504602	0.1	0.13		4505205	-0.2	0.39
4504603	0.25	0.15		4505206	0.0	0.36
4504604	0.4	0.13	*			
4504605	0.5	0.07		4505300	2	5
4504606	0.6	-0.04		4505301	0.0	-0.63
4504607	0.7	-0.23		4505302	0.2	-0.51
4504608	0.8	-0.51		4505303	0.4	-0.39
4504609	0.9	-0.91		4505304	0.6	-0.29
4504610	1.0	-1.47		4505305	0.8	-0.20
*				4505306	0.9	-0.16
4504700	1	7		4505307	1.0	-0.13
4504701	-1.0	0.0	*			
4504702	0.0	0.0		4505400	2	6
*				4505401	0.0	0.36
4504800	1	8		4505402	0.2	0.32
4504801	-1.0	0.0		4505403	0.4	0.27
4504802	0.0	0.0		4505404	0.6	0.18
*				4505405	0.8	0.05
* two-phase torque difference curves				4505406	1.0	-0.13
*			*			
4504900	2	1		4505500	2	7

4505501	-1.0	-1.44		20500211 0.37827 voidf 202110000	
4505502	-0.8	-1.25		20500212 0.50635 voidf 202120000	
4505503	-0.6	-1.08		20500213 0.50635 voidf 203010000	
4505504	-0.4	-0.92		20500214 0.40005 voidf 204010000	
4505505	-0.2	-0.77	*		
4505506	0.0	-0.63		*20500300 il-mass sum 1.0 0.0 1	
*				*20500301 0.0 1.0 cmpmass 101	
4505600	2 8			*20500302 1.0 cmpmass 102	
4505601	-1.0	-1.44		*20500303 1.0 cmpmass 103	
4505602	-0.8	-1.12		*20500304 1.0 cmpmass 104	
4505603	-0.6	-0.79		*20500305 1.0 cmpmass 105	
4505604	-0.4	-0.52		*20500306 1.0 cmpmass 106	
4505605	-0.2	-0.31		*20500307 1.0 cmpmass 107	
4505606	0.0	-0.15		*20500308 1.0 cmpmass 108	
*				*20500309 1.0 cmpmass 201	
4506100	501			*20500310 1.0 cmpmass 301	
4506101	0.0	0.0		*20500311 1.0 cmpmass 302	
4506102	1.0e06	0.0	*		
*				*20500400 vsslmass sum 1.0 0.0 1	
*****					
*				*20500401 0.0 1.0 cmpmass 501	
*				*20500402 1.0 cmpmass 502	
*				*20500403 1.0 cmpmass 503	
*				*20500404 1.0 cmpmass 504	
*				*20500405 1.0 cmpmass 505	
*				*20500406 1.0 cmpmass 506	
*				*20500407 1.0 cmpmass 507	
20500100	sgdc-lvl	sum	1.0 0.0 1	*20500408 1.0 cmpmass 508	
20500101	0.0	1.21831	voidf 205100000	*20500409 1.0 cmpmass 509	
20500102	1.20561	voidf	205090000	*20500410 1.0 cmpmass 513	
20500103	1.20561	voidf	205080000	*20500411 1.0 cmpmass 514	
20500104	1.20561	voidf	205070000	*20500412 1.0 cmpmass 516	
20500105	1.20561	voidf	205060000	*20500413 1.0 cmpmass 517	
20500106	1.20561	voidf	205050000	*20500414 1.0 cmpmass 518	
20500107	1.20561	voidf	205040000	*20500415 1.0 cmpmass 519	
20500108	0.48578	voidf	205030000	*20500416 1.0 cmpmass 531	
20500109	0.58737	voidf	205020000	*20500417 1.0 cmpmass 510	
20500110	0.41891	voidf	205010000	*	
20500111	0.37827	voidf	209020000	*20500500 bl-mass sum 1.0 0.0 1	
20500112	0.50633	voidf	209010000	*20500501 0.0 1.0 cmpmass 401	
20500113	0.50635	voidf	203010000	*20500502 1.0 cmpmass 402	
20500114	0.40005	voidf	204010000	*20500503 1.0 cmpmass 403	
*				*20500504 1.0 cmpmass 404	
20500200	sgsd-lvl	sum	1.0 0.0 1	*20500505 1.0 cmpmass 405	
20500201	0.0	1.21831	voidf 202010000	*20500506 1.0 cmpmass 406	
20500202	1.20561	voidf	202020000	*20500507 1.0 cmpmass 450	
20500203	1.20561	voidf	202030000	*20500508 1.0 cmpmass 701	
20500204	1.20561	voidf	202040000	*	
20500205	1.20561	voidf	202050000	*20500600 totmass sum 1.0 0.0 1	
20500206	1.20561	voidf	202060000	*20500601 0.0 1.0 cntrlvar 3	
20500207	1.20561	voidf	202070000	*20500602 1.0 cntrlvar 4	
20500208	0.48578	voidf	202080000	*20500603 1.0 cntrlvar 5	
20500209	0.58737	voidf	202090000	*	
20500210	0.41891	voidf	202100000	20500700 sg-delt sum 1.0 20.0 1	

```

20500701 0. 1. tempf 201010000
20500702 -1. tempf 201200000
*
* calculate system inventory
* the first number on the following card is the full system mass
*20500800 invn div 144. 1. 0
*20500801 cntrvar 6
*20500900 invent div 1. 1. 1
*20500901 cntrvar 8
*
* calculate the core liquid collapsed height
*
20501000 cord-lvl sum 1. 0. 1
20501001 0. .6096 voidf 505010000
20501002 .6096 voidf 505020000
20501003 .3048 voidf 505030000
20501004 .3048 voidf 505040000
20501005 .3048 voidf 505050000
20501006 .3048 voidf 505060000
20501007 .6096 voidf 505070000
20501008 .6096 voidf 505080000
*
20501100 sgsr-lvl sum 1.0 0.0 1
20501101 0.0 1.9609 voidf 702010000
20501102 1.23101 voidf 702020000
20501103 1.15481 voidf 702030000
20501104 1.23101 voidf 702040000
20501105 1.25641 voidf 702050000
20501106 1.15481 voidf 702060000
20501107 1.06591 voidf 702070000
20501108 1.65398 voidf 702080000
20501109 1.37827 voidf 702090000
20501110 0.50635 voidf 702100000
20501111 0.50635 voidf 703010000
20501112 0.40005 voidf 704010000
*
20501200 sgdc-lvl sum 1.0 0.0 1
20501201 0.0 1.19009 voidf 705080000
20501202 1.25101 voidf 705070000
20501203 1.15481 voidf 705060000
20501204 1.23101 voidf 705050000
20501205 1.25641 voidf 705040000
20501206 1.13481 voidf 705030000
20501207 1.06591 voidf 705020000
20501208 1.65398 voidf 705010000
20501209 0.37827 voidf 709020000
20501210 0.50635 voidf 709010000
20501211 0.50635 voidf 703010000
20501212 0.40005 voidf 704010000
*
* calculate the broken leg generator upflow collapsed liquid level
*20501300 blguel sum 1. 9.532 0
*20501301 0. 1. voidf 701010000
*20501302 1. voidf 701020000
*20501303 1. voidf 701030000
*20501304 1. voidf 701040000
*20501305 1. voidf 701050000
*20501306 1. voidf 701060000
*20501307 1. voidf 701070000
*20501308 1. voidf 701080000
*20501309 1. voidf 701090000
*
* calculate the broken leg generator downflow collapsed liquid
* level
*20501400 blgdgl sum 1. 9.53 0
*20501401 0. 1. voidf 701100000
*20501402 1. voidf 701110000
*20501403 1. voidf 701120000
*20501404 1. voidf 701130000
*20501405 1. voidf 701140000
*20501406 1. voidf 701150000
*20501407 1. voidf 701160000
*20501408 1. voidf 701170000
*20501409 1. voidf 701180000
*
20501600 hotchlvl sum 1. 0. 1
20501601 0. .6096 voidf 555010000
20501602 .6096 voidf 555020000
20501603 .3048 voidf 555030000
20501604 .3048 voidf 555040000.
20501605 .3048 voidf 555050000
20501606 .3048 voidf 555060000
20501607 .6096 voidf 555070000
20501608 .6096 voidf 555080000
*
20502300 przrlvl sum 1.0 0.0 1
20502301 0.0 0.3671 voidf 301010000
20502302 0.2549 voidf 301020000
20502303 0.2549 voidf 301030000
20502304 0.2549 voidf 301040000
20502305 0.0663 voidf 301050000
*
* heat losses to environment - pl sg
*
20502400 blsgpl sum 1. 0. 0
20502401 0. 1.41896 htrmr 705300101
20502402 0.91445 htrmr 705300201
20502403 0.99072 htrmr 705300301
20502404 0.07788 htrmr 705300401
20502405 0.05609 htrmr 705300501
20502406 0.99072 htrmr 705300601
20502407 0.05609 htrmr 705300701
20502408 0.02613 htrmr 705300801
20502409 0.57463 htrmr 705400101
20502410 0.72732 htrmr 705400201
20502411 0.72732 htrmr 705400301

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20502412	0.54335	htmr	205400401	*
*				
* power losses to environment - il sg				
*				
20502500	ilsgpl	sum	1. 0. 0	20510100 ilhlmass sum 1.0 0.0 1
20502501	0. .35939	htmr	205300101	20510101 0.0 9.2278200-04 rho 101010000
20502502	.50391	htmr	205300201	20510102 1.9918830-03 rho 102010000
20502503	.41675	htmr	205300301	20510103 5.9836050-04 rho 102020000
20502504	1.03430	htmr	205300401	20510104 5.9836050-04 rho 102030000
20502505	1.03430	htmr	205300501	20510105 7.8538960-04 rho 102040000
20502506	1.03430	htmr	205300601	20510106 8.8732920-04 rho 102050000
20502507	1.03430	htmr	205300701	20510107 8.8732920-04 rho 102060000
20502508	1.03430	htmr	205300801	20510108 1.2796520-03 rho 103010000
20502509	1.03430	htmr	205300901	20510109 5.4559250-04 rho 104010000
20502510	1.04520	htmr	205301001	20510110 9.7311260-04 rho 104020000
20502511	.57463	htmr	205400101	20510111 8.1432400-04 rho 104030000
20502512	.72732	htmr	205400201	20510112 8.1432400-04 rho 104040000
20502513	.72732	htmr	205400301	20510113 1.4841030-03 rho 104050000
20502514	.54335	htmr	205400401	*
*				20510200 crossms sum 1.0 0.0 1
* energy loss to environment - il sg				20510201 0.0 1.0187750-03 rho 105010000
*				20510202 9.3065600-04 rho 105020000
20502600	blsgel integral	1.	0. 0	20510203 8.1432400-04 rho 105030000
20502601	cntrlvar	24		20510204 8.1432400-04 rho 105040000
*				20510205 8.1432400-04 rho 105050000
* energy loss to environment - il sg				20510206 1.1289930-03 rho 105060000
20502700	ilsgel integral	1.	0. 0	20510207 2.0441630-03 rho 105070000
20502701	cntrlvar	25		20510208 2.7480260-03 rho 105080000
*				20510209 2.7480260-03 rho 105090000
* power loss to environment from sg				20510210 9.1438000-04 rho 105100000
*				20510211 9.1438000-04 rho 105110000
20502800	sgfl sum	1.	0. 0	20510212 2.7480260-03 rho 105120000
20502801	0. 1.	cntrlvar	24	20510213 2.7480260-03 rho 105130000
20502802	1.	cntrlvar	25	20510214 2.0441630-03 rho 105140000
*				*
* energy loss to environment from sg				20510300 ilclmass sum 1.0 0.0 1
*				20510301 0.0 4.0772550-04 rho 106010000
20502900	sgel sum	1.	0. 0	20510302 1.0447530-03 rho 106020000
20502901	0. 1.	cntrlvar	26	20510303 5.4641860-04 rho 106030000
20502902	1.	cntrlvar	27	20510304 6.7631200-04 rho 106040000
*				20510305 2.6372190-03 rho 106050000
* integ of bl hot leg mass flow				20510306 2.7614970-03 rho 107010000
*				20510307 7.6276200-04 rho 108010000
20503000	blm integral	1.	0. 0	*
20503001	mflowj	402010000		20510400 ilsgpr sum 1.0 0.0 1
*				20510401 0.0 1.6407770-03 rho 201010000
* integ of il hot leg mass flow				20510402 2.2416900-03 rho 201020000
20503100	ilm integral	1.	0. 0	20510403 2.2183220-03 rho 201030000
20503101	mflowj	102020000		20510404 2.2183220-03 rho 201040000
*				20510405 2.2183220-03 rho 201050000
*				20510406 2.2183220-03 rho 201060000
20510407	2.2183220-03	rho	201070000	20510407 2.2183220-03 rho 201070000
20510408	2.2183220-03	rho	201080000	20510408 2.2183220-03 rho 201080000
20510409	8.9383520-04	rho	201090000	20510409 8.9383520-04 rho 201090000
20510410	6.3316240-04	rho	201100000	20510410 6.3316240-04 rho 201100000
20510411	6.3316240-04	rho	201110000	20510411 6.3316240-04 rho 201110000

20510412 8.9383520-04 rho 201120000	20530112 4.4046000-05 rho 302060000
20510413 2.2183220-03 rho 201130000	20530113 4.4046000-05 rho 302070000
20510414 2.2183220-03 rho 201140000	*
20510415 2.2183220-03 rho 201150000	20510500 blhlmiss sum 1.0 0.0 1
20510416 2.2183220-03 rho 201160000	20510501 0.0 1.4245480-03 rho 401010000
20510417 2.2183220-03 rho 201170000	20510502 5.5496350-04 rho 402010000
20510418 2.2183220-03 rho 201180000	20510503 3.7182600-04 rho 402020000
20510419 2.2416900-03 rho 201190000	20510504 8.9706890-04 rho 402030000
20510420 1.6407770-03 rho 201200000	20510505 3.8022530-04 rho 402040000
*	20510506 3.2063850-04 rho 402050000
20520100 blsgpr sum 1.0 0.0 1	20510507 3.1781750-04 rho 402060000
20520101 0.0 1.4264000-02 rho 202010000	20510508 5.5399890-04 rho 402070000
20520102 1.6574000-02 rho 202020000	*
20520103 1.3183000-02 rho 202030000	20510700 blcross sum 1.0 0.0 1
20520104 1.6789000-02 rho 202040000	20510701 0.0 4.4975840-04 rho 403010000
20520105 1.3532000-02 rho 202050000	20510702 3.1781750-04 rho 403020000
20520106 1.2870000-02 rho 202060000	20510703 3.2063850-04 rho 403030000
20520107 1.2850000-02 rho 202070000	20510704 3.1781750-04 rho 403040000
20520108 5.8490000-03 rho 202080000	20510705 9.8569380-04 rho 403050000
20520109 9.2780000-03 rho 202090000	20510706 7.1445920-04 rho 403060000
20520110 7.6310000-03 rho 202100000	20510707 7.1445920-04 rho 403070000
20520111 1.5420000-02 rho 202110000	20510708 4.4539040-04 rho 403080000
20520112 2.6025000-02 rho 202120000	20510709 4.4539040-04 rho 403090000
20520113 5.9663000-02 rho 203010000	20510710 7.1445920-04 rho 403100000
20520114 3.3900000-02 rho 204010000	20510711 7.1445920-04 rho 403110000
*	20510712 6.3701820-04 rho 403120000
20520300 ilsgsec sum 1.0 0.0 1	*
20520301 0.0 6.3370000-03 rho 205010000	20510800 blclmass sum 1.0 0.0 1
20520302 3.2520000-03 rho 205020000	20510801 0.0 7.5605530-04 rho 404010000
20520303 1.3220000-03 rho 205030000	20510802 2.4731980-04 rho 405010000
20520304 3.2790000-03 rho 205040000	20510803 6.4741950-04 rho 405020000
20520305 3.2790000-03 rho 205050000	20510804 1.3575400-03 rho 406010000
20520306 3.2790000-03 rho 205060000	20510805 8.6000000-04 rho 450010000
20520307 3.2790000-03 rho 205070000	*
20520308 3.2790000-03 rho 205080000	20510900 rvcore sum 1.0 0.0 1
20520309 3.2790000-03 rho 205090000	20510901 0.0 6.7400000-03 rho 501010000
20520310 3.3140000-03 rho 205100000	20510902 6.5900000-03 rho 502010000
20520311 1.1400000-03 rho 206010000	20510903 2.9600000-03 rho 503010000
20520312 2.9856000-02 rho 209010000	20510904 5.2000000-04 rho 504010000
20520313 2.0686000-02 rho 209020000	20510905 1.7434560-03 rho 505010000
*	20510906 1.7434560-03 rho 505020000
20530100 pressms sum 1.0 0.0 1	20510907 8.7172800-04 rho 505030000
20530101 0.0 6.4825000-03 rho 301010000	20510908 8.7172800-04 rho 505040000
20530102 6.4825000-03 rho 301020000	20510909 8.7172800-04 rho 505050000
20530103 5.9118000-03 rho 301030000	20510910 8.7172800-04 rho 505060000
20530104 5.9118000-03 rho 301040000	20510911 1.7434560-03 rho 505070000
20530105 5.9118000-03 rho 301050000	20510912 1.7434560-03 rho 505080000
20530106 1.1360000-03 rho 301060000	20510913 1.6400000-03 rho 506010000
20530107 7.1837000-04 rho 302010000	20510914 2.8100000-03 rho 507010000
20530108 2.3214100-04 rho 302020000	20510915 2.1800000-03 rho 508010000
20530109 1.6457700-04 rho 302030000	20510916 1.4300000-03 rho 509010000
20530110 4.4046000-05 rho 302040000	20510917 4.0470000-03 rho 509020000
20530111 4.4046000-05 rho 302050000	20510918 3.9300000-04 rho 510010000

20510919 3.400000-04 rho 513010000	20520212 3.3900000-02 rho 704010000
20510920 3.4525000-04 rho 514010000	*
*	20520400 blsgsec sum 1.0 0.0 1
20511000 rvdcnr sum 1.0 0.0 1	20520401 0.0 1.4458000-02 rho 705010000
20511001 0.0 2.6189940-03 rho 516010000	20520402 2.2410000-03 rho 705020000
20511002 3.7726480-03 rho 517010000	20520403 2.4350000-03 rho 705030000
20511003 1.1833800-03 rho 518010000	20520404 2.6390000-03 rho 705040000
20511004 1.1833800-03 rho 518020000	20520405 2.5890000-03 rho 705050000
20511005 1.1833800-03 rho 518030000	20520406 2.4310000-03 rho 705060000
20511006 1.1833800-03 rho 518040000	20520407 2.5930000-03 rho 705070000
20511007 1.1833800-03 rho 518050000	20520408 2.5140000-03 rho 705080000
20511008 1.1833800-03 rho 518060000	20520409 2.9860000-02 rho 709010000
20511009 1.1833800-03 rho 518070000	20520410 2.0686000-02 rho 709020000
20511010 1.1833800-03 rho 518080000	*
20511011 1.1833800-03 rho 518090000	* total primary inventory
20511012 9.1139620-04 rho 518100000	*
20511013 2.0770600-03 rho 519010000	20511100 totalpr sum 1.0 0.0 1
20511014 2.6772900-05 rho 531010000	20511101 0.0 1.0 cntrivar 101
20511015 2.6772900-05 rho 531020000	20511102 1.0 cntrivar 102
20511016 2.6772900-05 rho 531030000	20511103 1.0 cntrivar 103
*	20511104 1.0 cntrivar 104
20510600 blsgpr sum 1.0 0.0 1	20511105 1.0 cntrivar 105
20510601 0.0 1.3434060-03 rho 701010000	20511106 1.0 cntrivar 106
20510602 7.2961490-04 rho 701020000	20511107 1.0 cntrivar 107
20510603 7.5091610-04 rho 701030000	20511108 1.0 cntrivar 108
20510604 7.0443410-04 rho 701040000	20511109 1.0 cntrivar 109
20510605 7.5091610-04 rho 701050000	20511110 1.0 cntrivar 110
20510606 7.6641010-04 rho 701060000	20511111 1.0 cntrivar 301
20510607 7.0443410-04 rho 701070000	*
20510608 6.5020510-04 rho 701080000	* total secondary inventory
20510609 5.9905660-04 rho 701090000	*
20510610 5.9905660-04 rho 701100000	20520500 totalsec sum 1.0 0.0 1
20510611 6.5020510-04 rho 701110000	20520501 0.0 1.0 cntrivar 201
20510612 7.0443410-04 rho 701120000	20520502 1.0 cntrivar 202
20510613 7.6641010-04 rho 701130000	20520503 1.0 cntrivar 203
20510614 7.5091610-04 rho 701140000	20520504 1.0 cntrivar 204
20510615 7.0443410-04 rho 701150000	*
20510616 7.5091610-04 rho 701160000	* core heat
20510617 7.2961490-04 rho 701170000	*
20510618 1.3434060-03 rho 701180000	20505000 thcore sum 1.0 0.0 1
*	20505001 0.0 13.4112 htrnr 501300101
20520200 blsgsec sum 1.0 0.0 1	20505002 13.4112 htrnr 501300201
20520201 0.0 1.3509000-02 rho 702010000	20505004 6.7056 htrnr 501300301
20520202 9.0360000-03 rho 702020000	20505005 6.7056 htrnr 501300401
20520203 8.4700000-03 rho 702030000	20505006 6.7056 htrnr 501300501
20520204 1.0739000-02 rho 702040000	20505007 6.7056 htrnr 501300601
20520205 9.6150000-03 rho 702050000	20505008 13.4112 htrnr 501300701
20520206 8.4740000-03 rho 702060000	20505009 13.4112 htrnr 501300801
20520207 8.4250000-03 rho 702070000	20505010 1.8288 htrnr 501300901
20520208 1.5782000-02 rho 702080000	20505011 1.8288 htrnr 501301001
20520209 1.6807000-02 rho 702090000	20505012 0.9144 htrnr 501301101
20520210 2.5882000-02 rho 702100000	20505013 0.9144 htrnr 501301201
20520211 5.6736000-02 rho 703010000	20505014 0.9144 htrnr 501301301

20505015	0.9144	htmr	501301401	20505118	7.30986	htmr	200101800
20505016	1.8288	htmr	501301501	*			
20505017	1.8288	htmr	501301601	*			
*				*			
*				*			
*				*			
*     Intact Loop SG Heat Transfer				20505200	bsgheat	sum	1.0 0.0 1
*				20505201	0.0	2.39218	htmr 700100100
20505100	isgheat	sum	1.0 0.0 1	20505202	2.46202	htmr	700100200
20505101	0.0	7.30986	htmr 200100100	20505203	2.30962	htmr	700100300
20505102	7.23366	htmr	200100200	20505204	2.46202	htmr	700100400
20505103	7.23366	htmr	200100300	20505205	2.51282	htmr	700100500
20505104	7.23366	htmr	200100400	20505206	2.30962	htmr	700100600
20505105	7.23366	htmr	200100500	20505207	2.13182	htmr	700100700
20505106	7.23366	htmr	200100600	20505208	1.96412	htmr	700100800
20505107	7.23366	htmr	200100700	20505209	1.96412	htmr	700100900
20505108	2.91468	htmr	200100800	20505210	2.13182	htmr	700101000
20505109	2.06466	htmr	200100900	20505211	2.30962	htmr	700101100
20505110	2.06466	htmr	200101000	20505212	2.51282	htmr	700101200
20505111	2.91468	htmr	200101100	20505213	2.46202	htmr	700101300
20505112	7.23366	htmr	200101200	20505214	2.30962	htmr	700101400
20505113	7.23366	htmr	200101300	20505215	2.46202	htmr	700101500
20505114	7.23366	htmr	200101400	20505216	2.39218	htmr	700101600
*				*			
*				*			
*				*			
20505115	7.23366	htmr	200101500	* end of deck			
20505116	7.23366	htmr	200101600				
20505117	7.23366	htmr	200101700				

## Transient Input Deck for Case T01

```

*      the next input deck is for the transient calculation
*      of the semiscale natural circulation experiment 8. *
= semiscale mod 2a - nc8 configuration (2-loop)
*
*      two core channel modeling implemented
*
0000100 restart transnt
0000101 run
0000103 8001
*0000104 none
0000105 10.0 12.0
0000201 1.0   1.0e-06 0.01 2 50 250 1000
0000201 5000.0 1.0e-06 0.05 2 200 20000 20000
*
20800001 dt 0
20800002 dtrcnt 0
20800003 cputime
20800004 tmass 0
20800005 emass 0
20800006 cntrivar 211 * primary system pressure
20800007 cntrivar 212 * ilsg pressure
20800008 cntrivar 213 * blsg pressure
20800009 cntrivar 214 * ilcrossoverleg sg side dp
20800010 cntrivar 215 * ilcrossover leg pump sideJp
20800011 cntrivar 216 * blcrossover leg sg side dp
20800012 cntrivar 217 * blcrossover leg pump side dp
20800013 cntrivar 218 * ector vessel core dp
*20800014 cntrivar 228 * total acculator flow (intact)
*20800015 cntrivar 229 * total accumulator flow (broken)
20800016 cntrivar 101 * ilhl mass
20800017 cntrivar 102 * ilcrl mass
20800018 cntrivar 103 * ilcl mass
20800019 cntrivar 104 * ilsg primary mass
20800020 cntrivar 105 * blhl mass
20800021 cntrivar 106 * blsg primary mass
20800022 cntrivar 107 * blcrl mass
20800023 cntrivar 108 * blcl mass
20800024 cntrivar 109 * rv core mass
20800025 cntrivar 110 * rv downcomer mass
20800026 cntrivar 111 * total primary side inventory
20800027 cntrivar 201 * ilsg secondary side mass
20800028 cntrivar 202 * blsg secondary side mass
20800029 cntrivar 203 * ilsg secondary mass
20800030 cntrivar 204 * blsg secondary mass
20800031 cntrivar 205 * total seconady mass
20800032 mflowj 101010000
20800033 mflowj 107010000
20800034 mflowj 401010000
20800035 mflowj 405010000
20800036 mflowj 518010000
20800037 mflowj 233000000
20800038 mflowj 733000000
20800039 mflowj 232000000
20800040 mflowj 732000000
20800041 mflowj 620000000
20800042 mflowj 820000000
*
20800043 tempf 101010000
20800044 tempf 107010000
20800045 tempf 401010000
20800046 tempf 405010000
20800047 htemp 501300711
20800048 htemp 501300811
*
*
0000501 time 0 ge null 0 -1.0 l * always true
0000502 time 0 lt null 0 -1.0 n * always false
0000510 time 0 ge null 0 0.0 l * induce blowdown
+ after 0 s
0000511 time 0 ge null 0 117.0 l * close steam valve
+ after 117 s
0000512 time 0 ge null 0 2100.0 l * open steam valve
+ after 2100 s
0000513 time 0 ge null 0 7550.0 l * open porv valve after
+ 7550 s
0000514 time 0 ge null 0 8098.0 l * close porv valve after
+ 8098 s
*
0000601 -511 or 512 n
0000602 513 and 514 n
0000610 -510 and -510 n
-
* modified by ysbang at 96/1/19
* to implement sg steam leak both at iSG bSG
*
0000550 time 0 gt null 0 117.0 n
0000551 time 0 lc null 0 2100.0 n
*
0000650 550 and 551 n
*
* insert bypass steam junction 211 and 711
*
2110000 isteaml valve
2110101 204010000 240000000 0.3-5 0.0 0.0 0100 l. l.
2110201 0 0.0 0.0
2110300 trpvlv
2110301 650
*
7110000 isteaml valve
7110101 704010000 740000000 0.3-5 0.0 0.0 0100 l. l.
7110201 0 0.0 0.0
7110300 trpvlv

```

7110301 650  
 \*  
 \* insert tm dpvol 240 and 740  
 \*  
 2400000 envir tm dpvol  
 2400101 1.0 1.0 0.0 0.0 90.0 1.0 5.-6 0.0 00  
 2400200 2  
 \*2400201 0.0 5.89e06 1.0  
 \*2400202 2100.0 5.89e06 1.0  
 \*2400203 2763.0 3.96e06 1.0  
 \*2400204 3380.0 3.15e06 1.0  
 \*2400205 4500.0 2.26e06 1.0  
 \*2400206 6110.0 1.50e06 1.0  
 \*2400207 8000.0 1.25e06 1.0  
 \*  
 \* modified by ysbang at Sep 3, 1996 to  
 \* implement an exact boundary condition  
 \*  
 2400201 0.0 5.85e06 1.0  
 2400202 2100.0 5.6e06 1.0  
 2400203 2763.0 2.78e06 1.0  
 2400204 3380.0 2.12e06 1.0  
 2400205 4500.0 1.80e06 1.0  
 2400206 6110.0 1.40e06 1.0  
 2400207 8000.0 1.20e06 1.0  
 \*  
 7400000 envir tm dpvol  
 7400101 1.0 1.0 0.0 0.0 90.0 1.0 5.-6 0.0 00  
 7400200 2  
 \*7400201 0.0 5.89e06 1.0  
 \*7400202 2100.0 5.89e06 1.0  
 \*7400203 2763.0 3.96e06 1.0  
 \*7400204 3380.0 3.15e06 1.0  
 \*7400205 4500.0 2.26e06 1.0  
 \*7400206 6110.0 1.50e06 1.0  
 \*7400207 8000.0 1.25e06 1.0  
 \*  
 \* modified by ysbang at Sep 3, 1996 to  
 \* implement an exact boundary condition  
 \*  
 7400201 0.0 5.89e06 1.0  
 7400202 2100.0 5.60e06 1.0  
 7400203 2763.0 3.95e06 1.0  
 7400204 3380.0 3.15e06 1.0  
 7400205 4500.0 2.25e06 1.0  
 7400206 6110.0 1.50e06 1.0  
 7400207 8000.0 1.23e06 1.0  
 \*  
 \* end of modification by ysbang  
 \*  
 \* intact loop steam generator steam outlet junction  
 \*  
 \* upper head bypass junction modify  
 \* modified by ysbang at Sep 16, 1996  
 \*  
 5350000 bypass-up sngljun  
 5350101 531010000 510010000 1.62-5 300.300.0100  
 5350201 0 0.0 0.0 0.0  
 \*  
 \*  
 2320000 steamout valve  
 2320101 204010000 207000000 0.0 0.0 0.0 0100  
 \*2320201 0 -2.166700.01040770 0.0  
 \*  
 \* modified by ysbang at 94/9/14  
 \* to implement the steady state result  
 \*  
 2320201 0 0.0379918 0.0139507 0.0  
 2320300 trpvlv  
 2320301 601  
 \*  
 2330000 feedint tm dpjun  
 2330101 206000000 205000000 0.00043  
 2330200 1 512 cntrlvar 1  
 2330201 -1.0 0.0 0.0 0.0  
 2330202 0.0 0.0 0.0 0.0  
 2330203 0.0 0.216 0.0 0.0  
 2330204 9.5 0.216 0.0 0.0  
 2330205 9.58 0.054 0.0 0.0  
 2330206 9.7149 0.036 0.0 0.0  
 2330207 9.7800 0.027 0.0 0.0  
 2330208 9.8500 0.0 0.0 0.0  
 2330209 20.0 0.0 0.0 0.0  
 \*  
 \* pressurizer porv downstream tank  
 \*  
 3300000 pressup tm dpvol  
 3300101 1.0 10.0 0.0 0.0 0.0 0.0 C.0 0.0 00  
 3300200 3  
 3300201 0.0 1.041e06 455.  
 3300202 49.0 1.041e06 455.  
 3300203 50.0 1.041e06 455.  
 3300204 150.0 0.280e06 406.  
 3300205 1500.0 0.270e06 403.  
 \*  
 3310000 porv valve  
 3310101 301000000 330000000 0.0001257 0.0 0.0 0100  
 + 1.0 1.0  
 3310201 0 0.0 0.0 0.0  
 3310300 trpvlv  
 3310301 602  
 \*  
 \* broken loop break junction  
 \*  
 \*4220000 brk-jun valve  
 \*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100

+ 1.0 1.0  
 \*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100  
 + 1.5 1.5  
 \*  
 \*4220201 0 0.0 0.0 0.0  
 \*4220300 trpvlv  
 \*4220304 510  
 \*  
 \* modified by ysbang to model smooth open  
 \* of break valve for 100 sec, Sep.30, 1996  
 \*  
 4220000 brk-jun valve  
 4220101 404010000 499000000 9.0e-07 0.0 0.0 0100 1.0  
 1.0  
 \*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100  
 \*+ 1.5 1.5  
 \*  
 4220201 0 0.0 0.0 0.0  
 4220300 mtrvlv  
 4220304 510 610 0.01 0.0 0  
 \*  
 4990000 pressup tmdpvol  
 4990101 1.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 00  
 4990200 3  
 \*4990201 0.0 1.041e06 455.  
 \*4990202 49.0 1.041e06 455.  
 \*4990203 50.0 1.041e06 455.  
 \*4990204 150.0 0.280e06 404.  
 \*4990205 1500.0 0.270e06 403.  
 \*  
 \* modified by y.s.bang for realistic modeling  
 \* of condensate tank pressure  
 \*  
 4990201 0.0 0.098e06 455.  
 4990202 1000.0 0.094e06 455.  
 4990203 3400.0 0.123e06 455.  
 4990204 8000.0 0.123e06 455.  
 \*  
 \*\*\*\*  
 \*  
 \* ecc system  
 \*  
 \*\*\*\*  
 6100000 ilcl-ecc pipe  
 6100001 1  
 6100101 0.000464 1  
 6100301 3.048 1  
 6100401 0.0 1  
 6100601 0.0 1  
 6100701 0.0 1  
 6100801 5.0e-04 0.0 1  
 6101001 00 1  
 6101201 1 300.0 0.0 0.0 0.0 0.0 0.0 1  
 \*  
 6110000 ilcl-acc accum  
 6110101 0.0 1.08032 0.071142 0.0 90.0 1.08032 5.0-04  
 0.0 00000  
 6110200 4.240e06 300.0  
 6111101 610000000 4.66e-04 0.0 0.0 0000  
 6112200 0.049043 0.0 9.144 0.0 1.45e-03 0 0 0 0  
 \*  
 6200000 ilcl-fcc sngljun  
 6200101 610010000 107000000 4.64e-04 0.0 0.0 0000  
 6200201 0 0.0 0.0 0.0  
 \*  
 8100000 blcl-ecc pipe  
 8100001 1  
 8100101 0.000250 1  
 8100301 3.048 1  
 8100401 0.0 1  
 8100601 0.0 1  
 8100701 0.0 1  
 8100801 5.0e-04 0.0 1  
 8101001 00 1  
 8101201 1 300.0 0.0 0.0 0.0 0.0 0.0 1  
 \*  
 8110000 blcl-acc accum  
 8110101 0.0 0.36027 0.02371 0.0 90.0 0.36027 5.0-04  
 0.0 00000  
 8110200 4.240e06 300.0  
 8111101 810000000 2.50e-04 0.0 0.0 0000  
 8112200 0.01776 0.0 6.096 0.0 1.45e-03 0 0 0 0  
 \*  
 8200000 blcl-ecc sngljun  
 8200101 810010000 404000000 4.64e-04 0.0 0.0 0000  
 8200201 0 0.0 0.0 0.0  
 \*  
 \* broken loop steam generator steam outlet junction  
 \*  
 7320000 steamou valve  
 7320101 704010000 707000000 0.0 0.0 0.0 0100  
 \*  
 \*7320201 0 -0.0599056 .333999-3 0.0  
 \*  
 \* modified by ysbang at 94/9/14  
 \* to implement the steady state result  
 \*  
 7320201 0 0.02012 0.001473 0.0  
 7320300 trpvlv  
 7320301 601  
 \*  
 7330000 feedin tmdpjun  
 7330101 706000000 705000000 0.00043  
 7330200 1 512 cntrlvar 12  
 7330201 -1.0 0.0 0.0 0.0

7330202	0.0	0.0	0.0	0.0		* average channel : volume 550
7330203	0.0	0.072	0.0	0.0		*
7330204	10.17	0.018	0.0	0.0		20255000 power
7330205	10.28	0.012	0.0	0.0		20255001 0.0 38.000e03
7330206	10.34	0.009	0.0	0.0		20255002 131.0 38.000e03
7330207	10.40	0.0	0.0	0.0		20255003 133.0 32.585e03
7330208	20.00	0.0	0.0	0.0		20255004 163.0 27.322e03
	*					20255005 203.0 24.244e03
*9000000	envirmt	tmdpvol				20255006 1103.0 14.782e03
*9000101	1.0	1.0	0.0	0.0	0.0	20255007 10103.0 7.0100e03
*9000200	3					*
*9000201	0.0	8.48e05	310.0			20220000 temp
**						20220001 0.0 300.
*****						*
*						20270500 htc-t
* general table data						20270501 0.0 6.806
*						*
*****						20220500 htc-t
*						20220501 0.0 6.806
*						*
* power for pressurizer						20220400 htc-t
*						20220401 0.0 5.98
20230000	power	502				*
20230001	-1.0	0.0				*
20230002	0.0	0.0				20270400 htc-t
20230003	0.0	12000.				20270401 0.0 5.98
20230004	1.0e06	12000.				*
*						*****
* reactor core power						*
*						* control components
*20250000	power					*
*20250001	0.0	95.000e03				*****
*20250002	131.0	95.000e03				*
*20250003	133.0	81.320e03				*
*20250004	163.0	68.305e03			20500100 sgdclvl sum 1.0 0.0 1	
*20250005	203.0	60.610e03			20500101 0.0 1.21831 voidf 205100000	
*20250006	1103.0	36.955e03			20500102 1.20561 voidf 205090000	
*20250007	10103.0	17.575e03			20500103 1.20561 voidf 205080000	
*					20500104 1.20561 voidf 205070000	
* reactor core power					20500105 1.20561 voidf 205060000	
* power ratio hot/average = 60/40					20500106 1.20561 voidf 205050000	
*					20500107 1.20561 voidf 205040000	
* hot channel : volume 500					20500108 0.48578 voidf 205030000	
*					20500109 0.58737 voidf 205020000	
20250000	power				20500110 0.41891 voidf 205010000	
20250001	0.0	57.000e03			20500111 0.37827 voidf 209020000	
20250002	131.0	57.000e03			20500112 0.50635 voidf 209010000	
20250003	133.0	48.792e03			20500113 0.50635 voidf 203010000	
20250004	163.0	40.983e03			20500114 0.40005 voidf 204010000	
20250005	203.0	36.366e03			*	
*20250006	1103.0	36.955e03			20500200 sgsrlvl sum 1.0 0.0 1	
20250006	1103.0	22.173e03			20500201 0.0 1.21831 voidf 202010000	
20250007	10103.0	10.545e03			20500202 1.20561 voidf 202020000	
*					20500203 1.20561 voidf 202030000	

20500204	1.20561	voidf	202040000	**
20500205	1.20561	voidf	202050000	*20500600 tot-p-mass sum 1.0 0.0 1
20500206	1.20561	voidf	202060000	*20500601 0.0 1.0 cntrvar 3
20500207	1.20561	voidf	202070000	*20500602 1.0 cntlvar 4
20500208	0.48578	voidf	202080000	*20500603 1.0 cntlvar 5
20500209	0.58737	voidf	202090000	**
20500210	0.41891	voidf	202100000	*205007600 sg-delt sum 1.0 20.0 1
20500211	0.37827	voidf	202110000	*205007601 0. 1. temp 201010000
20500212	0.50635	voidf	202120000	*205007602 -1. temp 201200000
*20500213	0.50635	voidf	202130000	*
20500214	0.40005	voidf	204010000	* calculate system inventory
*				* the first number on the following card is the full system mass
*20500300	fi-mass	sum	1.0 0.0 1	*20500800 invn div 144. 1. 0
*20500301	0.0 1.0	cmpmass	101	*20500801 cntrvar 6
*20500302	1.0	cmpmass	102	*20500900 invext div 1. 1. 1
*20500303	1.0	cmpmass	103	*20500901 cntrvar 8
*20500304	1.0	cmpmass	104	*
*20500305	1.0	cmpmass	105	* calculate the core liquid collapsed height
*20500306	1.0	cmpmass	106	*
*20500307	1.0	cmpmass	107	20501000 core-lvl sum 1. 0. 1
*20500308	1.0	cmpmass	108	20501001 0. .6096 voidf 505010000
*20500309	1.0	cmpmass	201	20501002 .6096 voidf 505020000
*20500310	1.0	cmpmass	301	20501003 .3048 voidf 505030000
*20500311	1.0	cmpmass	301	20501004 .3048 voidf 505040000
**				20501005 .3048 voidf 505050000
*20500400	vssl-mass	sum	1.0 0.0 1	20501006 .3048 voidf 505060000
*20500401	0.0 1.0	cmpmass	501	20501007 .6096 voidf 505070000
*20500402	1.0	cmpmass	502	20501008 .6096 voidf 505080000
*20500403	1.0	cmpmass	503	*
*20500404	1.0	cmpmass	504	20501100 sgshlvl sum 1.0 0.0 1
*20500405	1.0	cmpmass	505	20501101 0.0 1.9609 voidf 702010000
*20500406	1.0	cmpmass	506	20501102 1.23101 voidf 702020000
*20500407	1.0	cmpmass	507	20501103 1.15481 voidf 702030000
*20500408	1.0	cmpmass	508	20501104 1.23101 voidf 702040000
*20500409	1.0	cmpmass	509	20501105 1.25641 voidf 702050000
*20500410	1.0	cmpmass	513	20501106 1.15481 voidf 702060000
*20500411	1.0	cmpmass	514	20501107 1.06591 voidf 702070000
*20500412	1.0	cmpmass	516	20501108 0.65398 voidf 702080000
*20500413	1.0	cmpmass	517	20501109 0.37827 voidf 702090000
*20500414	1.0	cmpmass	518	20501110 0.50635 voidf 702100000
*20500415	1.0	cmpmass	519	*20501111 0.50635 voidf 702110000
*20500416	1.0	cmpmass	531	20501112 0.40005 voidf 704010000
*20500417	1.0	cmpmass	510	*
**				20501200 sgdcvl sum 1.0 0.0 1
*20500500	bi-mass	sum	1.0 0.0 1	20501201 0.0 1.9609 voidf 705080000
*20500501	0.0 1.0	cmpmass	401	20501202 1.23101 voidf 705070000
*20500502	1.0	cmpmass	402	20501203 1.15481 voidf 705060000
*20500503	1.0	cmpmass	403	20501204 1.23101 voidf 705050000
*20500504	1.0	cmpmass	404	20501205 1.25641 voidf 705040000
*20500505	1.0	cmpmass	405	20501206 1.15481 voidf 705030000
*20500506	1.0	cmpmass	406	20501207 1.06591 voidf 705020000
*20500507	1.0	cmpmass	450	20501208 0.65398 voidf 705010000
*20500508	1.0	cmpmass	701	20501209 0.37827 voidf 709020000

20501210	0.50635	voidf	709010000	*	
20501211	0.50635	voidf	703010000	20502300 pzrlevel sum 1.0 0.0 1	
20501212	0.40005	voidf	704010000	20502301 0.0 0.3671 voidf 301010000	
*				20502302 0.2549 voidf 301020000	
* calculate the broken leg generator upflow collapsed liquid level				20502303 0.2549 voidf 301030000	
*				20502304 0.2549 voidf 301040000	
20501300	blgu-cl sum 1.	9.532	0	20502305 0.0663 voidf 301050000	
20501301	0.	1.19609	voidf	701020000	*
20501302	1.23101	voidf	701030000	* heat losses to environment - bl sg	
20501303	1.15481	voidf	701040000	*	
20501304	1.23101	voidf	701050000	20502400 blsgpl sum 1. 0. 0	
20501305	1.25641	voidf	701060000	20502401 0. 1.41896 htrnr 705300101	
20501306	1.15481	voidf	701070000	20502402 0.91455 htrnr 705300201	
20501307	1.06591	voidf	701080000	20502403 0.99072 htrnr 705300301	
20501308	0.98206	voidf	701090000	20502404 1.07788 htrnr 705300401	
*				20502405 1.05609 htrnr 705300501	
* calculate the broken leg generator downflow collapsed liquid level				20502406 0.99072 htrnr 705300601	
*				20502407 1.05609 htrnr 705300701	
20501400	slgd-cl sum 1.	9.532	0	20502408 1.02613 htrnr 705300801	
20501401	0.	0.98206	voidf	701100000	20502409 0.57463 htrnr 705400101
20501402	1.06591	voidf	701110000	20502410 0.72732 htrnr 705400201	
20501403	1.15481	voidf	701120000	20502411 0.72732 htrnr 705400301	
20501404	1.25641	voidf	701130000	20502412 0.54335 htrnr 705400401	
20501405	1.23101	voidf	701140000	*	
20501406	1.15481	voidf	701150000	* power losses to environment - il sg	
20501407	1.23101	voidf	701160000	*	
20501408	0.19609	voidf	701170000	20502500 ilsgpl sum 1. 0. 0	
*				20502501 0. .35939 htrnr 205300101	
* calculate the intact leg generator upflow collapsed liquid level				20502502 .50391 htrnr 205300201	
*				20502503 .41679 htrnr 205300301	
20501500	ileu-cl sum 1.0	9.525	1	20502504 1.03430 htrnr 205300401	
20501501	0.	1.21831	voidf	201020000	20502505 1.03430 htrnr 205300501
20501502	1.20561	voidf	201030000	20502506 1.03430 htrnr 205300601	
20501503	1.20561	voidf	201040000	20502507 1.03430 htrnr 205300701	
20501504	1.20561	voidf	201050000	20502508 1.03430 htrnr 205300801	
20501505	1.20561	voidf	201060000	20502509 1.03430 htrnr 205300901	
20501506	1.20561	voidf	201070000	20502510 1.04520 htrnr 205301001	
20501507	1.20561	voidf	201080000	20502511 .57463 htrnr 205400101	
20501508	0.48578	voidf	201090000	20502512 .72732 htrnr 205400201	
20501509	0.34411	voidf	201100000	20502513 .72732 htrnr 205400301	
*				20502514 ... .54335 htrnr 205400401	
* calculate the intact leg generator downflow collapsed liquid level				*	
*				* energy losses to environment - bl sg	
20501600	blgd-cl sum 1.0	9.525	1	*	
20501601	0.	0.34411	voidf	201110000	20502600 blsgcl integral 1. 0. 0
20501602	0.48578	voidf	201120000	20502601 cntrivar 24	
20501603	1.20561	voidf	201130000	*	
20501604	1.20561	voidf	201140000	* energy losses to environment - il sg	
20501605	1.20561	voidf	201150000	*	
20501606	1.20561	voidf	201160000	20502700 ilsgcl integral 1. 0. 0	
20501607	1.20561	voidf	201170000	20502701 cntrivar 25	
20501608	1.20561	voidf	201180000	*	
20501609	1.21381	voidf	201190000	* power losses to environment from sg	

*					
20502800	sgpl sum 1. 0. 0	20510212	2.7480260-03	rho 105120000	
20502801	0. 1. cntrivar 24	20510213	2.7480260-03	rho 105130000	
20502802	1. cntrivar 25	20510214	2.0441630-03	rho 105140000	
*		*			
* energy losses to environment from sg		20510300	ilclmass sum 1.0 0.0 1		
*		20510301	0.0 4.0772550-04	rho 106010000	
20502900	blsgel sum 1. 0. 0	20510302	1.0447530-03	rho 106020000	
20502901	0. 1. cntrivar 26	20510303	5.4641860-04	rho 106030000	
20502902	1. cntrivar 27	20510304	6.7631200-04	rho 106040000	
*		20510305	2.6372190-03	rho 106050000	
* integ of bl hot leg mass flow		20510306	2.7614970-03	rho 107010000	
*		20510307	7.6276200-04	rho 108010000	
*		*			
20503000	blm integral 1. 0. 0	20510400	ilsgpr sum 1.0 0.0 1		
20503001	mflowj 402010000	20510401	0.0 1.6407770-03	rho 201010000	
*		20510402	2.2416900-03	rho 201020000	
* integ of il hot leg mass flow		20510403	2.2183220-03	rho 201030000	
*		20510404	2.2183220-03	rho 201040000	
20503000	ilm integral 1. 0. 0	20510405	2.2183220-03	rho 201050000	
20503001	mflowj 102020000	20510406	2.2183220-03	rho 201060000	
*		20510407	2.2183220-03	rho 201070000	
* integ of break mass flow		20510408	2.2183220-03	rho 201080000	
*		20510409	8.9383520-04	rho 201090000	
20503000	brm integral 1. 0. 0	20510410	6.3316240-04	rho 201100000	
20503001	mflowj 422000000	20510411	6.3316240-04	rho 201110000	
*		20510412	8.9383520-04	rho 201120000	
20510100	ilhlmass sum 1.0 0.0 1	20510413	2.2183220-03	rho 201130000	
20510101	0.0 9.2278200-04	rho 101010000	20510414	2.2183220-03	rho 201140000
20510102	1.9918830-03	rho 102010000	20510415	2.2183220-03	rho 201150000
20510103	5.9836050-04	rho 102020000	20510416	2.2183220-03	rho 201160000
20510104	5.9836050-04	rho 102030000	20510417	2.2183220-03	rho 201170000
20510105	7.8538960-04	rho 102040000	20510418	2.2183220-03	rho 201180000
20510106	8.8732920-04	rho 102050000	20510419	2.2416900-03	rho 201190000
20510107	8.8732920-04	rho 102060000	20510420	1.6407770-03	rho 201200000
20510108	1.2796520-03	rho 103010000	*		
20510109	5.4559250-04	rho 104010000	20520100	blsgpr sum 1.0 0.0 1	
20510110	9.7311260-04	rho 104020000	20520101	0.0 1.4264000-02	rho 202010000
20510111	8.1432400-04	rho 104030000	20520102	1.6574000-02	rho 202020000
20510112	8.1432400-04	rho 104040000	20520103	1.3183000-02	rho 202030000
20510113	1.4841030-03	rho 104050000	20520104	1.6789000-02	rho 202040000
*			20520105	1.3532000-02	rho 202050000
20510200	crossms sum 1.0 0.0 1		20520106	1.2870000-02	rho 202060000
20510201	0.0 1.0187750-03	rho 105010000	20520107	1.2850000-02	rho 202070000
20510202	9.3065600-04	rho 105020000	20520108	5.8490000-03	rho 202080000
20510203	8.1432400-04	rho 105030000	20520109	9.2780000-03	rho 202090000
20510204	8.1432400-04	rho 105040000	20520110	7.6310000-03	rho 202100000
20510205	8.1432400-04	rho 105050000	20520111	1.5420000-02	rho 202110000
20510206	1.1289930-03	rho 105060000	20520112	2.6025000-02	rho 202120000
20510207	2.0441630-03	rho 105070000	20520113	5.9663000-02	rho 203010000
20510208	2.7480260-03	rho 105080000	20520114	3.3900000-02	rho 204010000
*					
20510209	2.7480260-03	rho 105090000	20520300	ilsgsec sum 1.0 0.0 1	
20510210	9.1438000-04	rho 105100000	20520301	0.0 6.3370000-03	rho 205010000
20510211	9.1438000-04	rho 105110000			

20520302	3.2520000-03 rho 205020000	20510801	0.0	7.5605530-04 rho 404010000
20520302	1.3220000-03 rho 205030000	20510802		2.4731980-04 rho 405010000
20520304	3.2790000-03 rho 205040000	20510803		6.4741950-04 rho 405020000
20520305	3.2790000-03 rho 205050000	20510804		1.3575400-03 rho 406010000
20520306	3.2790000-03 rho 205060000	20510805		8.6000000-04 rho 450010000
20520307	3.2790000-03 rho 205070000	*		
20520308	3.2790000-03 rho 205080000	20510900	rvcore sum 1.0 0.0 1	
20520309	3.2790000-03 rho 205090000	20510901	0.0	6.7400000-03 rho 501010000
20520310	3.3140000-03 rho 205100000	20510902		6.5900000-03 rho 502010000
20520311	1.1400000-03 rho 206010000	20510903		2.9600000-03 rho 503010000
20520312	2.9856000-02 rho 209010000	20510904		5.2000000-04 rho 504010000
20520313	2.0686000-02 rho 209020000	20510905		1.7434560-03 rho 505010000
*		20510906		1.7434560-03 rho 505020000
20530100	pressms sum 1.0 0.0 1	20510907		8.7172800-04 rho 505030000
20530101	0.0 6.4825000-03 rho 301010000	20510908		8.7172800-04 rho 505040000
20530102	6.4825000-03 rho 301020000	20510909		8.7172800-04 rho 505050000
20530103	5.9118000-03 rho 301030000	20510910		8.7172800-04 rho 505060000
20530104	5.9118000-03 rho 301040000	20510911		1.7434560-03 rho 505070000
20530105	5.9118000-03 rho 301050000	20510912		1.7434560-03 rho 505080000
20530106	1.1360000-03 rho 301060000	20510913		1.6400000-03 rho 506010000
20530107	7.1837000-04 rho 302010000	20510914		2.8100000-03 rho 507010000
20530108	2.3214100-04 rho 302020000	20510915		2.1800000-03 rho 508010000
20530109	1.6457700-04 rho 302030000	20510916		1.4300000-03 rho 509010000
20530110	4.4046000-05 rho 302040000	20510917		4.0470000-03 rho 509020000
20530111	4.4046000-05 rho 302050000	20510918		3.9300000-04 rho 510010000
20530112	4.4046000-05 rho 302060000	20510919		3.4000000-04 rho 513010000
20530113	4.4046000-05 rho 302070000	20510920		3.4525000-04 rho 514010000
*		*		
20510500	bhlmiss sum 1.0 0.0 1	20511000	rwdcnr sum 1.0 0.0 1	
20510501	0.0 1.4245480-03 rho 401010000	20511001	0.0	2.6189940-03 rho 516010000
20510502	5.5496350-04 rho 402010000	20511002		3.7726480-03 rho 517010000
20510503	3.7182600-04 rho 402020000	20511003		1.1833800-03 rho 518010000
20510504	8.9706890-04 rho 402030000	20511004		1.1833800-03 rho 518020000
20510505	3.8022530-04 rho 402040000	20511005		1.1833800-03 rho 518030000
20510506	3.2063850-04 rho 402050000	20511006		1.1833800-03 rho 518040000
20510507	3.1781750-04 rho 402060000	20511007		1.1833800-03 rho 518050000
20510508	5.5399890-04 rho 402070000	20511008		1.1833800-03 rho 518060000
*		20511009		1.1833800-03 rho 518070000
20510700	blcross sum 1.0 0.0 1	20511010		1.1833800-03 rho 518080000
20510701	0.0 4.4975840-04 rho 403010000	20511011		1.1833800-03 rho 518090000
20510702	3.1781750-04 rho 403020000	20511012		9.1139620-04 rho 518100000
20510703	3.2063850-04 rho 403030000	20511013		2.0770600-03 rho 519010000
20510704	3.1781750-04 rho 403040000	20511014		2.6772900-05 rho 531010000
20510705	9.8569380-04 rho 403050000	20511015		2.6772900-05 rho 531020000
20510706	7.1445920-04 rho 403060000	20511016		2.6772900-05 rho 531030000
20510707	7.1445920-04 rho 403070000	*		
20510708	4.4539040-04 rho 403080000	20510600	blsgpr sum 1.0 0.0 1	
20510709	4.4539040-04 rho 403090000	20510601	0.0	1.3434060-03 rho 701010000
20510710	7.1445920-04 rho 403100000	20510602		7.2961490-04 rho 701020000
20510711	7.1445920-04 rho 403110000	20510603		7.5091610-04 rho 701030000
20510712	6.3701820-04 rho 403120000	20510604		7.0443410-04 rho 701040000
*		20510605		7.5091610-04 rho 701050000
20510800	blclmass sum 1.0 0.0 1	20510606		7.6641010-04 rho 701060000

20510607	7.0443410-04	rho	701070000	*
20510608	6.5020510-04	rho	701080000	* total secondary inventory
20510609	5.9905660-04	rho	701090000	*
20510610	5.9905660-04	rho	701100000	20520500 totalsec sum 1.0 0.0 1
20510611	6.5020510-04	rho	701110000	20520501 0.0 1.0 cntrlvar 201
20510612	7.0443410-04	rho	701120000	20520502 1.0 cntrlvar 202
20510613	7.6641010-04	rho	701130000	20520503 1.0 cntrlvar 203
20510614	7.5091610-04	rho	701140000	20520504 1.0 cntrlvar 204
20510615	7.0443410-04	rho	701150000	*
20510616	7.5091610-04	rho	701160000	2060000 feedinl tmddpvol
20510617	7.2961490-04	rho	701170000	2060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.000
20510618	1.3434060-03	rho	701180000	2060200 1
*				*
20520200	b1sgsec	sum	1.0 0.0 1	* modified by y.s.bang
20520201	0.0	1.3509000-02	rho	702010000 * maintaining 330 K
20520202		9.0360000-03	rho	702020000 *
20520203		8.4700000-03	rho	702030000 2060201 0.0 330.0 0.0
20520204		1.0739000-02	rho	702040000 *2060201 0.0 460.0 0.0
20520205		9.6150000-03	rho	702050000 *2060202 2100.0 460.0 0.0
20520206		8.4740000-03	rho	702060000 *2060203 3000.0 400.0 0.0
20520207		8.4250000-03	rho	702070000 *2060204 4500.0 300.0 0.0
20520208		1.5782000-02	rho	702080000 *2060205 6000.0 220.0 0.0
20520209		1.6807000-02	rho	702090000 *2060206 8000.0 130.0 0.0
20520210		2.5882000-02	rho	702100000 *
20520211		5.6736000-02	rho	703010000 2070000 steamout tmddpvol
20520212		3.3900000-02	rho	704010000 2070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.000
*				2070200 2
20520400	b1sgsec	sum	1.0 0.0 1	*
20520401	0.0	1.4458000-02	rho	705010000 2070201 0.0 5.85e06 1.0
20520402		2.2410000-03	rho	705020000 2070202 2100.0 5.6e06 1.0
20520403		2.4350000-03	rho	705030000 2070203 2763.0 2.78e05 1.0
20520404		2.6390000-03	rho	705040000 2070204 3380.0 2.12e06 1.0
20520405		2.5890000-03	rho	705050000 2070205 4500.0 1.80e06 1.0
20520406		2.4310000-03	rho	705060000 2070206 6110.0 1.40e06 1.0
20520407		2.5930000-03	rho	705070000 2070207 8000.0 1.20e06 1.0
20520408		2.5140000-03	rho	705080000 *
20520409		2.9860000-02	rho	709010000 *
20520410		2.0686000-02	rho	709020000 7060000 feedinl tmddpvol
*				7060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.000
* total primary inventory				7060200 1
*				*
20511100	totalpr	sum	1.0 0.0 1	* modified by y.s.bang
20511101	0.0	1.0	cntrlvar 101	* maintaining 330 K
20511102		1.0	cntrlvar 102	*
20511103		1.0	cntrlvar 103	7060201 0.0 330.0 0.0
20511104		1.0	cntrlvar 104	*7060201 0.0 460.0 0.0
20511105		1.0	cntrlvar 105	*7060202 2100.0 460.0 0.0
20511106		1.0	cntrlvar 106	*7060203 3000.0 400.0 0.0
20511107		1.0	cntrlvar 107	*7060204 4500.0 300.0 0.0
20511108		1.0	cntrlvar 108	*7060205 6000.0 220.0 0.0
20511109		1.0	cntrlvar 109	*7060206 8000.0 130.0 0.0
20511110		1.0	cntrlvar 110	*
20511111		1.0	cntrlvar 301	*

7070000	steamou	trndpvol		*										
7070101	1.0	1.0	0.0	0.0	90.0	1.0	5.0e-06	0.000	*20523000	isglvl	sum	0.001	0.0	1
7070200	2								*20523001	0.	1.	p	202010000	
*									*20523002		-1.	p	202120000	
7070201	0.0		5.89e06		1.0				*					
7070202	2100.0		5.60e06		1.0				*20523100	bsglvl	sum	0.001	0.0	1
7070203	2763.0		3.95e06		1.0				*20523101	0.	1.	p	702010000	
7070204	3380.0		3.15e06		1.0				*20523102		-1.	p	702100000	
7070205	4500.0		2.25e06		1.0				*					
7070206	6110.0		1.50e06		1.0				*	heat flus total				
7070207	8000.0		1.23e06		1.0				*					
*									*20522800	tihf	sum	1.0	0.0	1
*									*20522801	0.	1.0	htmr	201010101	
*	following items added to make easy postprocessing								*20522802		1.0	htmr	201010201	
*	at june 17, 1995 by ysbang.								*20522803		1.0	htmr	201010301	
*									*20522804		1.0	htmr	201010401	
*	control variables								*20522805		1.0	htmr	201010501	
*									*20522806		1.0	htmr	201010601	
*	pressure in mpa								*20522807		1.0	htmr	201010701	
*									*20522808		1.0	htmr	201010801	
20521100	ppre	mult	0.000001	0.0	1				*20522809		1.0	htmr	201010901	
20521101	p		508010000						*20522810		1.0	htmr	201010001	
*									*20522811		1.0	htmr	201010101	
20521200	isgp	mult	0.000001	0.0	1				*20522812		1.0	htmr	201010201	
20521201	p		204010000						*20522813		1.0	htmr	201010301	
*									*20522814		1.0	htmr	201010401	
20521300	bsgp	mult	0.000001	0.0	1				*20522815		1.0	htmr	201010501	
20521301	p		704010000						*20522816		1.0	htmr	201010601	
*									*20522817		1.0	htmr	201010701	
20503000	ibrfw integral	1.	0.0	1					*20522818		1.0	htmr	201010801	
20503001	mflowj		422000000						*					
*									*20522900	tbff	sum	1.0	0.0	1
*	differntial pressure in kpa								*20522901	0.	1.0	htmr	701010101	
*									*20522902		1.0	htmr	701010201	
20521400	icrsg	sum	0.001	0.0	1				*20522903		1.0	htmr	701010301	
20521401	0.	1.	p		105100000				*20522904		1.0	htmr	701010401	
20521402		-1.	p		105030000				*20522905		1.0	htmr	701010501	
*									*20522906		1.0	htmr	701010601	
20521500	icrpm	sum	0.001	0.0	1				*20522907		1.0	htmr	701010701	
20521501	0.	1.	p		105110000				*20522908		1.0	htmr	701010801	
20521502		-1.	p		106020000				*20522909		1.0	htmr	701010901	
*									*20522910		1.0	htmr	701010001	
20521600	bcrsg	sum	0.001	0.0	1				*20522911		1.0	htmr	701010101	
20521601	0.	1.	p		403010000				*20522912		1.0	htmr	701010201	
20521602		-1.	p		403120000				*20522913		1.0	htmr	701010301	
*									*20522914		1.0	htmr	701010401	
20521700	bcrpm	sum	0.001	0.0	1				*20522915		1.0	htmr	701010501	
20521701	0.	1.	p		403080000				*20522916		1.0	htmr	701010601	
20521702		-1.	p		403120000				*					
*									20523000	tilacc integral	1.	0.0	1	
20521800	cordif	sum	0.001	0.0	1				20523001	mflowj		620000000		
20521801	0.	1.	p		505010000				*					
20521802		-1.	p		505080000				20523100	tbacc integral	1.	0.0	1	

20523101	mflowj	820000000							
*									
*									
20510900	rvcore	sum	1.0	0.0	1				
20510901	0.0	6.7400000-03	rho	501010000		20548800	rvdp	sum	0.001 1.0 1
20510902		6.5900000-03	rho	502010000		20548801	0.0	1.0 p	502010000
20510903		2.9600000-03	rho	503010000		20548802		-1.0 p	508010000
20510904		5.2000000-04	rho	504010000		*			
20510905		0.8717280-03	rho	505010000		20531000	hotpow	function	1.0 5.7+04 1
20510906		0.8717280-03	rho	505020000		20531001	time	0	500
20510907		4.3586400-04	rho	505030000		20531200	avepow	function	1.0 3.8+04 1
20510908		4.3586400-04	rho	505040000		20531201	time	0	550
20510909		4.3586400-04	rho	505050000		*			
20510910		4.3586400-04	rho	505060000		20531300	totpow	sum	1.0 9.5+04 1
20510911		0.8717280-03	rho	505070000		20531301	0.0	1.0	cntrivar 310
20510912		0.8717280-03	rho	505080000		20531302		1.0	cntrivar 312
20510913		1.6400000-03	rho	506010000		*			
20510914		2.8100000-03	rho	507010000		*			
20510915		2.1800000-03	rho	508010000		20547100	stem	sum	1.0 0.0 1
20510916		1.4300000-03	rho	509010000		20547101	0.0	0.8717280-03	gammaw 505010000
20510917		4.0470000-03	rho	509020000		20547102		0.8717280-03	gammaw 505020000
20510918		3.9300000-04	rho	510010000		20547103		4.3586400-04	gammaw 505030000
20510919		3.4000000-04	rho	513010000		20547105		4.3586400-04	gammaw 505040000
20510920		3.4525000-04	rho	514010000		20547106		4.3586400-04	gammaw 505050000
*						20547107		4.3586400-04	gammaw 505060000
20540900	hcmass	sum	1.0	0.0	1	20547108		0.8717280-03	gammaw 505070000
20540901	0.0	0.8717280-03	rho	555010000		20547109		0.8717280-03	gammaw 505080000
20540902		0.8717280-03	rho	555020000		*			
20540903		4.3586400-04	rho	555030000		20547200	hsteam	sum	1.0 0.0 1
20540904		4.3586400-04	rho	555040000		20547201	0.0	0.8717280-03	gammaw 555010000
20540905		4.3586400-04	rho	555050000		20547202		0.8717280-03	gammaw 555020000
20540906		4.3586400-04	rho	555060000		20547203		4.3586400-04	gammaw 555030000
20540907		0.8717280-03	rho	555070000		20547204		4.3586400-04	gammaw 555040000
20540908		0.8717280-03	rho	555080000		20547205		4.3586400-04	gammaw 555050000
*						20547206		4.3586400-04	gammaw 555060000
*						20547207		0.8717280-03	gammaw 555070000
*						20547208		0.8717280-03	gammaw 555080000
						*			
*						*			
20511100	totalpr	sum	1.0	0.0	1	20547300	stem	sum	1.0 0.0 1
20511101	0.0	1.0	cntrlvar	101		20547301	0.0	0.8717280-03	vapgen 505010000
20511102		1.0	cntrlvar	102		20547302		0.8717280-03	vapgen 505020000
20511103		1.0	cntrlvar	103		20547303		4.3586400-04	vapgen 505030000
20511104		1.0	cntrlvar	104		20547305		4.3586400-04	vapgen 505040000
20511105		1.0	cntrlvar	105		20547306		4.3586400-04	vapgen 505050000
20511106		1.0	cntrlvar	106		20547307		4.3586400-04	vapgen 505060000
20511107		1.0	cntrlvar	107		20547308		0.8717280-03	vapgen 505070000
20511108		1.0	cntrlvar	108		20547309		0.8717280-03	vapgen 505080000
20511109		1.0	cntrlvar	109		*			
20511110		1.0	cntrlvar	110		20547400	hsteam	sum	1.0 0.0 1
20511111		1.0	cntrlvar	301		20547401	0.0	0.8717280-03	vapgen 555010000
20511112		1.0	cntrlvar	409		20547402		0.8717280-03	vapgen 555020000
*						20547403		4.3586400-04	vapgen 555030000
*						20547404		4.3586400-04	vapgen 555040000

20547405 4.3586400-04 vapgen 555050000 \*  
20547406 4.3586400-04 vapgen 555060000 20548200 totsteam sum 1.0 0.0 1  
20547407 0.8717280-03 vapgen 555070000 20548201 0.0 1.0 cntrivar 473  
20547408 0.8717280-03 vapgen 555080000 20548202 1.0 cntrivar 474  
\* \* end of transient input deck  
20548100 totsteam sum 1.0 0.0 1  
20548101 0.0 1.0 cntrivar 471  
20548102 1.0 cntrivar 472



**Appendix C**  
**RELAP5 Input Listing for Case E01**



## Steady State Input Deck for Case E01

```

= Semiscale Mod 2a, S-NC-8 Experiment Configuration (2-loop)
*
*****
*
* Implementing 2-core channel model at may 18, 1996
* ECCMIX component installation at Nov. 26, 1996
*
*****
*
0000100 new stdy-st
0000101 run
0000105 30.0 32.0
0000110 nitrogen
*
0000201 800.0 1.0e-06 0.1 2 200 8000 8000
*
* Minor Edit Variables
*
*301 cntrivar 917 * pqr liquid volume
*302 cntrivar 918 * pqr liquid volume error
*303 cntrivar 921 * letdown error
*304 cntrivar 937 * intact loop hot temperatur error
*305 cntrivar 947 * broken loop hot temp error
*306 cntrivar 961 * intact loop sg level
*307 cntrivar 971 * broken loop sg level
*308 cntrivar 962 * IL SG Level error
*309 cntrivar 963 * BL SG Level error
310 mflowj 101020000 * intact loop mass flow
311 mflowj 401020000 * broken loop mass flow
312 p 301010000 * pressurizer top pressure
313 p 204010000 * IL SG steam pressure
314 p 704010000 * BL SG steam pressure
315 cntrivar 101 * intact loop hot leg mass
316 cntrivar 102 * intact loop crossover leg mass
317 cntrivar 103 * intact loop cold leg mass
318 cntrivar 104 * intact loop s/g primary mass
319 cntrivar 105 * broken loop hot leg mass
320 cntrivar 106 * broken loop sg primary mass
321 cntrivar 107 * broken loop crossover leg mass
322 cntrivar 108 * broken loop cold leg mass
323 cntrivar 109 * reactor vessel core and etc mass
324 cntrivar 110 * reactor downcomer mass
325 cntrivar 201 * intact loop secondary mass
326 cntrivar 202 * broken loop secondary mass
327 cntrivar 301 * pressurizer mass
328 cntrivar 111 * total primary mass
329 cntrivar 205 * total secondary mass
*
* Trips
*
0000501 time 0 ge null 0 -1.0 1 * always true
0000502 time 0 lt null 0 -1.0 n * always false
*
* steady state trip : alway true
*
0000599 time 0 ge null 0 0.0 l *always true
*****
**
*
* intact loop piping
*
* ILHL Nozzle
*
1010000 hotleg branch
1010001 2 1
1010101 0.00420 0.21971 0.0 0.0 0.0 0.0 4.0e-05 0.0
+ 00000
1010200 3 15.4e06 581.4 * 0.0 0.0 0.0
1011101 508010000 101000000 0.0 0.5 1.0 0100
1012101 101010000 102000000 0.0 0.0 0.0 0100
1011201 0.26 0.0 0.0
1012201 0.26 0.0 0.0
*
* ILHL piping to Pqr surgeline
*
1020000 pclal8 pipe
1020001 6
1020101 0.00349.4
1020102 0.00229.6
1020301 0.57074.1
1020302 0.17145.3
1020303 0.22504.4
1020304 0.38748.6
1020601 0.0.6
1020801 4.0e-05,0.0.6
1020901 0.0.0.0.1
1020902 0.288.0.288.2
1020903 0.0.0.0.3
1020904 0.0.0.0.5
1021001 00.6
1021101 0000.3
1021102 0100.4
1021103 0000.5
1021201 3 15.4e06 518.4 0.0 0.0 0.0 06
1021300 1
1021301 0.260 0.0 0.0 05
*
* Pqr surgeline connection point
*
1030000 newspol branch

```

1030001	3	1														1050602	-90,0,9
1030101	0.00229	0.55880	0.0	0.0	0.0	0.0	4.0e-05	0.0							1050603	-45,0,10	
+ 00															1050604	45,0,11	
1030200	3	15.4e06	581.4												1050605	90,0,14	
1031101	102010000	103000000	0.0	0.18	0.18	0000									1050701	-0.36068,1	
1032101	103010000	104000000	0.0	0.18	0.18	0000									1050702	-0.40640,2	
1033101	302010000	103000000	0.0	0.90	0.90	0100									1050703	-0.35560,5	
1031201	0.260	0.0	0.0												1050704	-0.49301,6	
1032201	0.260	0.0	0.0												1050705	-0.58572,7	
1033201	0.260	0.0	0.0												1050706	-0.78740,9	
*															1050707	-0.1968,10	
* ILHL piping upto SG inlet plenum															1050708	0.1968,11	
*															1050709	0.78740,13	
1040000	newspol pipe														1050710	0.58572,14	
1040001	5														1050801	4.0e-05,0.0,14	
1040101	0.00229,5														1050901	0.288,0.288,1	
1040301	0.23825,1														1050902	0.0,0.0,9	
1040302	0.42494,2														1050903	0.450,0.450,11	
1040303	0.35560,4														1050904	0.0,0.0,13	
1040304	0.64808,5														1051001	00,14	
1040601	0.0,1														1051101	0000,5	
1040602	90,0,4														1051102	0100,6	
1040603	55,0,5														1051103	0000,13	
1040701	0,0,1														1051201	3 15.4e06 545.0 0.0 0.0 0.0 14	
1040702	0.42494,2														1051300	1	
1040703	0.35560,4														1051301	0.260 0.0 0.0 13	
1040704	0.52680,5														*	ILCL Piping including pump simulator	
1040801	4.0e-05,0.0,5														*		
1040901	0.540,0.540,1														1060000	pmpsiml pipe	
1040902	0.0,0.0,3														1060001	5	
1040903	0.288,0.288,4														1060101	0.00091,4	
1041001	00,5														1060102	0.00349,5	
1041101	0000,4														1060201	0.00091,1	
1041201	3 15.4e06 581.4	0.0 0.0 0.0	0.0	05											1060202	0.00030,2	
1041300	1														1060203	0.00091,4	
1041301	0.260 0.0 0.0 04														1060301	0.44805,1	
*															1060302	1.14808,2	
* Intact Loop Crossover Leg															1060303	0.60046,3	
*															1060304	0.74320,4	
1050000	pmpsuc pipe														1060305	0.75565,5	
1050001	14														1060601	90,0,1.	
1050101	0.00229,6														1060602	0,0,5	
1050102	0.00349,14														1060801	4.0e-05,0.0,5	
1050301	0.44488,1														1060901	0.966,0.966,1	
1050302	0.40640,2														1060902	1.260,1.260,2	
1050303	0.35560,5														1060903	0.0,0.0,4	
1050304	0.49301,6														1061001	00,5	
1050305	0.58572,7														1061101	0000,1	
1050306	0.78740,9														1061102	0100,2	
1050307	0.26200,11														1061103	0000,3	
1050308	0.78740,13														1061104	0100,4	
1050309	0.58572,14														1061201	3 15.4e06 545.0 0.0 0.0 0.0 05	
1050601	-55,0,1																

1061300	1	2010101	0.00783,1
1061301	0.260 0.0 0.0 0.04	2010102	0.00184,19
*-----		2010103	0.00783,20
* ECCS piping connection point		2010301	0.20955,1
*-----		2010302	1.21831,2
*1070000	pc19-3 branch	2010303	1.20561,8
*1070001	2	2010304	0.48578,9
*1070101	0.00349 0.79126 0.0 0.0 0.0 0.0 4.0e-05 0.0	2010305	0.34411,11
*+ 00		2010306	0.48578,12
*1070200	3 15.4e06 545.0	2010307	1.20561,18
*1071101	106010000 107000000 0.0 0.288 0.288 0000	2010308	1.21831,19
*1072101	107010000 108000000 0.0 0.0 0.0 0100	2010309	0.20955,20
*1071201	0.260 0.0 0.0	2010601	90.0,9
*1072201	0.260 0.0 0.0	2010602	70.0,10
*		2010603	-70.0,11
* Insatallation of ECCMIX component at Nov. 26, 1996		2010604	-90.0,20
*		* andy modified 4/21/83 roughness from 4.0e-05 to 5.0e-05	
1070000	inlg eccmix	2010801	4.0e-05,0.08386.1
1070001	3 0	2010802	4.0e-05,0.01974,19
1070101	0.00349 0.79626 0.0 0.0 0.0 0.0	2010803	4.0e-05,0.08386.20
1070102	4.0e-5 0.0 00000	2010901	0.0.0.0.8
1070200	0 1.5416e+07 0.11853e+07 0.24499e+07 0.0	2010902	0.3375.0.3375.9
1071101	610010000 107000000 4.64e-04 0. 0. 000000 *30.	2010903	0.675,0.675,10
1072101	106010000 107000000 0.0 0.288 0.288 000000 *0.	2010904	0.3375.0.3375.11
1073101	107010000 108000000 0.0 0.0 0.0 000100 *0.	2010905	0.0.0.0.19
1071201	0.0 0.0 0.0	2011001	00.20
1072201	0.15395 0.15395 0.0	2011101	0100.1
1073201	0.15395 0.15395 0.0	2011102	0000.18
*		2011103	0100.19
* ILCL nozzle to reactor vessel		2011201	3 15.4e06 563.2 0.0 0.0 0.0 20
*		2011300	1
1080000	dcmrlnl branch	2011301	0.260 0.0 0.0 19
1080001	1	*	
1080101	0.00420 0.18161 0.0 0.0 0.0 0.0 4.0e-05 0.0	* ILSG secondary side boiler section	
+ 00		*	
1080200	3 15.4e06 545.0	2020000	sgshr pipe
1081101	108010000 517010000 0.0 0.0 0.0 0100	2020001	12
1081201	0.260 0.0 0.0	2020101	0.0.12
*		2020201	0.00399.6
* junction between crossoverleg out let and ILCL piping		2020202	0.00371.7
*		2020203	* andy modified 2020203, 4/21/83
1100000	pmpsimi sngljun	2020203	0.00477.8
1100101	105010000 106000000 0.0 0.0 0.0 0100	2020204	0.00555.9
1100201	1 0.260 0.0 0.0	2020205	0.01342.10
*****		2020206	0.03515.11
*****		2020207	0.05502.12
* Intact loop steam generator		2020301	1.21831.1
*****		2020302	1.20561.7
*****		2020303	0.48578.8
* ILSG U-tubes		2020304	0.58737.9
*		2020305	0.41891.10
2010000	sgprim pipe	2020306	0.37827.11
2010001	20	2020307	0.50635.12

\* andy modified 2020401 to 2020413 4/21/83

2020401 0.014264,1

2020402 0.016574,2

2020403 0.013183,3

2020404 0.016789,4

2020405 0.013532,5

2020406 0.012870,6

2020407 0.012850,7

2020408 0.005849,8

2020409 0.009278,9

2020410 0.007631,10

2020411 0.015420,11

2020412 0.026025,12

\*2020413 0.028815,13

2020601 90.0,12

2020801 5.0e-06,0.03108,7

2020802 5.0e-06,0.04063,8

2020803 5.0e-06,0.05956,9

2020804 5.0e-06,0.06729,10

2020805 5.0e-06,0.0,12

2021001 00,12

2021101 0100,9

2021102 0000,11

2021201 2 5.85e06 0.0 0.0 0.0 0.0 12

2021300 1

2021301 0.0 0.0 0.0 0.0 11

\*-----

\* separator

\*-----

\*2030000 separatr separatr

\*2030001 3 0

\*2030101 0.0 0.50635 0.030848 0.0 -90.0 -0.50635 5.0e-06 0.1365 00

\*2030200 2 5.85e06 0.0

\*2031101 203000000 204000000 0.0 0.0 0.0 0100

\*2032101 202010000 203000000 0.0 0.0 0.0 0100

\*2033101 203010000 209000000 0.0 0.0 0.0 0100

\*2031201 0.0 0.0 0.0

\*2032201 0.0 0.0 0.0

\*2033201 0.0 0.0 0.0

\*

2030000 separatr separatr

2030001 3 0

2030101 0.0 0.50635 0.059663 0.0 90.0 0.50635 5.0e-06 + 0.1365 00

2030200 2 5.85e+6 0.9

\*2030200 2 5.85e+6 0.0

\*

\* modified by ysbang at 93/9/6

\* to match test initial condition

\*

2031101 203010000 204000000 0.06729 0.0 0.0 00100

2032101 203000000 209000000 0.058963 0.0 0.0 00100

2033101 202010000 203000000 0.05139 0.0 0.0 00100

2031201 0.0 0.0 0.0

2032201 0.0 0.0 0.0

2033201 0.0 0.0 0.0

\*-----

\* ILSG steam dome

\*-----

2040000 steamdom sng!vol

2040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0-6 + 0.32849 00

2040200 2 5843600.0 1.0

\*-----

\* ILSG downcomer

\*-----

2050000 stdome pipe

2050001 10

2050101 0.0,10

2050301 0.41891,1

2050302 0.58737,2

2050303 0.48578,3

2050304 1.20561,9

2050305 1.21831,10

\* a. modified 2050101, 2050401 to 2050405 4/21/83

2050401 0.006337,1

2050402 0.003252,2

2050403 0.001322,3

2050404 0.003279,9

2050405 0.003314,10

2050601 -90.0,10

2050801 5.0e-06,0.01023,10

2051001 00.10

2051101 0000.9

2051201 2 5.85e06 0.0 0.0 0.0 0.0 0.0 10

2051300 1

2051301 0.0 0.0 0.0 0.0 09

\*-----

\* Auxiliary Feedwater Source

\*-----

2060000 feedin! tmdpvol

2060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00

2060200 3

2060201 0.0 5.85e06 495.0

\*-----

\* Secondary side steam condenser

\*-----

2070000 stcamout tmdpvol

2070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00

2070200 2 \* !

\*2070201 0.0 546.98 1.0

2070201 0.0 5.85e+6 1.0

\*

\* modified by ysbang at 93/9/6

\* to match test initial condition

\*  
 \*-----  
 \* separator bypass part  
 \*-----  
 2090000 sepbyps pipe  
 2090001 2  
 2090101 0.0,2  
 2090301 0.50635,1  
 2090302 0.37827,2  
 \* andy modified volumes 2090401 to 2090402 4/21/63  
 2090401 0.029856,1  
 2090402 0.020686,2  
 2090601 -90.0,2  
 2090801 5.0e-06,0.13170,1  
 2090802 5.0e-06,0.08490,2  
 2091001 00,2  
 2091101 0000,1  
 \*2091201 2 5.85e06 0.0 0.0 0.0 0.0 0.02  
 2091201 2 5.85e+06 0.01 0.0 0.0 0.0 0.02  
 \*  
 \* modified by ysbang at 93/9/6  
 \* to match test initial condition  
 \*  
 2091300 1  
 2091301 0.0 0.0 0.0 0.01  
 \*  
 \*-----  
 \* Junction between bypass part to downcomer  
 \*-----  
 2100000 sepbyps sngljun  
 2100101 209010000 205000000 0.0 0.0 0.0 0000  
 2100201 I 0.260 0.0 0.0  
 \*-----  
 \* Junction between ILHL and SG inlet plenum  
 \*-----  
 2210000 sginlp sngljun  
 2210101 104010000 201000000 0.00229 0.288 0.288 0100  
 2210201 I 0.260 0.0 0.0  
 \*-----  
 \* Junction between SG outlet plenum and Crossover leg  
 \*-----  
 2220000 sgout-p sngljun  
 2220101 201010000 105000000 0.00229 0.288 0.288 0100  
 2220201 I 0.260 0.0 0.0  
 \*-----  
 \* Junction between downcomer and boiler section  
 \*-----  
 2310000 dcrrout sngljun  
 2310101 205010000 202000000 0.0 0.0 0.0 0100  
 2310201 I 0.0 0.0 0.0  
 \*-----  
 \* SG steam outlet junction  
 \*-----  
 2320000 steamout sngljun  
 2320101 204010000 207000000 0.0 0.0 0.0 0100  
 2320201 I 0.0 0.0 0.0  
 2330000 feedinlp tmddpjun  
 2330101 206000000 205000000 0.00043  
 \*2330200 I 501 cntrivar 2  
 2330201 -1.0 0.0 0.0 0.0  
 2330202 0.0 2.0 0.0 0.0  
 2330203 10.0 0.0 0.0 0.0  
 2330204 20.0 0.0 0.0 0.0  
 \*\*\*\*\*  
 \*\*\*\*\*  
 \* pressurizer  
 \*\*\*\*\*  
 \*-----  
 \* Pressurizer Vessel  
 \*-----  
 3010000 preizer pipe  
 3010001 6  
 3010101 0.0.6  
 3010201 2.69125e-02.2  
 3010202 6.72832e-03.3  
 3010203 2.69125e-02.5  
 3010301 0.240915.2  
 3010302 0.21967.5  
 3010303 0.066294.6  
 3010401 0.0064825.2  
 3010402 0.0059118.5  
 3010403 0.001136.6  
 3010601 -90.0.6  
 3010801 4.0e-05,0.0.6  
 3011001 00.6  
 3011101 0000.2  
 3011102 0100.3  
 3011103 0000.5  
 3011201 2 15.4e06 1.0 0.0 0.0 0.0 01  
 \*3011202 2 15.4e06 0.1728 0.0 0.0 0.0 02  
 3011202 2 15.4e06 1.0 0.0 0.0 0.0 02  
 \*  
 \* Modified by ysbang at 96/9/18  
 \* to match test initial condition  
 \*  
 3011203 2 15.4e06 0.0 0.0 0.0 0.0 0.006  
 3011300 I  
 3011301 0.0 0.0 0.0 0.05  
 \*-----  
 \* Pressurizer Surgeline  
 \*-----  
 3020000 pzsrsurge pipe  
 3020001 7  
 3020101 0.0.7  
 3020301 0.20574.1  
 3020302 0.17780.2

3020303	0.48895,3	4010001	2 1
3020304	0.67310,7	4010101	0.00349 0.40818 0.0 0.0 0.0 0.0 4.0e-05 0.0
3020401	7.1837-04,1	+ 00	
3020402	2.32141-04,2	4010200	3 15.4e06 581.4
3020403	1.64577-04,3	4011101	508010000 401000000 0.0 0.5 1.0 0100
3020404	4.4046-05,7	4012101	401010000 402000000 0.0 0.0 0.0 0100
3020601	-90.0,3	4011201	0.260 0.0 0.0
3020602	-45.0,7	4012201	0.260 0.0 0.0
3020701	-0.20574,1	*-----	
3020702	-0.17780,2	* BLHL Piping	
3020703	-0.48895,3	*-----	
3020704	-0.16380,7	4020000	hotleg pipe
3020801	4.0e-05,0,0,7	4020001	7
3020901	502.8,502.8,1	4020101	0.00091,7
3020902	33.42,33.42,2	4020301	0.60985,1
3020903	0.0,0.0,3	4020302	0.40860,2
3020904	1.42,1.42,5	4020303	0.98579,3
3020905	0.0,0.0,6	4020304	0.41783,4
3021001	00,7	4020305	0.35235,5
3021101	0000,6	4020306	0.34925,6
3021201	3 15.4e06 581.4 0.0 0.0 0.0 07	4020307	0.60879,7
3021300	1	4020601	0.3
3021301	0.0 0.0 0.0 06	4020602	90.0,6
*		4020603	50.0,7
* Junction between Pressurizer Vessel and Surgeline		4020701	0.3
*		4020702	0.41783,4
3210000	pzrout sngljun	4020703	0.35235,5
3210101	301010000 302000000 0.00349 0.0 0.0 0100	4020704	0.34925,6
3210201	1 0.0 0.0 0.0	4020705	0.46711,7
*		4020801	4.0e-05,0,0,7
* need to modify this		4020901	0.0,0.0,1
*		4020902	0.525,0.525,2
* Pressurizer downstream		4020903	0.630,0.630,3
*		4020904	0.0,0.0,5
3300000	pctrl tm dpvol	4020905	0.336,0.336,6
3300101	10.0 10.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00	4021001	00000 7
3300200	2	4021101	0000,6
3300201	0.0 15.4e06 1.0	4021201	3 15.4e06 581.4 0.0 0.0 0.0 07
*		4021300	1
* Pressurizer control valve		4021301	0.260 0.0 0.0 06
*		*	
3310000	pcontlv sngljun	* BL crossover leg	
3310101	301000000 330000000 0.005 0.0 0.0 0100	*	
3310201	1 0.0 0.0 0.0	4030000	pmpscn pipe
*		4030001	12
*****		4030101	0.00091,12
* broken loop piping		4030301	0.49424,1
*****		4030302	0.34925,2
*****		4030303	0.35235,3
* Broken Loop Hot Leg Nozzle		4030304	0.34925,4
*		4030305	1.08318,5
4010000	vsslout branch	4030306	0.78512,7
		4030307	0.48944,9

4030308 0.78512,11  
 4030309 0.70002,12  
 4030601 -60.0,1  
 4030602 -90.0,7  
 4030603 -45.0,8  
 4030604 45.0,9  
 4030605 90.0,12  
 4030701 -0.39980,1  
 4030702 -0.34925,2  
 4030703 -0.35235,3  
 4030704 -0.34925,4  
 4030705 -1.08318,5  
 4030706 -0.78512,7  
 4030707 -0.376936,8  
 4030708 0.376936,9  
 4030709 0.78512,11  
 4030710 0.70002,12  
 4030801 4.0e-05,0.0,12  
 4030901 0.336,0.336,1  
 4030902 0.0,0.0,6  
 4030903 0.525,0.525,8  
 4030904 0.0,0.0,11  
 4031001 00,12  
 4031101 0000,11  
 4031201 3 15.4e06 545.0 0.0 0.0 0.0 12  
 4031300 1  
 4031301 0.260 0.0 0.0 11  
 \*-----  
 \* BLCL piping & ECC Injection point  
 \*-----  
 \* Installation of ECCMIX component at Nov. 26. 1996  
 \*-----  
 \*4040000 blcldsb snglvol  
 \*4040101 0.00091 0.83083 0.0 0.0 0.0 0.0 4.0e-05 0.0  
 \*+ 0.0  
 \*4040200 3 15.4e06 545.0  
 \*-----  
 4070000 brclg eccmix  
 4070001 3 0  
 4070101 0.00091 0.5303 0.0 0.0 0.0 0.0  
 4070102 4.0e-05 0.0 00000  
 4070200 0 1.5416e+07 0.11868e+07 0.24497e+07 0.0  
 4071101 810010000 407000000 4.64e+04 0.0 0.0 000000 \*30.  
 4072101 404010000 407000000 0.00091 0.0 0.0 000000 \*0.  
 4073101 407010000 405000000 0.00091 0.0 0.0 000000 \*0.  
 4071201 0.0 0.0 0.0  
 4072201 0.1535 0.1535 0.0  
 4073201 0.1535 0.1535 0.0  
 \*-----  
 \* BL ECC Injection point  
 \*-----  
 4040000 brclg! snglvol  
 4040101 0.00091 0.30 0.0 0.0 0.0 0.0

4040102 4.0e-05 0.0 000000  
 4040200 0 1.5416e+07 0.11868e+07 0.24497e+07 0.0  
 \*-----  
 \* BLCL Piping  
 \*-----  
 4050000 coldleg pipe  
 4050001 2  
 4050101 0.00091,2  
 4050301 0.27178,1  
 4050302 0.71145,2  
 4050601 0.0,2  
 4050801 4.0e-05,0.0,2  
 4050901 0.138,0.138,1  
 4051001 00,2  
 4051101 0000,1  
 4051201 3 15.4e06 545.0 0.0 0.0 0.0 02  
 4051300 1  
 4051301 0.260 0.0 0.0 01  
 \*-----  
 \* BLCL Nozzle to RV  
 \*-----  
 4060000 vsslinit branch  
 4060001 2 1  
 4060101 0.00349 0.38898 0.0 0.0 0.0 0.0 4.0e-05 0.0  
 + 00  
 4060200 3 15.4e06 545.0  
 4061101 405010000 406000000 0.0 0.0 0.0 0.0 0100  
 4062101 406010000 517010000 0.0 1.0 0.5 0100  
 4061201 0.260 0.0 0.0  
 4062201 0.260 0.0 0.0  
 \*-----  
 \* BL Pump  
 \*-----  
 4500000 brkppmp pump  
 4500101 0.0 0.59847 0.00086 0.0 90.0 0.03137 00  
 4500108 403010000 0.00090 0.0 0.0 000100  
 \*4500109 404000000 0.00010 0.0 0.0 000000  
 \*-----  
 \* Junction Area Modified by ysbang at April 8, 1996  
 \* to correct unbalance of void distribution  
 \*-----  
 4500109 404000000 0.00090 0.0 0.0 C00000  
 \*-----  
 \* end of modification  
 \*-----  
 4500200 3 15.4e06 545.0  
 4500201 1 0.26 0.0 0.0  
 4500202 1 0.26 0.0 0.0  
 4500301 0 0 -1 0 501 0  
 4500302 1597.0000 0.1 .003240000 79.553000  
 + 2.9810000 .00925000  
 4500303 998.400 .00000 .0000 2.4800 00000 .00000  
 \*-----

\* BLCL junction for normal flow

---

\*-----

\*4210000 blcl-lg sngljun

\*4210101 404010000 405000000 0.00091 0.0 0.0 0000

\*4210201 1 0.260 0.0 0.0

\*

\*\*\*\*\*

\* Reactor Vessel

\*\*\*\*\*

\* Lower Plenum

-----

5010000 lowpln1 snglvol

5010101 0.0 0.14224 0.00674 0.0 90.0 0.14224 4.0e-05

+ 0.1162 00

5010200 3 15.4e06 545.0

-----

\* Lower Plenum

-----

5020000 lowpln2 branch

5020001 .3 1

5020101 0.0 0.22004 0.00659 0.0 90.0 0.22004 4.0e-05

0.0699 00

5020200 3 15.4e06 545.0

5021101 501010000 502000000 0.0 0.0 0.0 0000

5022101 502010000 503000000 0.00431 0.0 0.0 0100

5023101 502010000 519000000 0.0 0.5 1.0 0100

5021201 0.0 0.0 0.0

5022201 0.52 0.0 0.0

5023201 0.52 0.0 0.0

-----

\* Lower Core Support Structure

-----

5030000 lowpln3 snglvol

5030101 0.0 0.31725 0.00296 0.0 90.0 0.31725 4.0e-05

+ 0.0101 00

5030200 3 15.4e06 545.0

-----

\* Core Inlet

-----

5040000 lowpln4 branch

\*5040001 2 1

\* modified by ysbang at may 18. 1996

\* to implement two core channel model

\*

5040001 3 1

5040101 0.0 0.18136 0.00052 0.0 90.0 0.18136 4.0e-05

+ 0.0101 00

5040200 3 15.4e06 545.0

5041101 503010000 504000000 0.0 0.0 0.0 0100

5042101 504010000 505000000 0.0 0.0 0.0 0100

5043101 504010000 555000000 0.0 0.0 0.0 0100

---

5041201 0.52 0.0 0.0

5042201 0.52 0.0 0.0

5043201 0.52 0.0 0.0

-----

\* Active Core

-----

\* average core channel

\* ( two-core channel model area ratio=50:50 )

-----

5050000 core pipe

5050001 8

\*5050101 0.00286,8

\* modified by ysbang at may 18, 1996

\* to implement two core channel model

5050101 0.00143 8

\*

5050301 0.6096,2

5050302 0.3048,6

5050303 0.6096,8

5050601 90.0,8

\* andy modified volume 5050801 to 5.0e-05 5/4/83

5050801 2.0e-05,0.01,8

5050901 1.5,1.5,7

5051001 00,8

5051101 00100,7

\*

\* modified by ysbang at may 18, 1996

\* to use rod bundle interfacial drag corr.

5051201 3 15.4e06 563.2 0.0 0.0 0.0 0.08

5051300 1

5051301 0.520 0.0 0.0 7

-----

\* hot core channel

-----

5550000 core pipe

5550001 8

5550101 0.00143 8

5550301 0.6096,2

5550302 0.3048,6

5550303 0.6096,8

5550601 90.0,8

\* andy modified volume 5050801 to 5.0e-05 5/4/83

5550801 2.0e-05,0.01,8

5550901 1.5,1.5,7

5551001 00,8

5551101 00100,7

5551201 3 15.4e06 563.2 0.0 0.0 0.0 0.08

5551300 1

5551301 0.520 0.0 0.0 7

-----

\* multiple junction connection between hot and

\* average channel core volume by crossflow

-----

5600000 corecros mtpljun  
 5600001 8 1  
 5600011 505010003 555010004 0.0 0.0 0.0 000003  
 + 1.0 1.0 1.0 10000 10000 0 8  
 5601011 0.0 0.0 8  
 \*  
 \* Core Outlet  
 \*  
 5060000 upprpln1 branch  
 \*5060001 2 1  
 \* modified by ysbang at may 18, 1996  
 \* to use rod bundle interfacial drag corr.  
 5060001 3 1  
 5060101 0.0 0.30505 0.00164 0.0 90.0 0.30505 2.0e-05  
 + 0.023 00  
 5060200 3 15.4e06 581.4  
 5061101 505010000 506000000 0.0 0.0 0.0 0100  
 5062101 555010000 506000000 0.0 0.0 0.0 0100  
 5063101 506010000 507000000 0.00321 0.0 0.0 0100  
 5061201 0.520 0.0 0.0  
 5062201 0.520 0.0 0.0  
 5063201 0.52 0.0 0.0  
 \*  
 \* Upper Plenum  
 \*  
 5070000 upprpln2 snglvol  
 5070101 0.0 0.68910 0.00281 0.0 90.0 0.68910 4.0e-05  
 + 0.0401 00  
 5070200 3 15.4e06 581.4  
 \*  
 \* Upper Plenum  
 \*  
 5080000 upprpln3 branch  
 5080001 2 1  
 5080101 0.0 0.52070 0.00218 0.0 90.0 0.52070 4.0e-05  
 + 0.483 00  
 5080200 3 15.4e06 581.4  
 5081101 507010000 508000000 0.00277 0.0 0.0 0100  
 5082101 508010000 509000000 0.00415 0.0 0.0 0100  
 5081201 0.520 0.0 0.0  
 5082201 0.0 0.0 0.0  
 \*  
 \* Upper Part of Upper Plenum  
 \*  
 5090000 upprpln4 pipe  
 5090001 2  
 5090101 0.0.2  
 5090301 0.2761.1  
 5090302 0.7786.2  
 5090401 0.00143.1  
 5090402 0.004047.2  
 5090601 90.0.2  
 5090801 4.0e-05.0.04.1  
 5090802 4.0e-05.0.0509.2  
 5091001 00.2  
 5091101 0000.1  
 5091201 3 15.4e06 581.4 0.0 0.0 0.0 02  
 5091301 0.0 0.0 0.0 01  
 \*  
 \* Upper Part of Plenum  
 \*  
 5100000 upprpln5 snglvol  
 5100101 0.0 0.0756 0.000393 0.0 90.0 0.0756 4.0e-05  
 + 0.0509 00  
 5100200 3 15.4e06 581.4  
 \*  
 \* Guid Tube Thimble  
 \*  
 5130000 guidtub branch  
 5130001 1 0  
 5130101 0.0 1.651 0.00034 0.0 90.0 1.651 5.0e-06  
 + 0.0160 00  
 5130200 3 15.4e06 581.4  
 5131101 507010000 513000000 0.0 0.0 0.0 0100  
 5131201 0.0 0.0 0.0  
 \*  
 \* Guide Tube Thimble  
 \*  
 5140000 suscoln branch  
 5140001 1 0 ..  
 5140101 0.0 2.3401 0.00034525 0.0 90.0 2.3401 5.0e-06  
 + 0.00975 00  
 5141101 506010000 514000000 0.0 0.0 0.0 0100  
 5140200 0 15415300.0 1356030.0 0.0 0.0  
 5141201 0.0 0.0 0.0  
 \*  
 \* Upper Part of Cold Leg Nozzle/Downcome:  
 \*  
 5160000 upprdcm1 annulus  
 5160001 1  
 5160101 0.00982.1  
 5160301 0.26670.1  
 5160601 90.0.1  
 5160801 4.0e-05.0.04351.1  
 5161001 00.1  
 5161201 3 15.4e06 560.0 0.0 0.0 0.0 1  
 \*  
 \* Downcomer Annulus  
 \*  
 5170000 upprdcm2 annulus  
 5170001 1  
 5170101 0.00982.1  
 5170301 0.38418.1  
 5170601 90.0.1  
 5170801 4.0e-05.0.04351.1  
 5171001 00.1

5171201 3 15.4e06 560.0 0.0 0.0 0.0 1	5310101 0.00007,3
*-----	5310301 0.38247,3
* Downcomer Annulus	5310601 90.0,2
*-----	5310602 55.33,3
5180000 lowdcmr pipe	5310701 0.38247,2
5180001 10	5310702 0.31456,3
5180101 0.00242,10	5310801 5.0e-06,0.0094,3
5180301 0.4890,9	5310901 0.0,0.0,2
5180302 0.37661 10	5311001 00,3
5180601 90.0,10	5311101 0000,2
5180801 4.0e-05,0.0,10	5311201 3 15.4e06 550.0 0.0 0.0 0.0 3
5180901 0.3,0.3,1	5311300 1
5180902 0.0,0.0,8	5311301 0,0.0. 0.0,2
5180903 0.114,0.114,9	*-----
5181001 00,10	* Junction between Guide Tube and Upper Penum Volume
5181101 0000,9	*-----
5181201 3 15.4e06 550.0 0.0 0.0 0.0 10	5320000 gt-up sngljun
5181300 1	5320101 513010000 510010000 0.0 0.0 0.0 0100
5181301 -0.26,0.0,0.9	5320201 0 0.0 0.0 0.0
*-----	*-----
* Connection Volume to Lower Plenum	* Junction between Guide Tube and Upper Penum Volume
*-----	*-----
5190000 lowdcm annulus	5330000 sc-up sngljun
5190001 1	5330101 514010000 510010000 0.0 0.0 0.0 0100
5190101 0.00708,1	5330201 0 0.0 0.0 0.0
5190301 0.29337,1	*-----
5190601 90.0,1	* Junction between Upper Annulus and Lower Annulus
5190801 4.0e-05 0.0341,1	*-----
5191001 00,1	5340000 dc-byps sngljun
5191201 3 15.4e06 550.0 0.0 0.0 0.0 1	5340101 516010000 531000000 0.0 0.0 0.0 0100
*-----	5340201 0 0.0 0.0 0.0
* Junction between Downcomer and Volume	*-----
*-----	* Junction between Upper Penum and Upper Annulus
5200000 dcmrann sngljun	*-----
5200101 519010000 518000000 0.0 0.3 0.3 0100	5350000 byps-up sngljun
5200201 1 -0.26 0.0 0.0	5350101 531010000 510010000 1.62-5 300. 300. 0100
*-----	5350201 0 0.0 0.0 0.0
* Junction between Downcomer and Upper part	*-----
*-----	* Junction between Upper Plenum Volumes
5210000 upprdcmr sngljun	*-----
5210101 517010000 516000000 0.0 0.0 0.0 0100	5360000 up-cnet sngljun
5210201 1 0.0 0.0 0.0	5360101 509010000 510000000 0.0 0.0 0.0 0100
*-----	5360201 0 0.0 0.0 0.0
* Junction between Downcomer and Lower Volume	*-----
*-----	* ecc system
5220000 uplowcm sngljun	*-----
5220101 518010000 517000000 0.0 0.0 0.0 0100	* ECCS line from accumulator to cold leg
5220201 1 -0.26 0.0 0.0	*-----
*-----	6100000 ilcl-ecc pipe
* Upper Annulus of Downcomer	6100001 1
*-----	6100101 0.000464 1
5310000 bypsline pipe	6100301 3.048 1
5310001 3	

6100401	0.0	1	7010306	1.25641,6
6100601	0.0	1	7010307	1.15481,7
6100701	0.0	1	7010308	1.06591,8
6100801	5.0e-04	0.0 1	7010309	0.98206,10
6101001	00	1	7010310	1.06591,11
6101201	I	300.0 0.0 0.0 0.0 0.0 1	7010311	1.15481,12
*			7010312	1.25641,13
* intact loop accumulator			7010313	1.23101,14
*			7010314	1.15481,15
6110000	ilcl-acc	accum	7010315	1.23101,16
6110101	0.0 1.08032	0.071142 0.0 90.0 1.08032 5.0-04	7010316	1.19609,17
0.0 00000			7010317	0.26035,18
6110200	4.240e06	300.0	7010601	90.0,8
6111101	610000000	4.66e-04 0.0 0.0 0000	7010602	77.0,9
6112200	0.049043	0.0 9.144 0.0 1.45e-03 0 0 0 0	7010603	-77.0,10
*			7010604	-90.0,18
* ECCS line from accumulator to cold leg			* andy modified roughness to 5.0e-05 4/21/84	
*			7010801	4.0e-05,0.07797,1
8100000	blcl-ecc	pipe	7010802	4.0e-05,0.01974,17
8100001	I		7010803	4.0e-05,0.07797,18
8100101	0.000250	1	7010901	0.0,0,0,7
8100301	3.048	1	7010902	0.3375,0.3375,8
8100401	0.0	1	7010903	0.675,0.675,9
8100601	0.0	1	7010904	0.3375,0.3375,10
8100701	0.0	1	7010905	0.0,0,0,17
8100801	5.0e-04	0.0 1	7011001	00,18
8101001	00	1	7011101	0100,1
8101201	I	300.0 0.0 0.0 0.0 0.0 1	7011102	0000,16
*			7011103	0100,17
* broken loop accmulator			7011201	3 15.4e06 581.4 0.0 0.0 0.018
*			7011300	1
8110000	blcl-acc	accum	7011301	0.260 0.0 0.0 17
8110101	0.0 0.36027	0.02371 0.0 90.0 0.36027 5.0-04	*	
+ 0.0 00000			* Broken Loop SG Boiler Section	
8110200	4.240e06	300.0	7020000	sgroud pipe
8111101	810000000	2.50e-04 0.0 0.0 0000	*7020001	11
8112200	0.01776	0.0 6.096 0.0 1.45e-03 0 0 0 0	7020001	10
*			7020101	0.0,10
*****				
* broken loop steam generator			7020201	0.00462,7
*****				
* Broken Loop SG U-tubes			7020202	0.0,9
*			7020301	1.19609,1
7010000	brlpsign pipe		7020302	1.23101,2
7010001	I8		7020303	1.15481,3
7010101	0.00516,1		7020304	1.23101,4
7010102	0.00061,17		7020305	1.25641,5
7010103	0.00516,18		7020306	1.15481,6
7010301	0.26035,1		7020307	1.06591,7
7010302	1.19609,2		7020308	1.65398,8
7010303	1.23101,3		7020309	0.37827,9
7010304	1.15481,4		7020310	0.50635,10
7010305	1.23101,5		* andy modified volumes 7020401 to 7020411 4/21/83	
			7020401	0.013509,1

7020402 0.009036,2  
 7020403 0.008470,3  
 7020404 0.010739,4  
 7020405 0.009615,5  
 7020406 0.008474,6  
 7020407 0.008425,7  
 7020408 0.015782,8  
 7020409 0.016807,9  
 7020410 0.025882,10  
 \*7020411 0.025882,11  
 7020601 90.0,10  
 7020801 5.0e-06,0.1999,8  
 7020802 5.0e-06,0.0,10  
 7021001 00,10  
 7021101 0100,7  
 7021102 0000,9  
 7021201 2 5.89e06 0.0 0.0 0.0 0.0 10  
 7021300 1  
 7021301 0.0 0.0 0.0 9  
 \*  
 \* Separator  
 \*  
 \*7030000 separatr separatr  
 \*7030001 3 0  
 \*\* modified 4/21/83  
 \*7030101 0.0 0.50635 0.030854 0.0 -90.0 0.50635 5.0e-  
 + 06 0.13650 00  
 \*7030200 2 5.89e06 0.0  
 \*7031101 703000000 704000000 0.0 0.0 0.0 0100  
 \*7032101 702010000 703000000 0.0 0.0 0.0 0100  
 \*7033101 703010000 709000000 0.0 0.0 0.0 0100  
 \*7031201 0.0 0.0 0.0  
 \*7032201 0.0 0.0 0.0  
 \*7033201 0.0 0.0 0.0  
 \*  
 7030000 separatr separatr  
 7030001 3 0  
 7030101 0.0 0.50635 0.056736 0.0 90.0 0.50635 5.0e-6  
 + 0.1365 00  
 \*7030200 2 5.89e+6 0.0  
 7030200 2 5.89e+6 0.9  
 \*  
 \* modified by ysbang at 93/9/6  
 \* to match test initial condition  
 \*  
 7031101 703010000 704000000 0.0547542 0.0 0.0 00100  
 7032101 703000000 709000000 0.05299024 0.0 0.0  
 + 00100  
 7033101 702010000 703000000 0.04593079 0.0 0.0  
 00100  
 7031201 0.0 0.0 0.0  
 7032201 0.0 0.0 0.0  
 7033201 0.0 0.0 0.0

\*-----  
 \* Broken Loop Steam Dome  
 \*-----  
 7040000 steamdom sng!vol  
 7040101 0.0 0.40005 0.03390 0.0 90.0 0.40005 5.0e-06  
 + 0.32849 00  
 7040200 2 5.89e06 1.  
 \*-----  
 \* Broken Loop SG Downcomer  
 \*-----  
 7050000 sgdowncom pipe  
 7050001 8  
 \* andy deleted this input; 7050101 0.00164,8  
 7050101 0.0,8  
 7050301 1.65398,1  
 7050302 1.06591,2  
 7050303 1.15481,3  
 7050304 1.25641,4  
 7050305 1.23101,5  
 7050306 1.15481,6  
 7050307 1.23101,7  
 7050308 1.19609,8  
 \* andy modified volumes 7050401 to 7050408 4/21/83  
 7050401 0.014458,1  
 7050402 0.002241,2  
 7050403 0.002435,3  
 7050404 0.002639,4  
 7050405 0.002589,5  
 7050406 0.002431,6  
 7050407 0.002593,7  
 7050408 0.002514,8  
 7050601 -90.0,8  
 7050801 5.0e-06,0.01016,8  
 7051001 00,8  
 7051101 0000,7  
 7051201 2 5.89e06 0.0 0.0 0.0 0.0 0.08  
 7051300 1  
 7051301 0.0 0.0 0.0 0.07  
 \*-----  
 \* Broken Loop Auxiliary Feedwater Source  
 \*-----  
 7060000 feedinlc tmdpvol  
 7060101 0.00114 1.0 0.0 0.0 0.0 0.0 5.0e-06 0.0 00  
 7060200 3  
 7060201 0.0 5.89e06 495.0  
 \*-----  
 \* Broke Loop Steam Condenser  
 \*-----  
 7070000 steamotl tmdpvol  
 7070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.0 00  
 7070200 1  
 7070201 0.0 547.4245 1.0  
 \*

\* Separator Bypass Volume

7090000 sepbyps pipe  
7090001 2  
7090101 0.0,2  
7090301 0.50635,1  
7090302 0.37827,2  
\* andy modified volumes 7090401 to 7090402 4/21/83  
7090401 0.029860,1  
7090402 0.020686,2  
7090601 -90.0,2  
7090801 5.0e-06,0.13170,1  
7090802 5.0e-06,0.08490,2  
7091001 00,2  
7091101 0000,1  
\*7091201 2 5.89e06 0.0 0.0 0.0 0.0 0.02  
7091201 2 5.89e+06 0.01 0.0 0.0 0.0 02  
\*  
\* modified by ysbang at 93/9/6  
\* to match test initial condition  
\*  
7091300 1  
7091301 0.0 0.0 0.0 0.01  
\*

\* Junction Between Separator Bypass Volume and Downcomer

7100000 sepbyps sngljun  
7100101 709010000 705000000 0.0 0.0 0.0 0000  
7100201 1 0.26 0.0 0.0  
\*

\* Junction between BLHL to SG Inlet Plenm

7210000 sgnlt sngljun  
7210101 402010000 701000000 0.00091 0.336 0.336 0100  
7210201 1 0.26 0.0 0.0  
\*

\* Junction between SG Outlet Plenum and Crossover Leg

7220000 sg-ouri sngljun  
7220101 701010000 403000000 0.00091 0.336 0.336 0100  
7220201 1 0.26 0.0 0.0  
\*

\* Junction between Downcomer and Boiler

7310000 dcomeut sngljun  
7310101 705010000 702000000 0.0 0.0 0.0 0100  
7310201 1 0.0 0.0 0.0  
\*

\* Junction Steam Discharge

7320000 steamuts sngljun  
7320101 704010000 707000000 0.0 0.0 0.0 0100  
7320201 1 0.0 0.0 0.0

\* Junction for Auxliary Feedwater

7330000 feed-ltp tmdpjun  
7330101 706000000 705000000 0.00043

7330200 1 501 cntrivar 12  
7330201 -1.0 0.0 0.0 0.0  
7330202 0.0 2.0 0.0 0.0  
7330203 10.0 0.0 0.0 0.0  
7330204 20.0 0.0 0.0 0.0  
\*

\* heat structures

\* ILHL Piping

11011000 1 5 2 1 0.03625  
11011100 0 2  
11011101 0.00278,4  
11011201 0001,4  
11011301 0.04  
11011401 568.0,5  
11011501 101010000, 0, 1, 1, 0.21971, 1  
11011601 0, 0, 0, 1, 0.21971, 1  
11011701 0.0.0.0.0.0.1  
11011801 0. 10. 10. 0. 0. 0. 0. 1.1  
11011901 0. 10. 10. 0. 0. 0. - 0. 1.1  
\*11011801 0. 0.0. 0.0. 0.21971, 1  
\*11011901 0. 0.0. 0.0. 0.21971, 1  
\*

\* ILHL Piping

11021000 4 5 2 1 0.03332  
11021100 0 2  
11021101 0.00278.4  
11021201 0001.4  
11021301 0.04  
11021401 568.0,5  
11021501 102010000, 0, 1, 1, 0.57074, 1  
11021502 102020000, 0, 1, 1, 0.17145, 2  
11021503 102030000, 0, 1, 1, 0.17145, 3  
11021504 102040000, 0, 1, 1, 0.22504, 4  
11021601 0. 0. 0. 1. 0.57074, 1  
11021602 0. 0. 0. 1. 0.17145, 2  
11021603 0. 0. 0. 1. 0.17145, 3  
11021604 0. 0. 0. 1. 0.22504, 4  
11021701 0. 0.0.0.0.0. 4  
11021801 0. 10. 10. 0. 0. 0. 0. 1.4  
11021901 0. 10. 10. 0. 0. 0. 0. 1.4  
\*11021801 0.0.0.0.0.0.57074.1  
\*11021802 0.0.0.0.0.0.17145.2  
\*11021803 0.0.0.0.0.0.17145.3  
\*11021804 0.0.0.0.0.0.22504.4

*11021901	0.0,0,0,0,0.57074,1	11042603	0,0,0,1,0.35560,4
*11021902	0,0,0,0,0,0.17145,2	11042604	0,0,0,1,0.64808,5
*11021903	0,0,0,0,0,0.17145,3	11042701	0,0,0,0,0,0,5
*11021604	0,0,0,0,0,0.22504,4	11042801	0. 10. 10. 0. 0. 0. 0. 1.5
*		11042901	0. 10. 10. 0. 0. 0. 0. 1.5
* ILHL Piping		11042801	0,0,0,0,0,0.23825,1
*		11042802	0,0,0,0,0,0.42494,2
11022000	2 5 2 1 0.02699	11042803	0,0,0,0,0,0.35560,4
11022100	0 2	11042804	0,0,0,0,0,0.64808,5
11022101	0.00238,4	11042901	0,0,0,0,0,0.23825,1
11022201	0001,4	11042902	0,0,0,0,0,0.42494,2
11022301	0,4	11042903	0,0,0,0,0,0.35560,3
11022401	568,0,5	11042904	0,0,0,0,0,0.64808,5
11022501	102050000,10000,1,1,0.38748,2	*	
11022601	0,0,0,1,0.38748,2	* IL Crossover Leg Piping (1 to 6)	
11022701	0,0,0,0,0,0,2	*	
11022801	0. 10. 10. 0. 0. 0. 0. 1.2	11052000	6 5 2 1 0.02699
11022901	0. 10. 10. 0. 0. 0. 0. 1.2	*11052100	1022
*11022801	0,0,0,0,0,0.38748,2	11052100	0 2
*11022901	0,0,0,0,0,0.38748,2	11052101	0.00238,4
*		11052201	0001,4
* ILHL Piping		11052301	0,4
*		11052401	350,0,5
11032000	1 5 2 1 0.02699	11052501	105010000,0,1,1,0.44488,1
*11032100	1022	11052502	105020000,0,1,1,0.40640,2
11032100	0 2	11052503	105030000,10000,1,1,0.35560,5
11032101	0.00238 4	11052504	105060000,0,1,1,0.49301,6
11032201	0001 4	11052601	0,0,0,1,0.44488,1
11032301	0,0 4	11052602	0,0,0,1,0.40640,2
11032401	568,0,5	11052603	0,0,0,1,0.35560,5
11032501	103010000,0,1,1,0.55880,1	11052604	0,0,0,1,0.49301,6
11032601	0,0,0,1,0.55880,1	11052701	0,0,0,0,0,0,6
11032701	0,0,0,0,0,0,1	11052801	0. 10. 10. 0. 0. 0. 0. 1.6
11032801	0. 10. 10. 0. 0. 0. 0. 1.1	11052901	0. 10. 10. 0. 0. 0. 0. 1.6
11032901	0. 10. 10. 0. 0. 0. 0. 1.1	*11052801	0,0,0,0,0,0.44488,1
*11032801	0,0,0,0,0,0.55880,1	*11052802	0,0,0,0,0,0.40640,2
*11032901	0,0,0,0,0,0.55880,1	*11052803	0,0,0,0,0,0.35560,5
*		*11052804	0,0,0,0,0,0.49301,6
* ILHL Piping to SG Inlet Plenum		*11052901	0,0,0,0,0,0.44488,1
*		*11052902	0,0,0,0,0,0.40640,2
11042000	5 5 2 1 0.02699	*11052903	0,0,0,0,0,0.35560,5
*11042100	1022	*11052904	0,0,0,0,0,0.49301,6
11042100	0 2	*	
11042101	0.00238,4	* IL Crossover Leg Piping (7 to 14)	
11042201	0001,4	*	
11042301	0,4	11051000	8 5 2 1 0.03332
11042401	568,0,5	*11051100	1021
11042501	104010000,0,1,1,0.23825,1	11051100	0 2
11042502	104020000,0,1,1,0.42494,2	11051101	0,00278,4
11042503	104030000,10000,1,1,0.35560,4	11051201	0001,4
11042504	104050000,0,1,1,0.64808,5	11051301	0,4
11042601	0,0,0,1,0.23825,1	11051401	550,0,5
11042602	0,0,0,1,0.42494,2	11051501	105070000,0,1,1,0.58572,1

11051502	105080000,0,1,1,0.78740,3	11061000	1 5 2 1	0.03332
11051503	105100000,0,1,1,0.26200,5	*11061100	1021	
11051504	105120000,10000,1,1,0.78740,7	11061100	0 2	
11051505	105140000,0,1,1,0.58572,8	11061101	0.00278,4	
11051601	0,0,0,1,0.58572,1	11061201	0001,4	
11051602	0,0,0,1,0.78740,3	11061301	0,0,4	
11051603	0,0,0,1,0.26200,5	11061401	550,0,5	
11051604	0,0,0,1,0.78740,7	11061501	106050000,0,1,1,0.75565,1	
11051605	0,0,0,1,0.58572,8	11061601	0,0,0,1,0.75565,1	
11051701	0,0,0,0,0,0,8	11061701	0,0,0,0,0,0,1	
*11051801	0,0,0,0,0,0.58572,1	*11061801	0,0,0,0,0,0.75565,1	
*11051802	0,0,0,0,0,0.78740,3	*11061901	0,0,0,0,0,0.75565,1	
*11051803	0,0,0,0,0,0.26200,5	11061801	0. 10. 10. 0. 0. 0. 0. 1.1	
*11051804	0,0,0,0,0,0.78740,7	11061901	0. 10. 10. 0. 0. 0. 0. 1.1	
*11051805	0,0,0,0,0,0.58572,8	*		
*11051901	0,0,0,0,0,0.58572,1	* Injection Nozzle Piping		
*11051902	0,0,0,0,0,0.78740,3	*		
*11051903	0,0,0,0,0,0.26200,5	11071000	1 5 2 1	3.332000e-02
*11051904	0,0,0,0,0,0.78740,7	*11071100	1021	
*11051905	0,0,0,0,0,0.58572,8	11071100	0 2	
11051801	0. 10. 10. 0. 0. 0. 0. 1.8	11071101	0.00278,4	
11051901	0. 10. 10. 0. 0. 0. 0. 1.8	11071201	0001,4	
*		11071301	0,0,4	
* ILCL Piping (1 to 4)		11071401	550,0,5	
*		11071501	107010000,0,1,1,0.79126,1	
11063000	4 5 2 1 0.01699	11071601	0,0,0,1,0.79126,1	
11063100	0 2	11071701	0,0,0,0,0,0,1	
11063101	0.00178,4	*11071801	0,0,0,0,0,0.79126,1	
11063201	0001,4	*11071901	0,0,0,0,0,0.79126,1	
11063301	0,0,4	11071801	0. 10. 10. 0. 0. 0. 0. 1.1	
11063401	550,0,5	11071901	0. 10. 10. 0. 0. 0. 0. 1.1	
11063501	106010000,0,1,1,0.44805,1	*		
11063502	106020000,0,1,1,1,14808,2	* ILCL Nozzle (to RV) Piping		
11063503	106030000,0,1,1,0.60046,3	*		
11063504	106040000,0,1,1,0.74320,4	11081000	1 5 2 1	0.03625
11063601	0,0,0,1,0.44805,1	*11081100	1011	
11063602	0,0,0,1,1,14808,2	11081100	0 2	
11063603	0,0,0,1,0.60046,3	11081101	0.00238,4	
11063604	0,0,0,1,0.74320,4	11081201	0001,4	
11063701	0,0,0,0,0,0,4	11081301	0,0,4	
*11063801	0,0,0,0,0,0.44805,1	11081401	550,0,5	
*11063802	0,0,0,0,0,1,14808,2	11081501	108010000,0,1,1,0.18161,1	
*11063803	0,0,0,0,0,0.60046,3	11081601	0,0,0,1,0.18161,1	
*11063804	0,0,0,0,0,0.74320,4	11081701	0,0,0,0,0,0,1	
*11063901	0,0,0,0,0,0.44805,1	*11081801	0,0,0,0,0,0.18161,1	
*11063902	0,0,0,0,0,1,14808,2	*11081901	0,0,0,0,0,0.18161,1	
*11063903	0,0,0,0,0,0.60046,3	11081801	0. 10. 10. 0. 0. 0. 0. 1.1	
*11063904	0,0,0,0,0,0.74320,4	11081901	0. 10. 10. 0. 0. 0. 0. 1.1	
11063801	0. 10. 10. 0. 0. 0. 0. 1.4	*		
11063901	0. 10. 10. 0. 0. 0. 0. 1.4	* IL SG U-tubes		
*		*		
* ILCL Piping (5)		12001000	18 5 2 1	0.00987
*		12001100	0 2	

I2001101	0.00031,	4	I2012505	202100000, 0,	1,	1,	0.41891, 10				
I2001201	0002, 4		I2012601	202010000, 0,	1,	1,	1.21831, 1				
I2001301	0.0,	4	I2012602	202020000, 10000,	1,	1,	1.20561, 7				
I2001401	550.0,	5	I2012603	202080000, 0,	1,	1,	0.48578, 8				
*			I2012604	202090000, 0,	1,	1,	0.58737, 9				
* left bndry	incre	B.C typ factor	I2012605	202100000, 0,	1,	1,	0.41891, 10				
*			I2012701	0,0.0,0,0,0,10							
I2001501	201020000, 0,	1,	I2012801	0,0,0,0,1,21831,1							
I2001502	201030000,	10000,	I2012802	0,0,0,0,1,20561,7							
I2001503	201090000, 0,	1,	I2012803	0,0,0,0,0,48578,8							
I2001504	201100000,	10000,	I2012804	0,0,0,0,0,58737,9							
I2001505	201120000, 0,	1,	I2012805	0,0,0,0,0,41891,10							
I2001506	201130000,	10000,	I2012901	0,0,0,0,1,21831,1							
I2001507	201190000, 0,	1,	I2012902	0,0,0,0,1,20561,7							
*			I2012903	0,0,0,0,0,48578,8							
* rightbndry	incre	B.C typ factor	I2012904	0,0,0,0,0,58737,9							
*			I2012905	0,0,0,0,0,41891,10							
I2001601	202010000, 0,	1,	I2012801	0.	10.	10.	0.	0.	0.	0.	1.10
I2001602	202020000,	10000,	I2012901	0.	10.	10.	0.	0.	0.	0.	1.10
I2001603	202080000, 0,	1,	*								
I2001604	202090000, 0,	1,	* IL SG Shroud Wall								
I2001605	202080000, 0,	1,	*								
I2001606	202070000,	-10000,	I2022000	10	5	2	1	0.10578			
I2001607	202010000, 0,	1,	I2022100	0	2						
*			I2022101	0.00094.4							
I2001701	0.	0.0.	I2022201	0001.4							
*I2001801	0,	0.01974,	I2022301	0.4							
*I2001802	0,	0.01974,	I2022400	2001							
*I2001803	0,	0.01974,	I2022501	202010000,0,1,1,1,21831,1							
*I2001804	0,	0.01974,	I2022502	202020000,10000,1,1,1,20561,7							
*I2001805	0,	0.01974,	I2022503	202080000,0,1,1,0,48578,8							
*I2001806	0,	0.01974,	I2022504	202090000,0,1,1,0,58737,9							
*I2001807	0,	0.01974,	I2022505	202100000,0,1,1,0,41891,10							
*I2001901	0.	0.00635,	I2022601	205100000,0,1,1,1,21831,1							
*I2001902	0,	0.00635,	I2022602	205090000,-10000,1,1,1,20561,7							
*I2001903	0.	0.00635,	I2022603	205030000,0,1,1,0,48578,8							
*I2001904	0.	0.00635,	I2022604	205020000,0,1,1,0,58737,9							
*I2001905	0.	0.00635,	I2022605	205010000,0,1,1,0,41891,10							
*I2001906	0,	0.00635,	I2022701	0.0,0,0,0,0,10							
*I2001907	0.	0.00635,	*I2022801	0.0,03108,0,04968,1,21831,1							
I2001801	0.	10.	*I2022802	0.0,03108,0,04968,1,20561,7							
I2001901	0.	10.	*I2022803	0.0,04063,0,07265,0,48578,8							
*			*I2022804	0.0,05956,0,11346,0,58737,9							
I2012000	10	5	*I2022805	0.0,06729,0,18133,0,41891,10							
I2012100	0	2	*I2022901	0.0,0,0,0,1,21831,1							
I2012101	0.00937.4		*I2022902	0.0,0,0,0,1,20561,7							
I2012201	0006.4		*I2022903	0.0,0,0,0,0,40578,8							
I2012301	0.0.4		*I2022904	0.0,0,0,0,0,58737,9							
I2012400	2001		*I2022905	0.0,0,0,0,0,41891,10							
I2012501	202010000, 0.	1,	I2022801	0.	10.	10.	0.	0.	0.	0.	1.10
I2012502	202020000,	10000,	I2022901	0.	10.	10.	0.	0.	0.	0.	1.10
I2012503	202080000, 0.	1,	*								
I2012504	202090000, 0.	1,	* II. SG Downcomer Internal Structure								

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12032000	10	5	2	1	0.11074
12032100	0	2			
12032101	0.00238,4				
12032201	0001,4				
12032301	0.0,4				
12032400	2001				
12032501	205010000,0,1,1,0.35840,1				
12032502	205020000,0,1,1,0.50253,2				
12032503	205030000,0,1,1,0.41561,3				
12032504	205040000,10000,1,1,1.03147,9				
12032505	205100000,0,1,1,1.04234,10				
12032601	205010000,0,1,1,0.35840,1				
12032602	205020000,0,1,1,0.50253,2				
12032603	205030000,0,1,1,0.41561,3				
12032604	205040000,10000,1,1,1.03147,9				
12032605	205100000,0,1,1,1.04234,10				
12032701	0.0.0.0.0.0,10				
*12032801	0.0.0.0.0.0.41891,1				
*12032802	0.0.0.0.0.0.58737,2				
*12032803	0.0.0.0.0.0.48578,3				
*12032804	0.0.0.0.0.0.1.20561,9				
*12032805	0.0.0.0.0.0.1.21831,10				
*12032901	0.0.0.0.0.0.41891,1				
*12032902	0.0.0.0.0.0.58737,2				
*12032903	0.0.0.0.0.0.48578,3				
*12032904	0.0.0.0.0.0.1.20561,9				
*12032905	0.0.0.0.0.0.1.21831,10				
12032801	0. 10. 10. 0. 0. 0. 0. 1. 10				
12032901	0. 10. 10. 0. 0. 0. 0. 0. 1. 10				

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#### \* IL SG Shroud Wall Upper Part

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12042000	3	5	2	1	0.13233
12042100	0	2			
12042101	0.00105,4				
12042201	0001,4				
12042301	0.0,4				
12042400	2001				
12042501	202110000,0,1,1,0.37827,1				
12042502	202120000,0,1,1,0.50635,2				
12042503	203010000,0,1,1,0.50635,3				
12042601	209020000,0,1,1,0.37827,1				
12042602	209010000,0,1,1,0.50635,2				
12042603	203010000,0,1,1,0.50635,3				
12042701	0.0.0.0.0.0.3				
*12042801	0.0.0.0.0.0.37827,1				
*12042802	0.0.0.0.0.0.50635,3				
*12042901	0.0.0.0.0.0.37827,1				
*12042902	0.0.0.0.0.0.50635,3				
12042801	0. 10. 10. 0. 0. 0. 0. 0. 1. 3				
12042901	0. 10. 10. 0. 0. 0. 0. 0. 0. 1. 3				

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#### \* IL SG Outer Wall to Environment

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12053000	10	5	2	1	0.12146
12053100	0	2			
12053101	0.00377,4				
12053201	0001,4				
12053301	0.0,4				
12053400	2001				
12053501	205010000,0,1,1,0.41891,1				
12053502	205020000,0,1,1,0.58737,2				
12053503	205030000,0,1,1,0.48578,3				
12053504	205040000,10000,1,1,1.20561,9				
12053505	205100000,0,1,1,1.21831,10				
12053601	-200,0,3205,1,0.41891,1				
12053602	-200,0,3205,1,0.58737,2				
12053603	-200,0,3205,1,0.48578,3				
12053604	-200,0,3205,1,1.20561,9				
12053605	-200,0,3205,1,1.21831,10				
12053701	0.0.0.0.0.0,10				
*12053801	0.0.0.0.0.0.41891,1				
*12053802	0.0.0.0.0.0.58737,2				
*12053803	0.0.0.0.0.0.48578,3				
*12053804	0.0.0.0.0.0.1.20561,9				
*12053805	0.0.0.0.0.0.1.21831,10				
*12053901	0.0.0.0.0.0.41891,1				
*12053902	0.0.0.0.0.0.58737,2				
*12053903	0.0.0.0.0.0.48578,3				
*12053904	0.0.0.0.0.0.1.20561,9				
*12053905	0.0.0.0.0.0.1.21831,10				
12053801	0. 10. 10. 0. 0. 0. 0. 0. 1. 10				
12053901	0. 10. 10. 0. 0. 0. 0. 0. 0. 1. 10				

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#### \* IL SG Outer Wall at Steam Dome

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12054000	4	5	2	1	0.20477
12054100	0	2			
12054101	0.00596,4				
12054201	0001,4				
12054301	0.0,4				
12054400	2001				
12054501	204010000,0,1,1,0.40005,1				
12054502	203010000,0,1,1,0.50635,2				
12054503	209010000,0,1,1,0.50635,3				
12054504	209020000,0,1,1,0.37827,4				
12054601	-200, 0. 3204, 1.0.40005,1				
12054602	-200, 0. 3204, 1.0.50635,2				
12054603	-200, 0. 3204, 1.0.50635,3				
12054604	-200, 0. 3204, 1.0.37827,4				
12054701	0.0.0.0.0.0.4				
*12054801	0.0.0.0.0.0.40005,1				
*12054802	0.0.0.0.0.0.50635,3				
*12054803	0.0.0.0.0.0.37827,4				
*12054901	0.0.0.0.0.0.40005,1				

*12054902	0,0,0,0,0,0.50635,3	13012401	615,0,5
*12054903	0,0,0,0,0,0.37827,4	13012501	0,0,0,1,5.91312,2
12054801	0. 10. 10. 0. 0. 0. 0. 1.4	13012601	301050000,-10000,1,1,5.91312,2
12054901	0. 10. 10. 0. 0. 0. 0. 1.4	13012701	300,0,5,0,0,0,0,2
*		*13012901	0,0,0,0,0.0168,0.24638,2
* IL Steam Dome Outer Wall		13012801	0. 10. 10. 0. 0. 0. 0. 1.2
*		13012901	0. 10. 10. 0. 0. 0. 0. 1.2
12055000	1 5 1 1 0.0	*	
12055100	0 2	* Surgr Line Wall	
12055101	0.00596,4	*	
12055201	0001,4	13022000	1 5 2 1 1.560000e-02
12055301	0,0,4	13022100	0 2
12055401	543,0,5	13022101	0.00178,4
12055501	204010000,0,1,0,0.13174,1	13022201	0001,4
12055601	0,0,0,0.13174,1	13022301	0,0,4
12055701	0,0,0,0,0,0,1	13022400	3011
*12055801	0,0,0,0,0,0.40955,1	13022501	302010000,0,1,1,0.36713,1
*12055901	0,0,0,0,0,0.40955,1	13022601	0,0,0,1,0.36713,1
12055801	0. 10. 10. 0. 0. 0. 0. 1.1	13022701	0,0,0,0,0,0,0,1
12055901	0. 10. 10. 0. 0. 0. 0. 1.1	*13022801	0,0,0,0,0,0.22860,1
*		*13022901	0,0,0,0,0,0.22860,1
* Pressurizer walls		13022801	0. 10. 10. 0. 0. 0. 0. 1.1
*		13022901	0. 10. 10. 0. 0. 0. 0. 1.1
13011000	6 5 2 1 1.0795e-01	*	
13011100	0 2	* Surgeline Outer Wall	
13011101	0.007144,4	*	
13011201	0001,4	13023000	6 5 2 1 4.70000e-03
13011301	0,0,4	13023100	0 2
13011401	600,0,5	13023101	0.00098,4
13011501	301010000,0,1,1,0.183565,1	13023201	0001,4
13011502	301020000,10000,1,1,0.2549,5	13023301	0,0,4
13011503	301050000,0,1,1,0.00686,6	13023400	3011
13011601	0,0,1,0.183565,1	13023501	302020000,0,1,1,0.1778,1
13011602	0,0,0,1,0.2549,5	13023502	302030000,0,1,1,0.48895,2
13011603	0,0,0,1,0.00686,6	13023503	302040000,10000,1,1,0.6731,6
13011701	0,0,0,0,0,0,6	13023601	0,0,0,1,0.1778,1
*13011801	0,0,0,0,0,0.183564,2	13023602	0,0,0,1,0.48895,2
*13011802	0,0,0,0,0,0.2549,5	13023603	0,0,0,1,0.6731,6
*13011803	0,0,0,0,0,0.00686,6	13023701	0,0,0,0,0,0,0,6
*13011901	0,0,0,0,0,0.183564,2	*13023801	0,0,0,0,0,0.1778,1
*13011902	0,0,0,0,0,0.2549,5	*13023802	0,0,0,0,0,0.48895,2
*13011903	0,0,0,0,0,0.00686,6	*13023803	0,0,0,0,0,0.6731,6
13011801	0. 10. 10. 0. 0. 0. 0. 1.6	*13023901	0,0,0,0,0,0.1778,1
13011901	0. 10. 10. 0. 0. 0. 0. 1.6	*13023902	0,0,0,0,0,0.48895,2
*		*13023903	0,0,0,0,0,0.6731,6
* Pressurizer Heater		13023801	0. 10. 10. 0. 0. 0. 0. 1.6
*		13023901	0. 10. 10. 0. 0. 0. 0. 1.6
13012000	2 5 2 1 0.0	*	
13012100	0 2	* Broken Loop Piping	
13012101	0.00210,4	*	
13012201	0001,4	* BLHL Piping	
13012301	1,0,1	*	
13012302	0,0,4	I4011000	1 5 2 1 0.03332

*14011100	1021		*	-----	
14011100	0 2		* BL Crossover Leg Piping	-----	
14011101	0.00278,4				
14011201	0001,4		*14031000	1 5 2 1 0.01699	
14011301	0,4		14031000	12 5 2 1 0.01699	
14011401	568,0,5		*14031100	4021	
14011501	401010000,0,1,1,0.40818,1		14031100	0 2	
14011601	0,0,0,1,0.40818,1		14031101	0.00178,4	
14011701	0,0,0,0,0,0,1		14031201	0001,4	
*14011801	0,0,0,0,0,0.40818,1		14031301	0,4	
*14011901	0,0,0,0,0,0.40818,1		14031401	557,0,5	
14011801	0. 10. 10. 0. 0. 0. 0. 1. 1		14031501	403010000,0,1,1,0.49424,1	
14011901	0. 10. 10. 0. 0. 0. 0. 0. 1. 1		14031502	403020000,0,1,1,0.34925,2	
* -----				14031503	403030000,0,1,1,0.35235,3
* BLHL Piping				14031504	403040000,0,1,1,0.34925,4
* -----				14031505	403050000,0,1,1,0.08318,5
14021000	7 5 2 1 0.01699		14031506	403060000,10000,1,1,0.78512,7	
14021100	0 2		14031507	403080000,10000,1,1,0.48944,9	
14021101	0.00178,4		14031508	403100000,10000,1,1,0.78512,11	
14021201	0001,4		14031509	403120000,0,1,1,0.70002,12	
14021301	0,4		14031601	0,0,0,1,0.49424,1	
14021401	568,0,5		14031602	0,0,0,1,0.34925,2	
14021501	402010000,0,1,1,0.60985,1		14031603	0,0,0,1,0.35235,3	
14021502	402020000,0,1,1,0.40860,2		14031604	0,0,0,1,0.34925,4	
14021503	402030000,0,1,1,0.98572,3		14031605	0,0,0,1,0.08318,5	
14021504	402040000,0,1,1,0.41783,4		14031606	0,0,0,1,0.78512,7	
14021505	402050000,0,1,1,0.35235,5		14031607	0,0,0,1,0.48944,9	
14021506	402060000,0,1,1,0.34925,6		14031608	0,0,0,1,0.78512,11	
14021507	402070000,0,1,1,0.60879,7		14031609	0,0,0,1,0.70002,12	
14021601	0,0,0,1,0.60985,1		14031701	0,0,0,0,0,0,0,12	
14021602	0,0,0,1,0.40860,2		*14031801	0,0,0,0,0,0.49424,1	
14021603	0,0,0,1,0.98572,3		*14031802	0,0,0,0,0,0.34925,2	
14021604	0,0,0,1,0.41783,4		*14031803	0,0,0,0,0,0.35235,3	
14021605	0,0,0,1,0.35235,5		*14031804	0,0,0,0,0,0.34925,4	
14021606	0,0,0,1,0.34925,6		*14031805	0,0,0,0,0,1,0.08318,5	
14021607	0,0,0,1,0.60879,7		*14031806	0,0,0,0,0,0.78512,7	
14021701	0,0,0,0,0,0,0,7		*14031807	0,0,0,0,0,0.48944,9	
*14021801	0,0,0,0,0,0.60985,1		*14031808	0,0,0,0,0,0.78512,11	
*14021802	0,0,0,0,0,0.40860,2		*14031809	0,0,0,0,0,0.70002,12	
*14021803	0,0,0,0,0,0.98572,3		*14031901	0,0,0,0,0,0.49424,1	
*14021804	0,0,0,0,0,0.41783,4		*14031902	0,0,0,0,0,0.34925,2	
*14021805	0,0,0,0,0,0.35235,5		*14031903	0,0,0,0,0,0.35235,3	
*14021806	0,0,0,0,0,0.34925,6		*14031904	0,0,0,0,0,0.34925,4	
*14021807	0,0,0,0,0,0.60879,7		*14031905	0,0,0,0,0,1,0.08318,5	
*14021901	0,0,0,0,0,0.60985,1		*14031906	0,0,0,0,0,0.78512,7	
*14021902	0,0,0,0,0,0.40860,2		*14031907	0,0,0,0,0,0.48944,9	
*14021903	0,0,0,0,0,0.98572,3		*14031908	0,0,0,0,0,0.78512,11	
*14021904	0,0,0,0,0,0.41783,4		*14031909	0,0,0,0,0,0.70002,12	
*14021905	0,0,0,0,0,0.35235,5		14031801	0. 10. 10. 0. 0. 0. 0. 1. 12	
*14021906	0,0,0,0,0,0.34925,6		14031901	0. 10. 10. 0. 0. 0. 0. 0. 1. 12	
*14021907	0,0,0,0,0,0.60879,7		* -----		
14021801	0. 10. 10. 0. 0. 0. 0. 0. 1. 7		* BLCL Piping		
14021901	0. 10. 10. 0. 0. 0. 0. 0. 1. 7		* -----		

14041000 3 5 2 1	1.699000e-02	15011601	0, 0, 0, 0, 0.05200, 1
*14041100	4021	15011701	0, 0.0 0.0 0.0 1
14041100	0 2	*15011801	0, 0, 0.0,0.0.25730, 1
14041101	0.00178,4	*15011901	0, 0, 0.0,0.0.25730, 1
14041201	0001,4	15011801	0. 10. 10. 0. 0. 0. 0. 1.1
14041301	0,0,4	15011901	0. 10. 10. 0. 0. 0. 0. 1.1
*14041400	4031	*	
14041401	557.0 5	15012000	4 5 2 1 0
14041501	404010000,0,1,1,0.60046,1	15012100	0 2
14041502	405010000,0,1,1,0.50216,2	15012101	0.00134, 4
14041503	405020000,0,1,1,0.71145,3	15012201	0003, 4
14041601	0,0,0,1,0.60046,1	15012301	0.0, 4
14041602	0,0,0,1,0.50216,2	15012400	5011
14041603	0,0,0,1,0.71145,3	15012501	0, 0, 0, 1, 3.556, 1
14041701	0,0,0,0,0,0,3	15012502	0, 0, 0, 1, 5.501, 2
*14041801	0,0,0,0,0,0.60046,1	15012503	0, 0, 0, 1, 7.93125, 3
*14041802	0,0,0,0,0,0.50216,2	15012504	0, 0, 0, 1, 4.534, 4
*14041803	0,0,0,0,0,0.71145,3	15012601	501010000, 0, 1, 1, 3.556, 1
*14041901	0,0,0,0,0,0.60046,1	15012602	502010000, 0, 1, 1, 5.501, 2
*14041902	0,0,0,0,0,0.50216,2	15012603	503010000, 0, 1, 1, 7.93125, 3
*14041903	0,0,0,0,0,0.71145,3	15012604	504010000, 0, 1, 1, 4.534, 4
14041801	0. 10. 10. 0. 0. 0. 0. 1.3	15012701	0, 0, 0, 0, 0,0, 4
14041901	0. 10. 10. 0. 0. 0. 0. 1.3	*15012901	0, 0, 0, 0, 0, 0.14224, 1
*		*15012902	0, 0. 0, 0, 0, 0.22004, 2
* BLCL Piping		*15012903	0, 0. 0, 0, 0, 0.31725, 3
*		*15012904	0, 0. 0, 0, 0, 0.18136, 4
14051000	1 5 2 1 0.03332	15012801	0. 10. 10. 0. 0. 0. 0. 1.4
*14051100	1021	15012901	0. 10. 10. 0. 0. 0. 0. 1.4
14051100	0 2	*	
14051101	0.00278.4	* Implementing two core channel model	
14051201	0001.4	* power ratio avg:hot=60:40	
14051301	0.0.4	*	
14051401	557. 5	* average core	
14051501	406010000 0 1 1 0.47168 1	*	
14051601	0 0 0 1 0.47168 1	15013000	16 11 2 1 0
14051701	0 0.0 0.0 0.0 1	15013100	0 2
*14051801	0 0.0 0.0 0.47168 1	15013101	0.000529 3
*14051901	0 0.0 0.0 0.47168 1	15013102	0.000406 5
14051801	0. 10. 10. 0. 0. 0. 0. 1.1	15013103	0.000656 8
14051901	0. 10. 10. 0. 0. 0. 0. 1.1	15013104	0.000495 10
*		15013201	0004. 3
*		15013202	0005. 5
* Reactor Vessel Structure		15013203	0004. 8
*		15013204	0001. 10
* Lower Plenum Wall		15013301	0.0. 3
*		15013302	1.0. 5
15011000	1 5 1 1 0	15013303	0.0.10
15011100	0 2	15013401	557.0. 11
15011101	0.0370 4	15013501	0. 0. 0. 0. 0.16
15011201	0001.4	*15013601	505010000. 10000. 1. 1. 13.4112. 2
15011301	0.0.4	*15013602	505030000. 10000. 1. 1. 6.7056. 6
15011401	557.0 5	*15013603	505070000. 10000. 1. 1. 13.4112. 8
15011501	501010000. 0. 1. 0. 0.05200. 1		

*15013604	505010000.10000, 1, 1, 1.8288, 10	15513701	550.0.07500, 0.0, 0.0, 1
*15013605	505030000, 10000, 1, 1, 0.9144, 14	15513702	550, 0.17583, 0.0, 0.0, 2
*15013606	505070000, 10000, 1, 1, 1.8288, 16	15513703	550, 0.12000, 0.0, 0.0, 3
*		15513704	550.0.12917, 0.0, 0.0, 4
* implement 50:50 heat transfer area		15513705	550.0.12917, 0.0, 0.0, 5
*		15513706	550, 0.12000, 0.0, 0.0, 6
15013601	505010000, 10000, 1, 1, 6.70560, 2	15513707	550, 0.17583, 0.0, 0.0, 7
15013602	505030000, 10000, 1, 1, 3.35280 6	15513708	550, 0.07500, 0.0, 0.0, 8
15013603	505070000, 10000, 1, 1, 6.70560, 8	15513709	0, 0.0, 0.0, 0.0, 16
15013604	505010000, 10000, 1, 1, 0.91440 10	*15513901	0, 0.0, 0.01357, 0.6096, 2
15013605	505030000, 10000, 1, 1, 0.45720 14	*15513902	0, 0.0, 0.01357, 0.3048, 6
15013606	505070000, 10000, 1, 1, 0.91440 16	*15513903	0, 0.0, 0.01357, 0.6096, 10
15013701	500, 0.07500, 0.0, 0.0, 1	*15513904	0, 0.0, 0.01357, 0.3048, 14
15013702	500, 0.17583, 0.0, 0.0, 2	*15513905	0, 0.0, 0.01357, 0.6096, 16
15013703	500, 0.12000, 0.0, 0.0, 3	15513801	0. 10. 10. 0. 0. 0. 0. 1. 16
15013704	500, 0.12917, 0.0, 0.0, 4	15513901	0. 10. 10. 0. 0. 0. 0. 1. 16
15013705	500, 0.12917, 0.0, 0.0, 5	*	
15013706	500, 0.12000, 0.0, 0.0, 6	* Lowe Plenum Wall	
15013707	500.0.17583, 0.0, 0.0, 7	*	
15013708	500.0.07500, 0.0, 0.0, 8	15021000	1 5 2 1 1.286500e-01
15013709	0. 0. 0.0. 0.0. 16	15021100	0 2
*15013901	0, 0.0, 0.01357, 0.6096, 2	15021101	0.01568 4
*15013902	0, 0.0, 0.01357, 0.3048, 6	15021201	0001, 4
*15013903	0. 0.0. 0.01357. 0.6096, 10	15021301	0., 4
*15013904	0. 0.0, 0.01357. 0.3048, 14	15021401	557.0 5
*15013905	0. 0.0. 0.01357. 0.6096, 16	15021501	501010000, 0, 1, 1, 0.14224, 1
15013801	0. 10. 10. 0. 0. 0. 0. 1. 16	15021601	0. 0, 0.1, 0.14224, 1
15013901	0. 10. 10. 0. 0. 0. 0. 1. 16	15021701	0. 0. 0.0. 0.0. 1
*		*15021801	0. 0. 0, 0.0, 0.0, 1
* hot channel core		*15021901	0. 0. 0, 0.0, 0.0, 1
*		15021801	0. 10. 10. 0. 0. 0. 0. 1. 1
15513000	16 11 2 1 0	15021901	0. 10. 10. 0. 0. 0. 0. 1. 1
15513100	0 2	*	
15513101	0.000529 3	15022000	1 5 2 1 9.771000e-02
15513102	0.000406 5	15022100	0 2
15513103	0.000656 8	15022101	0.01588 4
15513104	0.000495 10	15022201	0001, 4
15513201	0004. 3	15022301	0. 4
15513202	0005. 5	15022401	557.0 5
15513203	0004. 8	15022501	502010000, 0, 1, 1, 0.22004, 1
15513204	0001. 10	15022601	0. 0, 0.1, 0.22004, 1
15513301	0.0, 3	15022701	0. 0. 0.0. 0.0. 1
15513302	1.0. 5	*15022801	0. 0. 0.0. 0.22004, 1
15513303	0.0. 10	*15022901	0. 0. 0.0. 0.22004, 1
15513401	557.0. 11	15022801	0. 10. 10. 0. 0. 0. 0. 1. 1
15513501	0. 0. 0.0. 0.16	15022901	0. 10. 10. 0. 0. 0. 0. 1. 1
15513601	555010000. 10000, 1, 1, 6.70560, 2	*	
15513602	555030000. 10000, 1, 1, 3.35280 6	* External Downcomer Outer Wall	
15513603	555070000. 10000, 1, 1, 6.70560, 8	*	
15513604	555010000. 10000, 1, 1, 0.91440 10	15023000	1 5 2 1 7.621000e-02
15513605	555030000. 10000, 1, 1, 0.45720 14	15023100	0 2
15513606	555070000. 10000, 1, 1, 0.91440 16	15023101	0.01588 4
*		15023201	0001, 4

15023301	0.0,	4			15025401	557.0	5					
15023401	557.0	5			15025501	504010000,0,	1,	1,	0.18136,	1		
15023501	519010000,0,	1,	1,	0.29337,	1	15025502	505010000,0,	1,	1,	0.0762,	2	
15023601	0, 0,	0,1,	0.29337,	1	15025601	0, 0, 0,1,	0.18136,	1				
15023701	0,	0.0,0.0,	0.0,1		15025602	0, 0, 0,1,	0.0762,	2				
*15023801	0,	0.0,0.0,	0.29337,	1	15025701	0,	0.0,0.0,	0.0,2				
*15023901	0,	0.0,0.0,	0.29337,	1	*15025801	0, 0.0,0.0,	0.18136,	1				
15023801	0.	10.	10.	0.	0.	0.	0.	1.1	*15025802	0, 0.0,0.0,	0.0762,	2
15023901	0.	10.	10.	0.	0.	0.	0.	1.1	*15025901	0, 0.0,0.0,	0.18136,	1
*					*15025902	0, 0.0,0.0,	0.0762,	2				
<hr/>												
* External Downcomer Outer Wall												
*												
15031000	10	5	2	1	0.02775							
15031100	0	2										
15031101	0.00471	4										
15031201	0001,4											
15031301	0.0,	4										
15031401	557.0	5										
15031501	518010000,10000,1,1,	0.4890,	9									
15031502	518100000,0,1,1,	0.37661,10										
15031601	0,	0,	0.1,	0.4890,	9							
15031602	0,	0,	0.1,	0.37661,10								
15031701	0,	0.0,0.0,	0.0,10									
*15031801	0.	0.0,0.0,	0.4890,	9								
*15031802	0.	0.0,0.0,	0.37661,10									
*15031901	0.	0.0,0.0,	0.4890,	9								
*15031902	0.	0.0,0.0,	0.37661,10									
15031801	0.	10.	10.	0.	0.	0.	0.	1.10				
15031901	0.	10.	10.	0.	0.	0.	0.	1.10				
*												
* Internal Wall between Downcomer and Lower Plenum												
*												
15024000	1	5	2	1	0.05121							
15024100	0	2										
15024101	0.00160	4										
15024201	0001.4											
15024301	0.0,	4										
15024401	557.0	5										
15024501	503010000,0.	1.	1.	0.31725,	1							
15024601	519010000,0.	1.	1.	0.31725,	1							
15024701	0.	0.0,0.0,	0.0,1									
*15024801	0.	0.0,0.0,	0.31725,	1								
*15024901	0.	0.0,0.0,	0.31725,	1								
15024801	0.	10.	10.	0.	0.	0.	0.	1.1				
15024901	0.	10.	10.	0.	0.	0.	0.	1.1				
*												
* Outer Wall of Core Inlet Volume												
*												
15025000	2	5	2	1	4.041000e-02							
15025100	0	2										
15025101	0.01765	4										
15025201	0001.4											
15025301	0.0,	4										
15025401	557.0	5										
15025501	504010000,0,	1,	1,	0.18136,	1							
15025502	505010000,0,	1,	1,	0.0762,	2							
15025601	0, 0, 0,1,	0.18136,	1									
15025602	0, 0, 0,1,	0.0762,	2									
15025701	0,	0.0,0.0,	0.0,2									
*15025801	0,	0.0,0.0,	0.18136,	1								
*15025802	0,	0.0,0.0,	0.0762,	2								
*15025901	0,	0.0,0.0,	0.18136,	1								
*15025902	0,	0.0,0.0,	0.0762,	2								
15025801	0.	10.	10.	0.	0.	0.	0.	1.2				
15025901	0.	10.	10.	0.	0.	0.	0.	1.2				
*												
* Active Core Outer Wall												
*												
15014000	8	5	2	1	4.041000e-02							
15014100	0	2										
15014101	0.01093	4										
15014201	0001,4											
15014301	0.0,	4										
15014401	575.5,5											
15014501	505010000,0,1,	1,	1,	0.5334,	1							
15014502	505020000,0,1,	1,	1,	0.6096,	2							
15014503	505030000,10000,	1.	1.	0.3048,	6							
15014504	505070000,10000,	1.	1.	0.6096,	8							
15014601	0,	0,	0,1,	0.5334,	1							
15014602	0,	0,	0,1,	0.6096,	2							
15014603	0,	0,	0,1,	0.3048,	6							
15014604	0,	0,	0,1,	0.6096,	8							
15014701	0,	0.0,0.0,	0.0,8									
*15014801	0,	0.0,0.0,	0.5334,	1								
*15014802	0,	0.0,0.0,	0.6096,	2								
*15014803	0,	0.0,0.0,	0.3048,	6								
*15014804	0,	0.0,0.0,	0.6096,	8								
*15014901	0,	0.0,0.0,	0.5334,	1								
*15014902	0,	0.0,0.0,	0.6096,	2								
*15014903	0,	0.0,0.0,	0.3048,	6								
*15014904	0,	0.0,0.0,	0.6096,	8								
15014801	0.	10.	10.	0.	0.	0.	0.	1.8				
15014901	0.	10.	10.	0.	0.	0.	0.	1.8				
*												
* External Downcomer Upper Part Outer Wall												
*												
*15015000	1	5	2	1	0.							
*15015100	0	2										
*15015101	0.02858	4										
*15015201	0001.4											
*15015301	0.0,	4										
*15015400	5011											
*15015501	516010000,0,1,	1,	1,	0.3765,	1							
*15015601	0.	0.	0,1,	0.3765,	1							
*15015701	0.	0.0,0.0,	0.0,1									
**15015801	0.	0.0,0.0,	0.54381,	1								

\*\*15015901 0. 0.0.0. 0.54381. 1  
 \*15015801 0. 10. 10. 0. 0. 0. 0. 1.1  
 \*15015901 0. 10. 10. 0. 0. 0. 0. 1.1  
 \*  
 \* External Downcomer Middle Part Outer Wall  
 \*  
 15016000 2 5 2 1 3.810000e-02  
 15016100 0 2  
 15016101 0.00572 4  
 15016201 0001,4  
 15016301 0.0. 4  
 15016400 5011  
 15016501 0, 0, 0,1. 0.26670. 1  
 15016502 0, 0, 0,1. 0.38418, 2  
 15016601 516010000,0,1, 1, 0.26670, 1  
 15016602 517010000,0,1, 1, 0.38418, 2  
 15016701 0, 0.0.0.0,0. 2  
 \*15016801 0, 0.0.0, 0.26670, 1  
 \*15016802 0, 0.0.0, 0.38418, 2  
 \*15016901 0, 0.0.0, 0.26670, 1  
 \*15016902 0, 0.0.0, 0.38418. 2  
 15016801 0. 10. 10. 0. 0. 0. 0. 1.2  
 15016901 0. 10. 10. 0. 0. 0. 0. 1.2  
 \*  
 \* External Downcomer Outer Wall  
 \*  
 15017000 2 5 2 1 0.08272  
 15017100 0 2  
 15017101 0.00671 4  
 15017201 0001,4  
 15017301 0.0. 4  
 15017400 5011  
 15017501 516010000.0,1. 1, 0.26670. 1  
 15017502 517010000.0,1. 1, 0.38418 2  
 15017601 0. 0. 0,1. 0.26670. 1  
 15017602 0. 0. 0,1. 0.38418. 2  
 15017701 0. 0.0.0.0.0. 2  
 \*15017801 0. 0.0.0. 0.26670. 1  
 \*15017802 0, 0.0.0. 0.38418, 2  
 \*15017901 0. 0.0.0. 0.26670, 1  
 \*15017902 0. 0.0.0. 0.38418. 2  
 15017801 0. 10. 10. 0. 0. 0. 0. 1.2  
 15017901 0. 10. 10. 0. 0. 0. 0. 1.2  
 \*  
 \* Core Outlet Wall  
 \*  
 15041000 1 5 2 1 0.  
 \*15041100 5012  
 15041100 0 2  
 15041101 0.00134. 4  
 15041201 0003,4  
 15041301 0.0,4  
 15041401 594.0.5  
 15041501 0, 0, 0, 1, 5.08. 1  
 15041601 506010000,0,1, 1, 5.08,1  
 15041701 0, 0.0.0.0,0.0, 1  
 \*15041801 0, 0.0.0.0, 0.2032, 1  
 \*15041901 0, 0.0.0.0, 0.2032, 1  
 15041801 0. 10. 10. 0. 0. 0. 0. 1.1  
 15041901 0. 10. 10. 0. 0. 0. 0. 1.1  
 \*  
 \* Core Outlet Wall  
 \*  
 15042000 1 5 2 1 0.04166  
 15042100 0 2  
 15042101 0.01816 4  
 15042201 0001,4  
 15042301 0.0. 4  
 15042400 5041  
 15042501 506010000,0,1. 1, 0.30505. 1  
 15042601 0. 0, 0,1. 0.30505. 1  
 15042701 0. 0.0.0,0.0, 1  
 \*15042801 0. 0.0.0, 0.30505, 1  
 \*15042901 0, 0.0.0, 0.30505. 1  
 15042801 0. 10. 10. 0. 0. 0. 0. 1.1  
 15042901 0. 10. 10. 0. 0. 0. 0. 1.1  
 \*  
 \* Core Outlet Wall  
 \*  
 15043000 1 5 2 1 4.299000e-02  
 15043100 0 2  
 15043101 0.01153 4  
 15043201 0001,4  
 15043301 0.0. 4  
 15043400 5041  
 15043501 507010000.0,1. 1, 0.68910. 1  
 15043601 0. 0. 0,1. 0.68910. 1  
 15043701 0. 0.0.0.0.0. 1  
 \*15043801 0. 0.0.0. 0.68910. 1  
 \*15043901 0. 0.0.0. 0.68910. 1  
 15043801 0. 10. 10. 0. 0. 0. 0. 1.1  
 15043901 0. 10. 10. 0. 0. 0. 0. 1.1  
 \*  
 \* Upper Plenum Wall  
 \*  
 15044000 1 5 2 1 3.826000e-02  
 15044100 0 2  
 15044101 0.01742 4  
 15044201 0001,4  
 15044301 0.0. 4  
 15044400 5041  
 15044501 508010000.0,1. 1, 0.52070. 1  
 15044601 0. 0. 0,1. 0.52070. 1  
 15044701 0. 0.0.0.0.0. 1  
 \*15044801 0. 0.0.0. 0.52070. 1  
 \*15044901 0. 0.0.0. 0.52070. 1

15044801	0.	10.	10.	0.	0.	0.	0.	1.1		15062502	513010000, 0, 1,	1,	0.7786,	2			
15044901	0.	10.	10.	0.	0.	0.	0.	1.1	*	15062503	513010000, 0, 1,	1,	0.2761,	3			
* Upper Plenum Wall									*	15062504	513010000, 0, 1,	1,	0.5207,	4			
									*	15062601	510010000, 0, 1,	1,	0.0756,	1			
15045000	3	5	2	1	4.299000e-02				*	15062602	509020000, 0, 1,	1,	0.7786,	2			
*15045100	5043								*	15062603	509010000, 0, 1,	1,	0.2761,	3			
15045100	0	2							*	15062604	508010000, 0, 1,	1,	0.5207,	4			
15045101	0.01153,4								*	15062701	0,	0.0.0.0, 0.0,	4				
15045201	0001,4								*	15062801	0,	0.0.0.0,	0.0756,	1			
15045301	0.0,4								*	15062802	0,	0.0.0.0,	0.7786,	2			
15045400	5041								*	15062803	0,	0.0.0.0,	0.2761,	3			
15045501	509010000, 0, 1,	1.	0.2761,	1					*	15062804	0,	0.0.0.0,	0.5207,	4			
15045502	509020000, 0, 1,	1,	0.7786,	2					*	15062901	0,	0.0.0.0,	0.0756,	1			
15045503	510010000, 0, 1,	1,	0.0756,	3					*	15062902	0,	0.0.0.0,	0.7786,	2			
15045601	0,	0,	0, 1,	0.2761,	1				*	15062903	0,	0.0.0.0,	0.2761,	3			
15045602	0,	0,	0, 1,	0.7786,	2				*	15062904	0,	0.0.0.0,	0.5207,	4			
15045603	0,	0,	0, 1,	0.0756,	3				*	15062801	0.	10.	10.	0.	0.	0.	1.4
15045701	0,	0.0.0.0, 0.0,	3						*	15062901	0.	10.	10.	0.	0.	0.	1.4
*15045801	0,	0.0.0.0,	0.2761,	1					*	* Internal Wall between Guide thime and Upper Plenum							
*15045802	0,	0.0.0.0,	0.7786,	2					*	15063000	5	5	2	1	4.880000e-03		
*15045803	0,	0.0.0.0,	0.0756,	3					*	15063100	0	2					
*15045901	0.	0.0.0.0,	0.2761,	1					*	15063101	0.00037	4					
*15045902	0.	0.0.0.0,	0.7786,	2					*	15063201	0001.4						
*15045903	0.	0.0.0.0,	0.0756,	3					*	15063301	0.0.	4					
15045801	0.	10.	10.	0.	0.	0.	0.	1.3	*	15063401	568.0.5						
15045901	0.	10.	10.	0.	0.	0.	0.	1.3	*	15063501	514010000, 0.1.	1.	0.1512.	1			
* Upper Plenum Wall									*	15063502	514010000, 0, 1,	1,	0.5572.	2			
									*	15063503	514010000, 0.1.	1.	0.5522.	3			
15046000	1	5	1	1	0.				*	15063504	514010000, 0.1.	1.	1.0414.	4			
15046100	0	2							*	15063505	514010000, 0.1.	1.	1.3782.	5			
15046101	0.04976	4							*	15063601	510010000, 0.1.	1.	0.1512.	1			
15046201	0001.4								*	15063602	509020000, 0.1.	1.	0.5572.	2			
15046301	0.0.	4							*	15063603	509010000, 0.1.	1.	0.5522.	3			
15046400	5043								*	15063604	508010000, 0.1.	1.	1.0414.	4			
15046501	510010000, 0.1.	0.	0.00575.	1					*	15063605	507010000, 0.1.	1.	1.3782.	5			
15046601	0.	0.	0. 0.	0.00575.	1				*	15063701	0.	0.0.0.0, 0.0.	5				
15046701	0.	0.0.0.0.0.0.	1						*	15063801	0.	0.0.0.0.	0.0756.	1			
*15046801	0.	0.0.0.0.	0.26670.	1					*	15063802	0.	0.0.0.0.	0.7786.	2			
*15046901	0.	0.0.0.0.	0.26670.	1					*	15063803	0.	0.0.0.0.	0.2761.	3			
15046801	0.	10.	10.	0.	0.	0.	0.	1.1	*	15063804	0.	0.0.0.0.	0.5207.	4			
15046901	0.	10.	10.	0.	0.	0.	0.	1.1	*	15063805	0.	0.0.0.0.	0.6891.	5			
* Internal Wall Between Upper Plenum and Downcomer									*	15063901	0.	0.0.0.0.	0.0756.	1			
15062000	4	5	2	1	8.050000e-03				*	15063902	0.	0.0.0.0.	0.7786.	2			
15062100	0	2							*	15063903	0.	0.0.0.0.	0.2761.	3			
15062101	0.00037	4							*	15063904	0.	0.0.0.0.	0.5207.	4			
15062201	0001.4								*	15063905	0.	0.0.0.0.	0.6891.	5			
15062301	0.0.	4							*	15063801	0.	10.	10.	0.	0.	0.	1.5
15062401	568.0.5								*	15063901	0.	10.	10.	0.	0.	0.	1.5
15062501	513010000, 0.1.	1.	0.0756.	1					*	* Upper Annulus Outer Wall							

15064000	3	5	2	1	0.00470	17001614	702020000, 0, 1,	1,	2.46202, 15					
15064100	0	2				17001615	702010000, 0, 1,	1,	2.39218, 16					
15064101	0.00041		4			17001701	0.	0.0.	0.0.	0.0,	16			
15064201	0001, 4					*17001801	0.	0.01974,	0.01974,	1.19609,	1			
15064301	0.	4				*17001802	0,	0.01974,	0.01974,	1.23101,	2			
15064401	557.0		5			*17001803	0.	0.01974,	0.01974,	1.15481,	3			
15064501	531010000, 0,	1,	1,	0.38247,	3	*17001804	0.	0.01974,	0.01974,	1.23101,	4			
15064601	0,	0, 0,	1,	0.38247,	3	*17001805	0,	0.01974,	0.01974,	1.25641,	5			
15064701	0,	0.0, 0.0,	0.0,	3		*17001806	0,	0.01974,	0.01974,	1.15481,	6			
*15064801	0,	0.0, 0.0,	0.38247,	3		*17001807	0,	0.01974,	0.01974,	1.06591,	7			
*15064901	0,	0.0, 0.0,	0.38247,	3		*17001808	0,	0.01974,	0.01974,	0.98206,	9			
15064801	0.	10.	10.	0.	0.	0.	1.3		*17001809	0.	0.01974,	0.01974,	1.06591,	10
15064901	0.	10.	10.	0.	0.	0.	1.3		*17001810	0.	0.01974,	0.01974,	1.15481,	11
*						*17001811	0.	0.01974,	0.01974,	1.25641,	12			
*						*17001812	0,	0.01974,	0.01974,	1.23101,	13			
* broken-loop steam generator						*17001813	0.	0.01974,	0.01974,	1.15481,	14			
*						*17001814	0.	0.01974,	0.01974,	1.23101,	15			
* BL SG U-tubes						*17001815	0.	0.01974,	0.01974,	1.19609,	16			
*						*17001901	0.	0.00635,	0.00635,	1.19609,	1			
17001000	16	5	2	1	0.00987	*17001902	0.	0.00635.	0.00635,	1.23101,	2			
17001100	0	2				*17001903	0.	0.00635,	0.00635,	1.15481,	3			
17001101	0.00031		4			*17001904	0.	0.00635,	0.00635,	1.23101,	4			
17001201	0002, 4					*17001905	0.	0.00635,	0.00635,	1.25641,	5			
17001301	0.	4				*17001906	0.	0.00635,	0.00635,	1.15481,	6			
17001401	495.0		5			*17001907	0.	0.00635,	0.00635,	1.06591,	7			
17001501	701020000, 0.	1.	1.	2.39218,	1	*17001908	0.	0.00635.	0.00635,	0.98206,	9			
17001502	701030000, 0.	1.	1.	2.46202,	2	*17001909	0.	0.00635,	0.00635,	1.06591,	10			
17001503	701040000, 0.	1.	1.	2.30962,	3	*17001910	0.	0.00635.	0.00635,	1.15481,	11			
17001504	701050000, 0.	1.	1.	2.46202,	4	*17001911	0.	0.00635,	0.00635,	1.25641,	12			
17001505	701060000, 0.	1.	1.	2.51282,	5	*17001912	0.	0.00635,	0.00635,	1.23101,	13			
17001506	701070000, 0.	1.	1.	2.30962,	6	*17001913	0.	0.00635,	0.00635,	1.15481,	14			
17001507	701080000, 0.	1.	1.	2.13182,	7	*17001914	0.	0.00635,	0.00635,	1.23101,	15			
17001508	701100000, 10000,	1.	1.	1.196412,	9	*17001915	0.	0.00635,	0.00635,	1.19609,	16			
17001509	701110000, 0.	1.	1.	2.13182,	10	17001801	0.	10.	10.	0.	0.	0.	1.16	
17001510	701120000, 0.	1.	1.	2.30962,	11	17001901	0.	10.	10.	0.	0.	0.	1.16	
17001511	701130000, 0.	1.	1.	2.51282,	12	*								
17001512	701140000, 0.	1.	1.	2.46202,	13	* BL SG Internal Structure								
17001513	701150000, 0.	1.	1.	2.30962,	14	*								
17001514	701160000, 0.	1.	1.	2.46202,	15	17012000	8	5	2	1	0.05255			
17001515	701170000, 0.	1.	1.	2.39218,	16	17012100	0	2						
17001601	702010000, 0.	1.	1.	2.39218,	1	17012101	0.01403		4					
17001602	702020000, 0.	1.	1.	2.46202,	2	17012201	0006.	4						
17001603	702030000, 0.	1.	1.	2.30962,	3	17012301	0.	4						
17001604	702040000, 0.	1.	1.	2.46202,	4	17012400	7001							
17001605	702050000, 0.	1.	1.	2.51282,	5	17012501	702010000, 0.	1.	1.	1.19609,	1			
17001606	702060000, 0.	1.	1.	2.30962,	6	17012502	702020000, 0.	1.	1.	1.23101,	2			
17001607	702070000, 0.	1.	1.	2.13182,	7	17012503	702030000, 0.	1.	1.	1.15481,	3			
17001608	702080000, 10000,	1.	1.	1.196412,	9	17012504	702040000, 0.	1.	1.	1.23101,	4			
17001609	702070000, 0.	1.	1.	2.13182,	10	17012505	702050000, 0.	1.	1.	1.25641,	5			
17001610	702060000, 0.	1.	1.	2.30962,	11	17012506	702060000, 0.	1.	1.	1.15481,	6			
17001611	702050000, 0.	1.	1.	2.51282,	12	17012507	702070000, 0.	1.	1.	1.06591,	7			
17001612	702040000, 0.	1.	1.	2.46202,	13	17012508	702080000, 0.	1.	1.	1.65398,	8			
17001613	702030000, 0.	1.	1.	2.30962,	14	17012601	702010000, 0.	1.	1.	1.19609,	1			

17012602	702020000.0, 1,	1.	1.23101,	2	17022603	705030000, 0, 1,	1,	1.15481,	3
17012603	702030000, 0, 1,	1,	1.15481,	3	17022604	705040000, 0, 1,	1,	1.23101,	4
17012604	702040000, 0, 1,	1,	1.23101,	4	17022605	705050000, 0, 1,	1,	1.25641,	5
17012605	702050000, 0, 1,	1,	1.25641,	5	17022606	705060000, 0, 1,	1,	1.15481,	6
17012606	702060000, 0, 1,	1,	1.15481,	6	17022607	705070000, 0, 1,	1,	1.06591,	7
17012607	702070000, 0, 1,	1,	1.06591,	7	17022608	705080000, 0, 1,	1,	1.65398,	8
17012608	702080000, 0, 1,	1,	1.65398,	8	17022701	0, 0.0, 0.0, 0.0,	8		
17012701	0, 0.0, 0.0, 0.0,	8			*17022801	0, 0.01999, 0.05963,	1.19609,	1	
*17012801	0, 0.0, 0.0,	1.19609,	1		*17022802	0, 0.01999, 0.05963,	1.23101,	2	
*17012802	0, 0.0, 0.0,	1.23101,	2		*17022803	0, 0.01999, 0.05963,	1.15481,	3	
*17012803	0, 0.0, 0.0,	1.15481,	3		*17022804	0, 0.01999, 0.05963,	1.23101,	4	
*17012804	0, 0.0, 0.0,	1.23101,	4		*17022805	0, 0.01999, 0.05963,	1.25641,	5	
*17012805	0, 0.0, 0.0,	1.25641,	5		*17022806	0, 0.01999, 0.05963,	1.15481,	6	
*17012806	0, 0.0, 0.0,	1.15481,	6		*17022807	0, 0.01999, 0.05963,	1.06591,	7	
*17012807	0, 0.0, 0.0,	1.06591,	7		*17022808	0, 0.01999, 0.05963,	1.65398,	8	
*17012808	0, 0.0, 0.0,	1.65398,	8		*17022901	0, 0.0, 0.0,	1.19609,	1	
*17012901	0, 0.0, 0.0,	1.19609,	1		*17022902	0, 0.0, 0.0,	1.23101,	2	
*17012902	0, 0.0, 0.0,	1.23101,	2		*17022903	0, 0.0, 0.0,	1.15481,	3	
*17012903	0, 0.0, 0.0,	1.15481,	3		*17022904	0, 0.0, 0.0,	1.23101,	4	
*17012904	0, 0.0, 0.0,	1.23101,	4		*17022905	0, 0.0, 0.0,	1.25641,	5	
*17012905	0, 0.0, 0.0,	1.25641,	5		*17022906	0, 0.0, 0.0,	1.15481,	6	
*17012906	0, 0.0, 0.0,	1.15481,	6		*17022907	0, 0.0, 0.0,	1.06591,	7	
*17012907	0, 0.0, 0.0,	1.06591,	7		*17022908	0, 0.0, 0.0,	1.65398,	8	
*17012908	0, 0.0, 0.0,	1.65398,	8		17022801	0, 10, 10, 0, 0, 0,	0, 0, 0, 1.8		
17012801	0, 10, 10, 0, 0, 0,	0, 0, 0, 1.8			17022901	0, 10, 10, 0, 0, 0,	0, 0, 0, 1.8		
17012901	0, 10, 10, 0, 0, 0,	0, 0, 0, 1.8							

\* BL SG Shroud Wall

17022000	8 5 2 1	0.10578		
17022100	0 2			
17022101	0.00094	4		
17022201	0001, 4			
17022301	0.0,	4		
17022400	7001			
17022501	702010000.0, 1,	1.	1.19609,	1
17022502	702020000, 0, 1,	1,	1.23101,	2
17022503	702030000, 0, 1,	1,	1.15481,	3
17022504	702040000, 0, 1,	1,	1.23101,	4
17022505	702050000, 0, 1,	1,	1.25641,	5
17022506	702060000, 0, 1,	1,	1.15481,	6
17022507	702070000, 0, 1,	1,	1.06591,	7
17022508	702080000, 0, 1,	1,	1.65398,	8
*17022601	702010000, 0, 1,	1,	1.19609,	1
*17022602	702020000, 0, 1,	1,	1.23101,	2
*17022603	702030000, 0, 1,	1,	1.15481,	3
*17022604	702040000, 0, 1,	1,	1.23101,	4
*17022605	702050000, 0, 1,	1,	1.25641,	5
*17022606	702060000, 0, 1,	1,	1.15481,	6
*17022607	702070000, 0, 1,	1,	1.06591,	7
*17022608	702080000, 0, 1,	1,	1.65398,	8
17022601	705010000, 0, 1,	1,	1.19609,	1
17022602	705020000, 0, 1,	1,	1.23101,	2

17022603	705030000, 0, 1,	1,	1.15481,	3
17022604	705040000, 0, 1,	1,	1.23101,	4
17022605	705050000, 0, 1,	1,	1.25641,	5
17022606	705060000, 0, 1,	1,	1.15481,	6
17022607	705070000, 0, 1,	1,	1.06591,	7
17022608	705080000, 0, 1,	1,	1.65398,	8
17022701	0, 0.0, 0.0, 0.0,	8		
*17022801	0, 0.0, 0.0, 0.0,	8		
*17022802	0, 0.0, 0.0, 0.0,	8		
*17022803	0, 0.0, 0.0, 0.0,	8		
*17022804	0, 0.0, 0.0, 0.0,	8		
*17022805	0, 0.0, 0.0, 0.0,	8		
*17022806	0, 0.0, 0.0, 0.0,	8		
*17022807	0, 0.0, 0.0, 0.0,	8		
*17022808	0, 0.0, 0.0, 0.0,	8		
*17022901	0, 0.0, 0.0,	1		
*17022902	0, 0.0, 0.0,	2		
*17022903	0.00238	4		
*17022904	0001, 4			
*17022905	0.0,	4		
*17022906	7001			
17032501	705010000, 0, 1,	1,	1.33972,	1
17032502	705020000, 0, 1,	1,	0.86339,	2
17032503	705030000, 0, 1,	1,	0.93540,	3
17032504	705040000, 0, 1,	1,	1.01769,	4
17032505	705050000, 0, 1,	1,	0.99712,	5
17032506	705060000, 0, 1,	1,	0.93540,	6
17032507	705070000, 0, 1,	1,	0.99712,	7
17032508	705080000, 0, 1,	1,	0.96883,	8
17032601	705010000, 0, 1,	1,	1.33972,	1
17032602	705020000, 0, 1,	1,	0.86339,	2
17032603	705030000, 0, 1,	1,	0.93540,	3
17032604	705040000, 0, 1,	1,	1.01769,	4
17032605	705050000, 0, 1,	1,	0.99712,	5
17032606	705060000, 0, 1,	1,	0.93540,	6
17032607	705070000, 0, 1,	1,	0.99712,	7
17032608	705080000, 0, 1,	1,	0.96883,	8
17032701	0, 0.0, 0.0, 0.0,	8		
*17032801	0, 0.0, 0.0,	1		
*17032802	0, 0.0, 0.0,	2		

*17032803	0,	0.0,0.0,	1.25481.	3	17053506	705060000,0,1,	1,	1.15481,	6				
*17032804	0,	0.0,0.0,	1.25641,	4	17053507	705070000,0,1,	1,	1.23101,	7				
*17032805	0,	0.0,0.0,	1.23101,	5	17053508	705080000,0,1,	1,	1.19609,	8				
*17032806	0,	0.0,0.0,	1.15481,	6	*								
*17032807	0,	0.0,0.0,	1.23101,	7	* Modify Right Boundary Condition identical to								
*17032808	0,	0.0,0.0,	1.19609,	8	* Intact Loop S/G								
*17032901	0,	0.0,0.0,	1.65398,	1	*								
*17032902	0,	0.0,0.0,	1.06591,	2	*17053601	-200, 0,1000,	1,	1.65398,	1				
*17032903	0,	0.0,0.0,	1.25481,	3	*17053602	-200, 0,1000,	1,	1.10659,	2				
*17032904	0,	0.0,0.0,	1.25641,	4	*17053603	-200, 0,1000,	1,	1.15481,	3				
*17032905	0,	0.0,0.0,	1.23101,	5	*17053604	-200, 0,1000,	1,	1.25641,	4				
*17032906	0,	0.0,0.0,	1.15481,	6	*17053605	-200, 0,1000,	1,	1.23101,	5				
*17032907	0,	0.0,0.0,	1.23101,	7	*17053606	-200, 0,1000,	1,	1.15481,	6				
*17032908	0,	0.0,0.0,	1.19609,	8	*17053607	-200, 0,1000,	1,	1.23101,	7				
17032801	0.	10.	10.	0.	0.	0.	0.	1.8	*17053608	-200, 0,1000,	1,	1.19609,	8
17032901	0.	10.	10.	0.	0.	0.	0.	1.8	*				
*					17053601	-200, 0,3205,	1,	1.65398,	1				
* BL SG Internal Structure Upper Part					17053602	-200, 0,3205,	1,	1.10659,	2				
*					17053603	-200, 0,3205,	1,	1.15481,	3				
17042000	3	5	2	1	17053604	-200, 0,3205,	1,	1.25641,	4				
17042100	0	2			17053605	-200, 0,3205,	1,	1.23101,	5				
17042101	0.00105	4			17053606	-200, 0,3205,	1,	1.15481,	6				
17042201	0001,4				17053607	-200, 0,3205,	1,	1.23101,	7				
17042301	0.0,	4			17053608	-200, 0,3205,	1,	1.19609,	8				
17042400	7001				*								
17042501	702090000.	0.1,	1.	0.37827,	1	* End of modification by Y.S Bnag at Aug 31. 1994							
17042502	702100000.	0.1,	1.	0.30635,	2	*							
*17042503	702110000.	0.1,	1.	0.30635,	3	17053701	0. 0.0,0.0.0.0.	8					
17042503	703010000,	0.	1,	1,	0.30635,	3	*17053801	0,	0.0,0.0,	1.65398,	1		
17042601	709010000.	0.1,	1.	0.37827,	1	*17053802	0.	0.0,0.0,	1.06591,	2			
17042602	709010000.	0.1,	1.	0.30635,	2	*17053803	0,	0.0,0.0,	1.15481,	3			
17042603	703010000.	0.1,	1.	0.30635,	3	*17053804	0.	0.0,0.0,	1.25641,	4			
17042701	0,	0.0,0.0.0.	3		*17053805	0.	0.0,0.0,	1.23101,	5				
*17042801	0.	0.0,0.0,	0.37827,	1	*17053806	0.	0.0,0.0,	1.15481,	6				
*17042802	0.	0.0,0.0,	0.50635,	2	*17053807	0.	0.0,0.0,	1.23101,	7				
*17042901	0.	0.0,0.0,	0.37827,	1	*17053808	0.	0.0,0.0,	1.19609,	8				
*17042902	0.	0.0,0.0,	0.50635,	2	*17053901	0.	0.0,0.0,	1.65398,	1				
17042801	0.	10.	10.	0.	0.	0.	0.	1.3	*17053902	0.	0.0,0.0,	1.06591,	2
17042901	0.	10.	10.	0.	0.	0.	0.	1.3	*17053903	0.	0.0,0.0,	1.15481,	3
*					*17053904	0.	0.0,0.0,	1.25641,	4				
* BL SG Downcomer Outer Wall					*17053905	0.	0.0,0.0,	1.23101,	5				
*					*17053906	0.	0.0,0.0,	1.15481,	6				
17053000	8	5	2	1	*17053907	0.	0.0,0.0,	1.23101,	7				
17053100	0	2			*17053908	0,	0.0,0.0,	1.19609,	8				
17053101	0.00377	4			17053801	0.	10.	10.	0.	0.	0.	0.	1.8
17053201	0001.4				17053901	0.	10.	10.	0.	0.	0.	0.	1.8
17053301	0.0.	4			*								
17053400	7001				* BL SG Outer Wall Upper Part								
17053501	705010000.	0.1,	1.	1.65398,	1	*							
17053502	705020000.	0.1,	1.	1.10659,	2	17054000	4	5	2	1	0.20477		
17053503	705030000.	0.1,	1.	1.15481,	3	17054100	0	2					
17053504	705040000.	0.1,	1.	1.25641,	4	17054101	0.00596	4					
17053505	705050000.	0.1,	1.	1.23101,	5	17054201	0001.4						

17054301	0.0.	4					
17054400	7001						
17054501	704010000, 0, 1.	1,	0.40005,	1			
17054502	703010000, 0, 1.	1,	0.50635,	2			
17054503	709010000, 0, 1.	1,	0.50635,	3			
17054504	709020000, 0, 1,	1,	0.37827,	4			
*17054601	-200, 0, 1000,	1,	0.40005,	1			
*17054602	-200, 0, 1000,	1,	0.50635,	2			
*17054603	-200, 0, 1000,	1,	0.50635,	3			
*17054604	-200, 0, 1000,	1,	0.37827,	4			
*							
* modify right boundary condition							
* identical to intact loop sg							
* by ysbang at 94.9.6							
*							
17054601	-200, 0, 3204,	1,	0.40005,	1			
17054602	-200, 0, 3204,	1,	0.50635,	2			
17054603	-200, 0, 3204,	1,	0.50635,	3			
17054604	-200, 0, 3204,	1,	0.37827,	4			
*							
17054701	0. 0.0,0.0,0.0,	4					
*17054801	0. 0.0,0.0,	0.40005,	1				
*17054802	0. 0.0,0.0,	0.50635,	3				
*17054803	0. 0.0,0.0,	0.37827,	4				
*17054901	0. 0.0,0.0,	0.40005,	1				
*17054902	0. 0.0,0.0,	0.50635,	3				
*17054903	0. 0.0,0.0,	0.37827,	4				
17054801	0. 10. 10. 0. 0.	0. 0.	1.4				
17054901	0. 10. 10. 0. 0.	0. 0.	1.4				
*							
* BL SG Steam Dome Upper Part Wall							
*							
17055000	1 5 1 1 0.0						
17055100	0 2						
17055101	0.00596	4					
17055201	0001.4						
17055301	0.0.	4					
17055400	7001						
17055501	704010000, 0, 1,	0,	0.13174,	1			
17055601	0. 0. 0. 0.	0.13174.	1				
17055701	0. 0.0.0.0.0.	1					
*17055801	0. 0.0.0.0.	0.40955.	1				
*17055901	0. 0.0.0.0.	0.49055.	1				
17055801	0. 10. 10. 0. 0.	0. 0.	1.1				
17055901	0. 10. 10. 0. 0.	0. 0.	1.1				
*							
*****							
* heat structure thermal property data (si units)							
*****							
*							
20100100	tbl/fctn	1	1	* s-steel			
20100200	tbl/fctn	1	1	* incoly 600			
20100300	tbl/fctn	1	1	* copper			
20100400	tbl/fctn	1	1	* boron nitride			
20100500	tbl/fctn	1	1	* inconel 600			
20100600	tbl/fctn	1	1	* filler pieces			
*							
* thermal conductivity S-Steel							
*							
20100101	273.15	12.98					
20100102	1199.82	25.1					
*							
* thermal conductivity incoloy 600							
*							
20100201	366.5	13.85					
20100202	477.6	15.92					
20100203	588.7	18.17					
20100204	700.0	20.42					
20100205	810.9	22.50					
20100206	922.0	24.92					
20100207	1033.2	26.83					
20100208	1144.3	29.42					
20100209	1477.6	36.06					
*							
* thermal conductivity copper							
*							
20100301	273.15	387.546					
20100302	373.15	377.577					
20100303	573.15	366.985					
20100304	773.15	358.262					
20100305	2477.60	358.262					
*							
* thermal conductivity boron nitride							
*							
20100401	273.15	15.888					
20100402	366.48	15.016					
20100403	533.15	13.458					
20100404	810.93	10.841					
20100405	1088.71	8.287					
20100406	1366.48	5.664					
20100407	1644.26	3.059					
20100408	1922.04	0.461					
20100409	2199.82	0.461					
20100410	2477.602	0.461					
*							
* thermal conductivity inconel 600							
*							
20100501	273.15	14.7043					
20100502	310.93	14.7043					
20100503	422.04	16.6358					
20100504	533.15	18.3181					
20100505	644.26	20.0627					
20100506	755.37	21.8073					
20100507	866.48	23.5518					
20100508	2477.60	23.5518					
*							

\* thermal conductivity fillers (air)

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20100601 300.0 0.02622  
 20100602 400.0 0.03362  
 20100603 500.0 0.04035  
 20100604 600.0 0.04565  
 20100605 700.0 0.05227

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\* volumetric heat capacity s-steel

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20100151 273.15 3.830e6  
 20100152 366.5 3.830e6  
 20100153 1466.5 5.376e6

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\* volumetric heat capacity incoloy 600

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20100251 366.5 3.908e5  
 20100252 477.6 4.084e5  
 20100253 588.7 4.260e5  
 20100254 700.0 4.436e5  
 20100255 810.9 4.665e5  
 20100256 922.0 4.929e5  
 20100257 1033.2 5.105e5  
 20100258 1477.6 5.727e5

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\* volumetric heat capacity copper

---

20100351 273.15 3.6429e06  
 20100352 2477.60 3.4429e06

---

\* volumetric heat capacity boron nitride

---

20100451 273.15 2.5150e06  
 20100452 477.59 2.515e06  
 20100453 699.82 3.2393e06  
 20100454 922.04 3.661e06  
 20100455 1144.26 3.9100e06  
 20100456 1366.48 4.0240e06  
 20100457 1588.71 4.1172e06  
 20100458 2144.26 4.1916e06  
 20100459 2477.60 4.1916e06

---

\* volumetric heat capacity inconel 600

---

20100551 273.15 3.50253e06  
 20100552 2477.60 3.50253e06

---

\* volumetric heat capacity filters

---

20100651 200.0 1.1595e06  
 20100652 1000.0 1.1595e06

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\* tabulat data

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\* power for pressurizer

20230000 power 502  
 20230001 -1.0 0.0  
 20230002 0.0 0.0  
 20230003 0.0 12000.  
 20230004 1.0e06 12000.

\* reactor core power

\* power ratio of aver/hot = 70/30

\* 20250000 power  
 \* 20250001 0.0 66.5e03

\* 20255000 power  
 \* 20255001 0.0 28.5e03

\* modified by ysbang at Sep. 18, 1996  
 \* to adjusting rod temp increase

\* power ratio of aver/hot = 60/40

\* 20250000 power  
 20250001 0.0 57.0e03

\* 20255000 power  
 20255001 0.0 38.0e03

\* 20220000 temp  
 20220001 0.0 300.

\* 20270500 htc-t  
 20270501 0.0 6.086

\* 20220500 htc-t  
 20220501 0.0 6.086

\* 20220400 htc-t  
 20220401 0.0 5.98

\* 20270400 htc-t  
 20270401 0.0 5.98

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\* homogeneous pump curves

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\* broken loop single-phase head curves

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4501100	1	1	*		
4501101	0.0	1.7321	4501900	2	1
4501102	0.2845	1.7059	4501901	0.0	0.54
4501103	0.569	1.627	4501902	0.2	0.59
4501104	0.8535	1.1878	4501903	0.4	0.65
4501105	1.0	1.0	4501904	0.6	0.77
*			4501905	0.8	0.95
4501200	1	2	4501906	0.9	0.98
4501201	0.0	-1.6359	4501907	0.95	0.96
4501202	0.713	0.0	4501908	1.0	0.87
4501203	0.8271	0.2959	*		
4501204	1.0	1.0	4502000	2	2
*			4502001	0.0	-0.15
4501300	1	3	4502002	0.2	0.02
4501301	-1.0	1.5	4502003	0.4	0.22
4501302	-0.8	1.275	4502004	0.6	0.46
4501303	-0.6	1.375	4502005	0.8	0.71
4501304	-0.4	1.375	4502006	0.9	0.81
4501305	0.0	1.2	4502007	0.95	0.85
*			4502008	1.0	0.87
4501400	1	4	*		
4501401	-1.0	1.5	4502100	2	3
4501402	-0.8	1.15	4502101	-1.0	0.62
4501403	-0.6	0.95	4502102	-0.8	0.68
4501404	-0.4	0.83	4502103	-0.6	0.53
4501405	-0.2	0.775	4502104	-0.4	0.46
4501406	0.0	0.725	4502105	-0.2	0.49
*			4502106	0.0	0.54
4501500	1	5	*		
4501501	0.0	0.975	4502200	2	4
4501502	0.5	1.33	4502201	-1.0	0.62
4501503	1.0	1.95	4502202	-0.8	0.53
*			4502203	-0.6	0.46
4501600	1	6	4502204	-0.4	0.42
4501601	0.0	0.725	4502205	-0.2	0.39
4501602	0.2	0.725	4502206	0.0	0.36
4501603	0.4	0.8	*		
4501604	0.6	1.025	4502300	2	5
4501605	1.0	1.95	4502301	0.0	-0.63
*			4502302	0.2	-0.51
4501700	1	7	4502303	0.4	-0.39
4501701	-1.0	0.175	4502304	0.6	-0.29
4501702	-0.5	0.65	4502305	0.8	-0.16
4501703	0.0	0.975	4502306	1.0	-0.13
*			*		
4501800	1	8	4502400	2	6
4501801	-1.0	0.175	4502401	0.0	0.36
4501802	-0.75	-0.15	4502402	0.2	0.32
4501803	-0.55	-0.3	4502403	0.4	0.27
4501804	-0.275	-0.4	4502404	0.6	0.18
4501805	0.0	-0.35	4502405	0.8	0.05
*			4502406	1.0	-0.13
*			*		

\* broken loop single-phase torque curves

4502500	2	7		4504107	1	0	1.0
4502501	-1.0	-1.44		*			
4502502	-0.8	-1.25		4504200	1	2	
4502503	-0.6	-1.08		4504201	0	0	0.0
4502504	-0.4	-0.92		4504202	0.1	-0.04	
4502505	-0.2	-0.77		4504203	0.2	0.0	
4502506	0.0	-0.63		4504204	0.3	0.1	
*				4504205	0.4	0.21	
4502600	2	8		4504206	0.8	0.67	
4502601	-1.0	-1.44		4504207	0.9	0.8	
4502602	-0.8	-1.12		4504208	1.0	1.0	
4502603	-0.6	-0.79		*			
4502604	-0.4	-0.52		4504300	1	3	
4502605	-0.2	-0.31		4504301	-1.0	-1.16	
4502606	0.0	-0.15		4504302	-0.9	-1.24	
*				4504303	-0.8	-1.77	
* two-phase head multiplier				4504304	-0.7	-2.36	
*				4504305	-0.6	-2.79	
4503000	0			4504306	-0.5	-2.91	
4503001	0.0	0.0		4504307	-0.4	-2.67	
4503002	0.1	0.0		4504308	-0.25	-1.69	
4503003	0.15	0.05		4504309	-0.1	-0.5	
4503004	0.24	0.8		4504310	0.0	0.0	
4503005	0.3	0.96		*			
4503006	0.4	0.98		4504400	1	4	
4503007	0.6	0.97		4504401	-1.0	-1.16	
4503008	0.8	0.90		4504402	-0.9	-0.78	
4503009	0.9	0.8		4504403	-0.8	-0.5	
4503010	0.96	0.5		4504404	-0.7	-0.31	
4503011	1.0	0.0		4504405	-0.6	-0.17	
*				4504406	-0.5	-0.08	
* two-phase torque multiplier				4504407	-0.35	0.0	
*				4504408	-0.2	0.05	
4503100	0			4504409	-0.1	0.08	
4503101	0.0	-0.17		4504410	0.0	0.11	
4503102	0.0001	-0.17		*			
4503103	0.006	0.0		4504500	1	5	
4503104	0.1	0.0		4504501	0.0	0.0	
4503105	0.15	0.05		4504502	0.2	-0.34	
4503106	0.24	0.56		4504503	0.4	-0.65	
4503107	0.8	0.56		4504504	0.6	-0.93	
4503108	0.96	0.45		4504505	0.8	-1.19	
4503109	1.0	0.0		4504506	1.0	-1.47	
*				*			
* two-phase head difference curves				4504600	1	6	
*				4504601	0.0	0.11	
4504100	1	1		4504602	0.1	0.13	
4504101	0.0	0.0		4504603	0.25	0.15	
4504102	0.1	0.85		4504604	0.4	0.13	
4504103	0.2	1.09		4504605	0.5	0.07	
4504104	0.5	1.02		4504606	0.6	-0.04	
4504105	0.7	1.01		4504607	0.7	-0.23	
4504106	0.9	0.94		4504608	0.8	-0.51	

4504609	0.9	-0.91	4505304	0.6	-0.29
4504610	1.0	-1.47	4505305	0.8	-0.20
*			4505306	0.9	-0.16
4504700	1	7	4505307	1.0	-0.13
4504701	-1.0	0.0	*		
4504702	0.0	0.0	4505400	2	6
*			4505401	0.0	0.36
4504800	1	8	4505402	0.2	0.32
4504801	-1.0	0.0	4505403	0.4	0.27
4504802	0.0	0.0	4505404	0.6	0.18
*			4505405	0.8	0.05
* two-phase torque difference curves			4505406	1.0	-0.13
*			*		
4504900	2	1	4505500	2	7
4504901	0.0	0.54	4505501	-1.0	-1.44
4504902	0.2	0.59	4505502	-0.8	-1.25
4504903	0.4	0.65	4505503	-0.6	-1.08
4504904	0.6	0.77	4505504	-0.4	-0.92
4504905	0.8	0.95	4505505	-0.2	-0.77
4504906	0.9	0.98	4505506	0.0	-0.63
4504907	0.95	0.96	*		
4504908	1.0	0.87	4505600	2	8
*			4505601	-1.0	-1.44
4505000	2	2	4505602	-0.8	-1.12
4505001	0.0	-0.15	4505603	-0.6	-0.79
4505002	0.2	0.02	4505604	-0.4	-0.52
4505003	0.4	0.22	4505605	-0.2	-0.31
4505004	0.6	0.46	4505606	0.0	-0.15
4505005	0.8	0.71	*		
4505006	0.9	0.81	4506100	501	
4505007	0.95	0.85	4506101	0.0	0.0
4505008	1.0	0.87	4506102	1.0e06	0.0
*	.		*		
4505100	2	3	*****		
4505101	-1.0	0.62	* control components		
4505102	-0.8	0.68	*****		
4505103	-0.6	0.53	*		
4505104	-0.4	0.46	20500100 sgdc-lvl sum 1.0 0.0 1		
4505105	-0.2	0.49	20500101 0.0 1.21831 voidf 205100000		
4505106	0.0	0.54	20500102 1.20561 voidf 205090000		
*			20500103 1.20561 voidf 205080000		
4505200	2	4	20500104 1.20561 voidf 205070000		
4505201	-1.0	0.62	20500105 1.20561 voidf 205060000		
4505202	-0.8	0.53	20500106 1.20561 voidf 205050000		
4505203	-0.6	0.46	20500107 1.20561 voidf 205040000		
4505204	-0.4	0.42	20500108 0.48578 voidf 205030000		
4505205	-0.2	0.39	20500109 0.58737 voidf 205020000		
4505206	0.0	0.36	20500110 0.41891 voidf 205010000		
*			20500111 0.37827 voidf 209020000		
4505300	2	5	20500112 0.50633 voidf 209010000		
4505301	0.0	-0.63	20500113 0.50635 voidf 203010000		
4505302	0.2	-0.51	20500114 0.40005 voidf 204010000		
4505303	0.4	-0.39	*		

20500200	sgsd-lvl	sum	1.0	0.0	1					
20500201	0.0	1.21831	voidf	202010000		20501207	1.06591	voidf	705020000	
20500202	1.20561	voidf	202020000			20501208	1.65398	voidf	705010000	
20500203	1.20561	voidf	202030000			20501209	0.37827	voidf	709020000	
20500204	1.20561	voidf	202040000			20501210	0.50635	voidf	709010000	
20500205	1.20561	voidf	202050000			20501211	0.50635	voidf	703010000	
20500206	1.20561	voidf	202060000			20501212	0.40005	voidf	704010000	
20500207	1.20561	voidf	202070000		*					
20500208	0.48578	voidf	202080000		*					
20500209	0.58737	voidf	202090000			20501600	hotchlvl	sum	1. 0. 1	
20500210	0.41891	voidf	202100000			20501601	0. .6096	voidf	555010000	
20500211	0.37827	voidf	202110000			20501602	.6096	voidf	555020000	
20500212	0.50635	voidf	202120000			20501603	.3048	voidf	555030000	
20500213	0.50635	voidf	203010000			20501604	.3048	voidf	555040000	
20500214	0.40005	voidf	204010000		*	20501605	.3048	voidf	555050000	
*						20501606	.3048	voidf	555060000	
20500700	sg-delt	sum	1.0	20.0	1	20501607	.6096	voidf	555070000	
20500701	0.	1.	tempf	201010000		20501608	.6096	voidf	555080000	
20500702	-1.	tempf	201200000		*					
*						20502300	przrlvl	sum	1.0 0.0 1	
*						20502301	0.0	0.3671	voidf	301010000
*						20502302	0.2549	voidf	301020000	
*						20502303	0.2549	voidf	301030000	
20501000	cord-lvl	sum	1.	0.	1	20502304	0.2549	voidf	301040000	
20501001	0.	.6096	voidf	505010000		20502305	0.0663	voidf	301050000	
20501002	.6096	voidf	505020000		*					
20501003	.3048	voidf	505030000		*					
20501004	.3048	voidf	505040000		*					
20501005	.3048	voidf	505050000		*					
20501006	.3048	voidf	505060000		*					
20501007	.6096	voidf	505070000		*					
20501008	.6096	voidf	505080000		*					
*						20502400	b1sgpl	sum	1. 0. 0	
20501100	sgsr-lvl	sum	1.0	0.0	1	20502401	0.	1.41896	htmr	705300101
20501101	0.0	1.9609	voidf	702010000		20502402	0.91445	htmr	705300201	
20501102	1.23101	voidf	702020000			20502403	0.99072	htmr	705300301	
20501103	1.15481	voidf	702030000			20502404	0.07788	htmr	705300401	
20501104	1.23101	voidf	702040000			20502405	0.05609	htmr	705300501	
20501105	1.25641	voidf	702050000			20502406	0.99072	htmr	705300601	
20501106	1.15481	voidf	702060000			20502407	0.05609	htmr	705300701	
20501107	1.06591	voidf	702070000			20502408	0.02613	htmr	705300801	
20501108	1.65398	voidf	702080000			20502409	0.57463	htmr	705400101	
20501109	1.37827	voidf	702090000			20502410	0.72732	htmr	705400201	
20501110	0.50635	voidf	702100000			20502411	0.72732	htmr	705400301	
20501111	0.50635	voidf	703010000			20502412	0.54335	htmr	705400401	
20501112	0.40005	voidf	704010000		*					
*					*					
20501200	sgdc-lvl	sum	1.0	0.0	1					
20501201	0.0	1.19009	voidf	705080000		20502500	ilsgpl	sum	1. 0. 0	
20501202	1.25101	voidf	705070000			20502501	0.	.35939	htmr	205300101
20501203	1.15481	voidf	705060000			20502502	.50391	htmr	205300201	
20501204	1.23101	voidf	705050000			20502503	.41675	htmr	205300301	
20501205	1.25641	voidf	705040000			20502504	1.03430	htmr	205300401	
20501206	1.13481	voidf	705030000			20502505	1.03430	htmr	205300501	

20502510	1.04520	htmr	205301001	20510113	1.4841030-03	rho	104050000	
20502511	.57463	htmr	205400101	*				
20502512	.72732	htmr	205400201	20510200	crossms	sum	1.0 0.0 1	
20502513	.72732	htmr	205400301	20510201	0.0	1.0187750-03	rho	105010000
20502514	.54335	htmr	205400401	20510202	9.3065600-04	rho	105020000	
*				20510203	8.1432400-04	rho	105030000	
*			* energy loss to environment - il sg	20510204	8.1432400-04	rho	105040000	
*			*	20510205	8.1432400-04	rho	105050000	
20502600	blsgel integral	1.0. 0		20510206	1.1289930-03	rho	105060000	
20502601	cntrlvar	24		20510207	2.0441630-03	rho	105070000	
*				20510208	2.7480260-03	rho	105080000	
*			* energy loss to environment - il sg	20510209	2.7480260-03	rho	105090000	
20502700	ilsgel integral	1.0. 0		20510210	9.1438000-04	rho	105100000	
20502701	cntrlvar	25		20510211	9.1438000-04	rho	105110000	
*				20510212	2.7480260-03	rho	105120000	
*			* power loss to environment from sg	20510213	2.7480260-03	rho	105130000	
*			*	20510214	2.0441630-03	rho	105140000	
20502800	sgfl sum	1. 0. 0		*				
20502801	0. 1.	cntrlvar	24	20510300	ilclmass	sum	1.0 0.0 1	
20502802	1.	cntrlvar	25	20510301	0.0	4.0772550-04	rho	106010000
*				20510302	1.0447530-03	rho	106020000	
*			* energy loss to environment from sg	20510303	5.4641860-04	rho	106030000	
*			*	20510304	6.7631200-04	rho	106040000	
20502900	sgel sum	1. 0. 0		20510305	2.6372190-03	rho	106050000	
20502901	0. 1.	cntrlvar	26	20510306	2.7614970-03	rho	107010000	
20502902	1.	cntrlvar	27	20510307	7.6276200-04	rho	108010000	
*			*					
*			* integ of bl hot leg mass flow	20510400	ilsgpr	sum	1.0 0.0 1	
*			*	20510401	0.0	1.6407770-03	rho	201010000
20503000	blm integral	1.0. 0		20510402	2.2416900-03	rho	201020000	
20503001	mflowj	402010000		20510403	2.2183220-03	rho	201030000	
*			*	20510404	2.2183220-03	rho	201040000	
*			* integ of il hot leg mass flow	20510405	2.2183220-03	rho	201050000	
*			*	20510406	2.2183220-03	rho	201060000	
20503100	ilm integral	1.0. 0		20510407	2.2183220-03	rho	201070000	
20503101	mflowj	102020000		20510408	2.2183220-03	rho	201080000	
*			*	20510409	8.9383520-04	rho	201090000	
*			*	20510410	6.3316240-04	rho	201100000	
*			*	20510411	6.3316240-04	rho	201110000	
*			*	20510412	8.9383520-04	rho	201120000	
20510100	ilhlmass	sum	1.0 0.0 1	20510413	2.2183220-03	rho	201130000	
20510101	0.0	9.2278200-04	rho	20510414	2.2183220-03	rho	201140000	
20510102	1.9918830-03	rho	101010000	20510415	2.2183220-03	rho	201150000	
20510103	5.9836050-04	rho	102020000	20510416	2.2183220-03	rho	201160000	
20510104	5.9836050-04	rho	102030000	20510417	2.2183220-03	rho	201170000	
20510105	7.8538960-04	rho	102040000	20510418	2.2183220-03	rho	201180000	
20510106	8.8732920-04	rho	102050000	20510419	2.2416900-03	rho	201190000	
20510107	8.8732920-04	rho	102060000	20510420	1.6407770-03	rho	201200000	
*			*					
20510108	1.2796520-03	rho	103010000	20520100	blsgpr	sum	1.0 0.0 1	
20510109	5.4559250-04	rho	104010000	20520101	0.0	1.4264000-02	rho	202010000
20510110	9.7311260-04	rho	104020000	20520102	1.6574000-02	rho	202020000	
20510111	8.1432400-04	rho	104030000	20520103	1.3183000-02	rho	202030000	
20510112	8.1432400-04	rho	104040000					

20520104	1.6789000-02	rho	202040000	20510701	0.0	4.4975840-04	rho	403010000	
20520105	1.3532000-02	rho	202050000	20510702	3.1781750-04	rho	403020000		
20520106	1.2870000-02	rho	202060000	20510703	3.2063850-04	rho	403030000		
20520107	1.2850000-02	rho	202070000	20510704	3.1781750-04	rho	403040000		
20520108	5.8490000-03	rho	202080000	20510705	9.8569380-04	rho	403050000		
20520109	9.2780000-03	rho	202090000	20510706	7.1445920-04	rho	403060000		
20520110	7.6310000-03	rho	202100000	20510707	7.1445920-04	rho	403070000		
20520111	1.5420000-02	rho	202110000	20510708	4.4539040-04	rho	403080000		
20520112	2.6025000-02	rho	202120000	20510709	4.4539040-04	rho	403090000		
20520113	5.9663000-02	rho	203010000	20510710	7.1445920-04	rho	403100000		
20520114	3.3900000-02	rho	204010000	20510711	7.1445920-04	rho	403110000		
*				20510712	6.3701820-04	rho	403120000		
20520300	ilsgsec	sum	1.0 0.0 1	*					
20520301	0.0	6.3370000-03	rho	205010000	20510800	blclmass	sum	1.0 0.0 1	
20520302	3.2520000-03	rho	205020000	20510801	0.0	7.5605530-04	rho	404010000	
20520303	1.3220000-03	rho	205030000	20510802	2.4731980-04	rho	405010000		
20520304	3.2790000-03	rho	205040000	20510803	6.4741950-04	rho	405020000		
20520305	3.2790000-03	rho	205050000	20510804	1.3575400-03	rho	406010000		
20520306	3.2790000-03	rho	205060000	20510805	8.6000000-04	rho	450010000		
20520307	3.2790000-03	rho	205070000	*					
20520308	3.2790000-03	rho	205080000	20510900	rvcore	sum	1.0 0.0 1		
20520309	3.2790000-03	rho	205090000	20510901	0.0	6.7400000-03	rho	501010000	
20520310	3.3140000-03	rho	205100000	20510902	6.5900000-03	rho	502010000		
20520311	1.1400000-03	rho	206010000	20510903	2.9600000-03	rho	503010000		
20520312	2.9856000-02	rho	209010000	20510904	5.2000000-04	rho	504010000		
20520313	2.0686000-02	rho	209020000	20510905	1.7434560-03	rho	505010000		
*				20510906	1.7434560-03	rho	505020000		
20530100	pressms	sum	1.0 0.0 1	20510907	8.7172800-04	rho	505030000		
20530101	0.0	6.4825000-03	rho	301010000	20510908	8.7172800-04	rho	505040000	
20530102	6.4825000-03	rho	301020000	20510909	8.7172800-04	rho	505050000		
20530103	5.9118000-03	rho	301030000	20510910	8.7172800-04	rho	505060000		
20530104	5.9118000-03	rho	301040000	20510911	1.7434560-03	rho	505070000		
20530105	5.9118000-03	rho	301050000	20510912	1.7434560-03	rho	505080000		
20530106	1.1360000-03	rho	301060000	20510913	1.6400000-03	rho	506010000		
20530107	7.1837000-04	rho	302010000	20510914	2.8100000-03	rho	507010000		
20530108	2.3214100-04	rho	302020000	20510915	2.1800000-03	rho	508010000		
20530109	1.6457700-04	rho	302030000	20510916	1.4300000-03	rho	509010000		
20530110	4.4046000-05	rho	302040000	20510917	4.0470000-03	rho	509020000		
20530111	4.4046000-05	rho	302050000	20510918	3.9300000-04	rho	510010000		
20530112	4.4046000-05	rho	302060000	20510919	3.4000000-04	rho	513010000		
20530113	4.4046000-05	rho	302070000	20510920	3.4525000-04	rho	514010000		
*				*					
20510500	blhlms	sum	1.0 0.0 1	20511000	rvdcr	sum	1.0 0.0 1		
20510501	0.0	1.4245480-03	rho	401010000	20511001	0.0	2.6189940-03	rho	516010000
20510502	5.5496350-04	rho	402010000	20511002	3.7726480-03	rho	517010000		
20510503	3.7182600-04	rho	402020000	20511003	1.1833800-03	rho	518010000		
20510504	8.9706890-04	rho	402030000	20511004	1.1833800-03	rho	518020000		
20510505	3.8022530-04	rho	402040000	20511005	1.1833800-03	rho	518030000		
20510506	3.2063850-04	rho	402050000	20511006	1.1833800-03	rho	518040000		
20510507	3.1781750-04	rho	402060000	20511007	1.1833800-03	rho	518050000		
20510508	5.5399890-04	rho	402070000	20511008	1.1833800-03	rho	518060000		
*				20511009	1.1833800-03	rho	518070000		
20510700	blicross	sum	1.0 0.0 1	20511010	1.1833800-03	rho	518080000		

20511011	1.1833800-03	rho	518090000	* total primary inventory	
20511012	9.1139620-04	rho	518100000	*	
20511013	2.0770600-03	rho	519010000	20511100 totalpr sum 1.0 0.0 1	
20511014	2.6772900-05	rho	531010000	20511101 0.0 1.0 cntrivar 101	
20511015	2.6772900-05	rho	531020000	20511102 1.0 cntrivar 102	
20511016	2.6772900-05	rho	531030000	20511103 1.0 cntrivar 103	
*				20511104 1.0 cntrivar 104	
20510600	b1sgpr	sum	1.0 0.0 1	20511105 1.0 cntrivar 105	
20510601	0.0	1.3434060-03	rho	701010000	20511106 1.0 cntrivar 106
20510602	7.2961490-04	rho	701020000	20511107 1.0 cntrivar 107	
20510603	7.5091610-04	rho	701030000	20511108 1.0 cntrivar 108	
20510604	7.0443410-04	rho	701040000	20511109 1.0 cntrivar 109	
20510605	7.5091610-04	rho	701050000	20511110 1.0 cntrivar 110	
20510606	7.6641010-04	rho	701060000	20511111 1.0 cntrivar 301	
20510607	7.0443410-04	rho	701070000	*	
20510608	6.5020510-04	rho	701080000	* total secondary inventory	
20510609	5.9905660-04	rho	701090000	*	
20510610	5.9905660-04	rho	701100000	20520500 totalsec sum 1.0 0.0 1	
20510611	6.5020510-04	rho	701110000	20520501 0.0 1.0 cntrivar 201	
20510612	7.0443410-04	rho	701120000	20520502 1.0 cntrivar 202	
20510613	7.6641010-04	rho	701130000	20520503 1.0 cntrivar 203	
20510614	7.5091610-04	rho	701140000	20520504 1.0 cntrivar 204	
20510615	7.0443410-04	rho	701150000	*	
20510616	7.5091610-04	rho	701160000	* core heat	
20510617	7.2961490-04	rho	701170000	*	
20510618	1.3434060-03	rho	701180000	20505000 thcore sum 1.0 0.0 1	
*				20505001 0.0 13.4112 htrnr 501300101	
20520200	b1sgsec	sum	1.0 0.0 1	20505002 13.4112 htrnr 501300201	
20520201	0.0	1.3509000-02	rho	702010000	20505004 6.7056 htrnr 501300301
20520202	9.0360000-03	rho	702020000	20505005 6.7056 htrnr 501300401	
20520203	8.4700000-03	rho	702030000	20505006 6.7056 htrnr 501300501	
20520204	1.0739000-02	rho	702040000	20505007 6.7056 htrnr 501300601	
20520205	9.6150000-03	rho	702050000	20505008 13.4112 htrnr 501300701	
20520206	8.4740000-03	rho	702060000	20505009 13.4112 htrnr 501300801	
20520207	8.4250000-03	rho	702070000	20505010 1.8288 htrnr 501300901	
20520208	1.5782000-02	rho	702080000	20505011 1.8288 htrnr 501301001	
20520209	1.6807000-02	rho	702090000	20505012 0.9144 htrnr 501301101	
20520210	2.5882000-02	rho	702100000	20505013 0.9144 htrnr 501301201	
20520211	5.6736000-02	rho	703010000	20505014 0.9144 htrnr 501301301	
20520212	3.3900000-02	rho	704010000	20505015 0.9144 htrnr 501301401	
*				20505016 1.8288 htrnr 501301501	
20520400	b1sgsec	sum	1.0 0.0 1	20505017 1.8288 htrnr 501301601	
20520401	0.0	1.4458000-02	rho	705010000	*
20520402	2.2410000-03	rho	705020000	* Intact Loop SG Heat Transfer	
20520403	2.4350000-03	rho	705030000	*	
20520404	2.6390000-03	rho	705040000	20505100 isgheat sum 1.0 0.0 1	
20520405	2.5890000-03	rho	705050000	20505101 0.0 7.30986 htrnr 200100100	
20520406	2.4310000-03	rho	705060000	20505102 7.23366 htrnr 200100200	
20520407	2.5930000-03	rho	705070000	20505103 7.23366 htrnr 200100300	
20520408	2.5140000-03	rho	705080000	20505104 7.23366 htrnr 200100400	
20520409	2.9860000-02	rho	709010000	20505105 7.23366 htrnr 200100500	
20520410	2.0686000-02	rho	709020000	20505106 7.23366 htrnr 200100600	
*				20505107 7.23366 htrnr 200100700	

20505108 2.91468	htmr	200100800	20505203 2.30962	htmr	700100300
20505109 2.06466	htmr	200100900	20505204 2.46202	htmr	700100400
20505110 2.06466	htmr	200101000	20505205 2.51282	htmr	700100500
20505111 2.91468	htmr	200101100	20505206 2.30962	htmr	700100600
20505112 7.23366	htmr	200101200	20505207 2.13182	htmr	700100700
20505113 7.23366	htmr	200101300	20505208 1.96412	htmr	700100800
20505114 7.23366	htmr	200101400	20505209 1.96412	htmr	700100900
20505115 7.23366	htmr	200101500	20505210 2.13182	htmr	700101000
20505116 7.23366	htmr	200101600	20505211 2.30962	htmr	700101100
20505117 7.23366	htmr	200101700	20505212 2.51282	htmr	700101200
20505118 7.30986	htmr	200101800	20505213 2.46202	htmr	700101300
*			20505214 2.30962	htmr	700101400
* Broken Loop SG Heat Transfer			20505215 2.46202	htmr	700101500
*			20505216 2.39218	htmr	700101600
20505200 bsgheat sum 1.0 0.0 1			*		
20505201 0.0 2.39218	htmr	700100100	.		* end of deck
20505202 2.46202	htmr	700100200			

## Transient Input Deck for Case E01

```

*      the next input deck is for the transient calculation
*      of the semiscale natural circulation experiment 8. *
= semiscale mod 2a -- nc8 configuration (2-loop)
*
*      two core channel modeling implemented
*
0000100 restart transnt
0000101 run
0000103 8001
*0000104 none
0000105 10.0 12.0
0000201 1.0 1.0e-06 0.01 2 50 250 1000
0000201 5000.0 1.0e-06 0.05 2 200 20000 20000
*-----*
*      minor edit variables
*-----*
20800001 dt 0
20800002 dcrmt 0
20800003 cputime
20800004 tmass 0
20800005 emass 0
20800006 cntrlvar 211 * primary system pressure
20800007 cntrlvar 212 * ilsg pressure
20800008 cntrlvar 213 * blsg pressure
20800009 cntrlvar 214 * ilcrossoverleg sg side dp
20800010 cntrlvar 215 * ilcrossover leg pump sideJp
20800011 cntrlvar 216 * blcrossover leg sg side dp
20800012 cntrlvar 217 * blcrossover leg pump side dp
20800013 cntrlvar 218 * ector vessel core dp
*20800014 cntrlvar 228 * total accumulator flow (intact)
*20800015 cntrlvar 229 * total accumulator flow (broken)
20800016 cntrlvar 101 * ilhl mass
20800017 cntrlvar 102 * ilcrl mass
20800018 cntrlvar 103 * ilcl mass
20800019 cntrlvar 104 * ilsg primary mass
20800020 cntrlvar 105 * blhl mass
20800021 cntrlvar 106 * blsg primary mass
20800022 cntrlvar 107 * blcrl mass
20800023 cntrlvar 108 * blcl mass
20800024 cntrlvar 109 * rv core mass
20800025 cntrlvar 110 * rv downcomer mass
20800026 cntrlvar 111 * total primary side inventory
20800027 cntrlvar 201 * ilsg secondary side mass
20800028 cntrlvar 202 * blsg secondary side mass
20800029 cntrlvar 203 * ilsg secondary mass
20800030 cntrlvar 204 * blsg secondary mass
20800031 cntrlvar 205 * total seconady mass
20800032 mflowj 101010000
20800033 mflowj 107010000
20800034 mflowj 401010000
20800035 mflowj 405010000
20800036 mflowj 518010000
20800037 mflowj 233000000
20800038 mflowj 733000000
20800039 mflowj 232000000
20800040 mflowj 732000000
20800041 mflowj 620000000
20800042 mflowj 820000000
*
20800043 tempf 101010000
20800044 tempf 107010000
20800045 tempf 401010000
20800046 tempf 405010000
20800047 httemp 501300711
20800048 httemp 501300811
*-----*
*      trips
*-----*
0000501 time 0 ge null 0 -1.0 l * always true
0000502 time 0 lt null 0 -1.0 n * always false
0000510 time 0 ge null 0 0.0 l * induce blowdown
* after 0 s
0000511 time 0 ge null 0 117.0 l * close steam valve
*+ after 117 s
0000512 time 0 ge null 0 2100.0 l * open steam valve
* after 2100 s
0000513 time 0 ge null 0 7550.0 l * open porv valve after
* 7550 s
0000514 time 0 ge null 0 8098.0 l * close porv valve after
* 8098 s
*
0000601 -511 or 512 n
0000602 513 and 514 n
0000610 -510 and -510 n
*
* modified by ysbang at 96/1/19
* to implement sg steam leak both at iSG bSG
*
0000550 time 0 gt null 0 117.0 n
0000551 time 0 le null 0 2100.0 n
*
0000650 550 and 551 n
*
*-----*
*      intact loop steam leak junction
*-----*
2110000 isteaml valve
2110101 204010000 240000000 0.3-5 0.0 0.0 0100 1.1.
2110201 0 0.0 0.0
2110300 trpvlv
2110301 650
*-----*

```

\* broken loop steam leak junction  
 \*  
 7110000 isteaml valve  
 7110101 704010000 740000000 0.3-5 0.0 0.0 0100 1.1.  
 7110201 0 0.0 0.0  
 7110300 trpvlv  
 7110301 650  
 \*  
 \* intact loop sg steam leak junction downstream  
 \*  
 \*  
 2400000 envir tmdpvol  
 2400101 1.0 1.0 0.0 0.0 90.0 1.0 5.-6 0.0 00  
 2400200 2  
 \*2400201 0.0 5.89e06 1.0  
 \*2400202 2100.0 5.89e06 1.0  
 \*2400203 2763.0 3.96e06 1.0  
 \*2400204 3380.0 3.15e06 1.0  
 \*2400205 4500.0 2.26e06 1.0  
 \*2400206 6110.0 1.50e06 1.0  
 \*2400207 8000.0 1.25e06 1.0  
 \*  
 \* modified by ysbang at Sep 3, 1996 to  
 \* implement an exact boundary condition  
 \*  
 2400201 0.0 5.85e06 1.0  
 2400202 2100.0 5.6e06 1.0  
 2400203 2763.0 2.78e06 1.0  
 2400204 3380.0 2.12e06 1.0  
 2400205 4500.0 1.80e06 1.0  
 2400206 6110.0 1.40e06 1.0  
 2400207 8000.0 1.20e06 1.0  
 \*  
 \* broken loop sg steam leak junction downstream  
 \*  
 7400000 envir tmdpvol  
 7400101 1.0 1.0 0.0 0.0 90.0 1.0 5.-6 0.0 00  
 7400200 2  
 \*7400201 0.0 5.89e06 1.0  
 \*7400202 2100.0 5.89e06 1.0  
 \*7400203 2763.0 3.96e06 1.0  
 \*7400204 3380.0 3.15e06 1.0  
 \*7400205 4500.0 2.26e06 1.0  
 \*7400206 6110.0 1.50e06 1.0  
 \*7400207 8000.0 1.25e06 1.0  
 \*  
 \* modified by ysbang at Sep 3, 1996 to  
 \* implement an exact boundary condition  
 \*  
 7400201 0.0 5.89e06 1.0  
 7400202 2100.0 5.60e06 1.0  
 7400203 2763.0 3.95e06 1.0  
 7400204 3380.0 3.15e06 1.0  
 7400205 4500.0 2.25e06 1.0  
 7400206 6110.0 1.50e06 1.0  
 7400207 8000.0 1.23e06 1.0  
 \*  
 \* end of modification by ysbang  
 \*  
 \* upper head bypass junction modify  
 \*  
 \* modified by ysbang at Sep 16, 1996  
 \*  
 5350000 bypass-up sngljun  
 5350101 531010000 510010000 1.62-5 300.300.0100  
 5350201 0 0.0 0.0 0.0  
 \*  
 \* intact loop sg steam discharge junction  
 \*  
 2320000 steamout valve  
 2320101 204010000 207000000 0.0 0.0 0.0 0100  
 \*2320201 0 -2.166700.01040770 0.0  
 \*  
 \* modified by ysbang at 94/9/14  
 \* to implement the steady state result  
 \*  
 2320201 0 0.0379918 0.0139507 0.0  
 2320300 trpvlv  
 2320301 601  
 \*  
 \* intact loop sg feedwater  
 \*  
 2330000 feedint tmdpjn  
 2330101 206000000 205000000 0.00043  
 2330200 1 512 cntrivar 1  
 2330201 -1.0 0.0 0.0 0.0  
 2330202 0.0 0.0 0.0 0.0  
 2330203 0.0 0.216 0.0 0.0  
 2330204 9.5 0.216 0.0 0.0  
 2330205 9.58 0.054 0.0 0.0  
 2330206 9.7149 0.036 0.0 0.0  
 2330207 9.7800 0.027 0.0 0.0  
 2330208 9.8500 0.0 0.0 0.0  
 2330209 20.0 0.0 0.0 0.0  
 \*  
 \* pressurizer porv downstream tank  
 \*  
 3300000 pressup tmdpvol  
 3300101 1.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 00  
 3300200 3  
 3300201 0.0 1.041e06 455.  
 3300202 49.0 1.041e06 455.  
 3300203 50.0 1.041e06 455.  
 3300204 150.0 0.280e06 406.  
 3300205 1500.0 0.270e06 403.  
 \*

\* pressurizer porv

---

3310000 porv valve

3310101 301000000 330000000 0.0001267 0.0 0.0 0100

\* 1.0 1.0

3310201 0 0.0 0.0 0.0

3310300 trpvlv

3310301 602

---

\* broken loop break junction

---

\*4220000 brk-jun valve

\*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100

\*+ 1.0 1.0

\*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100

1.5 1.5

\*

\*4220201 0 0.0 0.0 0.0

\*4220300 trpvlv

\*4220304 510

\*

\* modified by ysbang to model smooth open

\* of break valve for 100 sec, Sep.30. 1996

\*

4220000 brk-jun valve

4220101 404010000 499000000 9.0e-07 0.0 0.0 0100 1.0

+ 1.0

\*4220101 404010000 499000000 9.0e-07 0.0 0.0 0100

\*+ 1.5 1.5

\*

4220201 0 0.0 0.0 0.0

4220300 mtrvlv

4220304 510 610 0.01 0.0 0

---

\* break downstream volume

---

4990000 pressup tmdpvol

4990101 1.0 10.0 0.0 0.0 0.0 0.0 0.0 0.0 00

4990200 3

\*4990201 0.0 1.041e06 455.

\*4990202 49.0 1.041e06 455.

\*4990203 50.0 1.041e06 455.

\*4990204 150.0 0.280e06 404.

\*4990205 1500.0 0.270e06 403.

\*

\* modified by y.s.bang for realistic modeling

\* of condensate tank pressure

\*

4990201 0.0 0.098e06 455.

4990202 1000.0 0.094e06 455.

4990203 3400.0 0.123e06 455.

4990204 8000.0 0.123e06 455.

\*

---

\* broken loop steam generator steam outlet junction

---

7320000 steamou valve

7320101 704010000 707000000 0.0 0.0 0.0 0100

\*

\*7320201 0 -.0599056 .333999-3 0.0

\*

\* modified by ysbang at 94/9/14

\* to implement the steady state result

\*

7320201 0 0.02012 0.001473 0.0

7320300 trpvlv

7320301 601

---

\* broken loop sg feedwater junction

---

7330000 feedin tmdpjn

7330101 706000000 705000000 0.00043

7330200 1 512 cntrlvar 12

7330201 -1.0 0.0 0.0 0.0

7330202 0.0 0.0 0.0 0.0

7330203 0.0 0.072 0.0 0.0

7330204 10.17 0.018 0.0 0.0

7330205 10.28 0.012 0.0 0.0

7330206 10.34 0.009 0.0 0.0

7330207 10.40 0.0 0.0 0.0

7330208 20.00 0.0 0.0 0.0

\*

\*\*\*\*\*

\* general table data

\*\*\*\*\*

\*

\* power for pressurizer

\*\*\*\*\*

20230000 power 502

20230001 -1.0 0.0

20230002 0.0 0.0

20230003 0.0 12000.

20230004 1.0e06 12000.

\*

\* reactor core power

\*\*\*\*\*

\*20250000 power

\*20250001 0.0 95.000e03

\*20250002 131.0 95.000e03

\*20250003 133.0 81.320e03

\*20250004 163.0 68.305e03

\*20250005 203.0 60.610e03

\*20250006 1103.0 36.955e03

\*20250007 10103.0 17.575e03

\*

\* reactor core power

\* power ratio hot/average = 60/40  
 \*  
 \* hot channel : volume 500  
 \*  
 20250000 power  
 20250001 0.0 57.000e03  
 20250002 131.0 57.000e03  
 20250003 133.0 48.792e03  
 20250004 163.0 40.983e03  
 20250005 203.0 36.366e03  
 \*20250006 1103.0 36.955e03  
 20250006 1103.0 22.173e03  
 20250007 10103.0 10.545e03  
 \*  
 \* average channel : volume 550  
 \*  
 20255000 power  
 20255001 0.0 38.000e03  
 20255002 131.0 38.000e03  
 20255003 133.0 32.585e03  
 20255004 163.0 27.322e03  
 20255005 203.0 24.244e03  
 20255006 1103.0 14.782e03  
 20255007 10103.0 7.0100e03  
 \*  
 20220000 temp  
 20220001 0.0 300.  
 \*  
 20270500 htc-t  
 20270501 0.0 6.806  
 \*  
 20220500 htc-t  
 20220501 0.0 6.806  
 \*  
 20220400 htc-t  
 20220401 0.0 5.98  
 \*  
 20270400 htc-t  
 20270401 0.0 5.98  
 \*  
 \*\*\*\*  
 \* control components  
 \*\*\*\*  
 20500100 sgdcvl sum 1.0 0.0 1  
 20500101 0.0 1.21831 voidf 205100000  
 20500102 1.20561 voidf 205090000  
 20500103 1.20561 voidf 205080000  
 20500104 1.20561 voidf 205070000  
 20500105 1.20561 voidf 205060000  
 20500106 1.20561 voidf 205050000  
 20500107 1.20561 voidf 205040000  
 20500108 0.48578 voidf 205030000  
 20500109 0.58737 voidf 205020000  
 20500110 0.41891 voidf 205010000  
 20500111 0.37827 voidf 209020000  
 20500112 0.50635 voidf 209010000  
 20500113 0.50635 voidf 203010000  
 20500114 0.40005 voidf 204010000  
 \*  
 20500200 sgsrlvl sum 1.0 0.0 1  
 20500201 0.0 1.21831 voidf 202010000  
 20500202 1.20561 voidf 202020000  
 20500203 1.20561 voidf 202030000  
 20500204 1.20561 voidf 202040000  
 20500205 1.20561 voidf 202050000  
 20500206 1.20561 voidf 202060000  
 20500207 1.20561 voidf 202070000  
 20500208 0.48578 voidf 202080000  
 20500209 0.58737 voidf 202090000  
 20500210 0.41891 voidf 202100000  
 20500211 0.37827 voidf 202110000  
 20500212 0.50635 voidf 202120000  
 \*20500213 0.50635 voidf 202130000  
 20500214 0.40005 voidf 204010000  
 \*  
 \*20500300 fi-mass sum 1.0 0.0 1  
 \*20500301 0.0 1.0 cmpmass 101  
 \*20500302 1.0 cmpmass 102  
 \*20500303 1.0 cmpmass 103  
 \*20500304 1.0 cmpmass 104  
 \*20500305 1.0 cmpmass 105  
 \*20500306 1.0 cmpmass 106  
 \*20500307 1.0 cmpmass 107  
 \*20500308 1.0 cmpmass 108  
 \*20500309 1.0 cmpmass 201  
 \*20500310 1.0 cmpmass 301  
 \*20500311 1.0 cmpmass 301  
 \*\*  
 \*20500400 vssl-mass sum 1.0 0.0 1  
 \*20500401 0.0 1.0 cmpmass 501  
 \*20500402 1.0 cmpmass 502  
 \*20500403 1.0 cmpmass 503  
 \*20500404 1.0 cmpmass 504  
 \*20500405 1.0 cmpmass 505  
 \*20500406 1.0 cmpmass 506  
 \*20500407 1.0 cmpmass 507  
 \*20500408 1.0 cmpmass 508  
 \*20500409 1.0 cmpmass 509  
 \*20500410 1.0 cmpmass 513  
 \*20500411 1.0 cmpmass 514  
 \*20500412 1.0 cmpmass 516  
 \*20500413 1.0 cmpmass 517  
 \*20500414 1.0 cmpmass 518  
 \*20500415 1.0 cmpmass 519  
 \*20500416 1.0 cmpmass 531  
 \*20500417 1.0 cmpmass 510

```

**
*20500500 bi-mass sum 1.0 0.0 1
*20500501 0.0 1.0 cmpmass 401
*20500502 1.0 cmpmass 402
*20500503 1.0 cmpmass 403
*20500504 1.0 cmpmass 404
*20500505 1.0 cmpmass 405
*20500506 1.0 cmpmass 406
*20500507 1.0 cmpmass 450
*20500508 1.0 cmpmass 701
**
*20500600 tot-p-mass sum 1.0 0.0 1
*20500601 0.0 1.0 cntrvar 3
*20500602 1.0 cntrvar 4
*20500603 1.0 cntrvar 5
*
* calculate the broken leg generator upflow collapsed liquid level
*
*205007600 sg-delt sum 1.0 20.0 1
*205007601 0. 1. temp 201010000
*205007602 -1. temp 201200000
*
* calculate system inventory
* the first number on the following card is the full system mass
*20500800 invn div 144. 1. 0
*20500801 cntrvar 6
*20500900 invext div 1. 1. 1
*20500901 cntrvar 8
*
* calculate the core liquid collapsed height
*
20501000 core-lvl sum 1. 0. 1
20501001 0. .6096 voidf 505010000
20501002 .6096 voidf 505020000
20501003 .3048 voidf 505030000
20501004 .3048 voidf 505040000
20501005 .3048 voidf 505050000
20501006 .3048 voidf 505060000
20501007 .6096 voidf 505070000
20501008 .6096 voidf 505080000
*
* calculate the intact leg generator upflow collapsed liquid level
*
20501100 sgshlv1 sum 1.0 0.0 1
20501101 0.0 1.9609 voidf 702010000
20501102 1.23101 voidf 702020000
20501103 1.15481 voidf 702030000
20501104 1.23101 voidf 702040000
20501105 1.25641 voidf 702050000
20501106 1.15481 voidf 702060000
20501107 1.06591 voidf 702070000
20501108 0.65398 voidf 702080000
20501109 0.37827 voidf 702090000
20501110 0.50635 voidf 702100000
*20501111 0.50635 voidf 702110000
20501112 0.40005 voidf 704010000
*
* calculate the intact leg generator downflow collapsed liquid level
*
20501200 sgdclvl sum 1.0 0.0 1
20501201 0.0 1.9609 voidf 705080000
20501202 1.23101 voidf 705070000
20501203 1.15481 voidf 705060000
20501204 1.23101 voidf 705050000
20501205 1.25641 voidf 705040000
20501206 1.15481 voidf 705030000
20501207 1.06591 voidf 705020000
20501208 0.65398 voidf 705010000
20501209 0.37827 voidf 709020000
20501210 0.50635 voidf 709010000
20501211 0.50635 voidf 703010000
20501212 0.40005 voidf 704010000
*
* calculate the broken leg generator downflow collapsed liquid level
*
20501300 blgu-cl sum 1. 9.532 0
20501301 0. 1.19609 voidf 701020000
20501302 1.23101 voidf 701030000
20501303 1.15481 voidf 701040000
20501304 1.23101 voidf 701050000
20501305 1.25641 voidf 701060000
20501306 1.15481 voidf 701070000
20501307 1.06591 voidf 701080000
20501308 0.98206 voidf 701090000
*
* calculate the intact leg generator upflow collapsed liquid level
*
20501400 slgd-cl sum 1. 9.532 0
20501401 0. 0.98206 voidf 701100000
20501402 1.06591 voidf 701110000
20501403 1.15481 voidf 701120000
20501404 1.25641 voidf 701130000
20501405 1.23101 voidf 701140000
20501406 1.15481 voidf 701150000
20501407 1.23101 voidf 701160000
20501408 0.19609 voidf 701170000
*
* calculate the intact leg generator downflow collapsed liquid level
*
20501500 ileu-cl sum 1.0 9.525 1
20501501 0. 1.21831 voidf 201020000
20501502 1.20561 voidf 201030000
20501503 1.20561 voidf 201040000
20501504 1.20561 voidf 201050000
20501505 1.20561 voidf 201060000
20501506 1.20561 voidf 201070000
20501507 1.20561 voidf 201080000
20501508 0.48578 voidf 201090000
20501509 0.34411 voidf 201100000
*
* calculate the intact leg generator downflow collapsed liquid level
*

```

20501600	blgd-cl	sum	1.0	9.525	1	*	
20501601	0.	0.34411	voidf	201110000	20502600	bisgel integral 1. 0. 0	
20501602		0.48578	voidf	201120000	20502601	cntrlvar 24	
20501603		1.20561	voidf	201130000	*		
20501604		1.20561	voidf	201140000	*	* energy losses to environment - il sg	
20501605		1.20561	voidf	201150000	*		
20501606		1.20561	voidf	201160000	20502700	iisgel integral 1. 0. 0	
20501607		1.20561	voidf	201170000	20502701	cntrlvar 25	
20501608		1.20561	voidf	201180000	*		
20501609		1.21381	voidf	201190000	*	* power losses to environment from sg	
*					*		
20502300	pzrlevel	sum	1.0	0.0	1	20502800	sgpl sum 1. 0. 0
20502301	0.0	0.3671	voidf	301010000	20502801	0. 1. cntrlvar 24	
20502302		0.2549	voidf	301020000	20502802	1. cntrlvar 25	
20502303		0.2549	voidf	301030000	*		
20502304		0.2549	voidf	301040000	*	* energy losses to environment from sg	
20502305		0.0663	voidf	301050000	*		
*					*		
*					20502900	blsgel sum 1. 0. 0	
* heat losses to environment - bl sg					20502901	0. 1. cntrlvar 26	
*					20502902	1. cntrlvar 27	
20502400	blsgpl	sum	1. 0. 0		*		
20502401	0.	1.41896	htmr	705300101	*	* integ of bl hot leg mass flow	
20502402		0.91455	htmr	705300201	*		
20502403		0.99072	htmr	705300301	20503000	blm integral 1. 0. 0	
20502404		1.07788	htmr	705300401	20503001	mflowj 402010000	
20502405		1.05609	htmr	705300501	*		
20502406		0.99072	htmr	705300601	*	* integ of il hot leg mass flow	
20502407		1.05609	htmr	705300701	*		
20502408		1.02613	htmr	705300801	20503000	ilm integral 1. 0. 0	
20502409		0.57463	htmr	705400101	20503001	mflowj 102020000	
20502410		0.72732	htmr	705400201	*		
20502411		0.72732	htmr	705400301	*	* integ of break mass flow	
20502412		0.54335	htmr	705400401	*		
*					20503000	brm integral 1. 0. 0	
* power losses to environment - il sg					20503001	mflowj 422000000	
*					*		
20502500	iilsgpl	sum	1. 0. 0		20510100	ilhlmass sum 1.0 0.0 1	
20502501	0.	.35939	htmr	205300101	20510101	0.0 9.2278200-04 rho 101010000	
20502502		.50391	htmr	205300201	20510102	1.9918830-03 rho 102010000	
20502503		.41679	htmr	205300301	20510103	5.9836050-04 rho 102020000	
20502504		1.03430	htmr	205300401	20510104	5.9836050-04 rho 102030000	
20502505		1.03430	htmr	205300501	20510105	7.8538960-04 rho 102040000	
20502506		1.03430	htmr	205300601	20510106	8.8732920-04 rho 102050000	
20502507		1.03430	htmr	205300701	20510107	8.8732920-04 rho 102060000	
20502508		1.03430	htmr	205300801	20510108	1.2796520-03 rho 103010000	
20502509		1.03430	htmr	205300901	20510109	5.4559250-04 rho 104010000	
20502510		1.04520	htmr	205301001	20510110	9.7311260-04 rho 104020000	
20502511		.57463	htmr	205400101	20510111	8.1432400-04 rho 104030000	
20502512		.72732	htmr	205400201	20510112	8.1432400-04 rho 104040000	
20502513		.72732	htmr	205400301	20510113	1.4841030-03 rho 104050000	
20502514		.54335	htmr	205400401	*		
*					20510200	crossms sum 1.0 0.0 1	
* energy losses to environment - bl sg					20510201	0.0 1.0187750-03 rho 105010000	

20510202	9.3065600-04 rho	105020000	20520108	5.8490000-03 rho	202080000
20510203	8.1432400-04 rho	105030000	20520109	9.2780000-03 rho	202090000
20510204	8.1432400-04 rho	105040000	20520110	7.6310000-03 rho	202100000
20510205	8.1432400-04 rho	105050000	20520111	1.5420000-02 rho	202110000
20510206	1.1289930-03 rho	105060000	20520112	2.6025000-02 rho	202120000
20510207	2.0441630-03 rho	105070000	20520113	5.9663000-02 rho	203010000
20510208	2.7480260-03 rho	105080000	20520114	3.3900000-02 rho	204010000
20510209	2.7480260-03 rho	105090000	*		
20510210	9.1438000-04 rho	105100000	20520300	ilsgsec sum 1.0 0.0 1	
20510211	9.1438000-04 rho	105110000	20520301	0.0 6.3370000-03 rho	205010000
20510212	2.7480260-03 rho	105120000	20520302	3.2520000-03 rho	205020000
20510213	2.7480260-03 rho	105130000	20520302	1.3220000-03 rho	205030000
20510214	2.0441630-03 rho	105140000	20520304	3.2790000-03 rho	205040000
*			20520305	3.2790000-03 rho	205050000
20510300	ilclmass sum 1.0 0.0 1		20520306	3.2790000-03 rho	205060000
20510301	0.0 4.0772550-04 rho	106010000	20520307	3.2790000-03 rho	205070000
20510302	1.0447530-03 rho	106020000	20520308	3.2790000-03 rho	205080000
20510303	5.4641860-04 rho	106030000	20520309	3.2790000-03 rho	205090000
20510304	6.7631200-04 rho	106040000	20520310	3.3140000-03 rho	205100000
20510305	2.6372190-03 rho	106050000	20520311	1.1400000-03 rho	206010000
20510306	2.7614970-03 rho	107010000	20520312	2.9856000-02 rho	209010000
20510307	7.6276200-04 rho	108010000	20520313	2.0686000-02 rho	209020000
*			*		
20510400	ilsgpr sum 1.0 0.0 1		20530100	pressms sum 1.0 0.0 1	
20510401	0.0 1.6407770-03 rho	201010000	20530101	0.0 6.4825000-03 rho	301010000
20510402	2.2416900-03 rho	201020000	20530102	6.4825000-03 rho	301020000
20510403	2.2183220-03 rho	201030000	20530103	5.9118000-03 rho	301030000
20510404	2.2183220-03 rho	201040000	20530104	5.9118000-03 rho	301040000
20510405	2.2183220-03 rho	201050000	20530105	5.9118000-03 rho	301050000
20510406	2.2183220-03 rho	201060000	20530106	1.1360000-03 rho	301060000
20510407	2.2183220-03 rho	201070000	20530107	7.1837000-04 rho	302010000
20510408	2.2183220-03 rho	201080000	20530108	2.3214100-04 rho	302020000
20510409	8.9383520-04 rho	201090000	20530109	1.6457700-04 rho	302030000
20510410	6.3316240-04 rho	201100000	20530110	4.4046000-05 rho	302040000
20510411	6.3316240-04 rho	201110000	20530111	4.4046000-05 rho	302050000
20510412	8.9383520-04 rho	201120000	20530112	4.4046000-05 rho	302060000
20510413	2.2183220-03 rho	201130000	20530113	4.4046000-05 rho	302070000
20510414	2.2183220-03 rho	201140000	*		
20510415	2.2183220-03 rho	201150000	20510500	blhlms sum 1.0 0.0 1	
20510416	2.2183220-03 rho	201160000	20510501	0.0 1.4245480-03 rho	401010000
20510417	2.2183220-03 rho	201170000	20510502	5.5496350-04 rho	402010000
20510418	2.2183220-03 rho	201180000	20510503	3.7182600-04 rho	402020000
20510419	2.2416900-03 rho	201190000	20510504	8.9706890-04 rho	402030000
20510420	1.6407770-03 rho	201200000	20510505	3.8022530-04 rho	402040000
*			20510506	3.2063850-04 rho	402050000
20520100	bisgpr sum 1.0 0.0 1		20510507	3.1781750-04 rho	402060000
20520101	0.0 1.4264000-02 rho	202010000	20510508	5.5399890-04 rho	402070000
20520102	1.6574000-02 rho	202020000	*		
20520103	1.3183000-02 rho	202030000	20510700	bicross sum 1.0 0.0 1	
20520104	1.6789000-02 rho	202040000	20510701	0.0 4.4975840-04 rho	403010000
20520105	1.3532000-02 rho	202050000	20510702	3.1781750-04 rho	403020000
20520106	1.2870000-02 rho	202060000	20510703	3.2063850-04 rho	403030000
20520107	1.2850000-02 rho	202070000	20510704	3.1781750-04 rho	403040000

20510705	9.8569380-04 rho 403050000	20511015	2.6772900-05 rho 531020000
20510706	7.1445920-04 rho 403060000	20511016	2.6772900-05 rho 531030000
20510707	7.1445920-04 rho 403070000	*	
20510708	4.4539040-04 rho 403080000	20510600	blsgpr sum 1.0 0.0 1
20510709	4.4539040-04 rho 403090000	20510601	0.0 1.3434060-03 rho 701010000
20510710	7.1445920-04 rho 403100000	20510602	7.2961490-04 rho 701020000
20510711	7.1445920-04 rho 403110000	20510603	7.5091610-04 rho 701030000
20510712	6.3701820-04 rho 403120000	20510604	7.0443410-04 rho 701040000
*		20510605	7.5091610-04 rho 701050000
20510800	bclmass sum 1.0 0.0 1	20510606	7.6641010-04 rho 701060000
20510801	0.0 7.5605530-04 rho 404010000	20510607	7.0443410-04 rho 701070000
20510802	2.4731980-04 rho 405010000	20510608	6.5020510-04 rho 701080000
20510803	6.4741950-04 rho 405020000	20510609	5.9905660-04 rho 701090000
20510804	1.3575400-03 rho 406010000	20510610	5.9905660-04 rho 701100000
20510805	8.6000000-04 rho 450010000	20510611	6.5020510-04 rho 701110000
*		20510612	7.0443410-04 rho 701120000
20510900	rvcore sum 1.0 0.0 1	20510613	7.6641010-04 rho 701130000
20510901	0.0 6.7400000-03 rho 501010000	20510614	7.5091610-04 rho 701140000
20510902	6.5900000-03 rho 502010000	20510615	7.0443410-04 rho 701150000
20510903	2.9600000-03 rho 503010000	20510616	7.5091610-04 rho 701160000
20510904	5.2000000-04 rho 504010000	20510617	7.2961490-04 rho 701170000
20510905	1.7434560-03 rho 505010000	20510618	1.3434060-03 rho 701180000
20510906	1.7434560-03 rho 505020000	*	
20510907	8.7172800-04 rho 505030000	20520200	blsgsec sum 1.0 0.0 1
20510908	8.7172800-04 rho 505040000	20520201	0.0 1.3509000-02 rho 702010000
20510909	8.7172800-04 rho 505050000	20520202	9.0360000-03 rho 702020000
20510910	8.7172800-04 rho 505060000	20520203	8.4700000-03 rho 702030000
20510911	1.7434560-03 rho 505070000	20520204	1.0739000-02 rho 702040000
20510912	1.7434560-03 rho 505080000	20520205	9.6150000-03 rho 702050000
20510913	1.6400000-03 rho 506010000	20520206	8.4740000-03 rho 702060000
20510914	2.8100000-03 rho 507010000	20520207	8.4250000-03 rho 702070000
20510915	2.1800000-03 rho 508010000	20520208	1.5782000-02 rho 702080000
20510916	1.4300000-03 rho 509010000	20520209	1.6807000-02 rho 702090000
20510917	4.0470000-03 rho 509020000	20520210	2.5882000-02 rho 702100000
20510918	3.9300000-04 rho 510010000	20520211	5.6736000-02 rho 703010000
20510919	3.4000000-04 rho 513010000	20520212	3.3900000-02 rho 704010000
20510920	3.4525000-04 rho 514010000	*	
*		20520400	blsgsec sum 1.0 0.0 1
20511000	rvdcnr sum 1.0 0.0 1	20520401	0.0 1.4458000-02 rho 705010000
20511001	0.0 2.6189940-03 rho 516010000	20520402	2.2410000-03 rho 705020000
20511002	3.7726480-03 rho 517010000	20520403	2.4350000-03 rho 705030000
20511003	1.1833800-03 rho 518010000	20520404	2.6390000-03 rho 705040000
20511004	1.1833800-03 rho 518020000	20520405	2.5890000-03 rho 705050000
20511005	1.1833800-03 rho 518030000	20520406	2.4310000-03 rho 705060000
20511006	1.1833800-03 rho 518040000	20520407	2.5930000-03 rho 705070000
20511007	1.1833800-03 rho 518050000	20520408	2.5140000-03 rho 705080000
20511008	1.1833800-03 rho 518060000	20520409	2.9860000-02 rho 709010000
20511009	1.1833800-03 rho 518070000	20520410	2.0686000-02 rho 709020000
20511010	1.1833800-03 rho 518080000	*	
20511011	1.1833800-03 rho 518090000	*	total primary inventory
20511012	9.1139620-04 rho 518100000	*	
20511013	2.0770600-03 rho 519010000	20511100	totalpr sum 1.0 0.0
20511014	2.6772900-05 rho 531010000	20511101	0.0 1.0 cntrivar 101

20511102	1.0	cntrlvar	102	*
20511103	1.0	cntrlvar	103	7060201 0.0 330.0 0.0
20511104	1.0	cntrlvar	104	*7060201 0.0 460.0 0.0
20511105	1.0	cntrlvar	105	*7060202 2100.0 460.0 0.0
20511106	1.0	cntrlvar	106	*7060203 3000.0 400.0 0.0
20511107	1.0	cntrlvar	107	*7060204 4500.0 300.0 0.0
20511108	1.0	cntrlvar	108	*7060205 6000.0 220.0 0.0
20511109	1.0	cntrlvar	109	*7060206 8000.0 130.0 0.0
20511110	1.0	cntrlvar	110	*
20511111	1.0	cntrlvar	301	*
*				7070000 steamou tmdpvol
* total secondary inventory				7070101 1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.000
*				7070200 2
				*
20520500	totalsec	sum	1.0 0.0 1	7070201 0.0 5.89e06 1.0
20520501	0.0	1.0	cntrlvar 201	7070202 2100.0 5.60e06 1.0
20520502		1.0	cntrlvar 202	7070203 2763.0 3.95e06 1.0
20520503		1.0	cntrlvar 203	7070204 3380.0 3.15e06 1.0
20520504		1.0	cntrlvar 204	7070205 4500.0 2.25e06 1.0
*				7070206 6110.0 1.50e06 1.0
2060000	feedinl	tmdpvol		7070207 8000.0 1.23e06 1.0
2060101	0.00114	1.0 0.0 0.0 0.0 0.0	5.0e-06 0.000	*
2060200	1			*
*				*
* modified by y.s.bang				* following items added to make easy postprocessing
* maintaining 330 K				* at june 17. 1995 by ysbang.
*				*
2060201	0.0	330.0	0.0	* control variables
*2060201	0.0	460.0	0.0	*
*2060202	2100.0	460.0	0.0	* pressure in mpa
*2060203	3000.0	400.0	0.0	*
*2060204	4500.0	300.0	0.0	20521100 ppre mult 0.000001 0.0 1
*2060205	6000.0	220.0	0.0	20521101 p 508010000
*2060206	8000.0	130.0	0.0	*
*				20521200 isgp mult 0.000001 0.0 1
2070000	steamout	tmdpvol		20521201 p 204010000
2070101	1.0 1.0 0.0 0.0 90.0 1.0 5.0e-06 0.000			*
2070200	2			20521300 bsgp mult 0.000001 0.0 1
*				20521301 p 704010000
2070201	0.0	5.85e06	1.0	*
2070202	2100.0	5.6e06	1.0	20503000 ibrfw integral 1. 0.0 1
2070203	2763.0	2.78e06	1.0	20503001 mflowj 422000000
2070204	3380.0	2.12e06	1.0	*
2070205	4500.0	1.80e06	1.0	* differential pressure in kpa
2070206	6110.0	1.40e06	1.0	*
2070207	8000.0	1.20e06	1.0	20521400 icrsg sum 0.001 0 0 1
*				20521401 0. 1. p 105100000
*				20521402 -1. p 105030000
7060000	feedinlc	tmdpvol		*
7060101	0.00114	1.0 0.0 0.0 0.0 0.0	5.0e-06 0.000	20521500 icrpm sum 0.001 0.0 1
7060200	1			20521501 0. 1. p 105110000
*				20521502 -1. p 106020000
* modified by y.s.bang				*
* maintaining 330 K				20521600 bcrgs sum 0.001 0.0 1

20521601	0.	1.	p	403010000	*20522912	1.0	htmr	701010201
20521602		-1.	p	403120000	*20522913	1.0	htmr	701010301
*					*20522914	1.0	htmr	701010401
20521700	bcrpm	sum	0.001	0.0 1	*20522915	1.0	htmr	701010501
20521701	0.	1.	p	403080000	*20522916	1.0	htmr	701010601
20521702		-1.	p	403120000	*			
*					20523000	tilacc	integral	1. 0.0 1
20521800	cordif	sum	0.001	0.0 1	20523001	mflowj	611000000	
20521801	0.	1.	p	505010000	*			
20521802		-1.	p	505080000	20523100	tbacc	integral	1. 0.0 1
*					20523101	mflowj	811000000	
*20523000	isglvl	sum	0.001	0.0 1	*			
*20523001	0.	1.	p	202010000	20510900	rvcore	sum	1.0 0.0 1
*20523002		-1.	p	202120000	20510901	0.0	6.7400000-03	rho 501010000
*					20510902	6.5900000-03	rho 502010000	
*20523100	bsglvl	sum	0.001	0.0 1	20510903	2.9600000-03	rho 503010000	
*20523101	0.	1.	p	702010000	20510904	5.2000000-04	rho 504010000	
*20523102		-1.	p	702100000	20510905	0.8717280-03	rho 505010000	
*					20510906	0.8717280-03	rho 505020000	
* heat flux total					20510907	4.3586400-04	rho 505030000	
*					20510908	4.3586400-04	rho 505040000	
*20522800	tihf	sum	1.0	0.0 1	20510909	4.3586400-04	rho 505050000	
*20522801	0.	1.0	htmr	201010101	20510910	4.3586400-04	rho 505060000	
*20522802		1.0	htmr	201010201	20510911	0.8717280-03	rho 505070000	
*20522803	1.0	htmr	201010301	20510912	0.8717280-03	rho 505080000		
*20522804	1.0	htmr	201010401	20510913	1.6400000-03	rho 506010000		
*20522805	1.0	htmr	201010501	20510914	2.8100000-03	rho 507010000		
*20522806	1.0	htmr	201010601	20510915	2.1800000-03	rho 508010000		
*20522807	1.0	htmr	201010701	20510916	1.4300000-03	rho 509010000		
*20522808	1.0	htmr	201010801	20510917	4.0470000-03	rho 509020000		
*20522809	1.0	htmr	201010901	20510918	3.9300000-04	rho 510010000		
*20522810	1.0	htmr	201010001	20510919	3.4000000-04	rho 513010000		
*20522811	1.0	htmr	201010101	20510920	3.4525000-04	rho 514010000		
*20522812	1.0	htmr	201010201	*				
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*20522815	1.0	htmr	201010501	20540902	0.8717280-03	rho 555020000		
*20522816	1.0	htmr	201010601	20540903	4.3586400-04	rho 555030000		
*20522817	1.0	htmr	201010701	20540904	4.3586400-04	rho 555040000		
*20522818	1.0	htmr	201010801	20540905	4.3586400-04	rho 555050000		
*				20540906	4.3586400-04	rho 555060000		
*20522900	tbff	sum	1.0	0.0 1	20540907	0.8717280-03	rho 555070000	
*20522901	0.	1.0	htmr	701010101	20540908	0.8717280-03	rho 555080000	
*20522902		1.0	htmr	701010201	*			
*20522903	1.0	htmr	701010301	* total primary inventory				
*20522904	1.0	htmr	701010401	*				
*20522905	1.0	htmr	701010501	20511100	totalpr	sum	1.0 0.0 1	
*20522906	1.0	htmr	701010601	20511101	0.0	1.0	cntrlvar 101	
*20522907	1.0	htmr	701010701	20511102		1.0	cntrlvar 102	
*20522908	1.0	htmr	701010801	20511103		1.0	cntrlvar 103	
*20522909	1.0	htmr	701010901	20511104		1.0	cntrlvar 104	
*20522910	1.0	htmr	701010001	20511105		1.0	cntrlvar 105	
*20522911	1.0	htmr	701010101					

20511106	1.0	cntrivar	106	20547306	4.3586400-04 vapgen 505050000
20511107	1.0	cntrivar	107	20547307	4.3586400-04 vapgen 505060000
20511108	1.0	cntrivar	108	20547308	0.8717280-03 vapgen 505070000
20511109	1.0	cntrivar	109	20547309	0.8717280-03 vapgen 505080000
20511110	1.0	cntrivar	110	*	
20511111	1.0	cntrivar	301	20547400	hsteam sum 1.0 0.0 1
20511112	1.0	cntrivar	409	20547401	0.0 0.8717280-03 vapgen 555010000
*				20547402	0.8717280-03 vapgen 555020000
*				20547403	4.3586400-04 vapgen 555030000
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20548800	rvdp	sum	0.001 1.0 1	20547405	4.3586400-04 vapgen 555050000
20548801	0.0	1.0	p 502010000	20547406	4.3586400-04 vapgen 555060000
20548802		-1.0	p 508010000	20547407	0.8717280-03 vapgen 555070000
*				20547408	0.8717280-03 vapgen 555080000
*				*	
20531000	hotpow	function	1.0 5.7+04 1	20548100	totsteam sum 1.0 0.0 1
20531001	time	0	500	20548101	0.0 1.0 cntrivar 471
*				20548102	1.0 cntrivar 472
*				*	
20531200	avepow	function	1.0 3.8+04 1	20548200	totsteam sum 1.0 0.0 1
20531201	time	0	550	20548201	0.0 1.0 cntrivar 473
*				20548202	1.0 cntrivar 474
*				*	
20531300	totpow	sum	1.0 9.5+04 1	*	
20531301	0.0	1.0	cntrivar 310	*	
20531302		1.0	cntrivar 312	*	
*				*	
*				*	
*				*	
*				*	
*				*	
20547100	stem	sum	1.0 0.0 1	*	
20547101	0.0	0.8717280-03 gammaw 505010000		*	
20547102		0.8717280-03 gammaw 505020000		*	
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*				*	
20547300	stem	sum	1.0 0.0 1	*	
20547301	0.0	0.8717280-03 vapgen 505010000		*	
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20547303		4.3586400-04 vapgen 505030000		*	
20547305		4.3586400-04 vapgen 505040000		*	





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**10. SUPPLEMENTARY NOTES**

S. Smith, NRC Project Manager

**11. ABSTRACT (200 words or less)**

The predictability of RELAP5/MOD3.2 code is assessed for the natural circulation induced by small break loss of coolant accident in the pressurized water reactor by using Semiscale experiment S-NC-8B. The Semiscale Mod-2A facility is modeled, as a base case, by using single core channel model. The base case calculation is executed, the result is compared with the experiment data and code predictability on the important thermal-hydraulic phenomena is discussed.

Sensitivity calculations are attempted to figure out the problems in base case prediction, and to find out the effects of two core channel model and ECCMIX component model on the improvement code predictability. The important thermal-hydraulic phenomena include system depressurization, break flow in saturated and stratified conditions, natural circulation in two-phase mode and reflux mode, loop seal behavior at crossover legs, and accumulator injection behavior. The base calculation shows the RELAP5/MOD3.2 can predict the overall thermal-hydraulic behavior such as system depressurization, with the exception of underprediction of saturated break flow, deviation of loop seal behavior, and resultant discrepancy in core thermal response. Two core channel model can improve the predictability on loop seal behavior.

ECCMIX component can improve an early accumulator injection behavior and core thermal response. However, discontinuous accumulator injection is one of the problems in two core channel model calculation. To resolve the accumulator injection problem, the extensive modeling study and/or code model improvement are needed.

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RELAP5, SBLOCA, Semiscale

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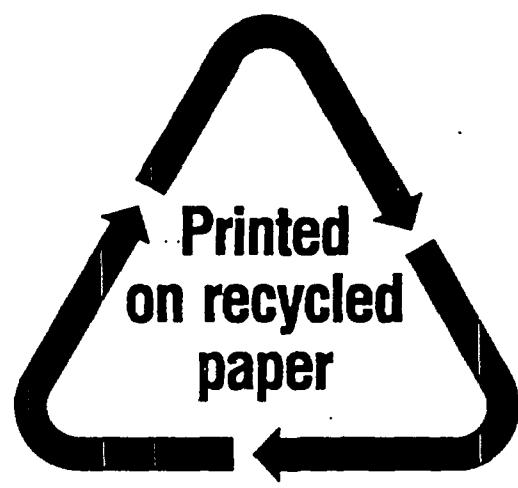
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