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International Agreement Report

Assessment of RELAP5/MOD2, Cycle 36.04 Using LOFT Large Break Experiment L2-5

Prepared by
Young Seok Bang, Sang Yong Lee, Hho-Jung Kim

Nuclear Safety Center
Korea Advanced Energy Research Institute

Office of Nuclear Regulatory Research
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Prepared as part of
The Agreement on Research Participation and Technical Exchange
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ICAP

ASSESSMENT OF RELAP5/MOD2 Cycle 36.04

USING LOFT LARGE BREAK EXPERIMENT L2-5

Abstract

The LOFT L2-5 LBLOCA Experiment was simulated using the RELAP5/MOD2 Cycle 36.04 code to assess its capability to predict the phenomena in LBLOCA. One base case calculation and three cases of different nodalizations were carried out. The effect of different nodalization was studied in the area of the downcomer and core. For a sensitivity study, another calculation was executed using an updated version of RELAP5/MOD2 Cycle 36.04.

A Split downcomer with one crossflow junction and two core channels were found to be effective in describing the ECC bypass and hot channel behavior. And the updated version was found to be effective in overcoming the code deficiency in the interfacial friction and reflood quenching.

Executive Summary

This report documents the assessment calculations using RELAP5/MOD2 Cycle 36.04, a frozen version of the code, to predict the thermal-hydraulic responses of the Loss of Fluid Test (LOFT) L2-5 Large Break Loss of Coolant Accident (LBLOCA). Experiment L2-5 simulated a 200 % guillotine break at the discharge of a primary coolant pump of a four loop commercial pressurized water reactor (PWR).

The version of the code used in the present calculations was the RELAP5/MOD2 Cycle 36.04 with some corrections on indexing errors. For the base calculation, the reactor vessel of the LOFT system was modelled by a split downcomer with crossflow junctions and the single core channel. Results of the base case calculation indicated (1). the unrealistic ECC bypass flow through crossflow junctions between the intact side downcomer and the broken side downcomer, (2). the flow oscillations due to the overpredicted interfacial friction in the rod bundle geometry, and (3). underpredicted core heat up due to poor modelling the hot channel behavior.

To determine the effectiveness of the nodalization changes and to quantify their effects on the thermal-hydraulic responses, nodalization studies was performed for three different cases of reactor vessel modelling. They are, split downcomer modelling without crossflow junction (CASE A), finer axial modelling of core (CASE B) and two core channel modelling (CASE C). A calculation was also carried out using an updated version of RELAP5/MOD2 Cycle 36.04

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with PSI (Paul Scherrer Institute) modifications to investigate the sensitivity of code model changes.

According to the results of calculations for nodalization and sensitivity studies, it is shown that an unrealistic ECC bypass flow can be reduced by deleting unnecessary crossflow junctions in the downcomer. Results also show that the axial refinement of core nodalization has little effect on the thermal response of the core and that two core channels are effective in describing a hot channel behavior in LBLOCA. It is also found that the improvement of interfacial friction in the rod bundle and the correction of heat transfer correlation in reflood phase can reduce the unphysical flow oscillation and predict the quenching temperature accurately.

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1. Introduction

RELAP5/MOD2[1], which was developed by the Idaho National Engineering Laboratory (INEL) under the sponsorship of the United States Nuclear Regulatory Commission (USNRC), has been frequently used in safety analysis of the Pressurized Water Reactor(PWR). The RELAP5/MOD2 code is applicable to the simulation of the postulated Loss of Coolant Accident (LOCA). However it has some deficiencies especially in analyzing the Large Break Loss of Coolant Accident (LBLOCA) [2]. Most of these deficiencies are being removed in the next version of the code, RELAP5/MOD3 [3].

Under the International Code Assessment and Application Program(ICAP) organized by the USNRC, the code is being assessed and the code deficiencies are being identified based on code assessment activities of the ICAP member countries [4].

This report is part of the Korean contribution of 15 code assessments to ICAP. The RELAP5/MOD2 Cycle 36.04 code was used in the present calculation simulating the Experiment L2-5 of the Loss of Fluid Test (LOFT) [5]. The Experiment L2-5, as one of the Integral Effect Test (IET), simulated a 200 % guillotine break at the primary coolant pump (PCP) discharge with a rapid coastdown of PCP in a Westinghouse 4 loop commercial PWR.

One base case calculation and three sensitivity calculations for different nodalizations of the reactor vessel using the frozen version of the code are presented in this report. Another calculation using an updated version of RELAP5/MOD2 Cycle 36.04 is also presented to address the code deficiencies and sensitivity of the models in the code.

The descriptions of the LOFT system and the Experiment L2-5 are provided in Chapter 2. The code and modelling for a base case calculation are described in Chapter 3. The results of the base case calculation are discussed in Chapter 4 in terms of thermal and hydraulic behaviors. In Chapter 5, the scope and results of the calculations for nodalization and sensitivity studies are presented. Run statistics are discussed in Chapter 6, and general conclusions are drawn in Chapter 7. Appendices of this report contain the detailed information discussed in the appropriate chapters.

2. Facility and Test Description

2.1 Facility Description

The LOFT facility is an experimental 50 MWt PWR designed to simulate LOCA's and anticipated transients and to provide data on the thermal hydraulic phenomena occurring throughout the system [6]. It is a scaled representation of a commercial PWR of Westinghouse type having 4 loops with a volume ratio of 1/60. The LOFT syatem consists of five major systems : reactor system, primary coolant sysytem, blowdown suppression system, emergency core cooling system and secondary coolant system, and also includes instrumentations. The lengths of the core and reactor vessel is 1.68 and 10 m, respectively. The overall configuration is shown in Fig.1.

2.2 Test Description

Loss of Coolant Experiment (LOCE) L2-5 was the third experiment in the nuclear power ascension test L2 series as an IET. L2-5 Test simulated a guillotine break simultaneous with a loss of site power, at the discharge of the primary coolant pump of commercial PWR.

The specific objectives of L2-5 [5] were to determine if early core rewet occurs with immediate PCP coastdown, to provide data on the core thermal response for evaluation of computer code, and to evaluate the external thermocouple effects on core thermal response.

Prior to the experiment, the intact loop was set to flow rate of 192.4 kg/s, temperature of 589.4 K and pressure in hot leg of 14.94 MPa. Table 1 shows a summary of the measured initial conditions with the calculated values by RELAP5/MOD2 for the base case.

The experiment was initiated by opening the Quick-Opening Blowdown-Valves (QOBV) both in hot and cold leg, the reactor was scrammed on low pressure (14.19 MPa) at 0.24 sec and PCP was tripped by operator at 0.94 sec. Accumulator was started to inject the coolant at 16.8 sec and the delayed ECC injection from HPIS and LPIS was started at 23.9 and 37.3 sec, respectively. The experiment was completed at the time of the end of LPIS injection, 107 sec. The detailed sequence of events for L2-5 test are listed in Table 2 compared with the results of the base case calculation.

2.3 Uncertainty

Uncertainties of the experimental data and computed variables from measured data were fully discussed in reference[7] for L2-5 test. Uncertaineies on the measured values and computed values used for comparisons with calculation in this report are presented in Table 3.

3. Code and Modelling Description

3.1 Code Description

RELAP5/MOD2 Cycle 36.04, frozen version of RELAP5/MOD2 used in this assessment was received at October 1986.

For a specific objective of LBLOCA simulation in this report, the indexing errors in subroutine RACCUM, IHTCMP and IRFLHT are corrected from the frozen code. In the correction, there are no model change and hence the corrected version can also be regarded as RELAP5/MOD2 Cycle 36.04. These corrections were based on the update work of KWU, and STUDSVIK, [8]. The corrected items and their rationale are listed in Table 4, and the whole update list is presented in Appendix A. The code features and input descriptions for a frozen code are presented in the code manual[1].

3.2 Modelling Description

For a simulation of LOFT L2-5 Test, the original input as developed by INEL[9] for RELAP5/MOD1 had a sufficiently discretized nodalization including a pressurizer and its surge line, a steam generator secondary side, a complex ECCS line, and a letdown and charging line, etc. A nodalization selected for a base case calculation in this assessment is basically the same as used in reference [2]. It was also the fully-discretized representation of the LOFT system, which was almost similar to that in reference [9] except for the discretization in reactor vessel. The selection of this nodalization scheme allows the results of base calculation to be compared with the results in the reference [2]. The important items of the nodalization scheme are shown in Table 5. Differences of nodalization in the reactor vessel from the original one [9] came from the trials to make a simple core modelling, i.e., single core channel modelling, and to compare the cladding temperatures obtained from calculations with those measured in experiment at the same locations, i.e., 12 volumes for a channel. Table 5 also shows a summary of reactor vessel modelling for a base case. The overall nodalization diagram in simulating L2-5 experiment is shown in Fig.2. It consists of 128 hydrodynamic volumes, 138 junctions and 33 heat structures. The volume and junction options are selected almost the same as reference [2], i.e., nonequilibrium and nonhomogeneous. The input deck used for a base case is presented in Appendix B and C for steady state and transient cases, respectively.

3.3 Boundary Conditions

Boundary conditions required for a simulation of L2-5 experiment are listed in Table 6 . As shown in Table 6, the specified boundary conditions are almost the same as those in reference[2]. In the test calculations prior to the base calculation, the unrealistic results were obtained when the containment back pressure, 0.1 MPa is used, which was specified in reference [2]. This led to changes of some boundary conditions, such as containment back pressure, reactor power history, etc, in base case calculation. In the axial power level, the total power integrated by the linear heat generation rate measured at the locations of 5H8, 1C7 for the central fuel assembly and the peripheral fuel assembly repectively, is not equal to 36.0 MWt. Thus, the power levels were corrected as shown in Fig.3. The power history used in reference [2] was originally obtained only from the fission power measured at the neutron detector of RE-T-77-1A2 [7] while the uncertainty for this measurement has the order of magnitude, 2 MWt. It exceeds the range of powers measured at the times 1.0 sec after the experiment. To avoid this uncertain power, and to consider the decay heat, a new power history was implemented as shown in Fig.4. and Table 6.

3.4 Steady State Calculation

The steady state run was carried out with some modification of input deck to reproduce fundamental, measured initial conditions and to provide all initial quantities of the whole system proir to the transient calculation. Major changes are additions of 7 steady state controllers 2 PCP speed controllers, 1 pressurizer heater power controller, 1 pressurizer spray valve area controller, 1 letdown/charging valve area controller, 1 Main Steam Control Valve (MSCV) area controller and 1 feedwater flow rate controller. Some options are changed for the related components. The changed input is provided in Appendix B.

The computing time required to obtain the final steady state was about 980 s. The results of steady state calculation are summarized in Table 1. From this Table, the calculated steady state values are found to be similar to the measured values. A little difference in steam generator secondary pressure can be ignored in that MSCV are closed in a short time after initiation of experiment. The secondary side pressure has little effect on the transient calculation in LBLOCA.

4. Base Case Calculation

4.1 Results of Base Case Calculation

The base case transient calculation was carried out on the basis of the restart-plot file obtained from the steady state calculation. Some additional components and steady state controllers were deleted and options changed. The restart transient inputs are listed in Appendix C.

In this assessment the LBLOCA transient up to 120 sec was simulated, during which the core quenching was completed at about 65 sec. The sequence of events predicted in base case calculation is presented in Table 2 as compared with the experimental chronology. In this chapter, the comparison of results between the base case calculation and the experiment is discussed in terms of the primary system hydraulic behavior and thermal response of the core.

Table 7 shows a list of the important assessment parameters to be discussed below, which were almost the same as the ones discussed in the reference [2].

4.2 Discussions on the Base Case Calculation

4.2.1 Hydraulic Behavior

The calculated primary system pressure is well-behaved as shown in Fig.5. During 15 sec to 30 sec, a little more depressurization was shown in the calculation than the experiment, which caused earlier initiation and completion of accumulator injection as shown in Fig.13.

The secondary side pressure also agrees well with the experimental behavior up to 50 sec, after which there is significant underprediction as shown in Fig.6.

The break flow at the cold leg shows overall agreement with the experiment except for the duration of 15 to 40 sec as shown in Fig.7. The difference during this period, which corresponds to the accumulator injection phase, can be considered as noticeable ECC bypasses through the crossflow junctions between the intact side and broken side of the downcomer and upper annulus, which were not observed in experiment [7]. Figures from 24 to 30 present the calculated mass flow rates at the inlet of downcomer, at the inlet of upper annulus, at the downcomer crossflow junction J722, J724, J726 and J728, and at the inlet to the core from lower plenum, repectively. According to these figures, flow oscillations with high frequencies and large amplitudes can be observed after about 15 sec. From these observations, the sudden oscillation of the cold leg mass flow rate during 15 to 40 sec in the Fig.7, seems to be caused by the sum of these oscillatory ECC bypass flows. The oscillation of the ECC bypass flow may be due to the numerical oscillation associated with the current nodalization.

For the hot leg flow in both broken and intact loops, Fig.8 and Fig.10 show comparisons with experiment. In Fig.10, two kinds of deviations from the experimental behavior are found; the first one is a negative flow until 25 sec, and the second one is a oscillation after about 40 sec. The positive flows of the experiment during 0 to 20 sec can be explained as 'mirror image' of negative flow in the sense that the negative flow can not be measured in the experiment [7], and that the magnitude was almost same as the experiment [7]. The second deviation, namely, oscillation can be considered as a propagation of flow oscillation at the core inlet in Fig.27, which has a larger amplitude than that at the downcomer inlet in Fig.24. The reason for these flow oscillations can be regarded as an over-prediction of the interfacial friction in the rod bundle geometry [10]. As shown in Fig.31, the collapsed core liquid level has a similar oscillation especially in the period after quenching (at about 60 sec).

The effect of the over-predicted interfacial friction on the flow at broken loop hot leg was found to be smaller than that at the intact loop because larger values of the foward and reverse form loss factors were used for the broken side junction than those for the intact side junction (0.738 and 1.23 for broken side junction versus 0.1 and 0.1, for intact side one).

The mass flow rate at PCP discharge in the intact loop cold leg is provided in Fig.9, showing a partly good agreement with the experiment. A poor prediction of experimental behavior was found during 30 to 60 sec, which corresponds to a period for which the PCP speed was under-predicted as shown in Fig.12. A lower estimate of mass flow can be considered to be caused by the poor prediction of pump speed from these two figures. In Fig.11, several jumps in the calculated coolant density were found after about 40 sec., which also can be regarded as the results from the over-prediction of interfacial drag in the rod bundle in the sense that the oscillation mode was similar to that of the mass flow rate in Fig.10. Similar jumping behavior was found in the calculated pump speed as shown in the Fig.12, which also might be related to the problem of interfacial friction. From the sensitivity study to be discussed in the later chapter, it will be demonstrated that the correction of the interfacial friction in the rod bundle can reduce the magnitudse of oscillation in mass flow and pump spped, etc.

4.2.2 Thermal Behavior

Fig.14 and 15 present the comparisons of the calculated coolant temperatures in the upper and lower plenums with experiment. The code under-predicted both temperatures from about 25 seconds. The reason for under-prediction can be considered as the earlier depressurization in the upper plenum, yielding lower saturation temperature.

Two downcomer coolant temperatures are also showing the same behaviors as indicated in Fig.16 and 17.

Fig.18 compares the calculated temperature with the experiment at the fuel centerline at 27 inches from the bottom of the core. The comparis shows a good overall agreement.

The cladding temperatures in hot assembly predicted in the base case calculation are compared with those in the experiment for the axial locations of 5, 21, 27, 39 and 54 inches from the bottom of core in Fig.19 to Fig.23, respectively. From these comparisons, the following behaviors are found :

1. A later departure of nucleate boiling(DNB) for all axial locations than experiment in Fig.19 to Fig.21
2. A lower heat up during the blowdown phase and a lower peak clad temperature (PCT) than the experiment (926.4 K vs. 1077 K) shown in Fig.20 and Fig.21
3. No heat up and no top-down quenching in the higher part of the core (Fig.23 and 24, see also Table 2)
4. Larger amplitude oscillations than those in the experiment at the locations with high LHGR during reflood phase (Fig.21 and 22)
5. Lower quenching temperatures than experiment for all locations

One of the reasons for these behaviors seems to be a single core flow channel modelling used in this base case calculation. Acccording to an experiment L2-5 data report[7], the thermal behaviors of cladding in the central fuel assembly(Assembly 5) are quite different from those in other parts (peripheral assemblies). To describe these two different behaviors accurately, the core needs to be modelled as two separated flow channels, hot and average channel.

The oscillations in the cladding temperature at 21 and 27 inches during the reflood phase must be closely linked with the oscillation of the collapsed liquid level of the core in Fig.31.

The absence of the top-down quenching and the lower estimation of reflood quenching temperature can be looked upon as the defiencies of the current code, as reported in the reference[11].

To match the experimental values more closely, finer nodalizations in the axial direction are needed so that the volume centers are located exactly at the measuring point with the same LHGR as used in the experiment for each corresponding heat structure.

5. Nodalization and Sensitivity Study

5.1 Scope of Nodalization and Sensitivity Study

From the discussions in the previous chapters, it is shown that some nodalization changes and code model changes are needed to predict the phenomena accurately. Four cases of calculations were thus performed to determine and to quantify the effects of the nodalization and model changes on the thermal and hydrodynamic behaviors.

For nodalization study, three cases of different nodalization of the downcomer and core were tested. In the first case (Case A) the core was modelled with twelve volumes of equal length and the split downcomer model with only one crossflow junction was used to reduce the unrealistic ECC bypass and oscillations.

In second case (Case B), the core was modelled with fourteen volumes in a single channel with unequal volume lengths to match the measuring point exactly. The other conditions are the same as for Case A .

Two core channel model was implemented in Case C in which there was no crossflow junction between the hot channel and the average one. The hot and average channels are divided by 14 and 6 volumes with unequal lengths, respectively. The flow in the hot channel was 17 % of the total core flow. Fig.32 shows the reactor vessel nodalizations for each case while Fig.33 shows the discretization of core channel into 14 volumes.

For a sensitivity study (Case D), an updated version from RELAP5/MOD2 Cycle 36.04 was used to recalculate a Case C. This update was made with the PSI-UPDATE EIR-83 [11] and designated as Special MOD2. Table 8 summarizes the major items in EIR-83. This updates also includes change of the limit used in the criteria of early blowdown rewet. Since the early return to the nucleate boiling (REWET) was not observed in the Experiment L2-5 during which pumps were coasted down, this update is expected to have little effect on calculation. The effectiveness of EIR-83 was reported for assessment against NEPTUN and FLECHT-SEASET in reference[11]. The full update list is presented in Appendix D.

Table 9 summarizes the calculation conditions for nodalization and sensitivity studies.

5.2 Discussions on Nodalization and Sensitivity Study

5.2.1 Crossflow Junction in Downcomer

As mentioned previously, the modelling with one crossflow junction between broken side and intact side downcomer was tested in Case A.

Fig.34 shows a comparison of the mass flow rate at the broken loop cold leg between the base case and Case A. The figure shows that there is a noticeable reduction in the ECC bypass flow caused by deleting the crossflow junctions.

This effect can be described in terms of downcomer liquid level in Fig.35, which shows that there is a difference in liquid level between the intact side and the broken side downcomer during 20 to 30 sec. Fig.36 shows that the minimum water level in Case A is higher than that in the base case.

A less break flow yielded a less depressurization, and the primary system pressure was closer to the experiment than the base case, as shown in Fig.37.

In Fig.38, the comparison of the collapsed liquid level in the core is presented. From this comparison, it is shown that the core was fully covered, even though momentarily, with water at about 45 sec in Case A, while the core was re-emptied at that time in the base case. Because of this difference, the quenching time was sooner in Case A than that of the base case as shown in Fig.39 for cladding temperatures at the 27 inch elevation.

The mass flow rate in the intact loop hot leg, however, still shows a oscillatory behavior after 40 sec.

5.2.2 Refinement of Core Nodalization

Core nodalization was revised in Case B, i.e, 14 volumes with unequal length with no other changes from Case A.

The predicted primary system pressure was almost the same as that of Case B, as shown in figure 40.

In the area of thermal behavior, little difference was found, as shown in Fig.41 and 42, which present comparisons of cladding temperatures at 21 inches and 27 inches, repectively, with those of CASE A. These comparisons show that the predicitions in Case B are somewhat closer to the experiment. However, the fundamental behaviors are poorly predicted in both cases.

5.2.3 Two Channels in Core Nodalization

In Case C, the core was modelled by two independent channels. Nodalization in hot channel was basically the same as in Case B.

Fig.43 and 44 show comparisons of cladding temperatures calculated in the base case, Case B and Case C at 21, 27 inches, respectively. As shown in these comparisons, the behaviors of cladding temperature in

Case C are considerably closer to the experiment with earlier DNB and higher heat up than those in single channel cases. From these figures the effect of two core channel on the core response can be clearly seen.

Hot channel effects, however, are not cleary demonstrated in the lower part of the core as shown in Fig.45 which shows cladding temperatures at 5 inches. The reason for this ineffectiveness can be explained in terms of core collapsed liquid level in Fig.46. The level in the hot channel did not fully drop in the blowdown phase but again moved up to 0.4 m in 10 sec; i.e., a partial rewet which was not observed in the experiment.

At the higher location of 43 inches, the early heat up vanished and a later DNB was found even in Case C than experiment as shown in Fig.47.

The hydraulic behavior of primary system are found to be almost the same as those in Case B as shown in Fig.48.

5.3 Discussions on Sensitivity Study

As mentioned previously, the Special MOD2 code was tested to recalculate Case C (Case D).

Fig.49 shows a comparison of mass flow rate at the intact loop hot leg, which shows a considerable reduction in flow oscillations after 40 sec, as compared with Case C. This stabilization occurs in the collapsed liquid level in the hot channel of the core as shown in Fig.50. This improvement is probably due to the correction of the interfacial friction in the rod bunble in PSI update.

Fig.51 shows the comparison of primary pump velocity between the Case C and the Case D. It is shown that pump speed also was stablized by the update code.

Fig.52 and 53 show comparisons of cladding temperatures at 21 and 27 inch elevations with CASE C. Quenching temperatures at 21 and 27 inch location in Case D were predicted to be closer to the experiment, and thermal responses in Case D to be more stablized than the Case C though cladding temperatures in the Case D were higher and more deviated from the experiment than those in the Case C.

6. Run Statistics

The main frame computer used in the present calculations was CDC 170-875 Series at KAERI, with NOS Version 2.6.1.

Fig.54 presents a plot of the required CPU time for the transient time in the base case calculation. The time step size in the base calculation is also plotted in Fig.55. The user-specified maximum time step was 0.01 sec in the base case calculation as recommended in reference[1]. The computational efficiency is summarized in Table 10 from the major edit for a base case calculation and can be calculated as follows.

Computer time,	CPU = 2528.43 - 3.2 = 2525.23 , sec
Number of time step,	DT = 13407 - 252 = 13157
Number of volume	C = 128
Transient real time	RT = 120 , sec

Grind time = CPU / (C * DT) = 0.01498 CPU sec/vol.step

7. Conclusions

RELAP5/MOD2 Cycle 36.04 code was assessed using LOFT L2-5 LBLOCA test. A base case calculation including the single core and split downcomer modelling with crossflow junctions was carried out. To determine the effect of nodalization change and code model change and to quantify the effects on the hydraulic and thermal behavior, three cases of nodalization of downcomer and core were tested. In addition, a sensitivity calculation was performed using a corrected code updated from RELAP5/MOD2 Cycle 36.04 with PSI. As a result of the present calculations, the following conclusions are obtained.

1) Using LOFT L2-5 Experiment, a base case calculation and a nodalization and sensitivity study were successfully executed from the viewpoint of the specific objectives and the requirements of ICAP assessment activity.

2) In the base case calculation using a nodalization of single core and split downcomer with crossflow junctions, an unrealistic ECC bypass flow was found and a hot channel behavior was not predicted. The code deficiencies of over-prediction of interfacial friction and core quenching temperature were also found in the current frozen code.

3) A split downcomer model without crossflow junctions except for a connection with upper annulus was demonstrated to be effective in reducing the unrealistic ECC bypass flow. The refinement of the axial nodalization in the core has little effect on the core

thermal response. Two core channel modelling was recommended to describe the hot channel behavior accurately.

4) The PSI-updated version which includes the correction of the interfacial friction and the reflood heat transfer correlations was found to be effective in predicting the thermal-hydraulic behaviors during LBLOCA.

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Table 1 Summary of comparison of the initial conditions between the measured and the calculated in base case

Parameter	Measured	Calculated
• Primary Coolant System		
Mass flow rate* , kg/s	192.4	192.4
Hot leg pressure* , MPa	14.94	14.918
Core delta T , K	33.1	33.03
Cold leg temperature* ,K	556.6	556.49
• Reactor Vessel		
Power level , MW	36.0	35.69
Max.Linear HGR , kW/m	40.1	39.8
• Pressurizer		
Liquid temperature , K	615	614.7
Pressure , MPa	14.94	14.94
Liquid level* , m	1.14	1.1389
• Steam Generator sec.side		
Saturation temperature , K	547.1	546.22
Pressure , MPa	5.85	5.78
Mass flow rate , kg/s	19.1	18.7
Level* , m	3.1293	3.12

Note * : Setpoint in steady state controllers

Table 2 Summary of comparison of the sequence of events between the measured and the calculated in base case

Event	Measured,sec /Uncertainty	Calculated,sec
Experiment initiated	0.	0.
End of Subcooled Blowdown	0.043/0.01	0.01
Reactor Scrammed	0.28/0.2	0.015
Clad Temperatur deviated from saturation	0.91/0.2	3.4
Primary Pump Coastdown initiated*	0.94/0.5	0.94
End of Subcooled Break flow(cold leg)	3.4/0.5	2.55
Top-down Quench initiated	12.1/1.0	**
Pressurizer Empty	16.3/2.0	13.6
Accumulator Injection	17.3/0.7	15.0
End of Top-down Quench	22.7/1.0	**
HPIS initiated*	24.0	24.0
Peak Clad Temperature reached	28.5/0.5	47.0
Lower Plenum Refill	31.2/1.0	30.9
LPIS initiated*	37.0/0.5	37.0
Accumulator Empty	49.4/1.5	33.0
Core Reflood completed	55.3/1.5	63.0
Core Cladding Quenched	65.0/2.0	67.0

Note * : specified by input , ** : not predicted

Table 3. Uncertainties of Measurements

item	type	range	uncertainty
Primary system pressure	M	0.1 - 21 MPa	0.12 MPa
Secondary system pressure	M	0.1 - 7.0 MPa	0.087 MPa
Coolant Temperature	M	310 - 970 K	4.3 K
Mass Flow Rate	C		
Broken loop cold leg			62.0 kg/s
Broken loop hot leg			23.0 kg/s
Intact loop cold leg			32.0 kg/s
intact loop hot leg			30.0 kg/s
Density	C		0.10 Mg/m
Cladding Temperature	M	420 - 1530 K	6 - 13 K [1]
Accumulator Liquid Level	M	0 - 3.5 m	0.007 m
Primary Coolant Pump Speed	C	0 - 4500 RPM	8.2 RPM
Reactor Power	M	0 - 62.5 MWt	2.0 MWt

Note. M : Measured data,
C : Computed varibles derived from the measured data
[1] For cladding temperatures, uncertainties vary within this range depending on the measurement locations

Table 4. Summary of corrected items in RELAP5/MOD2 Cycle 36.04

No.	Subroutine	Reasons	Reference
1	RACCUM	To correct indexing error	Update KWU-01
2	IH[illegible]MP	To correct indexing error in gap pressure calculation in CDC version	Update SKI01
3	IRFLHT	To correct a geometric pointer to allow reflood to work with/out change of heat slab associated with reflood in RESTART case	Update SKI01

Table 5. Summary of the important items in nodalization

items	description	Reference [9]
• Primary Coolant System (Intact Loop)		
Number of volumes in		
hot leg from RV outlet to S/G inlet	7	
Steam Generator U tube	8	same
cold leg from S/G outlet to RV inlet	18	
Primary Coolant Pump	2	
• Primary Coolant System (Broken Loop)		
Number of volumes in		
hot leg from RV outlet to S/G simulator	3	
Steam Generator simulator	8	same
cold leg from RV outlet to BST inlet	4	
Reflood Assist Bypass line	6	
• Blowdown Suppretion Tank		
Number of volume in connection to cold leg	1 TMDPVOL	same
Number of volume in connection to hot leg	1 TMDPVOL	
• Emergence Core Cooling System		
Accumulator	1 ACCUM	1 TMDPVOL
High Pressure Injection System	1 TMDPVOL	same
Low Pressure Injection System	1 TMDPVOL	
Number of volume in ECC line	2	
• Pressurizer System		
Number of volume in dome	8	
Number of volume in surgeline to hot leg	3	same
Number of volume in spray line from cold leg	1	
• Steam Generator Secondary System		
Number of volume in boiler	5	
Separator	1 SEPARATOR	
Number of volume in Steam line	3	same
Number of volume in Liquid Fall Back line	2	
Number of volume in S/G downcomer	4	
Feedwater Tank	1 TMDPVOL	
Line from MSIV to Air-cooled Condenser	1	
• Reactor Vessel		
Core		
Number of flow channel	1	2
Number of volume per channel	12	6
Number of heat structure component	2	3
Number of volume per H.S. component	12	6
Gap conductance model	used	none
Reflood option	Pressure *	none
Number of mesh point in heat structure	10	10
Number of maximum fine mesh	8	none
Number of volume in core bypass compnt	3	3
Core Bypass flow ratio	5 %	5 %
Downcomer		
Number of flow channel	2	2
Number of volume per flow channel	5	5
Number of crossflow junctions for downcomer bypass	4	5

Note * : Reflood option was not used even in reference [2],
Option used in base calculation : Pressure at core top less than 0.1 MPa

Table 6. Summary of the boundary conditions for a base case

item	description
• Primary coolant system	
Primary Coolant Pump *	Trip time of 0.94 sec changed from 1.74 for accurate description
Containment *	Pressure chaged from 0.1 MPa to simulate the measurement PE-SV-060 accurately
• Secondary Coolant System	
Feedwater	Tablet form of mass flow rate vs. pressure
Air-cooled Condenser	2.0 MPa
• ECC System	
Accumulator *	Empty level changed to 0.94 m from 1.04 m for accurate description
HPIS	Tablet form of mass flow rate vs. pressure
LPIS	Tablet form of mass flow rate vs. pressure
• Reactor Vessel Core	
Axial power shape	From experiment data, see Fig.3
Power history *	Changed to aviod the measurement uncertainty :measurement RE-T-77-1A2 plus L2-5 posttest decay heat curve, see Fig.4
• Others *	
Pressurizer heater	Power table changed to zero in transient calculation witout any change of H.S.
Thermal conductivy table	Extended the lower limit to 300 K from 380 K

Note * : Changed items from reference[2]

Table 7. List of the important assessment parameters

description	experiment ID[7]	calculation	No.of Fig.
Primary system pressure	PE-1-UP-00A1	P 250-01	5
S/G secondary system pressure	PE-SGS-001	P 530-01	6
Mass flow rate at broken loop cold leg	FR-BL-001	MFLOWJ 340-01	7
Mass flow rate at broken loop hot leg	FR-BR-002	MFLOWJ 305-01	8
Mass flow rate at intact loop cold leg	FR-PC-101	MFLOWJ 180-01	9
Mass flow rate at intact loop hot leg	FR-PC-201	MFLOWJ 100-01	10
Primary system density at intact loop hot leg	DE-PC-205	RHO 100-01	11
Primary coolant pump speed	RPE-PC-002	PMPVEL 165	12
Accumulator liquid level	LE-ECC-01A	CNTRLVAR 4	13
Coolant temperature at upper plenum	TE-4UP-001	TEMPF 250-01	14
Coolant temperature at lower plenum	TE-4LP-001	TEMPF 215-01	15
Coolant temperature at broken side downcomer, 4.8 m	TE-1ST-001	TEMPF 712-01	16
Coolant temperature at broken side downcomer, 0.85 m	TE-1ST-007	TEMPF 718-01	17
Fuel Centerline temperature at hot fuel, 27 inches	TC-5D09-27	HTTEMP 21-0501	18
Cladding Temperature at hot fuel, 5 inches	TE-5I06-005	HTTEMP 21-0110	19
Cladding temperature at hot fuel, 21 inches	TE-5I06-021	HTTEMP 21-0410	20
Cladding temperature at hot fuel, 27 inches	TE-5I04-027	HTTEMP 21-0510	21
Cladding temperature at hot fuel, 39 inches	TE-5I06-039	HTTEMP 21-0810	22
Cladding temperature at hot fuel, 54 inches	TE-5I06-054	HTTEMP 21-1010	23

Table 8. Updated items in PSI-EIR 83 [11]

item	description	effect
heat transfer coefficient	Correction of Modified-Bromley correlation in film boiling to original form with coefficient in medium/high flooding rate	Decrease heat transfer coefficient
interfacial friction	New correlation from CATHARE code for interfacial friction in bubbly and slug flow regime	Decrease interfacial drag
heat transfer coefficient	Implementation of Forslund/Rosenhow formula for the reflood dispersed film boiling heat transfer	Stabilize numerical vibration
interfacial drag	Reduction of interfacial friction in rod bundle in inverted slug flow regime by factor of 0.4, in dispersed flow and annular mist flow regime by factor 0.5	Reduce too high void fraction
criteria	Changing the criterion for predry-out interfacial friction correlation near quench front	Reduce unphysical oscillation
quenching temperature	Changing an exponent in the Weisman reflood transition film boiling correlation multiply a factor to Modified-Bromley heat transfer correlation	Increase quenching temperature

Table 9. Summary of the calculation conditions for nodalization and sensitivity study

item	Base-case	CASE A	CASE B	CASE C	CASE D
No.of core channel	1	1	1	2	2
No.of volume					
average channel	12	12	14	6	6
hot channel	none	none	none	14	14
No.of crossflow junction in DC	4	0	0	0	0
Used code	C.36.04	C.36.04	C.36.04	C.36.04	Special*

Note * : Special MOD2 : RELAP5/MOD2 Cycle 36.04 plus PSI Update

Table 10. Run statistics data in base case

Transient time (sec)	CPU time (sec)	Attempted ADV	Repeated ADV	Mass error (kg)
0	3.2			
10	187.855	1040	13	-1.28
20	365.525	2040	13	-0.9371
30	566.903	3142	15	-0.929
40	866.809	4703	88	0.269
50	1081.10	5813	104	0.277
60	1281.74	6877	131	0.672
70	1484.11	7924	141	1.043
80	1685.57	9004	159	0.931
90	1895.16	10109	170	0.886
100	2109.97	11239	202	0.8155
110	2314.75	12300	222	0.934
120	2528.43	13407	252	2.12

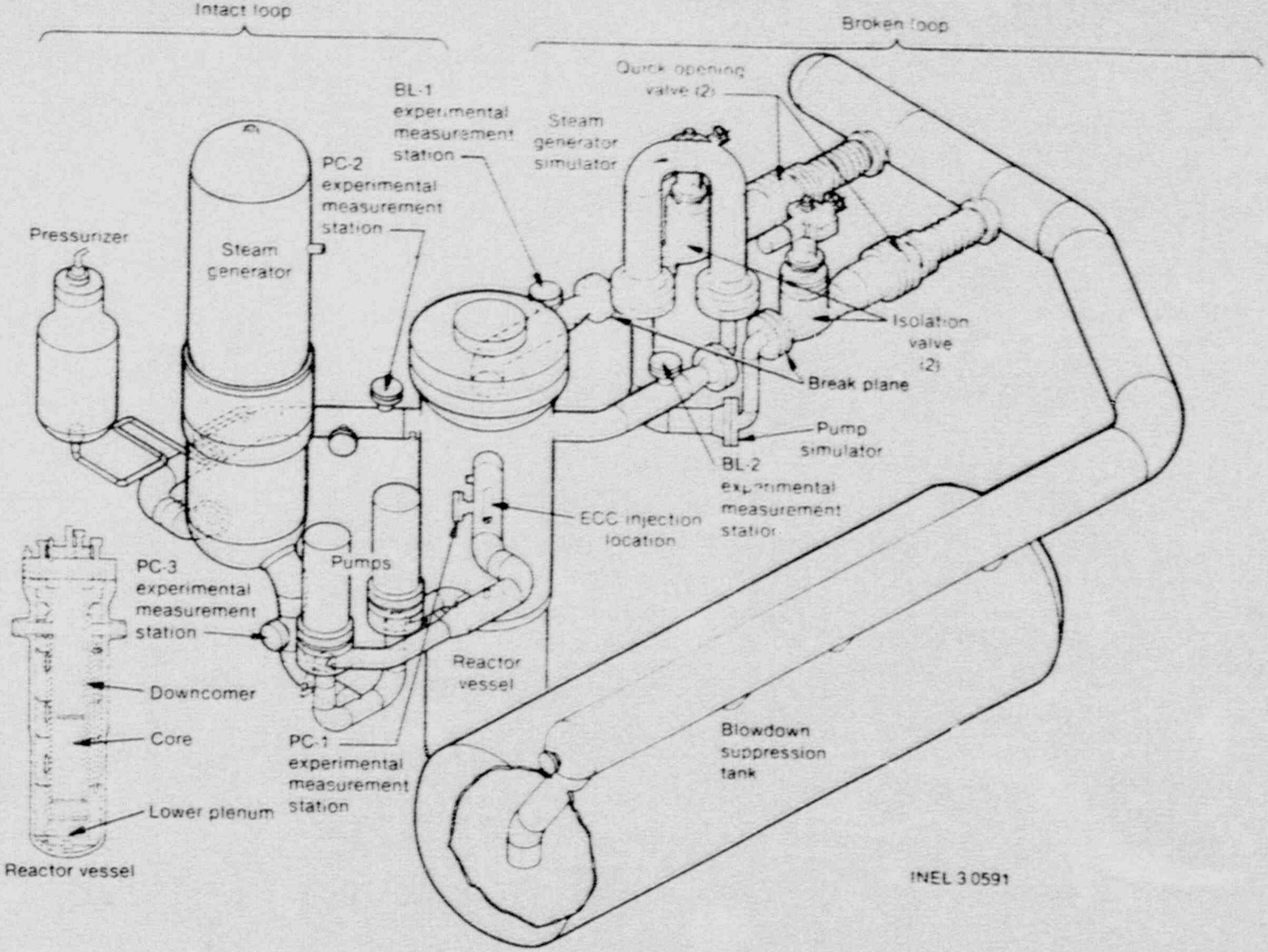


Fig.1 Axonometric configuration of LOFT L2-5 test

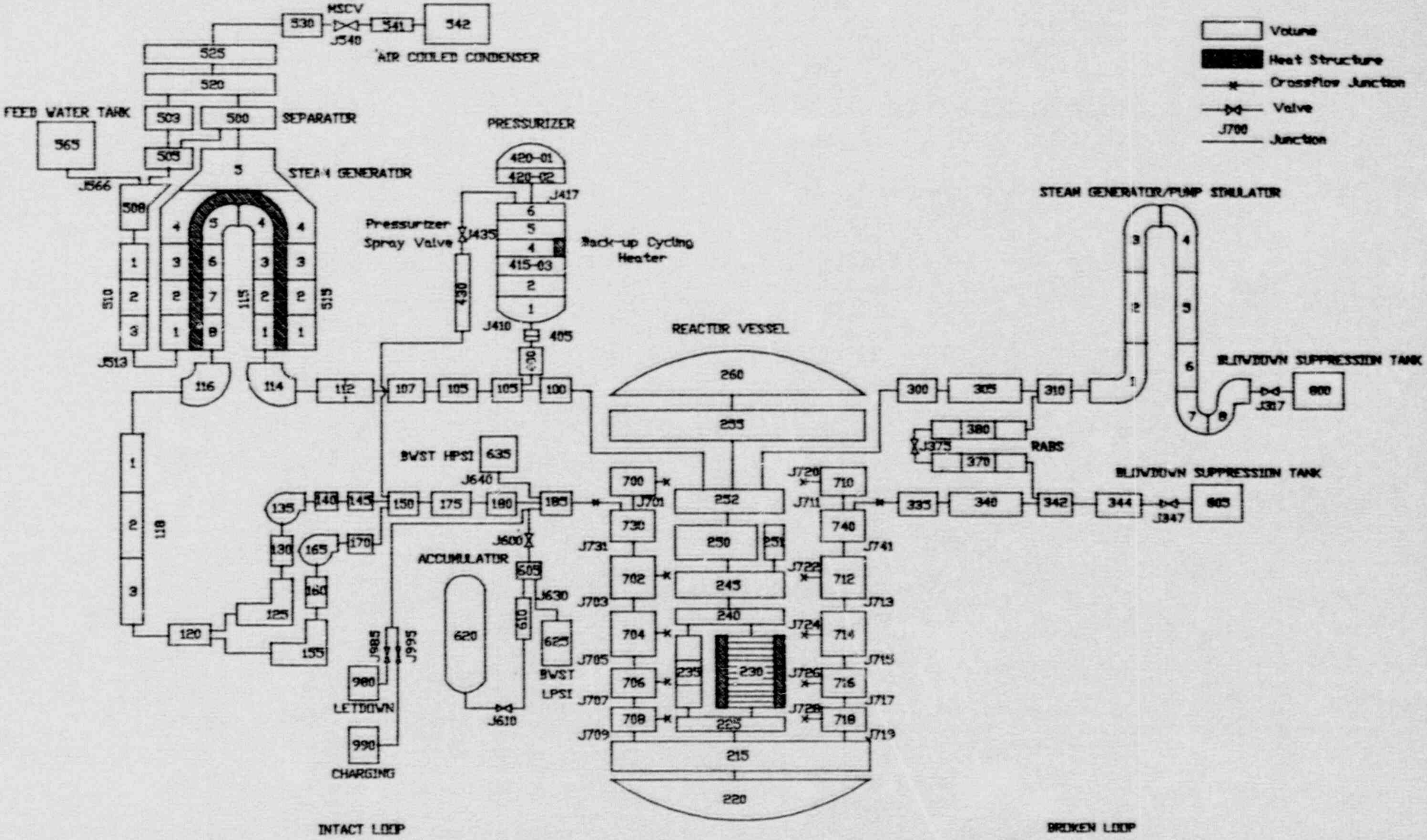


Fig.2 Nodalization diagram for base case calculation of LOFT L2-5 test

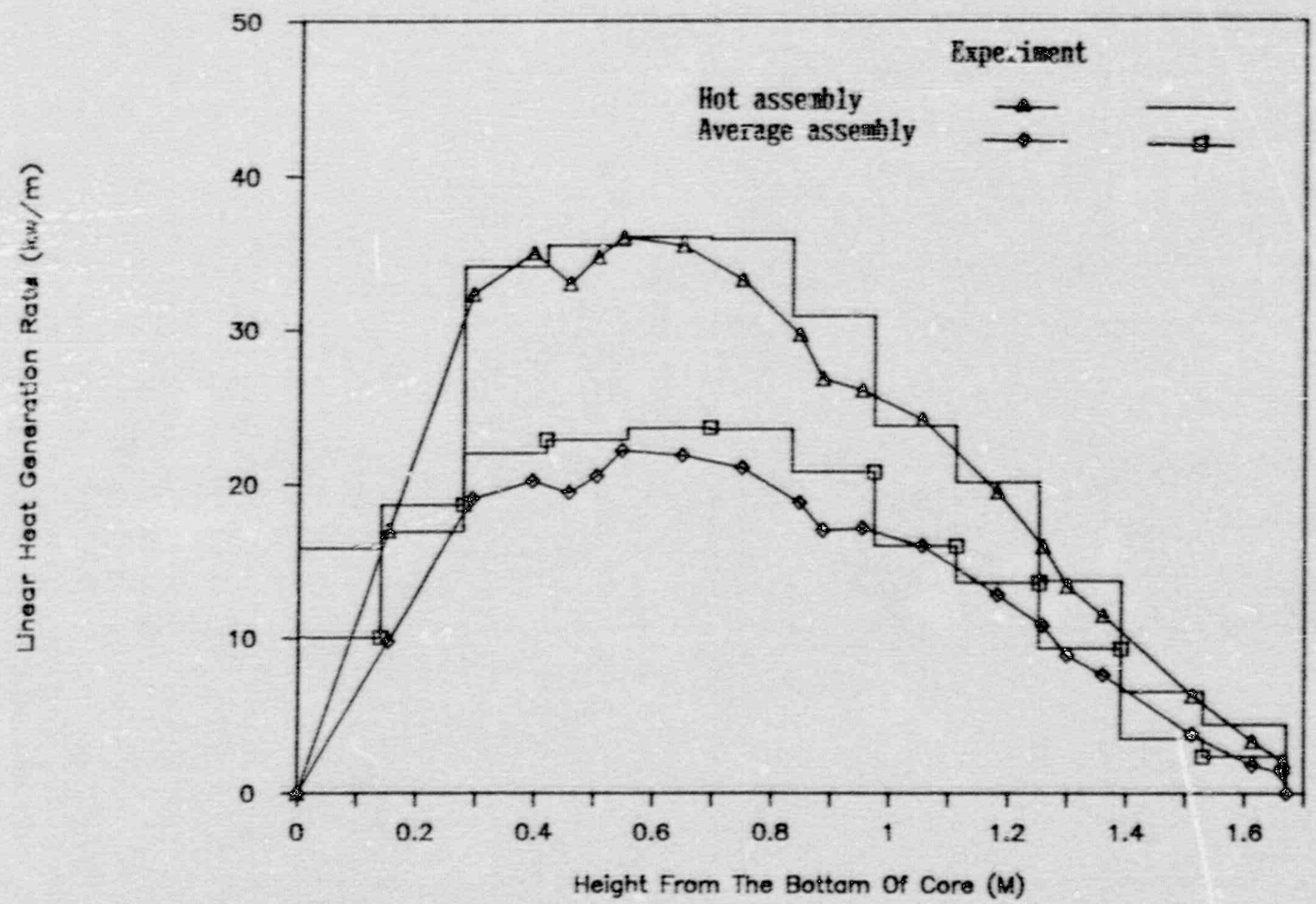


Fig.3 Axial power distribution in base case calculation of L2-5 test

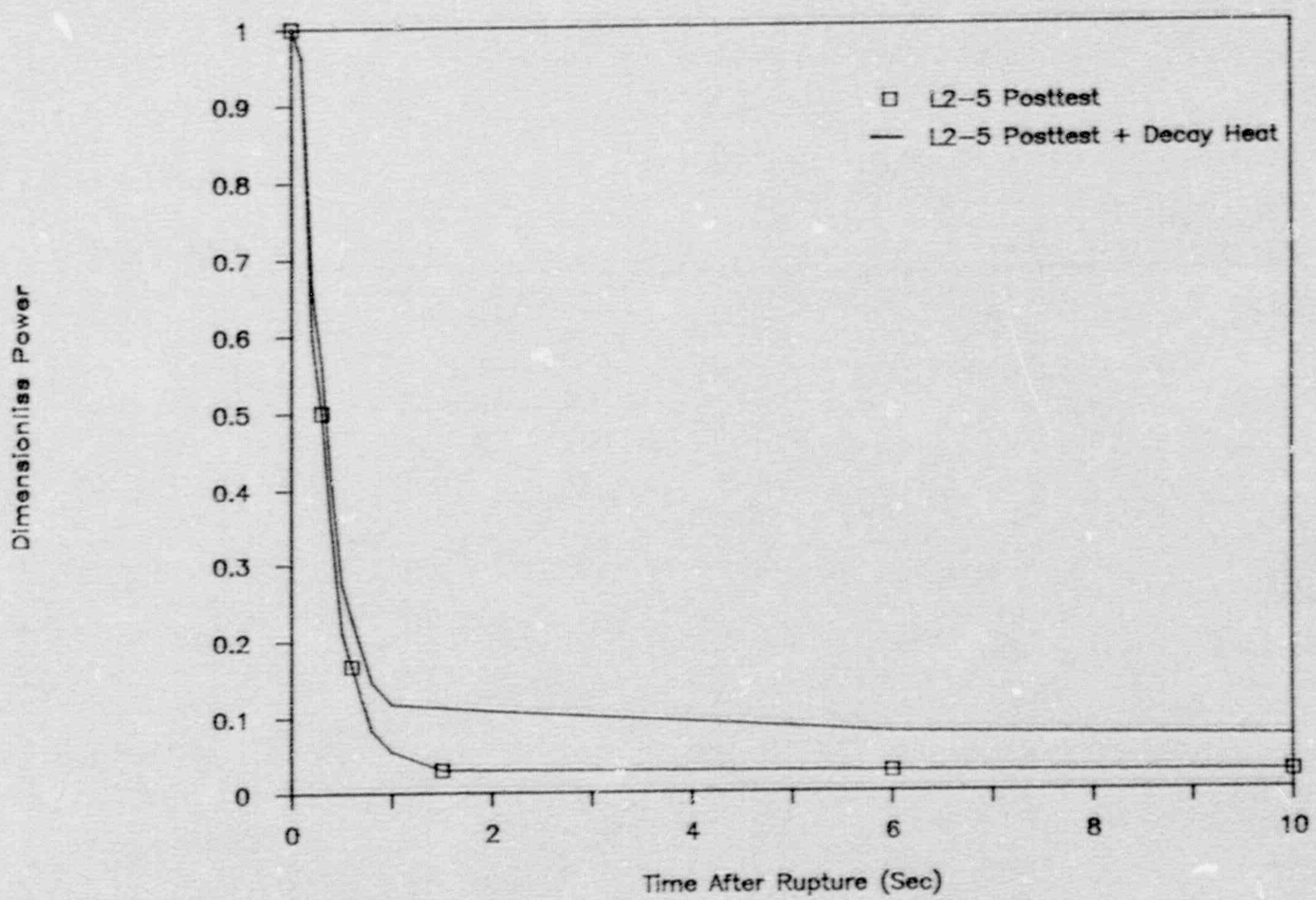


Fig.4 Power history in base case calculation of L2-5 test

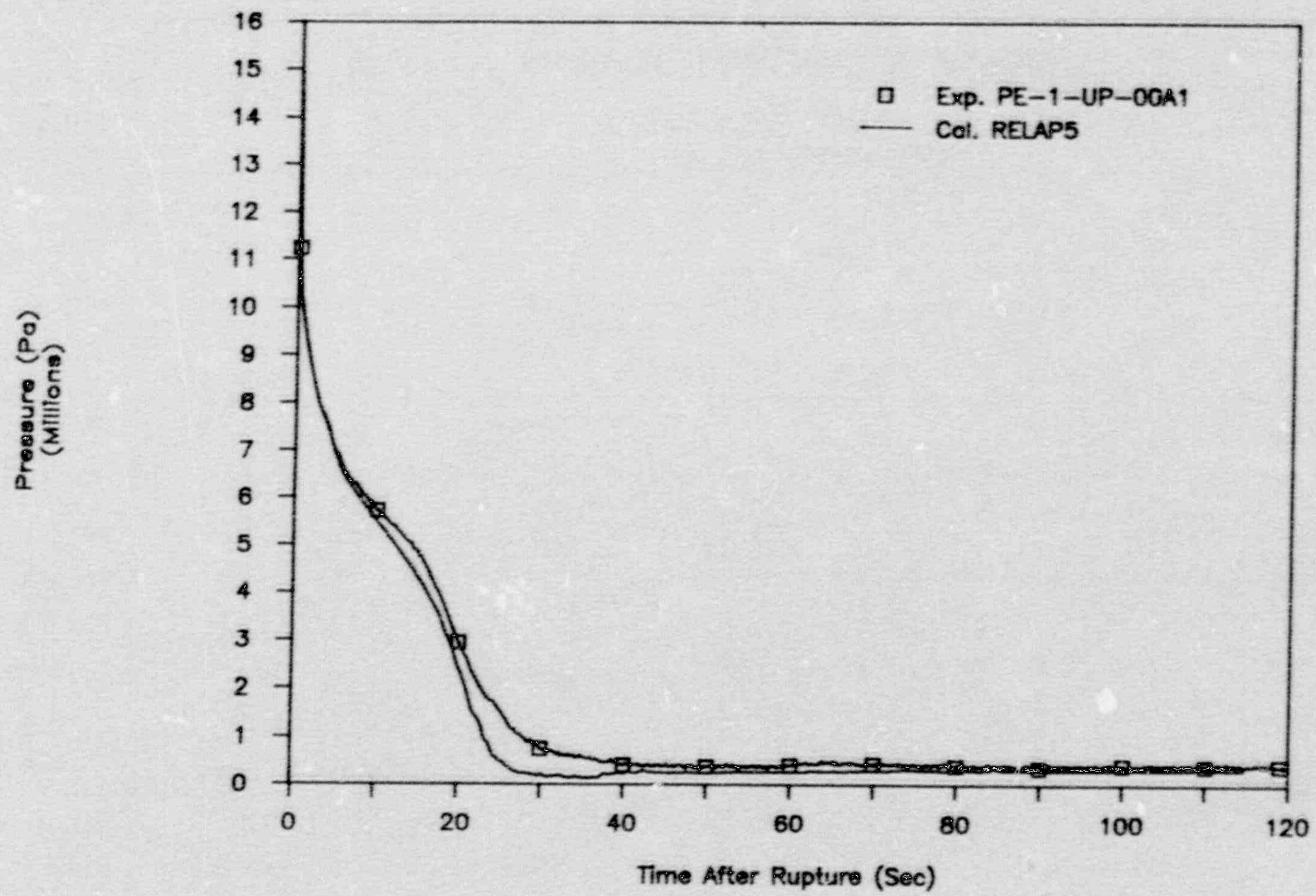


Fig.5 Comparison of primary system pressure between the base case calculation and the experiment

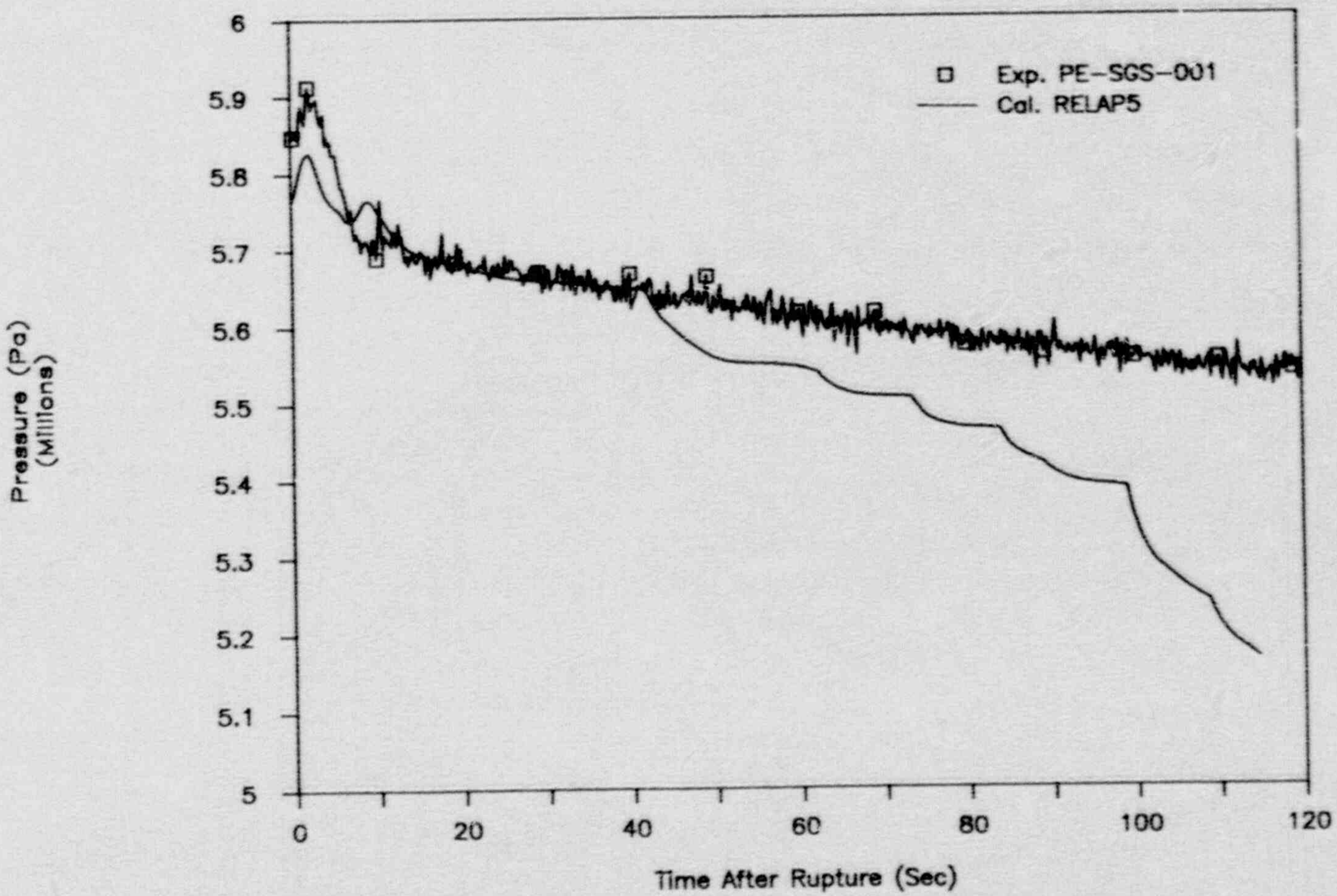


Fig.6 Comparison of secondary system pressure between the base case calculation and the experiment

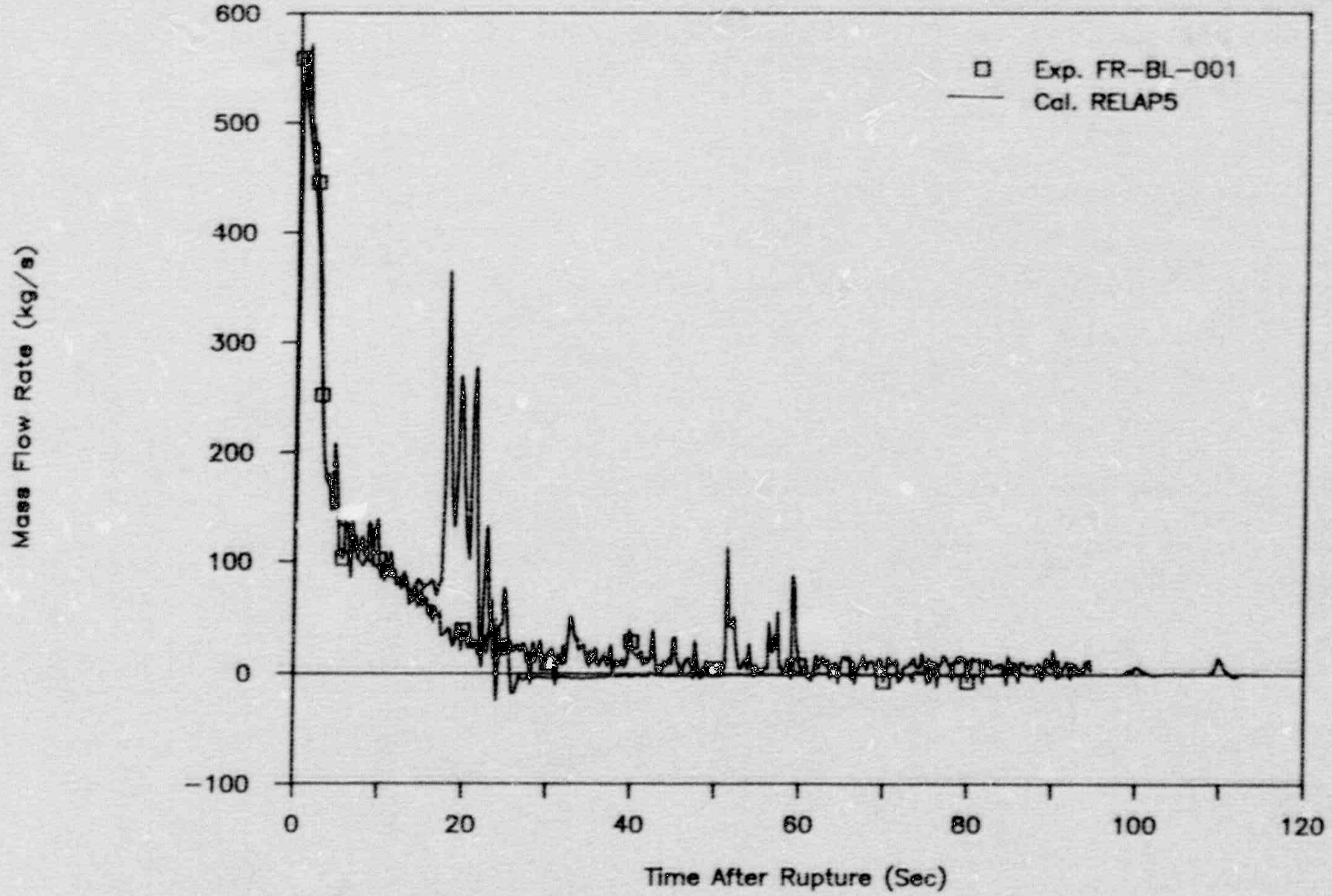


Fig.7 Comparison of mass flow rate at broken loop cold leg between the base case calculation and the experiment

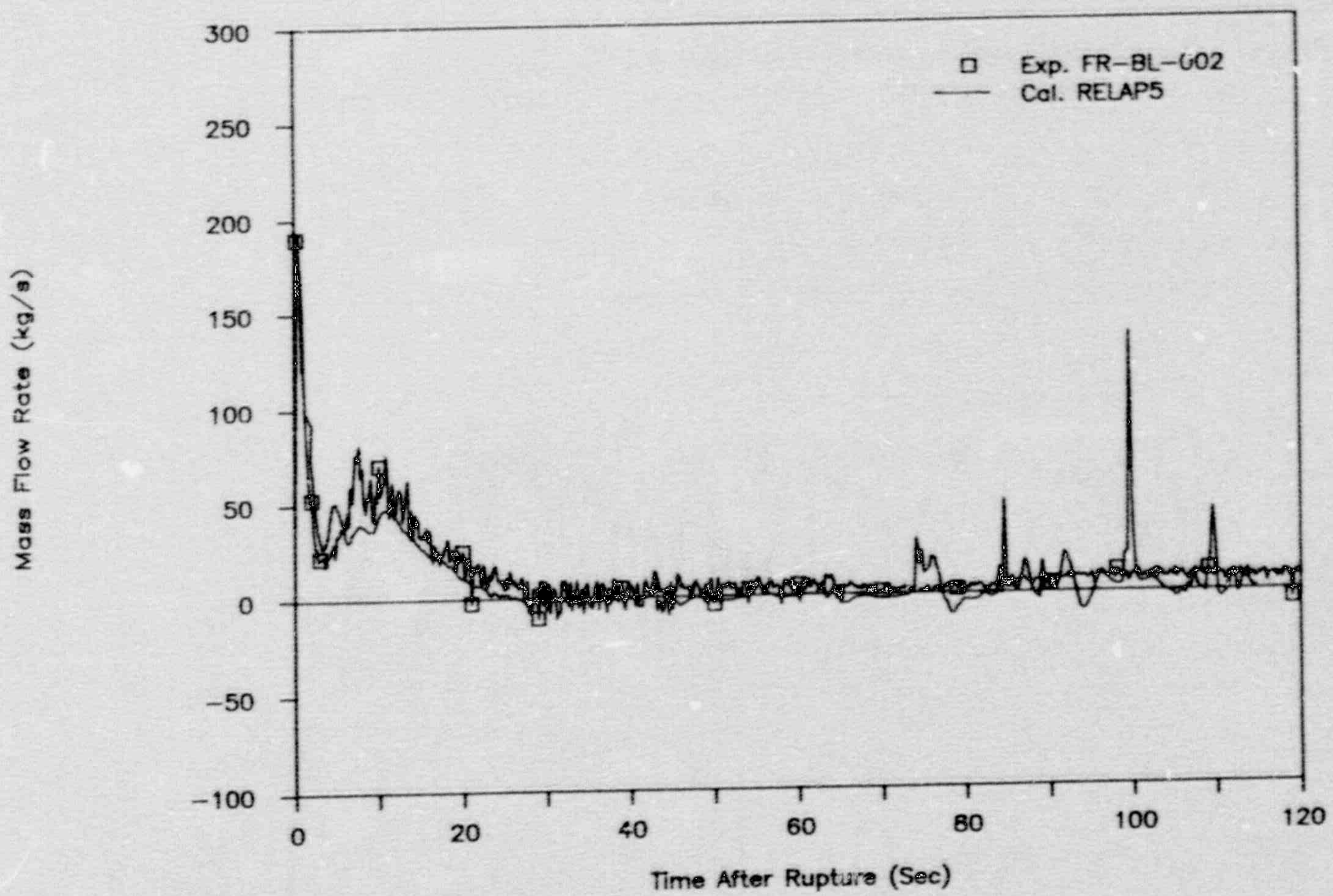


Fig.8 Comparison of mass flow rate at broken loop hot leg between the base case calculation and the experiment

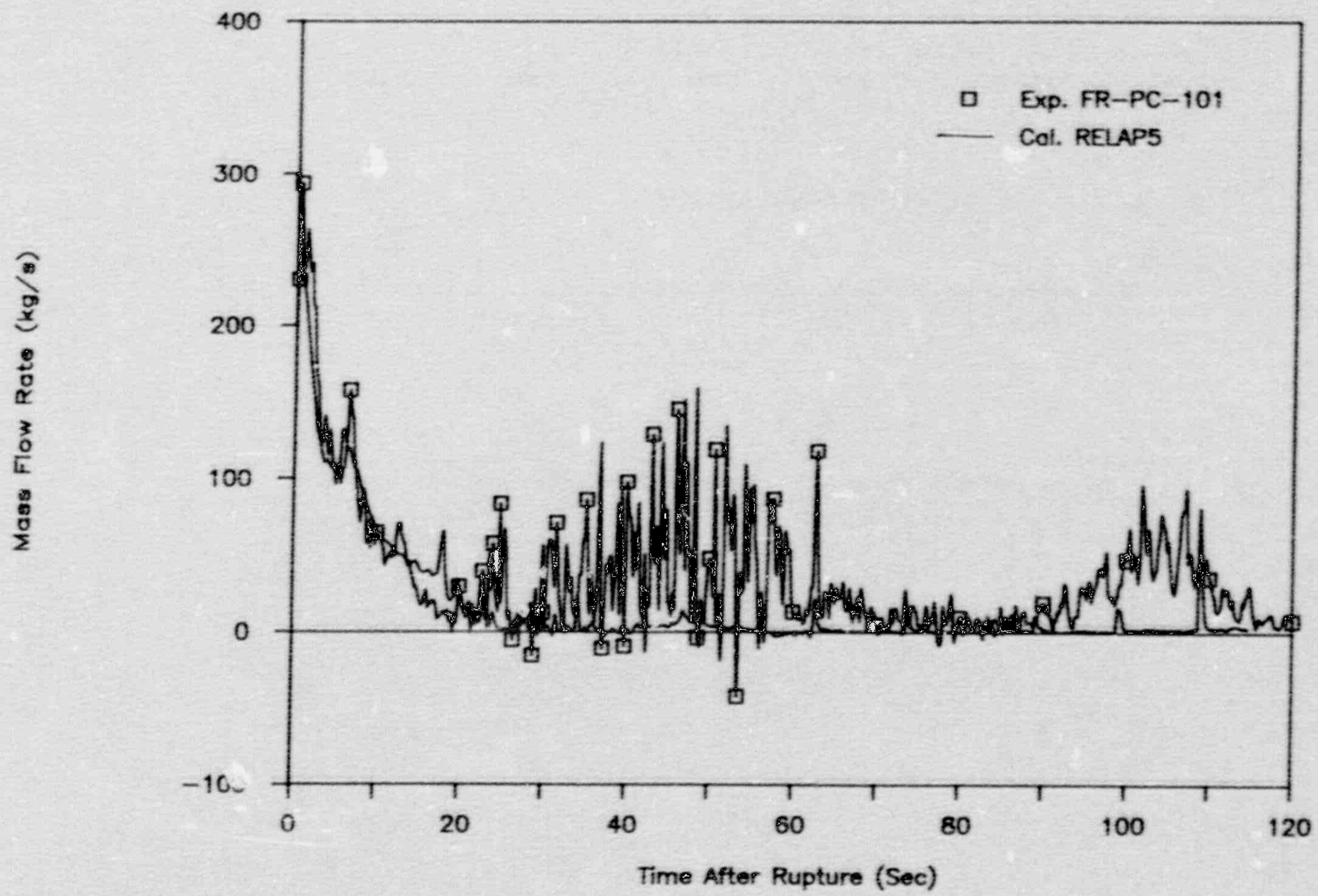


Fig.9 Comparison of mass flow rate at intact loop cold leg between the base case calculation and the experiment

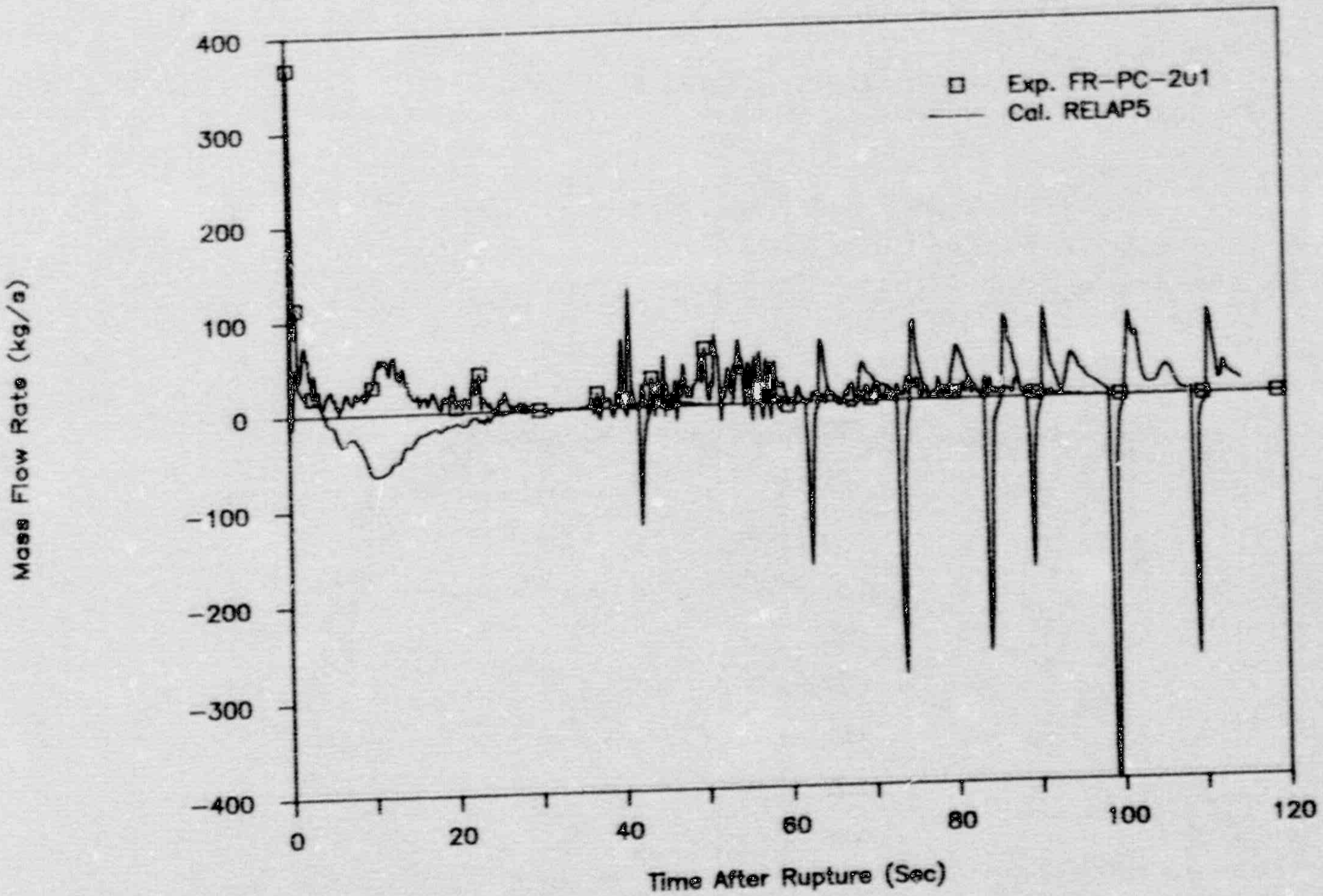


Fig.10 Comparison of mass flow rate at intact loop hot leg between the base case calculation and the experiment

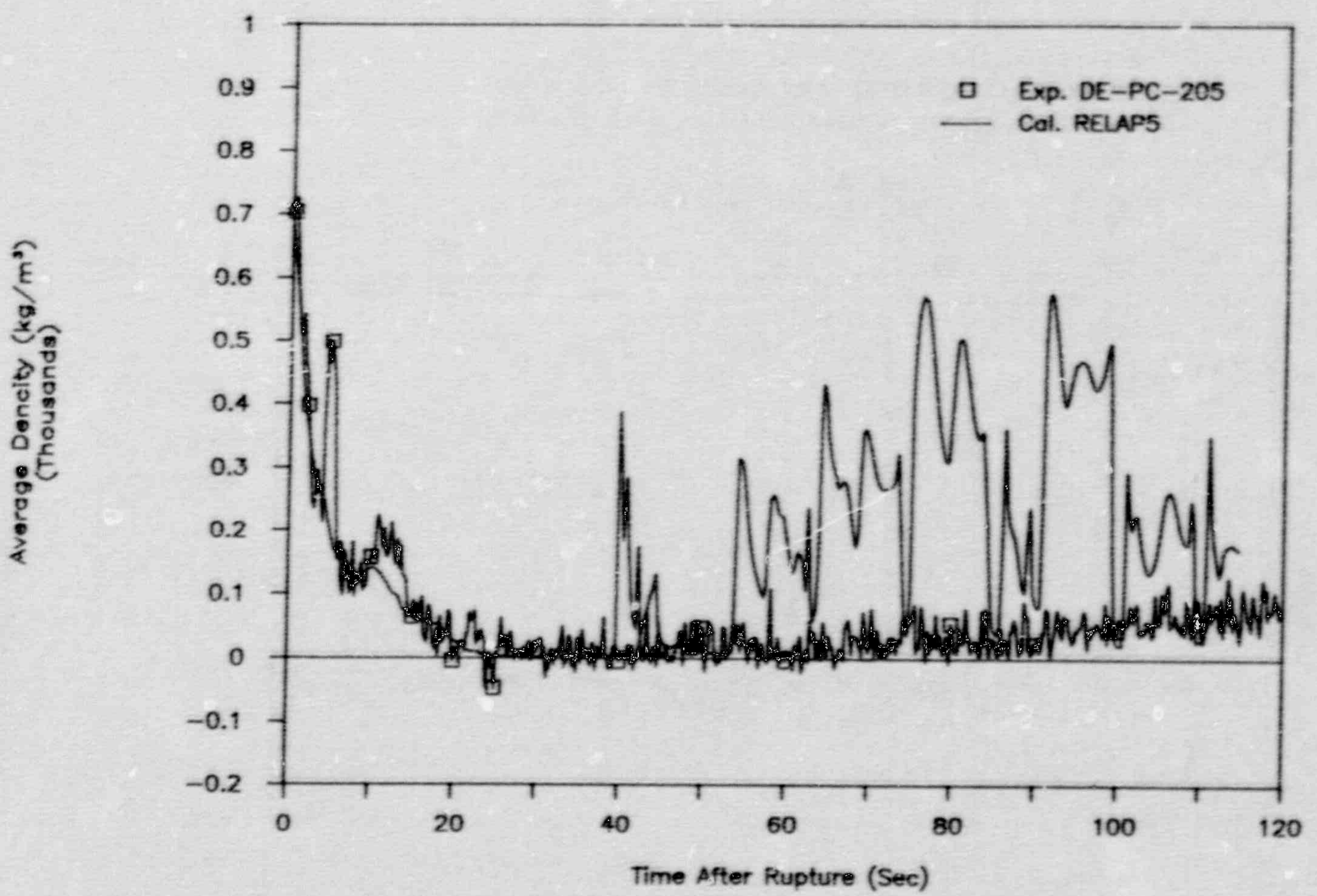


Fig.11 Comparison of primary system density at intact loop hot leg between the base case calculation and the experiment

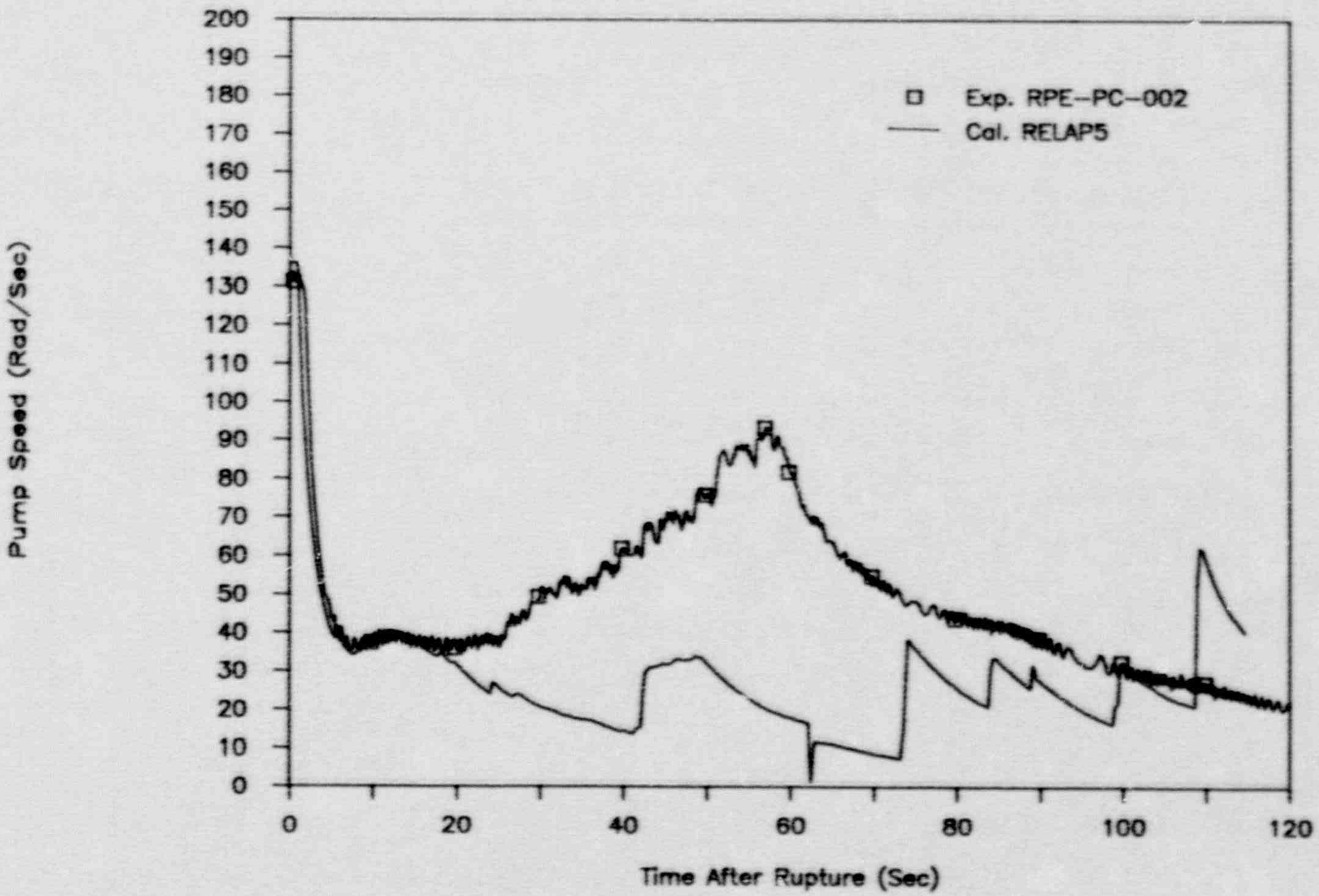


Fig.12 Comparison of primary coolant pump speed between the base case calculation and the experiment

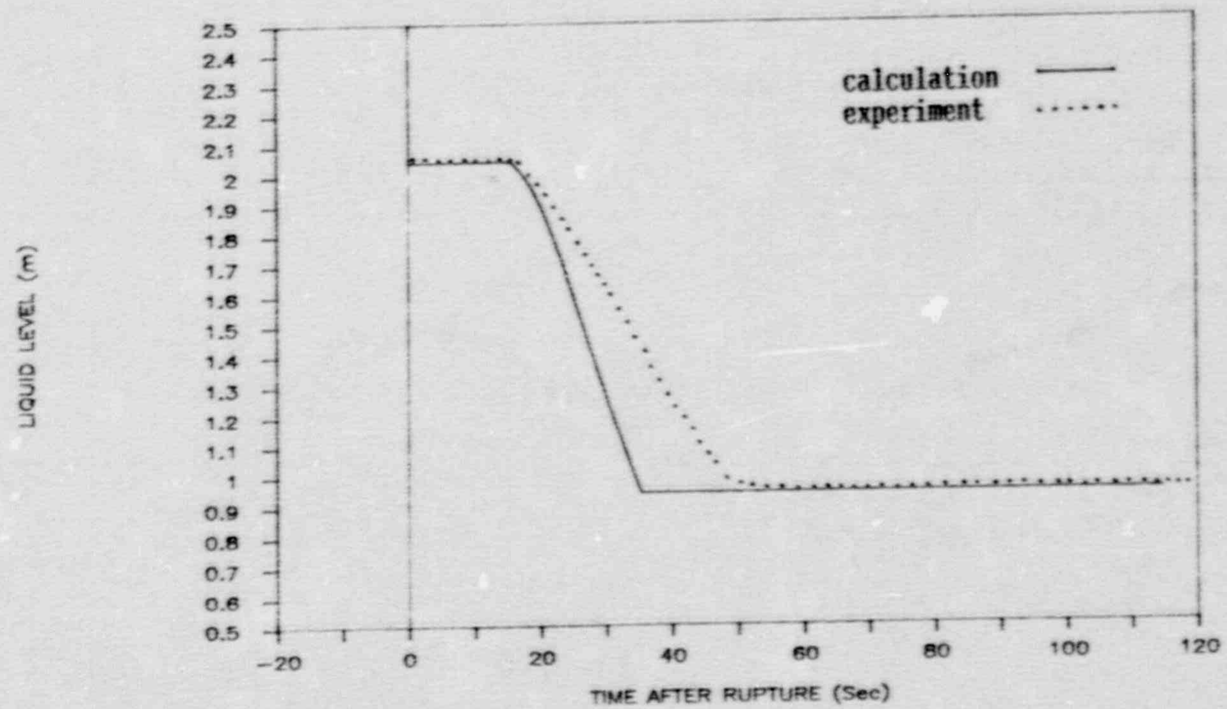


Fig.13 Comparison of liquid level in accumulator between the base case calculation and the experiment

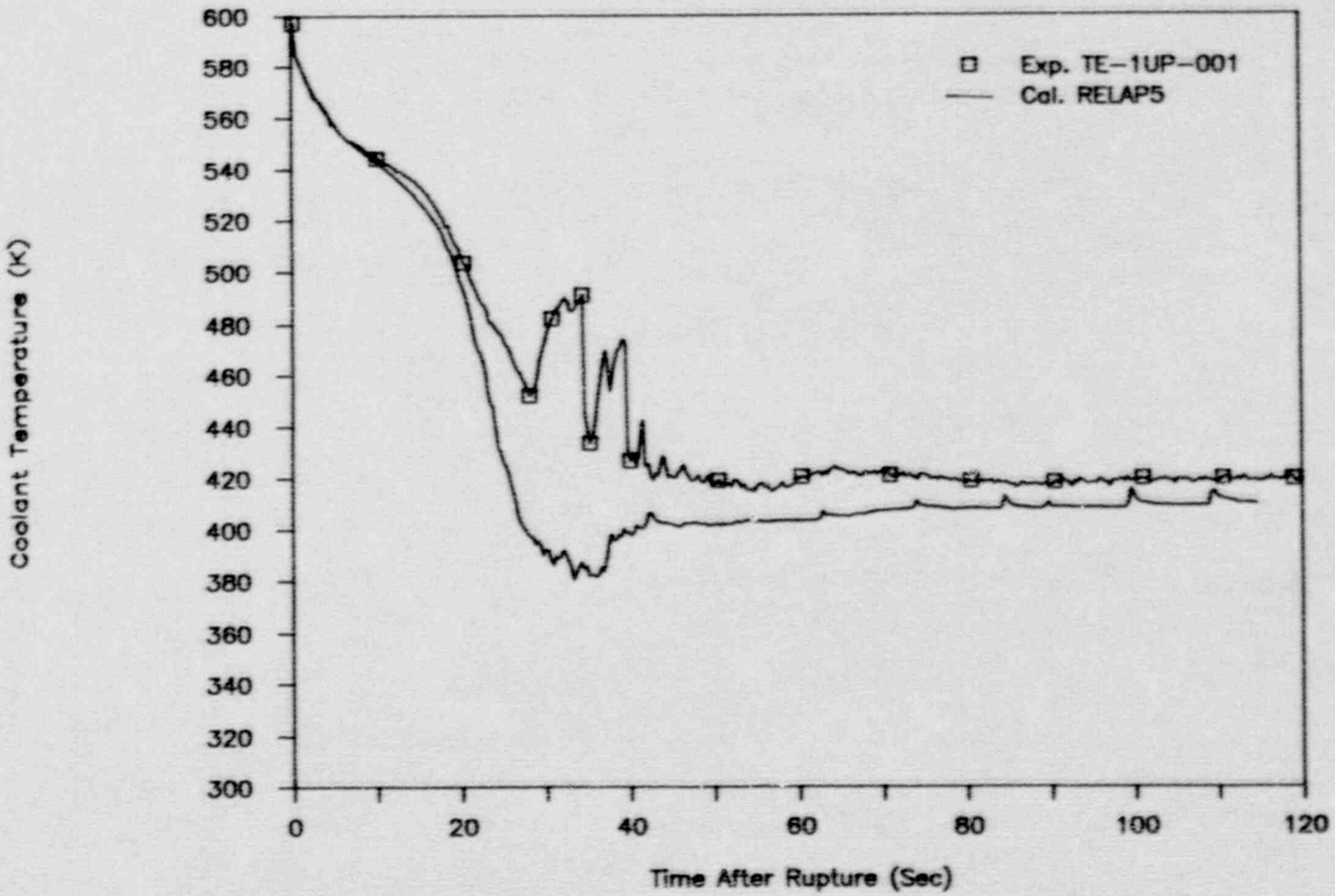


Fig.14 Comparison of coolant temperature in upper plenum between the base case calculation and the experiment

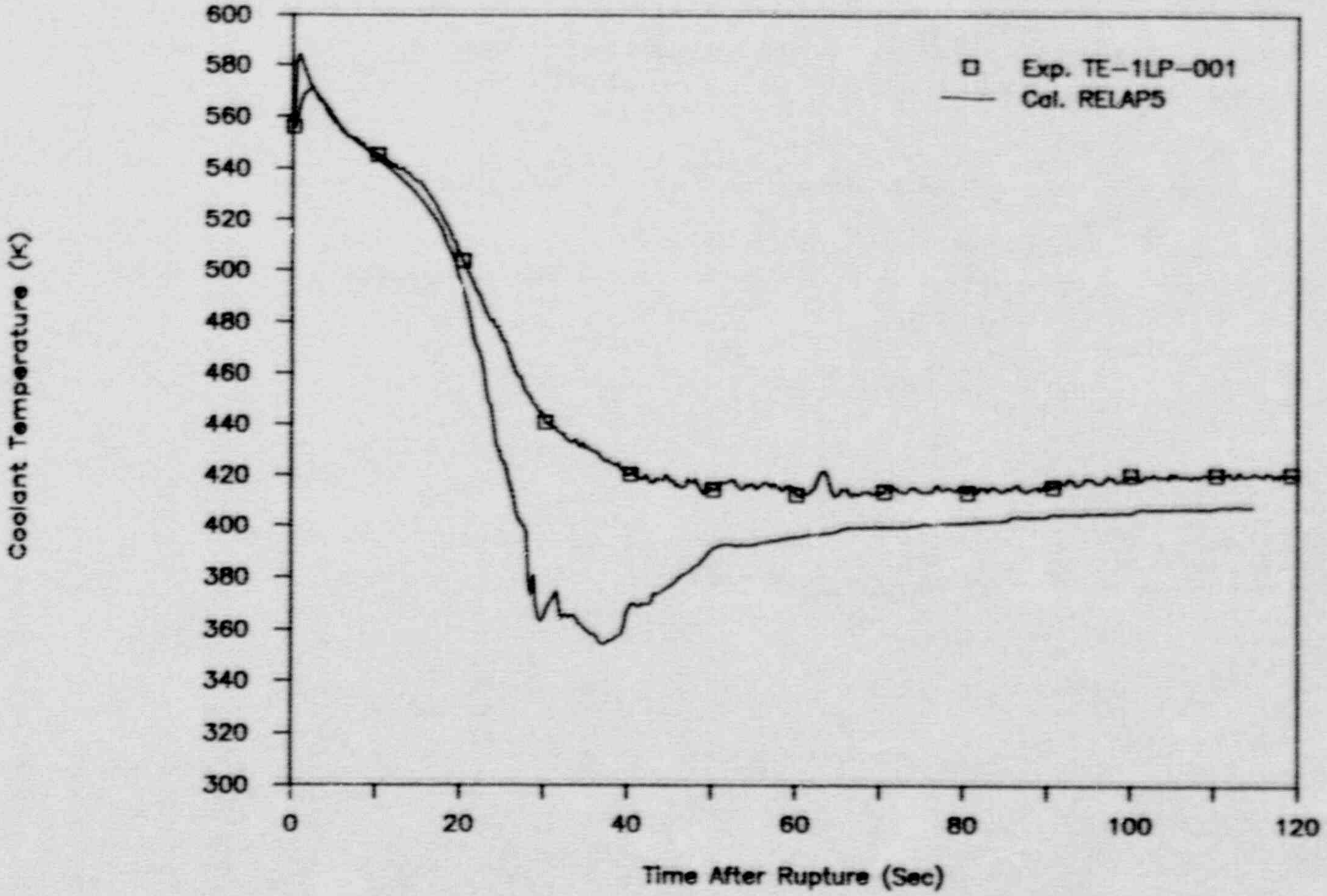


Fig.15 Comparison of coolant temperature in lower plenum between the base case calculation and the experiment

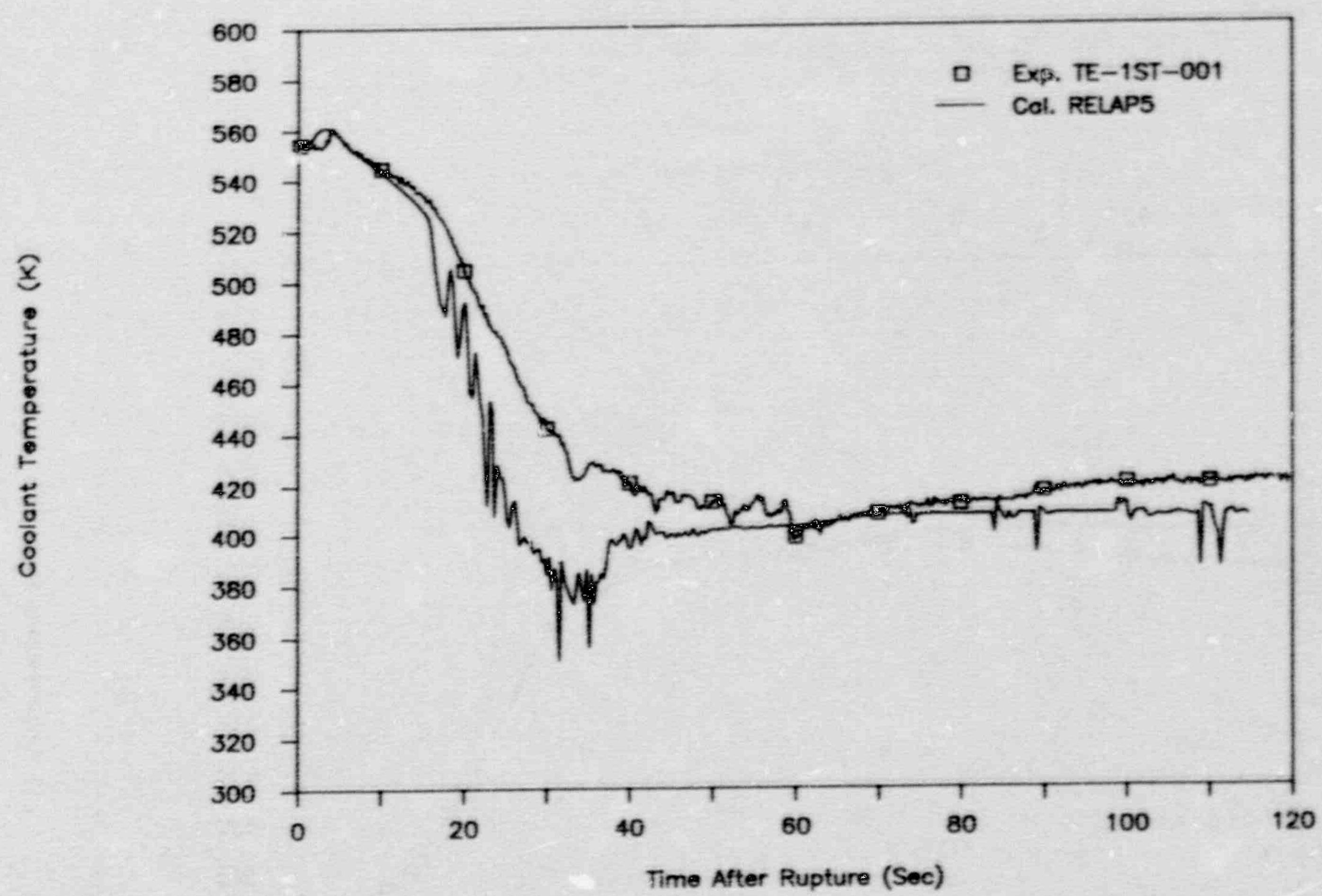


Fig.16 Comparison of coolant temperature at downcomer inlet between the base case calculation and the experiment

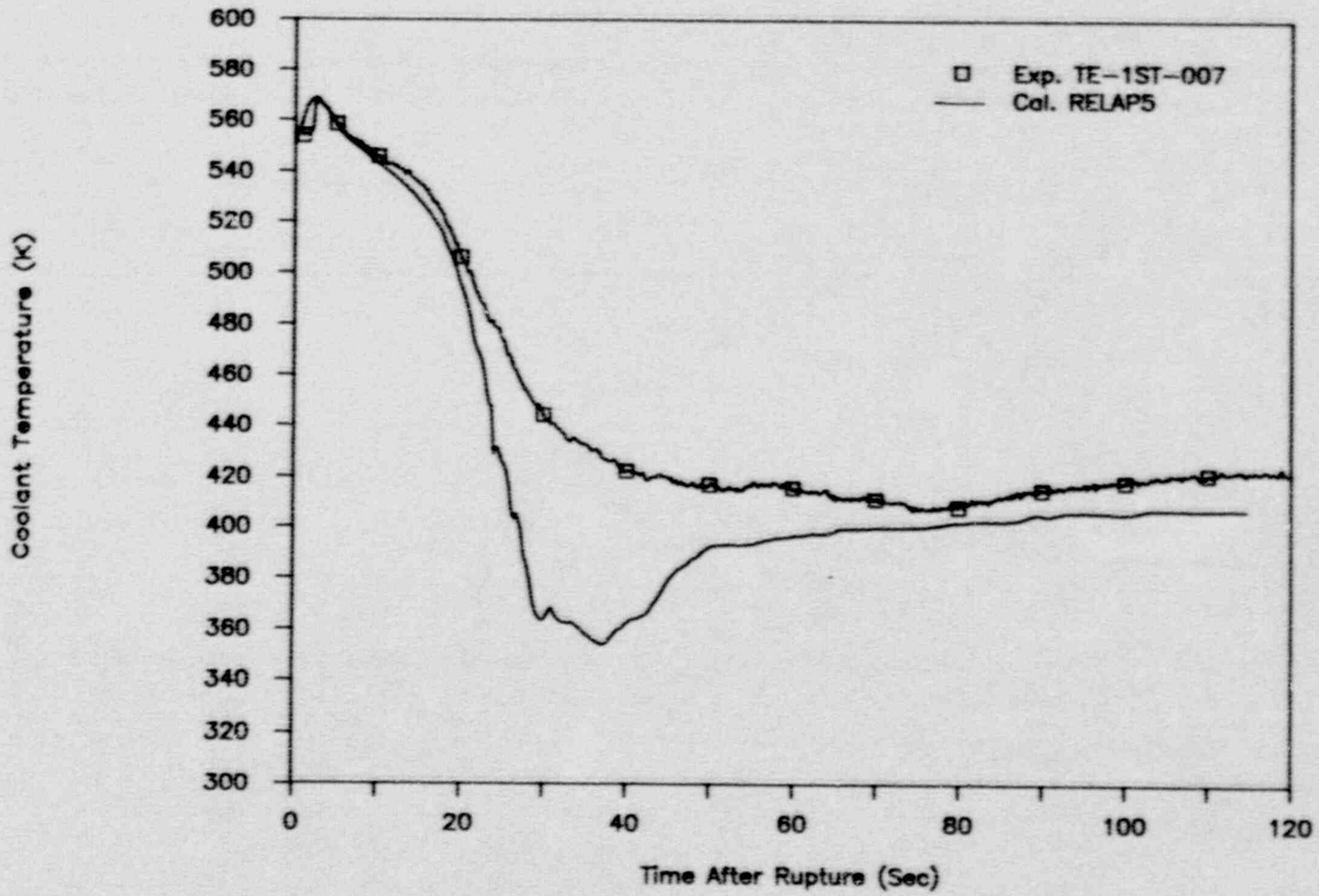


Fig.17 Comparison of coolant temperature at downcomer outlet between the base case calculation and the experiment

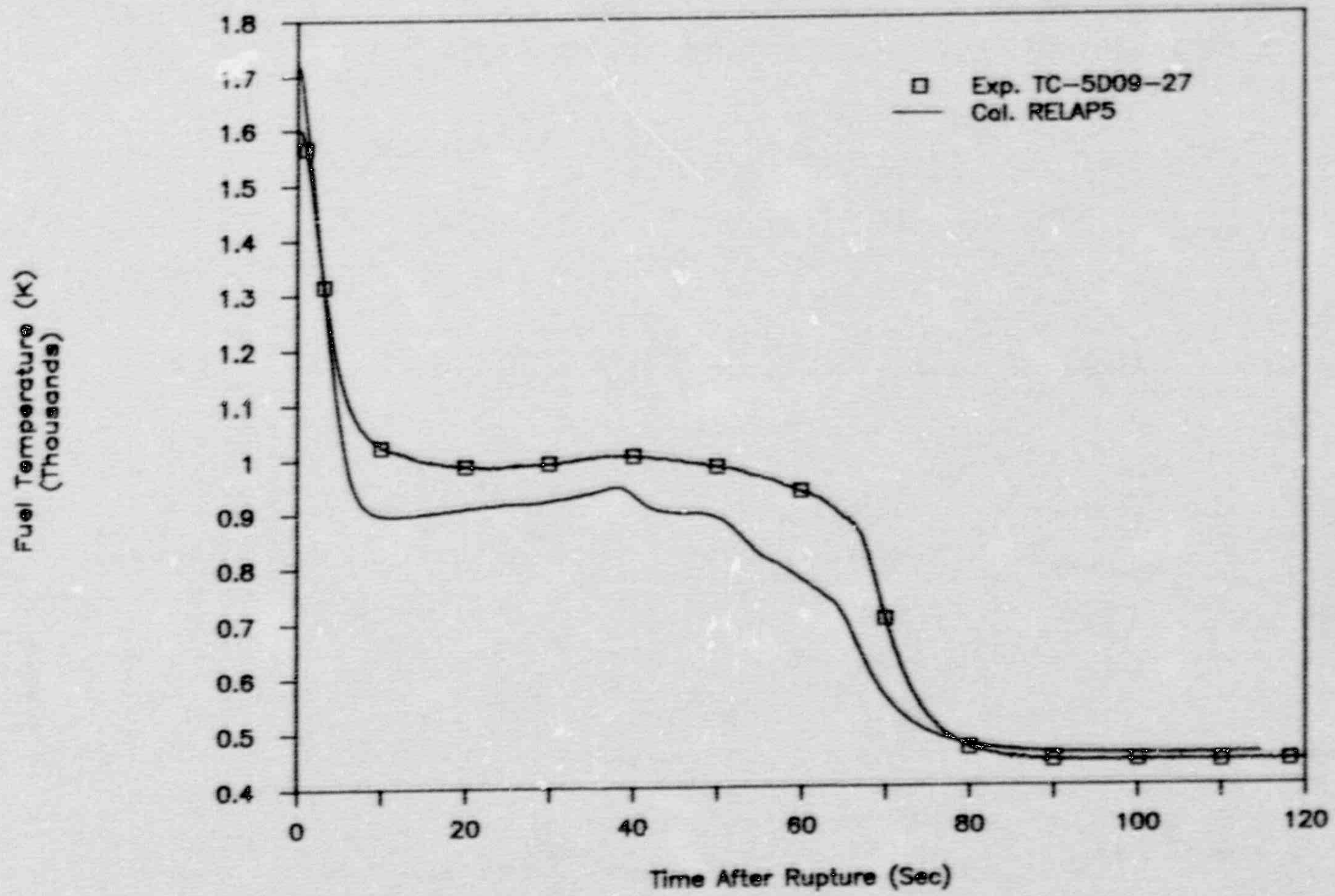


Fig.18 Comparison of fuel centerline temperature at 27 inches between the base case calculation and the experiment

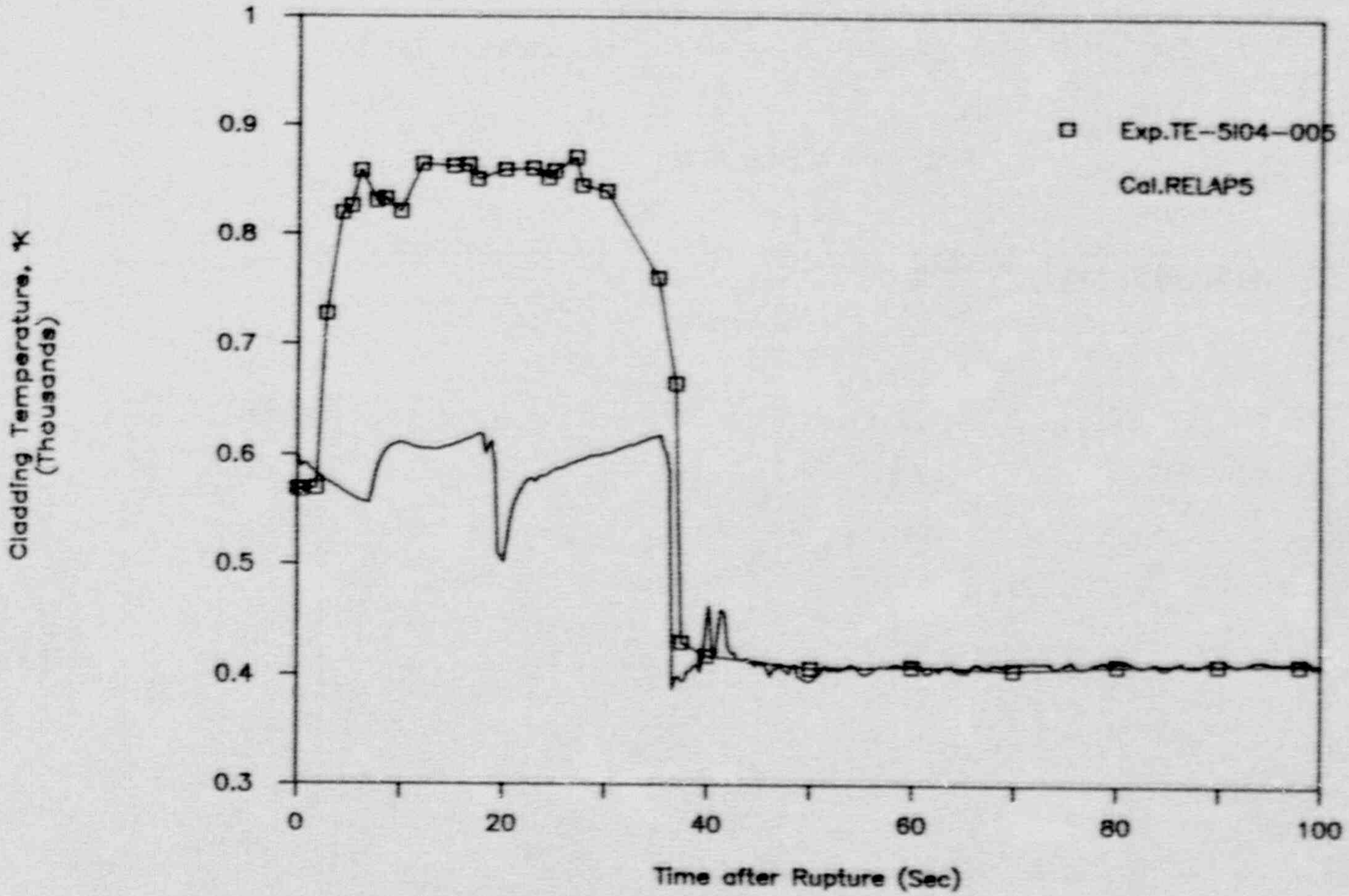


Fig.19 Comparison of cladding temperature at 5 inches of hot fuel between the base case calculation and the experiment

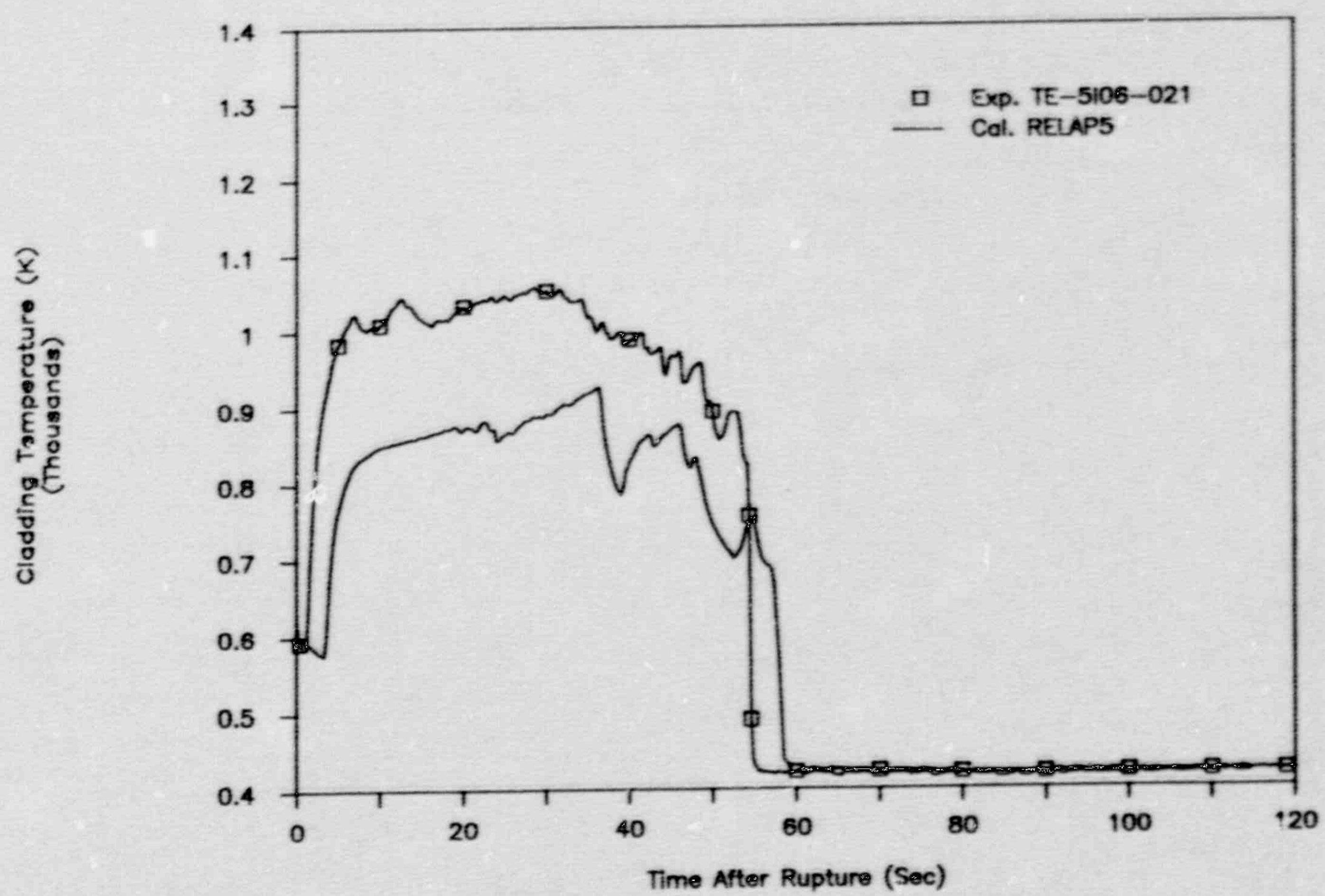


Fig.20 Comparison of cladding temperature at 21 inches of hot fuel between the base case calculation and the experiment

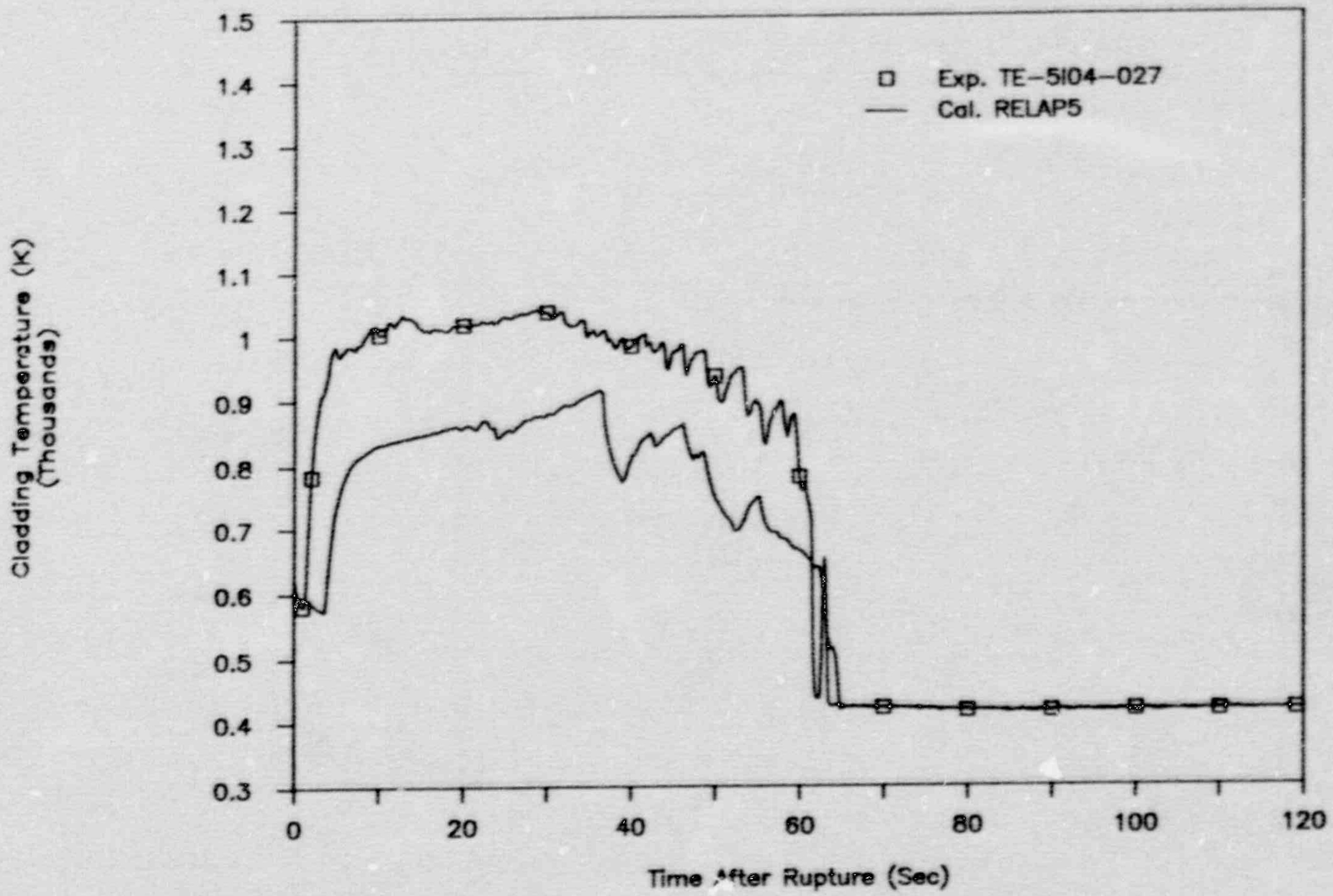


Fig.21 Comparison of cladding temperature at 27 inches of hot fuel between the base case calculation and the experiment

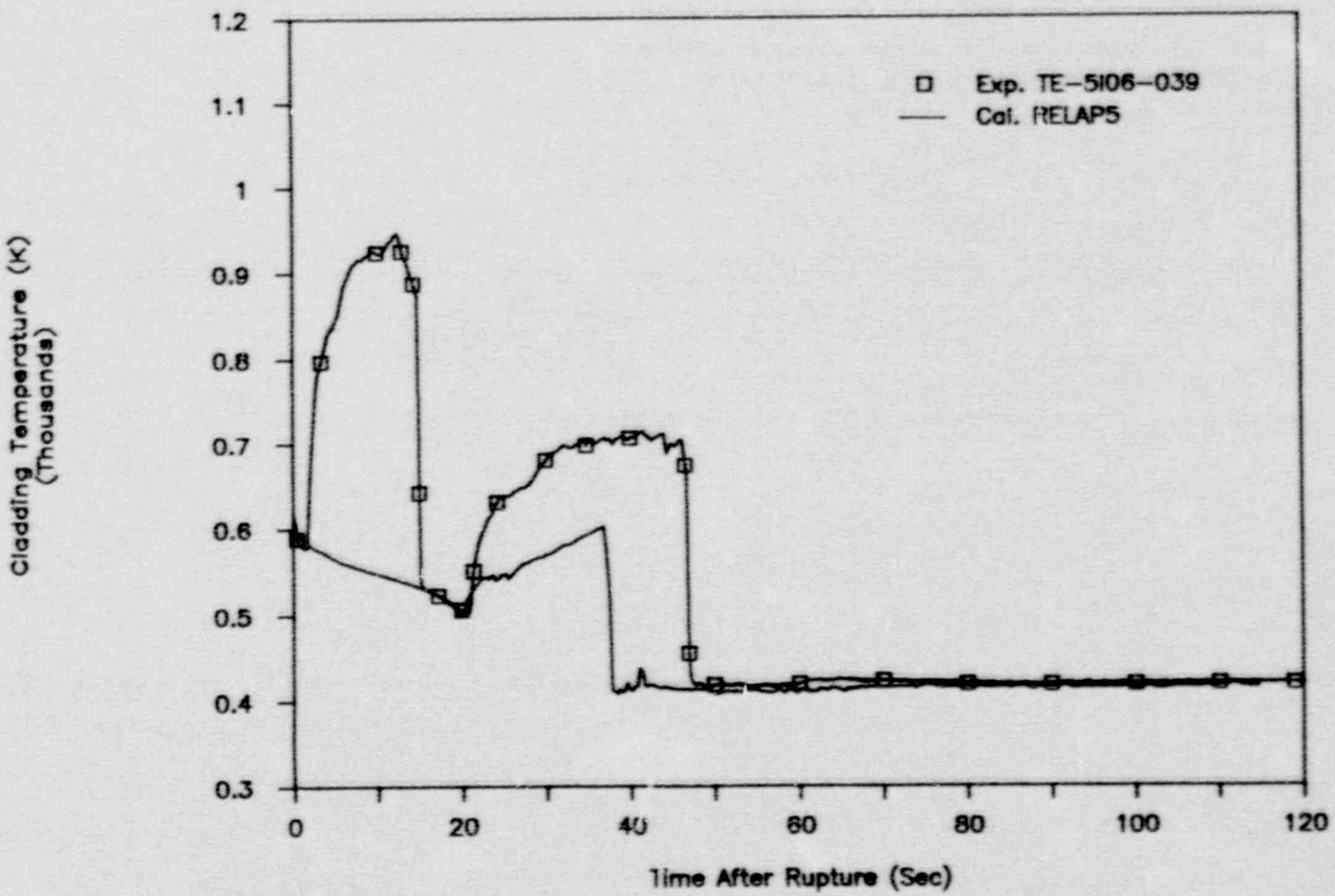


Fig.22 Comparison of cladding temperature at 39 inches of hot fuel between the base case calculation and the experiment

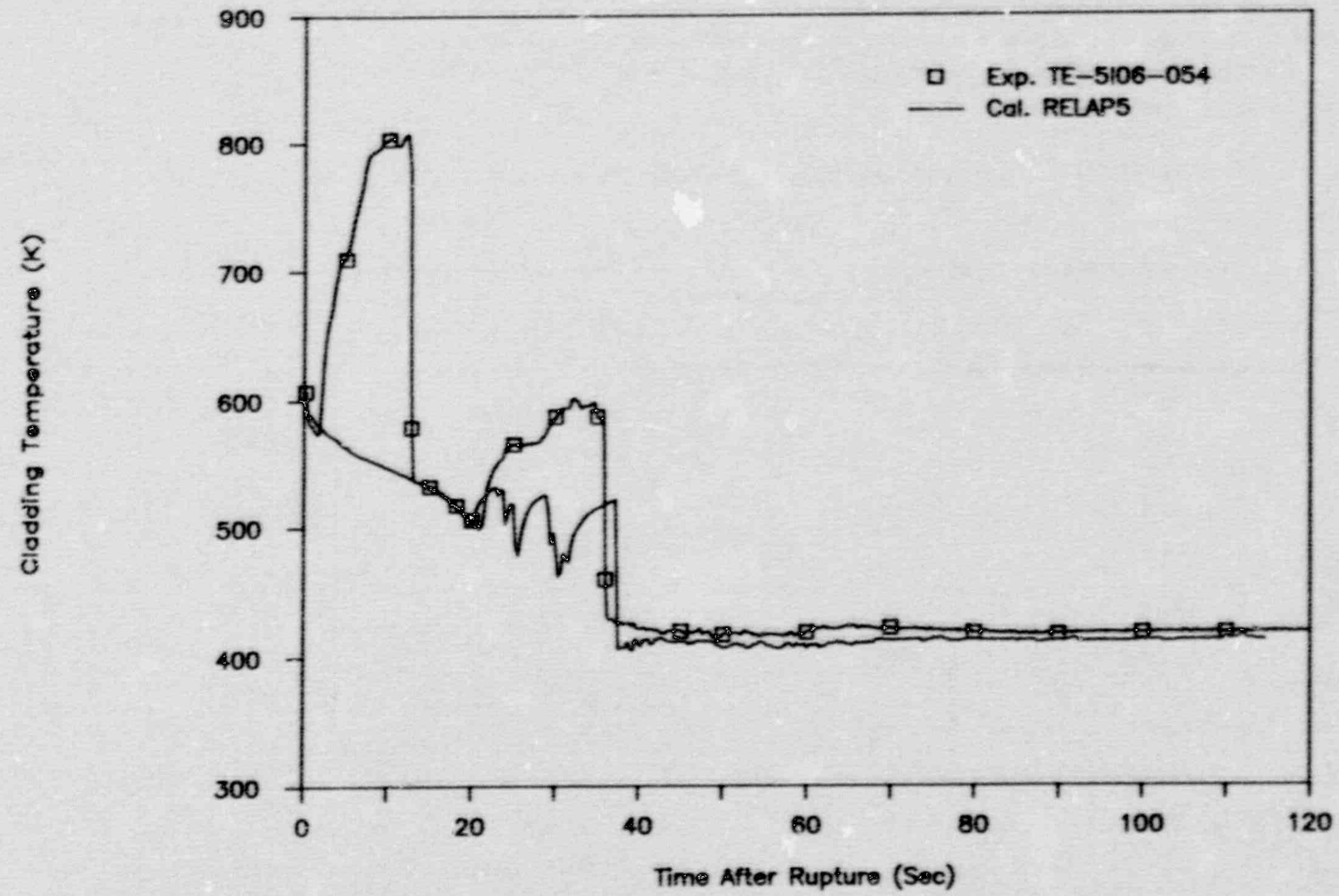


Fig.23 Comparison of cladding temperature at 54 inches of hot fuel between the base case calculation and the experiment

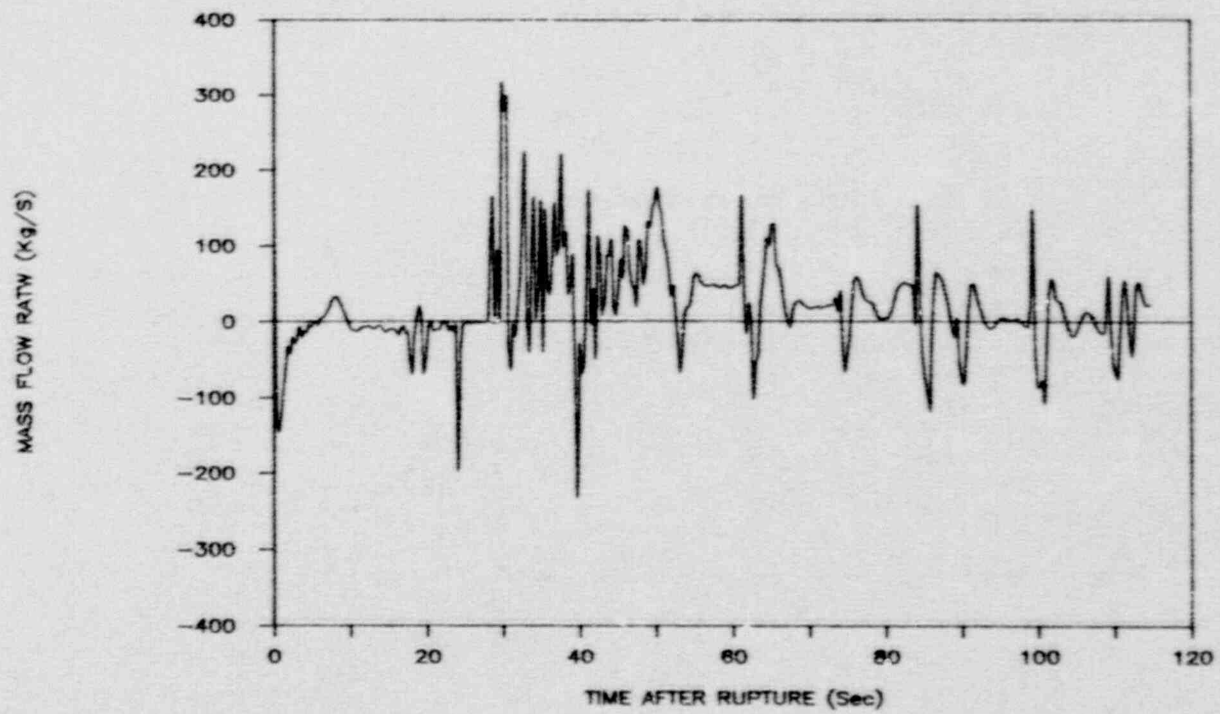


Fig.24 Mass flow rate at the inlet of intact side downcomer in base case

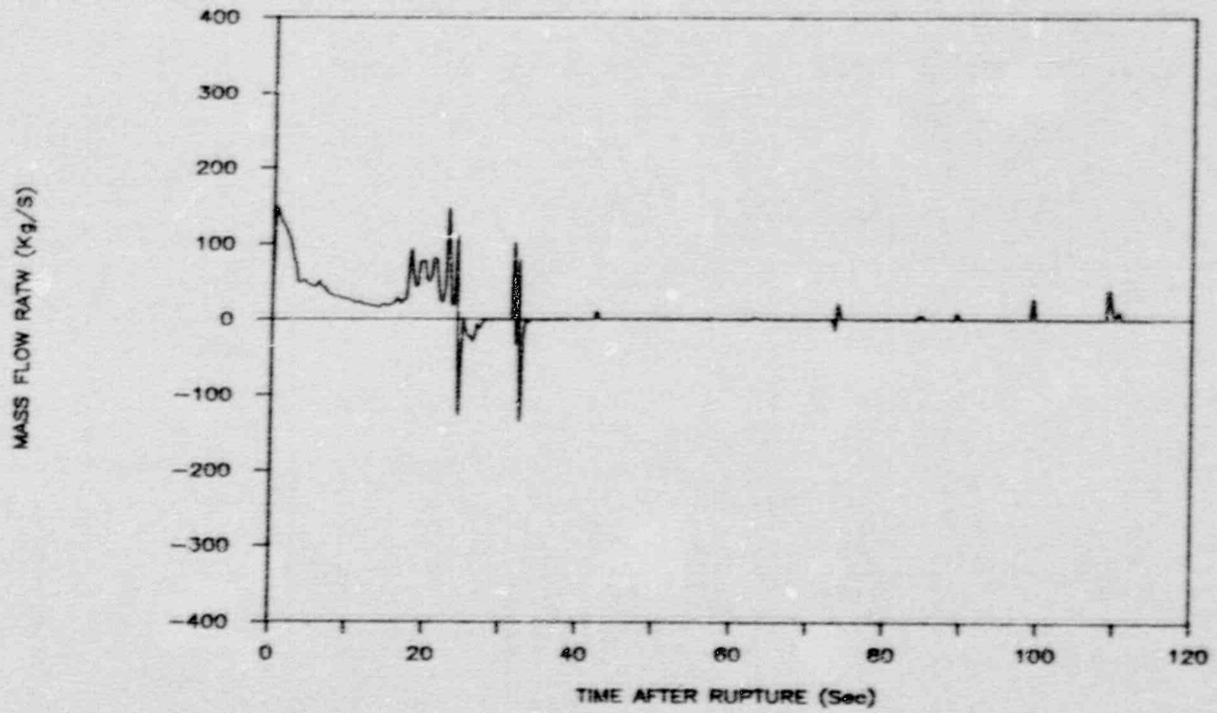


Fig.25 Mass flow rate at the inlet of intact side upper annulus in base case

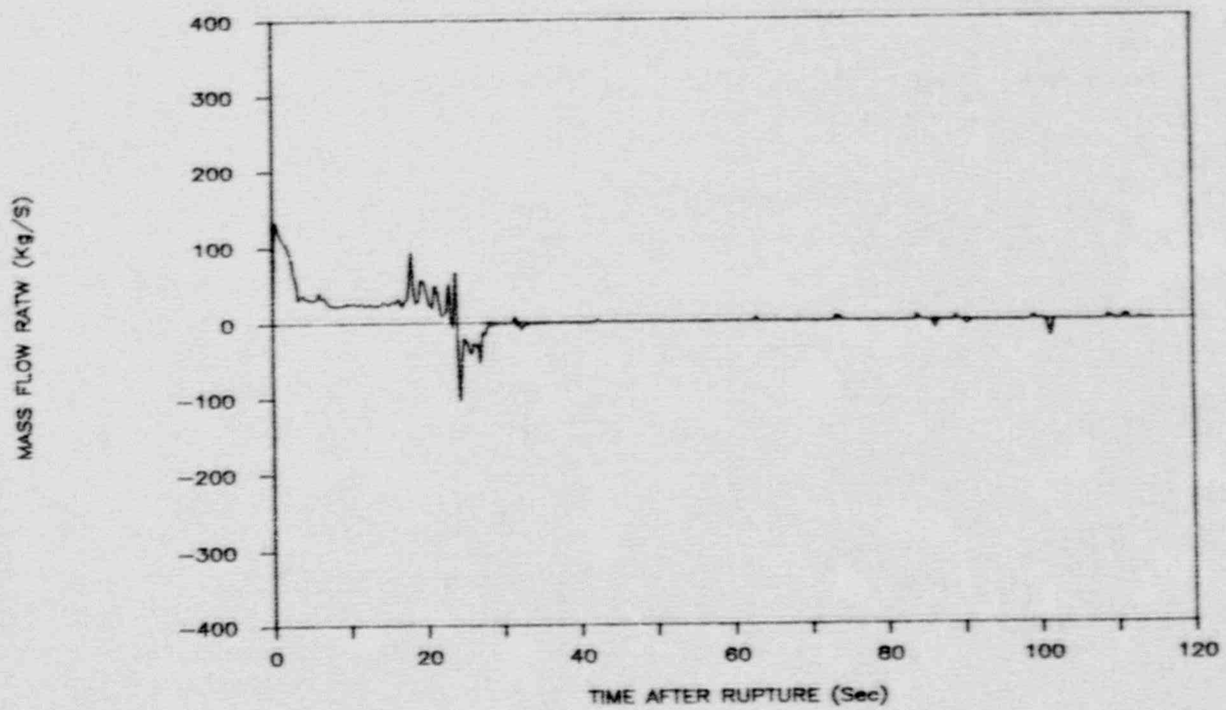


Fig.26 Mass flow rate at the bypass junction J722 in base case

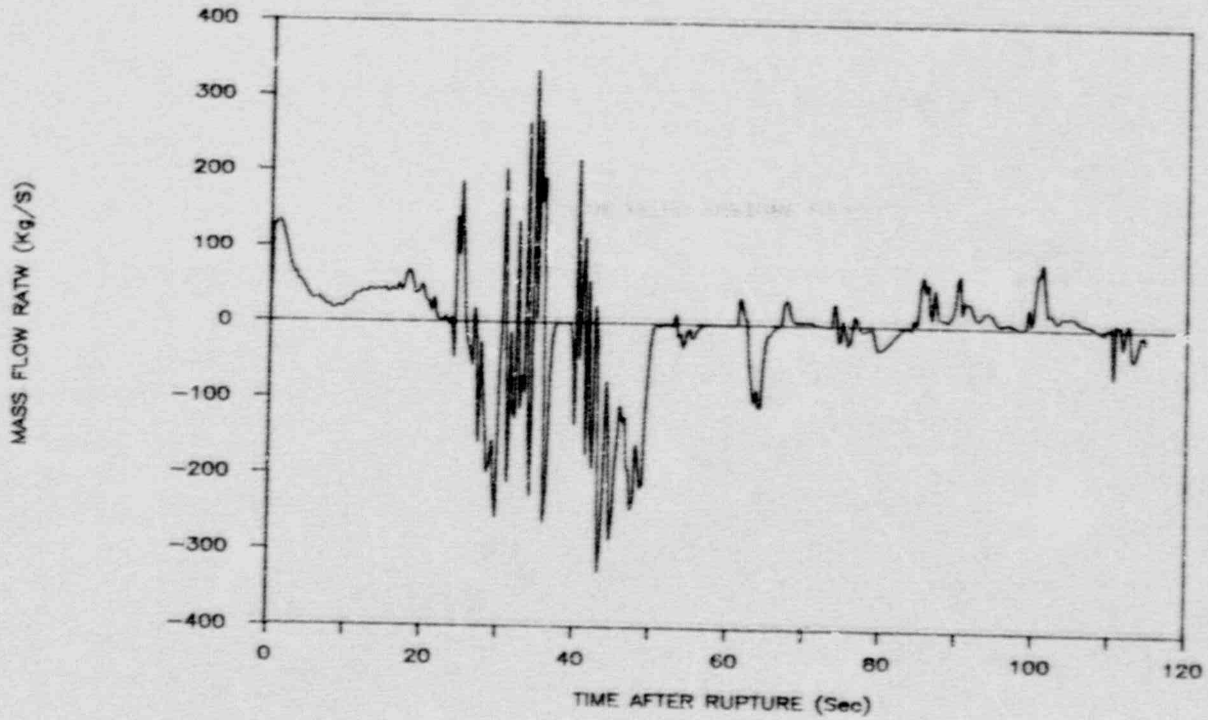


Fig.27 Mass flow rate at the bypass junction J724 in base case

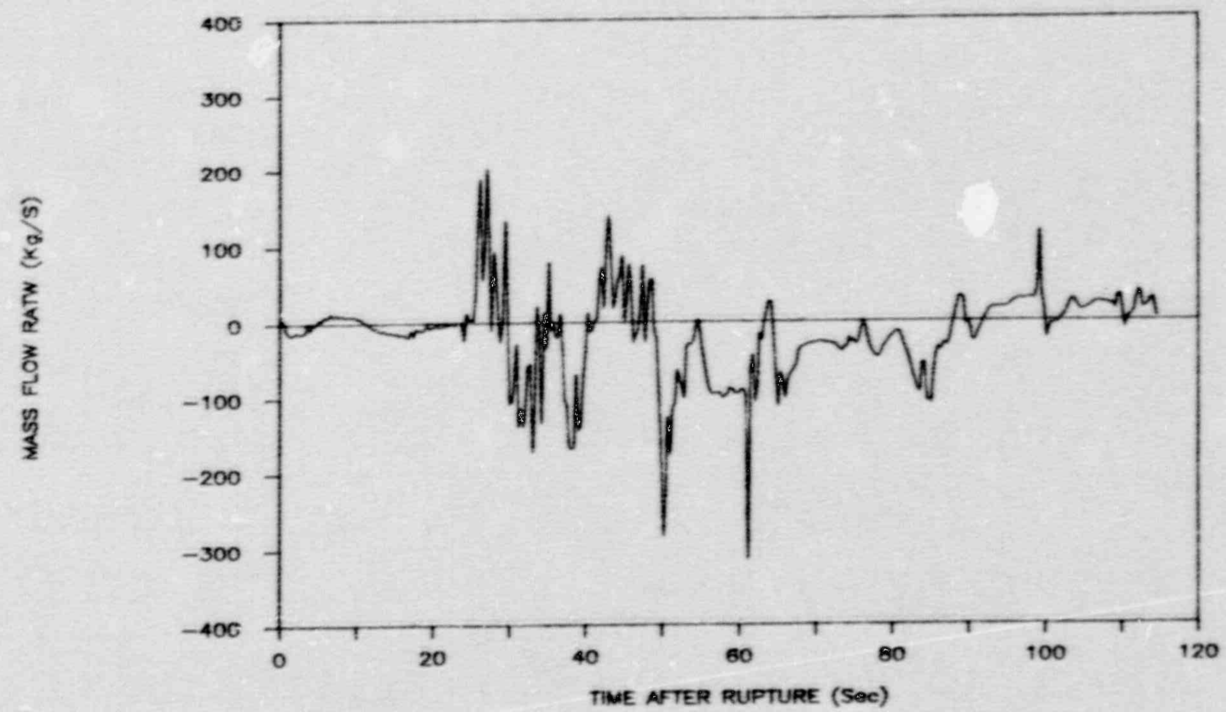


Fig.28 Mass flow rate at the bypass junction J726 in base case

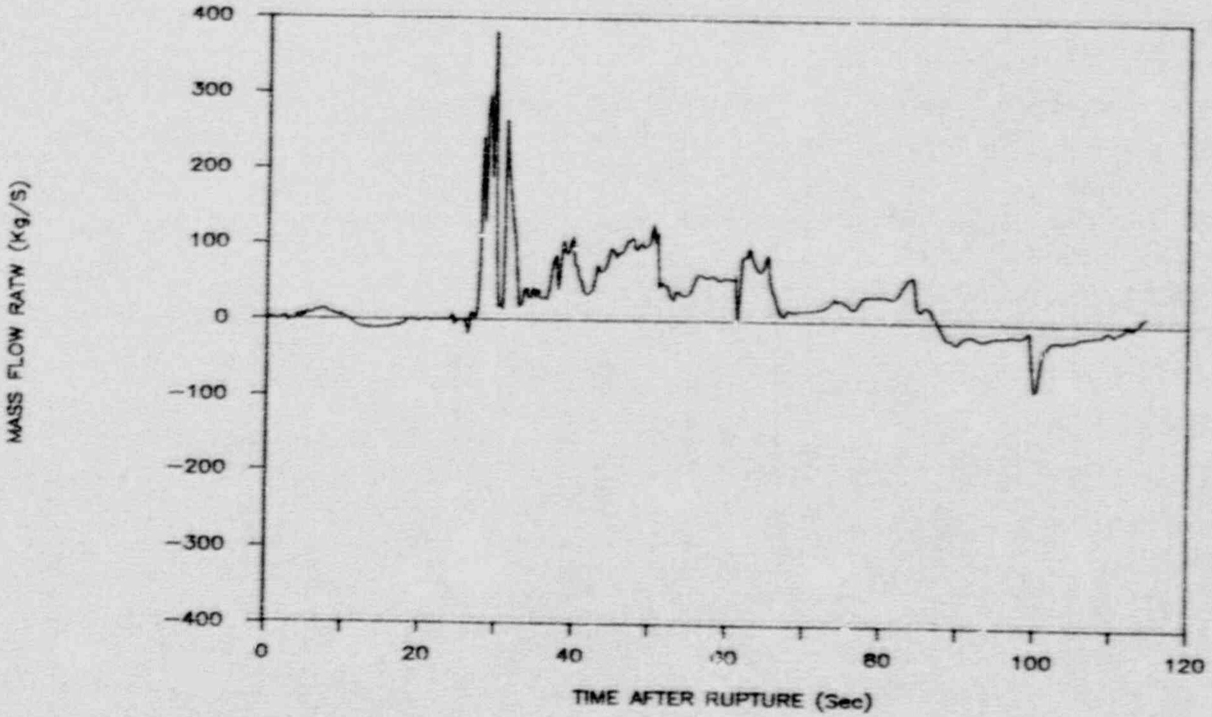


Fig.29 Mass flow rate at the bypass junction J728 in base case

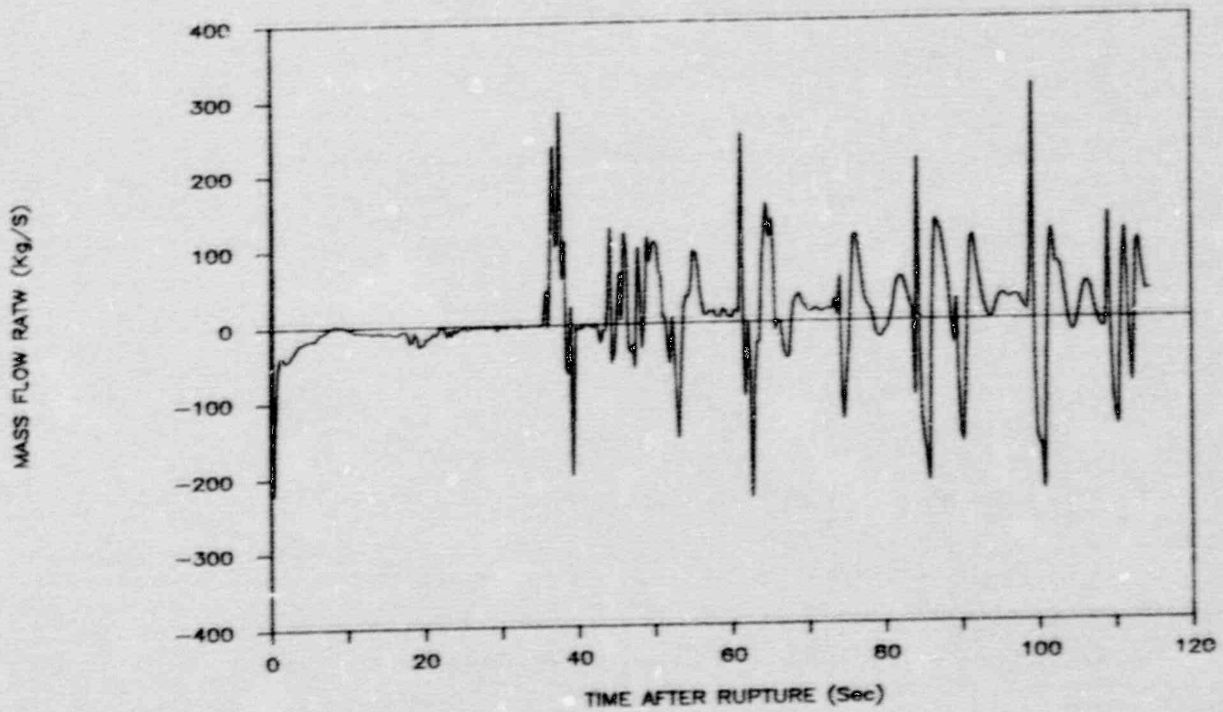


Fig.30 Mass flow rate to the core from the lower plenum in base case

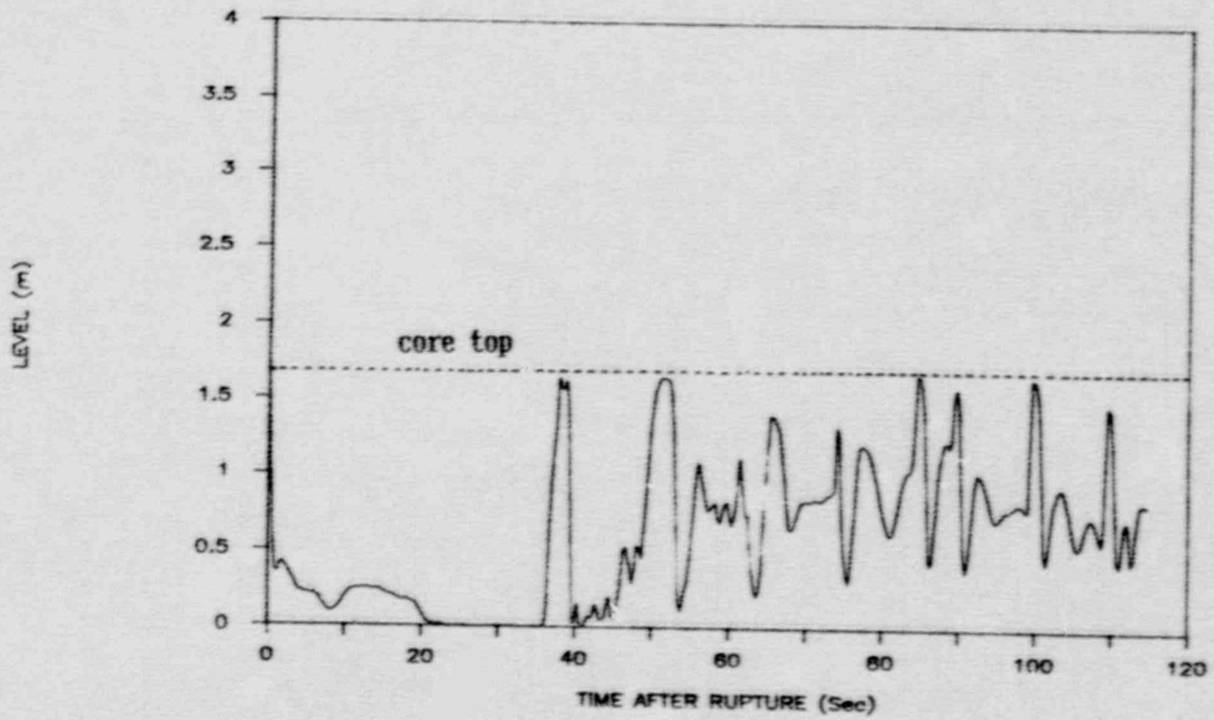
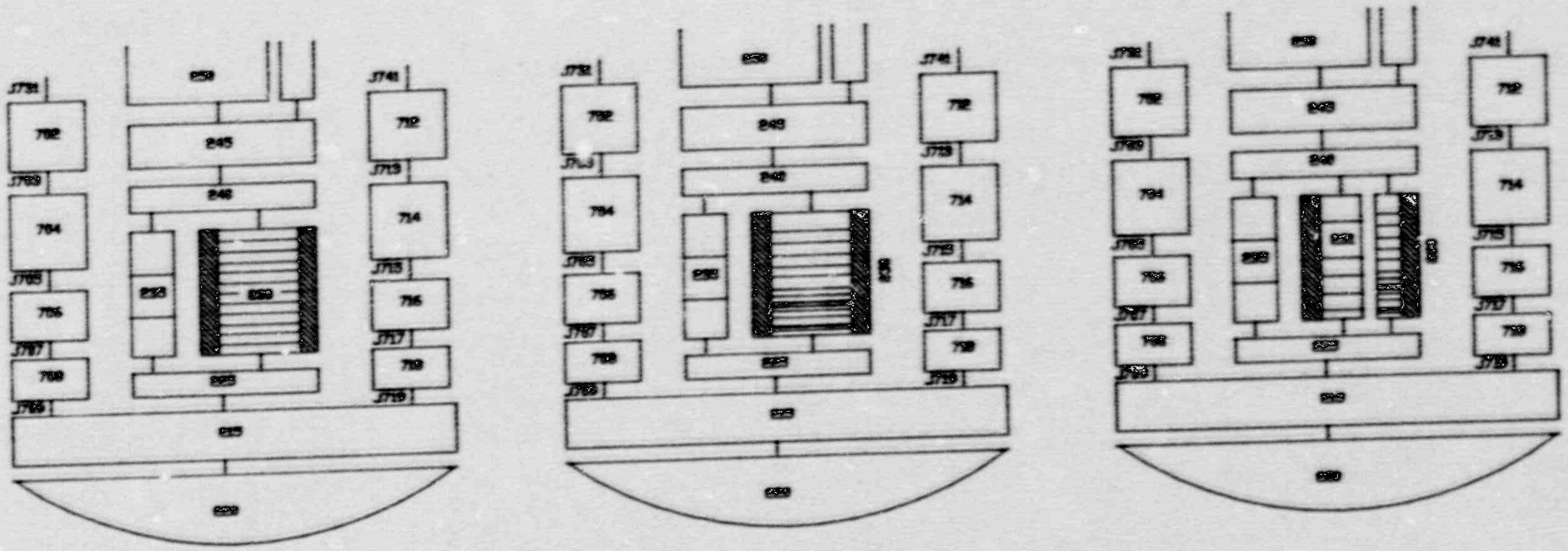


Fig.31 Collapsed liquid level in the core in base case



a) CASE A B) CASE B c) CASE C

Fig.32 Comparison of nodalization in the core for Case A, B and C

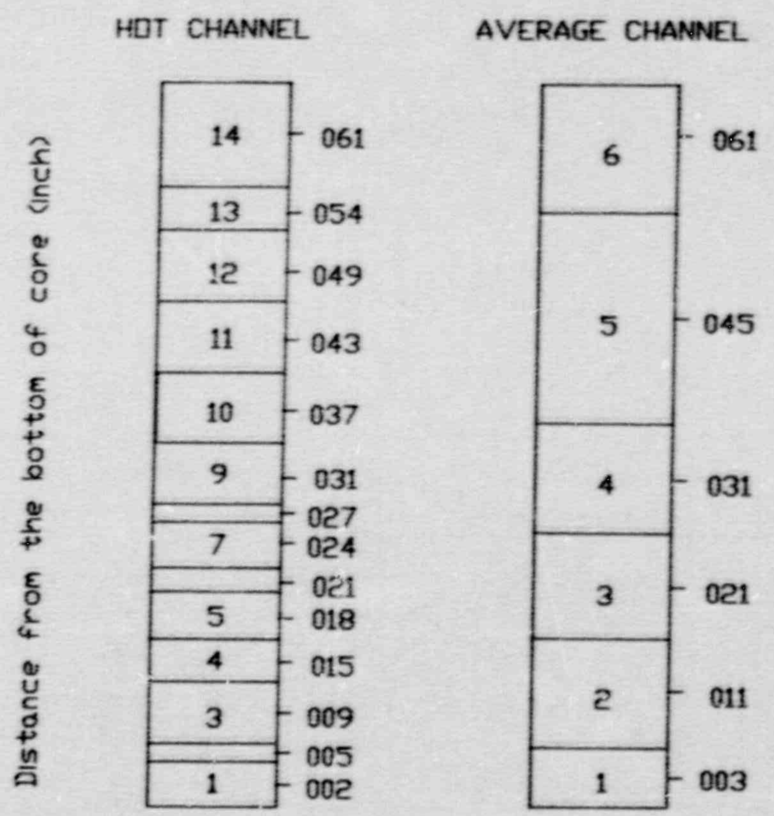


Fig.33 Discretization scheme of hot and average channel of the core

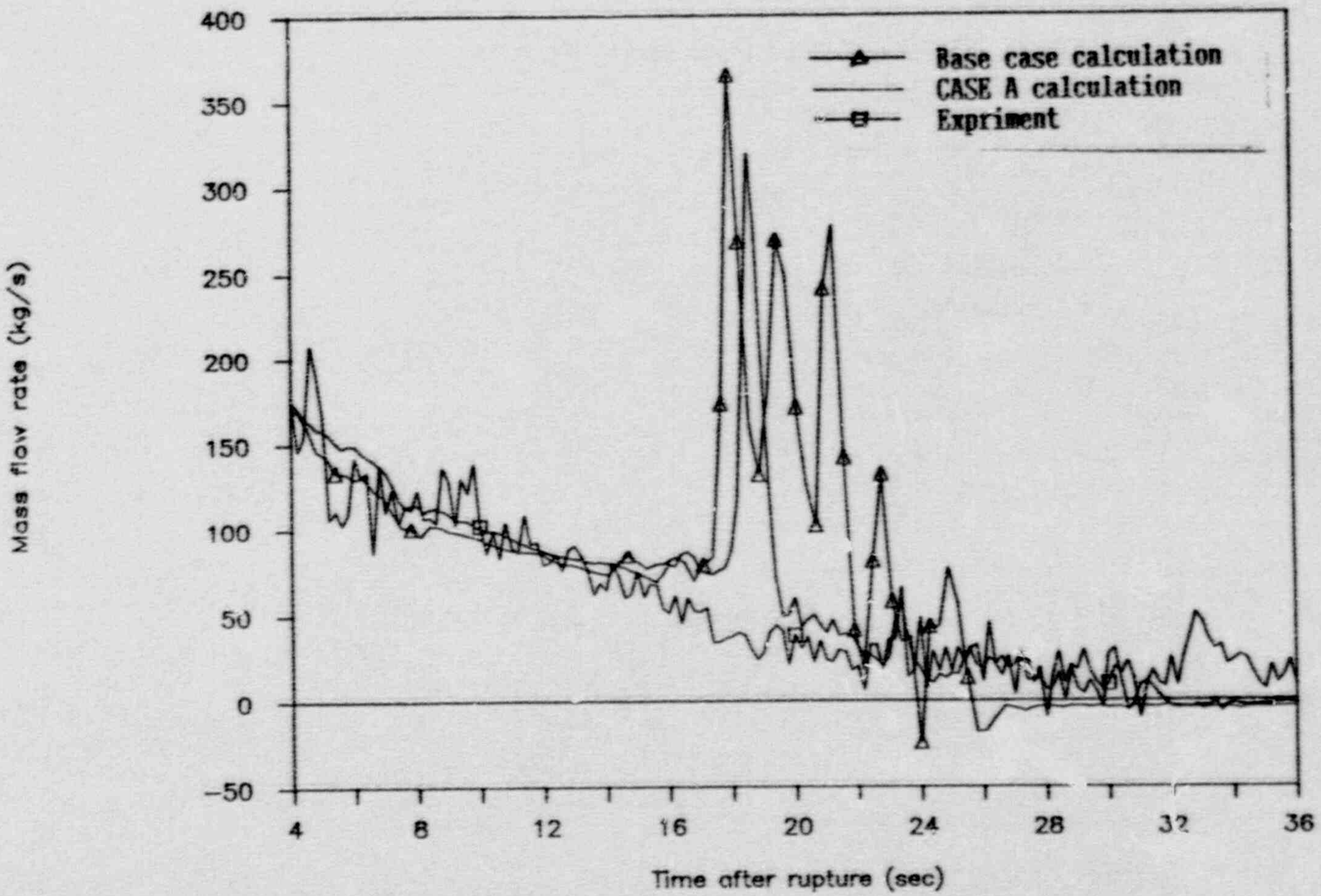


Fig.34 Comparison of mass flow rate at broken loop cold leg between base case and CASE A

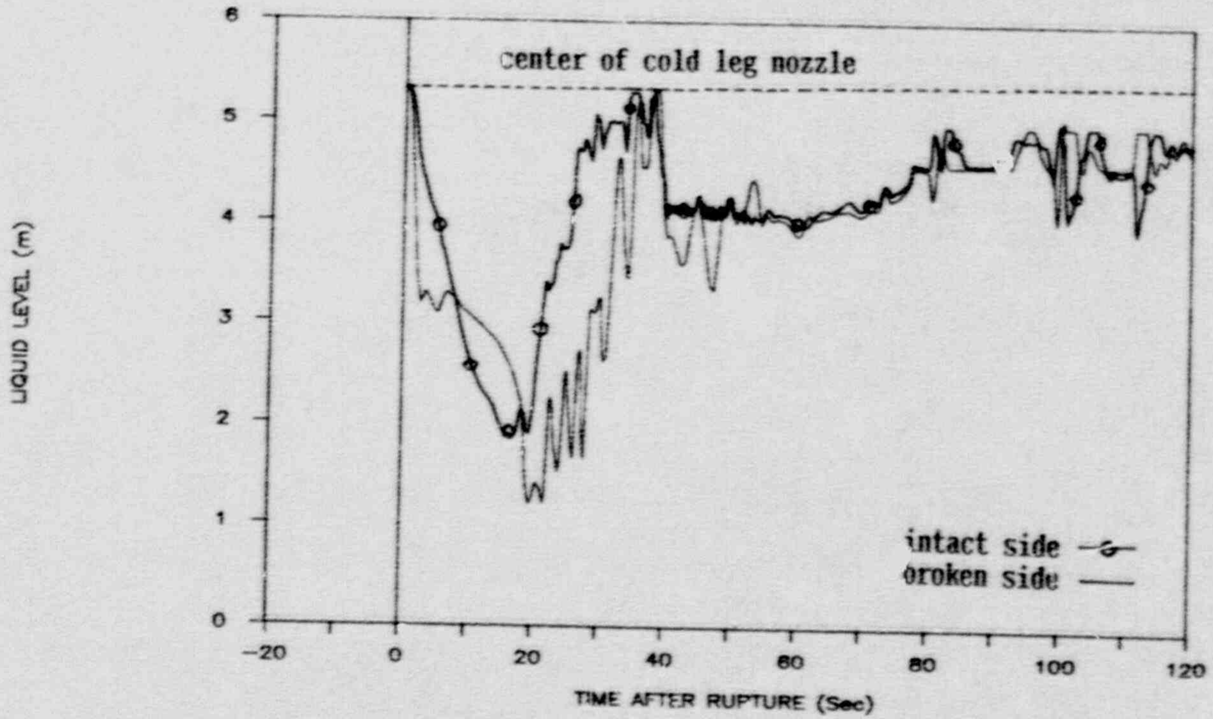


Fig.35 Collapsed liquid level of the downcomer in CASE A

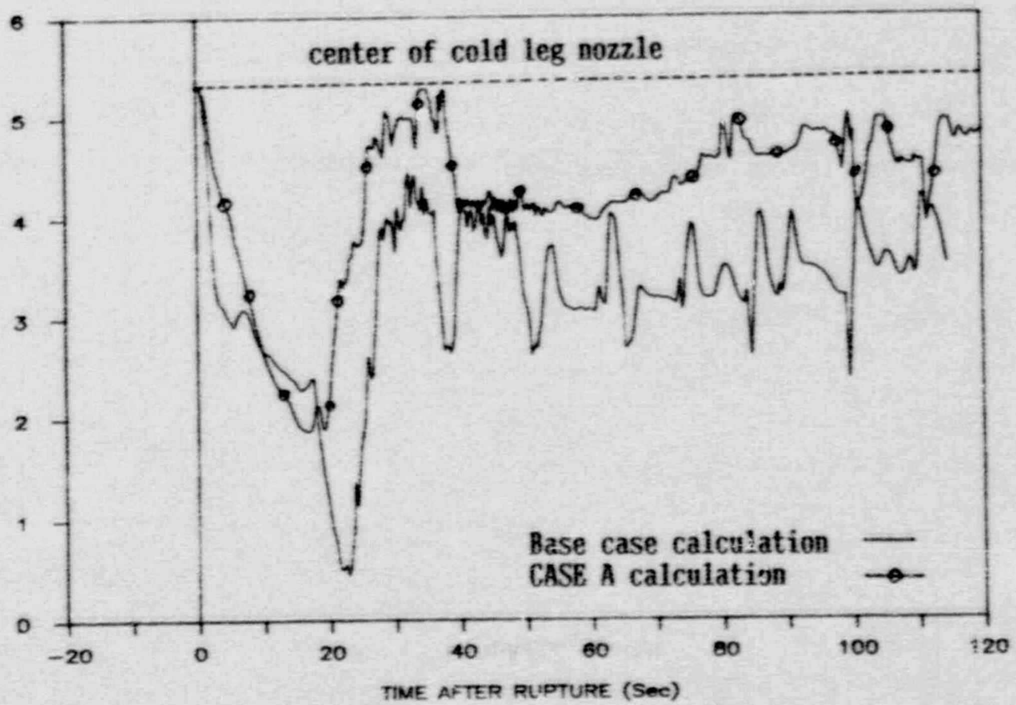


Fig.36 Comparison of liquid level in the intact side downcomer between base case and CASE A

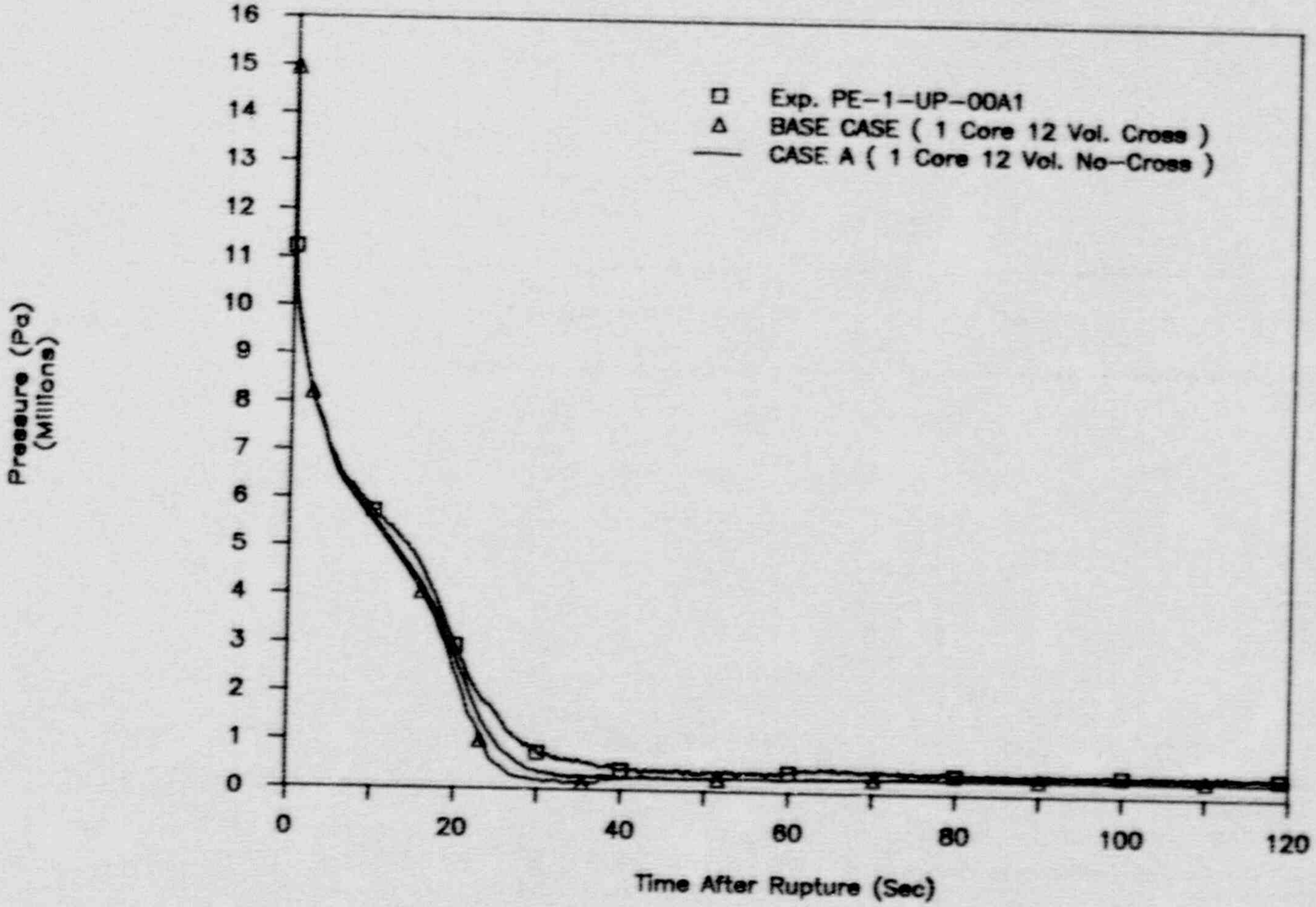


Fig.37 Comparison of primary system pressure between base case and CASE A

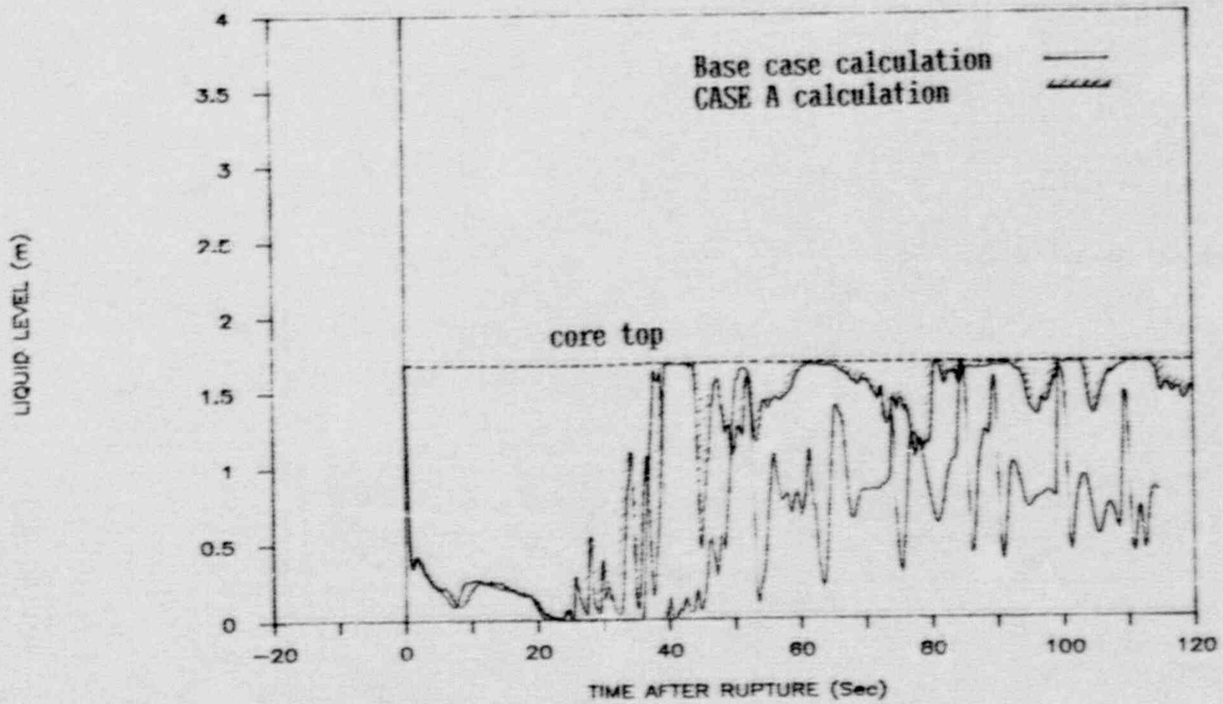


Fig.38 Comparison of liquid level in the core between base case and CASE A

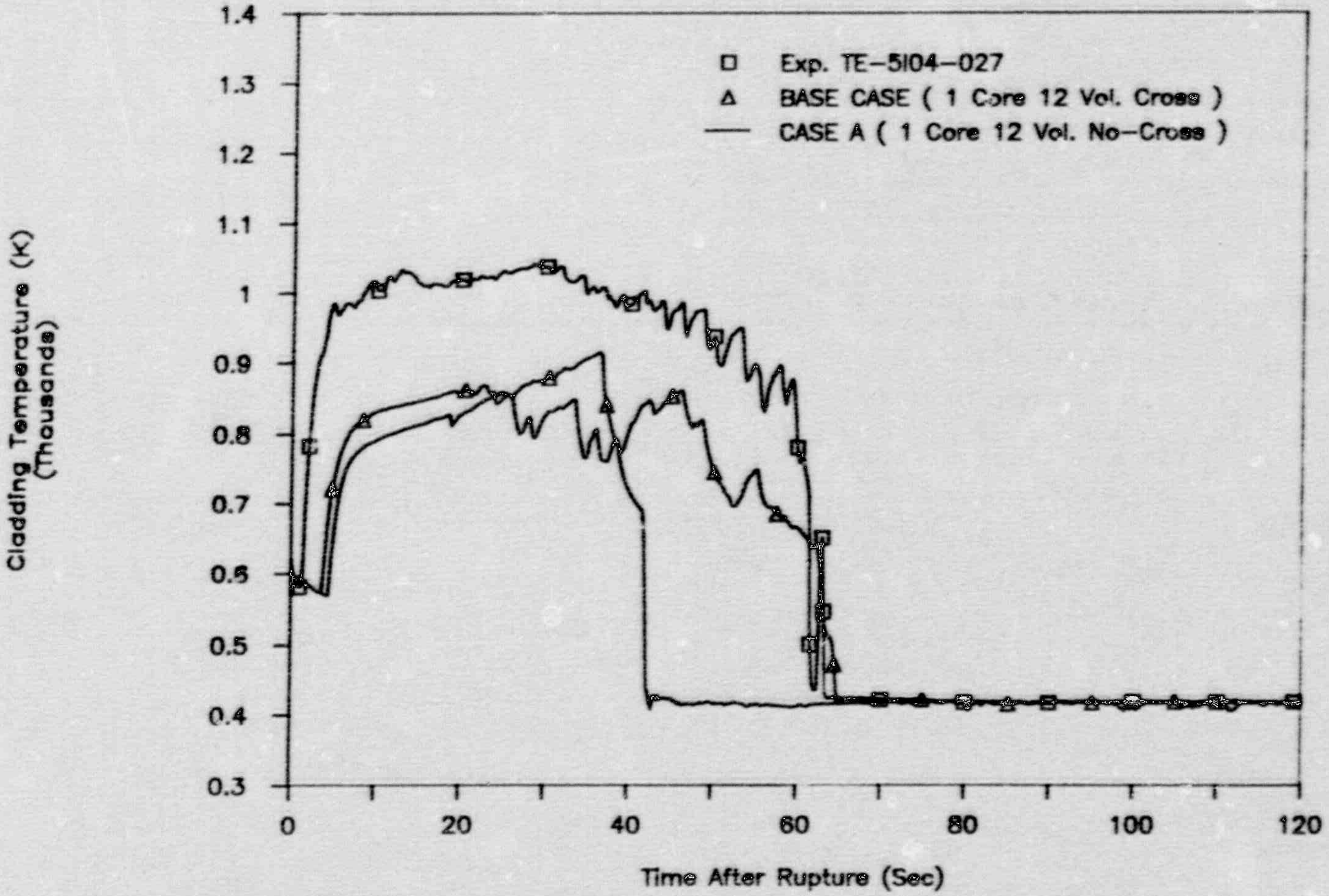


Fig.39 Comparison of cladding temperature at 27 inches of hot fuel between base case and CASE A

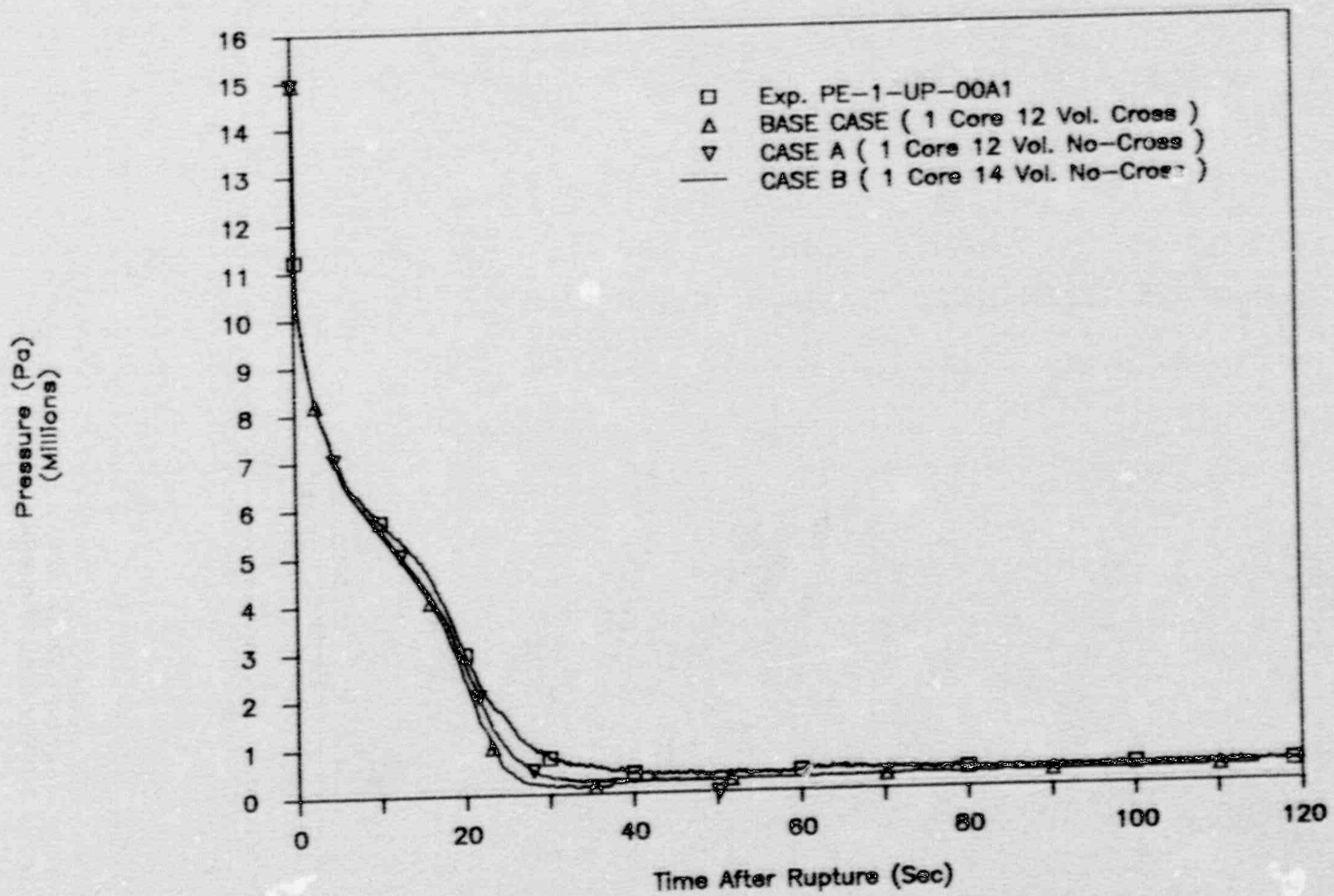


Fig.40 Comparison of primary system pressure in base case, CASE A and CASE B

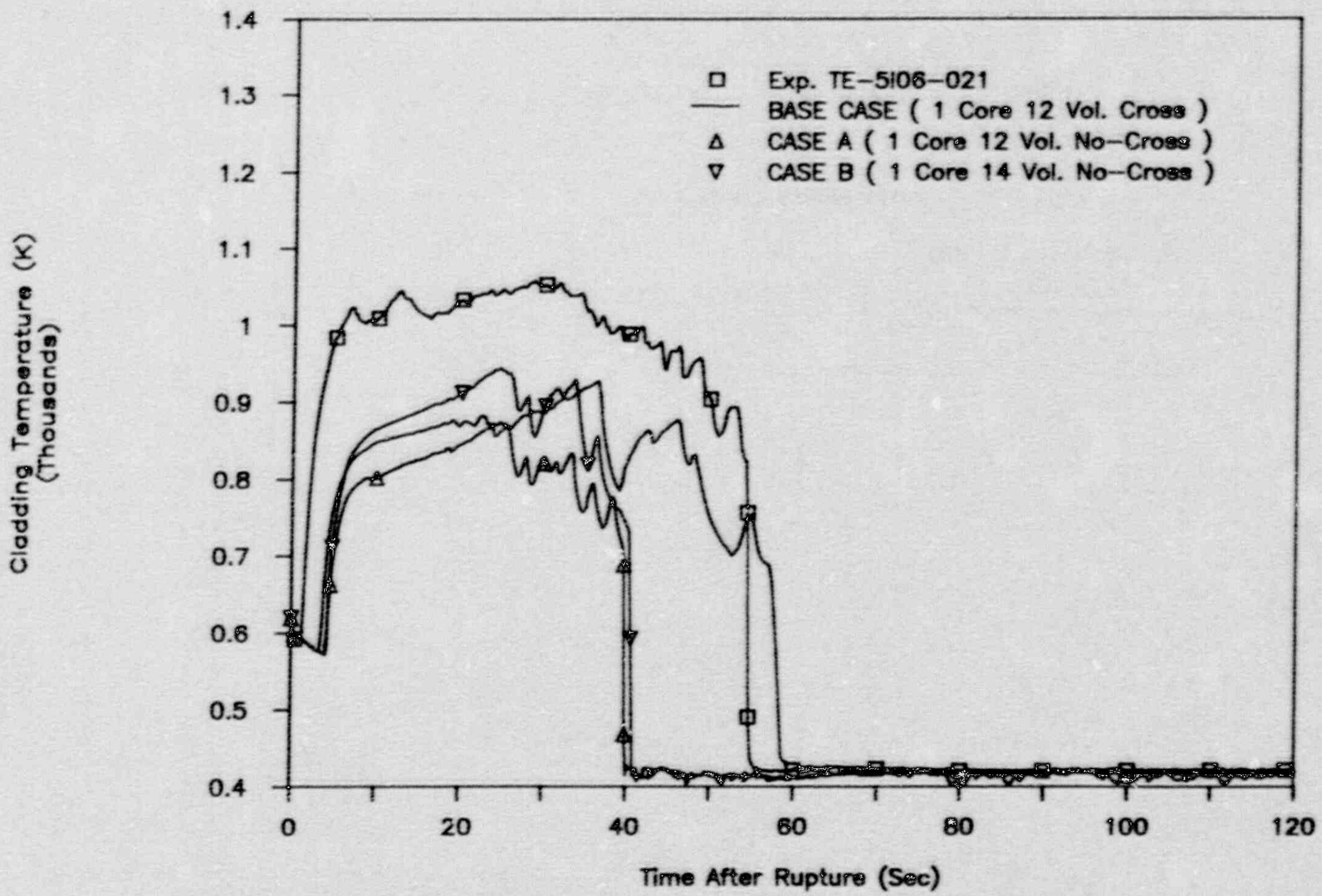


Fig.41 Comparison of cladding temperature at 21 inches of hot fuel in base case, CASE A and CASE B

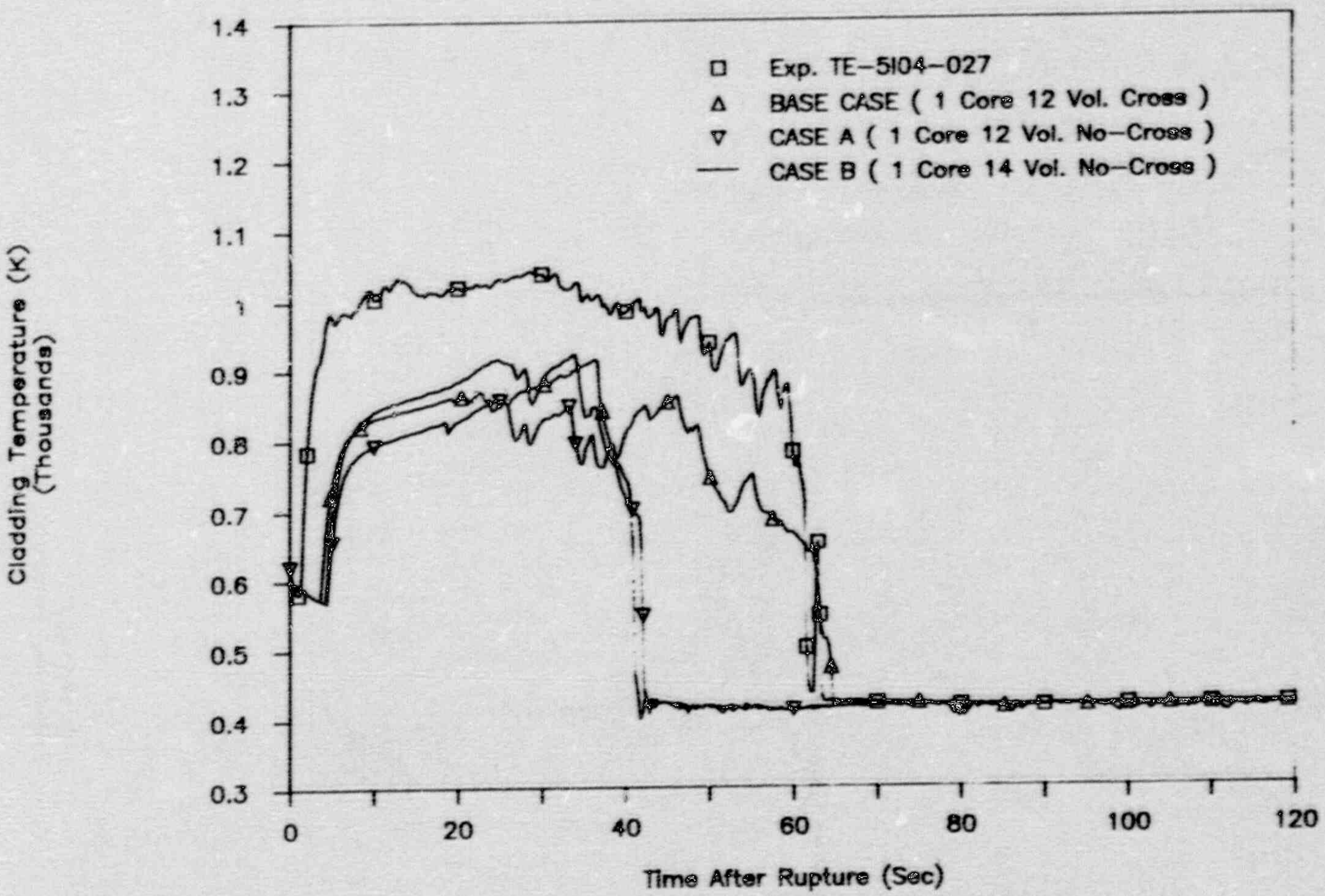


Fig.42 Comparison of cladding temperature at 27 inches of hot fuel in base case, CASE A and CASE B

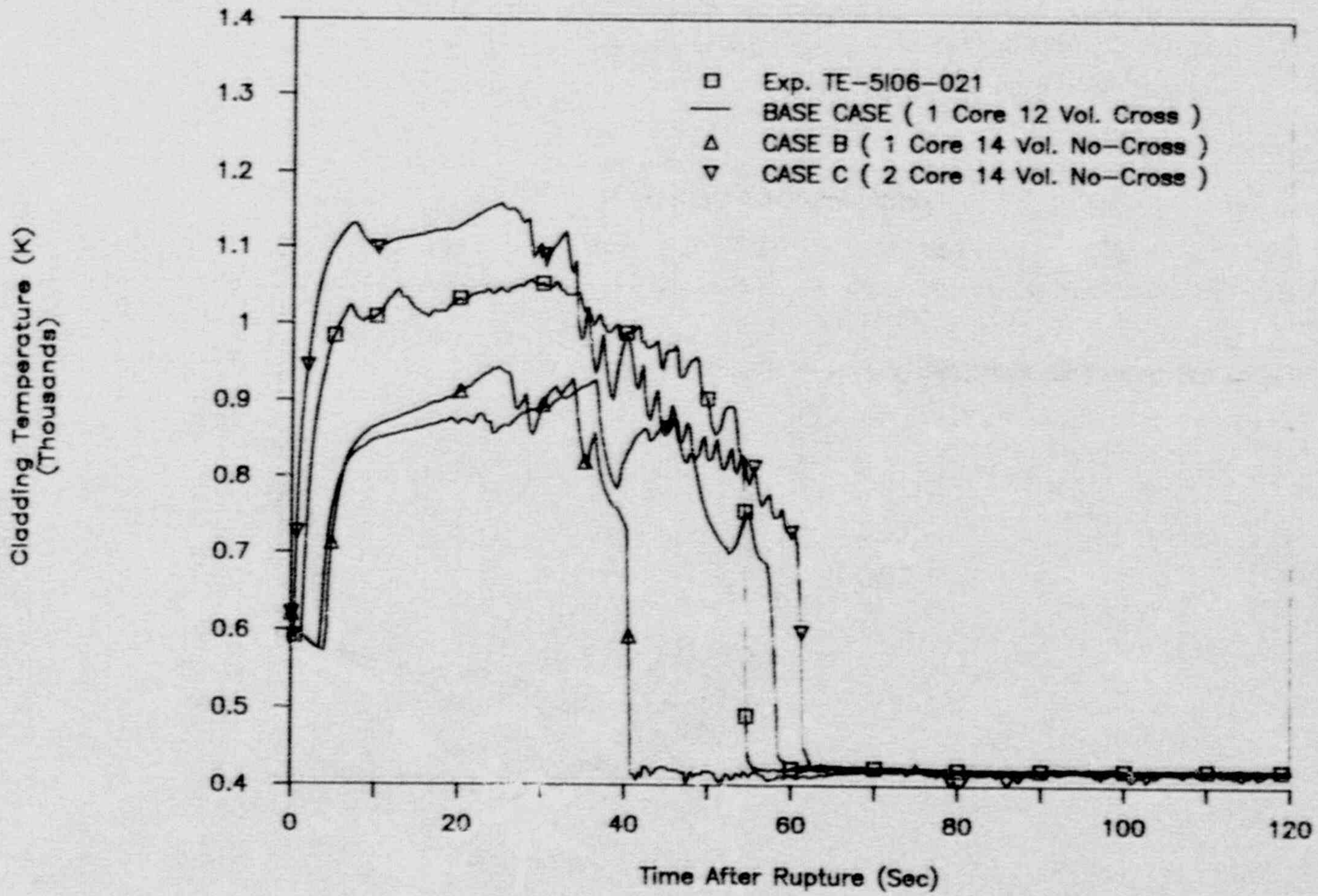


Fig.43 Comparison of cladding temperature at 21 inches of hot fuel in base case, CASE B and CASE C

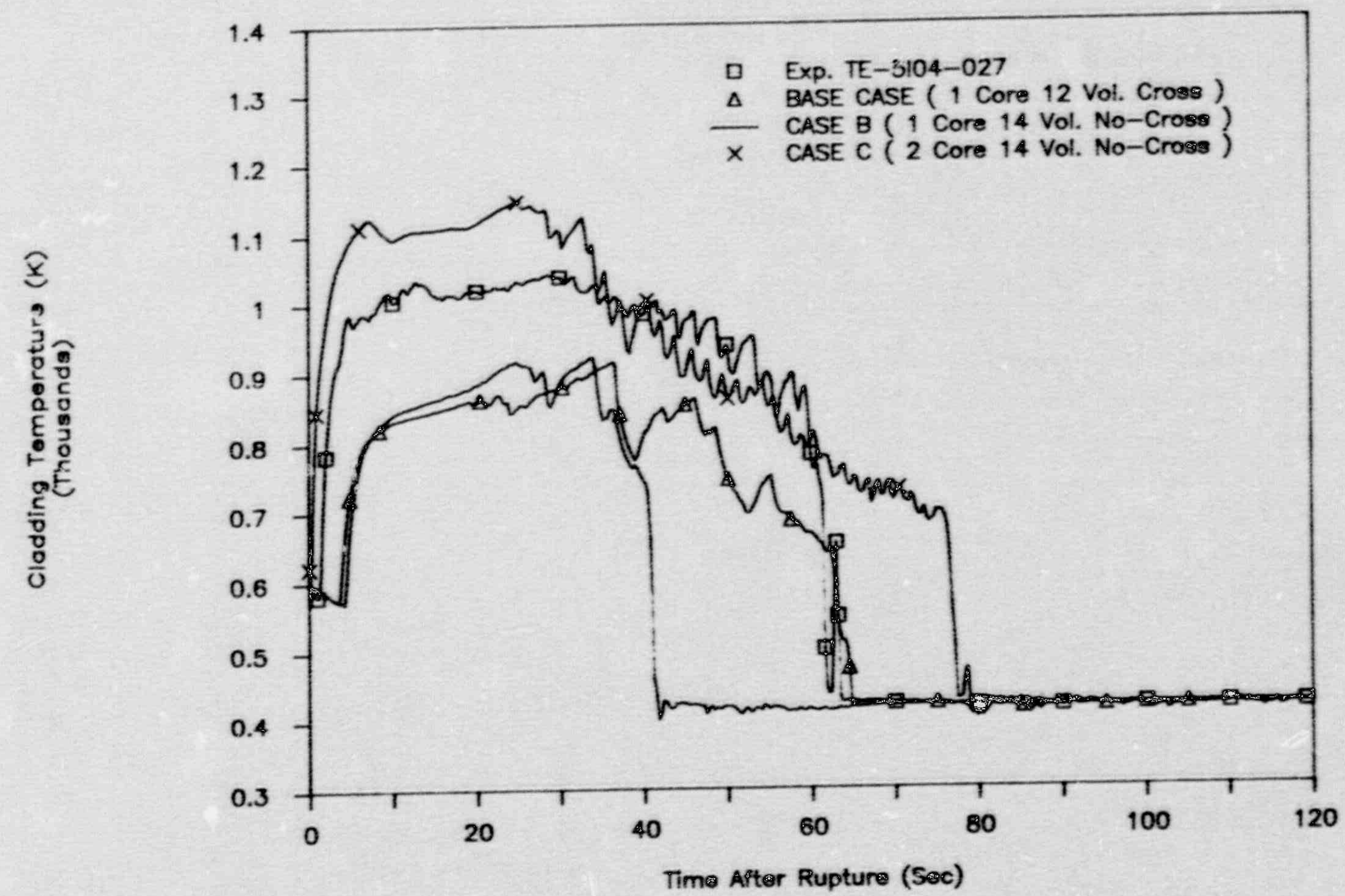


Fig.44 Comparison of cladding temperature at 27 inches of hot fuel in base case, CASE B and CASE C

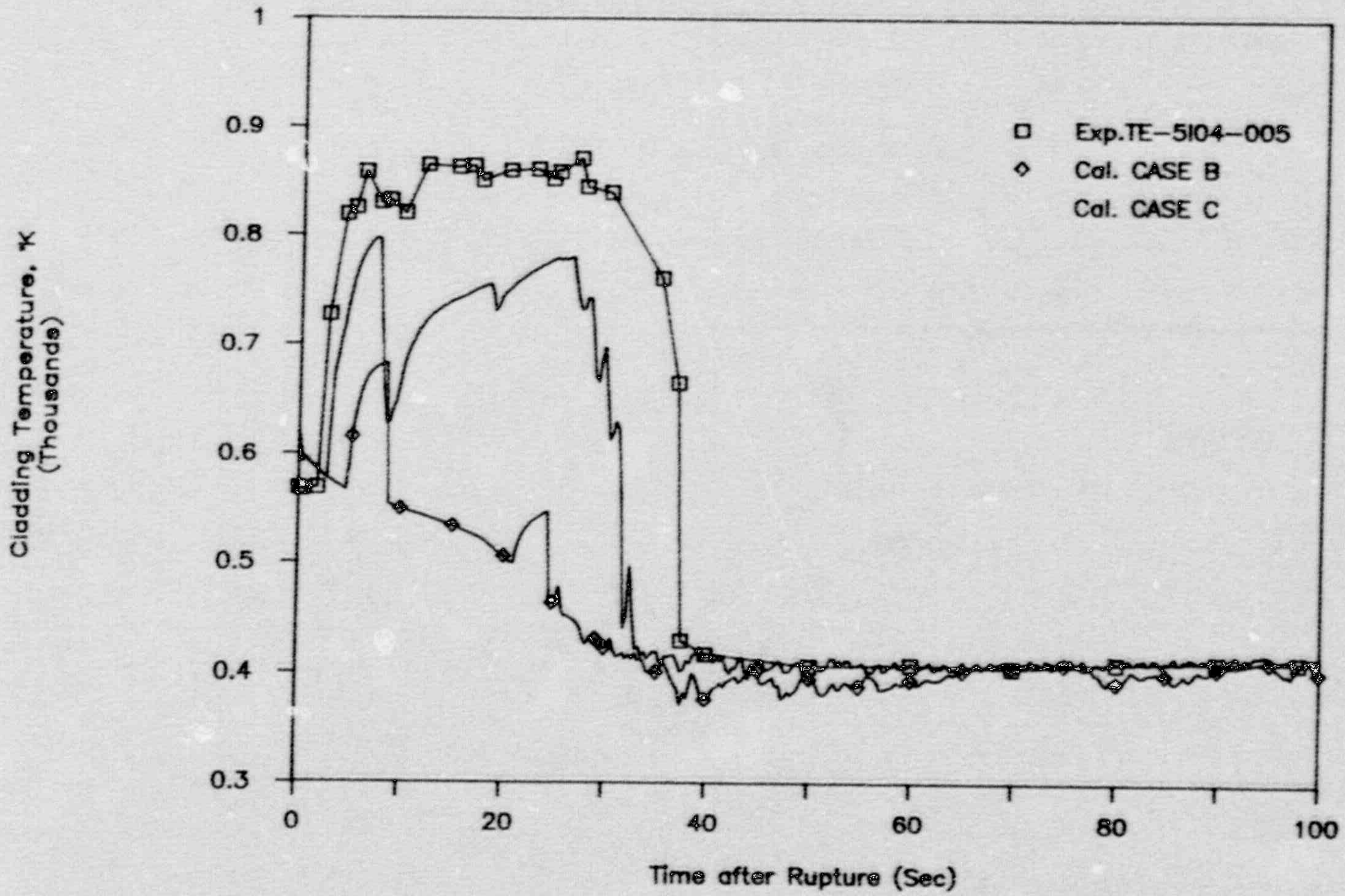


Fig.45 Comparison of cladding temperature at 5 inches of hot fuel in base case, CASE B and CASE C

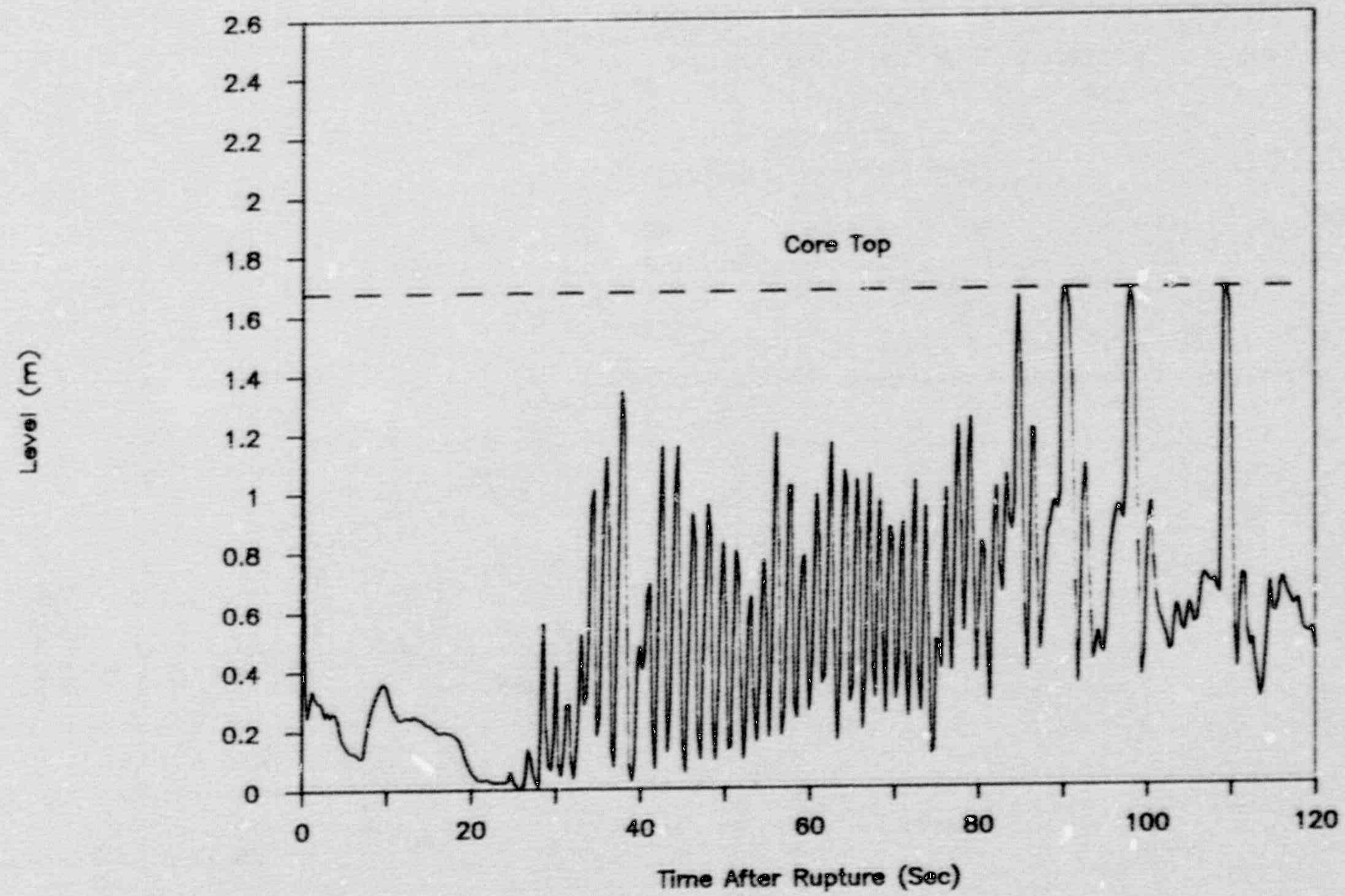


Fig.46 Collapsed liquid level in the hot channel of core in CASE C

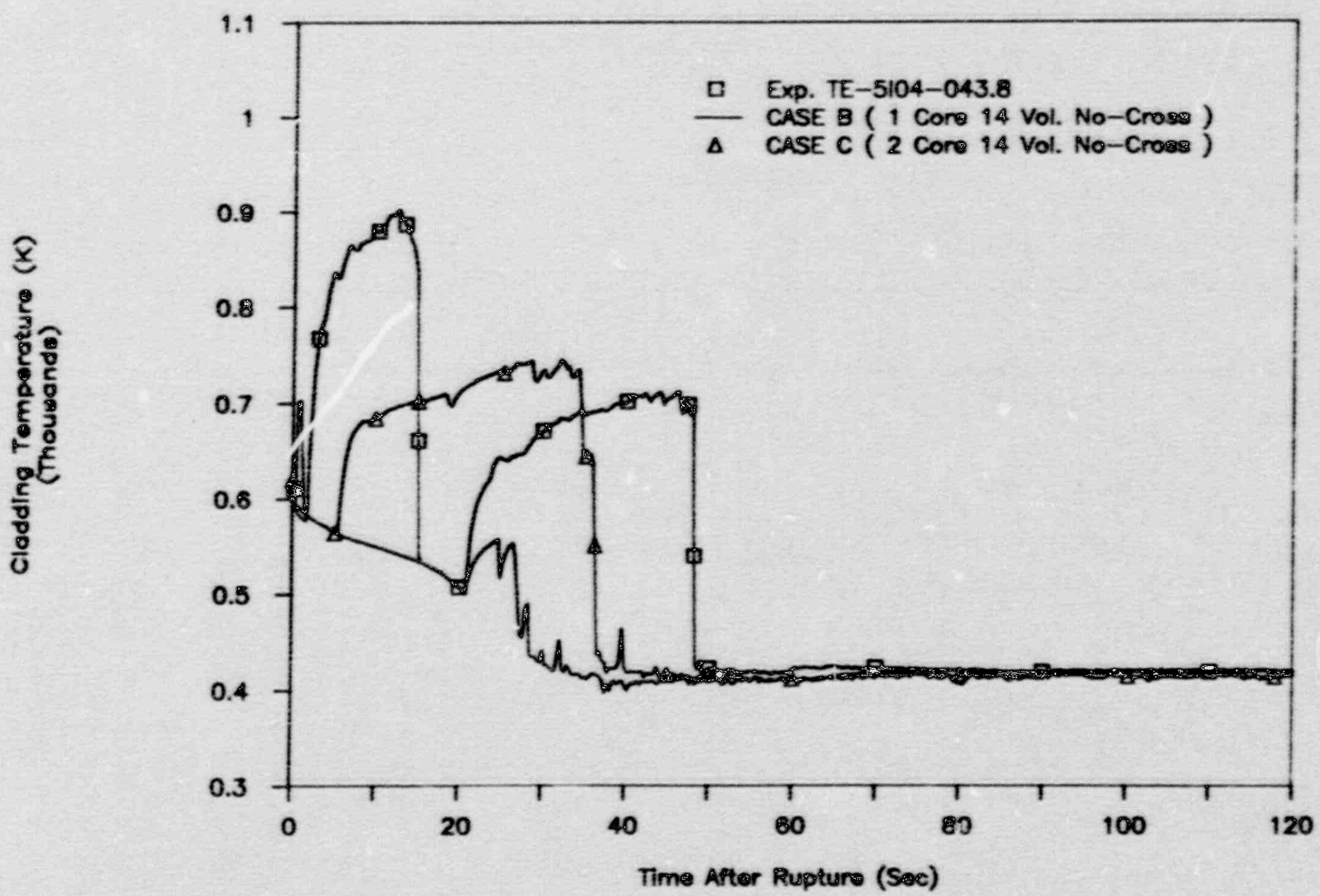


Fig.47 Comparison of cladding temperature at 43.8 inches of hot fuel between CASE B and CASE C

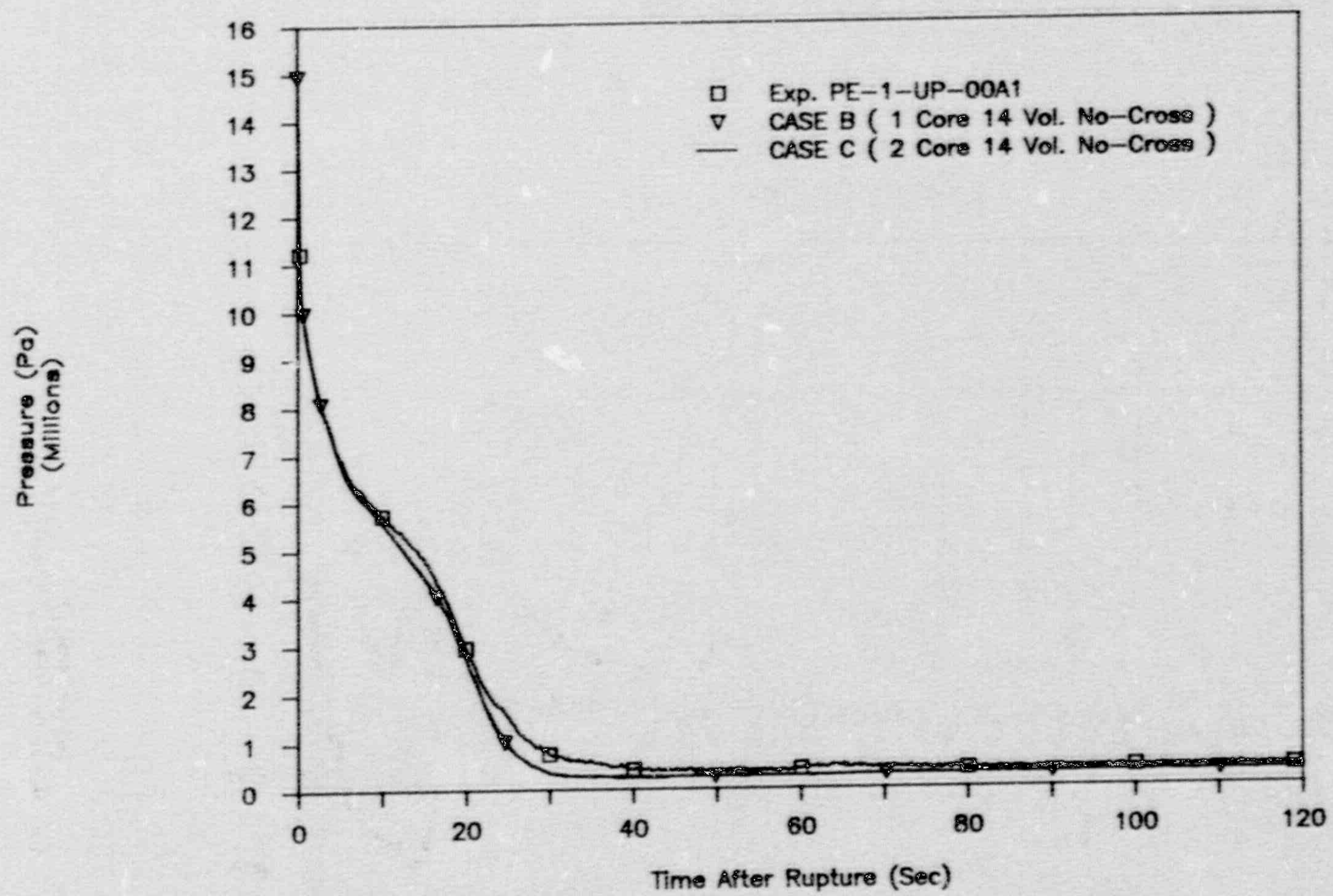


Fig.48 Comparison of primary system pressure between CASE B and CASE C

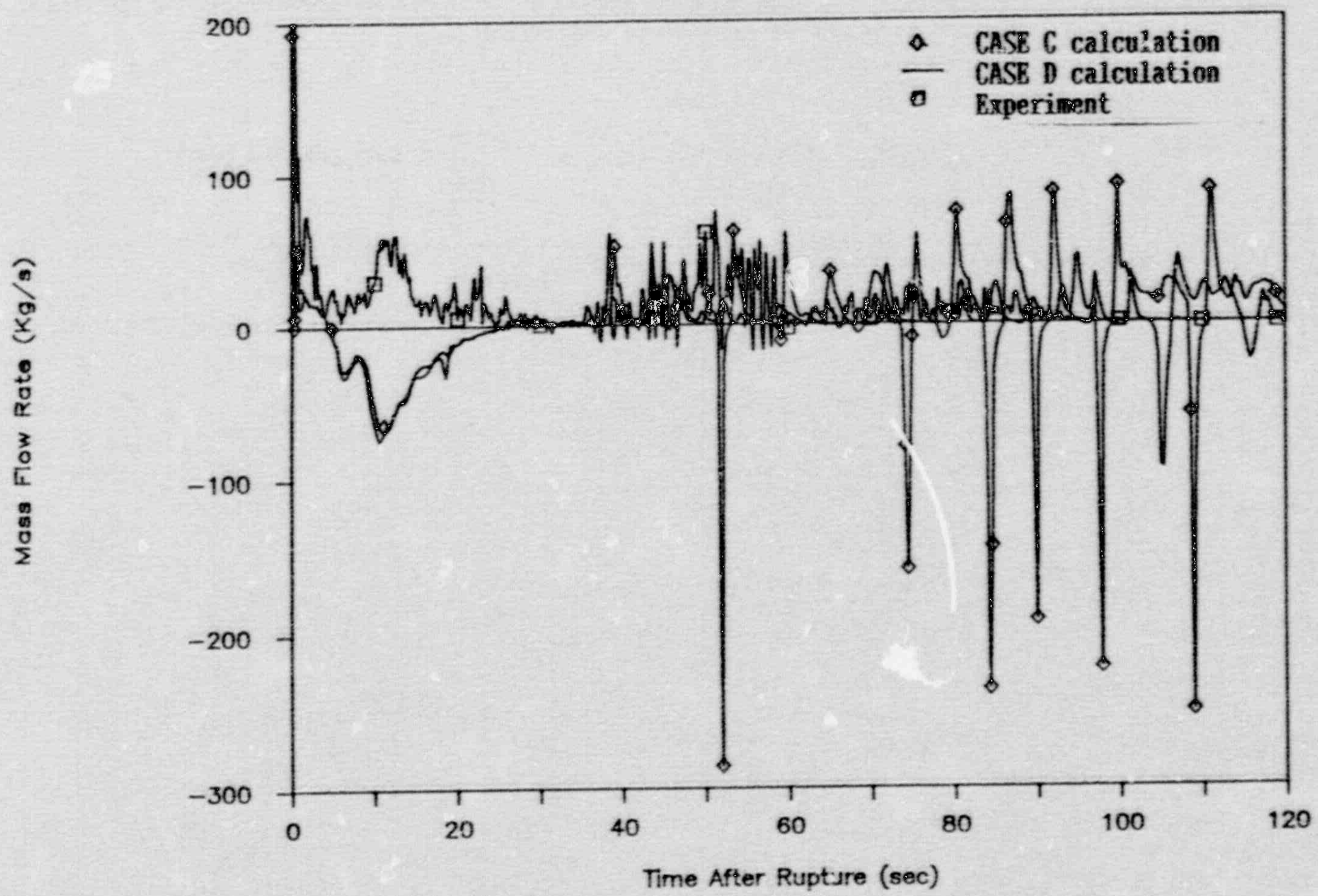


Fig.49 Comparison of mass flow rate at intact loop hot leg between CASE C and CASE D

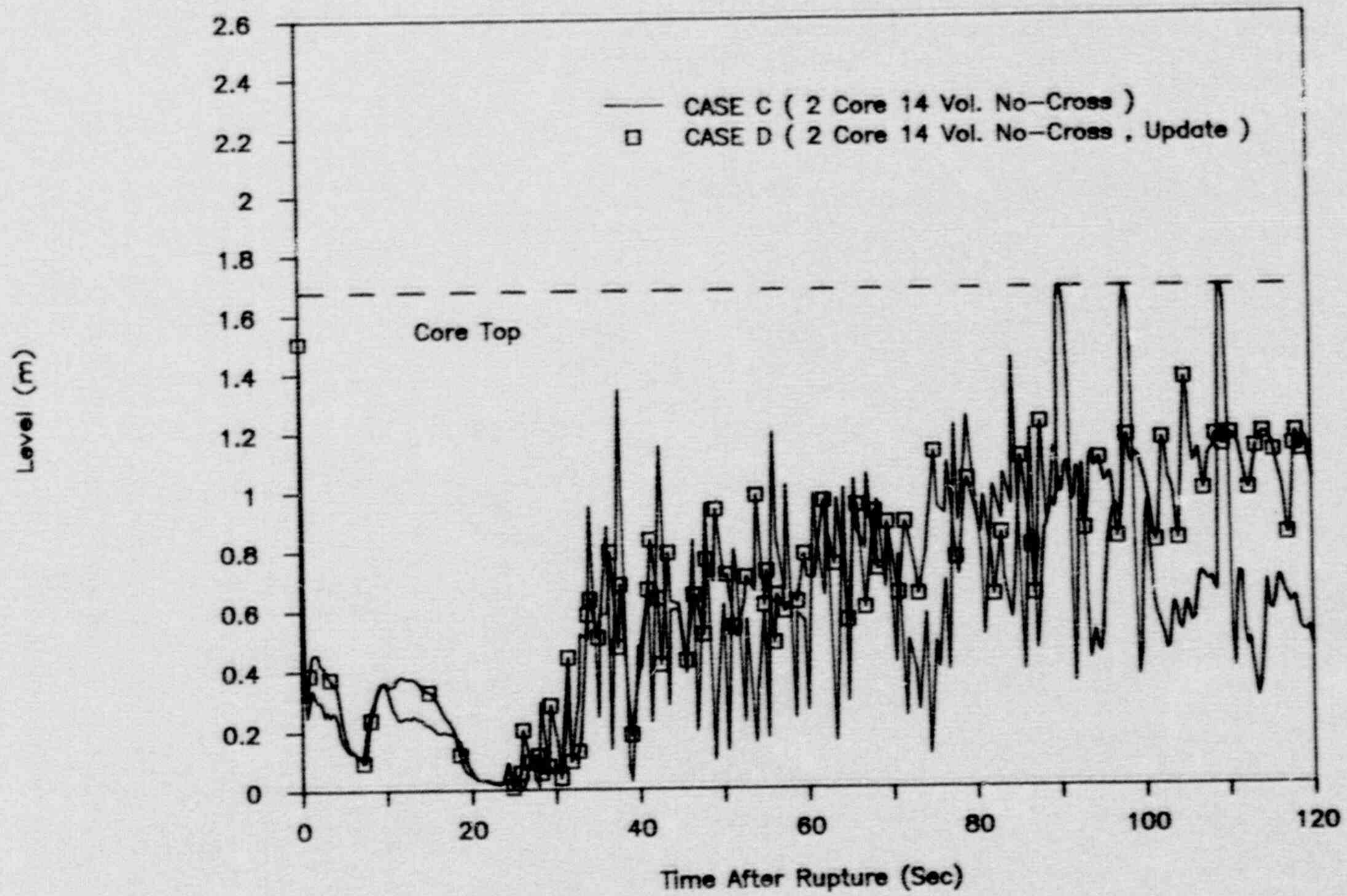


Fig.50 Comparison of liquid level in the hot channel of core between CASE C and CASE D

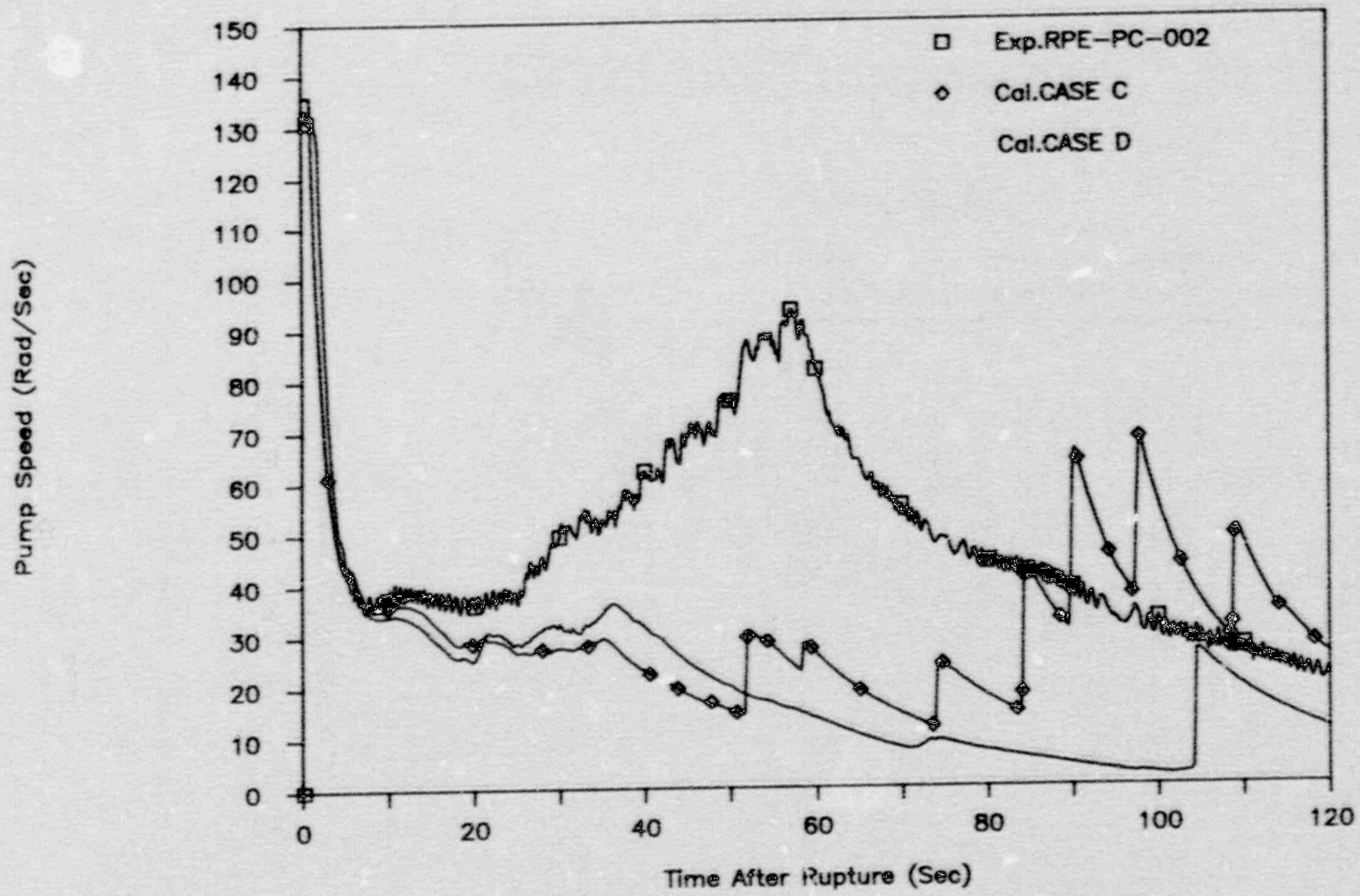


Fig.51 Comparison of primary coolant pump velocity between CASE C and CASE D

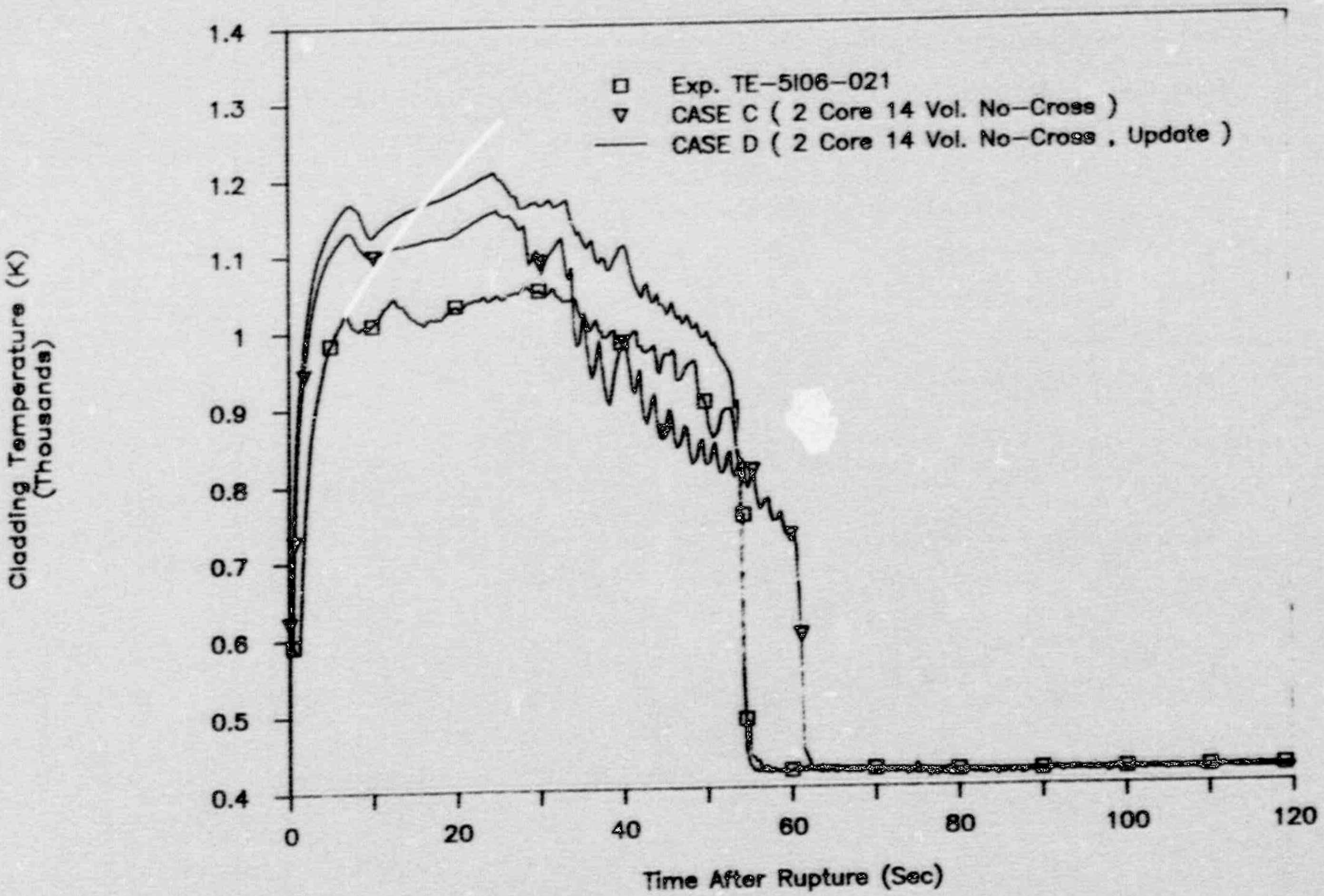


Fig.52 Comparison of cladding temperature at 21 inches of hot fuel between CASE C and CASE D

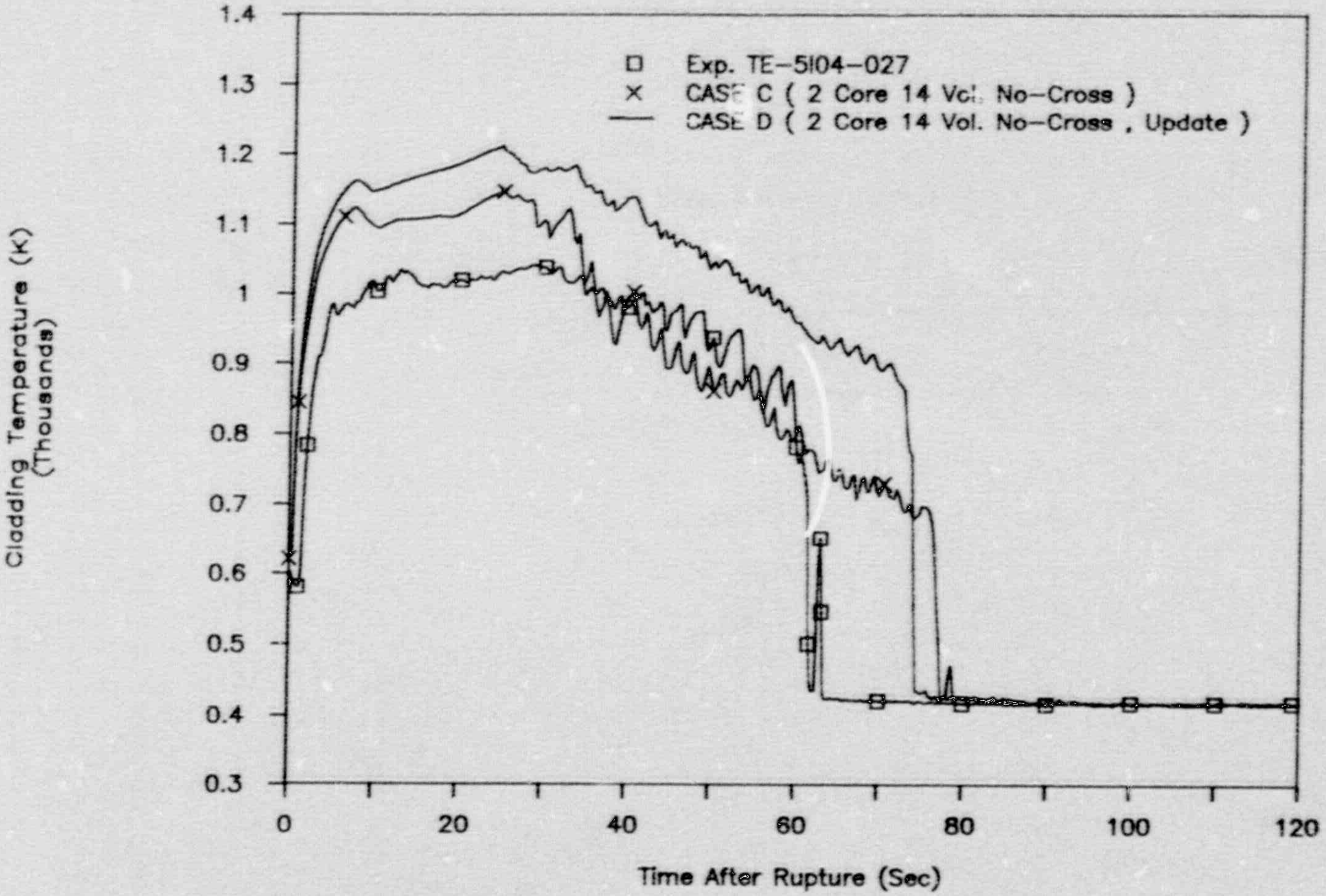


Fig.53 Comparison of cladding temperature at 27 inches of hot fuel between CASE C and CASE D

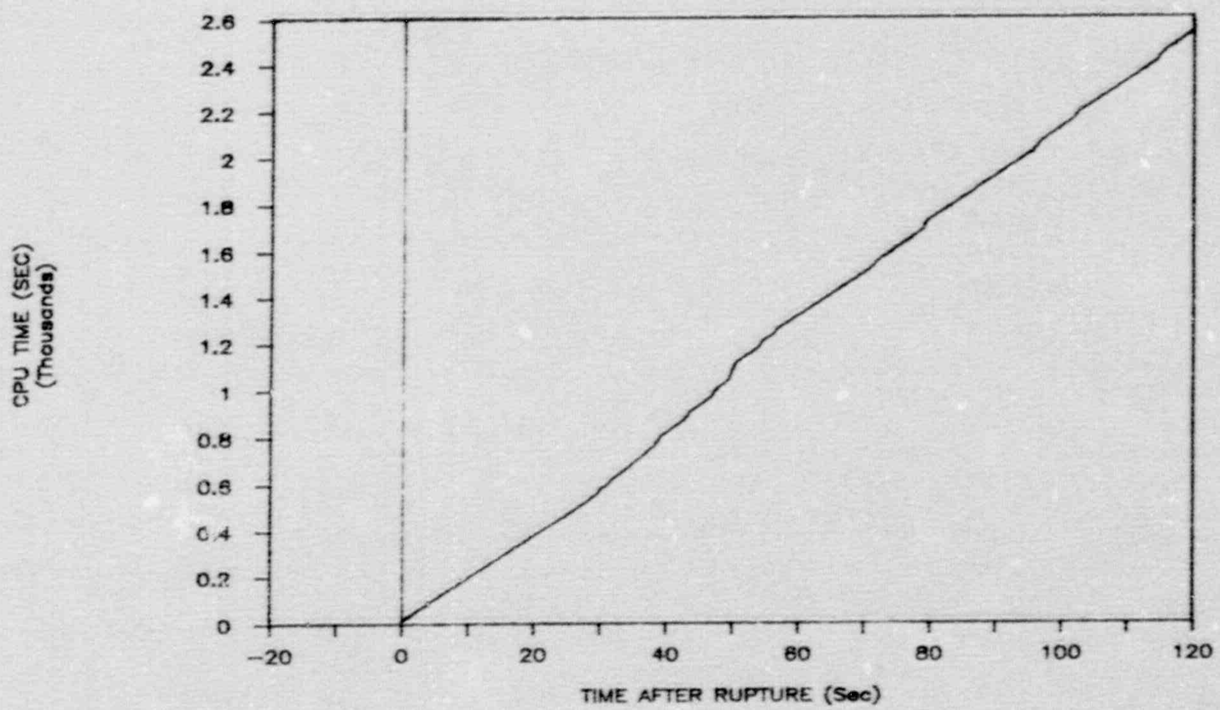


Fig.54 The required CPU time versus the advanced time in base case calculation of L2-5 test

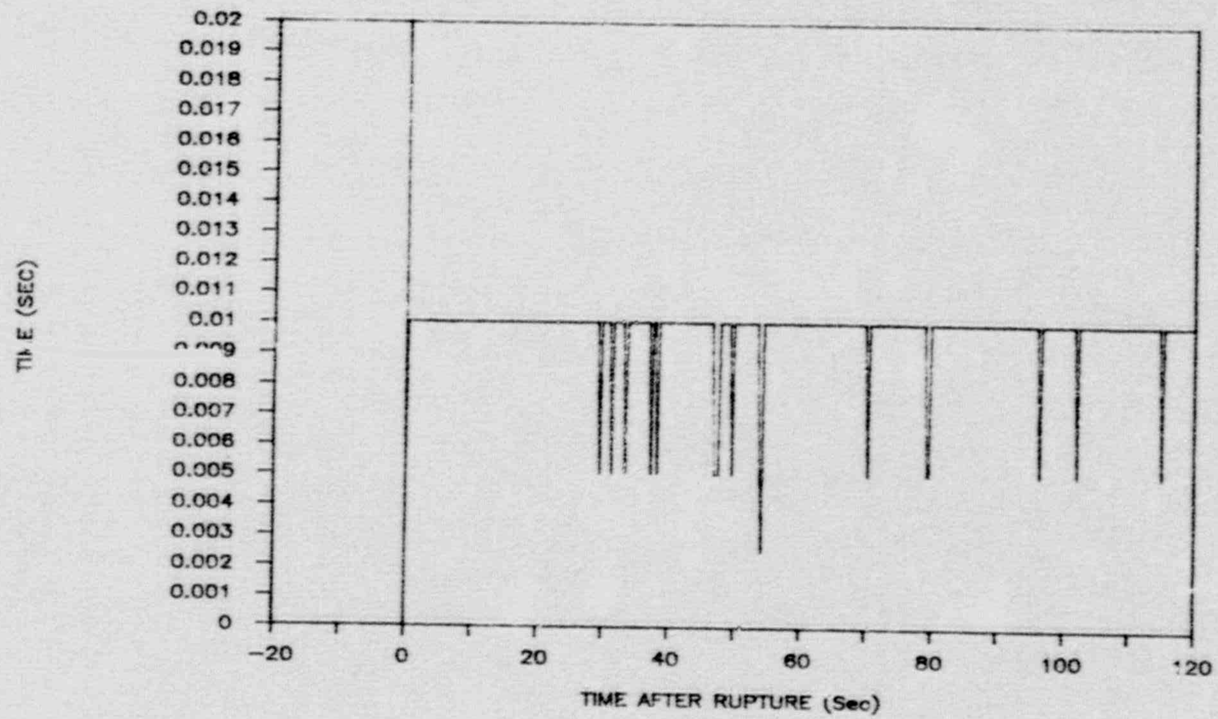


Fig.55 Time step size of base case calculation of L2-5 test

Appendix

```
/JOB
RM364B,T200.
/USER
ATTACH,OLDPL=REL364S.
PURGE,RE364BS/NA.
PURGE,RE364BX/NA.
PURGE,RE364BL/NA.
* ***************************
*  IMPORTANT !!            *
*   THE UPDATE DIRECTIVE   *
*   SHOULD HAVE *COMPILE DEFINE
*   AS THE FIRST DIERECTIVE
****************************
UPDATE,N=RE364BS.
UPDATE,P=RE364BS,Q,C=R5SEG.
REPLACE,R5SEG.
RETURN,OLDPL.
*DEFINE,RE364BS.
RETURN,RE364BS.
ATTACH,ENVRLX=ENVR41X.
LIBRARY,ENVRLX.
SELECTA,COMPILE,COMP.
LIBRARY.
RETURN,ENVRLX.
REWIND,COMP.
FTN5,I=COMP,DO,ET,STATIC,OPT=2,ROUND,LO=M/A/R/S,L=0.
RETURN,COMP.
REWIND,LGO.
ATTACH,RELAP5I=REL364L.
GTR,RELAP5I,ADD.REL/*
*DEFINE,RELAP50=RE364BL.
LIBEDIT,P=RELAP50,I=0,B=ADD,LO=F,U,C.
LIBEDIT,P=RELAP50,B=LGO,I=0,LO=F,U,C.
RETURN,NULL,LGO,RELAP5I.
RETURN,RLP5F1,RLP5F2.
ATTACH,ENVRL=ENVR41L.
FILE,RSTIN,RT=S,SBF=NO,USE,FO=SQ.
RFL,EC=200.
DEFINE,RE364BX.
SEGLOAD,I=R5SEG,B=RE364BX.
LDSET,LIB=RELAP50/ENVRL.
LDSET,PRESETA=NGINDEF,ERR=NONE,MAP=SB.
LDSET,STAT=RSTIN.
LIBLOAD,ENVRL,$HDR=$.
LIBLOAD,FTN5LIB,$FERCAP.$,$RPVCAP.$,$FTNRP2.$,$Q2NTRY.$.
NOGO.
PERMIT,RE364BX,KA41202.
RETURN,RELAP50,ENVRL,COMPILE.
SKIP,KKK.
EXIT.
ENDIF,KKK.
DAYFILE,KMRRDAY.
REPLACE,KMRRDAY.
/EOR
*COMPILE DEFINE
*ID CBD3604
*D DMK3601.484
*D PLOTMD.24
```

```
 901  FORMAT ('OPLOTFL SCRACH FILE GENERATED.')
*COMPILE DEFINE,SEGDIR
*COMPILE RELAP5
*D RJW3603.23
      DATA PTITLE/"RELAP5/2/3","6.04-NSC","REACTOR LO","SS OF COOL",
*/
*/    ENDIF
*/        *ID KWU01  ALREADY IMPLEMENTED IN RELAP5OLDPL3604C,
*/                   WHICH IS USED AS BASIS
*/        */    CORRECTIONS OF INDEX IN SUBROUTINE RACCUM
*/        *I RACCUM.618
*/              IELV=I
*/        *B DMK3602.581
*/        I=IELV
*COMPILE DEFINE,SEGDIR,RACCUM
*ID KWU01
*I RACCUM.618
         IELV=I
*B DMK3602.581
        I=IELV
*/        */    END OF KWU-UPDATES TO CYCLE 3604
*COMPILE DEFINE,SEGDIR
*IDENT SKI01
*/         THESE UPDATES ARE RECOMMENDED BY SKI TO BE
*/         IMPLEMENTED IN RELAP5/MOD2-36.04
*/         SOURCE:     LETTER FROM STUDSVIK (MR.SANDERVAG)
*/                     TO          KWU      (MR.GRUBER)
*/                     1987-06-25
*/
*/         COMPILE RELAP5
*/
*COMPILE IHTCMP
*/
*/        FIX AN INDEXING ERROR IN IHTCMP
*/        ERROR CAUSED ROD PLENUM VOLUME FOR GAP-GAS PRESSURE CALCULATION
*/        TO BE INCORRECT. FOUND AND FIXED BY D.CARAHER 20MAY87
*/        FIX ONLY CDC-VERSION CODING
*D IHTCMP.1041
      L=(.NOT.MASK(43).AND.IHTPTR(J))+FILNDX(8)
*/
*/         UPDATE ROUTINE IRFLHT TO ALLOW REFLOOD TO WORK
*/         HEAT STRUCTURE FILE GETS CHANGED ON RESTART (FOR
*/         EXAMPLE BY DELETING OR ALTERING SOME STRUCTURES)
*/  NOTE..HEAT STRS ASSOCIATED WITH REFLOOD CANNOT BE ALTERED
*/         ON RESTART AS IRFLHT IS NOW PROGRAMMED
*/
*COMPILE IRFLHT
*I IRFLHT.330
C          UPDATE THE GEOMETRY POINTER IN IGLRFL BITS 44-60 IN CASE THE
C          HEAT STRUCTURE FILE CHANGED ON RESTART.
      J=(.NOT.MASK(43).AND.IH) + IHT
      J=(.NOT.MASK(43).AND.IHTPTR(J)) + IHT
      NCOLS=.NOT.MASK(43).AND.INXGOM(J)
      IGLRFL(I)=(MASK(43).AND.IGLRFL(I)).OR.NCOLS
*/
*/    END OF UPDATES SKI01
*/
/EOR
*COMPILE SEGDIR
```

```
/JOB
L25BSR1,T4000.
/USER
ATTACH,STH2XT,RE364BX.
DEFINE,RSTPLT=L25SR.
FILE,RSTPLT,SBF=NO.
RFL,CM=350000,EC=200.
REDUCE(-)
RE364BX,,*PL=50000.
/EOR
= LOFT L2-5 POST TEST ANALYSIS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*
*     L2-5 INITIAL CONDITIONS
*
*                       POWER = 36.0 MW
*                    PCS FLOW = 192.4 KG/S
*                       TCOLD = 556.6 K
*                PCS PRESSURE = 14.94 MPA
*                   PZR LEVEL = 1.14 M (45 IN)
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000100   NEW       STDY-ST
0000101   RUN
0000105   5.0       10.0
*     TIME STEP CONTROL CARDS                        * REQUIRED
*         END TIME  MIN DT    MAX DT    OPTN MNR  MJR  RST
0000201   900.0     1.0-6     1.0   14003    1   100  450
*
*   MINOR EDIT VARIABLES
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEADY STATE PLOT REQUESTS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000301   P         250010000
0000302   P         530010000
0000303   TEMPF     250010000
0000304   TEMPF     185010000
0000305   TEMPF     515010000
0000306   MFLOWJ    540000000
0000307   MFLOWJ    985000000
0000308   MFLOWJ    995000000
0000309   CNTRLVAR  1
0000310   CNTRLVAR  2
0000311   MFLOWJ    566000000
0000312   CNTRLVAR  910
0000313   MFLOWJ    100010000
0000314   P         420010000
0000315   VOIDG     500010000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CLADDING TEMPERATURES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000321   HTTEMP    001100210          *
0000322   HTTEMP    001100310          *
0000323   HTTEMP    002100210          *
0000324   HTTEMP    002100310          *
0000325   HTTEMP    002100410          *
```

```
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1 ---
* FUEL CENTERLINE TEMPERATURES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000326  HTTEMP   002100201          *
0000327  HTTEMP   002100301          *
0000328  HTTEMP   002100401          *
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*    TRIPS
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*    501-509  GENERAL TRIPS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*    ALWAYS TRUE
0000501  TIME      0         GE   NULL      0         -1.0     L
*    ALWAYS FALSE
0000502  TIME      0         LT   NULL      0         -1.0     N
*    PRESSURIZER LOW LEVEL ALARM
0000503  CNTRLVAR  002       LE   NULL      0         0.3810   L
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     BUDGET SAVER CONTROLS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     FOR EVERY 100 CPU SECONDS THE TRANSIENT MUST ADVANCE
*     AT LEAST 1.00 SECONDS OR THE PROBLEM WILL TERMINATE
*     THIS PROVIDES A RATIO OF 100:1  CPU:TRANSIENT
0000507  TIME      0         GE   CNTRLVAR  705       1.0      N
0000508  CPUTIME   0         GE   CNTRLVAR  703       100.     N
0000509  CPUTIME   0         GE   NULL      0         100.     L
*
0000600  602
0000601  -507      AND       508       N
0000602  601       AND       509       N
*
20570100  TU-VT508  TRIPUNIT  1.0       0.0       0
20570101  508
20570200  NXT-CPU   MULT      1.0       0.0       0
20570201  CPUTIME   0
20570202  CNTRLVAR  701
20570300  OLD-CPU   STDFNCTN  1.0       0.0       0
20570301  MAX       CNTRLVAR  702       CNTRLVAR  703
20570400  NXT-TRAN  MULT      1.0       0.0       0
20570401  TIME      0
20570402  CNTRLVAR  701
20570500  OLD-TRAN  STDFNCTN  1.0       0.0       0
20570501  MAX       CNTRLVAR  704       CNTRLVAR  705
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     510-519  TEST SPECIFIC TRIPS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     SCRAM
0000510  P         100010000 LT   NULL      0         14.19+6  L
*     BREAK OPENS
0000511  TIME      0         GE   NULL      0         0.00     L
*     PCP TRIP
0000512  TIME      0         GE   NULL      0         0.94     L
*     HPIS ON
0000513  TIME      0         GE   NULL      0         23.90    L
*     LPIS ON
0000514  TIME      0         GE   NULL      0         37.32    L
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

```
* LT  555  REFLOOD TRIP
0000555   P       230120000 LE   NULL      0         1.0+6    L
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LT  677  COLD LEG BREAK VALVE    CARD 3470301
0000677   511       OR        511       L
*---- ----1---- ----1---- ----1----
* LT  679  HOT LEG BREAK VALVE     CARD 3170301
0000679   511       OR        511       L
*---- ----1---- ----1---- ----1----
* LT  681  ECC CHECK VALVE         CARD 6000301
0000577   MFLOWJ    600000000 GE   NULL      0         0.0      N
0000578   P         605010000 GT   P         185010000 0.       N
0000681   577       AND       578       N
*---- ----1---- ----1---- ----1----
* LT  682  ACCUMULATOR VALVE       CARD 6100301
0000579   TIME      0         GE   NULL      0         1.0+9    L
0000682   579       AND       579       L
*---- ----1---- ----1---- ----1----
* LT  683  HPIS JUNCTION           CARD 6400200
0000683   513       OR        513       L
*---- ----1---- ----1---- ----1----
* LT  684  LPIS JUNCTION           CARD 6350200
0000684   514       OR        514       L
*---- ----1---- ----1---- ----1----
* LT  685-686  STEAM VALVE         CARD 5400301
* OPEN TRIP
0000589   P         530010000 GT   NULL      0         7.1125+6 N
0000590   P         530010000 LT   NULL      0         6.9747+6 N
0000670   685       OR        589       N
0000671   -590      AND       -686      N
0000685   671       AND       670       N
* CLOSE TRIP
0000591   P         530010000 GT   NULL      0         6.5613+6 N
0000592   P         530010000 LT   NULL      0         6.4924+6 N
0000672   686       OR        592       N
0000673   -591      AND       672       N
0000674   -685      AND       699       N
0000686   673       AND       674       N
* JOB TERMINATION VALVE TRIPS
* OPEN
0000687   685       OR        602       N
* CLOSE
0000688   686       OR        602       N
*---- ----1---- ----1---- ----1----
* LT  689  FEED TRIP               CARD 5660200
0000689   510       OR        510       L
*---- ----1---- ----1---- ----1----
* LT  695  PCP 1 TRIP              CARD 1350301
0000695   512       OR        512       N
*---- ----1---- ----1---- ----1----
* LT  696  PCP 1 VELOCITY TABLE    CARD 1356100
0000696   502       AND       502       N
*---- ----1---- ----1---- ----1----
* LT  697  PCP 2 TRIP              CARD 1650301
0000697   512       OR        512       N
*---- ----1---- ----1---- ----1----
* LT  698  PCP 2 VELOCITY TABLE    CARD 1656100
0000698   502       AND       502       N
*---- ----1---- ----1---- ----1----
```

```
* LT  699  SCRAM                         CARD 20269900 OR 20290000
0000699   510       OR        510       L
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   INTACT LOOP
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REACTOR VESSEL NOZZLE - INTACT LOOP HOT LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1000000   "RVN ILHL  "         BRANCH
1000001   2         0
1000101   0.0       1.58878   0.102752  0.0       0.0       0.0
1000102   4.0E-5    0.0       00
1000200   0         15009300. 1410030.  2458100.  .00000000
1001101   252010000 100000000 0.0634    0.1       0.1       0002
1002101   100010000 105000000 0.0       0.1       0.1       0000
1001201   4.6275000 4.6275000 0.0
1002201   4.6243000 4.6243000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER CONNECTION TEE REACTOR VESSEL SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1050000   "PZR T RVS "         BRANCH
1050001   1         0
1050101   0.0634444 1.0531192 0.0       0.0       0.0       0.0
1050102   4.0E-5    0.0       00
1050200   0         15007600. 1410030.  2459730.  .00000000
1051101   105010000 107000000 0.0       0.12      0.12      0000
1051201   4.8409000 4.8409000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER CONNECTION TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1070000   "PZR T     "         BRANCH
1070001   1         0
1070101   0.0620253 0.2810215 0.0       0.0       0.0       0.0
1070102   4.0E-5    0.0       00
1070200   0         15006000. 1328625.  2459750.  .00000000
1071101   107010000 110000000 0.0       0.135     0.135     0000
1071201   4.98      4.98      0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER CONNECTION TEE STEAM GENERATOR SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1100000   "PZR T SGS "         BRANCH
1100001   1         0
1100101   0.0606063 0.9207292 0.0       0.0       0.0       0.0
1100102   4.0E-5    0.0       00
1100200   0         15005300. 1410030.  2459800.  .00000000
1101101   110010000 112000000 0.0       0.15      0.15      0000
1101201   5.1146000 5.1146000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HOT LEG PIPING
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1120000   "HOT LEG PP"         PIPE
1120001   2
1120101   0.0       2
1120201   0.0       1
1120301   1.38893   1
1120302   0.707687  2
1120401   0.0796973 1
1120402   0.0579614 2
```

```
1120501   0.0       2
1120601   0.0       1
1120602   90.0      2
1120701   0.0       1
1120702   0.246447  2
1120801   4.0E-5    0.0       2
1120901   0.20      0.20      1
1121001   00        2
1121101   0000      1
1121201   0         15002900. 1410030.  2459870.  .00000000 0.0       01
1121202   0         15005500. 1410030.  2459770.  .00000000 0.0       02
1121300   0
1121301   5.1146000 5.1146000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SG INLET PLENUM
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1140000   "SG IN PLNM"        BRANCH
1140001   2         0
1140101   0.0       0.629795  0.33532   0.0       90.0      0.512756
1140102   4.E-5     0.0102    00
1140200   0         14987200. 1410020.  2460000.  .00000000
1141101   112010000 114000000 0.0512    0.0       0.0       0100
1142101   114010000 115000000 0.0       0.0       0.0       0100
1141201   3.5832000 3.5832000 0.0
1142201   1.9414000 1.9414000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SG U-TUBES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1150000   "SG TUBES  "        PIPE
1150001   8
1150101   0.0       8
1150201   0.151171  7
1150301   0.902     1
1150302   0.6096    3
1150303   0.462908  5
1150304   0.6096    7
1150305   0.902     8
1150401   0.136356  1
1150402   0.0921538 3
1150403   0.0699783 5
1150404   0.0921538 7
1150405   0.136356  8
1150501   0.0       8
1150601   90.0      4
1150602   -90.0     8
1150701   0.902     1
1150702   0.6096    3
1150703   0.299572  4
1150704   -0.299572 5
1150705   -0.6096   7
1150706   -0.902    8
1150801   1.27-7    0.01022   8
1150901   0.0       0.0       7
1151001   00        8
1151101   0000      7
1151201   0         14979600. 1367230.  2460010.0 .00000000 0.0       01
1151202   0         14972800. 1333400.  2460020.0 .00000000 0.0       02
1151203   0         14967300. 1306120.  2460030.0 .00000000 0.0       03
1151204   0         14962900. 1288520.  2460040.0 .00000000 0.0       04
```

```
1151205   0          14962000. 1273520.  2460050.0 .00000000 0.0        05
1151206   0          14964300. 1257470.  2460040.0 .00000000 0.0        06
1151207   0          14967600. 1244800.  2460030.0 .00000000 0.0        07
1151208   0          14971800. 1233820.  2460020.0 .00000000 0.0        08
1151300   0
1151301   1.8921000 1.8921000 0.0        01
1151302   1.8565000 1.8565000 0.0        02
1151303   1.8299000 1.8299000 0.0        03
1151304   1.8134000 1.8134000 0.0        04
1151305   1.7997000 1.7997000 0.0        05
1151306   1.7856000 1.7856000 0.0        06
1151307   1.7746000 1.7746000 0.0        07
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SG OUTLET PLENUM
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1160000   "SG OUT PLN"        BRANCH
1160001   2          0
1160101   0.0        0.629795  0.33532   0.0        -90.0      -0.512756
1160102   4.E-5      0.0102    00
1160200   0          14976400. 1233810.  2460100.   .00000000
1161101   115010000 116000000 0.0        0.0        0.0        0100
1162101   116010000 118000000 0.0512     0.0        0.0        0100
1161201   1.7656000 1.7656000 0.0
1162201   3.2740000 3.2740000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP SUCTION PIPING
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1180000   "PMP SUC PP"        PIPE
1180001   3
1180101   0.0        3
1180201   0.0        2
1180301   0.546638   1
1180302   0.688596   2
1180303   0.558577   3
1180401   0.0445625  1
1180402   0.0445137  2
1180403   0.0354278  3
1180501   0.0        3
1180601   -90.0      3
1180701   -0.498052  1
1180702   -0.688596  2
1180703   -0.355604  3
1180801   4.E-5      0.0        3
1180901   0.083      0.083      1
1180902   0.104      0.104      2
1181001   00         3
1181101   0000       2
1181201   0          14965800. 1233810.  2460030.0 .00000000 0.0        01
1181202   0          14967700. 1233810.  2460033.0 .00000000 0.0        02
1181203   0          14970500. 1233810.  2460035.0 .00000000 0.0        03
1181300   0
1181301   4.1288000 4.1288000 0.0        01
1181302   4.2081000 4.2081000 0.0        02
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP SUCTION TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1200000   "PMP SCT T "        BRANCH
1200001   3          0
1200101   0.0        0.759614  0.0487901 0.0        0.0        0.0
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1200102   4.0E-5    0.0       00
1200200   0         14974000. 1233810.  2460020.  .00000000
1201101   118010000 120000000 0.063427  0.0       0.0       0000
1202101   120010000 125000000 0.063427  1.075     1.25      0000
1203101   120010000 155000000 0.063427  1.075     1.25      0000
1201201   4.2080000 4.2080000 0.0
1202201   1.9967000 1.9967000 0.0
1203201   2.2113000 2.2113000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP1 SUCTION TEE OUTLET
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1250000   "PMP1 SCT T"        BRANCH
1250001   1         0
1250101   0.0       1.00308   0.0640548 0.0       90.0      0.520704
1250102   4.0E-5    0.0       00
1250200   0         14974500. 1233810.  2460022.  .00000000
1251101   125010000 130000000 0.0       0.13      0.13      0000
1251201   3.2631000 3.2631000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 1 INLET
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1300000   "PMP1 INLET"        SNGLVOL
1300101   0.0       0.457201  0.0177444 0.0       90.0      0.457201
1300102   4.0E-5    0.0       00
1300200   0         14968300. 1233810.  2460030.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRIMARY COOLANT PUMP 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1350000   "PCPUMP1   "        PUMP
1350101   0.0       0.4572    0.0991    0.0       90.0      0.317900
1350102   0
1350108   130010000 0.0       0.017     0.017     0000
1350109   140000000 0.0       0.05      0.05      0000
1350200   0         15010900. 1233820.  2459500.  .00000000
1350201   0         3.2631000 3.2631000 0.0
1350202   0         3.4591000 3.4591000 0.0
1350301     0   0   0         -1        -1        695       0
1350302   369.00000 .36043360 .31550000 96.000000 500.60000 1.4310000
1350303   613.60000 .00000000 207.43300 .04440000 19.598700 .00000000
1350310   0.0       0.0       0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 1 OUTLET PUMP SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1400000   "PMP1 OUT P"        SNGLVOL
1400101   0.0       0.502185  0.0183849 0.0       0.0       0.0
1400102   4.0E-5    0.0       00
1400200   0         15046700. 1233820.  2459000.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP1 OUTLET PIPE TEE SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1450000   "PMP1 OUT T"        BRANCH
1450001   2         0
1450101   0.0       1.40843   0.0633861 0.0       0.0       0.0
1450102   4.0E-5    0.0       00
1450200   0         15048400. 1233820.  2458800.  .00000000
1451101   140010000 145000000 0.0       0.0       0.0       0000
1452101   145010000 150000000 0.0       0.57456   0.050347  0000
1451201   3.4589000 3.4589000 0.0
1452201   2.8137000 2.8137000 0.0
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP OUTLET TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1500000   "PMP OUT T "        BRANCH
1500001   1         0
1500101   0.0       0.496511  0.0316011 0.0       0.0       0.0
1500102   4.0E-5    0.0       00
1500200   0         15042300. 1233820.  2458700.  .00000000
1501101   150010000 175000000 0.063427  0.0       0.0       0000
1501201   4.2075000 4.2075000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2 SUCTION TEE OUTLET
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1550000   "PMP2 SCT T"        BRANCH
1550001   1         0
1550101   0.0       1.00308   0.0640548 0.0       90.0      0.520704
1550102   4.0E-5    0.0       00
1550200   0         14973600. 1233810.  2460020.  .00000000
1551101   155010000 160000000 0.0       0.13      0.13      0000
1551201   3.6137000 3.6137000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2 INLET PIPE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1600000   "PMP2 INLET"        SNGLVOL
1600101   0.0       0.457201  0.0177444 0.0       90.0      0.457201
1600102   4.0E-5    0.0       00
1600200   0         14966800. 1233810.  2460030.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRIMARY COOLANT PUMP 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1650000   "PCPUMP2  "         PUMP
1650101   0.0       0.514     0.0991    0.0       90.0      0.317900
1650102   0
1650108   160010000 0.0       0.017     0.017     0000
1650109   170000000 0.0       0.1       0.1       0000
1650200   0         15010900. 1233820.  2459500.  .00000000
1650201   0         3.6138000 3.6138000 0.0
1650202   0         3.7364000 3.7364000 0.0
1650301   135  135  135        -1        -1       697       0
1650302   369.00000 .37883469 .31550000 96.000000 500.60000 1.4310000
1650303   613.60000 .00000000 207.43300 .04440000 19.598700 .00000000
1650310   0.0       0.0       0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2 OUTLET
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1700000   "PMP2 OUT T"        BRANCH
1700001   1         0
1700101   0.0       0.514071  0.0192958 0.0       0.0       0.0
1700102   4.0E-5    0.0       00
1700200   0         15046300. 1233820.  2459000.  .00000000
1701101   170010000 150000000 0.036611  0.3847    0.6316    0000
1701201   3.8305000 3.8305000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INTACT LOOP COLD LEG PIPE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1750000   "ILCL PIPE "        PIPE
1750001   2
1750101   0.0       2
1750201   0.0       1
```

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1750301   0.558577  1
1750302   0.613244  2
1750401   0.035478  1
1750402   0.038895  2
1750501   0.0       2
1750601   0.0       2
1750701   0.0       2
1750801   4.0E-5    0.0       2
1750901   0.0       0.0       1
1751001   00        2
1751101   0000      1
1751201   0         15043000. 1233820.  2459500.0 .00000000 0.0       01
1751202   0         15042800. 1233820.  2459500.0 .00000000 0.0       02
1751300   0
1751301   4.2076000 4.2076000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ECC CONNECTION TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1800000   "ECC T     "        BRANCH
1800001   1         0
1800101   0.0       1.15189   0.0730598 0.0       0.0       0.0
1800102   4.0E-5    0.0       00
1800200   0         15042500. 1233830.  2459500.  .00000000
1801101   175010000 180000000 0.0       0.0       0.0       0000
1801201   4.2076000 4.2076000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REACTOR VESSEL NOZZLE - INTACT LOOP COLD LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1850000   "RVN ILCL  "        BRANCH
1850001   2         0
1850101   0.0       1.00965   0.0644920 0.0       0.0       0.0
1850102   4.0E-5    0.0       00
1850200   0         15041900. 1233830.  2459550.  .00000000
1851101   185010000 730000000 0.0634    2.8       2.8       0001
1852101   180010000 185000000 0.0       0.0       0.0       0000
1851201   4.2093000 4.2093000 0.0
1852201   4.2076000 4.2076000 0.0
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   REACTOR VESSEL
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS UPPER VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7000000   "INANUPRINT"        ANNULUS
7000001   1
7000101   0.1308530 1
7000301   0.1876129 1
7000401   0.0       1
7000501   0.0       1
7000601   90.0      1
7000801   3.81-6    0.172     1
7001001   00        1
7001201   0         15028400. 1233830.  2459250   .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - UPPER TO LOWER INLET ANNULUS INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7010000   "INANMUINT "        SNGLJUN
7010101   730000000 700000000 0.129467  0.0000    0.0000    0100
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7010201   0         .34062000 .34062000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS MIDDLE VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7300000   "INANMIDINT"        ANNULUS
7300001   1
7300101   0.1308530 1
7300301   0.2851823 1
7300401   0.0       1
7300501   0.0       1
7300601   -90.0     1
7300801   3.81-6    0.172     1
7301001   00        1
7301201   0         15028400. 1233830.  2459250.  0.0       0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - MIDDLE TO LOWER INLET ANNULUS INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7310000   "INANMLINT "        SNGLJUN
7310101   730010000 702000000 0.0709408 0.0       0.0       0100
7310201   0         1.5959    1.5959    0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS LOWER VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7020000   "INANLWRINT"        ANNULUS
7020001   1
7020101   0.1464354 1
7020301   0.2525361 1
7020401   0.0       1
7020501   0.0       1
7020601   -90.0     1
7020801   3.81-6    0.172     1
7021001   00        1
7021201   0         15030600. 1233830.  2459300.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - INLET ANNULUS TO DOWNCOMER INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7030000   "INAN2DCINT"        SNGLJUN
7030101   702010000 704000000 0.0709408 0.0000    0.0000    0100
7030201   0         1.5959000 1.5959000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DOWNCOMER UPPER VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7040000   "DNCRUPRINT"        ANNULUS
7040001   1
7040101   0.0       1
7040301   1.5200561 1
7040401   0.1581866 1
7040501   0.0       1
7040601   -90.0     1
7040801   3.81-6    0.102     1
7041001   00        1
7041201   0         15036100. 1233810.  2459350.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - UPPER TO MIDDLE DOWNCOMER INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7050000   "UPR2MIDINT"        SNGLJUN
7050101   704010000 706000000 0.0709408 0.0000    0.0000    0100
7050201   0         1.5106000 1.5106000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
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* DOWNCOMER MIDDLE VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7060000   "DNCRMIDINT"        ANNULUS
7060001   1
7060101   0.0        1
7060301   1.2616333 1
7060401   0.1217000 1
7060501   0.0        1
7060601   -90.0      1
7060801   3.81-6     0.102       1
7061001   00         1
7061201   0          15045800. 1233800.  2459500.  .0000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - MIDDLE TO LOWER DOWNCOMER INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7070000   "MID2LWRINT"        SNGLJUN
7070101   706010000 708000000 0.0709408 0.0000    0.0000    0100
7070201   0          1.4821000 1.4821000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DOWNCOMER LOWER VOLUME INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7080000   "DNCRLWRINT"        ANNULUS
7080001   1
7080101   0.0        1
7080301   1.0792591 1
7080401   0.0986806 1
7080501   0.0        1
7080601   -90.0      1
7080801   3.81-6     0.102       1
7081001   00         1
7081201   0          15054000. 1233790.  2458600.  .0000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - LOWER DOWNCOMER TO LOWER PLENUM INTACT SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7090000   "LRDC2LPINT"        SNGLJUN
7090101   708010000 215000000 0.0709408 0.0000    0.0000    0100
7090201   0          1.4104000 1.4104000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS UPPER VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7100000   "INANUPRBKN"        ANNULUS
7100001   1
7100101   0.1308530 1
7100301   0.1876129 1
7100401   0.0        1
7100501   0.0        1
7100601   90.0       1
7100801   3.81-6     0.172       1
7101001   00         1
7101201   0          15027200. 1233830.  2459250.  .0000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - MIDDLE TO UPPER INLET ANNULUS BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7110000   "INANMUBKN "        SNGLJUN
7110101   740000000 710000000 0.129467  0.0000    0.0000    0100
7110201   0          -.2873200 -.2873200 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS MIDDLE VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
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7400000   "INANMIDBKN"        ANNULUS
7400001   1
7400101   0.1308530 1
7400301   0.2851823 1
7400401   0.0       1
7400501   0.0       1
7400601   -90.0     1
7400801   3.81-6    0.172     1
7401001   00        1
7401201   0         15028400. 1233830.  2459250.  0.0       0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - MIDDLE TO LOWER INLET ANNULUS BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7410000   "INANMLBKN "        SNGLJUN
7410101   740010000 712000000 0.0709408 0.0       0.0       0100
7410201   0         .86411    .86411    0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INLET ANNULUS LOWER VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7120000   "INANLWRBKN"        ANNULUS
7120001   1
7120101   0.1464354 1
7120301   0.2525361 1
7120401   0.0       1
7120501   0.0       1
7120601   -90.0     1
7120801   3.81-6    0.172     1
7121001   00        1
7121201   0         15029700. 1233820.  2459200.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - INLET ANNULUS TO DOWNCOMER BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7130000   "INAN2DCBKN"        SNGLJUN
7130101   712010000 714000000 0.0709408 0.0000    0.0000    0100
7130201   0         .86411000 .86411000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DOWNCOMER UPPER VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7140000   "DNCRUPRBKN"        ANNULUS
7140001   1
7140101   0.0       1
7140301   1.5200561 1
7140401   0.1581866 1
7140501   0.0       1
7140601   -90.0     1
7140801   3.81-6    0.102     1
7141001   00        1
7141201   0         15036100. 1233800.  2459350.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - UPPER TO MIDDLE DOWNCOMER BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7150000   "UPR2MIDBKN"        SNGLJUN
7150101   714010000 716000000 0.0709408 0.0000    0.0000    0100
7150201   0         1.1432000 1.1432000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DOWNCOMER MIDDLE VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7160000   "DNCRMIDBKN"        ANNULUS
7160001   1
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7160101   0.0        1
7160301   1.2616333  1
7160401   0.1217000  1
7160501   0.0        1
7160601   -90.0      1
7160801   3.81-6     0.102     1
7161001   00         1
7161201   0          15045800. 1233780.  2459500.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - MIDDLE TO LOWER DOWNCOMER BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7170000   "MID2LWRBKN"         SNGLJUN
7170101   716010000 718000000 0.0709408 0.0000    0.0000    0100
7170201   0         1.3175000 1.3175000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DOWNCOMER LOWER VOLUME BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7180000   "DNCRLWRBKN"         ANNULUS
7180001   1
7180101   0.0        1
7180301   1.0792591  1
7180401   0.0986806  1
7180501   0.0        1
7180601   -90.0      1
7180801   3.81-6     0.102     1
7181001   00         1
7181201   0          15054000. 1233760.  2458600.  .00000000 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - LOWER DOWNCOMER TO LOWER PLENUM BROKEN SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7190000   "LRDC2LPBKN"         SNGLJUN
7190101   718010000 215000000 0.0709408 0.0000    0.0000    0100
7190201   0         1.3892000 1.3892000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CROSSFLOW JUNCTION - UPPER INLET ANNULUS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7200000   "UPRINANNXF"         SNGLJUN
7200101   700000000 710000000 0.0296780 1.8341    1.8341    0003
7200201   0         .28732000 .28732000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CROSSFLOW JUNCTION - LOWER INLET ANNULUS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7220000   "LWRINANNXF"         SNGLJUN
7220101   702000000 712000000 0.0428706 1.8079    1.8079    0003
7220201   0         .38395000 .38395000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CROSSFLOW JUNCTION - UPPER DOWNCOMER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7240000   "UPRDNCMRXF"         SNGLJUN
7240101   704000000 714000000 0.03      1.33165-2 1.33165-2 0003
7240201   0         .19557000 .19557000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CROSSFLOW JUNCTION - MIDDLE DOWNCOMER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7260000   "MIDDNCMRXF"         SNGLJUN
7260101   706000000 716000000 0.03      2.10929-2 2.10929-2 0003
7260201   0         .10572000 .10572000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CROSSFLOW JUNCTION - LOWER DOWNCOMER
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
7280000   "LWRDNCMRXF"        SNGLJUN
7280101   708000000 718000000 0.03      3.05234-2 3.05234-2 0003
7280201   0         .07171910 .07171910 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER PLENUM TOP VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2150000   "LWR PL TOP"        BRANCH
2150001   2         0
2150101   0.0       0.3533183 0.2592277 0.0       -90.0     -0.3533183
2150102   3.81-6    0.0       00
2150200   0         15059400. 1233780.  2458550.  .00000000
2151101   215010000 220000000 0.0       0.005     0.005     0000
2152101   215000000 225000000 0.1499    1.5       1.5       0000
2151201   .571898-5 .571894-5 0.0
2152201   1.7076000 1.7076000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER PLENUM BOTTOM VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2200000   "LWR PL BOT"        SNGLVOL
2200101   0.0       0.3741720 0.29656   0.0       -90.0     -0.3741720
2200102   4.0E-5    0.0       00
2200200   0         15062100. 1233780.  2458500.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER CORE SUPPORT STRUCTURE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2250000   "L CORE SUP"        BRANCH
2250001   2         0
2250101   0.2832456 0.5709989 0.0       0.0       90.0      0.5709989
2250102   3.81-6    0.095     00
2250200   0         15054400. 1233780.  2458550.  .00000000
2251101   225010000 230000000 0.1134    1.5       1.5       0000
2252101   225010000 235000000 0.0       12.       12.       0000
2251201   2.1758000 2.1758000 0.0
2252201   .65905000 .65905000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACTIVE CORE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2300000   "CORE     "         PIPE
2300001   12
2300101   0.183262  2
2300102   0.171287  4
2300103   0.172986  6
2300104   0.171486  8
2300105   0.171455  10
2300106   0.177236  12
2300201   0.1705    3
2300202   0.144     4
2300203   0.1705    7
2300204   0.144     8
2300205   0.1705    11
2300301   0.1397017 12
2300401   0.0       12
2300501   0.0       12
2300601   90.0      12
2300801   1.27-7    0.012     12
2300901   0.0       0.0       3
2300902   0.66      0.66      4
2300903   0.0       0.0       7
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2300904   0.66      0.66      8
2300905   0.0       0.0       11
2301001   00        12
2301101   0000      11
2301201   0         15048500. 1263450.  2459550.  .00000000 0.0       02
2301202   0         15045400. 1309480.  2459550.  .00000000 0.0       04
2301203   0         15042500. 1357660.  2459550.  .00000000 0.0       05
2301204   0         15040100. 1394080.  2459550.  .00000000 0.0       06
2301205   0         15037200. 1417170.  2459550.  .00000000 0.0       10
2301206   0         15034300. 1424460.  2459550.  .00000000 0.0       12
2301300   0
2301301   1.4679000 1.4679000 0.0       02
2301302   1.7789000 1.7789000 0.0       04
2301303   1.5425000 1.5425000 0.0       06
2301304   1.8668000 1.8668000 0.0       08
2301305   1.5994000 1.5994000 0.0       11
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CORE BYPASS VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2350000   "CORE BYPSS"        PIPE
2350001   3
2350101   0.0129428 3
2350201   0.0       2
2350301   0.5588068 3
2350401   0.0       3
2350501   0.0       3
2350601   90.0      3
2350801   3.81-6    0.003     3
2350901   0.0       0.0       2
2351001   00        3
2351101   0000      2
2351201   0         15048000. 1233790.  2459550.0 .00000000 0.0       01
2351202   0         15042400. 1233790.  2459550.0 .00000000 0.0       02
2351203   0         15036500. 1233790.  2459550.0 .00000000 0.0       03
2351300   0
2351301   .71258000 .71258000 0.0       01
2351302   .73579000 .73579000 0.0       02
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER END BOXES AND SUPPORT STRUCTURE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2400000   "UPR END BX"        BRANCH
2400001   2         0
2400101   0.2423341 0.5867979 0.0       0.0       90.0      0.5867979
2400102   3.81-6    0.145     00
2400200   0         15028800. 1417550.  2459600.  .00000000
2401101   230010000 240000000 0.1118    1.5       1.5       0000
2402101   235010000 240000000 0.0       12.       12.       0000
2401201   2.4488000 2.4488000 0.0
2402201   .73579000 .73579000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER CORE SUPPORT STRUCTURE - CROSS FLOW REGION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2450000   "UPR CR SUP"        BRANCH
2450001   2         0
2450101   0.0       0.4933248 0.1280806 0.0       90.0      0.4933248
2450102   3.81-6    0.145     00
2450200   0         15025400. 1417510.  2459600.  .00000000
2451101   240010000 245000000 0.0       0.0       0.0       0000
2452101   245010000 251000000 0.0       0.0       0.0       0000
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2451201   1.1669000 1.1669000 0.0
2452201   .439867-4 .439867-4 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER FLOW SKIRT REGION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2500000   "U FLW SKRT"        BRANCH
2500001   1         0
2500101   0.1547532 0.7850547 0.0       0.0       90.0      0.7850547
2500102   3.81-6    0.131     00
2500200   0         15020100. 1410020.  2459600.  .00000000
2501101   245010000 250000000 0.0       0.0       0.0       0000
2501201   1.8273000 1.8273000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* DEAD END OF FUEL MODULES
*---- ----1---- ----1 --- ----1---- ----1---- ----1---- ----1----
2510000   "DE FL MODS"        SNGLVOL
2510101   0.0       0.7844123 0.1154214 0.0       90.0      0.7844123
2510102   3.81-6    0.214     00
2510200   0         15021500. 1424270.  2459600.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER HEAD
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2520000   "UPR HEAD  "        BRANCH
2520001   2         0
2520101   0.2622585 0.2869580 0.0       0.0       90.0      0.2869580
2520102   3.81-6    0.0       00
2520200   0         15019000. 1410020.  2459550.  .00000000
2521101   250010000 252000000 0.0       0.006     0.006     0000
2522101   730000000 252000000 0.0       0.90+4    0.90+4    0003
2521201   -.1334300 .1334300  0.0
2522201   .05329530 .05329530 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER PLENUM BOTTOM VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2550000   "UPR PL BOT"        BRANCH
2550001   2         0
2550101   0.2622585 0.6312304 0.0       0.0       90.0      0.6312304
2550102   3.81-6    0.0       00
2550200   0         15017200. 1410020.  2459500.  .00000000
2551101   250010000 255000000 0.0       0.006     0.006     0000
2552101   255010000 260000000 0.0       0.03      0.03      0000
2551201   -.0450137 -.0450137 0.0
2552201   .186978-4 .186979-4 0.0
*---- ----1---- ----1---- ----1---- ---   --- ----1---- ----1----
* UPPER PLENUM TOP VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2600000   "UPR PL TOP"        SNGLVOL
2600101   0.0       0.7747094 0.1914909 0.0       90.0      0.7747094
2600102   3.81-6    0.0       00
2600200   0         15013400. 1410020.  2459500.  .00000000
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*    BROKEN LOOP
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REACTOR VESSEL NOZZLE - BROKEN LOOP HOT LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3000000   "RVN BLHL  "        BRANCH
3000001   2         0
```

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3000101   0.0        0.876303  0.0575410 0.0       0.0       0.0
3000102   4.0E-5     0.0       00
3000200   0          15018100. 1231960.  2459500.  .00000000
3001101   252010000  300000000 0.067014  0.7385868 1.2309481 0002
3002101   300010000  305000000 0.063426  0.1005    0.1005    0000
3001201   -.0578446  -.0578446 0.0
3002201   -.0611292  -.0611292 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HOT LEG PIPE TO REFLOOD ASSIST BYPASS TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3050000   "HLP-RABS T"         BRANCH
3050001   1          0
3050101   0.0        0.698336  0.0442927 0.0       0.0       0.0
3050102   4.0E-5     0.0       00
3050200   0          15018100. 1231980.  2459500.  .00000000
3051101   305010000  310000000 0.063426  0.1005    0.1005    0000
3051201   -.0611386  -.0611386 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* BROKEN LOOP HOT LEG CONTRACTION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3100000   "BLHL CONTR"         BRANCH
3100001   2          0
3100101   0.0        1.50013   0.0678467 0.0       0.0       0.0
3100102   4.0E-5     0.0       00
3100200   0          15018100. 1231950.  2459500.  .00000000
3101101   380010000  310000000 0.0388    0.84      0.84      0000
3102101   310010000  315000000 8.3647-3  0.553     1.09056   0000
3101201   .10016000  .10016000 0.0
3102201   .922485-3  .922485-3 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM GENERATOR AND PUMP SIMULATIOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3150000   "SG+PMP SIM"         PIPE
3150001   8
3150101   0.0        8
3150201   8.3647-3   1
3150202   1.12-2     2
3150203   0.105626   3
3150204   1.12-2     4
3150205   8.3647-3   7
3150301   0.919969   1
3150302   1.987956   2
3150303   0.849744   4
3150304   1.987956   5
3150305   1.371350   6
3150306   1.365029   7
3150307   1.674812   8
3150401   7.75291-3  1
3150402   0.1721108  2
3150403   8.97552-2  4
3150404   0.1721108  5
3150405   1.82303-2  6
3150406   5.46687-2  7
3150407   1.82489-2  8
3150601   90.0       3
3150602   -90.0      7
3150603   90.0       8
3150701   0.679201   1
3150702   1.987956   2
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3150703    0.457202  3
3150704    -0.457202 4
3150705    -1.987956 5
3150707    -1.371350 6
3150708    -0.520701 7
3150709    1.212851  8
3150801    4.0E-5    0.0       8
3150901    0.93596   0.93596   1
3150902    2.0       2.0       2
3150903    0.5       0.5       3
3150904    2.0       2.0       4
3150905    0.23025   0.23025   5
3150906    2.534     2.534     6
3150907    5.069     5.069     7
3151001    00        8
3151101    0000      7
3151201    0         15015600. 1243880.  2459924.  .00000000 0.0        01
3151202    0         15005700. 1237630.  2459924.  .00000000 0.0        02
3151203    0         14996600. 1237670.  2459924.  .00000000 0.0        03
3151204    0         14996600. 1237680.  2459924.  .00000000 0.0        04
3151205    0         15005600. 1237680.  2459924.  .00000000 0.0        05
3151206    0         15018100. 1237680.  2459924.  .00000000 0.0        06
3151207    0         15025100. 1237680.  2459924.  .00000000 0.0        07
3151208    0         15022500. 1237680.  2459924.  .00000000 0.0        08
3151300    0
3151301    .910345-3 .910345-3 0.0       01
3151302    .487913-3 .487915-3 0.0       02
3151303    .411825-4 .411825-4 0.0       03
3151304    .289111-3 .289109-3 0.0       04
3151305    .133199-3 .133198-3 0.0       05
3151306    .106449-3 .106449-3 0.0       06
3151307    .266103-4 .266103-4 0.0       07
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HOT LEG BREAK VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3170000    "HL BREAK  "        VALVE
3170101    315010000 800000000 8.3647-3  0.94883   0.94883   0100
3170102    0.93      0.84
3170201    0         .00000000 .00000000 0.0
3170300    TRPVLV
3170301    679
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REACTOR VESSEL NOZZLE - BROKEN LOOP COLD LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3350000    "RVN BLCL  "        BRANCH
3350001    2         0
3350101    0.0       0.749305  0.047979  0.0       0.0       0.0
3350102    4.0E-5    0.0       00
3350200    0         15028400. 1233660.  2459250.  .00000000
3351101    740000000 335000000 0.064130  1.450594  0.812933  0002
3352101    335010000 340000000 0.063426  0.1005    0.1005    0000
3351201    .06071680 .06071680 0.0
3352201    .06138070 .06138070 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* COLD LEG PIPE TO REFLOOD ASSIST BYPASS TEE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3400000    "CLP-RABS T"        BRANCH
3400001    1         0
3400101    0.0       0.698336  0.0443927 0.0       0.0       0.0
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3400102   4.0E-5    0.0       00
3400200   0         15028400. 1233140.  2459250.  .00000000
3401101   340010000 342000000 0.063426  0.1005    0.1005    0000
3401201   .06137130 .06137130 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* BROKEN LOOP COLD LEG RABS TO DTT
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3420000   "BLCL 2DTT "        BRANCH
3420001   1         0
3420101   0.0       0.5715069 0.0362484 0.0       0.0       0.0
3420102   4.0E-5    0.0       00
3420200   0         15028400. 1232540.  2459250.  .00000000
3421101   342000000 370000000 0.0388    0.84      0.84      0000
3421201   .10030000 .10030000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* BROKEN LOOP COLD LEG DTT TO BREAK PLANE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3440000   "BLCL 2BRK "        BRANCH
3440001   1         0
3440101   0.0       0.9286231 0.0310679 0.0       0.0       0.0
3440102   4.0E-5    0.0       00
3440200   0         15028400. 1232300.  2459250.  .00000000
3441101   342010000 344000000 0.0540157 6.545     14.05     0000
3441201   .759199-5 .759199-5 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* COLD LEG BREAK VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3470000   "CL BREAK  "        VALVE
3470101   344010000 805000000 8.3647-3  0.415     0.415     0100
3470102   0.93      0.84
3470201   0         .00000000 .00000000 0.0
3470300   TRPVLV
3470301   677
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REFLOOD ASSIST BYPASS PIPING - COLD LEG SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3700000   "RABS C L  "        PIPE
3700001   3
3700101   0.0388    2
3700102   0.0776    3
3700201   0.0388    2
3700301   0.0       3
3700401   0.0279    1
3700402   0.070     2
3700403   0.1165    3
3700601   90.0      1
3700602   0.0       3
3700701   0.64      1
3700702   0.0       3
3700801   4.0-5     0.0       3
3700901   0.28      0.28      1
3700902   0.84      0.84      2
3701001   00        3
3701101   0000      2
3701201   0         15026000. 1232040.  2459300.  .00000000 0.0       01
3701202   0         15023600. 1231420.  2459300.  .00000000 0.0       02
3701203   0         15023600. 1231430.  2459300.  .00000000 0.0       03
3701300   0
3701301   .10029000 .10029000 0.0       01
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3701302   .10027000 .10027000 0.0       02
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REFLOOD ASSIST BYPASS VALVES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3750000   "RABS VALVS"        SNGLJUN
3750101   370010000 380000000 0.0       0.90+4    0.90+4    0000
3750201   0         .05011390 .05011390 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REFLOOD ASSIST BYPASS PIPING - HOT LEG SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
3800000   "RABS H L  "        PIPE
3800001   3
3800101   0.0776    1
3800102   0.0388    3
3800201   0.0388    2
3800301   0.0       3
3800401   0.0915    1
3800402   0.048     2
3800403   0.0489    3
3800601   0.0       1
3800602   -90.0     2
3800603   0.0       3
3800701   0.0       1
3800702   -0.64     2
3800703   0.0       3
3800801   4.0-5     0.0       3
3800901   0.84      0.84      1
3800902   0.28      0.28      2
3801001   00        3
3801101   0000      2
3801201   0         15013400. 1231620.  2459400.  .00000000 0.0       01
3801202   0         15015700. 1231730.  2459400.  .00000000 0.0       02
3801203   0         15018100. 1231820.  2459400.  .00000000 0.0       03
3801300   0
3801301   .10020000 .10020000 0.0       01
3801302   .10018000 .10018000 0.0       02
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*  PRESSURIZER
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SURGE LINE PCS SIDE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4000000   "SRG LN PCS"        BRANCH
4000001   2         0
4000101   1.44561-3 2.30      0.0       0.0       90.0      0.54
4000102   2.3622-5  0.0       00
4000200   0         15012400. 1418060.  2459400.  .00000000
4001101   107000000 400000000 1.44561-3 3.9       3.9       0002
4002101   400010000 405000000 1.44561-3 2.85      2.85      1000
4001201   -.0607909 -.0607909 0.0
4002201   -.0608265 -.0608265 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER SURGE LINE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4050000   "SRG LN PZR"        PIPE
4050001   2
4050101   1.44561-3 2
4050201   1.44561-3 1
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4050301   2.30        2
4050401   0.0         2
4050601   90.0        2
4050701   0.30        2
4050801   2.3622-5    0.0        2
4050901   2.85        2.85       1
4051001   00          2
4051101   1000        1
4051201   0           15010800. 1427980.  2459500.  .00000000 0.0       01
4051202   0           15010100. 1444040.  2459500.  .00000000 0.0       02
4051300   0
4051301   -.0608633 -.0608633 0.0       01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* PRESSURIZER SURGE LINE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
4100000   "SRG LINE  "        SNGLJUN
4100101   405010000 415000000 1.44561-3 0.42      1.00      1000
4100201   0           -.0608789 -.0608789 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* PRESSURIZER VESSEL
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
4150000   "PZR VESSEL"        PIPE
4150001   6
4150101   0.0         2
4150102   0.5653      5
4150103   0.0         6
4150201   0.0         5
4150301   0.1815      1
4150302   0.1524      2
4150303   0.3967      3
4150304   0.5289      4
4150305   0.3967      5
4150306   0.1943      6
4150401   0.0684      1
4150402   0.0838      2
4150403   0.0         5
4150404   0.0732      6
4150501   0.0         6
4150601   90.0        6
4150801   4.0E-5      0.0        6
4151001   00          6
4151101   0000        5
4151201   0           15009100. 1586220.  2459600.  .00000000 0.0       01
4151202   0           15008000. 1586220.  2459600.  .00000000 0.0       02
4151203   0           15006300. 1586220.  2459600.  .00000000 0.0       03
4151204   0           15003800. 1586220.  2460000.  .03846070 0.0       04
4151205   0           15002300. 1586220.  2466560.  1.0000000 0.0       05
4151206   0           15002000. 1586220.  2468160.  1.0000000 0.0       06
4151300   0
4151301   -.23340-3 -.23340-3 0.0       01
4151302   -.15968-3 -.15968-3 0.0       02
4151303   -.19217-3 .36250000 0.0       03
4151304   -.4272500 -.48004-4 0.0       04
4151305   -.23263-4 -.23263-4 0.0       05
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* PRESSURIZER VESSEL TO TOP HAT
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
4170000   "VSSL-TPHAT"        SNGLJUN
4170101   415010000 420000000 0.0       0.0       0.0       0000
```

```
4170201  0          -.21090-4 -.21090-4 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER TOP HAT AND RELIEF CONNECTION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4200000  "PZR TOPHAT"         PIPE
4200001  2
4200101  0.0        2
4200201  0.0        1
4200301  0.1104915  2
4200401  0.0139870  2
4200601  90.0       2
4200801  4.E-5      0.346066  2
4201001  00         2
4201101  0000       1
4201201  0          15001900. 1509900.  2482590.  1.0000000 0.0       01
4201202  0          15001800. 1509900.  2484800.  1.0000000 0.0       02
4201300  0
4201301  -.11442-4  -.11442-4 0.0       01
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   STEAM GENERATOR SECONDARY SIDE
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRIMARY SEPARATOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5000000  "SEPARATOR "         SEPARATR
5000001  3          0
5000101  0.0        0.4445    0.2425    0.0       90.0      0.4445
5000102  4.E-5      0.2840    00
5000200  0          5828810.0 1145280.  2580000.  .49664000
5001101  500010000  520000000 0.087745  0.0       0.0       0100
5002101  500000000  505000000 0.087745  0.0       0.0       0100
5003101  515010000  500000000 0.29187   0.4       0.4       0100
5001201  .30829000  1.0170000 0.0
5002201  1.1801000  .17265000 0.0
5003201  2.4900000  2.4900000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SEPARATOR BYPASS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5030000  "SEPBYPASS "         BRANCH
5030001  2          0
5030101  0.0        0.4445    0.4384    0.0       90.0      0.4445
5030102  4.E-5      0.3678    00
5030200  0          5827350.0 1150000.  2591270.  .99988000
5031101  505000000  503000000 0.98627   0.0       0.0       0100
5032101  503010000  520000000 0.98627   0.8       0.0       0100
5031201  -1.265400  .17607000 0.0
5032201  -.3871600  .07560020 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SEPARATOR OUTLET REGION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5050000  "LWR SEPAR "         BRANCH
5050001  1          0
5050101  0.0        1.2131    1.4850    0.0       -90.0     -1.2131
5050102  4.E-5      1.9048    00
5050200  0          5830080.0 1236530.  2580000.  .02870570
5051101  505010000  508000000 0.0       0.0       0.0       0100
5051201  .64364000  -2.022800 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

```
* FEED INLET VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5080000  "UPR DWNCMR"       BRANCH
5080001  1         0
5080101  0.0       0.6096    0.22107   0.0       -90.0     -0.6096
5080102  4.E-5     0.163697  00
5080200  0         5835210.0 1145280.  2580000.  .00000000
5081101  508010000 510000000 0.0       0.0       0.0       0100
5081201  .66587000 .66587000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM GENERATOR DOWNCOMER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5100000  "DWNCMR    "       ANNULUS
5100001  3
5100101  0.232     3
5100201  0.0       2
5100301  0.6096    3
5100401  0.0       3
5100601  -90.0     3
5100701  -0.6096   3
5100801  4.E-5     0.10793   3
5100901  0.0       0.0       2
5101001  00        3
5101101  0000      2
5101201  0         5839840.0 1145550.  2580000.  .00000000 0.0       01
5101202  0         5844480.0 1145820.  2580000.  .00000000 0.0       02
5101203  0         5849120.0 1146090.  2580000.  .00000000 0.0       03
5101300  0
5101301  .66594000 .66594000 0.0       01
5101302  .66602000 .66602000 0.0       02
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* JUNCTION - DOWNCOMER TO BOILER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5130000  "DNCMR-BLR "       SNGLJUN
5130101  510010000 515000000 0.0       17.5      17.5      0100
5130201  0         .66609000 .88146000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM GENERATOR BOILER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5150000  "BOILER    "       PIPE
5150001  5
5150101  0.2776    4
5150102  0.306294  5
5150201  0.0       4
5150301  1.8288    4
5150302  1.2131    5
5150401  0.0       5
5150601  60.0      4
5150602  90.0      5
5150701  0.6096    4
5150702  1.2131    5
5150801  4.E-5     0.0234    4
5150802  4.E-5     0.5962    5
5150901  4.05      4.05      4
5151001  00        5
5151101  0100      4
5151201  0         5846670.0 1222840.  2580000.  .01975860 0.0       01
5151202  0         5842700.0 1274560.  2580000.  .05552290 0.0       02
5151203  0         5838650.0 1321180.  2580000.  .08907110 0.0       03
```

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5151204  0         5834160.0 1360130.  2580000.  .11715000 0.0        04
5151205  0         5829740.0 1414230.  2580000.  .15606000 0.0        05
5151300  0
5151301  .83850000 1.1089000 0.0       01
5151302  1.3147000 1.8082000 0.0       02
5151303  1.7463000 2.4614000 0.0       03
5151304  2.1057000 2.9324000 0.0       04
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER PORTION OF STEAM DOME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5200000  "LWR STM DM"        BRANCH
5200001  1         0
5200101  0.0       0.46956   0.705312  0.0       90.0      0.46956
5200102  4.E-5     1.383     00
5200200  0         5827210.0 1150000.  2591540.  .99979000
5201101  520010000 525000000 0.0       0.0       0.0       0000
5201201  -.0806823 .41903000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER PORTION OF STEAM DOME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5250000  "UPR STM DM"        BRANCH
5250001  1         0
5250101  0.0       0.46956   0.705312  0.0       90.0      0.46956
5250102  4.E-5     1.383     00
5250200  0         5827070.0 1150000.  2591710.  .99990000
5251101  525010000 530000000 0.0       0.8       0.8       0100
5251201  13.328000 13.578000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM PIPE FROM GENERATOR TO CONTROL VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5300000  "STEAM PIPE"        SNGLVOL
5300101  0.04635   25.074    0.0       0.0       0.0       0.0
5300102  4.E-5     0.0       00
5300200  0         5819190.0 1148038.  2591620.  1.0000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM FLOW CONTROL VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5400000  "CV-P4-10  "        VALVE
5400101  530010000 541000000 0.0047772 0.0       0.0       1100
5400201  0         13.593000 13.593000 0.0
5400300  MTRVLV
5400301  687       688       0.05      0.44405   540
20254000 NORMAREA
20254001 0.0       0.0
20254002 9.25-4    9.25-4
20254003 1.0       1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PIPE DOWNSTREAM OF STEAM CONTROL VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5410000  "COND INLET"        BRANCH
5410001  1         0
5410101  0.06557   54.44     0.0       0.0       0.0       0.0
5410102  4.E-5     0.0       00
5410200  0         2072970.0 914598.   2[illegible]98620.  .86686000
5411101  541010000 542000000 0.0       0.0       0.0       0100
5411201  13.013000 25.588000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* AIR COOLED CONDENSER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

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5420000   "CONDENSER "          TMDPVOL
5420101   0.21677    17.67      0.0        0.0        0.0        0.0
5420102   4.E-5      0.02       00
5420200   2                                                      *IC01
5420207   0.0        2.069E6    1.0                              *IC01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SIMPLIFIED FEED SYSTEM
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* FEED STORAGE TANK
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5650000   "FEED TANK "          TMDPVOL
5650101   29.81      3.048      0.0        0.0        0.0        0.0
5650102   4.E-5      0.0        00
5650200   3          502
5650201   0.0        2.15323E6 477.6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* FEED WATER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
5660000   "FEED      "          TMDPJUN
5660101   565000000 508000000 0.05
5660200   1          689
5660201   -100.0     18.788     0.0        0.0        *L2-5
5660202   0.0        18.788     0.0        0.0        *L2-5
5660203   0.5        10.0       0.0        0.0        *L2-5
5660204   1.0        2.50       0.0        0.0        *L2-5
5660205   1.5        1.00       0.0        0.0        *L2-5
5660206   2.0        0.25       0.0        0.0        *L2-5
5660207   2.5        0.00       0.0        0.0        *L2-5
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   ECC SYSTEM
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ECC CHECK VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6000000   "ECC CHKVLV"          VALVE
6000101   605010000 185000000 5.9896-3   0.935      0.935      1120
6000201   0          .00000000 .00000000 0.0
6000300   TRPVLV
6000301   681
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ECCS HEADER TO PCS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6050000   "ECCS HEADR"          SNGLVOL
6050101   5.9896-3   5.0148     0.0        0.0        90.0       3.3071202
6050102   4.0-5      0.0        00
6050200   0          4.5E+6     172410.    2459920.   .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6100000   "ACCUM VLV "          VALVE
6100101   615010000 605000000 5.9896-3   6.278      6.278      1000
6100201   0          -.4902-15 .79206-11 0.0
6100300   TRPVLV
6100301   682
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR PIPE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6150000   "ACC PIPE  "          SNGLVOL
```

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6150101  0.0       25.997165 0.4074774 0.0       0.0       0.0
6150102  4.0-5     0.0       00
6150200  0         4.5E+6    112409.   2459920.  .00000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR VESSEL
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*6200000  "ACCUMULATR"        ACCUM
*6200101  0.0       1.8103    2.3422    0.0       90.0      1.8103
*6200102  4.0-5     0.0       01
*6200200  4.223+6   305.38
*6201101  615000000 8.2132-3  13.3      13.3      0
*6202200  0.0       1.0662    2.4509    1.6927    0.04445   0 0 0 0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* BWST LPIS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6250000  "BWST LPIS "         TMDPVOL
6250101  20.44     5.0       0.0       0.0       90.0      5.0
6250102  4.0E-5    0.0       00
6250200  3
6250201  0.0       1.0+5     300.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOW PRESSURE INJECTION SYSTEM
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6300000  "LPIS     "          TMDPJUN
6300101  625000000 605000000 5.9896-3
6300200  1         684       P         605010000
6300201  -1.0      0.0       0.0       0.0
6300202  0.0       0.0       0.0       0.0
6300203  8.483+4   7.045     0.0       0.0
6300204  4.297+5   6.091     0.0       0.0
6300205  7.745+5   5.045     0.0       0.0
6300206  9.448+5   4.313     0.0       0.0
6300207  1.119+6   3.454     0.0       0.0
6300208  1.186+6   3.173     0.0       0.0
6300209  1.257+6   2.673     0.0       0.0
6300210  1.326+6   2.159     0.0       0.0
6300211  1.395+6   1.536     0.0       0.0
6300212  1.464+6   0.7182    0.0       0.0
6300213  1.517+6   0.0       0.0       0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* BWST HPIS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6350000  "BWST HPIS "         TMDPVOL
6350101  20.44     5.0       0.0       0.0       90.0      5.0
6350102  4.0E-5    0.0       00
6350200  3
6350201  0.0       1.0+5     300.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HIGH PRESSURE INJECTION SYSTEM
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6400000  "HPIS     "          TMDPJUN
6400101  635000000 185000000 5.9896-3
6400200  1         683       P         185010000
6400201  -1.0      0.0       0.0       0.0
6400202  0.0       .75687272 0.0       0.0
6400203  7.72514+6 .75687272 0.0       0.0
6400204  8.3597+6  .31536281 0.0       0.0
6400205  17.2436+6 .31536281 0.0       0.0
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
```

```
*
*   CONTAINMENT
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CONTAINMENT BROKEN LOOP HOT LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
8000000  "CONT BLHL "       TMDPVOL
8000101  0.0       1.0      0.1       0.0       0.0       0.0
8000102  0.0       0.0      00
8000200  2
8000201  0.0       1.0+5    1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CONTAINMENT BROKEN LOOP COLD LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
8050000  "CONT BLCL "       TMDPVOL
8050101  0.0       1.0      0.1       0.0       0.0       0.0
8050102  0.0       0.0      00
8050200  2
8050201  0.0       1.0+5    1.0
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   REACTOR VESSEL HEAT STRUCTURES
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACTIVE CORE
* STATION 116.91 TO 182.94
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PERIPHERAL FUEL MODULES
*---- ----1---- ----1---- ----1----
10011000 12        10        2         1         0.0  555  1  8
10011001 7.869E+6
10011011 1.0E-6    2.0E-6    0.0       0.0       12
10011100 0         1
10011101 5         4.65564-3
10011102 1         4.75106-3
10011103 3         5.36806-3
10011201 1         5
10011202 -2        6
10011203 -3        9
10011301 1.0       5
10011302 0.0       9
10011401 560.0     10
10011501 0         0         0         1         153.113   12
10011601 230010000 10000     1         1         153.113   12
10011701 900       0.0416629 0.0       0.0       1 * SGTR 36MW
10011702 900       0.0778047 0.0       0.0       2 * SGTR 36MW
10011703 900       0.0912202 0.0       0.0       3 * SGTR 36MW
10011704 900       0.0948738 0.0       0.0       4 * SGTR 36MW
10011705 900       0.0980981 0.0       0.0       5 * SGTR 36MW
10011706 900       0.0977318 0.0       0.0       6 * SGTR 36MW
10011707 900       0.0861681 0.0       0.0       7 * SGTR 36MW
10011708 900       0.0662856 0.0       0.0       8 * SGTR 36MW
10011709 900       0.0565472 0.0       0.0       9 * SGTR 36MW
10011710 900       0.0386339 0.0       0.0      10 * SGTR 36MW
10011711 900       0.0146376 0.0       0.0      11 * SGTR 36MW
10011712 900       0.0099343 0.0       0.0      12 * SGTR 36MW
10011901 0         0.013633  0.01504   1.6764    12
*---- ----1---- ----1---- ----1----
* CENTER FUEL MODULE
```

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*---- ----1---- ----1---- ----1----
10021000 12        10        2         1         0.0  555  1  8
10021001 7.869E+6
10021011 1.0E-6    2.0E-6    0.0       0.0       12
10021100 0         1
10021101 5         4.65564-3
10021102 1         4.75106-3
10021103 3         5.36806-3
10021201 1         5
10021202 -2        6
10021203 -3        9
10021301 1.0       5
10021302 0.0       9
10021401 560.0     10
10021501 0         0         0         1         28.4988   12
10021601 230010000 10000     1         1         28.4988   12
10021701 900       1.25-2    0.0       0.0       1 * SGTR 36MW
10021702 900       1.33435-2 0.0       0.0       2 * SGTR 36MW
10021703 900       2.7-2     0.0       0.0       3 * SGTR 36MW
10021704 900       2.80814-2 0.0       0.0       4 * SGTR 36MW
10021705 900       2.85-2    0.0       0.0       5 * SGTR 36MW
10021706 900       2.83936-2 0.0       0.0       6 * SGTR 36MW
10021707 900       2.44008-2 0.0       0.0       7 * SGTR 36MW
10021708 900       1.87704-2 0.0       0.0       8 * SGTR 36MW
10021709 900       1.58694-2 0.0       0.0       9 * SGTR 36MW
10021710 900       1.08422-2 0.0       0.0       10 * SGTR 36MW
10021711 900       0.51629-2 0.0       0.0       11 * SGTR 36MW
10021712 900       0.3504-2  0.0       0.0       12 * SGTR 36MW
10021901 0         0.013633  0.01504   1.6764    12
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   STEAM GENERATOR HEAT STRUCTURES
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TUBING
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
10060000 8         8         2         1         0.0051054
10060100 0         1
10060101 7         0.006348984
10060201 6         7
10060301 0.0       7
10060401 560.0     8
10060501 115010000 10000     1         1         1124.71   3
10060502 115040000 10000     1         1         849.063   5
10060503 115060000 10000     1         1         1124.71   8
10060601 515010000 10000     1         1         1124.71   3
10060602 515040000 0         1         1         849.063   4
10060603 515040000 0         1         1         849.063   5
10060604 515030000 -10000    1         1         1124.71   8
10060701 0         0         0         0         8
10060801 0         0         0         0         8
10060901 0         0         0         0         8
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   HEAT STRUCTURE THERMAL PROPERTY DATA
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100100 TBL/FCTN  1         1         * UO2
20100200 TBL/FCTN  3         1         * GAP
```

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20100300  TBL/FCTN  1          1          * ZR
20100400  TBL/FCTN  1          1          * S-STEEL
20100500  C-STEEL
20100600  TBL/FCTN  1          1          * INCONEL 600
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* U02 - THERMAL CONDUCTIVITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100101  2.7315E2  8.44
20100102  4.1667E2  6.46
20100103  5.3315E2  5.782385
20100104  6.99817E2 4.633177
20100105  8.66483E2 3.880307
20100106  1.03315E3 3.357625
20100107  1.08871E3 3.155129
20100108  1.19982E3 2.983787
20100109  1.28315E3 2.836674
20100110  1.36648E3 2.713792
20100111  1.53315E3 2.521680
20100112  1.61648E3 2.448990
20100113  1.69982E3 2.391875
20100114  1.97759E3 2.289762
20100115  2.25537E3 2.307069
20100116  2.53315E3 2.433413
20100117  2.81093E3 2.661870
20100118  3.08871E3 2.994171
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* U02 - VOLUMETRIC HEAT CAPACITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100151  2.73150E2 2.310427E6
20100152  3.23150E2 2.571985E6
20100153  3.73150E2 2.746357E6
20100154  6.7315E2  3.138694E6
20100155  1.37315E3 3.443844E6
20100156  1.77315E3 3.531030E6
20100157  1.97315E3 3.792588E6
20100158  2.17315E3 4.228518E6
20100159  2.37315E3 4.882412E6
20100160  2.67315E3 6.015829E6
20100161  2.77315E3 6.320980E6
20100162  2.87315E3 6.582538E6
20100163  2.97315E3 6.713317E6
20100164  3.11315E3 6.800503E6
20100165  4.69982E3 6.800503E6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HELIUM(GAP) - THERMAL CONDUCTIVITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100201  HELIUM    1.00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HELIUM(GAP) - VOLUMETRIC HEAT CAPACITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100251  273.15    5.4
20100252  5000.0    5.4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ZIRCALOY-4 - THERMAL CONDUCTIVITY          FROM MATPRO
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100301   300.0    12.68
*20100301  380.4     13.6
20100302  469.3     14.6
20100303  577.6     15.8
```

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20100304  685.9      17.3
20100305  774.8      18.4
20100306  872.0      19.8
20100307  973.2      21.8
20100308  1073.2     23.2
20100309  1123.2     25.4
20100310  1152.3     24.2
20100311  1232.2     25.5
20100312  1331.2     26.6
20100313  1404.2     28.2
20100314  1576.2     33.0
20100315  1625.2     36.7
20100316  1755.2     41.2
20100317  2273.2     55.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ZIRCALOY-4 - VOLUMETRIC HEAT CAPACITY      FROM MATPRO
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100351  300.0      1.841E6
20100352  400.0      1.978E6
20100353  640.0      2.168E6
20100354  1090.0     2.456E6
20100355  1093.0     3.288E6
20100356  1113.0     3.865E6
20100357  1133.0     4.028E6
20100358  1153.0     4.709E6
20100359  1173.0     5.345E6
20100360  1193.0     5.044E6
20100361  1213.0     4.054E6
20100362  1233.0     3.072E6
20100363  1243.0     2.332E6
20100364  1477.0     2.332E6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* S-STEEL - THERMAL CONDUCTIVITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100401  273.15     12.98
20100402  1199.82    25.1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* S-STEEL - VOLUMETRIC HEAT CAPACITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100451  273.15     3.83E6
20100452  366.5      3.83E6
20100453  477.59     4.190E6
20100454  588.59     4.336E6
20100455  699.82     4.504E6
20100456  810.93     4.639E6
20100457  922.04     4.773E6
20100458  1144.26    5.076E6
20100459  1366.5     5.376E6
20100460  1477.59    5.546E6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INCONEL-600 - THERMAL CONDUCTIVITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100601  366.5      13.85
20100602  477.6      15.92
20100603  588.7      18.17
20100604  700.0      20.42
20100605  810.9      22.50
20100606  922.0      24.92
20100607  1033.2     26.83
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20100608  1144.3    29.42
20100609  1477.6    36.06
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* INCONEL-600 - VOLUMETRIC HEAT CAPACITY
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100651  366.5     3.908+6
20100652  477.6     4.084+6
20100653  588.7     4.260+6
20100654  700.0     4.436+6
20100656  810.9     4.665+6
20100657  922.0     4.929+6
20100658  1033.2    5.105+6
20100659  1477.6    5.727+6
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*         CONTROL VARIABLES
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*  001-006  LEVEL CALCULATORS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* 001 STEAM GENERATOR LEVEL
20500100  SGLVL     SUM       1.0       0.0       1
20500101  0.0       0.4445    VOIDF     503010000
20500102            1.2131    VOIDF     505010000
20500103            0.6096    VOIDF     508010000
20500104            0.6096    VOIDF     510010000
20500105            0.6096    VOIDF     510020000
20500106            0.6096    VOIDF     510030000
* 002 PRESSURIZER LEVEL
20500200  PZRLVL    SUM       1.0       0.0       1
20500201  0.0       0.1815    VOIDF     415010000
20500202            0.1524    VOIDF     415020000
20500203            0.3967    VOIDF     415030000
20500204            0.5289    VOIDF     415040000
20500205            0.3967    VOIDF     415050000
20500206            0.1943    VOIDF     415060000
20500207            0.1029    VOIDF     420010000
20500208            0.1029    VOIDF     420020000
* 003 REACTOR VESSEL LEVEL
20500300  RVLVL     SUM       1.0       0.0       1
20500301  0.0       0.84888   VOIDF     260010000
20500302            0.24333   VOIDF     255010000
20500303            0.9285337 VOIDF     250010000
20500304            0.4933248 VOIDF     245010000
20500305            0.4933248 VOIDF     240010000
20500306            0.4234231 VOIDF     230060000
20500307            0.2794034 VOIDF     230050000
20500308            0.2794034 VOIDF     230040000
20500309            0.2794034 VOIDF     230030000
20500310            0.2794034 VOIDF     230020000
20500311            0.3728765 VOIDF     230010000
20500312            0.4269792 VOIDF     225010000
20500313            0.3533183 VOIDF     215010000
20500314            0.3741720 VOIDF     220010000
* 004 ACCUMULATOR LEVEL
*20500400  ACCMLVL   INTEGRAL  -6.3480-3 2.0447     0
*20500401  VELFJ     62001000
* 007 REACTOR VESSEL DOWNCOMER LEVEL INTACT SIDE
20500700  RVDCLVLIN SUM       1.0       0.0       1
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20500701  0.0       0.3302040 VOIDF      700010000
20500702            0.3951272 VOIDF      702010000
20500703            1.5200561 VOIDF      704010000
20500704            1.2616333 VOIDF      706010000
20500705            1.0792591 VOIDF      708010000
20500706            0.3533183 VOIDF      215010000
20500707            0.3741720 VOIDF      220010000
* 008 REACTOR VESSEL DOWNCOMER LEVEL BROKEN SIDE
20500800  RVDCLVLBK SUM       1.0        0.0        1
20500801  0.0       0.3302040 VOIDF      710010000
20500802            0.3951272 VOIDF      712010000
20500803            1.5200561 VOIDF      714010000
20500804            1.2616333 VOIDF      716010000
20500805            1.0792591 VOIDF      718010000
20500806            0.3533183 VOIDF      215010000
20500807            0.3741720 VOIDF      220010000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*  061-072  PRIMARY SYSTEM MASS CALCULATOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* 061 INTACT LOOP HOT LEG MASS
20506100  ILHLMASS  SUM       1.0        0.0        1
20506101  0.0       0.102752  RHO        100010000
20506102            7.57291-2 RHO        105010000
20506103            6.43178-2 RHO        110010000
20506104            7.96973-2 RHO        112010000
20506105            5.79614-2 RHO        112020000
* 062 STEAM GENERATOR PRIMAPY MASS
20506200  SGPRIMASS SUM       1.0        0.0        1
20506201  0.0       0.335320  RHO        114010000
20506202            0.136356  RHO        115010000
20506203            9.21538-2 RHO        115020000
20506204            9.21538-2 RHO        115030000
20506205            6.99783-2 RHO        115040000
20506206            6.99783-2 RHO        115050000
20506207            9.21538-2 RHO        115060000
20506208            9.21538-2 RHO        115070000
20506209            0.136356  RHO        115080000
20506210            0.335320  RHO        116010000
* 063 PUMP SUCTION PIPING MASS
20506300  PMPSUMASS SUM       1.0        0.0        1
20506301  0.0       4.45625-2 RHO        118010000
20506302            4.45137-2 RHO        118020000
20506303            3.54278-2 RHO        118030000
20506304            4.87901-2 RHO        120010000
20506305            6.40548-2 RHO        125010000
20506306            1.77444-2 RHO        130010000
20506307            6.40548-2 RHO        155010000
20506308            1.77444-2 RHO        160010000
* 064 INTACT LOOP COLD LEG MASS
20506400  ILCLMASS  SUM       1.0        0.0        1
20506401  0.0       9.91000-2 RHO        135010000
20506402            1.83849-2 RHO        140010000
20506403            6.33861-2 RHO        145010000
20506404            3.16011-2 RHO        150010000
20506405            9.91000-2 RHO        165010000
20506406            1.92958-2 RHO        170010000
20506407            3.54280-2 RHO        175010000
20506408            3.88950-2 RHO        175020000
20506409            7.30598-2 RHO        180010000
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20506410                6.44920-2 RHO          185010000
* 065 DOWNCOMER/LOWER PLENUM MASS
20506500  DCLPMASS   SUM          1.0          0.0          1
20506501  0.0        0.0432082 RHO          700010000
20506502             0.0578606 RHO          702010000
20506503             0.1581866 RHO          704010000
20506504             0.1217000 RHO          706010000
20506505             0.0986806 RHO          708010000
20506506             0.0432082 RHO          710010000
20506507             0.0578606 RHO          712010000
20506508             0.1581866 RHO          714010000
20506509             0.1217000 RHO          716010000
20506510             0.0986806 RHO          718010000
20506511             0.24520   RHO          215010000
20506512             0.29656   RHO          220010000
* 067 CORE/UPPER PLENUM MASS
20506700  CRUPMASS   SUM          1.0          0.0          1
20506701  0.0        0.12094   RHO          225010000
20506702             0.0683340 RHO          230010000
20506703             0.0478582 RHO          230020000
20506704             0.0483329 RHO          230030000
20506705             0.0479138 RHO          230040000
20506706             0.0479052 RHO          230050000
20506707             0.0750459 RHO          230060000
20506708             0.0091280 RHO          235010000
20506709             0.0072325 RHO          235020000
20506710             0.0088095 RHO          235030000
20506711             0.1195494 RHO          240010000
20506712             0.1280806 RHO          245010000
20506713             0.1436936 RHO          250010000
20506714             0.1154214 RHO          251010000
20506715             0.083595  RHO          255010000
20506716             0.310967  RHO          260010000
* 068 BROKEN LOOP HOT LEG MASS
20506800  BLHLMASS   SUM          1.0          0.0          1
20506801  0.0        5.75410-2 RHO          300010000
20506802             4.42927-2 RHO          305010000
20506803             6.78467-2 RHO          310010000
20506804             7.75291-3 RHO          315010000
20506805             1.72111-1 RHO          315020000
20506806             8.97552-2 RHO          315030000
20506807             8.97552-2 RHO          315040000
20506808             1.72111-1 RHO          315050000
20506809             1.82303-2 RHO          315060000
20506810             5.46687-2 RHO          315070000
20506811             1.82489-2 RHO          315080000
20506812             9.15000-2 RHO          380010000
20506813             4.80000-2 RHO          380020000
20506814             4.89000-2 RHO          380030000
* 069 BROKEN LOOP COLD LEG MASS
20506900  BLCLMASS   SUM          1.0          0.0          1
20506901  0.0        4.79790-2 RHO          335010000
20506902             4.43927-2 RHO          340010000
20506903             3.62484-2 RHO          342010000
20506904             3.10679-2 RHO          344010000
20506907             2.79000-2 RHO          370010000
20506908             7.00000-2 RHO          370020000
20506909             1.16500-1 RHO          370030000
* 070 PRESSURIZER MASS
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20507000  PZRMASS   SUM        1.0       0.0       1
20507001  0.0       3.33500-3 RHO       400010000
20507002            3.33500-3 RHO       405010000
20507003            3.33500-3 RHO       405020000
20507004            6.84000-2 RHO       415010000
20507005            8.38000-2 RHO       415020000
20507006            2.24255-1 RHO       415030000
20507007            2.98987-1 RHO       415040000
20507008            2.24255-1 RHO       415050000
20507009            7.32000-2 RHO       415060000
20507010            1.42000-2 RHO       420010000
20507011            1.42000-2 RHO       420020000
20507012            2.12609-3 RHO       430010000
* 071 REACTOR VESSEL TOTAL MASS
20507100  RVMASS    SUM        1.0       0.0       1
20507101  0.0       1.0        CNTRLVAR  65
20507103            1.0        CNTRLVAR  67
* 072 PCS TOTAL MASS
20507200  PCSMASS   SUM        1.0       0.0       1
20507201  0.0       1.0        CNTRLVAR  61
20507202            1.0        CNTRLVAR  62
20507203            1.0        CNTRLVAR  63
20507204            1.0        CNTRLVAR  64
20507205            1.0        CNTRLVAR  68
20507206            1.0        CNTRLVAR  69
20507207            1.0        CNTRLVAR  70
20507208            1.0        CNTRLVAR  71
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   GENERAL TABLE DATA
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*
*      TABLE
*      NUMBER      DESCRIPTION
*      ------      -----------
*
*       900        REACTOR POWER VS TIME AFTER SCRAM
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20290000  POWER     699       1.0       36.0+6
20290001  0.0       1.0
20290002  0.1       0.900689  * FROM L2-3 POSTTEST
20290003  0.2       0.274300
20290004  0.3       0.153171
20290005  0.4       0.110821
20290006  0.5       0.091625
20290007  0.6       0.083212
20290008  0.8       0.073556
20290009  1.0       0.062500
20290010  1.5       0.063089
20290011  2.0       0.059854
20290012  3.0       0.057265
20290013  4.0       0.055204
20290014  6.0       0.052085
20290015  8.0       0.049776
20290016  10.0      0.047947
20290017  15.0      0.044575
20290018  20.0      0.042176
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20290019  30.0      0.038783
20290020  40.0      0.036348
20290021  60.0      0.031546
20290022  1.+5      0.001460  * FROM LTR LO-08-81-173
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   PUMP DATA
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* SINGLE PHASE HEAD CURVES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1351100   1                 1
1351101   0.000000E+00      1.403600E+00
1351102   1.906100E-01      1.363600E+00
1351103   3.896300E-01      1.318600E+00
1351104   5.939600E-01      1.232800E+00
1351105   7.902000E-01      1.133600E+00
1351106   1.000000E+00      1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1351200   1                 2
1351201   0.000000E+00      -6.700000E-01
1351202   2.000000E-01      -5.000000E-01
1351203   4.000000E-01      -2.500000E-01
1351204   5.755400E-01      0.000000E+00
1351205   7.443200E-01      2.583000E-01
1351206   7.734800E-01      3.778000E-01
1351207   8.631300E-01      6.326000E-01
1351208   1.000000E+00      1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1351300   1                 3
1351301   -1.000000E+00     2.472200E+00
1351302   -8.057400E-01     2.047400E+00
1351303   -6.069000E-01     1.831000E+00
1351304   -4.068300E-01     1.624000E+00
1351305   -2.001710E-01     1.470500E+00
1351306   0.000000E+00      1.403600E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1351400   1                 4
1351401   -1.000000E+00     2.472200E+00
1351402   -8.229700E-01     1.996800E+00
1351403   -6.333200E-01     1.589700E+00
1351404   -4.553400E-01     1.327900E+00
1351405   -2.710900E-01     1.194900E+00
1351406   -1.771600E-01     1.060500E+00
1351407   -9.073000E-02     1.015600E+00
1351408   0.000000E+00      9.342790E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1351500   1                 5
1351501   0.000000E+00      2.500000E-01
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1351502   2.000000E-01          2.800000E-01
1351503   4.000000E-01          3.400000E-01
1351504   4.118000E-01          2.768000E-01
1351505   5.976300E-01          4.584000E-01
1351506   7.934670E-01          6.992000E-01
1351507   1.000000E+00          1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351600   1                     6
1351601   0.000000E+00          9.342790E-01
1351602   9.109900E-02          9.229000E-01
1351603   1.865090E-01          8.963000E-01
1351604   2.717620E-01          8.750000E-01
1351605   4.558720E-01          8.433000E-01
1351606   5.744060E-01          8.355000E-01
1351607   7.405760E-01          8.466000E-01
1351608   7.666190E-01          8.469000E-01
1351609   8.714710E-01          8.838000E-01
1351610   1.000000E+00          1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351700   1                     7
1351701   -1.000000E+00         -1.000000E+00
1351702   -8.000000E-01         -6.300000E-01
1351703   -6.000000E-01         -3.000000E-01
1351704   -4.000000E-01         -5.000000E-02
1351705   -2.000000E-01         1.500000E-01
1351706   0.000000E+00          2.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351800   1                     8
1351801   -1.000000E+00         -1.000000E+00
1351802   -8.000000E-01         -9.700000E-01
1351803   -6.000000E-01         -9.500000E-01
1351804   -4.000000E-01         -8.800000E-01
1351805   -2.000000E-01         -8.000000E-01
1351806   0.000000E+00          -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SINGLE PHASE TORQUE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351900   2                     1
1351901   0.000000E+00          6.032000E-01
1351902   1.930000E-01          6.325000E-01
1351903   3.930000E-01          7.369000E-01
1351904   5.955200E-01          8.331000E-01
1351905   7.978200E-01          9.229000E-01
1351906   1.000000E+00          1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352000   2                     2
1352001   0.000000E+00          -6.700000E-01
1352002   4.000000E-01          -2.500000E-01
1352003   5.000000E-01          1.500000E-01
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1352004   7.372550E-01          5.265860E-01
1352005   7.680490E-01          6.065940E-01
1352006   8.672300E-01          7.436600E-01
1352007   1.000000E+00          1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352100   2                     3
1352101   -1.000000E+00         1.984300E+00
1352102   -8.009600E-01         1.394000E+00
1352103   -6.063800E-01         1.097500E+00
1352104   -4.068600E-01         8.220000E-01
1352105   -1.992800E-01         6.648000E-01
1352106   0.000000E+00          6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352200   2                     4
1352201   -1.000000E+00         1.984300E+00
1352202   -8.223400E-01         1.830800E+00
1352203   -6.337100E-01         1.682400E+00
1352204   -4.585300E-01         1.557000E+00
1352205   -2.670230E-01         1.436200E+00
1352206   -1.761070E-01         1.387900E+00
1352207   -8.931000E-02         1.348100E+00
1352208   0.000000E+00          1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352300   2                     5
1352301   0.000000E+00          -4.500000E-01
1352302   4.000000E-01          -2.500000E-01
1352303   5.000000E-01          0.000000E+00
1352304   1.000000E+00          3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352400   2                     6
1352401   0.000000E+00          1.233610E+00
1352402   9.064300E-02          1.196500E+00
1352403   1.885690E-01          1.109600E+00
1352404   2.734700E-01          1.041600E+00
1352405   4.586690E-01          8.958000E-01
1352406   5.744800E-01          7.807000E-01
1352407   7.381600E-01          6.134000E-01
1352408   7.685200E-01          5.849000E-01
1352409   8.700570E-01          4.877000E-01
1352410   1.000000E+00          3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352500   2                     7
1352501   -1.000000E+00         -1.000000E+00
1352502   -3.000000E-01         -9.000000E-01
1352503   -1.000000E-01         -5.000000E-01
1352504   0.000000E+00          -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
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1352600   2                  8
1352601   -1.000000E+00      -1.000000E+00
1352602   -2.500000E-01      -9.000000E-01
1352603   -8.000000E-02      -8.000000E-01
1352604   0.000000E+00       -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TWO - PHASE MULTIPLIER DATA FROM L3-6 TEST DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1353000   0
1353001   0.000000E+00       0.000000E+00
1353002   1.000000E-01       0.000000E+00
1353003   2.000000E-01       1.000000E-01
1353004   3.000000E-01       2.000000E-01
1353005   3.500000E-01       3.000000E-01
1353006   4.000000E-01       6.000000E-01
1353007   5.000000E-01       6.000000E-01
1353008   6.000000E-01       6.000000E-01
1353009   7.000000E-01       6.000000E-01
1353010   8.000000E-01       5.000000E-01
1353011   9.000000E-01       3.000000E-01
1353012   1.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1353100   0
1353101   0.000000E+00       0.000000E+00
1353102   1.000000E-01       0.000000E+00
1353103   2.000000E-01       1.000000E-01
1353104   3.000000E-01       3.000000E-01
1353105   3.500000E-01       5.000000E-01
1353106   4.000000E-01       7.500000E-01
1353107   5.000000E-01       7.500000E-01
1353108   6.000000E-01       7.500000E-01
1353109   7.000000E-01       7.500000E-01
1353110   8.000000E-01       7.500000E-01
1353111   9.000000E-01       5.000000E-01
1353112   1.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2-PHASE DIFFERENCE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* HEAD CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354100   1                  1
1354101   0.000000E+00       1.000000E+00
1354102   1.000000E+00       1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354200   1                  2
1354201   0.000000E+00       1.000000E+00
1354202   1.000000E+00       1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354300   1                  3
1354301   -1.000000E+00      -1.160000E+00
1354302   -9.000000E-01      -1.240000E+00
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1354303   -8.000000E-01        -1.770000E+00
1354304   -7.000000E-01        -2.360000E+00
1354305   -6.000000E-01        -2.790000E+00
1354306   -5.000000E-01        -2.910000E+00
1354307   -4.000000E-01        -2.670000E+00
1354308   -2.500000E-01        -1.690000E+00
1354309   -1.000000E-01        -5.000000E-01
1354310   0.000000E+00         0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354400   1                    4
1354401   -1.000000E+00        -1.160000E+00
1354402   -9.000000E-01        -7.800000E-01
1354403   -8.000000E-01        -5.000000E-01
1354404   -7.000000E-01        -3.100000E-01
1354405   -6.000000E-01        -1.700000E-01
1354406   -5.000000E-01        -8.000000E-02
1354407   -3.500000E-01        0.000000E+00
1354408   -2.000000E-01        5.000000E-02
1354409   -1.000000E-01        8.000000E-02
1354410   0.000000E+00         1.100000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354500   1                    5
1354501   0.000000E+00         0.000000E+00
1354502   2.000000E-01         -3.400000E-01
1354503   4.000000E-01         -6.500000E-01
1354504   6.000000E-01         -9.300000E-01
1354505   8.000000E-01         -1.190000E+00
1354506   1.000000E+00         -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354600   1                    6
1354601   0.000000E+00         1.100000E-01
1354602   1.000000E-01         1.300000E-01
1354603   2.500000E-01         1.500000E-01
1354604   4.000000E-01         1.300000E-01
1354605   5.000000E-01         7.000000E-02
1354606   6.000000E-01         -4.000000E-02
1354607   7.000000E-01         -2.300000E-01
1354608   8.000000E-01         -5.100000E-01
1354609   9.000000E-01         -9.100000E-01
1354610   1.000000E+00         -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354700   1                    7
1354701   -1.000000E+00        0.000000E+00
1354702   0.000000E+00         0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354800   1                    8
1354801   -1.000000E+00        0.000000E+00
1354802   0.000000E+00         0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
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* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354900   2                 1
1354901   0.000000E+00      1.000000E+00
1354906   1.000000E+00      1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355000   2                 2
1355001   0.000000E+00      1.000000E+00
1355007   1.000000E+00      1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355100   2                 3
1355101   -1.000000E+00     1.984300E+00
1355102   -8.009600E-01     1.394000E+00
1355103   -6.063800E-01     1.097500E+00
1355104   -4.068600E-01     8.220000E-01
1355105   -1.992800E-01     6.648000E-01
1355106   0.000000E+00      6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355200   2                 4
1355201   -1.000000E+00     1.984300E+00
1355202   -8.223400E-01     1.830800E+00
1355203   -6.337100E-01     1.682400E+00
1355204   -4.585300E-01     1.557000E+00
1355205   -2.670230E-01     1.436200E+00
1355206   -1.761070E-01     1.387900E+00
1355207   -8.931000E-02     1.348100E+00
1355208   0.000000E+00      1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355300   2                 5
1355301   0.000000E+00      -4.500000E-01
1355302   4.000000E-01      -2.500000E-01
1355303   5.000000E-01      0.000000E+00
1355304   1.000000E+00      3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355400   2                 6
1355401   0.000000E+00      1.233610E+00
1355402   9.064300E-02      1.196500E+00
1355403   1.885690E-01      1.109600E+00
1355404   2.734700E-01      1.041600E+00
1355405   4.586690E-01      8.958000E-01
1355406   5.744800E-01      7.807000E-01
1355407   7.381600E-01      6.134000E-01
1355408   7.685200E-01      5.849000E-01
1355409   8.700570E-01      4.877000E-01
1355410   1.000000E+00      3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355500   2                 7
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1355501   -1.000000E+00        -1.000000E+00
1355502   -3.000000E-01        -9.000000E-01
1355503   -1.000000E-01        -5.000000E-01
1355504   0.000000E+00         -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355600   2                    8
1355601   -1.000000E+00        -1.000000E+00
1355602   -2.500000E-01        -9.000000E-01
1355603   -8.000000E-02        -8.000000E-01
1355604   0.000000E+00         -6.700000E-01
* $$$ REMOVE ALL REMAINING DATA CARDS AFTER ACHIEVING STEADY STATE
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*   PUMP DATA
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SINGLE PHASE HEAD CURVES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651100   1                    1
1651101   0.000000E+00         1.403600E+00
1651102   1.906100E-01         1.363600E+00
1651103   3.896300E-01         1.318600E+00
1651104   5.939600E-01         1.232800E+00
1651105   7.902000E-01         1.133600E+00
1651106   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651200   1                    2
1651201   0.000000E+00         -6.700000E-01
1651202   2.000000E-01         -5.000000E-01
1651203   4.000000E-01         -2.500000E-01
1651204   5.755400E-01         0.000000E+00
1651205   7.443200E-01         2.583000E-01
1651206   7.734800E-01         3.778000E-01
1651207   8.631300E-01         6.326000E-01
1651208   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651300   1                    3
1651301   -1.000000E+00        2.472200E+00
1651302   -8.057400E-01        2.047400E+00
1651303   -6.069000E-01        1.831000E+00
1651304   -4.068300E-01        1.624000E+00
1651305   -2.001710E-01        1.470500E+00
1651306   0.000000E+00         1.403600E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651400   1                    4
1651401   -1.000000E+00        2.472200E+00
1651402   -8.229700E-01        1.996800E+00
1651403   -6.333200E-01        1.589700E+00
1651404   -4.553400E-01        1.327900E+00
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1651405   -2.710900E-01        1.194900E+00
1651406   -1.771600E-01        1.060500E+00
1651407   -9.073000E-02        1.015600E+00
1651408   0.000000E+00         9.342790E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651500   1                    5
1651501   0.000000E+00         2.500000E-01
1651502   2.000000E-01         2.800000E-01
1651503   4.000000E-01         3.400000E-01
1651504   4.118000E-01         2.768000E-01
1651505   5.976300E-01         4.584000E-01
1651506   7.934670E-01         6.992000E-01
1651507   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651600   1                    6
1651601   0.000000E+00         9.342790E-01
1651602   9.109900E-02         9.229000E-01
1651603   1.865090E-01         8.963000E-01
1651604   2.717620E-01         8.750000E-01
1651605   4.558720E-01         8.433000E-01
1651606   5.744060E-01         8.355000E-01
1651607   7.405760E-01         8.466000E-01
1651608   7.666190E-01         8.469000E-01
1651609   8.714710E-01         8.838000E-01
1651610   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651700   1                    7
1651701   -1.000000E+00        -1.000000E+00
1651702   -8.000000E-01        -6.300000E-01
1651703   -6.000000E-01        -3.000000E-01
1651704   -4.000000E-01        -5.000000E-02
1651705   -2.000000E-01        1.500000E-01
1651706   0.000000E+00         2.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651800   1                    8
1651801   -1.000000E+00        -1.000000E+00
1651802   -8.000000E-01        -9.700000E-01
1651803   -6.000000E-01        -9.500000E-01
1651804   -4.000000E-01        -8.800000E-01
1651805   -2.000000E-01        -8.000000E-01
1651806   0.000000E+00         -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SINGLE PHASE TORQUE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1651900   2                    1
1651901   0.000000E+00         6.032000E-01
1651902   1.930000E-01         6.325000E-01
1651903   3.930000E-01         7.369000E-01
1651904   5.955200E-01         8.331000E-01
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1651905   7.978200E-01         9.229000E-01
1651906   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652000   2                    2
1652001   0.000000E+00         -6.700000E-01
1652002   4.000000E-01         -2.500000E-01
1652003   5.000000E-01         1.500000E-01
1652004   7.372550E-01         5.265860E-01
1652005   7.680490E-01         6.065940E-01
1652006   8.672300E-01         7.436600E-01
1652007   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652100   2                    3
1652101   -1.000000E+00        1.984300E+00
1652102   -8.009600E-01        1.394000E+00
1652103   -6.063800E-01        1.097500E+00
1652104   -4.068600E-01        8.220000E-01
1652105   -1.992800E-01        6.648000E-01
1652106   0.000000E+00         6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652200   2                    4
1652201   -1.000000E+00        1.984300E+00
1652202   -8.223400E-01        1.830800E+00
1652203   -6.337100E-01        1.682400E+00
1652204   -4.585300E-01        1.557000E+00
1652205   -2.670230E-01        1.436200E+00
1652206   -1.761070E-01        1.387900E+00
1652207   -8.931000E-02        1.348100E+00
1652208   0.000000E+00         1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652300   2                    5
1652301   0.000000E+00         -4.500000E-01
1652302   4.000000E-01         -2.500000E-01
1652303   5.000000E-01         0.000000E+00
1652304   1.000000E+00         3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652400   2                    6
1652401   0.000000E+00         1.233610E+00
1652402   9.064300E-02         1.196500E+00
1652403   1.885690E-01         1.109600E+00
1652404   2.734700E-01         1.041600E+00
1652405   4.586690E-01         8.958000E-01
1652406   5.744800E-01         7.807000E-01
1652407   7.381600E-01         6.134000E-01
1652408   7.685200E-01         5.849000E-01
1652409   8.700570E-01         4.[illegible]
1652410   1.000000E+00         3.[illegible]
*---- ----1---- ----1---- ----1[illegible]---- ----1----
* TORQUE CURVE NO. 7
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652500   2                  7
1652501   -1.000000E+00      -1.000000E+00
1652502   -3.000000E-01      -9.000000E-01
1652503   -1.000000E-01      -5.000000E-01
1652504   0.000000E+00       -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1652600   2                  8
1652601   -1.000000E+00      -1.000000E+00
1652602   -2.500000E-01      -9.000000E-01
1652603   -8.000000E-02      -8.000000E-01
1652604   0.000000E+00       -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TWO - PHASE MULTIPLIER DATA FROM L3-6 TEST DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1653000   0
1653001   0.000000E+00       0.000000E+00
1653002   1.000000E-01       0.000000E+00
1653003   2.000000E-01       1.000000E-01
1653004   3.000000E-01       2.000000E-01
1653005   3.500000E-01       3.000000E-01
1653006   4.000000E-01       6.000000E-01
1653007   5.000000E-01       6.000000E-01
1653008   6.000000E-01       6.000000E-01
1653009   7.000000E-01       6.000000E-01
1653010   8.000000E-01       5.000000E-01
1653011   9.000000E-01       3.000000E-01
1653012   1.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1653100   0
1653101   0.000000E+00       0.000000E+00
1653102   1.000000E-01       0.000000E+00
1653103   2.000000E-01       1.000000E-01
1653104   3.000000E-01       3.000000E-01
1653105   3.500000E-01       5.000000E-01
1653106   4.000000E-01       7.500000E-01
1653107   5.000000E-01       7.500000E-01
1653108   6.000000E-01       7.500000E-01
1653109   7.000000E-01       7.500000E-01
1653110   8.000000E-01       7.500000E-01
1653111   9.000000E-01       5.000000E-01
1653112   1.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2-PHASE DIFFERENCE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654100   1                  1
1654101   0.000000E+00       1.000000E+00
1654102   1.000000E+00       1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
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1654200   1               2
1654201   0.000000E+00    1.000000E+00
1654202   1.000000E+00    1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654300   1               3
1654301   -1.000000E+00   -1.160000E+00
1654302   -9.000000E-01   -1.240000E+00
1654303   -8.000000E-01   -1.770000E+00
1654304   -7.000000E-01   -2.360000E+00
1654305   -6.000000E-01   -2.790000E+00
1654306   -5.000000E-01   -2.910000E+00
1654307   -4.000000E-01   -2.670000E+00
1654308   -2.500000E-01   -1.690000E+00
1654309   -1.000000E-01   -5.000000E-01
1654310   0.000000E+00    0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654400   1               4
1654401   -1.000000E+00   -1.160000E+00
1654402   -9.000000E-01   -7.800000E-01
1654403   -8.000000E-01   -5.000000E-01
1654404   -7.000000E-01   -3.100000E-01
1654405   -6.000000E-01   -1.700000E-01
1654406   -5.000000E-01   -8.000000E-02
1654407   -3.500000E-01   0.000000E+00
1654408   -2.000000E-01   5.000000E-02
1654409   -1.000000E-01   8.000000E-02
1654410   0.000000E+00    1.100000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654500   1               5
1654501   0.000000E+00    0.000000E+00
1654502   2.000000E-01    -3.400000E-01
1654503   4.000000E-01    -6.500000E-01
1654504   6.000000E-01    -9.300000E-01
1654505   8.000000E-01    -1.190000E+00
1654506   1.000000E+00    -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654600   1               6
1654601   0.000000E+00    1.100000E-01
1654602   1.000000E-01    1.300000E-01
1654603   2.500000E-01    1.500000E-01
1654604   4.000000E-01    1.300000E-01
1654605   5.000000E-01    7.000000E-02
1654606   6.000000E-01    -4.000000E-02
1654607   7.000000E-01    -2.300000E-01
1654608   8.000000E-01    -5.100000E-01
1654609   9.000000E-01    -9.100000E-01
1654610   1.000000E+00    -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654700   1               7
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1654701   -1.000000E+00       0.000000E+00
1654702   0.000000E+00        0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654800   1                   8
1654801   -1.000000E+00       0.000000E+00
1654802   0.000000E+00        0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1654900   2                   1
1654901   0.000000E+00        1.000000E+00
1654906   1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655000   2                   2
1655001   0.000000E+00        1.000000E+00
1655007   1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655100   2                   3
1655101   -1.000000E+00       1.984300E+00
1655102   -8.009600E-01       1.394000E+00
1655103   -6.063800E-01       1.097500E+00
1655104   -4.068600E-01       8.220000E-01
1655105   -1.992800E-01       6.648000E-01
1655106   0.000000E+00        6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655200   2                   4
1655201   -1.000000E+00       1.984300E+00
1655202   -8.223400E-01       1.830800E+00
1655203   -6.337100E-01       1.682400E+00
1655204   -4.585300E-01       1.557000E+00
1655205   -2.670230E-01       1.436200E+00
1655206   -1.761070E-01       1.387900E+00
1655207   -8.931000E-02       1.348100E+00
1655208   0.000000E+00        1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655300   2                   5
1655301   0.000000E+00        -4.500000E-01
1655302   4.000000E-01        -2.500000E-01
1655303   5.000000E-01        0.000000E+00
1655304   1.000000E+00        3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655400   2                   6
1655401   0.000000E+00        1.233610E+00
1655402   9.064300E-02        1.196500E+00
1655403   1.885690E-01        1.109600E+00
1655404   2.734700E-01        1.041600E+00
1655405   4.586690E-01        8.958000E-01
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1655406   5.744800E-01         7.807000E-01
1655407   7.381600E-01         6.134000E-01
1655408   7.685200E-01         5.849000E-01
1655409   8.700570E-01         4.877000E-01
1655410   1.000000E+00         3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* TORQUE CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1655500   2                    7
1655501   -1.000000E+00        -1.000000E+00
1655502   -3.000000E-01        -9.000000E-01
1655503   -1.000000E-01        -5.000000E-01
1655504   0.000000E+00         -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1---
1655600   2                    8
1655601   -1.000000E+00        -1.000000E+00
1655602   -2.500000E-01        -9.000000E-01
1655603   -8.000000E-02        -8.000000E-01
1655604   0.000000E+00         -6.700000E-01
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*     STEADY STATE CONTROL SYSTEM
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRIMARY COOLANT PUMP SPEED CONTROLLERS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CALCULATE MASS FLOW ERROR
*---- ----1---- ----1---- ----1----
20590100  MSSERR    SUM       1.0       0.0       1
20590101  192.40    -1.0      MFLOWJ    100010000
*---- ----1---- ----1---- ----1----
* PUMP 1 SPEED
*---- ----1---- ----1---- ----1----
20590200  PCP1SPD   INTEGRAL  0.34482   133.000   1
20590201  CNTRLVAR  901
*---- ----1---- ----1---- ----1----
* PCP1 PUMP VELOCITY TABLE
*---- ----1---- ----1---- ----1----
1356100   501       CNTRLVAR  902
1356101   0.0       0.0
1356102   369.0     369.0
*---- ----1---- ----1---- ----1----
* MODIFY PCP1 PUMP DATA
*---- ----1---- ----1---- ----1----
1350301   0    0    0         -1        0         695       0
*---- ----1---- ----1---- ----1----
* PUMP 2 SPEED
*---- ----1---- ----1---- ----1----
20590300  PCP2SPD   INTEGRAL  0.34482   139.790   1
20590301  CNTRLVAR  901
*---- ----1---- ----1---- ----1----
* PCP2 PUMP VELOCITY TABLE
*---- ----1---- ----1---- ----1----
1656100   501       CNTRLVAR  903
1656101   0.0       0.0
1656102   369.0     369.0
*---- ----1---- ----1---- ----1----
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* MODIFY PCP2 PUMP DATA
*---- ----1---- ----1---- ----1----
1650301  0    0    0          -1        0         697       0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER SPRAY VALVE CONTROLLER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*---- ----1---- ----1---- ----1---- ----1---- ----1---- - 1----
* SPRAY LINE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4300000   "SPRAY    "         BRANCH
4300001   1         0
4300101   0.0003363 6.322     0.0       0.0       90.0      2.9905
4300102   4.0-5     0.0       00
4300200   0         15037900. 1238620.  2459550.  .00000000
4301101   150000000 430000000 0.0       0.0       0.0       0000
4301201   .777018-4 .777018-4 0 0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SPRAY VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4350000   "SPRVLV   "         VALVE
4350101   430010000 415010000 3.3451E-4 1.5432E01 1.5432E01 0100
4350201   0         .00000000 .00000000 0.0
4350300   SRVVLV
4350301   904       999
*---- ----1---- ----1---- ----1----
* SPRAY VALVE POSITION CALCULATOR
*---- ----1---- ----1---- ----1----
20590400  SPRAY     SUM       -1.0      0.0       1         * CONTIN
+         3         0.0       1.0
20590401  14.94+6   -1.0      P         420010000
*---- ----1---- ----1---- ----1----
* POSITION VS AREA TABLE
*---- ----1---- ----1---- ----1----
20299900  NORMAREA
20299901  0.0       0.0
20299902  0.0001    0.0
20299903  1.0       1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER HEATERS IN INITIALIZATION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER HEATER TRIPS
*---- ----1---- ----1---- ----1----
* LT 693  CYLCING HEATERS         CARD 20241700
0000585   P         420010000 GT    NULL      0         14.90+6   N
0000586   P         420010000 LT    NULL      0         14.8999+6 N
0000666   586       OR        693       N
0000667   -585      AND       666       N
0000693   -503      AND       667       N
*---- ----1---- ----1---- ----1----
* LT  694  BACKUP HEATERS         CARD 20241800
0000587   P         420010000 GT    NULL      0         14.85+6   N
0000588   P         420010000 LT    NULL      0         14.8499+6 N
0000668   588       OR        694       N
0000669   -587      AND       668       N
0000694   -503      AND       669       N
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER HEATERS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
14172000  2         9         2         1         0.0
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14172100  0          1
14172101  8          8.3820E-3
14172201  4          8
14172301  1.0        8
14172401  615.0      9
14172501  0          0          0          1          5.4864     1
14172502  0          0          0          1          1.8288     2
14172601  415040000  0          1          1          5.4864     1
14172602  415040000  0          1          1          1.8288     2
14172701  417        1.0        0.0        0.0        1          * CYCLING
14172702  418        1.0        0.0        0.0        2          * BACKUP
14172901  0          1.6764E-2  1.6764E-2  5.4864     1
14172902  0          1.6764E-2  1.6764E-2  1.8288     2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER CYCLING HEATERS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20241700  POWER      693
20241701  0.0        0.0
20241702  1.0        3.6+4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER BACKUP HEATERS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20241800  POWER      694
20241801  0.0        0.0
20241802  1.0        1.2+4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PRESSURIZER LEVEL CONTROL USING CHARGING AND LETDOWN COMPONENTS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* MODIFY PZR LEVEL CONTROL VARIABLE
*---- ----1---- ----1---- ----1----
20500206             0.1249     VOIDF      415060000
20500207             0.02477    VOIDF      420010000
20500208             0.02477    VOIDF      420020000
*---- ----1---- ----1---- ----1----
* CHARGING RESERVIOR
*---- ----1---- ----1---- ----1----
9800000   "CHRG RESRV"          TMDPVOL
9800101   1.0        1.0        0.0        0.0        0.0        0.0
9800102   4.0-5      0.0        00
9800200   3
9800201   0.0        2.07+07    559.2
*---- ----1---- ----1---- ----1----
* CHARGING VALVE
*---- ----1---- ----1---- ----1----
9850000   "CHRG VALVE"          VALVE
9850101   980000000  185000000  3.8E-05    0.0        0.0        0100
9850201   0          .608458-3  .608458-3  0.0
9850300   SRVVLV
9850301   905        999
*---- ----1---- ----1---- ----1----
* CHARGING VALVE POSITION CALCULATOR
*---- ----1---- ----1---- ----1----
20590500  CHARGE     SUM        7.7        0.0        1          *CONTIN
+         3          0.0        1.0
20590501  1.1370     -1.0       CNTRLVAR   2
*---- ----1---- ----1---- ----1----
* LETDOWN SINK
*---- ----1---- ----1---- ----1----
9900000   "LTDWN SINK"          TMDPVOL
```

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9900101   1.0       1.0       0.0       0.0       0.0       0.0
9900102   4.0-5     0.0       00
9900200   3
9900201   0.0       1.4+7     559.2
*---- ----1---- ----1---- ----1----
* LETDOWN VALVE
*---- ----1---- ----1---- ----1----
9950000   "LTDWN VLV "        VALVE
9950101   185000000 990000000  2.5-5    0.0       0.0       0100
9950201   0         .00000000 .00000000 0.0
9950300   SRVVLV
9950301   906       999
*---- ----1---- ----1---- ----1----
* LETDOWN VALVE POSITION CALCULATOR
*---- ----1---- ----1---- ----1----
20590600  LETDOWN   SUM       -7.7      0.0       1         *CONTIN
+         3         0.0       1.0
20590601  1.1430    -1.0      CNTRLVAR  2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* STEAM VALVE CONTROLLER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CHANGES TO STEAM VALVE
*---- ----1---- ----1---- ----1----
5400201   0         13.604000 13.604000 0.0
5400300   SRVVLV
5400301   910       540
20254000  NORMAREA
20254001  0.0       0.0
20254002  0.0001    0.0
20254003  1.0       1.0
*---- ----1---- ----1---- ----1----
* COMPUTE DELTA T ERROR
*---- ----1---- ----1---- ----1----
20590700  "DELTA T" SUM       1.0       0.0       1
20590701  556.6     -1.       TEMPF     185010000
*---- ----1---- ----1---- ----1----
* FILTER DELTA T THRU DEADBAND
*---- ----1---- ----1---- ----1----
20590800  DEADBAND  FUNCTION  1.0       0.0       1
20590801  CNTRLVAR  907       908
20290800  REAC-T
20290801  -100.     -100.
20290802  -0.1      -0.1
20290803  -0.1      0.0
20290804  0.1       0.0
20290805  0.1       0.1
20290806  100.      100.
*---- ----1---- ----1---- ----1----
* INTEGRATE DELTA T ERROR
*---- ----1---- ----1---- ----1----
20590900  "INT D T" INTEGRAL  1.0       0.0       1
20590901  CNTRLVAR  908
*---- ----1---- ----1---- ----1----
* STEAM VALVE POSITION CALCULATOR
*---- ----1---- ----1---- ----1----
20591000  TCONTROL  SUM       1.0       0.44405   0         *CONTI
+         3         0.40      0.55
20591001  0.44405   -0.0564   CNTRLVAR  908
20591002            -0.0059   CNTRLVAR  909
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SIMPLIFIED FEED SYSTEM CONTROLLER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SIMPLIFIED FEED LOGIC
*---- ----1---- ----1---- ----1----
20591100  SGLVLERR  SUM      1.0       0.0      1
20591101  3.1293    -1.0     CNTRLVAR  001
20591200  FEEDFLOW  SUM      1.0       0.0      1
20591201  0.0       1.0      MFLOWJ    540000000
20591202            48.4     CNTRLVAR  911
*---- ----1---- ----1---- ----1----
* REPLACE FEED JUNCTION TABLE
*---- ----1---- ----1---- ----1----
5660200   1         0        CNTRLVAR  912
5660201   -100.0    19.017   0.0       0.0
5660202   -1.0      0.0      0.0       0.0
5660203   0.0       0.0      0.0       0.0
5660204   50.0      50.0     0.0       0.0
5660205
5660206
5660207
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REPLACE REACTOR POWER TABLE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20290000  POWER     699      1.0       36.0+6
20290001  0.0       1.0
20290002  0.1       1.0
20290003  0.2       1.0
20290004  0.3       1.0
20290005  0.4       1.0
20290006  0.5       1.0
20290007  0.6       1.0
20290008  0.8       1.0
20290009  1.0       1.0
20290010  1.5       1.0
20290011  2.0       1.0
20290012  3.0       1.0
20290013  4.0       1.0
20290014  6.0       1.0
20290015  8.0       1.0
20290016  10.0      1.0
20290017  15.0      1.0
20290018  20.0      1.0
20290019  30.0      1.0
20290020  40.0      1.0
20290021  60.0      1.0
20290022  1.+5      1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REPLACE TRIPS FOR STEADY STATE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     SCRAM
0000510   TIME      0        GE   NULL      0         1.+9     L
*     BREAK OPENS
0000511   TIME      0        GE   NULL      0         1.+9     L
*     PCP TRIP
0000512   TIME      0        GE   NULL      0         1.+9     L
*     HPIS ON
0000513   TIME      0        GE   NULL      0         1.+9     L
*     LPIS ON
```

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0000514   TIME      0         GE   NULL      0         1.+9     L
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
. . . . . RELAP5 END CARD
```

```
/JOB
L25BTR4,T5000.
/USER
ATTACH,RSTIN=L25SR.
ATTACH,STH2XT,RE364BX.
FILE,RSTIN,SBF=NO.
FILE,RSTPLT,SBF=NO.
DEFINE,PLOT=L25P4BL.
RFL,CM=370000,EC=200.
REDUCE(-)
RE364BX,,*PL=50000.
/EOR
= LOFT L2-5 BASE TRANSIENT TO 120 SEC
0000100   RESTART   TRANSNT
0000101   RUN
0000103    14453
0000105   5.0       10.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000201   120.0     1.0-6     0.01     14003     10 1000   1000
* REMOVE PUMP SPEED CONTROLLERS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20590100  MSSERR    DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20590200  PCP1SPD   DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20590300  PCP2SPD   DELETE    0.0  0.0  0.0  0.0  0.0  0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* RENODALIZE PUMP1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1350000   "PCPUMP1   "        PUMP
1350101   0.0       0.4572    0.0991    0.0       90.0      0.317900
1350102   0
1350108   130010000 0.0       0.017     0.017     0000
1350109   140000000 0.0       0.05      0.05      0000
1350200   0         1.49288+7 1.23094+6 2.46151+6 0.
1350201   0         3.0790    3.0790    0.0
1350202   0         3.2641    3.2641    0.0
1350301     0   0   0          -1        -1       695        0
1350302   369.00000 .35018970 .31550000 96.000000 590.60000 1.4310000
1350303   613.60000 .00000000 207.43300 .04440000 19.598700 .00000000
1350310   0.0       0.0       0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*
*   PUMP DATA
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SINGLE PHASE HEAD CURVES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 1
*---- - --1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351100   1                   1
1351101   0.000000E+00        1.403600E+00
1351102   1.906100E-01        1.363600E+00
1351103   3.896300E-01        1.318600E+00
1351104   5.939600E-01        1.232800E+00
1351105   7.902000E-01        1.133600E+00
1351106   1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 2
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351200   1                    2
1351201   0.000000E+00         -6.700000E-01
1351202   2.000000E-01         -5.000000E-01
1351203   4.000000E-01         -2.500000E-01
1351204   5.755400E-01         0.000000E+00
1351205   7.443200E-01         2.583000E-01
1351206   7.734800E-01         3.778000E-01
1351207   8.631300E-01         6.326000E-01
1351208   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351300   1                    3
1351301   -1.000000E+00        2.472200E+00
1351302   -8.057400E-01        2.047400E+00
1351303   -6.069000E-01        1.831000E+00
1351304   -4.068300E-01        1.624000E+00
1351305   -2.001710E-01        1.470500E+00
1351306   0.000000E+00         1.403600E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351400   1                    4
1351401   -1.000000E+00        2.472200E+00
1351402   -8.229700E-01        1.996800E+00
1351403   -6.333200E-01        1.589700E+00
1351404   -4.553400E-01        1.327900E+00
1351405   -2.710900E-01        1.194900E+00
1351406   -1.771600E-01        1.060500E+00
1351407   -9.073000E-02        1.015600E+00
1351408   0.000000E+00         9.342790E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351500   1                    5
1351501   0.000000E+00         2.500000E-01
1351502   2.000000E-01         2.800000E-01
1351503   4.000000E-01         3.400000E-01
1351504   4.118000E-01         2.758000E-01
1351505   5.976300E-01         4.584000E-01
1351506   7.934670E-01         6.992000E-01
1351507   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351600   1                    6
1351601   0.000000E+00         9.342790E-01
1351602   9.109900E-02         9.229000E-01
1351603   1.865090E-01         8.963000E-01
1351604   2.717620E-01         8.750000E-01
1351605   4.558720E-01         8.433000E-01
1351606   5.744060E-01         8.355000E-01
1351607   7.405760E-01         8.466000E-01
1351608   7.666190E-01         8.469000E-01
1351609   8.714710E-01         8.838000E-01
1351610   1.000000E+00         1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351700   1                   7
1351701   -1.000000E+00       -1.000000E+00
1351702   -8.000000E-01       -6.300000E-01
1351703   -6.000000E-01       -3.000000E-01
1351704   -4.000000E-01       -5.000000E-02
1351705   -2.000000E-01       1.500000E-01
1351706   0.000000E+00        2.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351800   1                   8
1351801   -1.000000E+00       -1.000000E+00
1351802   -8.000000E-01       -9.700000E-01
1351803   -6.000000E-01       -9.500000E-01
1351804   -4.000000E-01       -8.800000E-01
1351805   -2.000000E-01       -8.000000E-01
1351806   0.000000E+00        -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* SINGLE PHASE TORQUE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1351900   2                   1
1351901   0.000000E+00        6.032000E-01
1351902   1.930000E-01        6.325000E-01
1351903   3.930000E-01        7.369000E-01
1351904   5.955200E-01        8.331000E-01
1351905   7.978200E-01        9.229000E-01
1351906   1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352000   2                   2
1352001   0.000000E+00        -6.700000E-01
1352002   4.000000E-01        -2.500000E-01
1352003   5.000000E-01        1.500000E-01
1352004   7.372550E-01        5.265860E-01
1352005   7.680490E-01        6.063940E-01
1352006   8.672300E-01        7.436600E-01
1352007   1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352100   2                   3
1352101   -1.000000E+00       1.984300E+00
1352102   -8.009600E-01       1.394000E+00
1352103   -6.063800E-01       1.097500E+00
1352104   -4.068600E-01       8.220000E-01
1352105   -1.992800E-01       6.648000E-01
1352106   0.000000E+00        6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352200   2                   4
1352201   -1.000000E+00       1.984300E+00
1352202   -8.223400E-01       1.830800E+00
1352203   -6.337100E-01       1.682400E+00
1352204   -4.585300E-01       1.557000E+00
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1352205   -2.670230E-01        1.436200E+00
1352206   -1.761070E-01        1.387900E+00
1352207   -8.931000E-02        1.348100E+00
1352208   0.000000E+00         1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352300   2                    5
1352301   0.000000E+00         -4.500000E-01
1352302   4.000000E-01         -2.500000E-01
1352303   5.000000E-01         0.000000E+00
1352304   1.000000E+00         3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352400   2                    6
1352401   0.000000E+00         1.233610E+00
1352402   9.064300E-02         1.196500E+00
1352403   1.885690E-01         1.109600E+00
1352404   2.734700E-01         1.041600E+00
1352405   4.586690E-01         8.958000E-01
1352406   5.744800E-01         7.807000E-01
1352407   7.381600E-01         6.134000E-01
1352408   7.685200E-01         5.849000E-01
1352409   8.700570E-01         4.877000E-01
1352410   1.000000E+00         3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352500   2                    7
1352501   -1.000000E+00        -1.000000E+00
1352502   -3.000000E-01        -9.000000E-01
1352503   -1.000000E-01        -5.000000E-01
1352504   0.000000E+00         -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1352600   2                    8
1352601   -1.000000E+00        -1.000000E+00
1352602   -2.500000E-01        -9.000000E-01
1352603   -8.000000E-02        -8.000000E-01
1352604   0.000000E+00         -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TWO - PHASE MULTIPLIER DATA FROM L3-6 TEST DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1353000   0
1353001   0.000000E+00         0.000000E+00
1353002   1.000000E-01         0.000000E+00
1353003   2.000000E-01         1.000000E-01
1353004   3.000000E-01         2.000000E-01
1353005   3.500000E-01         3.000000E-01
1353006   4.000000E-01         6.000000E-01
1353007   5.000000E-01         6.000000E-01
1353008   6.000000E-01         6.000000E-01
1353009   7.000000E-01         6.000000E-01
1353010   8.000000E-01         5.000000E-01
1353011   9.000000E-01         3.000000E-01
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1353012  1.000000E+00        0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1353100  0
1353101  0.000000E+00        0.000000E+00
1353102  1.000000E-01        0.000000E+00
1353103  2.000000E-01        1.000000E-01
1353104  3.000000E-01        3.000000E-01
1353105  3.500000E-01        5.000000E-01
1353106  4.000000E-01        7.500000E-01
1353107  5.000000E-01        7.500000E-01
1353108  6.000000E-01        7.500000E-01
1353109  7.000000E-01        7.500000E-01
1353110  8.000000E-01        7.500000E-01
1353111  9.000000E-01        5.000000E-01
1353112  1.000000E+00        0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* PUMP 2-PHASE DIFFERENCE DATA
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354100  1                   1
1354101  0.000000E+00        1.000000E+00
1354102  1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354200  1                   2
1354201  0.000000E+00        1.000000E+00
1354202  1.000000E+00        1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354300  1                   3
1354301  -1.000000E+00       -1.160000E+00
1354302  -9.000000E-01       -1.240000E+00
1354303  -8.000000E-01       -1.770000E+00
1354304  -7.000000E-01       -2.360000E+00
1354305  -6.000000E-01       -2.790000E+00
1354306  -5.000000E-01       -2.910000E+00
1354307  -4.000000E-01       -2.670000E+00
1354308  -2.500000E-01       -1.690000E+00
1354309  -1.000000E-01       -5.000000E-01
1354310  0.000000E+00        0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354400  1                   4
1354401  -1.000000E+00       -1.160000E+00
1354402  -9.000000E-01       -7.800000E-01
1354403  -8.000000E-01       -5.000000E-01
1354404  -7.000000E-01       -3.100000E-01
1354405  -6.000000E-01       -1.700000E-01
1354406  -5.000000E-01       -8.000000E-02
1354407  -3.500000E-01       0.000000E+00
1354408  -2.000000E-01       5.000000E-02
1354409  -1.000000E-01       8.000000E-02
1354410  0.000000E+00        1.100000E-01
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*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354500   1                  5
1354501   0.000000E+00       0.000000E+00
1354502   2.000000E-01       -3.400000E-01
1354503   4.000000E-01       -6.500000E-01
1354504   6.000000E-01       -9.300000E-01
1354505   8.000000E-01       -1.190000E+00
1354506   1.000000E+00       -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354600   1                  6
1354601   0.000000E+00       1.100000E-01
1354602   1.000000E-01       1.300000E-01
1354603   2.500000E-01       1.500000E-01
1354604   4.000000E-01       1.300000E-01
1354605   5.000000E-01       7.000000E-02
1354606   6.000000E-01       -4.000000E-02
1354607   7.000000E-01       -2.300000E-01
1354608   8.000000E-01       -5.100000E-01
1354609   9.000000E-01       -9.100000E-01
1354610   1.000000E+00       -1.470000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354700   1                  7
1354701   -1.000000E+00      0.000000E+00
1354702   0.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* HEAD CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354800   1                  8
1354801   -1.000000E+00      0.000000E+00
1354802   0.000000E+00       0.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 1
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1354900   2                  1
1354901   0.000000E+00       1.000000E+00
1354906   1.000000E+00       1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355000   2                  2
1355001   0.000000E+00       1.000000E+00
1355007   1.000000E+00       1.000000E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 3
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355100   2                  3
1355101   -1.000000E+00      1.984300E+00
1355102   -8.009600E-01      1.394000E+00
1355103   -6.063800E-01      1.097500E+00
1355104   -4.068600E-01      8.220000E-01
1355105   -1.992800E-01      6.648000E-01
1355106   0.000000E+00       6.032000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

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* TORQUE CURVE NO. 4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355200  2                4
1355201  -1.000000E+00    1.984300E+00
1355202  -8.223400E-01    1.830800E+00
1355203  -6.337100E-01    1.682400E+00
1355204  -4.585300E-01    1.557000E+00
1355205  -2.670230E-01    1.436200E+00
1355206  -1.761070E-01    1.387900E+00
1355207  -8.931000E-02    1.348100E+00
1355208  0.000000E+00     1.233610E+00
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355300  2                5
1355301  0.000000E+00     -4.500000E-01
1355302  4.000000E-01     -2.500000E-01
1355303  5.000000E-01     0.000000E+00
1355304  1.000000E+00     3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 6
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355400  2                6
1355401  0.000000E+00     1.233610E+00
1355402  9.064300E-02     1.196500E+00
1355403  1.885690E-01     1.109600E+00
1355404  2.734700E-01     1.041600E+00
1355405  4.586690E-01     8.958000E-01
1355406  5.744800E-01     7.807000E-01
1355407  7.381600E-01     6.134000E-01
1355408  7.685200E-01     5.849000E-01
1355409  8.700570E-01     4.877000E-01
1355410  1.000000E+00     3.569000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 7
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355500  2                7
1355501  -1.000000E+00    -1.000000E+00
1355502  -3.000000E-01    -9.000000E-01
1355503  -1.000000E-01    -5.000000E-01
1355504  0.000000E+00     -4.500000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* TORQUE CURVE NO. 8
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1355600  2                8
1355601  -1.000000E+00    -1.000000E+00
1355602  -2.500000E-01    -9.000000E-01
1355603  -8.000000E-02    -8.000000E-01
1355604  0.000000E+00     -6.700000E-01
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* RENODALIZE PUMP 2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
1650000  "PCPUMP2  "        PUMP
1650101  0.0       0.514    0.0991   0.0      90.0     0.317900
1650102  0
1650108  160010000 0.0      0.017    0.017    0000
1650109  170000000 0.0      0.1      0.1      0000
1650200  0         1.49287+7 1.23094+6 2.46151+6 0.
1650201  0         3.4623   3.4623   0.0
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```
1650202  0          3.5798     3.5798     0.0
1650301  135  135   135        -1         -1         697        0
1650302  369.00000  .36859079  .31550000  96.000000  500.60000  1.4310000
1650303  613.60000  .00000000  207.43300  .04440000  19.598700  .00000000
1650310  0.0        0.0        0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REMOVE SPRAY LINE, SPRAY VALVE, AND CALCULATOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
4300000   SPRAY     DELETE
4350000   SPRVLV    DELETE
20590400  SPRAY     DELETE     0.0  0.0  0.0  0.0  0.0  0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* RENODALIZE PRESSURIZER MASS CALCULATOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20507000  PZRMASS   SUM        1.0        0.0        1
20507001  0.0       3.33500-3  RHO        400010000
20507002            3.33500-3  RHO        405010000
20507003            3.33500-3  RHO        405020000
20507004            6.84000-2  RHO        415010000
20507005            8.38000-2  RHO        415020000
20507006            2.24255-1  RHO        415030000
20507007            2.98987-1  RHO        415040000
20507008            2.24255-1  RHO        415050000
20507009            7.32000-2  RHO        415060000
20507010            1.42000-2  RHO        420010000
20507011            1.42000-2  RHO        420020000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*   REPLACE PRESSURIZER BACKUP/CYCLING HEATERS POWER TABLE
*   BY ZERO POWER IN ORDER TO DESCRIBE HEATER-OFF OF PRZ.
*   INSTEAD OF REMOVING PRESSURIZER HEAT STRUCTURE COMPNENTS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----
20241700  POWER   693
20241701    0.0     0.0
20241702    1.0     0.0
20241800   POWER  694
20241801    0.0     0.0
20241802    1.0     0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REMOVE PRESSURIZER LEVEL CONTROLLERS, CHARGING COMPONENT, AND
* LETDOWN COMPONENT
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20500200  PZRLVL    SUM        1.0        0.0        1
20500201  0.0       0.1815     VOIDF      415010000
20500202            0.1524     VOIDF      415020000
20500203            0.3967     VOIDF      415030000
20500204            0.5289     VOIDF      415040000
20500205            0.3967     VOIDF      415050000
20500206            0.1943     VOIDF      415060000
20500207            0.1029     VOIDF      420010000
20500208            0.1029     VOIDF      420020000
9800000   "CHRG R"  DELETE
9850000   "CHRG V"  DELETE
20590500  CHARGE    DELETE     0.0  0.0  0.0  0.0  0.0  0.0
9900000   "LTDWN S" DELETE
9950000   "LTDWN V" DELETE
20590600  LETDOWN   DELETE     0.0  0.0  0.0  0.0  0.0  0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REMOVE STEAM VALVE CONTROLLER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

```
5400000   "CV-P4-10  "         VALVE
5400101   530010000 541000000 0.0047772 0.0       0.0       0100
5400201   0         35.132    13.536    0.0
5400300   MTRVLV
5400301   687       688       0.05      .416170   540
20254000  NORMAREA
20254001  0.0       0.0
20254002  9.25-4    9.25-4
20254003  1.0       1.0
20590700  "DELTA T" DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20590800  DEADBAND  DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20590900  "INT D T" DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20591000  TCONTROL  DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20290800  DELETE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* REMOVE FEED SYSTEM CONTROLLER
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20591100  SGLVLERR  DELETE    0.0  0.0  0.0  0.0  0.0  0.0
20591200  FEEDFLOW  DELETE    0.0  0.0  0.0  0.0  0.0  0.0
5660000   "FEED      "        TMDPJUN
5660101   565000000 508000000 0.05
5660200   1         689
5660201   -100.0    18.630    0.0       0.0       *L2-5
5660202   0.0       18.630    0.0       0.0       *L2-5
5660203   0.5       10.0      0.0       0.0       *L2-5
5660204   1.0       2.50      0.0       0.0       *L2-5
5660205   1.5       1.00      0.0       0.0       *L2-5
5660206   2.0       0.25      0.0       0.0       *L2-5
5660207   2.5       0.00      0.0       0.0       *L2-5
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*       900         REACTOR POWER VS TIME AFTER SCRAM
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20290000  POWER     699       1.0       36.0+6
20290001  0.0       1.0
20290002  0.1       0.963758  *NEWLY GENERATED FROM L2-5 POSTTEST
20290003  0.2       0.659722   *AND L2-5 DECAY CURVE BY EDR
20290004  0.3       0.5625
20290005  0.4       0.409722
20290006  0.5       0.274004
20290007  0.6       0.22917
20290008  0.8       0.145832
20290009  1.0       0.117425
20290010  2.0       0.1085
20290011  6.0       0.077943
20290012  10.0      0.0701122
20290013  20.0      0.06049765
20290014  50.0      0.041384
20290015  60.0      0.040139
20290016    100.0   0.035159
* REPLACE TRIPS 510-514
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*     SCRAM
0000510   P         100010000 LT   NULL      0         14.19+6   L
*     BREAK OPENS
0000511   TIME      0         GE   NULL      0         0.00      L
* PCP TRIP*MODIFYRFROM1.75CSEC:ACCORDINGOTO1EXP.DAT.REP. L2-5
0000512   TIME      0         GE   NULL      0         0.94      L
*     HPIS ON
```

```
0000513   TIME      0         GE   NULL      0         23.90    L
*    LPIS ON
0000514   TIME      0         GE   NULL      0         37.32    L
*    REFLOOD INITIATION TRIP MODIFY
0000555   P 230120000       LE    NULL  0  1.0+6    L
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* RENODALIZE DEAD END OF FUEL MODULES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2510000   "DE FL MODS"        SNGLVOL
2510101   0.0       0.7844123 0.1154214 0.0       90.0      0.7844123
2510102   3.81-6    0.214     00
2510200   0         14942600. 1422680.0 2461200.0 2.43866E-4
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* MINOR EDIT VARIABLES
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000301   P         250010000
0000302   P         530010000
0000303   TEMPF     250010000
0000304   TEMPF     215010000
0000305   MFLOWJ    340010000
0000306   MFLOWJ    305010000
0000307   RHO       100010000
0000308   HTTEMP    002100501
0000309   HTTEMP    002100110
0000310   HTTEMP    002100410
0000311   HTTEMP    002100510
0000312   HTTEMP    002100810
0000313   HTTEMP    002101010
0000314   HTTEMP    002101110
0000315   MFLOWJ    600000000
0000316   MFLOWJ    610000000
0000317   CNTRLVAR  4
0000318   PMPVEL    165
* ---- ADDED MINOR EDIT VARIABLE  ----
0000331     P     100010000
0000332     VOIDG  230010000
0000333     VOIDGJ  317000000
0000334     VOIDGJ  347000000
0000335     HTTEMP  002101210
0000336     CNTRLVAR  2
0000338     VOIDG    225010000
0000338     MFLOWJ   180010000
0000339     MFLOWJ   100010000
0000340     TEMPF    712010000
0000341     TEMPF    714010000
0000342     TEMPF    716010000
0000343     TEMPF    718010000
0000344     TEMPF    225010000
0000345     MFLOWJ   720000000
0000346     MFLOWJ   722000000
0000347     MFLOWJ   724000000
0000348     MFLOWJ   726000000
0000349     MFLOWJ   728000000
0000350     MFLOWJ   731000000
0000351     MFLOWJ   709000000
0000352     MFLOWJ   225010000
0000353     MFLOWJ   225020000
0000354     MFLOWJ   719000000
0000355     MFLOWJ   741000000
```

```
0000356    MFLOWJ   215020000
0000357    CNTRLVAR   1
0000358    CNTRLVAR   7
0000359    CNTRLVAR   8
0000360    CNTRLVAR   10
0000361    CNTRLVAR   12
0000362    CNTRLVAR   71
0000363    CNTRLVAR   72
0000364    CNTRLVAR   75
0000365    CNTRLVAR   77
0000366    HTTEMP    001100110
0000367    HTTEMP    001100410
0000368    HTTEMP    001100510
0000369    HTTEMP    001100810
0000370    HTTEMP    001101010
0000371    HTTEMP    001101110
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*    ACCUMULATOR, TRIPS, AND CONTROL VARIABLE
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR VALVE TRIPS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
0000579    MFLOWJ    610000000 GE        NULL      0    0.0     N
0000580    CNTRLVAR  4         LT        NULL      0    0.939   L
0000682    579       AND       -580      N
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR LEVEL CONTROL VARIABLE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20500400  ACCMLVL   INTEGRAL  -6.549E-3 2.10      0
20500401  VELFJ     610000000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ECC CHECK VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6000000   "ECC CHKVLV"        VALVE
6000101   605010000 185000000 0.0       1.3869    1.3869    0100
6000201   0         0.0       0.0       0.0
6000300   TRPVLV
6000301   681
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ECCS HEADER TO PCS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6050000   "ECCS HEADR"        SNGLVOL
6050101   5.989E-3  4.8247    0.0       0.0       90.0      2.2061
6050102   1.0165-5  0.0       10
6050200   0         4.29E+6   125472.   2600290.  0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR VALVE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6100000   "ACCUM VLV "        VALVE
6100101   615010000 605000000 0.0       8.1009    8.1009    0000
6100201   0         0.0       0.0       0.0
6100300   TRPVLV
6100301   682
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR PIPE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
```

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6150000   "ACC PIPE  "         SNGLVOL
6150101   0.01608   24.5486   0.0        0.0       0.0       0.0
6150102   1.0165-5  0.0       10
6150200   3         4.29E+6   303.2
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACCUMULATOR VESSEL
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
6200000   "ACCUMULATR"        ACCUM
6200101   1.254     1.8261563 0.0        0.0       -90.0     -1.8261563
6200102   2.286-5   0.0       10
6200200   4.29E+6   303.2
6201101   615000000 8.213E-3  6.7582     8.3202    0
6202200   1.45      0.0       4.0251     0.67056   0.04445   0 0 0 0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*
*   RENODALIZE REACTOR VESSEL
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ACTIVE CORE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2300000   "CORE      "        PIPE
2300001   12
2300101   0.183262  2
2300102   0.171287  4
2300103   0.172986  6
2300104   0.171486  8
2300105   0.171455  10
2300106   0.177236  12
2300201   0.183262  1
2300202   0.170500  2
2300203   0.171287  3
2300204   0.144000  4
2300205   0.172986  5
2300206   0.170500  6
2300207   0.171486  7
2300208   0.144000  8
2300209   0.171455  9
2300210   0.170500  10
2300211   0.177236  11
2300301   0.1397017 12
2300401   0.0       12
2300501   0.0       12
2300601   90.0      12
2300801   1.27-7    0.012     12
2300901   0.0       0.0       3
2300902   0.66      0.66      4
2300903   0.0       0.0       7
2300904   0.66      0.66      8
2300905   0.0       0.0       11
2301001   00        12
2301101   00100     11
2301201   0         14965200. 1241610.  2460710.  .00000000 0.0        01
2301202   0         14963900. 1259980.  2460740.  .00000000 0.0        02
2301203   0         14962600. 1283660.  2460770.  .00000000 0.0        03
2301204   0         14961300. 1308190.  2460800.  .00000000 0.0        04
2301205   0         14959600. 1333120.  2460840.  .00000000 0.0        05
2301206   0         14958400. 1357340.  2460860.  .00000000 0.0        06
2301207   0         14957200. 1378570.  2460880.  .0        0.0        07
2301208   0         14956000. 1395380.  2460900.  .0        0.0        08
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2301209   0           14954300. 1409880.  2460930.  .0        0.0       09
2301210   0           14953100. 1420370.  2460950.  .0        0.0       10
2301211   0           14952100. 1424970.  2460980.  .0        0.0       11
2301212   0           14950800. 1428220.  2461010.  .0        0.0       12
2301300   0
2301301   1.3752000 1.3752000 0.0       01
2301302   1.3873000 1.4831000 0.0       02
2301303   1.4047000 1.5229000 0.0       03
2301304   1.6861000 1.8848000 0.0       04
2301305   1.4469000 1.5896000 0.0       05
2301306   1.4747000 1.6113000 0.0       06
2301307   1.4997000 1.6387000 0.0       07
2301308   1.7952000 2.0126000 0.0       08
2301309   1.5299000 1.7418000 0.0       09
2301310   1.5361000 1.7545000 0.0       10
2301311   1.5359    1.7821    0.0       11
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER CORE SUPPORT STRUCTURE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2250000   "L CORE SUP"        BRANCH
2250001   2         0
2250101   0.2832456 0.5709989 0.0       0.0       90.0      0.5709989
2250102   3.81-6    0.095     00
2250200   0         14970400. 1230690.  2460590.  .00000000
2251101   225010000 230000000 0.1134    1.5       1.5       0100
2252101   225010000 235000000 0.0       12.       12.       0100
2251201   2.0569000 2.0569000 0.0
2252201   .67052000 .67052000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER HEAD
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2520000   "UPR HEAD  "        BRANCH
2520001   2         0
2520101   0.2622585 0.2869580 0.0       0.0       90.0      0.2869580
2520102   3.81-6    0.0       00
2520200   0         14934100. 1413720.  2461390.  6.97239-6
2521101   250010000 252000000 0.0       0.37      0.37      0100
2522101   730000000 252000000 0.0       0.90+4    0.90+4    0003
2521201   1.7356    1.8386    0.0
2522201   .0602599  .15501    0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER FLOW SKIRT REGION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2500000   "U FLW SKRT"        BRANCH
2500001   1         0
2500101   0.1547532 0.7850547 0.0       0.0       90.0      0.7850547
2500102   3.81-6    0.131     00
2500200   0         14937200. 1422700.  2461320.  3.42343-5
2501101   245010000 250000000 0.0       0.37      0.37      0100
2501201   1.7359000 1.8386000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER END BOXES AND SUPPORT STRUCTURE
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2400000   "UPR END BX"        BRANCH
2400001   2         0
2400101   0.2423341 0.5867979 0.0       0.0       90.0      0.5867979
2400102   3.81-6    0.145     00
2400200   0         14946300. 1422480.  2461120.  1.37821-3
2401101   230010000 240000000 0.1118    1.5       1.5       0100
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2402101   235010000 240000000 0.0       12.        12.        0100
2401201   2.3404000 2.8789000 0.0
2402201   .67053000 .87895000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* UPPER CORE SUPPORT STRUCTURE - CROSS FLOW REGION
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2450000   "UPR CR SUP"        BRANCH
2450001   2         0
2450101   0.0       0.4933248 0.1280806 0.0       90.0       0.4933248
2450102   3.81-6    0.145     00
2450200   0         14942600. 1422680.  2461200.  2.43866-4
2451101   240010000 245000000 0.0       0.0       0.0        0100
2452101   245010000 251000000 0.0       0.0       0.0        0100
2451201   1.1094000 1.3074000 0.0
2452201   -3.75341-6 9.0743224 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* LOWER PLENUM TOP VOLUME
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
2150000   "LWR PL TOP"        BRANCH
2150001   2         0
2150101   0.0       0.3533183 0.2592277 0.0       -90.0      -0.3533183
2150102   3.81-6    0.0       00
2150200   0         14975700. 1230730.  2460480.  .00000000
2151101   215010000 220000000 0.0       0.005     0.005      0100
2152101   215000000 225000000 0.1499    1.5       1.5        0100
2151201   5.02601-7 5.02570-7 0.0
2152201   1.6140000 1.6140000 0.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CONTAINMENT BROKEN LOOP HOT LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
8000000   "CONT BLHL "        TMDPVOL
8000101   0.0       1.0       0.1       0.0       0.0        0.0
8000102   0.0       0.0       00
8000200   2
8000201   0.0       1.0+5     1.0
*
*   CONTAINMENT BACK PRESSURE BEHAVIOR TABLE MODIFICATION
*      BY  Y.S.BANG AT 89/3/4
*
8000202    0.5     2.0+5    1.0
8000203   20.0     2.9+5    1.0
8000204   37.0     2.7+5    1.0
8000205   60.0     2.7+5    1.0
8000206   70.0     3.1+5    1.0
8000207  120.0     3.1+5    1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* CONTAINMENT BROKEN LOOP COLD LEG
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
8050000   "CONT BLCL "        TMDPVOL
8050101   0.0       1.0       0.1       0.0       0.0        0.0
8050102   0.0       0.0       00
8050200   2
8050201   0.0       1.0+5     1.0
*
*   CONTAINMENT BACK PRESSURE BEHAVIOR TABLE MODIFICATION
*      BY  Y.S.BANG AT 89/3/4
*
8050202    0.5     2.0+5    1.0
8050203   20.0     2.9+5    1.0
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8050204   37.0    2.7+5    1.0
8050205   60.0    2.7+5    1.0
8050206   70.0    3.1+5    1.0
8050207  120.0    3.1+5    1.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ZIRCALOY-4 - THERMAL CONDUCTIVITY           FROM MATPRC
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100300  TBL/FCTN       1           1
20100301  300.0       12.68
*20100301  380.4       13.6
20100302  469.3       14.6
20100303  577.6       15.8
20100304  685.9       17.3
20100305  774.8       18.4
20100306  872.0       19.8
20100307  973.2       21.8
20100308  1073.2      23.2
20100309  1123.2      25.4
20100310  1152.3      24.2
20100311  1232.2      25.5
20100312  1331.2      26.6
20100313  1404.2      28.2
20100314  1576.2      33.0
20100315  1625.2      36.7
20100316  1755.2      41.2
20100317  2273.2      55.0
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* ZIRCALOY-4 - VOLUMETRIC HEAT CAPACITY       FROM MATPRO
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
20100351  300.0       1.841E6
20100352  400.0       1.978E6
20100353  640.0       2.168E6
20100354  1090.0      2.456E6
20100355  1093.0      3.288E6
20100356  1113.0      3.865E6
20100357  1133.0      4.028E6
20100358  1153.0      4.709E6
20100359  1173.0      5.345E6
20100360  1193.0      5.044E6
20100361  1213.0      4.054E6
20100362  1233.0      3.072E6
20100363  1243.0      2.332E6
20100364  1477.0      2.332E6
*---- ----1---- ----1---- ----1
20300100   P           250010000
20300200   P           530010000
20300300   TEMPF       250010000
20300400   TEMPF       215010000
20300500   MFLOWJ      340010000
20300600   MFLOWJ      305010000
20300700   RHO         100010000
20300800   HTTEMP      002100501
20300900   HTTEMP      002100110
20301000   HTTEMP      002100410
20301100   HTTEMP      002100510
20301200   HTTEMP      002100810
20301300   HTTEMP      002101010
20301400   HTTEMP      002101110
20301500   MFLOWJ      600000000
```

```
20301600   MFLOWJ    610000000
20301700   CNTRLVAR  4
20301800   PMPVEL    165
* ---- ADDED MINOR EDIT VARIABLE  ----
20303100     P     100010000
20303200    VOIDG  230010000
20303300    VOIDGJ  317000000
20303400    VOIDGJ  347000000
20303500    HTTEMP  002101210
20303600    CNTRLVAR  2
20303800  VOIDG     225010000
20303900    MFLOWJ   180010000
20304000    MFLOWJ   100010000
20304200    TEMPF    712010000
20304300    TEMPF    714010000
20304400    TEMPF    716010000
20304500    TEMPF    718010000
20304600    TEMPF    225010000
20304700   MFLOWJ   317000000
20304800   MFLOWJ   347000000
20304900   CNTRLVAR   1     *S/G LEVEL
20305000   CNTRLVAR   7     *DOWNCOMER LEVEL(INTACT SIDE)
20305100   CNTRLVAR   8     *DOWNCOMER LEVEL(BROKEN SIDE)
20305200   CNTRLVAR  10     *CORE LEVEL
20305300   CNTRLVAR  12     *TOTAL COLLAPSED CORE LEVEL
20305400   CNTRLVAR  71     *RV MASS
20305500   CNTRLVAR  72     *PCS MASS
20305600   CNTRLVAR  75     *TOTAL INJECTED MASS
20305700   CNTRLVAR  77     *TOTAL DISCHARGED MASS
20305800    MFLOWJ   720000000
20305900    MFLOWJ   722000000
20306000    MFLOWJ   724000000
20306100    MFLOWJ   726000000
20306200    MFLOWJ   728000000
20306300    MFLOWJ   731000000
20306400    MFLOWJ   709000000
20306500    MFLOWJ   225010000
20306600    MFLOWJ   225020000
20306700    MFLOWJ   719000000
20306800    MFLOWJ   741000000
20306900    MFLOWJ   215020000
20307000    HTTEMP    001100110
20307100    HTTEMP    001100410
20307200    HTTEMP    001100510
20307300    HTTEMP    001100810
20307400    HTTEMP    001101010
20307500    HTTEMP    001101110
20307600    CPUTIME   0
20307700    CNTRLVAR  81
*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*
*
*        CONTROL VARIABLES
*
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*  001-006  LEVEL CALCULATORS
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
* 001 STEAM GENERATOR LEVEL
20500100  SGLVL      SUM       1.0        0.0        1
20500101  0.0        0.4445    VOIDF      503010000
```

```
20500102            1.2131    VOIDF     505010000
20500103            0.6096    VOIDF     508010000
20500104            0.6096    VOIDF     510010000
20500105            0.6096    VOIDF     510020000
20500106            0.6096    VOIDF     510030000
* 002 PRESSURIZER LEVEL
*20500200  PZRLVL    SUM      1.0       0.0        1
*20500201  0.0       0.1815   VOIDF     415010000
*20500202            0.1524   VOIDF     415020000
*20500203            0.3967   VOIDF     415030000
*20500204            0.5289   VOIDF     415040000
*20500205            0.3967   VOIDF     415050000
*20500206            0.1943   VOIDF     415060000
*20500207            0.1029   VOIDF     420010000
*20500208            0.1029   VOIDF     420020000
* 007 REACTOR VESSEL DOWNCOMER LEVEL INTACT SIDE
20500700  RVDCLVLIN SUM       1.0       0.0        1
20500701  0.0       0.3302040 VOIDF     700010000
20500702            0.3951272 VOIDF     702010000
20500703            1.5200561 VOIDF     704010000
20500704            1.2616333 VOIDF     706010000
20500705            1.0792591 VOIDF     708010000
20500706            0.3533183 VOIDF     215010000
20500707            0.3741720 VOIDF     220010000
* 008 REACTOR VESSEL DOWNCOMER LEVEL BROKEN SIDE
20500800  RVDCLVLBK SUM       1.0       0.0        1
20500801  0.0       0.3302040 VOIDF     710010000
20500802            0.3951272 VOIDF     712010000
20500803            1.5200561 VOIDF     714010000
20500804            1.2616333 VOIDF     716010000
20500805            1.0792591 VOIDF     718010000
20500806            0.3533183 VOIDF     215010000
20500807            0.3741720 VOIDF     220010000
* 010 REACTOR VESSEL CORE COLLAPSED LEVEL
20501000  RVLVL     SUM  0.1397017     0.0     1
20501001   0.0      1.0  VOIDF     230010000
20501002            1.0  VOIDF     230020000
20501003            1.0  VOIDF     230030000
20501004             1.0 VOIDF     230040000
20501005            1.0  VOIDF     230050000
20501006            1.0  VOIDF     230060000
20501007            1.0  VOIDF     230070000
20501008            1.0  VOIDF     230080000
20501009            1.0  VOIDF     230090000
20501010            1.0  VOIDF     230100000
20501011            1.0  VOIDF     230110000
20501012            1.0  VOIDF     230120000
*  011  UPPER/LOWER PLENUM COLLAPSED LEVEL
20501100  UDLVL     SUM  1.0        0.0        1
20501101   0.0      0.7749094  VOIDF  260010000
20501102            0.6312304  VOIDF  255010000
20501103            0.286958   VOIDF  252010000
20501104            0.7850547  VOIDF  250010000
20501105            0.4933248  VOIDF  245010000
20501106            0.5867979  VOIDF  240010000
20501107            0.5709989  VOIDF  225010000
20501108            0.3533183  VOIDF  215010000
20501109            0.374172   VOIDF  220010000
* 012  TOTAL COLLAPSED CORE LEVEL
```

```
20501200   CCCLEVEL  SUM       1.0       0.0     1
20501201   0.0       1.0     CNTRLVAR  10
20501202             1.0     CNTRLVAR  11
*  013 BOTTOM BASE LEVEL
20501300   BBLEVEL   SUM       1.0       0.0     1
20501301   1.298489   -1.0   CNTRLVAR  12
*  ACCUMULATOR LEVEL
20500400  ACCMLVL   INTEGRAL  -6.3480-3 2.0447    0
20500401  VELFJ     620010000
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*  060-072  PRIMARY SYSTEM MASS CALCULATOR
*---- ----1---- ----1---- ----1---- ----1---- ----1---- ----1----
*    060  CORE MASS
20506000   COREMAS   SUM        1.0       0.0     1
20506001     0.0     2.5602-2   RHO      230010000
20506002               2.5602-2   RHO      230020000
20506003               2.3929-2   RHO      230030000
20506004               2.3929-2   RHO      230040000
20506005               2.4167-2   RHO      230050000
20506006               2.4167-2   RHO      230060000
20506007               2.3957-2   RHO      230070000
20506008               2.3957-2   RHO      230080000
20506009               2.3953-2   RHO      230090000
20506010               2.3953-2   RHO      230100000
20506011               2.4760-2   RHO      230110000
20506012               2.4760-2   RHO      230120000
* 061 INTACT LOOP HOT LEG MASS
20506100  ILHLMASS    SUM        1.0       0.0       1
20506101  0.0         0.102752  RHO       100010000
20506102              7.57291-2 RHO       105010000
20506103              6.43178-2 RHO       110010000
20506104              7.96973-2 RHO       112010000
20506105              5.79614-2 RHO       112020000
* 062 STEAM GENERATOR PRIMARY MASS
20506200  SGPRIMASS SUM         1.0       0.0       1
20506201  0.0         0.335320  RHO       114010000
20506202              0.136356  RHO       115010000
20506203              9.21538-2 RHO       115020000
20506204              9.21538-2 RHO       115030000
20506205              6.99783-2 RHO       115040000
20506206              6.99783-2 RHO       115050000
20506207              9.21538-2 RHO       115060000
20506208              9.21538-2 RHO       115070000
20506209              0.136356  RHO       115080000
20506210              0.335320  RHO       116010000
* 063 PUMP SUCTION PIPING MASS
20506300  PMPSUMASS SUM         1.0       0.0       1
20506301  0.0         4.45625-2 RHO       118010000
20506302              4.45137-2 RHO       118020000
20506303              3.54278-2 RHO       118030000
20506304              4.87901-2 RHO       120010000
20506305              6.40548-2 RHO       125010000
20506306              1.77444-2 RHO       130010000
20506307              6.40548-2 RHO       155010000
20506308              1.77444-2 RHO       160010000
* 064 INTACT LOOP COLD LEG MASS
20506400  ILCLMASS  SUM         1.0       0.0       1
20506401  0.0         9.91000-2 RHO       135010000
20506402              1.83849-2 RHO       140010000
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20506403                 6.33861-2 RHO        145010000
20506404                 3.16011-2 RHO        150010000
20506405                 9.91000-2 RHO        165010000
20506406                 1.92958-2 RHO        170010000
20506407                 3.54280-2 RHO        175010000
20506408                 3.88950-2 RHO        175020000
20506408                 3.88950-2 RHO        175020000
20506409                 7.30598-2 RHO        180010000
20506410                 6.44920-2 RHO        185010000
* 065 DOWNCOMER/LOWER PLENUM MASS
20506500  DCLPMASS       SUM       1.0        0.0        1
20506501  0.0            0.0432082 RHO        700010000
20506502                 0.0578606 RHO        702010000
20506503                 0.1581866 RHO        704010000
20506504                 0.1217000 RHO        706010000
20506505                 0.0986806 RHO        708010000
20506506                 0.0432082 RHO        710010000
20506507                 0.0578606 RHO        712010000
20506508                 0.1581866 RHO        714010000
20506509                 0.1217000 RHO        716010000
20506510                 0.0986806 RHO        718010000
20506511                 0.24520   RHO        215010000
20506512                 0.29656   RHO        220010000
* 067 UPPER PLENUM MASS
20506700  CRUPMASS       SUM       1.0        0.0        1
20506701  0.0            0.12094   RHO        225010000
20506708                 0.0091280 RHO        235010000
20506709                 0.0072325 RHO        235020000
20506710                 0.0088095 RHO        235030000
20506711                 0.1195494 RHO        240010000
20506712                 0.1280806 RHO        245010000
20506713                 0.1436936 RHO        250010000
20506714                 0.1154214 RHO        251010000
20506715                 0.063595  RHO        255010000
20506716                 0.310967  RHO        260010000
* 068 BROKEN LOOP HOT LEG MASS
20506800  BLHLMASS       SUM       1.0        0.0        1
20506801  0.0            5.75410-2 RHO        300010000
20506802                 4.42927-2 RHO        305010000
20506803                 6.78467-2 RHO        310010000
20506804                 7.75291-3 RHO        315010000
20506805                 1.72111-1 RHO        315020000
20506806                 8.97552-2 RHO        315030000
20506807                 8.97552-2 RHO        315040000
20506808                 1.72111-1 RHO        315050000
20506809                 1.82303-2 RHO        315060000
20506810                 5.46687-2 RHO        315070000
20506811                 1.82489-2 RHO        315080000
20506812                 9.15000-2 RHO        380010000
20506813                 4.80000-2 RHO        380020000
20506814                 4.89000-2 RHO        380030000
* 069 BROKEN LOOP COLD LEG MASS
20506900  BLCLMASS       SUM       1.0        0.0        1
20506901  0.0            4.79790-2 RHO        335010000
20506902                 4.43927-2 RHO        340010000
20506903                 3.62484-2 RHO        342010000
20506903                 3.62484-2 RHO        342010000
20506904                 3.10679-2 RHO        344010000
20506907                 2.79000-2 RHO        370010000
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20506908          7.00000-2 RHO       370020000
20506909          1.16500-1 RHO       370030000
* 070 PRESSURIZER MASS
*20507000  PZRMASS   SUM      1.0      0.0       1
*20507001  0.0       3.33500-3 RHO      400010000
*20507002            3.33500-3 RHO      405010000
*20507003            3.33500-3 RHO      405020000
*20507004            6.84000-2 RHO      415010000
*20507005            8.38000-2 RHO      415020000
*20507006            2.24255-1 RHO      415030000
*20507007            2.98987-1 RHO      415040000
*20507008            2.24255-1 RHO      415050000
*20507009            7.32000-2 RHO      415060000
*20507010            1.42000-2 RHO      420010000
*20507011            1.42000-2 RHO      420020000
*20507012            2.12609-3 RHO      430010000
* 071 RECTOR VESSEL MASS
20507100   RVMASS     SUM      1.0      0.0       1
20507101   0.0        1.0      CNTRLVAR   65
20507102              1.0      CNTRLVAR   67
20507103              1.0      CNTRLVAR   60
* 072 PCS TOTAL MASS
20507200  PCSMASS   SUM       1.0      0.0        1
20507201  0.0       1.0       CNTRLVAR  61
20507202            1.0       CNTRLVAR  62
20507203            1.0       CNTRLVAR  63
20507204            1.0       CNTRLVAR  64
20507205            1.0       CNTRLVAR  68
20507206            1.0       CNTRLVAR  69
20507207            1.0       CNTRLVAR  70
20507208            1.0       CNTRLVAR  71
*
*    TOTAL INJECTION MASS
*
20507400     TOINFL      SUM      1.0      0.0     1
20507401     0.          1.0      MFLOWJ   600000000
20507402                 1.0      MFLOWJ   640000000
20507500     INJMASS     INTEGRAL  1.0     0.0     1
20507501                 CNTRLVAR   74
*
*    TOTAL DISCHARGE MASS
*
20507600     TOBRFL      SUM      1.0      0.0     1
20507601     0.         1.0       MFLOWJ   317000000
20507602                1.0       MFLOWJ   347000000
20507700     BRMASS      INTEGRAL  1.0     0.0     1
20507701                CNTRLVAR     76
20507701                CNTRLVAR     76
*
20507800    OLDTIME       SUM    1.     0.      0
20507801    0.    1.    CNTRLVAR   79
*
20507900    NEWTIME       SUM    1.     0.      0
20507901    0.    1.      TIME       0
*
20508100    TSTEP         SUM    1.     0.      0
20508101    0.    -1.     CNTRLVAR   78
20508102           1.     CNTRLVAR   79
*
```

*   END OF INPUT

APPENDIX D Update list for a updated RELAP5/MOD2 Cycle 36.0

```
/JOB
RM364T,T200.
/USER
ATTACH,OLDPL=REL364S.
PURGE,RE364TS/NA.
PURGE,RE364TX/NA.
PURGE,RE364TL/NA.
* **************************
*  IMPORTANT !!           *
*   THE UPDATE DIRECTIVE   *
*   SHOULD HAVE *COMPILE DEFINE
*   AS THE FIRST DIERECTIVE
***************************
UPDATE,N=RE364TS.
UPDATE,P=RE364TS,Q,C=R5SEG.
REPLACE,R5SEG.
RETURN,OLDPL.
*DEFINE,RE364TS.
RETURN,RE364TS.
ATTACH,ENVRLX=ENVR41X.
LIBRARY,ENVRLX.
SELECTA,COMPILE,COMP.
LIBRARY.
RETURN,ENVRLX.
REWIND,COMP.
FTN5,I=COMP,DO,ET,STATIC,OPT=2,ROUND,LO=M/A/R/S.
RETURN,COMP.
REWIND,LGO.
ATTACH,RELAP5I=REL36IL.
GTR,RELAP5I,ADD.REL/*
*DEFINE,RELAP5O=RE364TL.
LIBEDIT,P=RELAP5O,I=0,B=ADD,LO=F,U,C.
LIBEDIT,P=RELAP5O,B=LGO,I=0,LO=F,U,C.
RETURN,NULL,LGO,RELAP5I.
RETURN,RLP5F1,RLP5F2.
ATTACH,ENVRL=ENVR41L.
FILE,RSTIN,RT=S,SBF=NO,USE,FO=SQ.
RFL,EC=200.
DEFINE,RE364TX.
SEGLOAD,I=R5SEG,B=RE364TX.
LDSET,LIB=RELAP5O/ENVRL.
LDSET,PRESETA=NGINDEF,ERR=NONE,MAP=SB.
LDSET,STAT=RSTIN.
LIBLOAD,ENVRL,$HDR=$.
LIBLOAD,FTN5LIB,$FERCAP.$,$RPVCAP.$,$FTNRP2.$,$Q2NTRY.$.
NOGO.
RETURN,RELAP5O,ENVRL,COMPILE.
SKIP,KKK.
EXIT.
ENDIF,KKK.
DAYFILE,KMRRDAY.
REPLACE,KMRRDAY.
/EOR
*COMPILE DEFINE
*ID CBD3604
*D DMK3601.484
*D PLOTMD.24
```

```
  901  FORMAT ('OPLOTFL SCRACH FILE GENERATED.')
*COMPILE DEFINE,SEGDIR
*COMPILE RELAP5
*D RJW3603.23
       DATA PTITLE/"RELAP5/2/3","6.04-PSI","REACTOR LO","SS OF COOL",
*/
*/    ENDIF
*/        *ID KWU01  ALREADY IMPLEMENTED IN RELAP5OLDPL3604C.
*/                   WHICH IS USED AS BASIS
*/        */    CORRECTIONS OF INDEX IN SUBROUTINE RACCUM
*/        *I RACCUM.618
*/               IELV=I
*/        *B DMK3602.581
*/        I=IELV
*COMPILE DEFINE,SEGDIR,RACCUM
*ID KWU01
*I RACCUM.618
          IELV=I
*B DMK3602.581
          I=IELV
*/        */     END OF KWU-UPDATES TO CYCLE 3604
*COMPILE DEFINE,SEGDIR
*IDENT SKI01
*/          THESE UPDATES ARE RECOMMENDED BY SKI TO BE
*/          IMPLEMENTED IN RELAP5/MOD2-36.04
*/          SOURCE:     LETTER FROM STUDSVIK (MR.SANDERVAG)
*/                      TO          KWU      (MR.GRUBER)
*/                      1987-06-25
*/
*/         COMPILE RELAP5
*/
*COMPILE IHTCMP
*/
*/        FIX AN INDEXING ERROR IN IHTCMP
*/        ERROR CAUSED ROD PLENUM VOLUME FOR GAP-GAS PRESSURE CALCULATION
*/        TO BE INCORRECT. FOUND AND FIXED BY D.CARAHER 20MAY87
*/        FIX ONLY CDC-VERSION CODING
*D IHTCMP.1041
      L=(.NOT.MASK(43).AND.IHTPTR(J))+FILNDX(8)
*/
*/         UPDATE ROUTINE IRFLHT TO ALLOW REFLOOD TO WORK
*/         HEAT STRUCTURE FILE GETS CHANGED ON RESTART (FOR
*/         EXAMPLE BY DELETING OR ALTERING SOME STRUCTURES)
*/  NOTE..HEAT STRS ASSOCIATED WITH REFLOOD CANNOT BE ALTERED
*/         ON RESTART AS IRFLHT IS NOW PROGRAMMED
*/
*COMPILE IRFLHT
*I IRFLHT.330
C         UPDATE THE GEOMETRY POINTER IN IGLRFL BITS 44-60 IN CASE THE
C         HEAT STRUCTURE FILE CHANGED ON RESTART.
      J=(.NOT.MASK(43).AND.IH) + IHT
      J=(.NOT.MASK(43).AND.IHTPTR(J)) + IHT
      NCOLS=.NOT.MASK(43).AND.INXGOM(J)
      IGLRFL(I)=(MASK(43).AND.IGLRFL(I)).OR.NCOLS
*/
*/    END OF UPDATES SKI01
*/
*/  START OF PSI UPDATE
*/
```

```
*ID MARTIN
*I PHAINT.9
         COMMON/IFLG2/IFLAG2(1000)
         DIMENSION IFLAG1(1000)
*I PHAINT.151
         IIFL1=(I-IV+IVSKP)/IVSKP
         IFLAG1(IIFL1)=0
*I PHAINT.294
         TGSAT=TGSAT-40.*VOIDF(I)
*I PHAINT.370
       IF(FBUB.GT.0.0.OR.FSLUG.GT.0.0.AND.DIAMV(I).LT.0.018)
     1  IFLAG1(IIFL1)=1
*I PHAINT.390
      IF(DIAMV(I).LT.0.018) THEN
      FIC=65.0*VOIDG(I)*VOIDF(I)**3.0*RHOG(I)/DIAMV(I)
      ENDIF
*I PHAINT.421
      IF(DIAMV(I).LT.0.018) THEN
      FIC1=65.0*VOIDG(I)*VOIDF(I)**3.0*RHOG(I)/DIAMV(I)
      ENDIF
*I PHAINT.424
      IF(DIAMV(I).GE.0.018) THEN
*I PHAINT.425
      ENDIF
*I PHAINT.495
      IF(DIAMV(I).LT.0.018) FIC1=FIC1*0.5
*I PHAINT.633
      IF(DIAMV(I).LT.0.018) THEN
      FIC1=VOID*(FIC1*0.5+1.225*0.4*RHOG(I)*SLSLG*VOID**2.)
      ELSE
*I PHAINT.634
      ENDIF
*I PHAINT.656
      IF(DIAMV(I).LT.0.018) FIC=FIC*0.5
*I PHAINT.462
      IF(DIAMV(I).LT.0.018) FIC=FIC*0.5
*I PHAINT.855
      IIFL2= (I-IJ+IJSKP)/IJSKP
      IFLAG2(IIFL2)=0
*I PHAINT.919
      INDK=(K-IV+IVSKP)/IVSKP
      INDL=(L-IV+IVSKP)/IVSKP
      IF(IFLAG1(INDK).EQ.1.OR.IFLAG1(INDL).EQ.1) IFLAG2(IIFL2)=1
*D QFHTRC.156
      HTV2(INDZ)=HCCHFA*EXP(-0.0175*TERM)+GTERM*EXP(-0.012*TERM)
*D QFHTRC.178
      FACBR = (1.+0.025*AMAX1(0.,SATT(IDX)-TEMPF(IDX)))
      HCBR=AMAX1(HTV2(INDZ),(CONVAP*TERM1*TERM2*((SATHG(IDX)-SATHG(IDX))
*D QFHTRC.179
     1/AMAX1(TMPBDY-SATT(IDX),0.01)+0.68*CSUBPG(IDX))*9.81/(2.*3.14159)
*D QFHTRC.180
     2    *SQRT(9.81*TERM1/SIGMA(IDX))/VISCG(IDX))**0.25*0.62*FACBR)
       VELD=AMAX1(VELG(IDX)-VELF(IDX),0.001)
       DDROP=3.*SIGMA(IDX)/(RHOG(IDX)*VELD**2)
        IF(DDROP.LT.1.5E-4)DDROP=1.5E-4
        IF(DDROP.GT.3.0E-3)DDROP=3.0E-3
      TERM5=1./(1.+0.35*CSUBPG(IDX)*AMAX1(TMPBDY-SATT(IDX),0.0001)
     1      /AMAX1(SATHG(IDX)-SATHF(IDX),0.01))**3.
       HCF0=0.4*3.14159/4.*(6.*(1.-VOIDG(IDX))/3.14159)**0.6666667
```

```
     1    *(9.81*RHOF(IDX)*RHOG(IDX)*AMAX1(SATHG(IDX)-SATHF(IDX),0.01)
     2    *TERM5*CONVAP/(AMAX1(TMPBDY-TEMPF(IDX),0.0001)*VISCG(IDX)
     3    *(3.14159/6.)**0.3333333*DDROP))**0.25
       IF(VOIDG(IDX).LE.0.6)THEN
        HCFB=HCBR
      ELSE
        IF(VOIDG(IDX).GE.0.8) THEN
          HCFB=HCFO
        ELSE
          HCFB=(VOIDG(IDX)-0.6)/0.2*HCFO+(0.8-VOIDG(IDX))/0.2
     1        *HCBR
        ENDIF
      ENDIF
*D QFHTRC.187,188
      TERM=TERM2+HCFB
*D QFHTRC.209
     1    *AMAX1(0.023*(REYN2)**0.4/DIAMV(IDX),TERM4)
*D QFHTRC.221,223
      VELD=AMAX1(VELG(IDX)-VELF(IDX),0.001)
      DDROP=3.*SIGMA(IDX)/(RHOG(IDX)*VELD**2)
      IF(DDROP.LT.1.5E-4) DDROP = 1.5E-4
      IF(DDROP.GT.3.0E-3) DDROP = 3.0E-3
      TERM5=1./(1.+0.35*CSUBPG(IDX)*AMAX1(TMPBDY-SATT(IDX),0.0001)
     1     /(SATHG(IDX)-SATHF(IDX)))**3.
      HCFO=0.4*3.14159/4.*(6.*(1.-VOIDG(IDX))/3.14159)**0.6666667
     1    *(9.81*RHOF(IDX)*RHOG(IDX)*(SATHG(IDX)-SATHF(IDX))
     2    *TERM5*CONVAP/(AMAX1(TMPBDY-TEMPF(IDX),0.0001)*VISCG(IDX)
     3    *(3.14159/6.)**0.3333333*DDROP))**0.25
      HCFB=HCFO
*I VEXPLT.9
      COMMON/IFLG2/IFLAG2(1000)
*I VEXPLT.322
      CO=1.0
      C1=1.0
      IIFL2=(I-IJ+IJSKP)/IJSKP
      IF(IFLAG2(IIFL2).EQ.1) THEN
        CO=1.2
        C1=(1.0-CO*VOIDGA)/AMAX1((1.-VOIDGA),1.0E-5)
        IF(C1.LT.0.7) C1=0.7
      ENDIF
*D VEXPLT.323
      FJFG=(FIJ(I)*DX*(ABS(C1*VELGJO(I)-CO*VELFJO(I))+0.01)
*D VEXPLT.507
       DIFF=SCRACH+(FRICFJ+CO*FJFG+VPGNX+HLOSSF)*DT
*D VEXPLT.508
       DIFG=-SCRACH-(FRICGJ+C1*FJFG+VPGNX+HLOSSG)*DT
*I VIMPLT.8
      COMMON/IFLG2/IFLAG2(1000)
*I VIMPLT.435
      CO=1.0
      C1=1.0
      IIFL2=(I-IJ+IJSKP)/IJSKP
      IF(IFLAG2(IIFL2).EQ.1) THEN
        CO=1.2
        C1=(1.0-CO*VOIDGA)/AMAX1((1.-VOIDGA),1.0E-5)
        IF(C1.LT.0.7) C1=0.7
      ENDIF
*D VIMPLT.436
      FJFG=(FIJ(I)*DX*(ABS(C1*VELGJO(I)-CO*VELFJO(I))+0.01)
```

```
*D VIMPLT.591
       COEFV(IDG-1) = (FRICFJ+CO*FJFG+VPGNX+HLOSSF)*DT + SCRACH
*D VIMPLT.592
       COEFV(IDG)   =-(FRICGJ+C1*FJFG+VPGNX+HLOSSG)*DT - SCRACH
*C DEFINE,PHAINT,QFHTRC,VEXPLT,VIMPLT
*/
*/   END OF PSI UPDATE
*/
*/
*COMPILE ACCUM,PHAINT,DTSTEP
*/
*/ PROTECTS SIGMA (SURFACE TENSION) BY 1.0E-7 IN SUBROUTINE PHAINT
*/
*DELETE,PHAINT.200
      DSTAR(I) =DIAMV(I)*SQRT(9.8*RHOFG/AMAX1(SIGMA(I),1.0E-7))
*DELETE,PHAINT.326
   55 VCRIT=2.5*SQRT(SQRT(AMAX1(SIGMA(I),1.0E-7)*RHOFG)/RHOG(I))
*/
*/ CORRECT ERROR IN SUBROUTINE DTSTEP INTRODUCED IN CYCLE 30 SO THAT
*/ STATE PROPERTIES ARE NOT RESET WHEN AT A MINIMUM TIMESTEP DUE TO
*/ MASS ERROR
*/
*DELETE,DTSTEP.161
       IF (NANY .EQ. 0) WRITE (OUTPT,2003)
*/
*/ REWET CRITERIA REDUCTION (89/5/23 AKSAN & ICAP)
*IDENT MARTIN2
*I HTRC1.60
      GGT = RHOF(IV)*VOIDF(IV)*VELF(IV)+
     1      RHOG(IV)*VOIDG(IV)*VELF(IV)
*I HTRC1.111
      IF(GGT.GT.-100.) GO TO 12
*D HTRC1.112
       IF(XE.GT.XEC.OR.TW.GT.(1250.-TSAT)) GO TO 2000
      GO TO 13
   12 IF(XE.GE.XEC) GO TO 2000
   13 CONTINUE
*I HTRC1.82
      IF(GGT.GT.-100.) GO TO 11
*D HTRC1.83
      IF(TW.GT.1250.-TSAT) GO TO 2000
   11 CONTINUE
*I PSTDNB.28
      GGT = RHOF(IV)*VOIDF(IV)*VELF(IV)+
     1      RHOG(IV)*VOIDG(IV)*VELG(IV)
*I PSTDNB.29
        IF(GGT.GT.-100.) GO TO 231
*D PSTDNB.30
      IF(XE.GT.XEC.OR.TW.GT.(1250.-TSAT)) GO TO 235
*I PSTDNB.31
      GO TO 232
  231 IF(XE.GT.XEC) GO TO 235
  232 CONTINUE
*I PSTDNB.124
      IF(GGT.GT.-100.) GO TO 401
*D PSTDNB.126
     1   (1250.-TSAT)) TRANS = .FALSE.
*I PSTDNB.141
      GO TO 499
```

```
 401 IF(XE.GE.XES)TRANS=.FALSE.
     IF(TRANS) THEN
     GO TO 402
     ELSE
     GO TO 403
      ENDIF
 402 HTCF=AMAX1(HTBF,HFB)
     HTCG=AMAX1(HTBG,HV)
     QFFO=AMAX1(QTFBF,QFBF)
     QFGO=AMAX1(QTFBG,QFBG)
     GO TO 450
 403 HTCF=HFB
     HTCG=HV
     QFFO=QFBF
     QFGO=QFBG
 499 CONTINUE
*D PSTDNB.42
     IF(GGT.LT.-100) THEN
     FL=EXP(-5.0*THETA*AMIN1(ABS(TW-TWRTO),SQRT(DTSAT)))
     ELSE
     IF(GGT.GE.-100..AND.GGT.LE.0) THEN
     FL=((EXP(-2.0*THETA*AMIN1(ABS(TW-TWRTO),SQRT(DTSAT)))
    1   -EXP(-5.0*THETA*AMIN1(ABS(TW-TWRTO),SQRT(DTSAT))))/100.)*GGT+
    2    EXP(-2.0*THETA*AMIN1(ABS(TW-TWRTO),SQRT(DTSAT)))
      ELSE
     FL= EXP(-2.0*THETA*AMIN1(ABS(TW-TWRTO),SQRT(DTSAT)))
     ENDIF
      ENDIF
     FL = FL*AMIN1(1.,(((1.-ALPH)/0.05)**4))
*D PSTDNB.67
     HFB = 0.92163*(SQRT(HFB/SIGMA(IV))
*I PSTDNB.69
     HCBR = HFB
     VAMA = AMAX1(VELG(IV)-VELF(IV),0.001)
     VFG2 = VAMA**2.
     XA= AMAX1(3.*SIGMA(IV),1.E-10)
     RDIAM =RHOG(IV)*VFG2/XA
     DDROP = 1./RDIAM
     IF(DDROP.LT.1.0E-4) DDROP=1.0E-4
     IF(DDROP.LT.3.0E-3) DDROP=3.0E-3
     TERM5=1./(1.+0.35*CSUBPG(IV)*AMAX1(TW-TSAT,0.001)
    1     /AMAX1(SATHG(IV)-SATHF(IV),0.001))**3.
     HCFO=0.2*3.14159/4.*(6.*(1.-VOIDG(IV))/3.14159)**0.6666667
    1    *(9.81*RHOF(IV)*RHOG(IV)*AMAX1(SATHG(IV)-SATHF(IV),0.01)
    2    *TERM5*THCONS**3/(AMAX1(TW-TEMPF(IV),0.01)*VISCS
    3    *(3.14159/6.)**0.3333333*DDROP))**0.25
      HCFO = 0.001*HCFO
     IF(VOIDG(IV).LE.0.60) THEN
     HFB=HCBR
      ELSE
     IF(VOIDG(IV).GE.0.80) THEN
     HFB=HCFO
       ELSE
     HFB=(VOIDG(IV)-0.60)/0.2*HCFO+(0.80-VOIDG(IV))/0.2
    1 *HCBR
       ENDIF
         ENDIF
      IF(GGT.LT.0.) THEN
     HHHH=AMAX1(1.E-7,RHOF(IV)-RHOG(IV))
```

```
      HFB=1.09680*VOIDF(IV)*SQRT((1./1.)
     1    *THCONS**3*RHOG(IV)*HHHH*(HFG+0.5*DTSAT*CSUBPG(IV))
     2    /(VISCS*DTSAT))**.25
      ENDIF
*C HTRC1,PSTDNB,PREDNB
*/
*/  END OF AKSAN UPDATE
*/
/EOR
*COMPILE SEGDIR
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11. ABSTRACT (200 words or less)

The LOFT L2-5 LBLOCA Experiment was simulated using the RELAP5/MOD2 Cycle 36.04 code to assess its capability to predict the phenomena in LBLOCA. One base case calculation and three cases of different nodalizations were carried out. The effect of different nodalization was studied in the area of the downcomer and core. For a sensitivity study, another calculation was executed using an updated version of RELAP5/MOD2 Cycle 36.04.

A Split downcomer with one crossflow junction and two core channels were found to be effective in describing the ECC bypass and hot channel behavior. And the updated version was found to be effective in overcoming the code deficiency in the interfacial friction and reflood quenching.

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