



# **International Agreement Report**

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## **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  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555**

April 1990

Prepared as part of  
The Agreement on Research Participation and Technical Exchange  
under the International Thermal-Hydraulic Code Assessment  
and Application Program (ICAP)

Published by  
U.S. Nuclear Regulatory Commission

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NUREG/IA-0032



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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

## ACKNOWLEDGEMENTS

This report was completed under the sponsorship of the Korean Ministry of Science and Technology. Dr. Sang Hoon Lee, President of the Korea Nuclear Safety Center, contributed significantly to the administration of the project. Authors expressed a great appreciation for their in-depth technical review of the report to Professors E.C.Lee, C.S.Kang in Seoul National University and Professors M.H. Chun, S.H. Chang in Korea Advanced Institute of Science and Technology. Special Thanks should be addressed to Dr. Sih Hwan Kim, General Manager of LWR Fuel Division in Korea Advanced Energy Research Institute, for his general support to this project.

Another appreciation should be expressed to Mr. Dick Schultz, Rich Riemke and Bob Hanson in EG&G, Idaho for their kind advices of RELAP5 assessment work. Mr. Schultz's technical response for the experimental data tape questioned by authors was greatly important in preparing the data comparison in this report. Authors should appreciate Dr. Aksan in Paul Scherrer Institute in Switzerland for his code update work and technical comments during his visit in Korea and to Mr. D.Bessette in USNRC for his coordination of this technical support.

Authors should express their sincere gratitudes to members of Department of Safety Analysis in KNSC, Mr. Bub Dong Chung and Dr. Euy Joon Lee for technical discussions and to Mr. Jong Han Park for preparing data plots.

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 system consists of five major systems : reactor system, primary coolant system, 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 cal-

culated 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. Uncertainties 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 IREFLHT 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 STUDEVIK, [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 respectively, 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 prior 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, respectively. 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 forward 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 magnitude of oscillation in mass flow and pump speed, 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 comparison 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. According

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 deficiencies 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, respectively, with those of CASE A. These comparisons show that the predictions 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 clearly 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 bundle 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 stabilized 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 variables 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	IHTCMP	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 witous any change of H.S.
Thermal conductivity 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

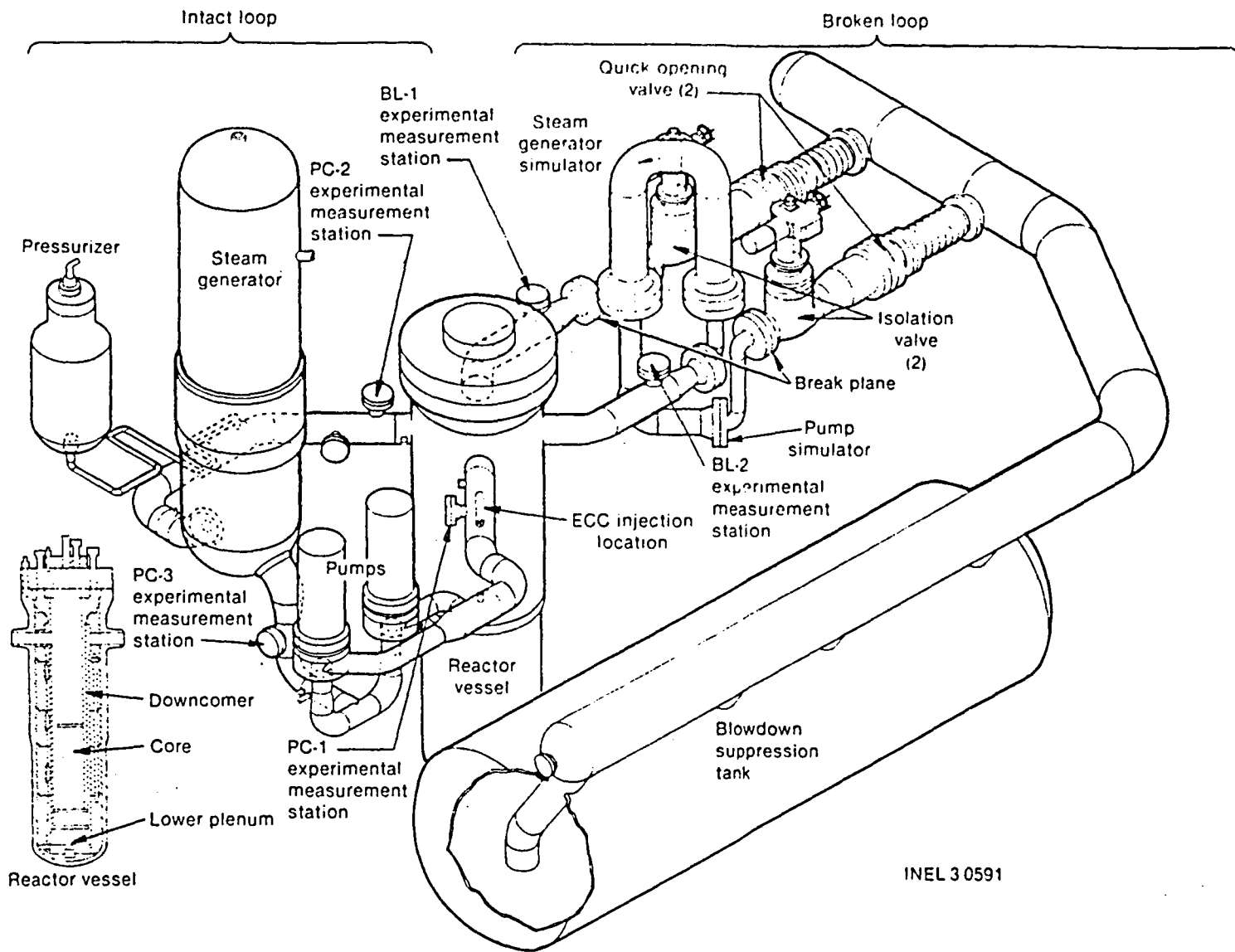


Fig.1 Axonometric configuration of LOFT L2-5 test

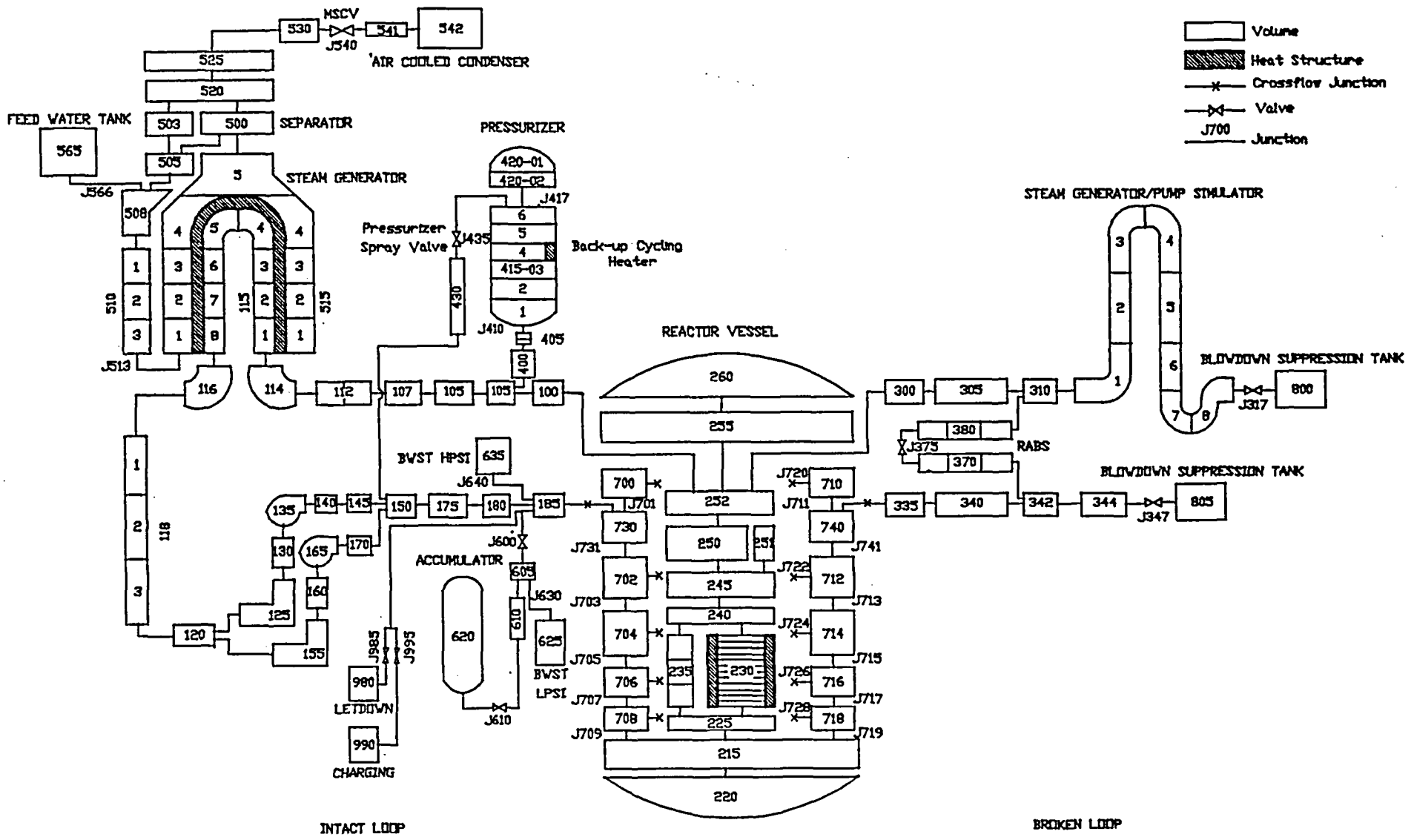


Fig.2 Nodalization diagram for base case calculation of LOFT L2-5 test

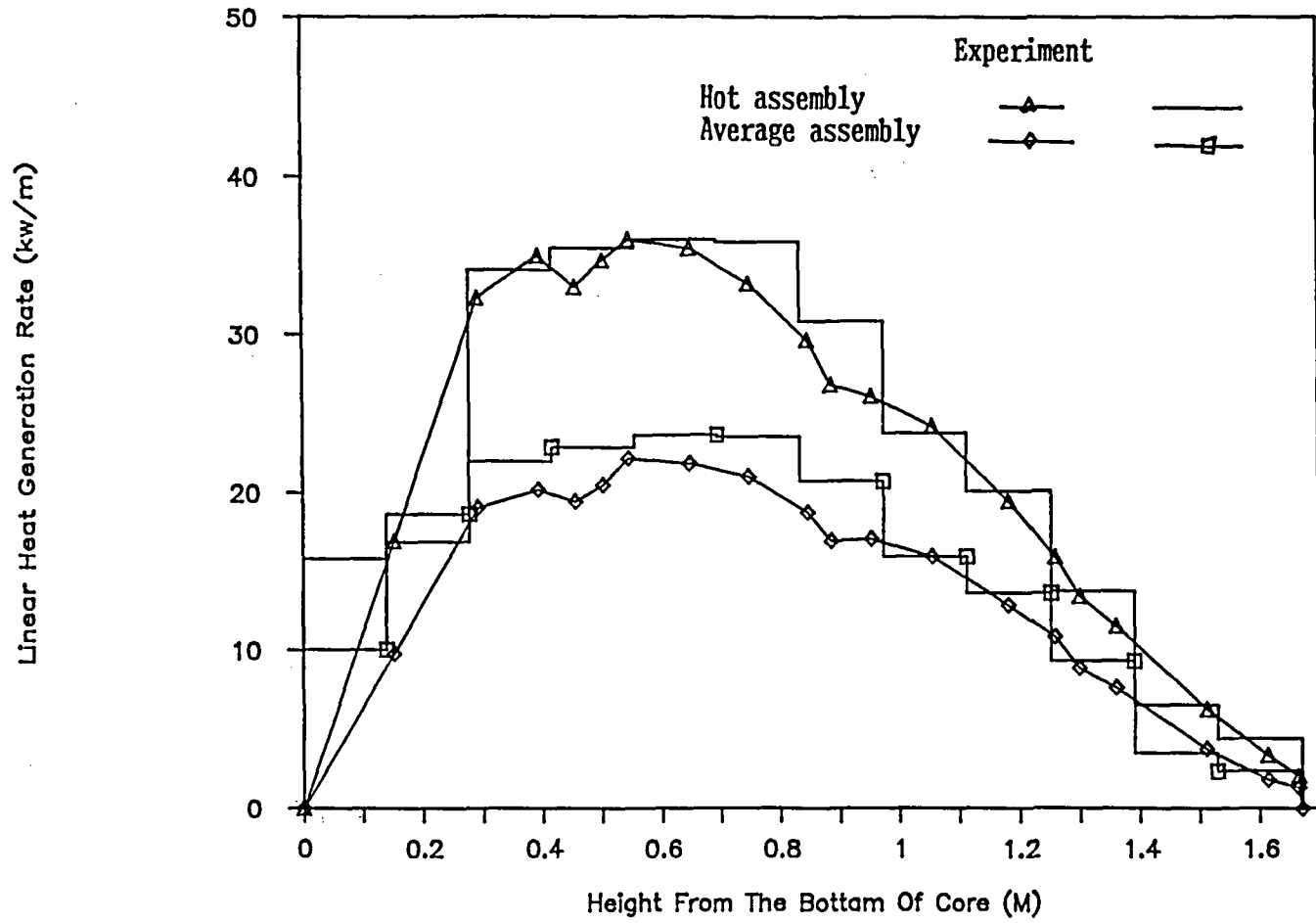


Fig.3 Axial power distribution in base case calculation of L2-5 test



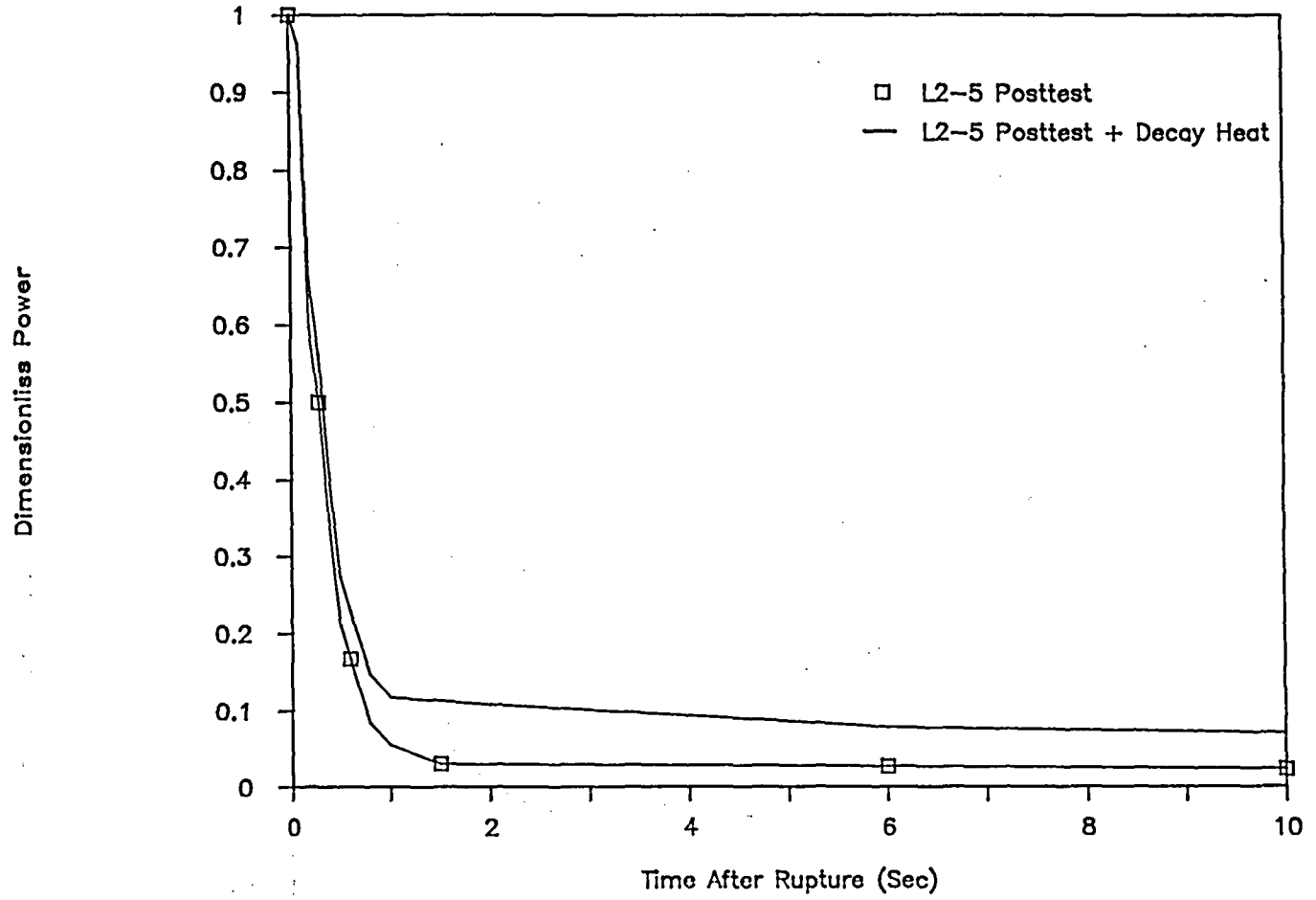


Fig.4 Power history in base case calculation of L2-5 test

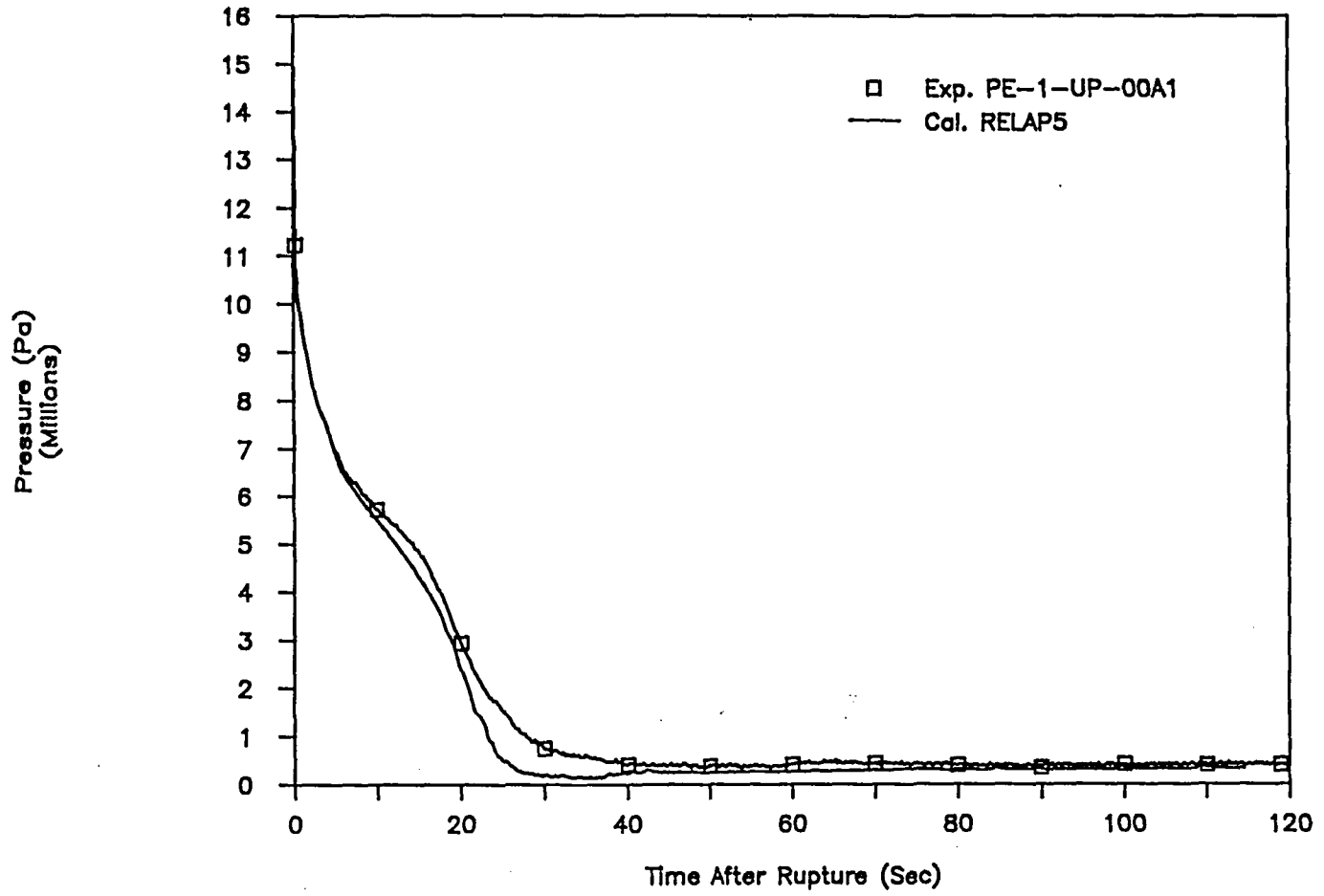


Fig.5 Comparison of primary system pressure between the base case calculation and the experiment.

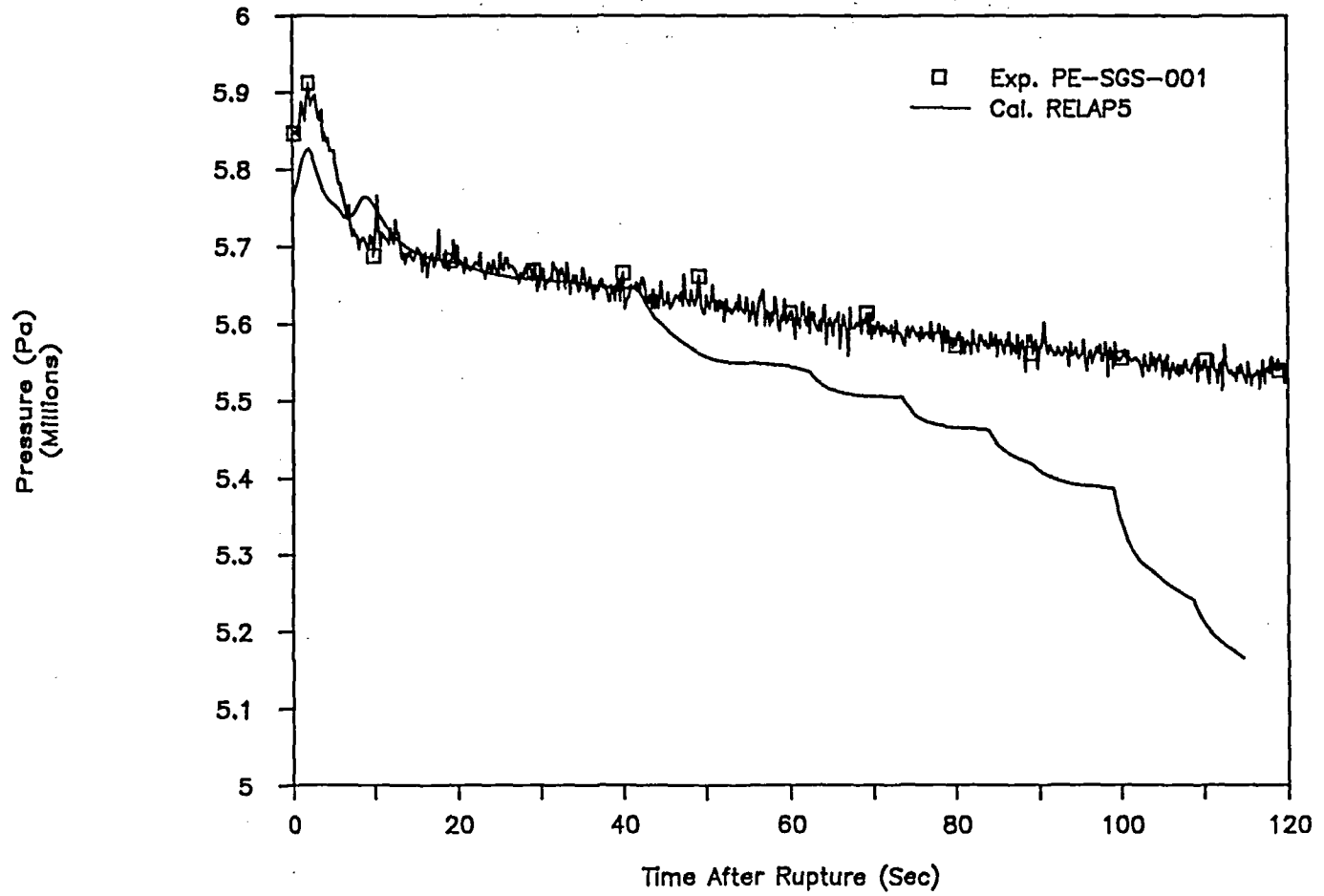


Fig.6 Comparison of secondary system pressure between the base case calculation and the experiment

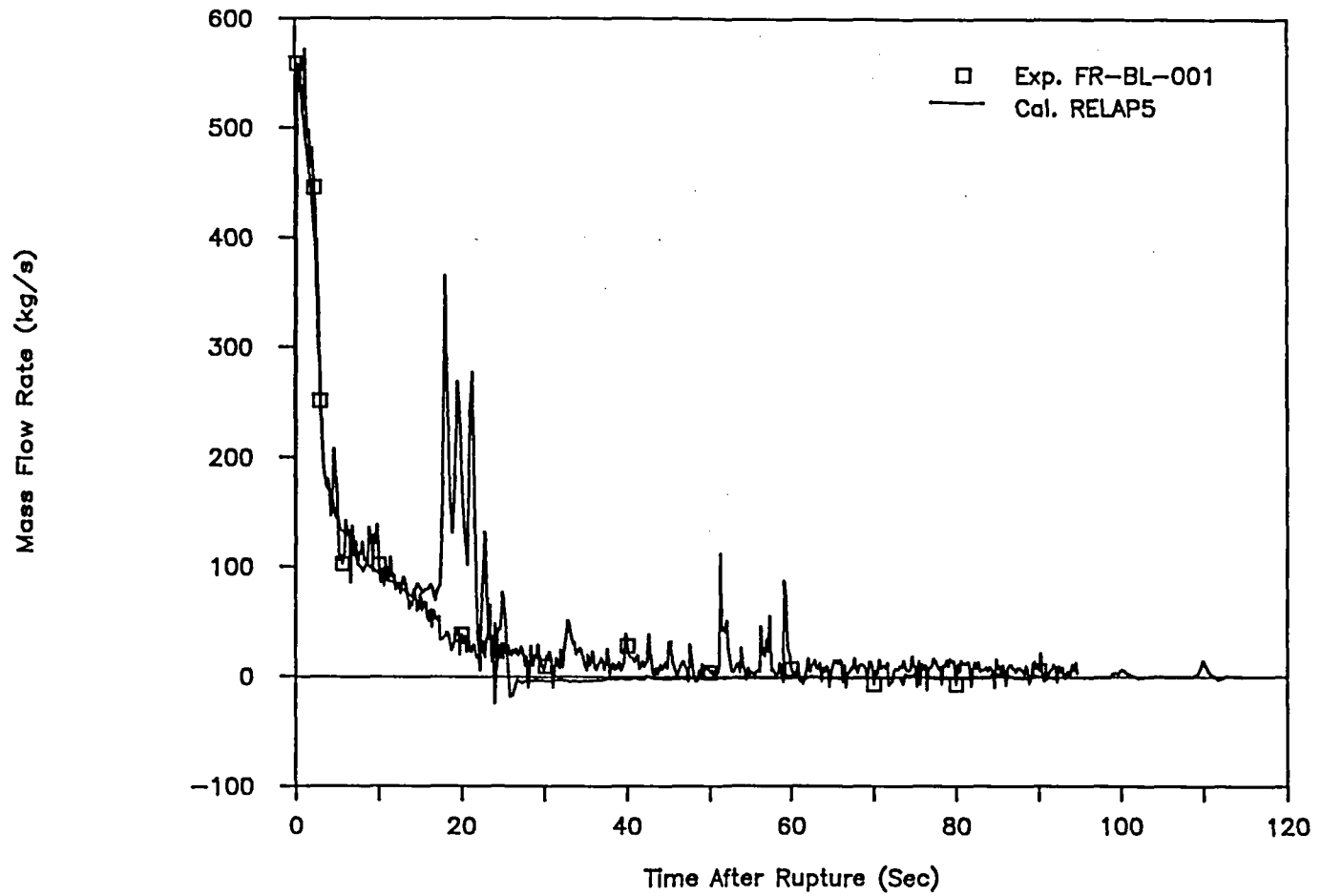


Fig.7 Comparison of mass flow rate at broken loop cold leg between the base case calculation and the experiment

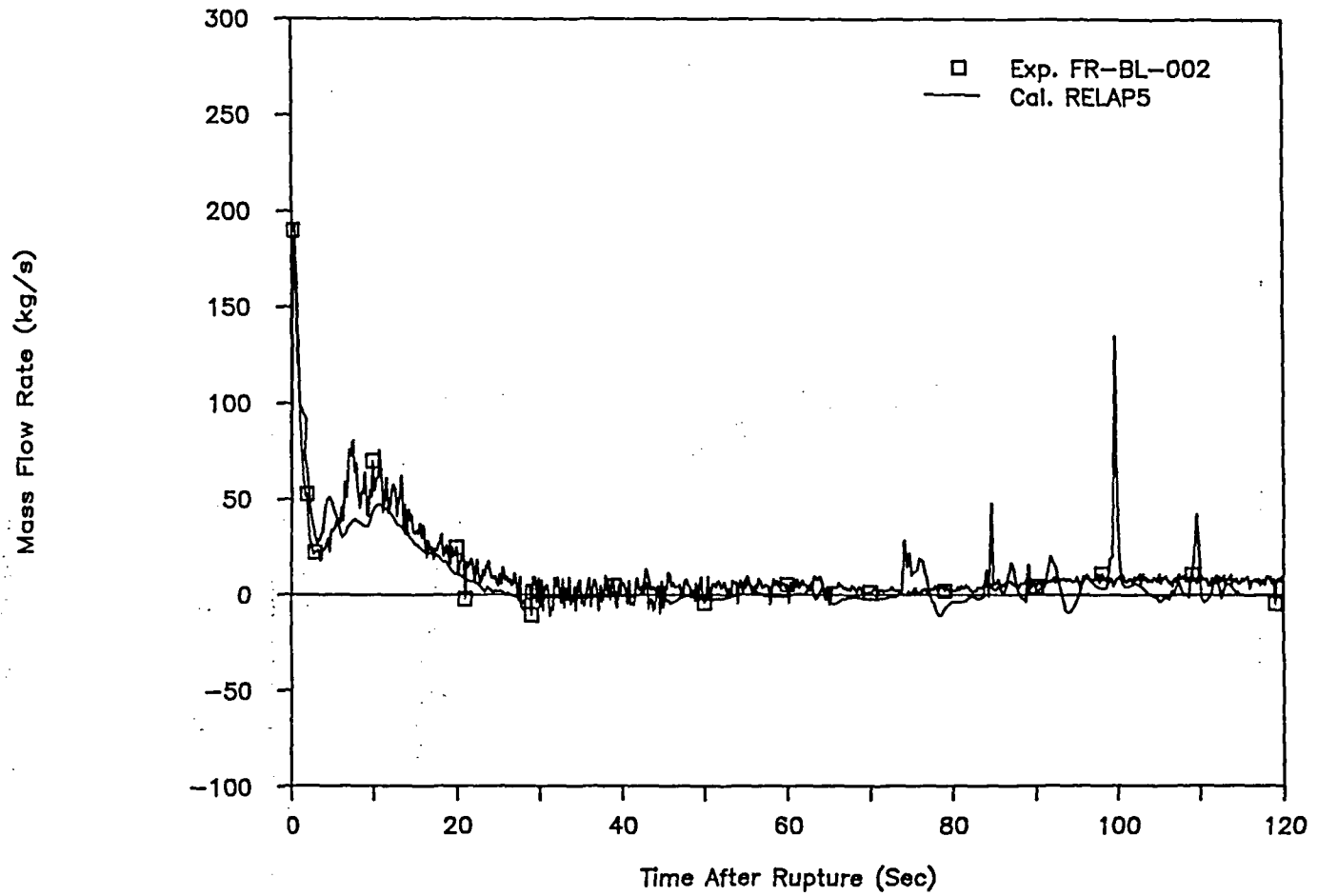


Fig.8 Comparison of mass flow rate at broken loop hot leg between the base case calculation and the experiment

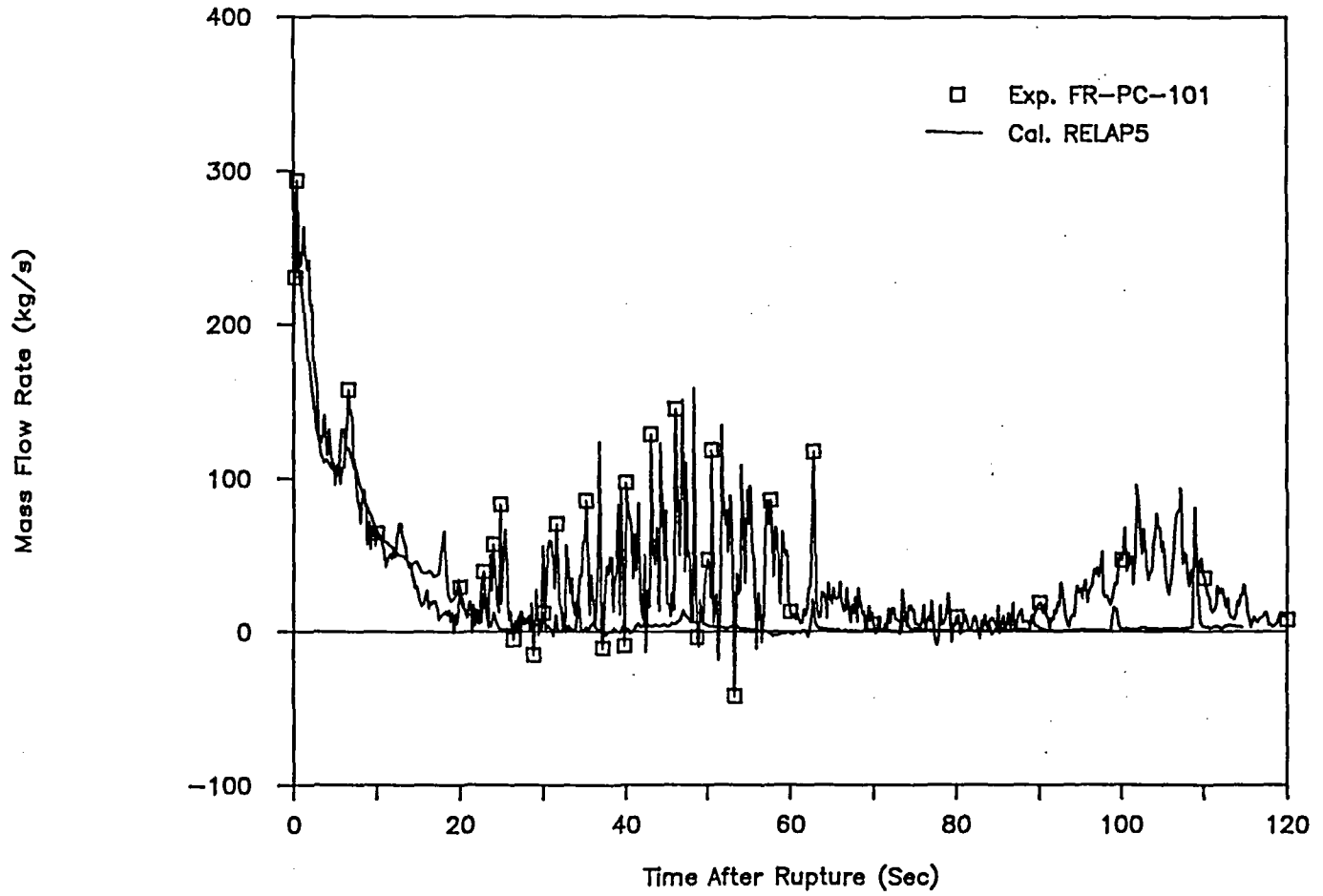


Fig.9 Comparison of mass flow rate at intact loop cold leg between the base case calculation and the experiment

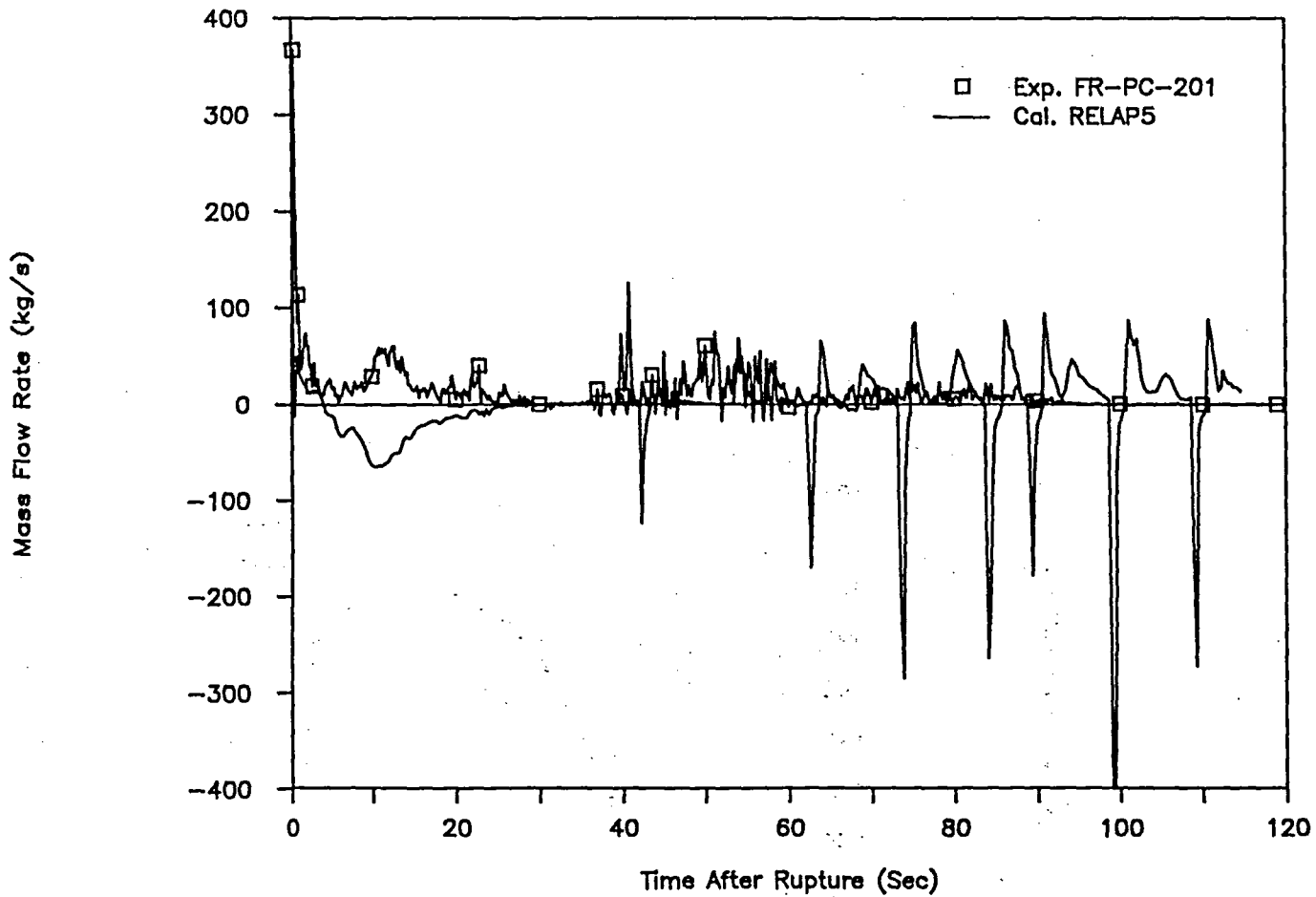


Fig.10 Comparison of mass flow rate at intact loop hot leg between the base case calculation and the experiment

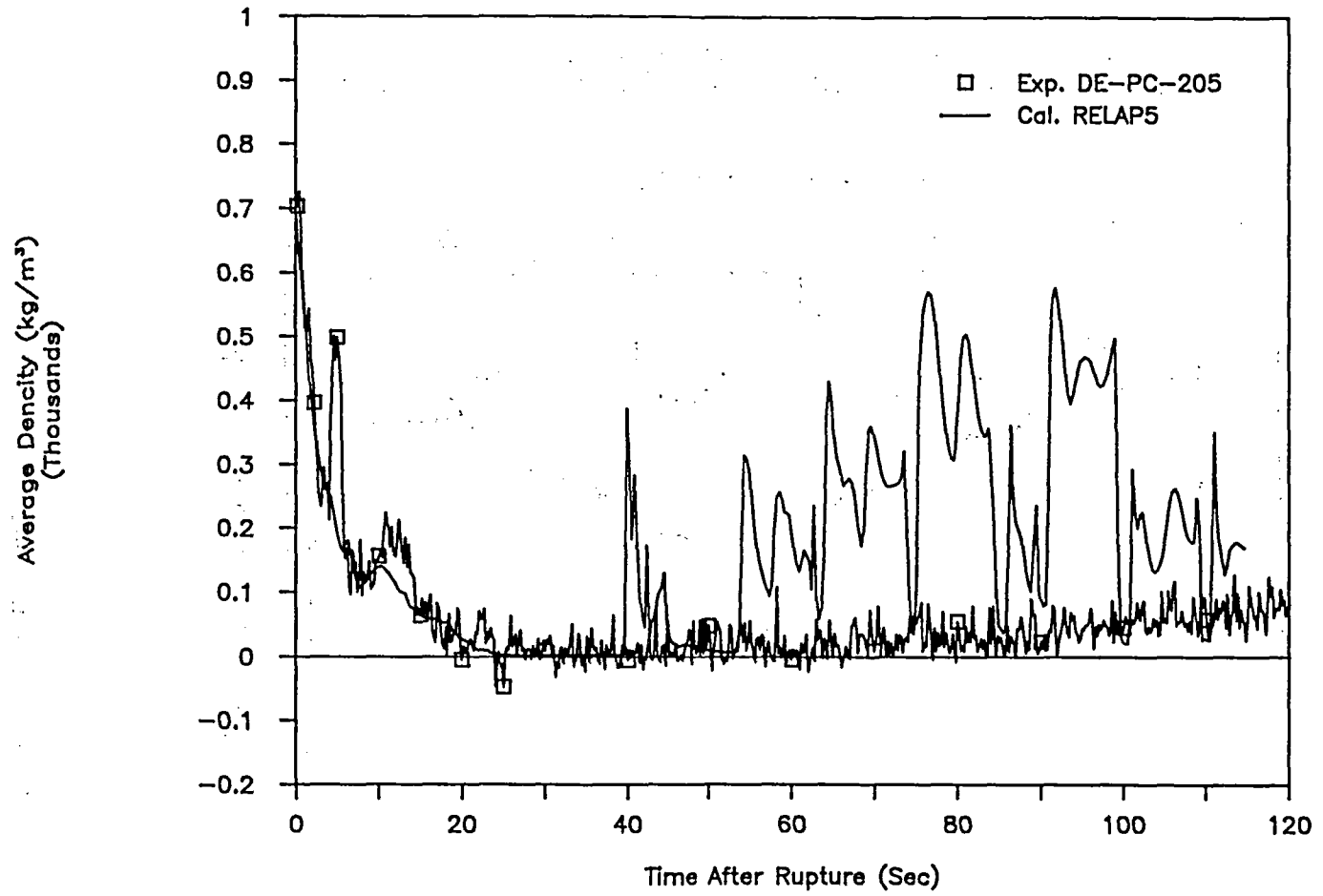


Fig.11 Comparison of primary system density at intact loop hot leg between the base case calculation and the experiment



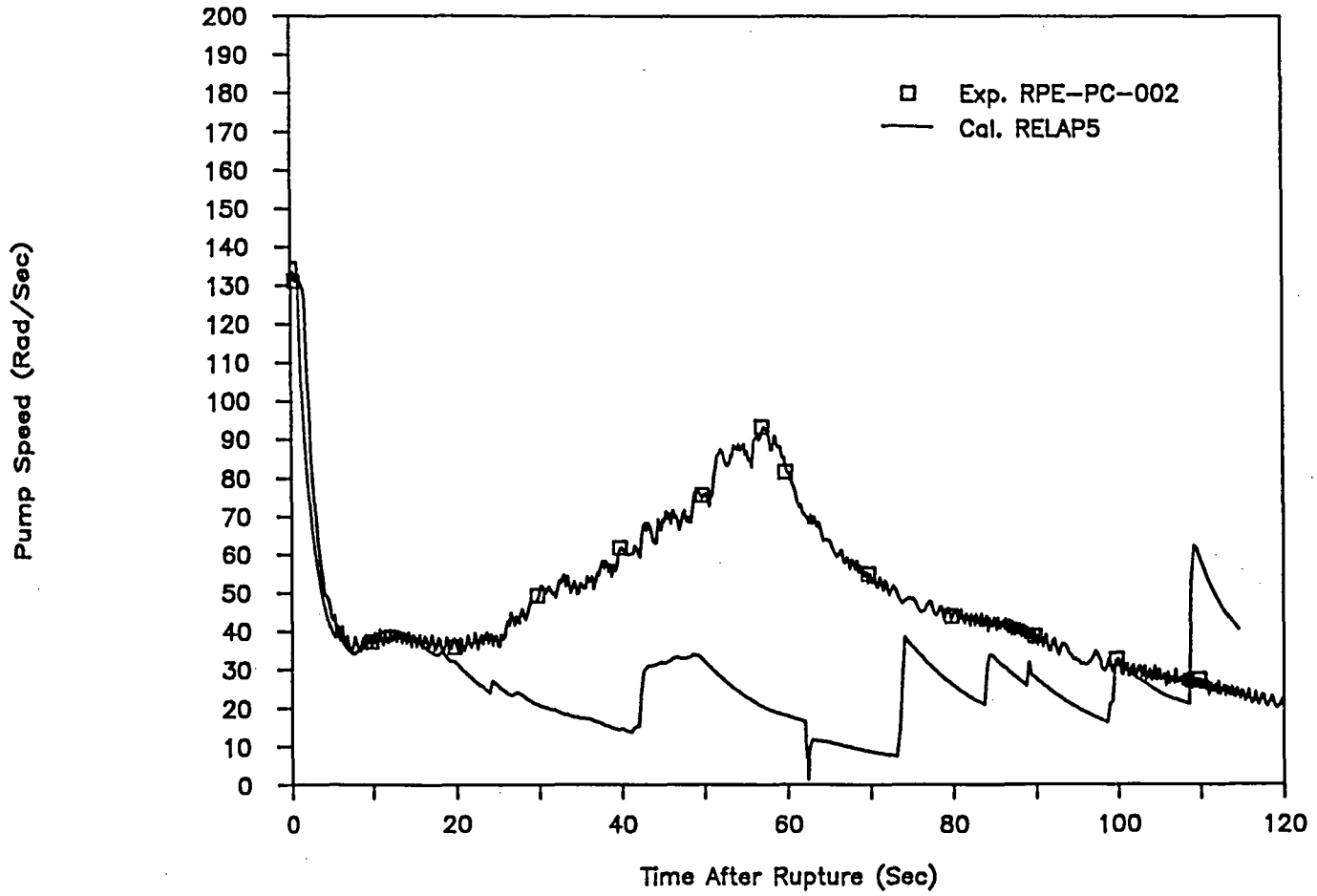


Fig.12 Comparison of primary coolant pump speed between the base case calculation and the experiment

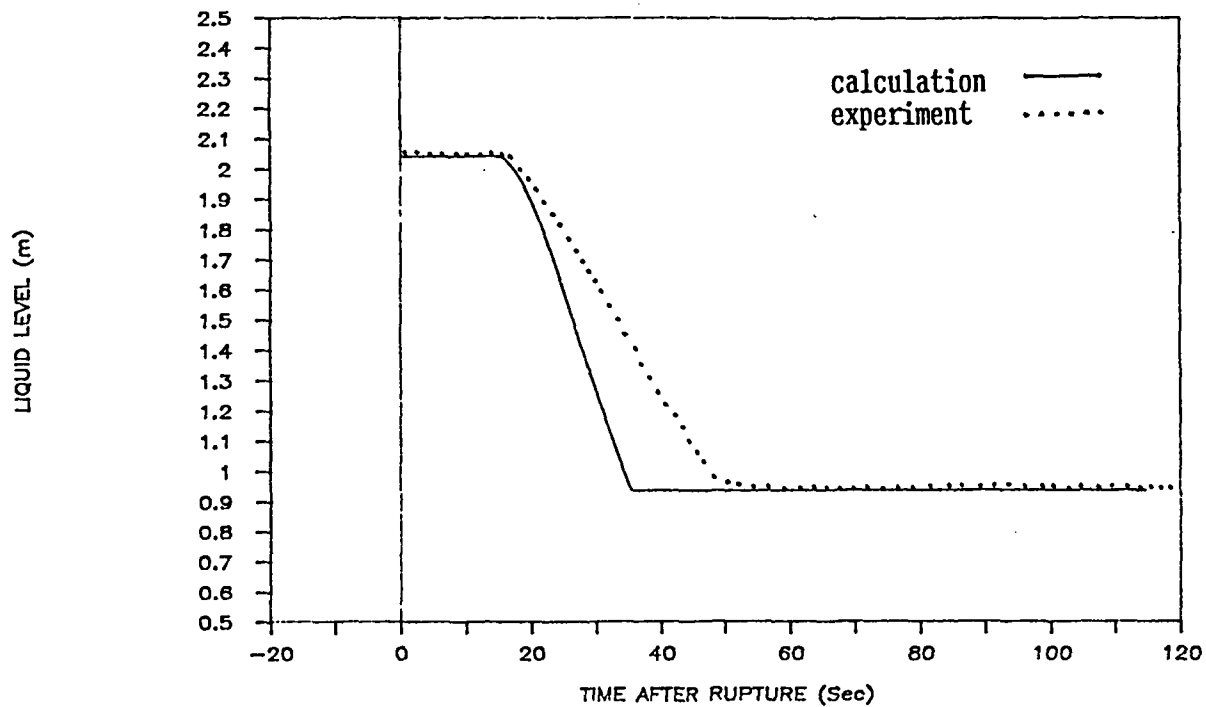


Fig.13 Comparison of liquid level in accumulator between the base case calculation and the experiment

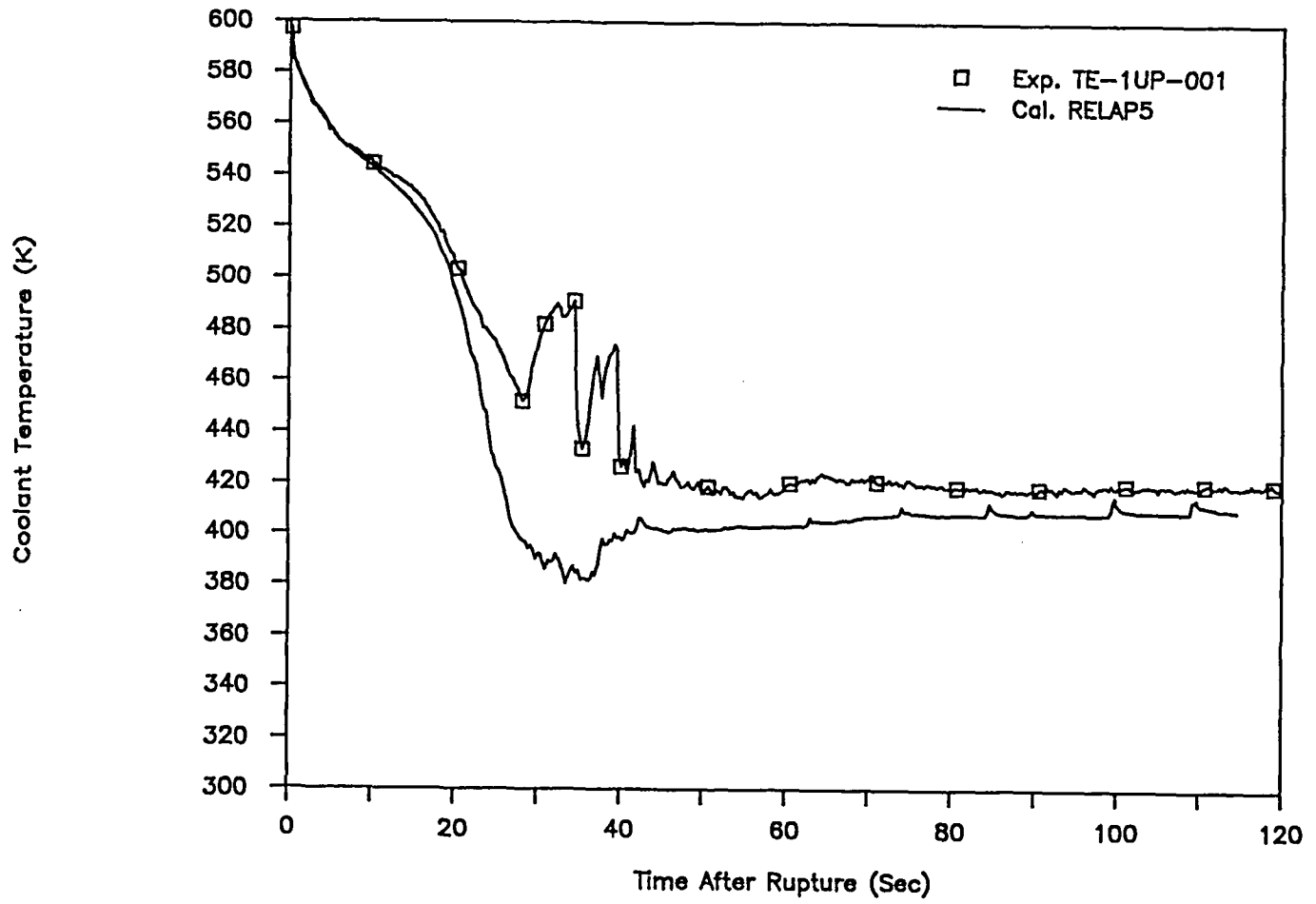


Fig.14 Comparison of coolant temperature in upper plenum between the base case calculation and the experiment

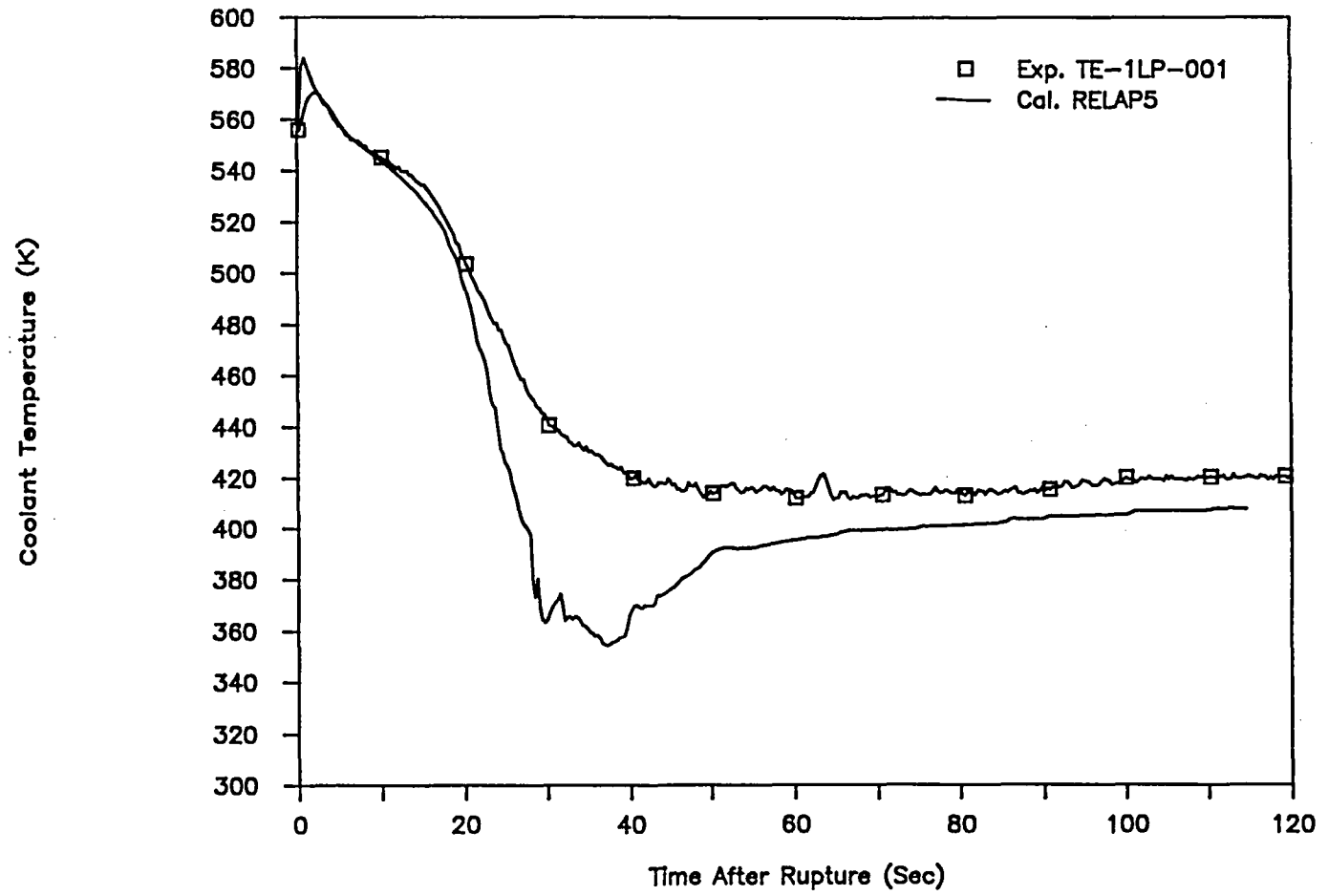


Fig.15 Comparison of coolant temperature in lower plenum between the base case calculation and the experiment

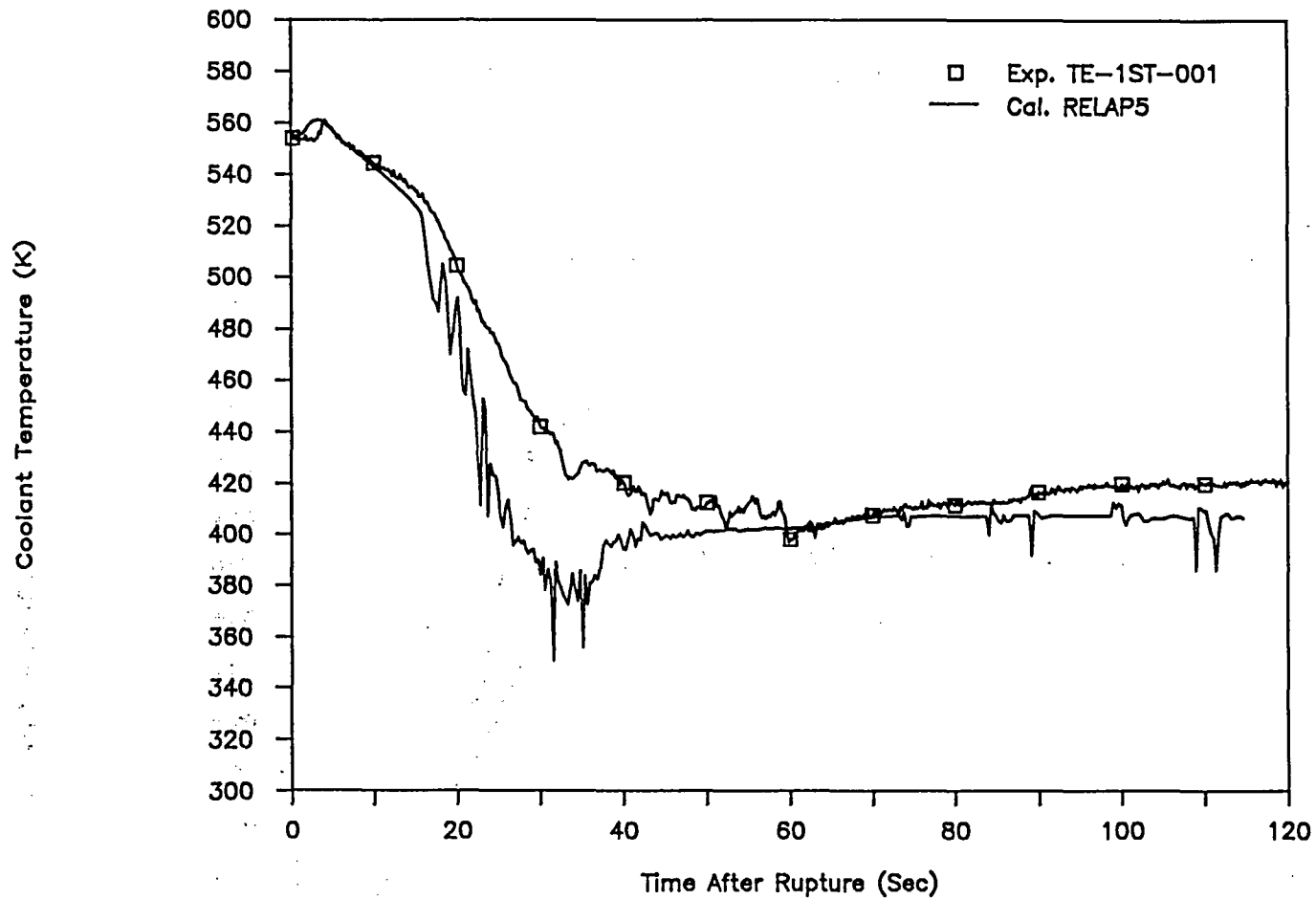


Fig.16 Comparison of coolant temperature at downcomer inlet between the base case calculation and the experiment

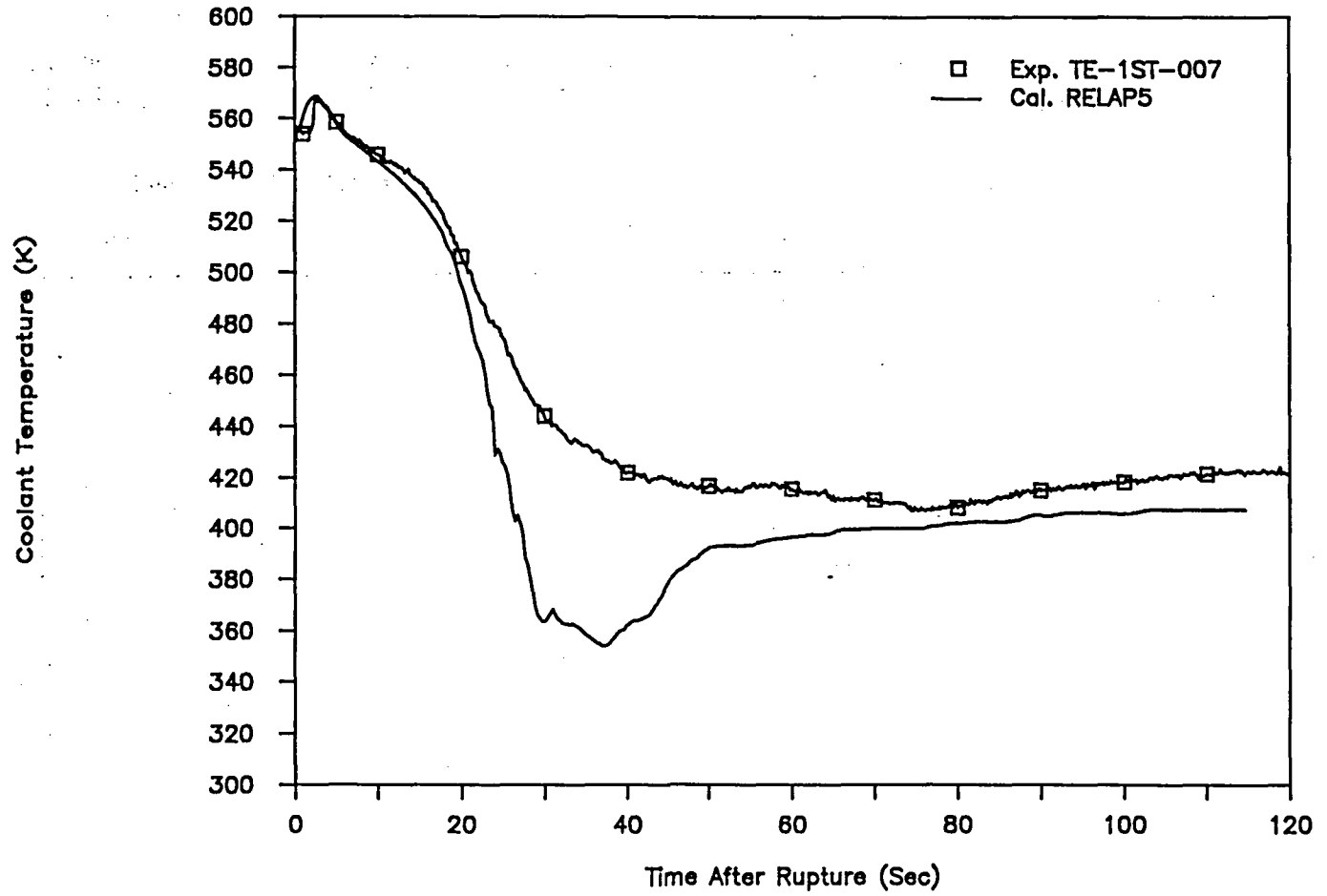


Fig.17 Comparison of coolant temperature at downcomer outlet between the base case calculation and the experiment

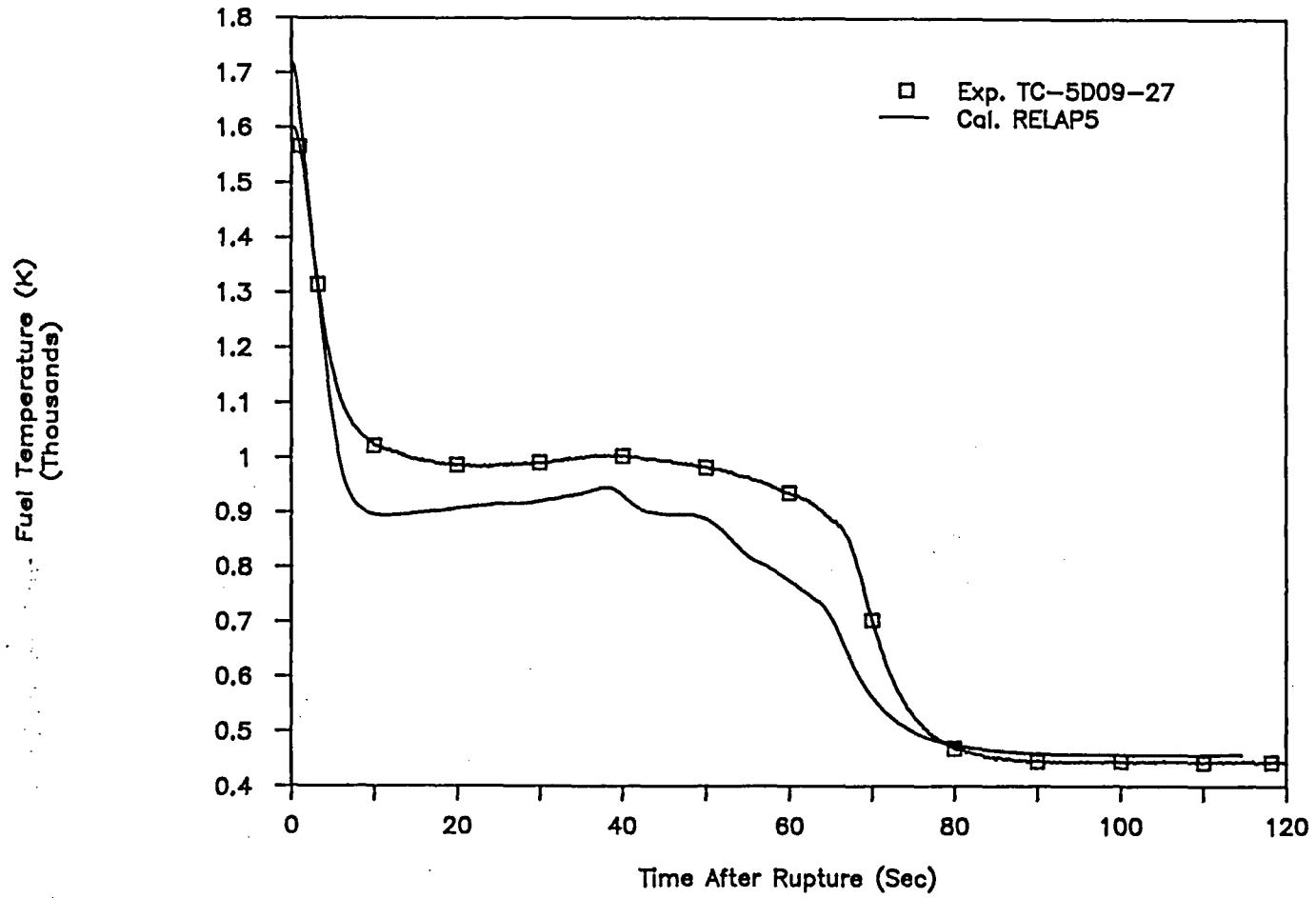


Fig.18 Comparison of fuel centerline temperature at 27 inches between the base case calculation and the experiment

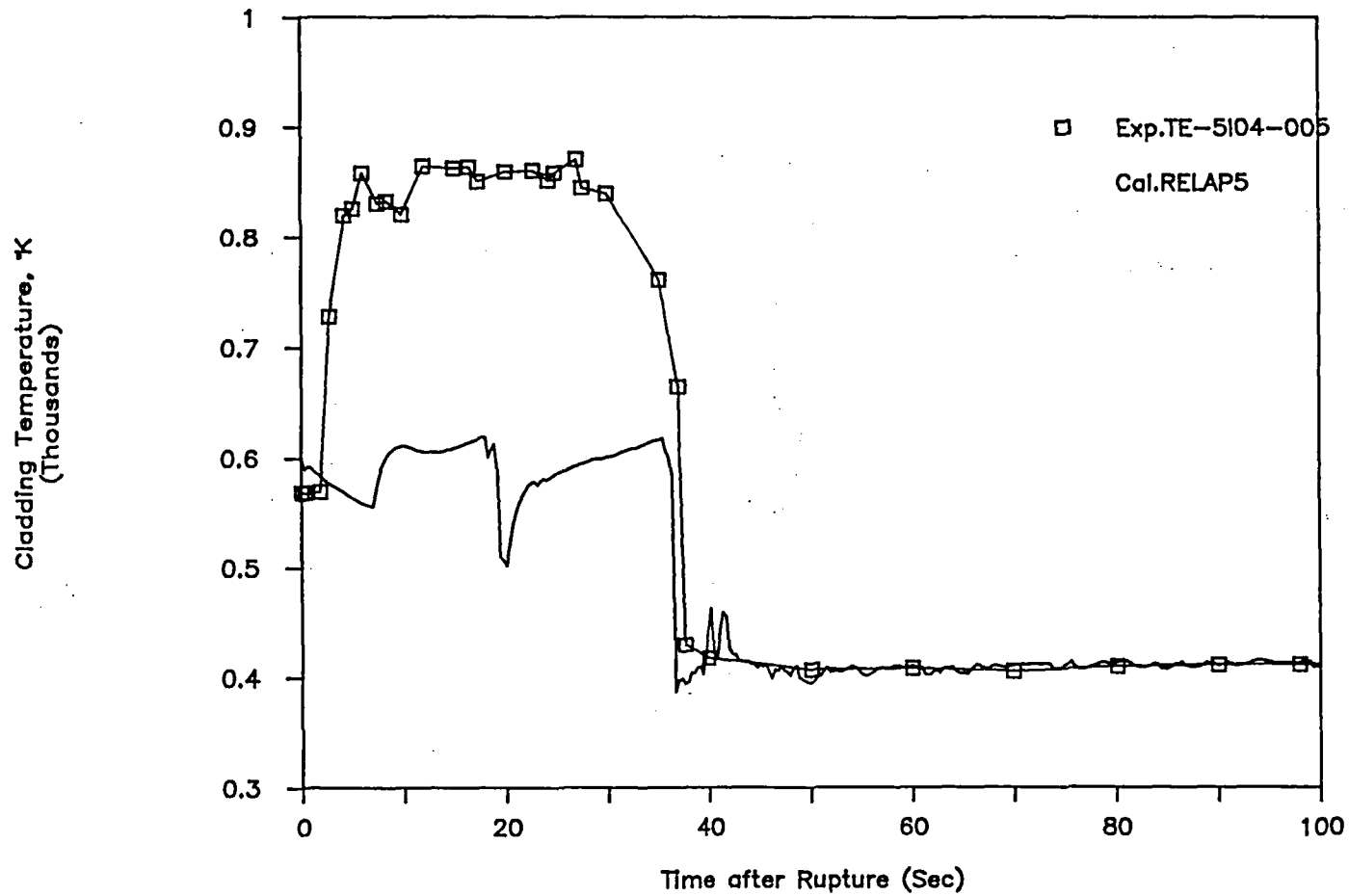


Fig.19 Comparison of cladding temperature at 5 inches of hot fuel between the base case calculation and the experiment



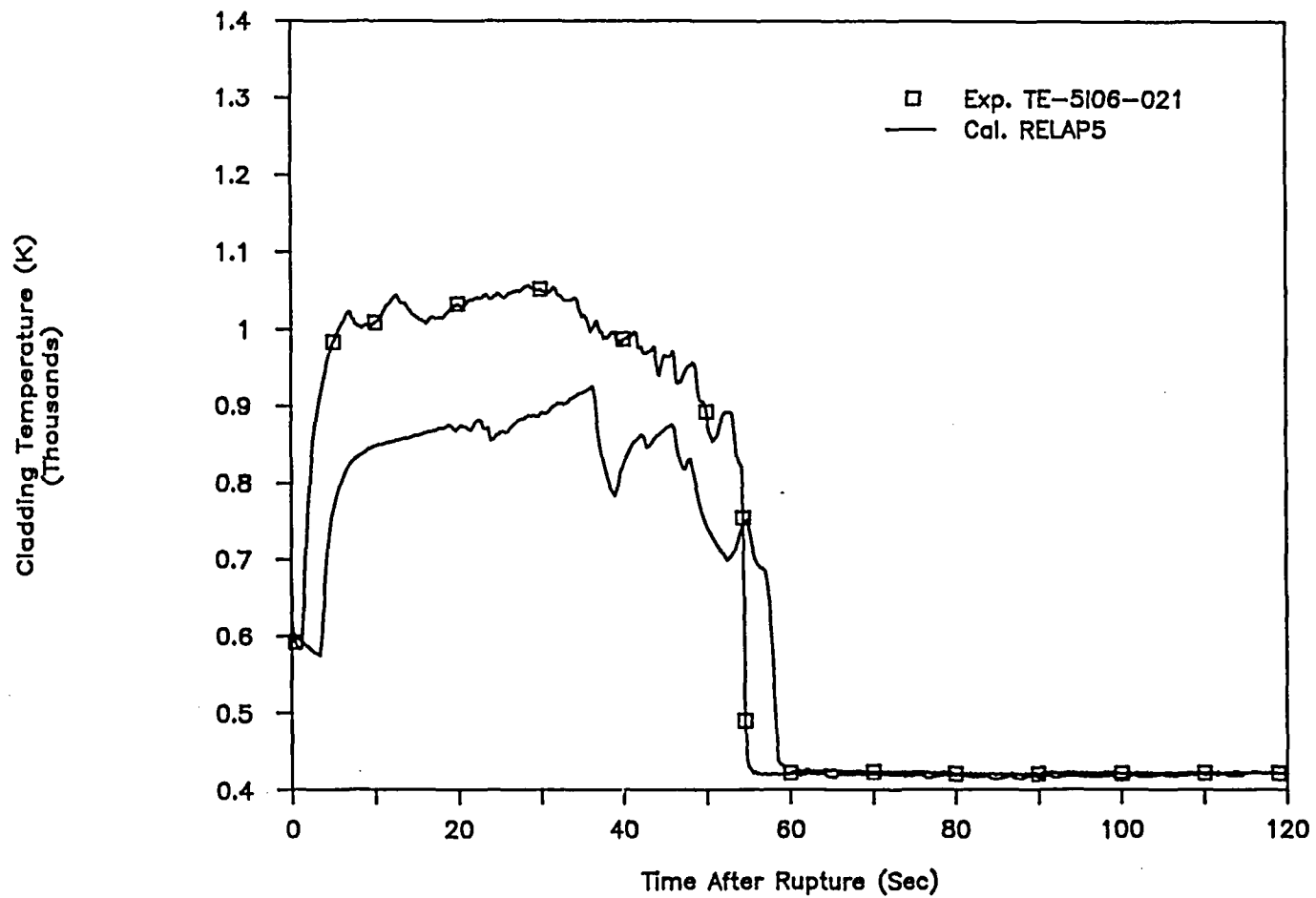


Fig.20 Comparison of cladding temperature at 21 inches of hot fuel between the base case calculation and the experiment

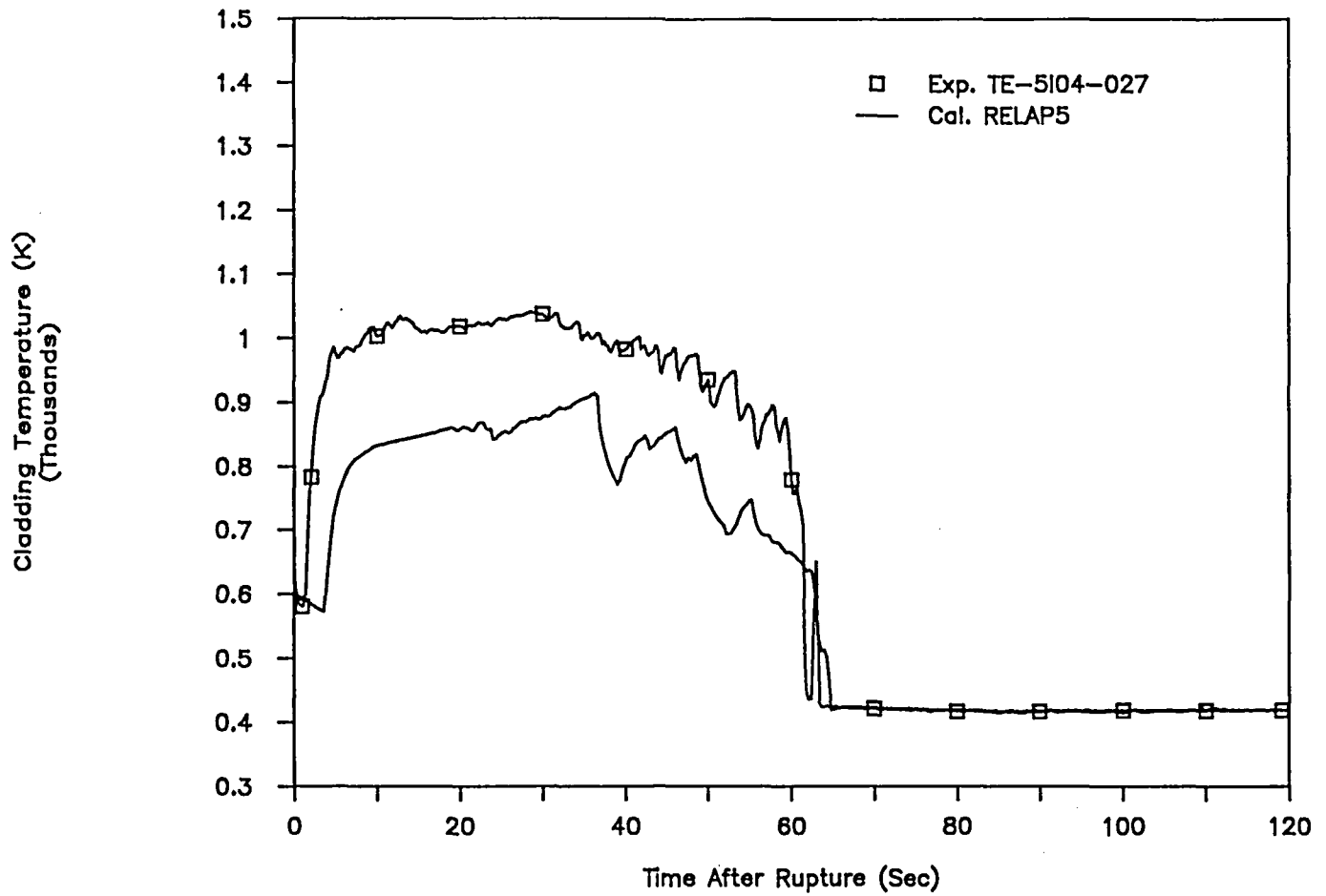


Fig.21 Comparison of cladding temperature at 27 inches of hot fuel between the base case calculation and the experiment

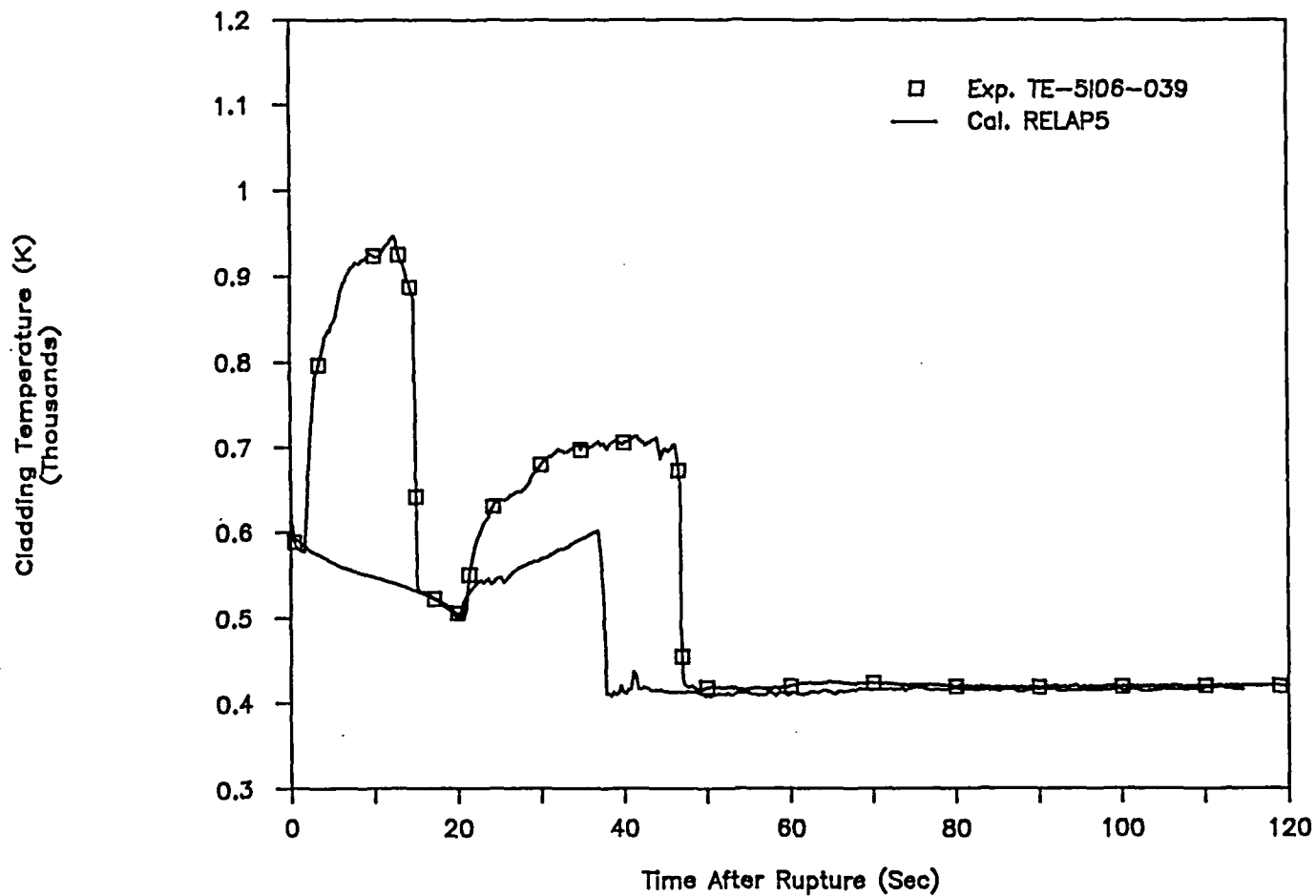


Fig.22 Comparison of cladding temperature at 39 inches of hot fuel between the base case calculation and the experiment

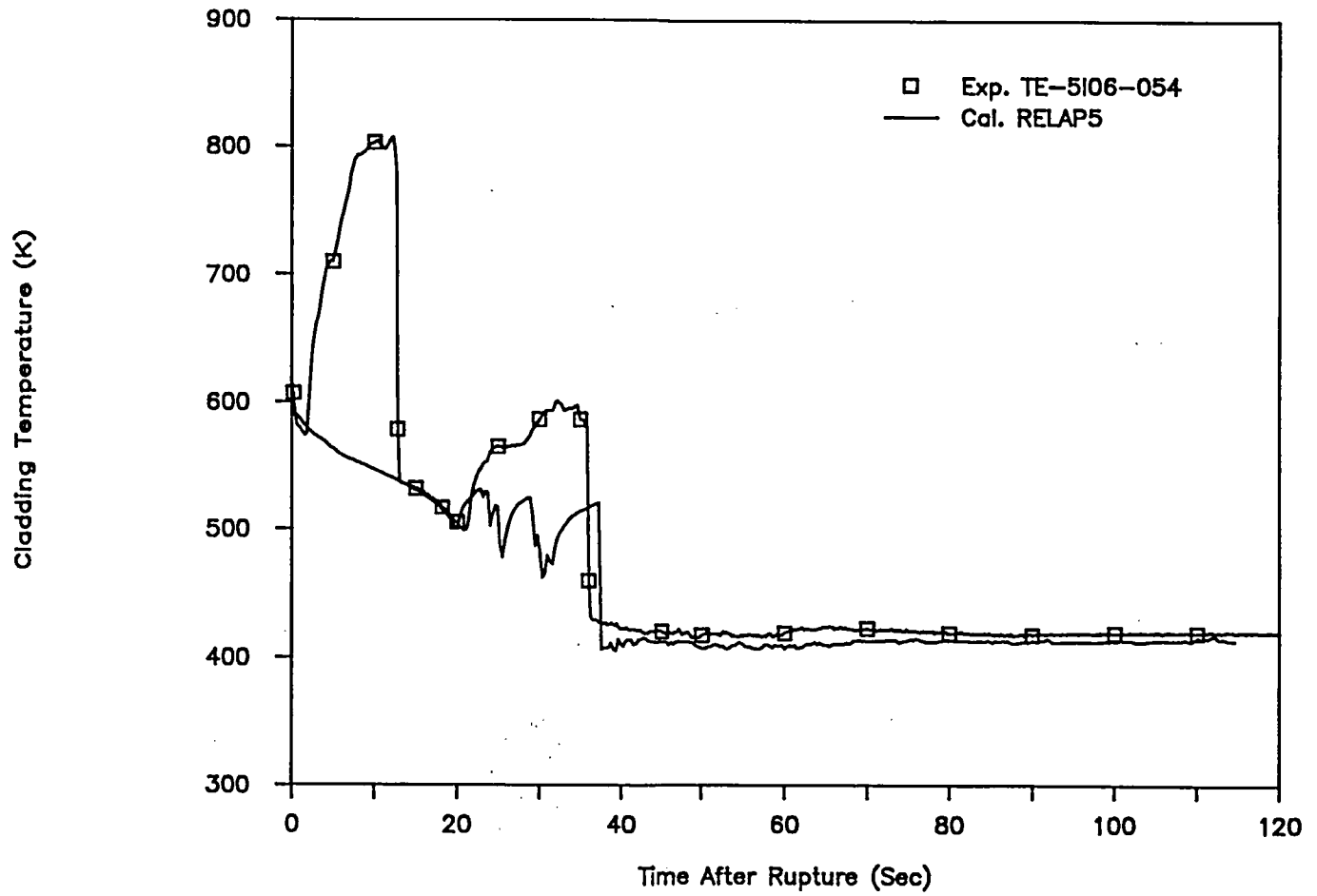


Fig.23 Comparison of cladding temperature at 54 inches of hot fuel between the base case calculation and the experiment

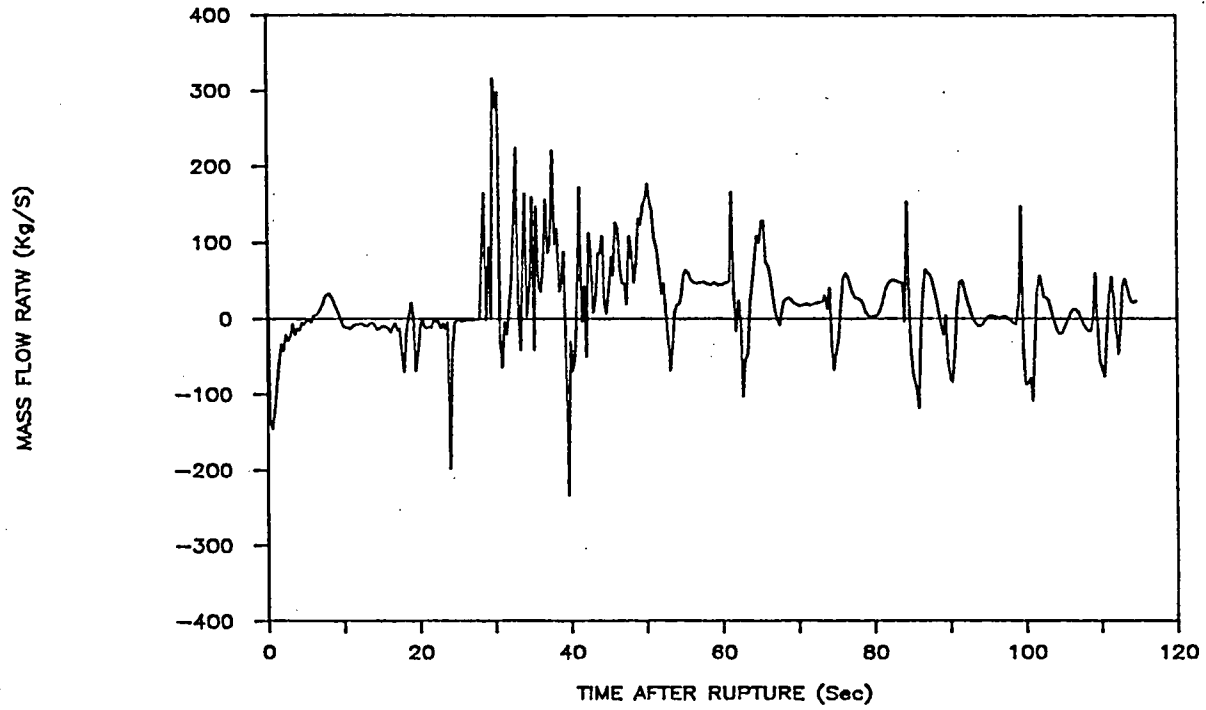


Fig.24 Mass flow rate at the inlet of intact side downcomer in base case

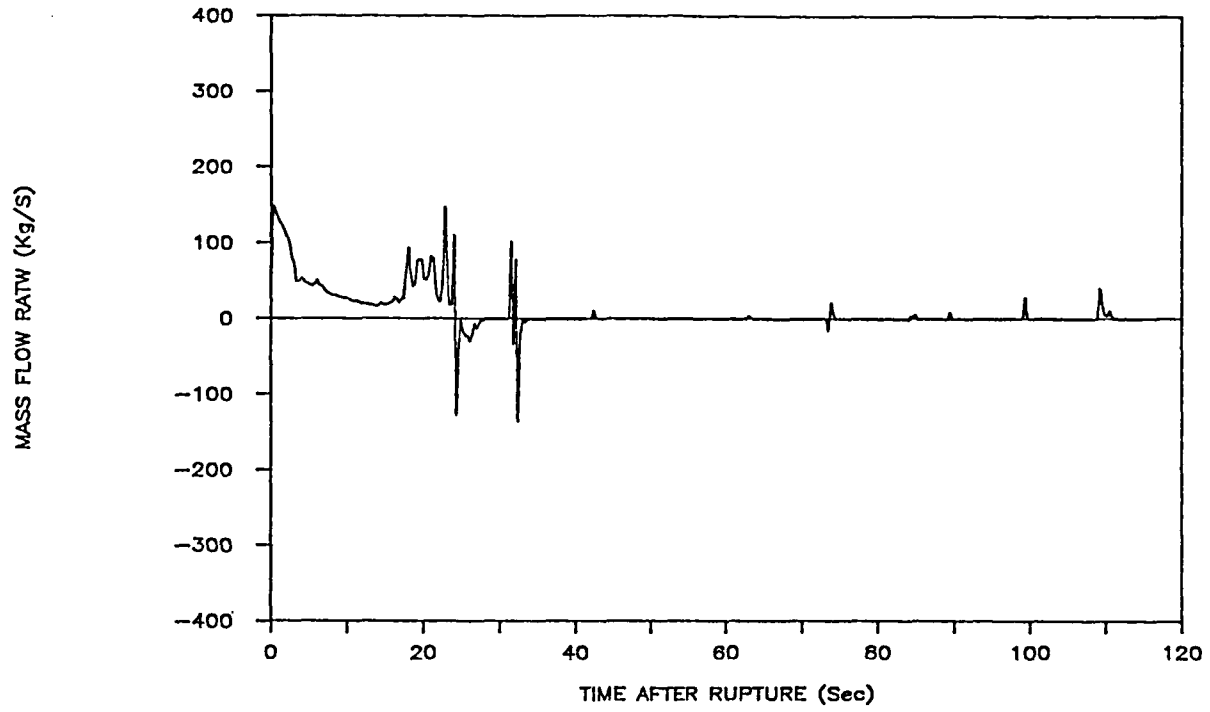


Fig.25 Mass flow rate at the inlet of intact side upper annulus in base case

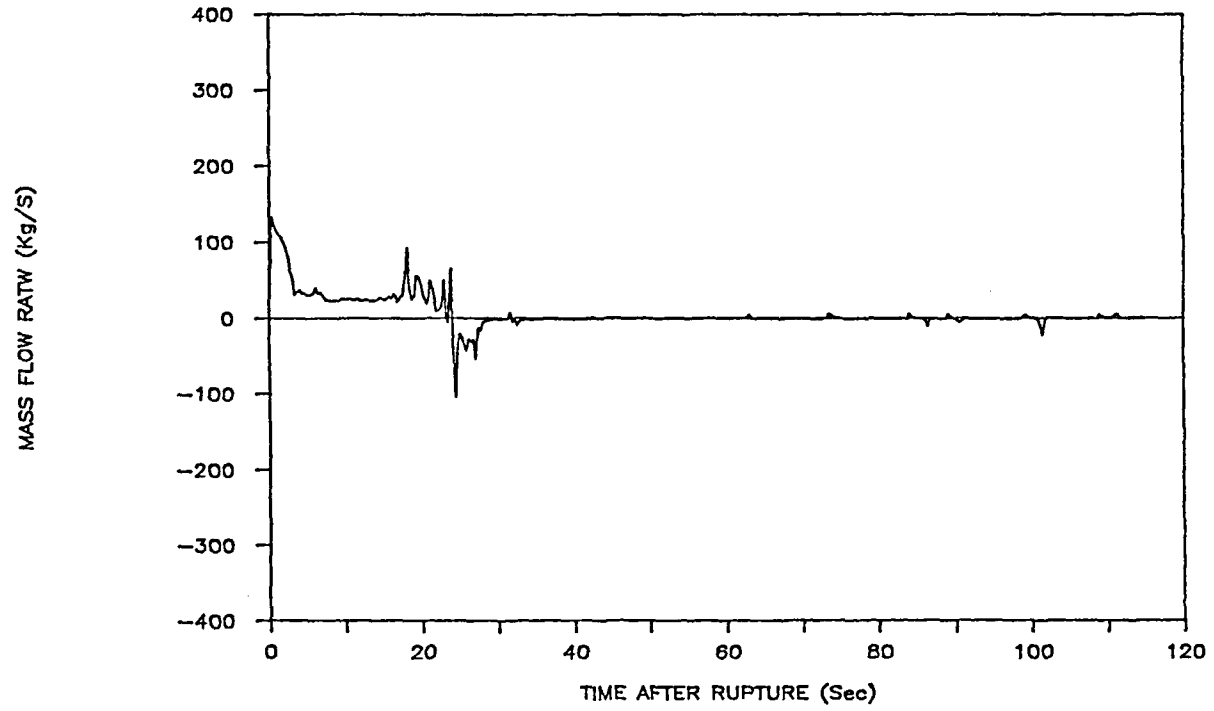


Fig.26 Mass flow rate at the bypass junction J722 in base case

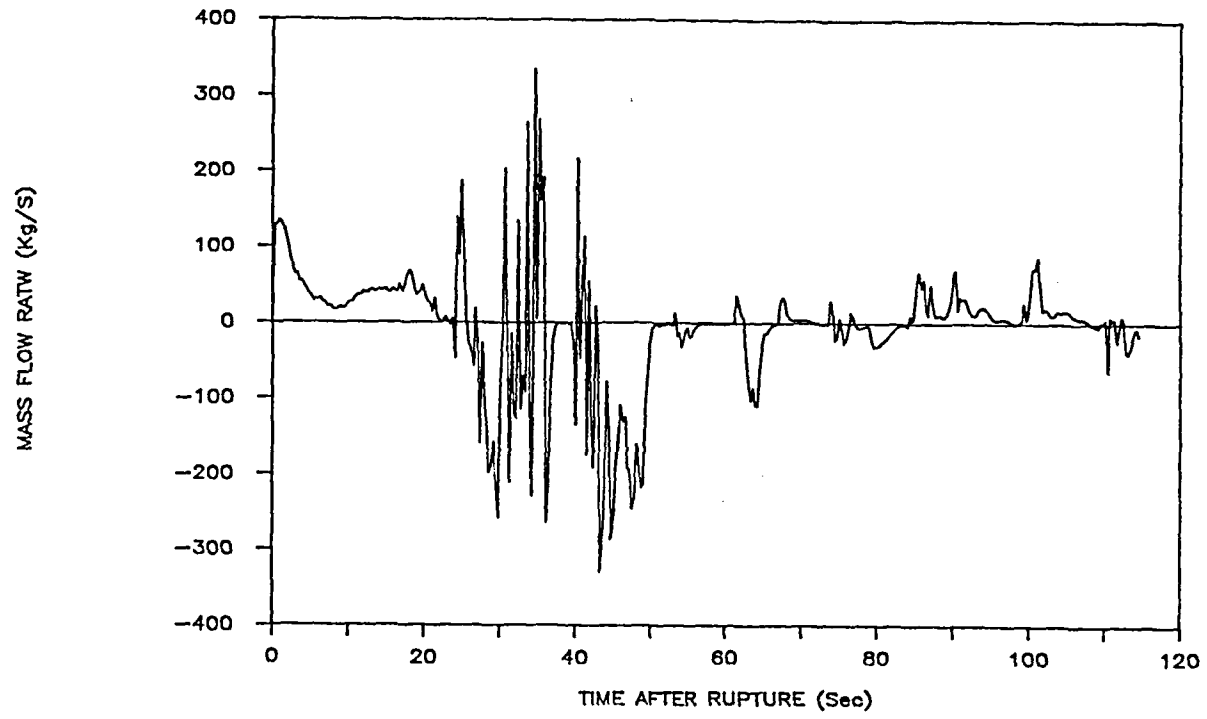


Fig.27 Mass flow rate at the bypass junction J724 in base case



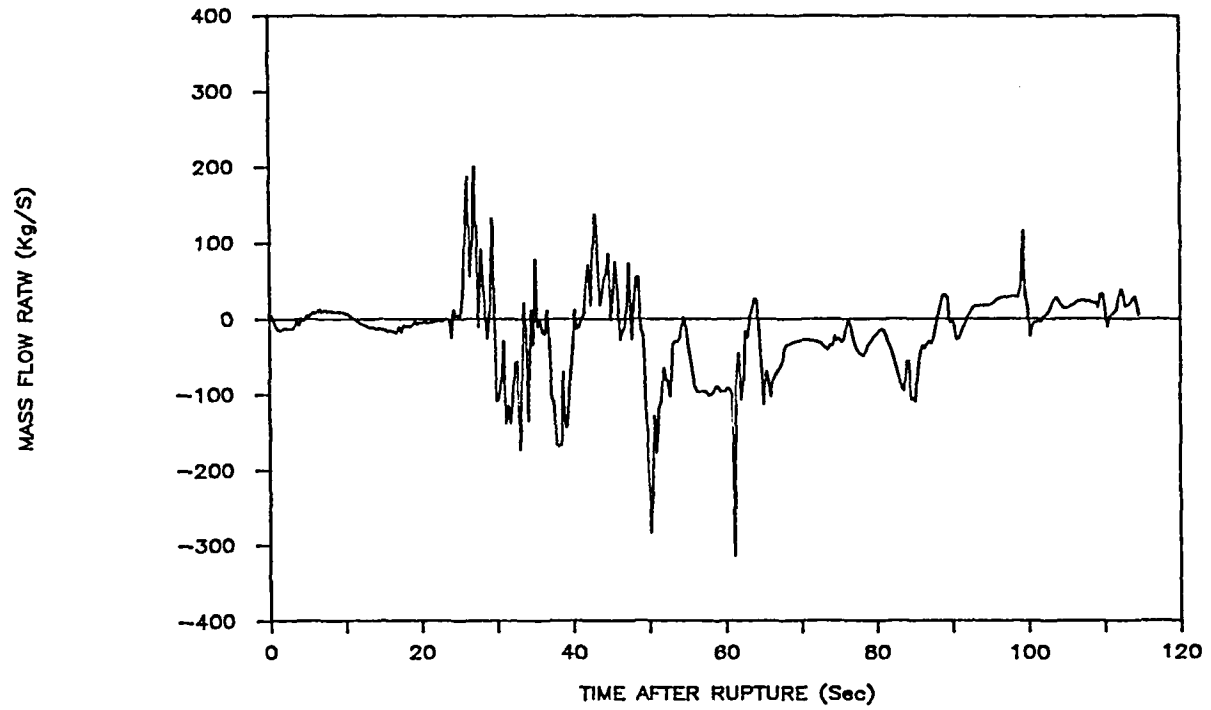


Fig.28 Mass flow rate at the bypass junction J726 in base case

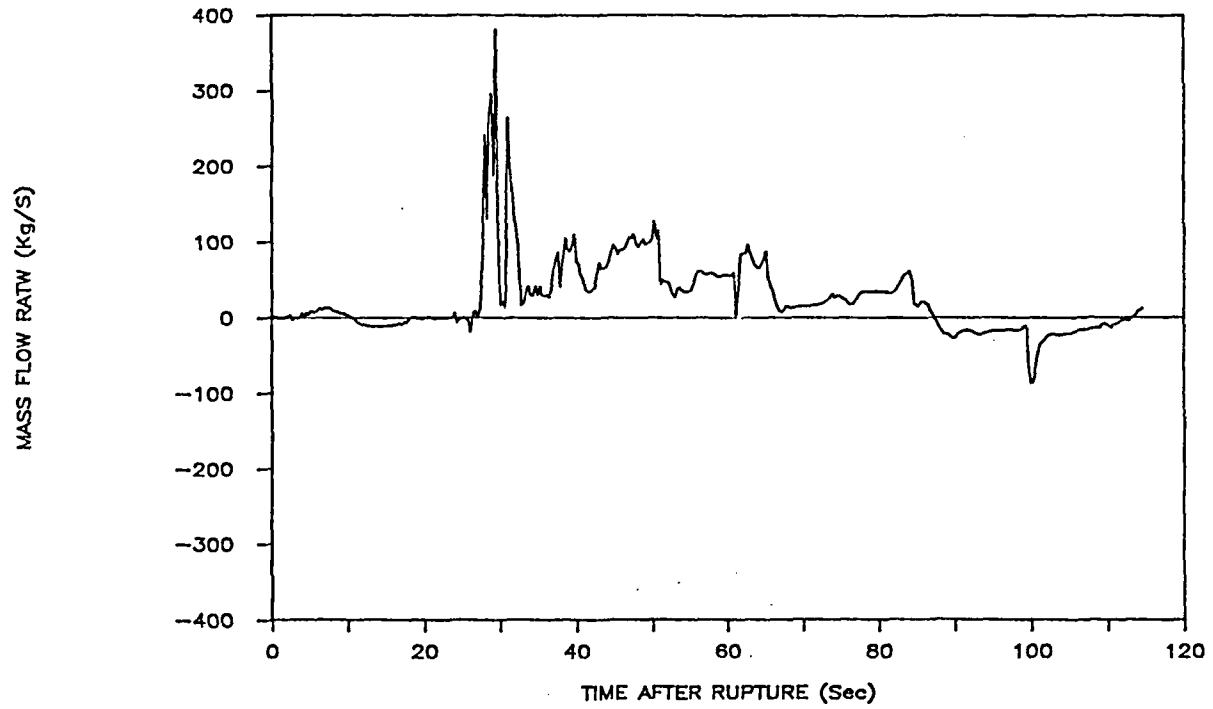


Fig.29 Mass flow rate at the bypass junction J728 in base case

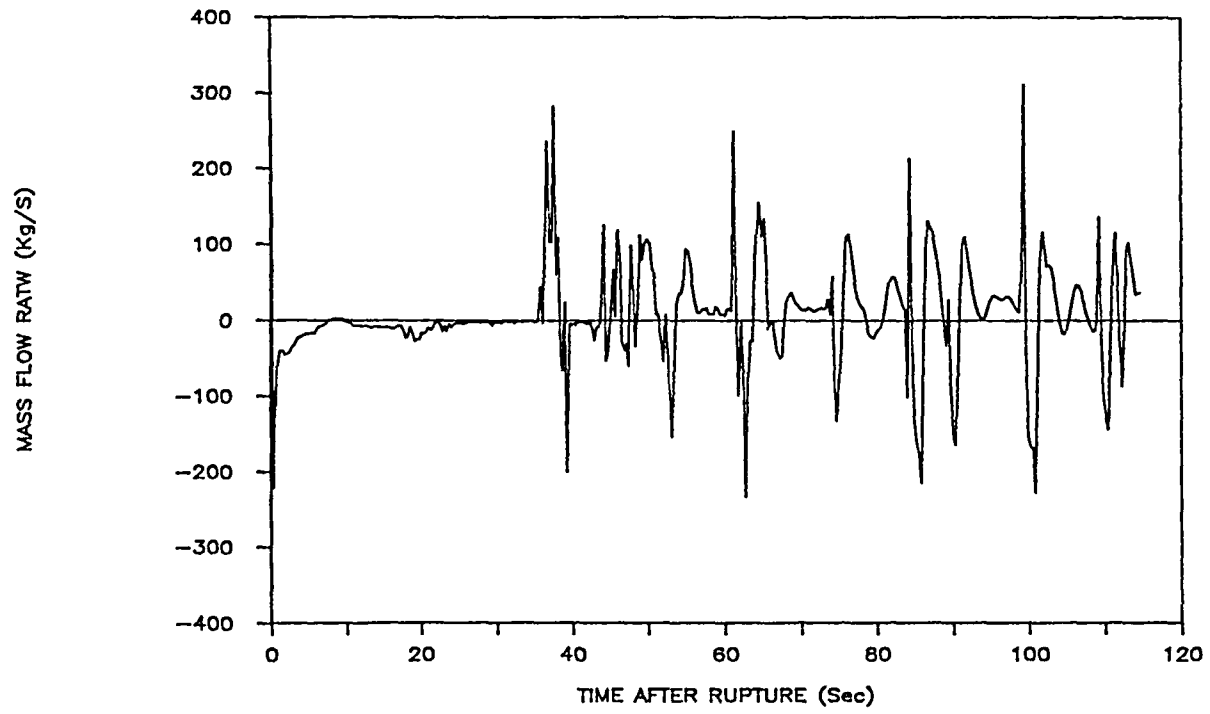


Fig.30 Mass flow rate to the core from the lower plenum in base case

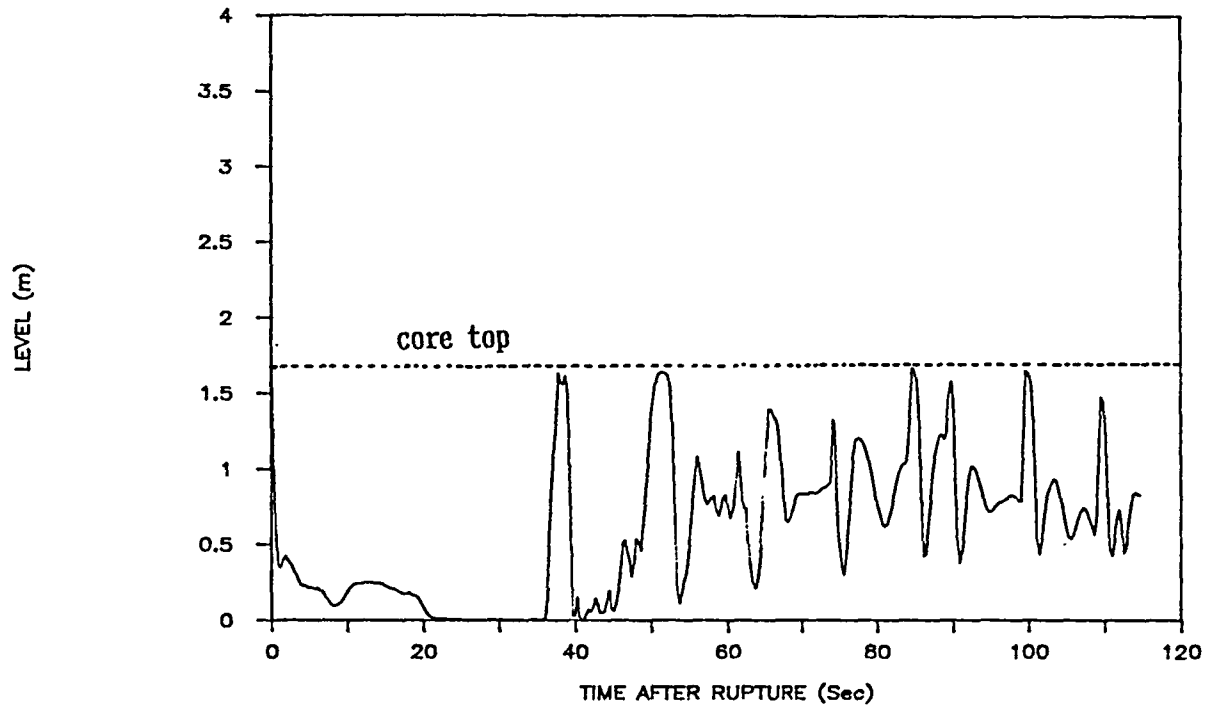


Fig.31 Collapsed liquid level in the core in base case

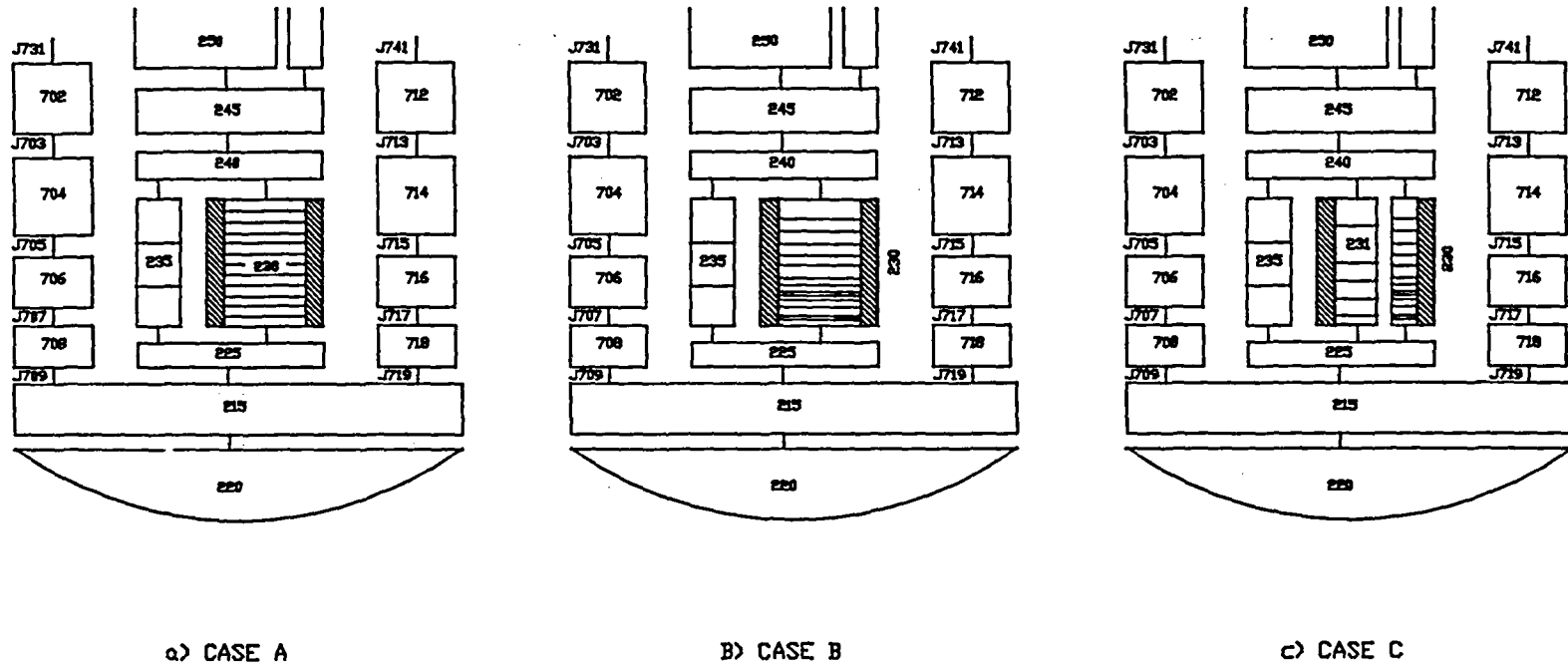


Fig.32 Comparison of nodalization in the core for Case A, B and C

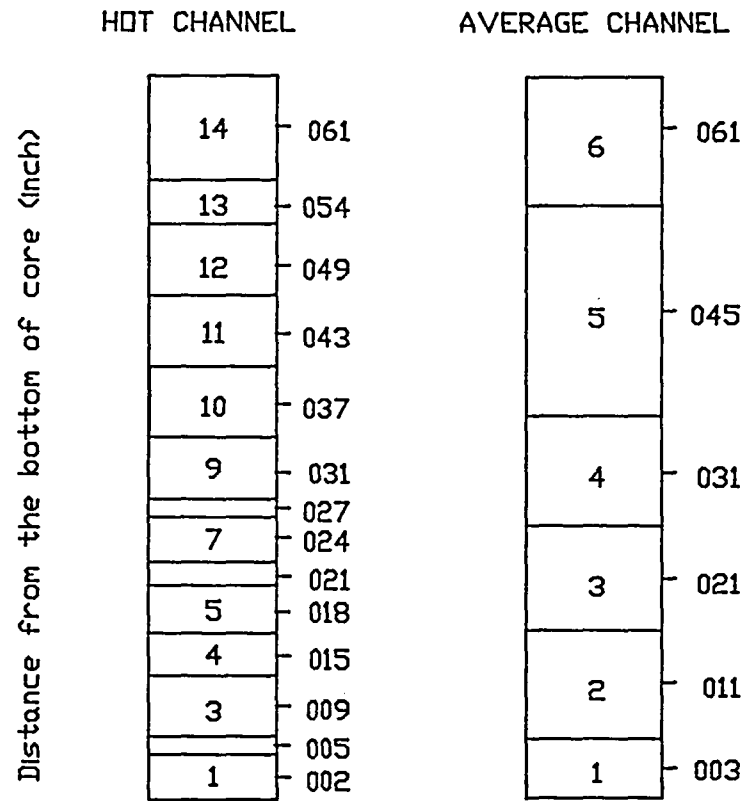


Fig.33 Discretization scheme of hot and average channel of the core

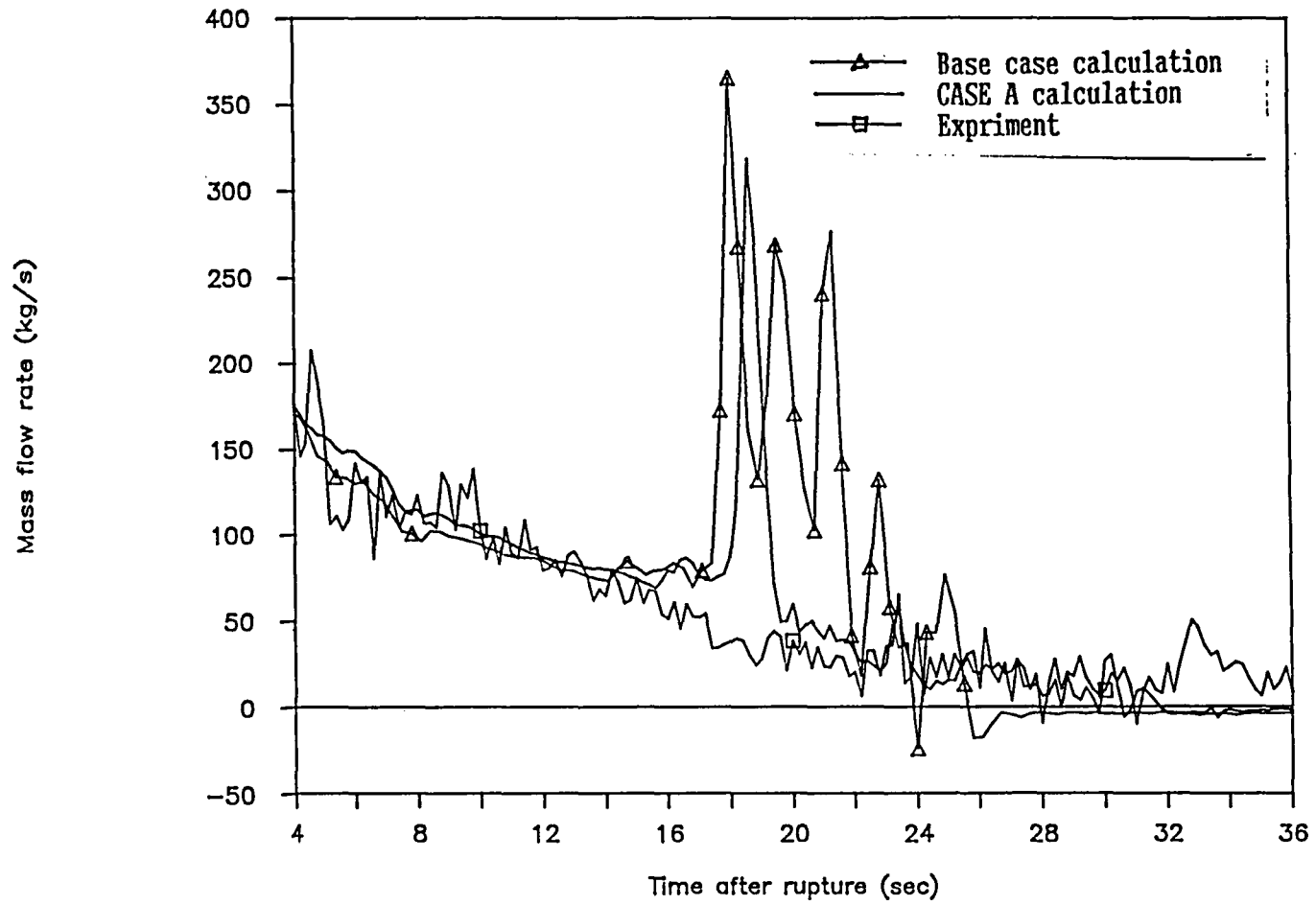


Fig.34 Comparison of mass flow rate at broken loop cold leg between base case and CASE A

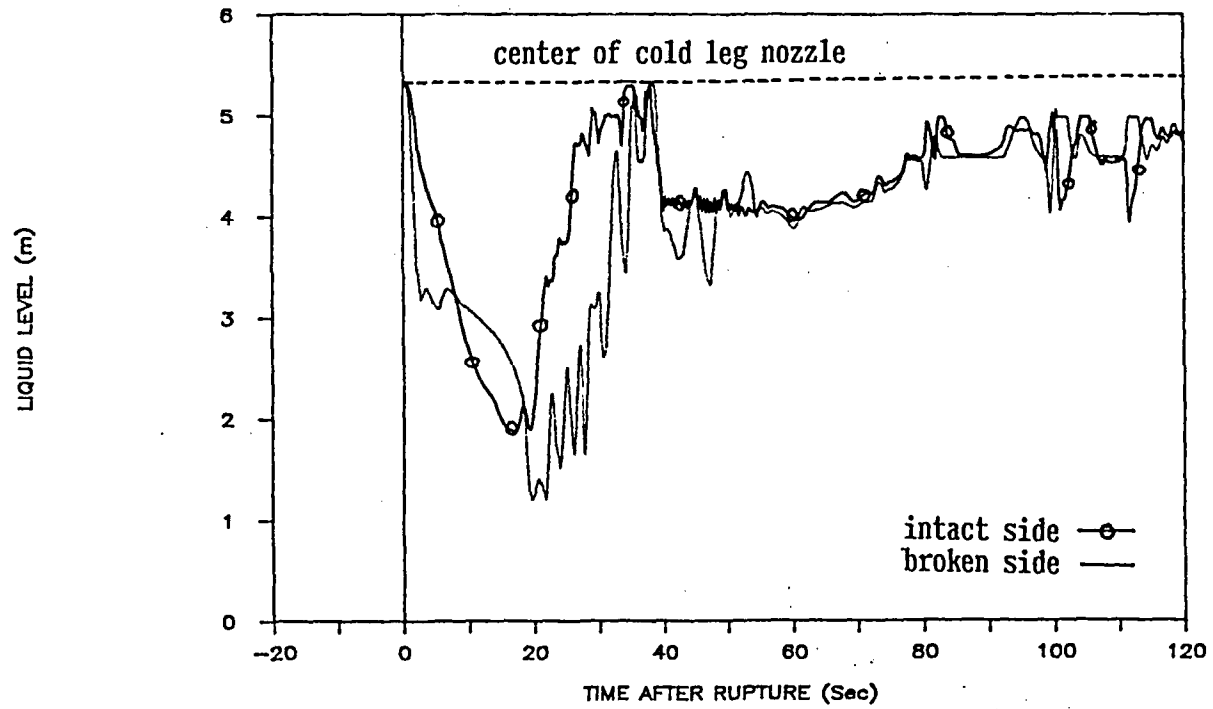


Fig.35 Collapsed liquid level of the downcomer in CASE A



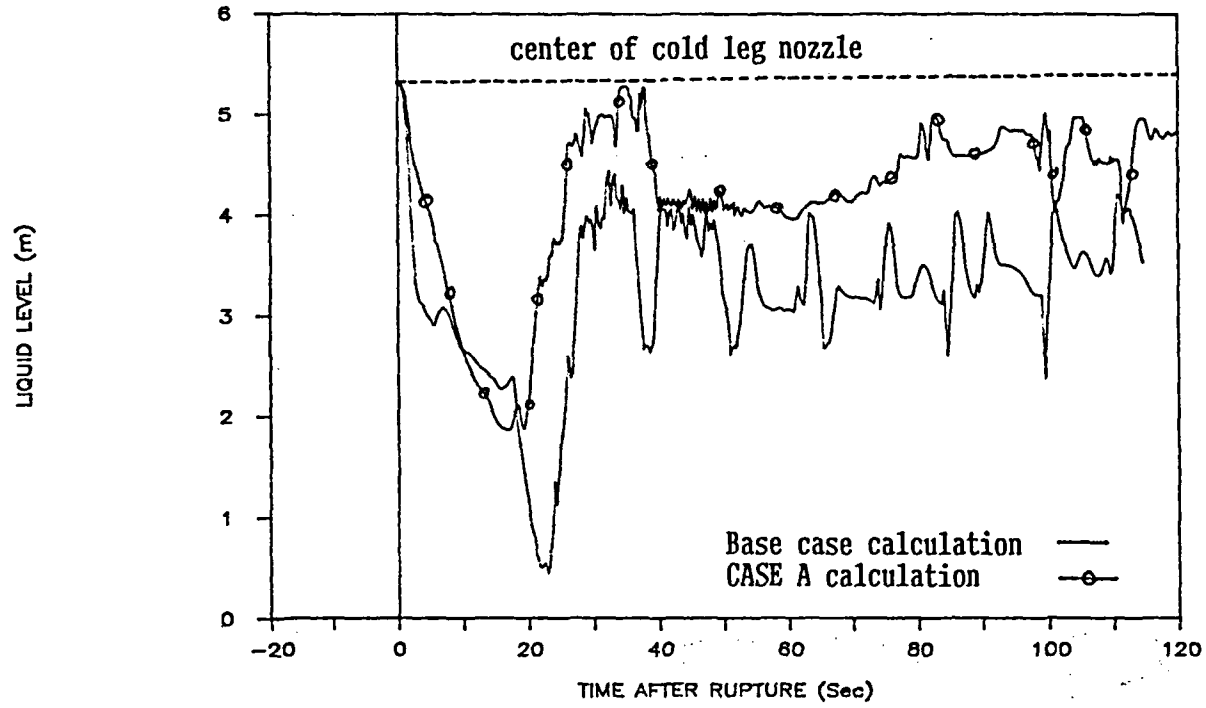


Fig.36 Comparison of liquid level in the intact side downcomer between base case and CASE A

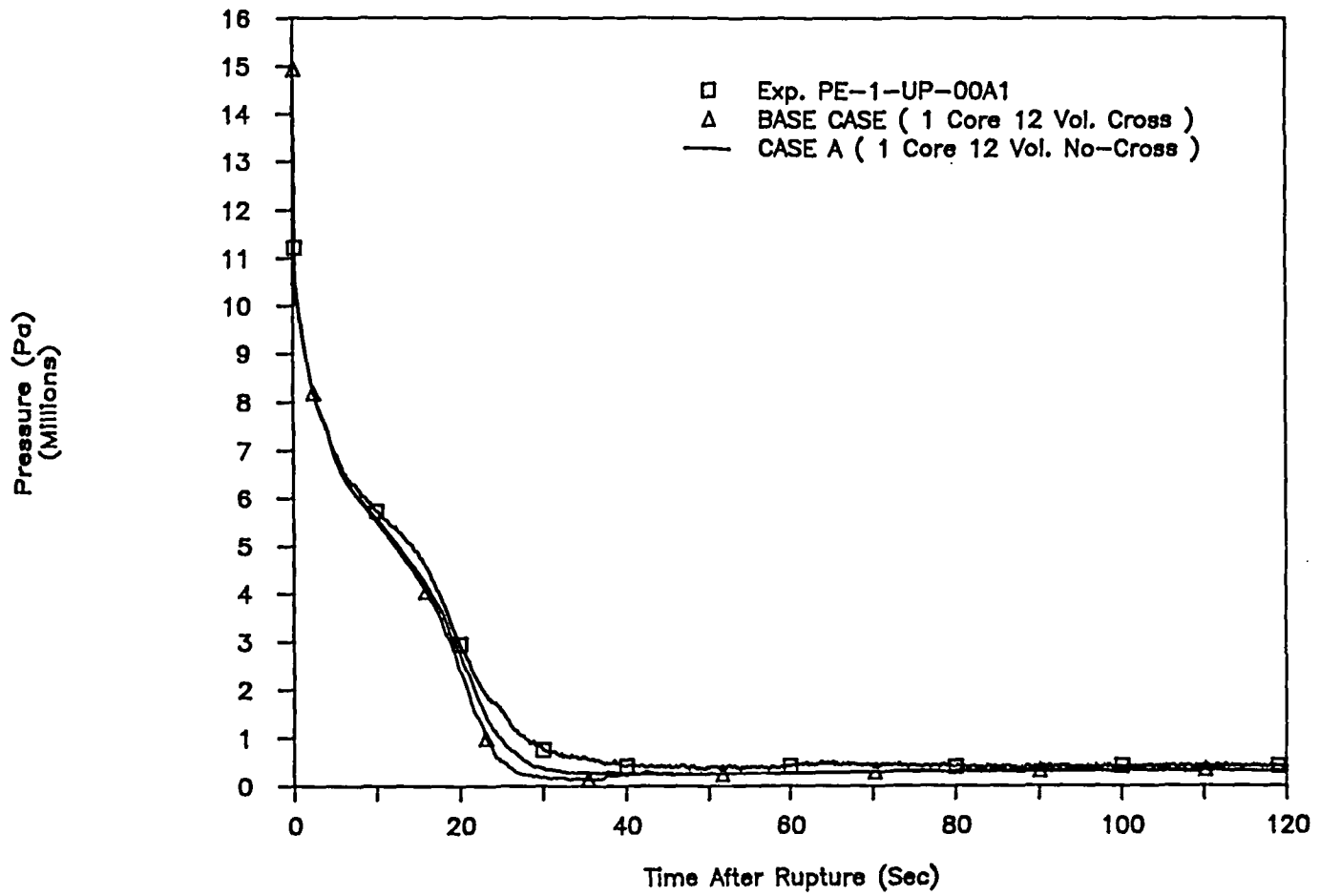


Fig.37 Comparison of primary system pressure between base case and CASE A

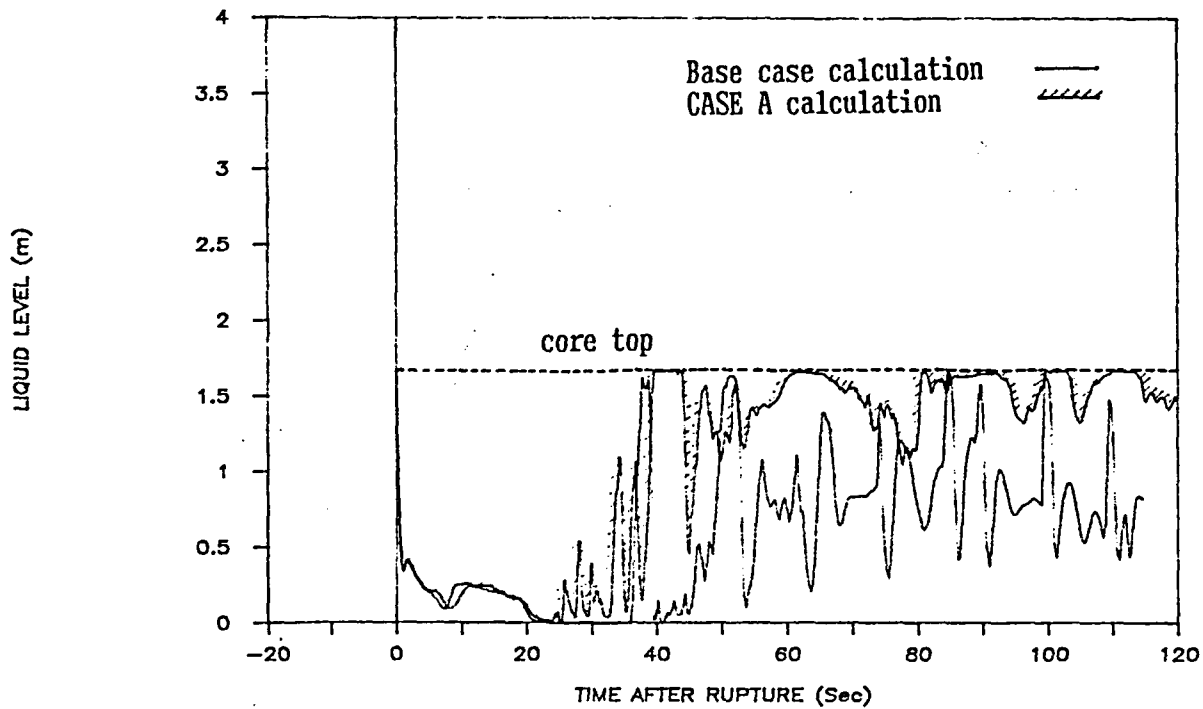


Fig.38 Comparison of liquid level in the core between base case and CASE A

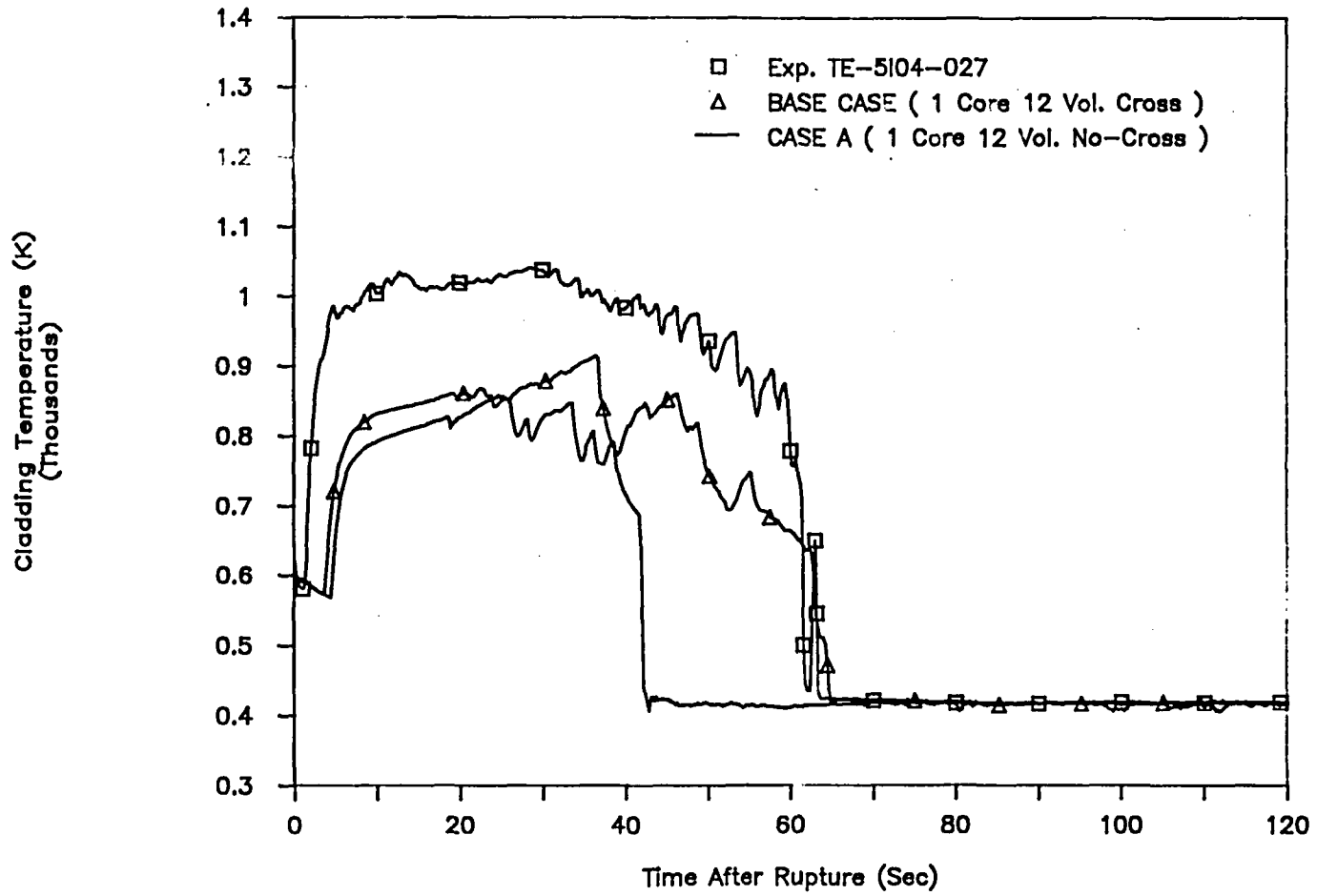


Fig.39 Comparison of cladding temperature at 27 inches of hot fuel between base case and CASE A

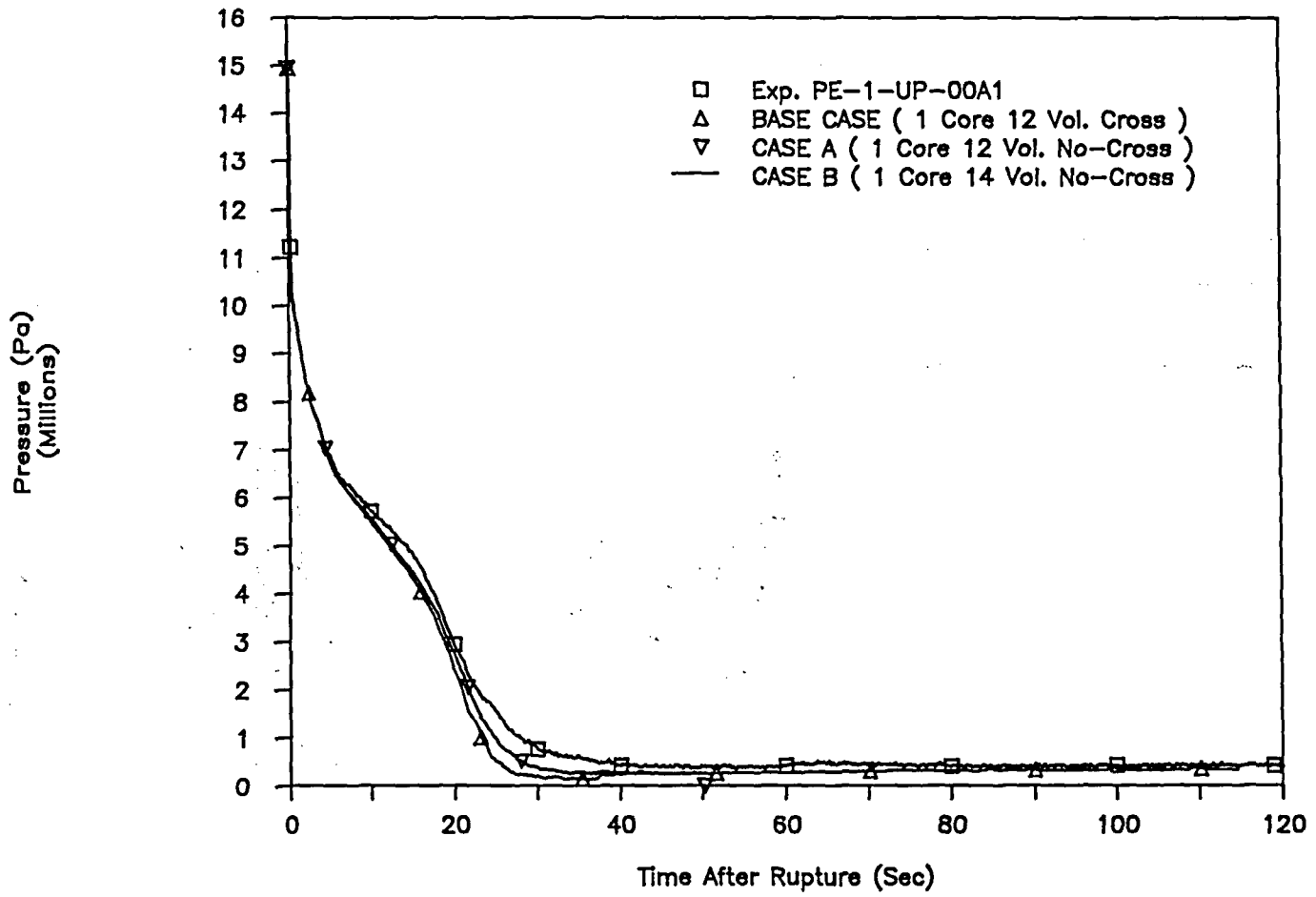


Fig.40 Comparison of primary system pressure in base case, CASE A and CASE B

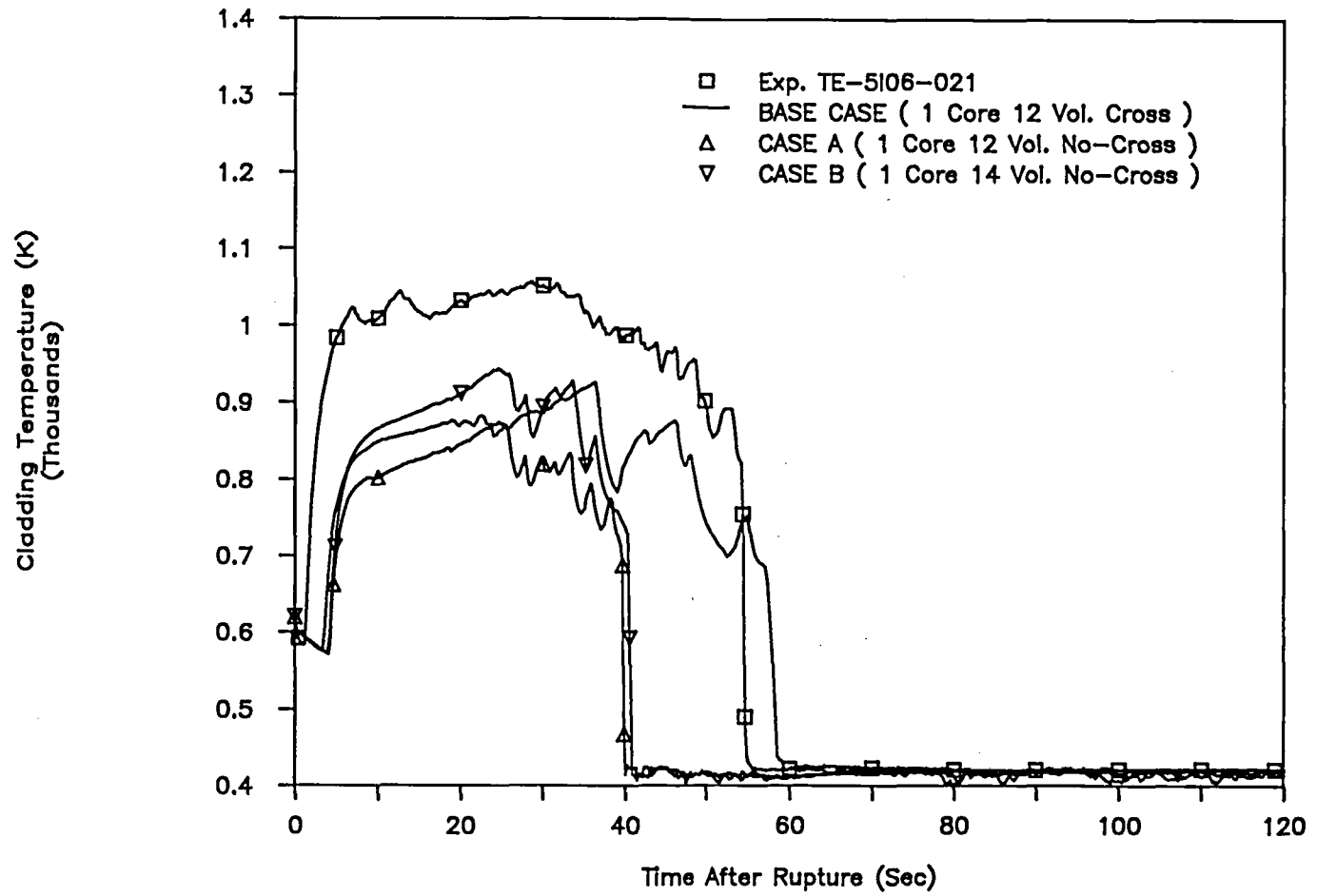


Fig.41 Comparison of cladding temperature at 21 inches of hot fuel in base case, CASE A and CASE B

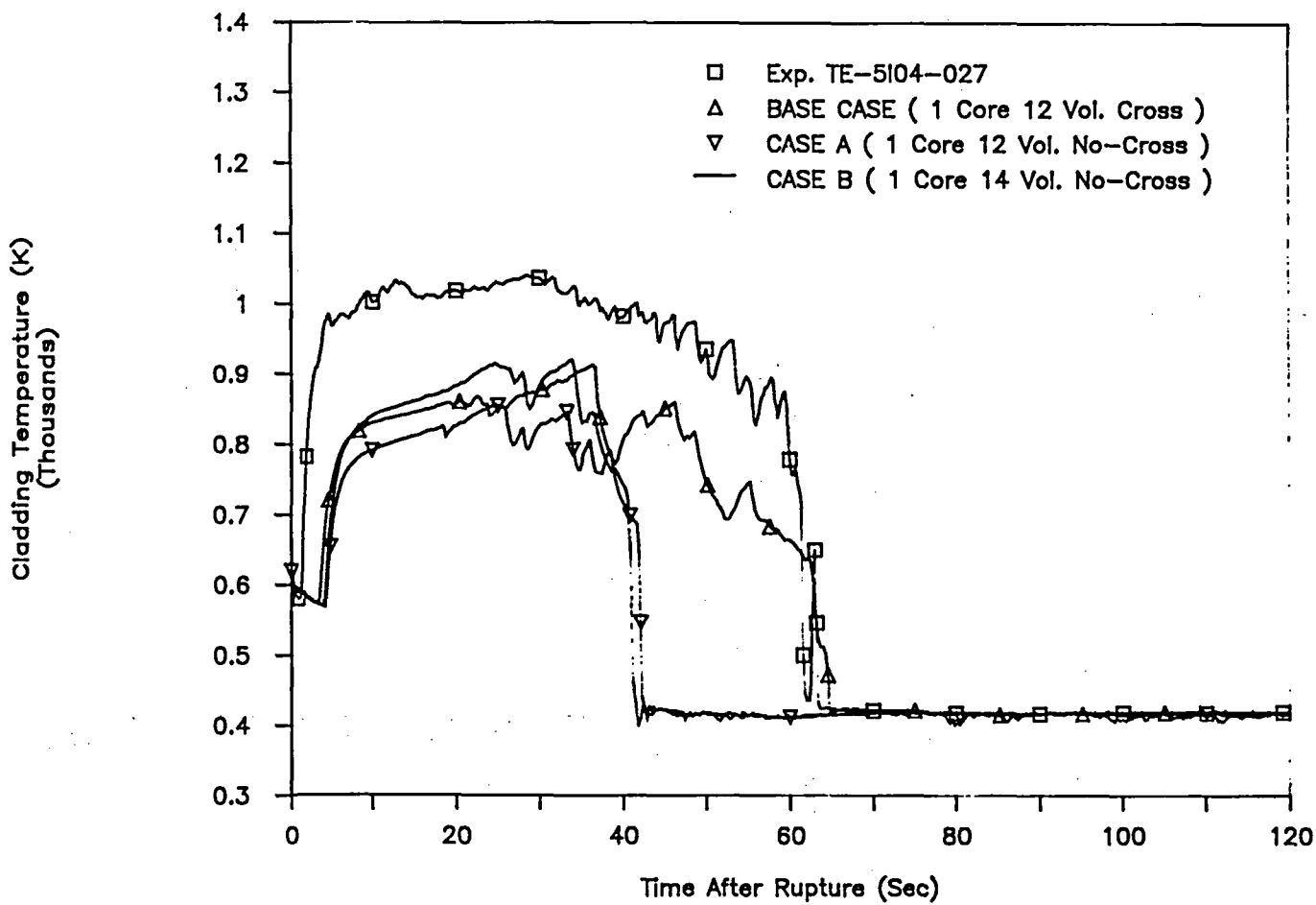


Fig.42 Comparison of cladding temperature at 27 inches of hot fuel in base case, CASE A and CASE B

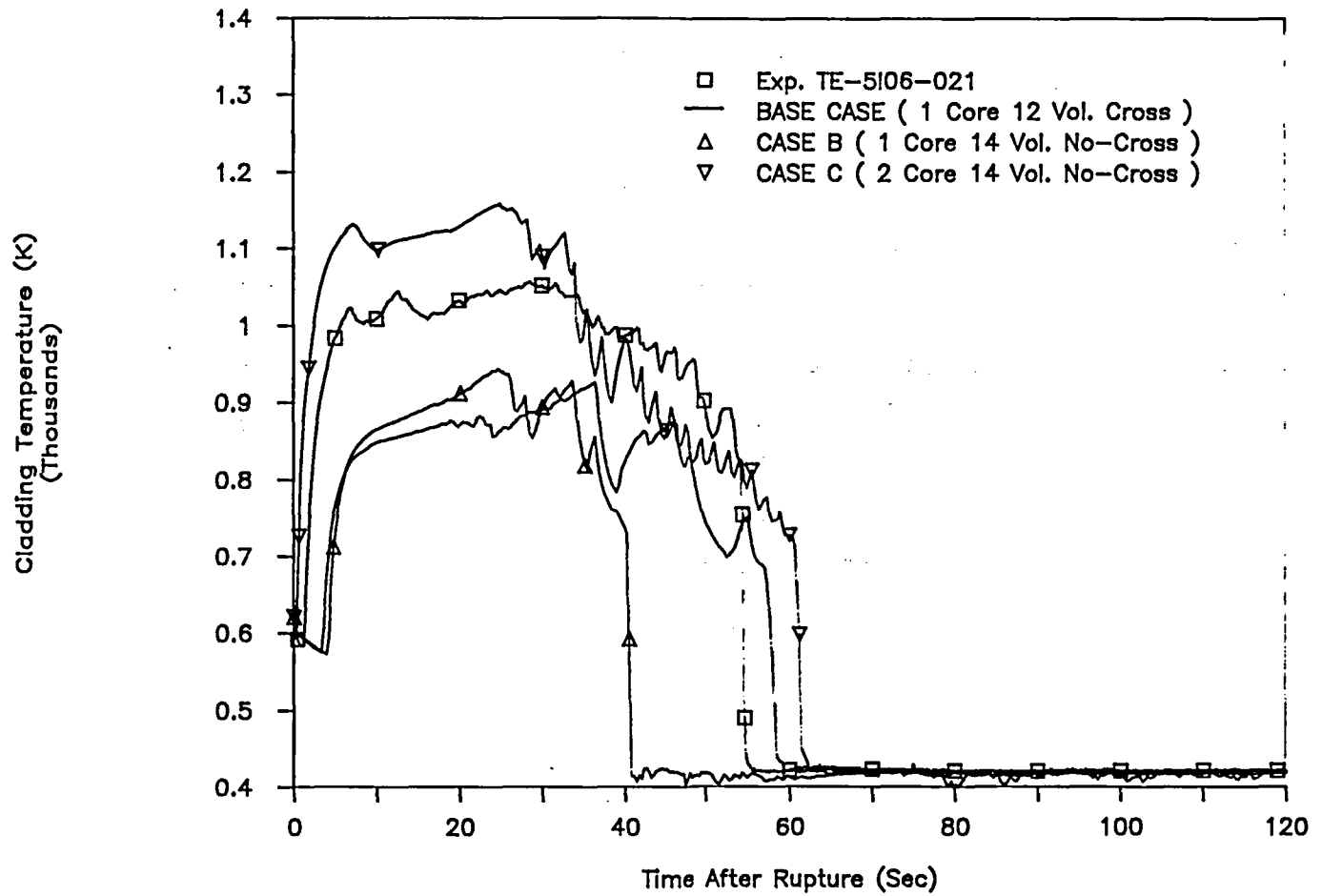


Fig.43 Comparison of cladding temperature at 21 inches of hot fuel in base case, CASE B, and CASE C



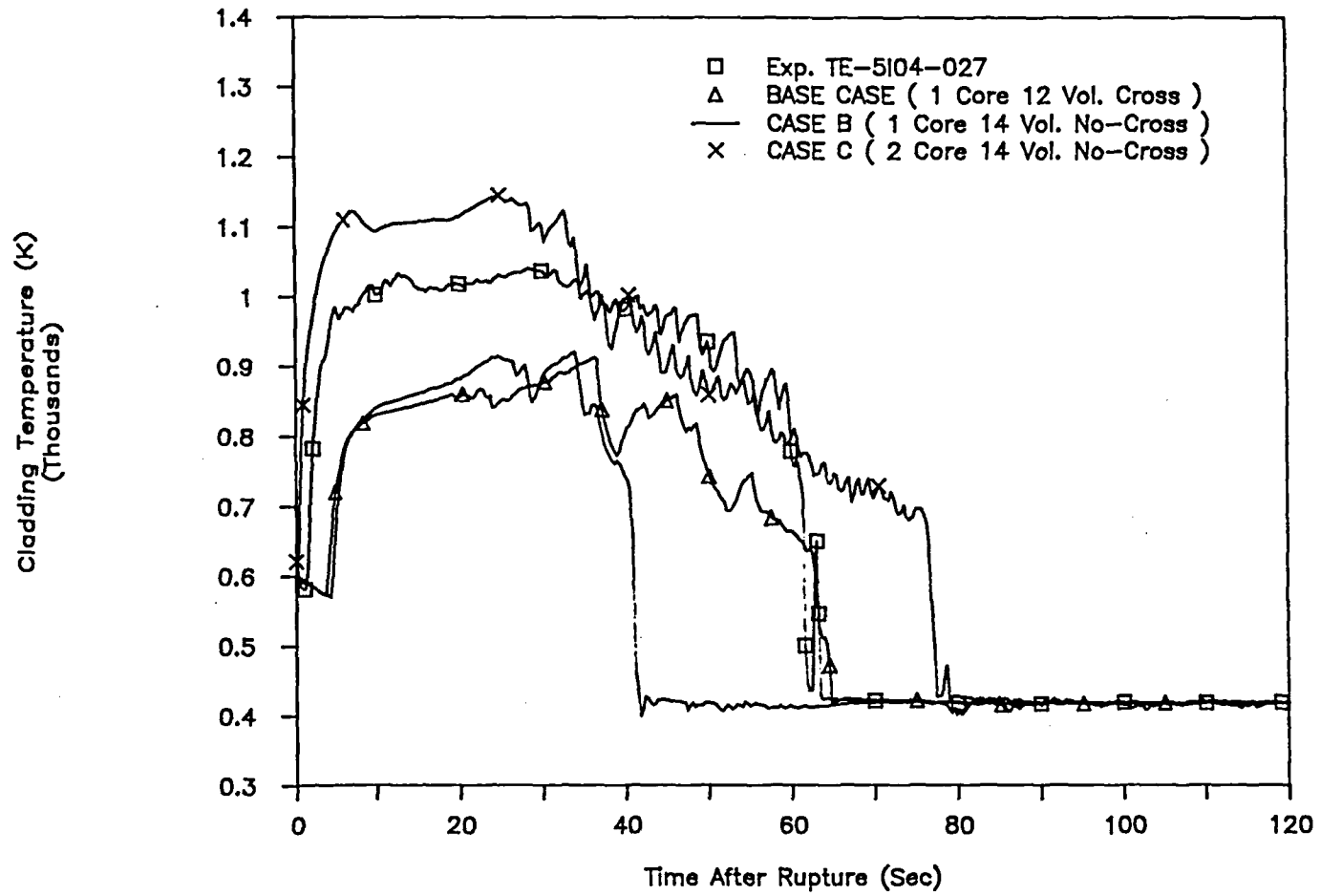


Fig.44 Comparison of cladding temperature at 27 inches of hot fuel in base case, CASE B and CASE C

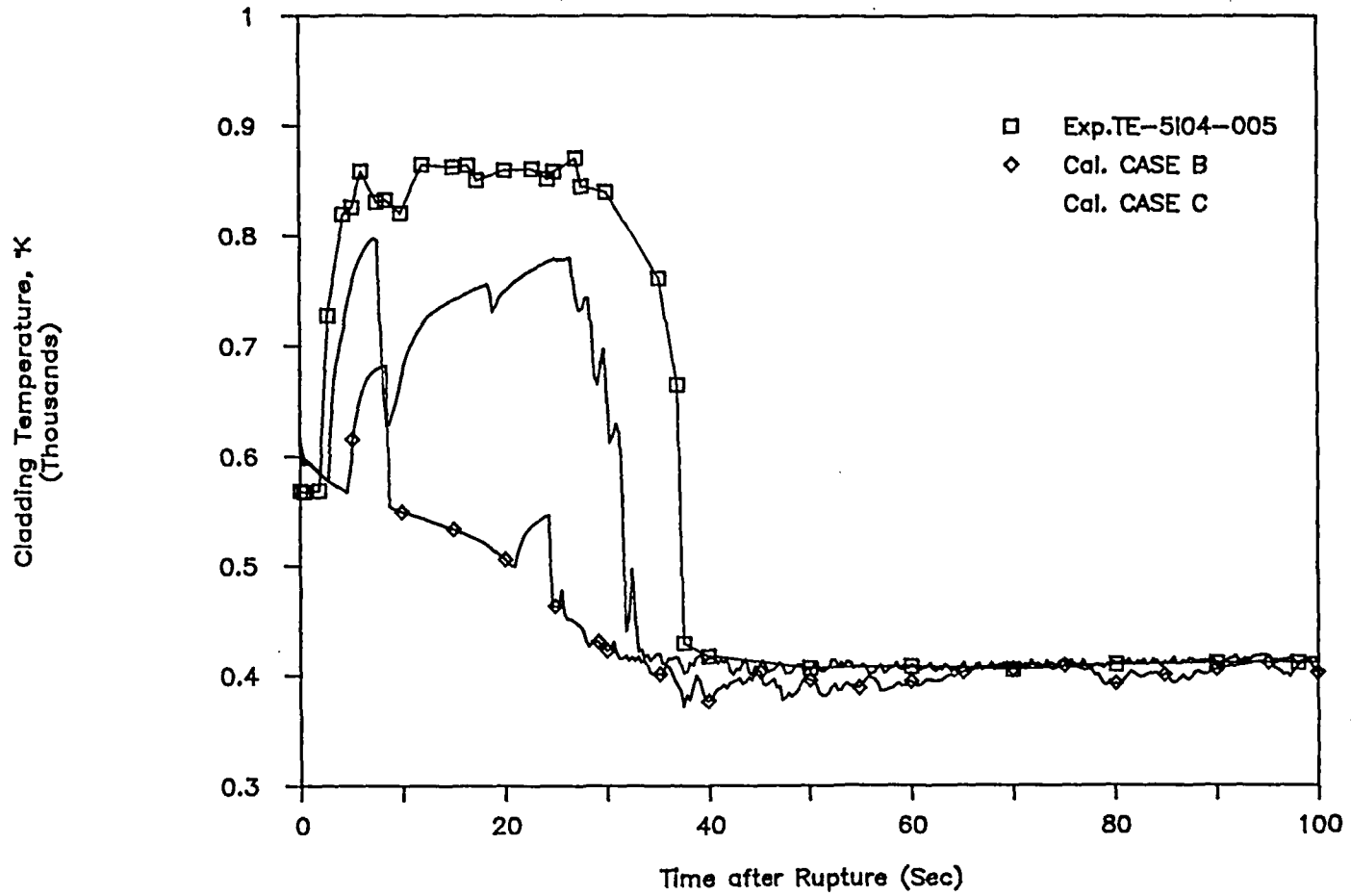


Fig.45 Comparison of cladding temperature at 5 inches of hot fuel in base case, CASE B and CASE C

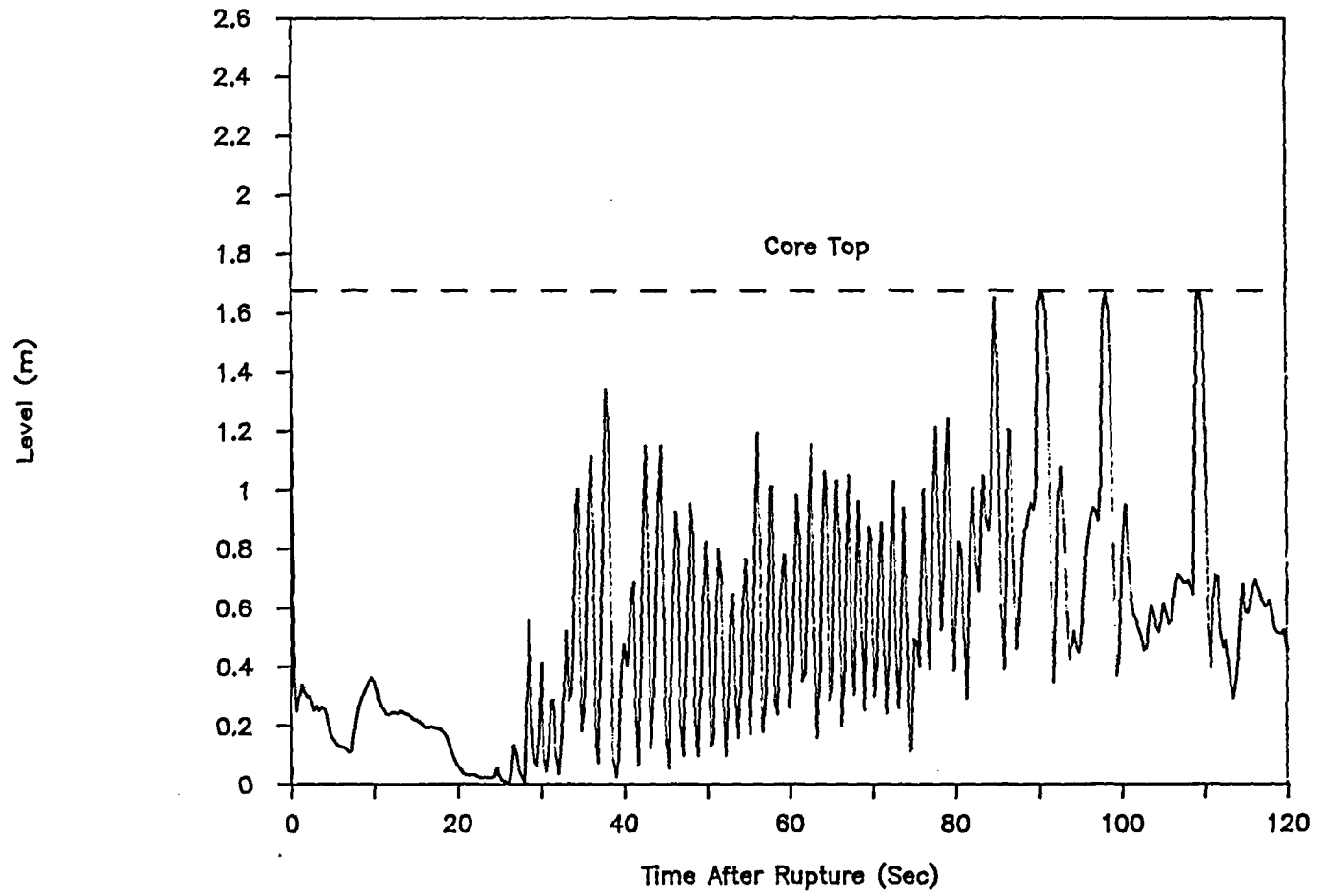


Fig.46 Collapsed liquid level in the hot channel of core in CASE C

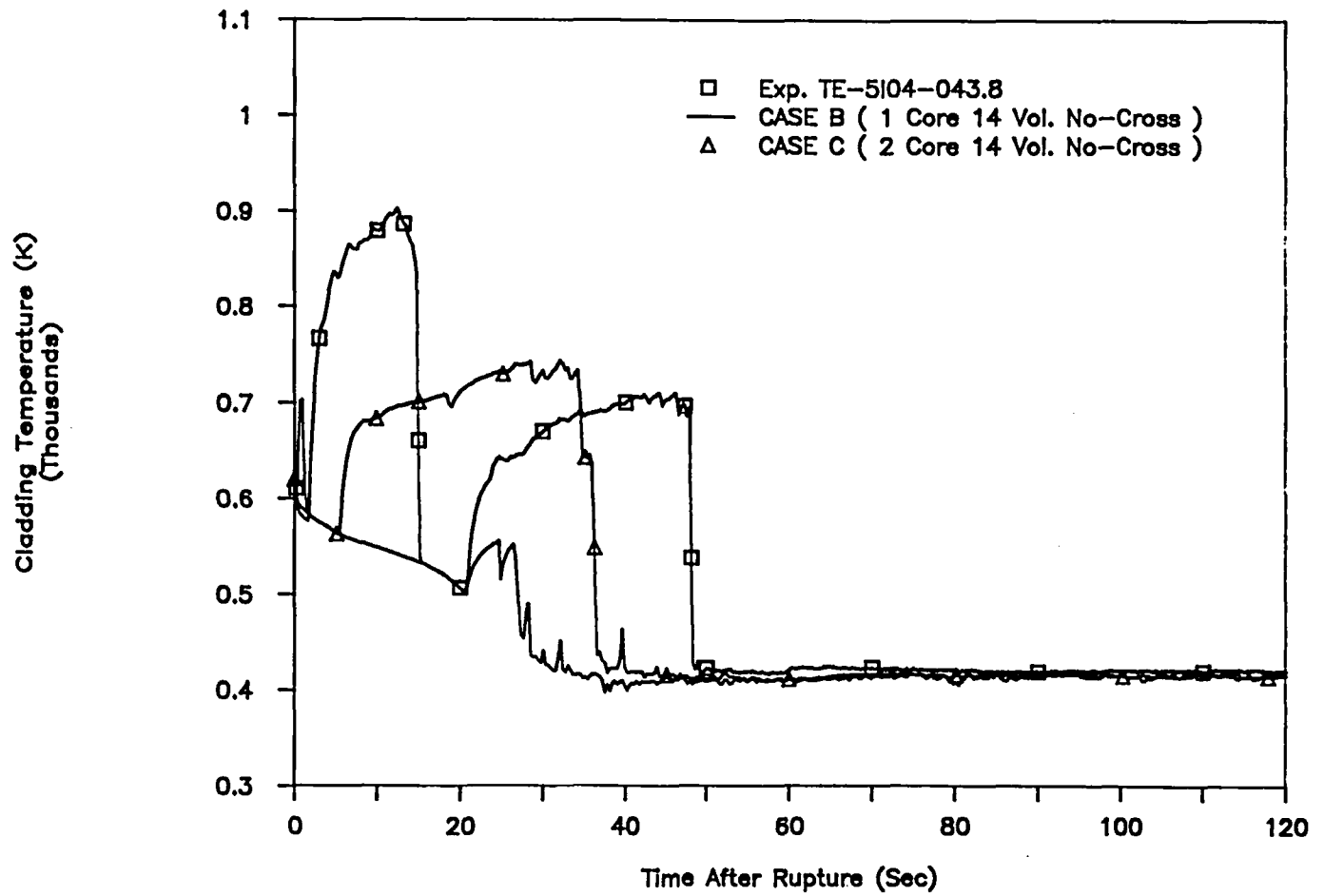


Fig.47 Comparison of cladding temperature at 43.8 inches of hot fuel between CASE B and CASE C

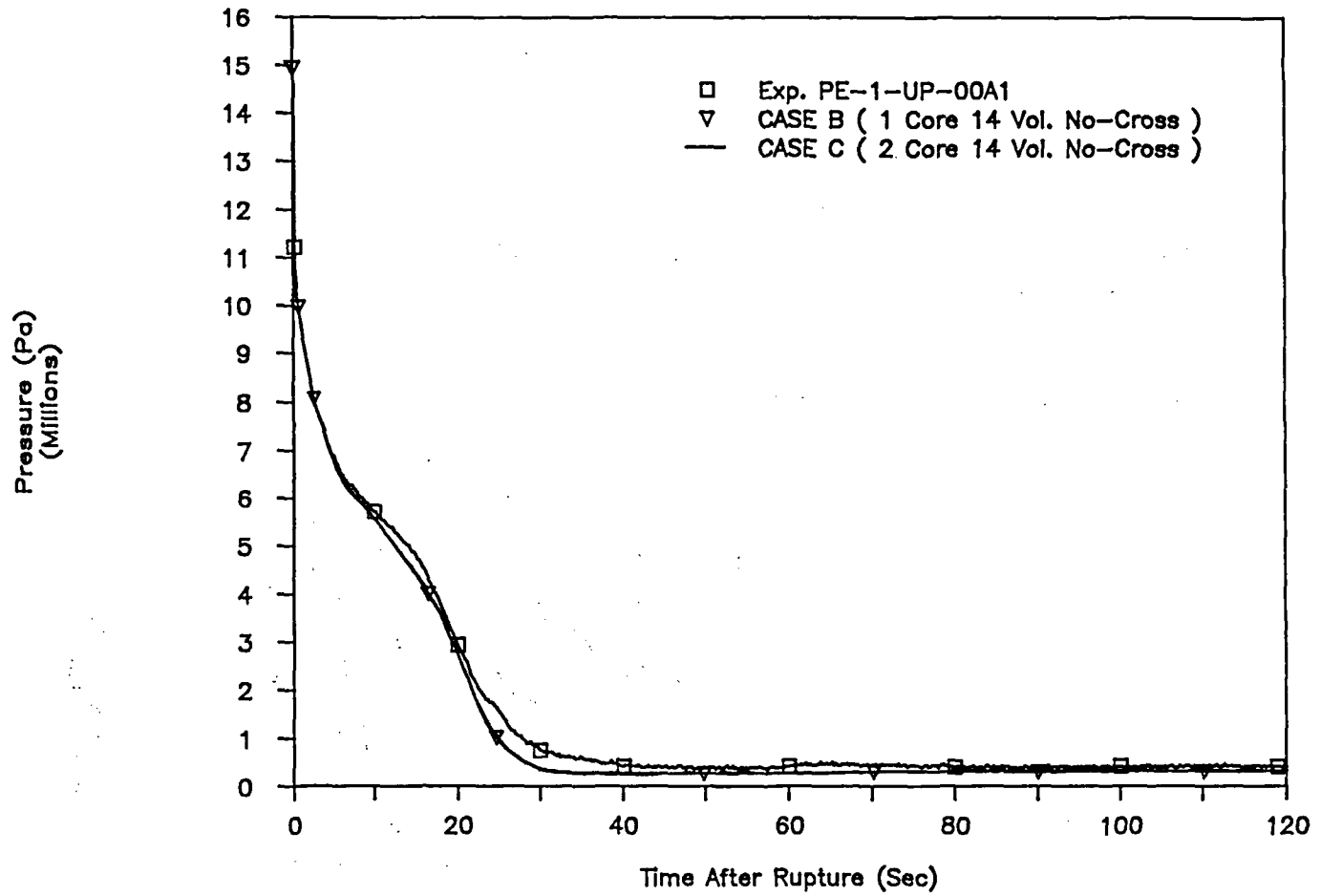


Fig.48 Comparison of primary system pressure between CASE B and CASE C

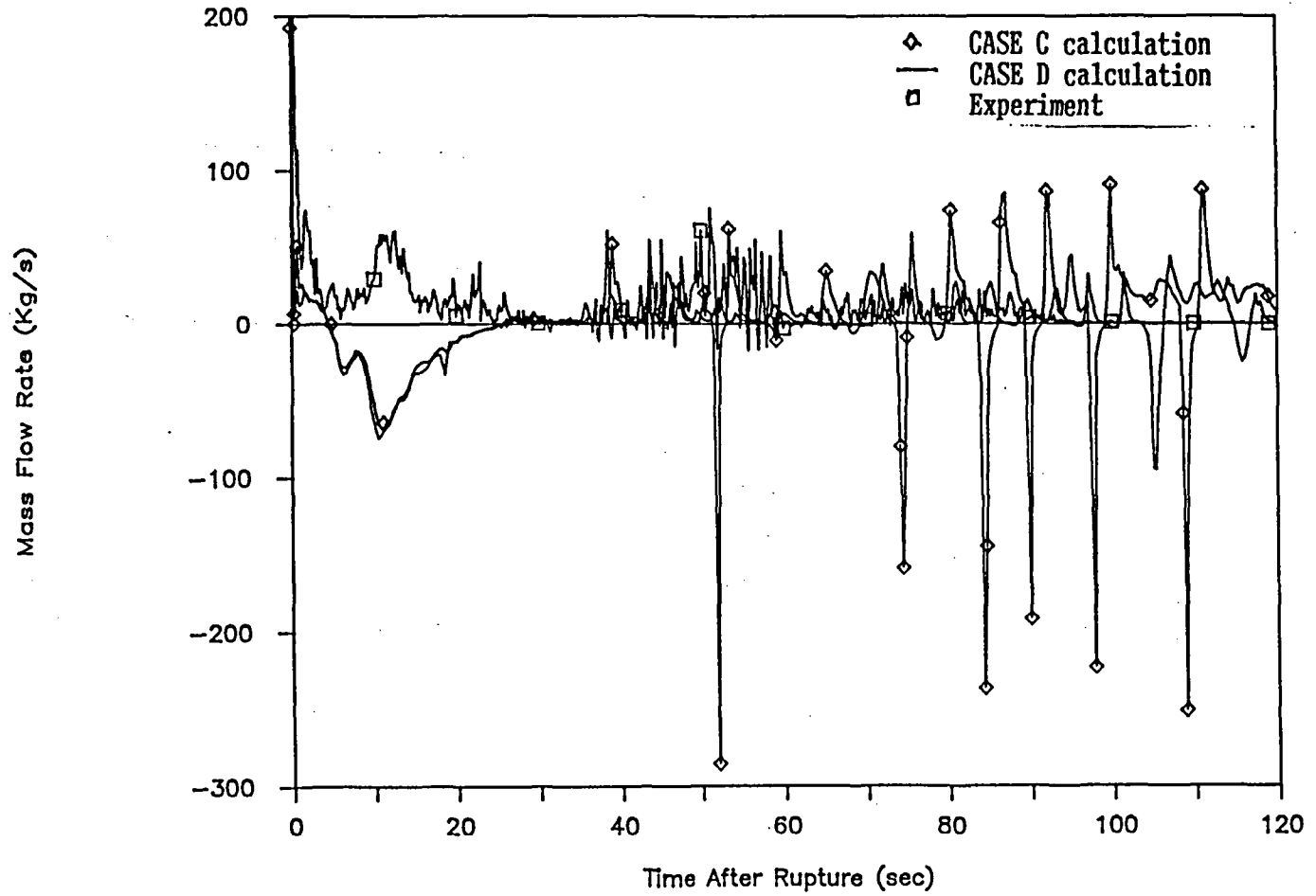


Fig.49 Comparison of mass flow rate at intact loop hot leg between CASE C and CASE D

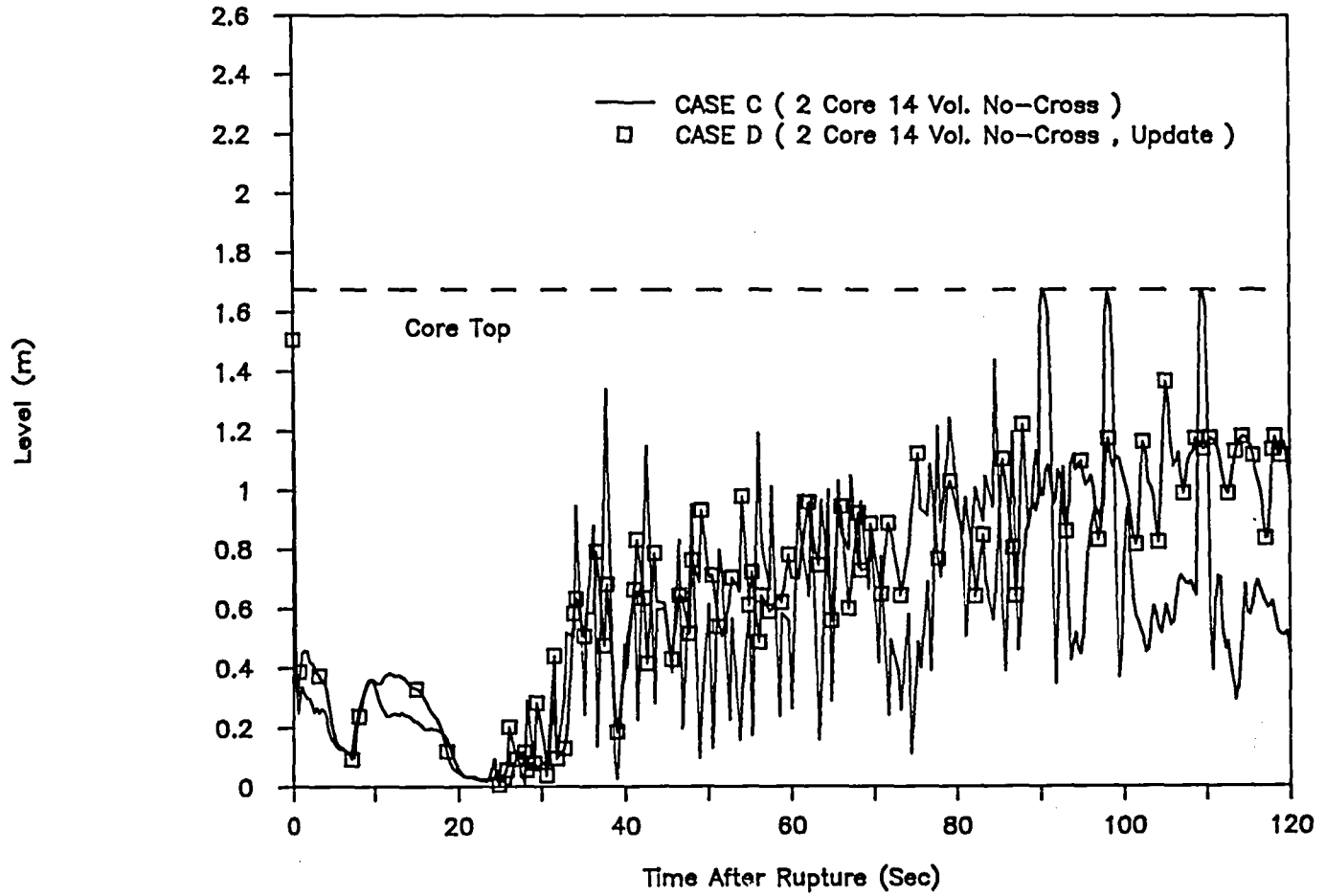


Fig.50 Comparison of liquid level in the hot channel of core between CASE C and CASE D

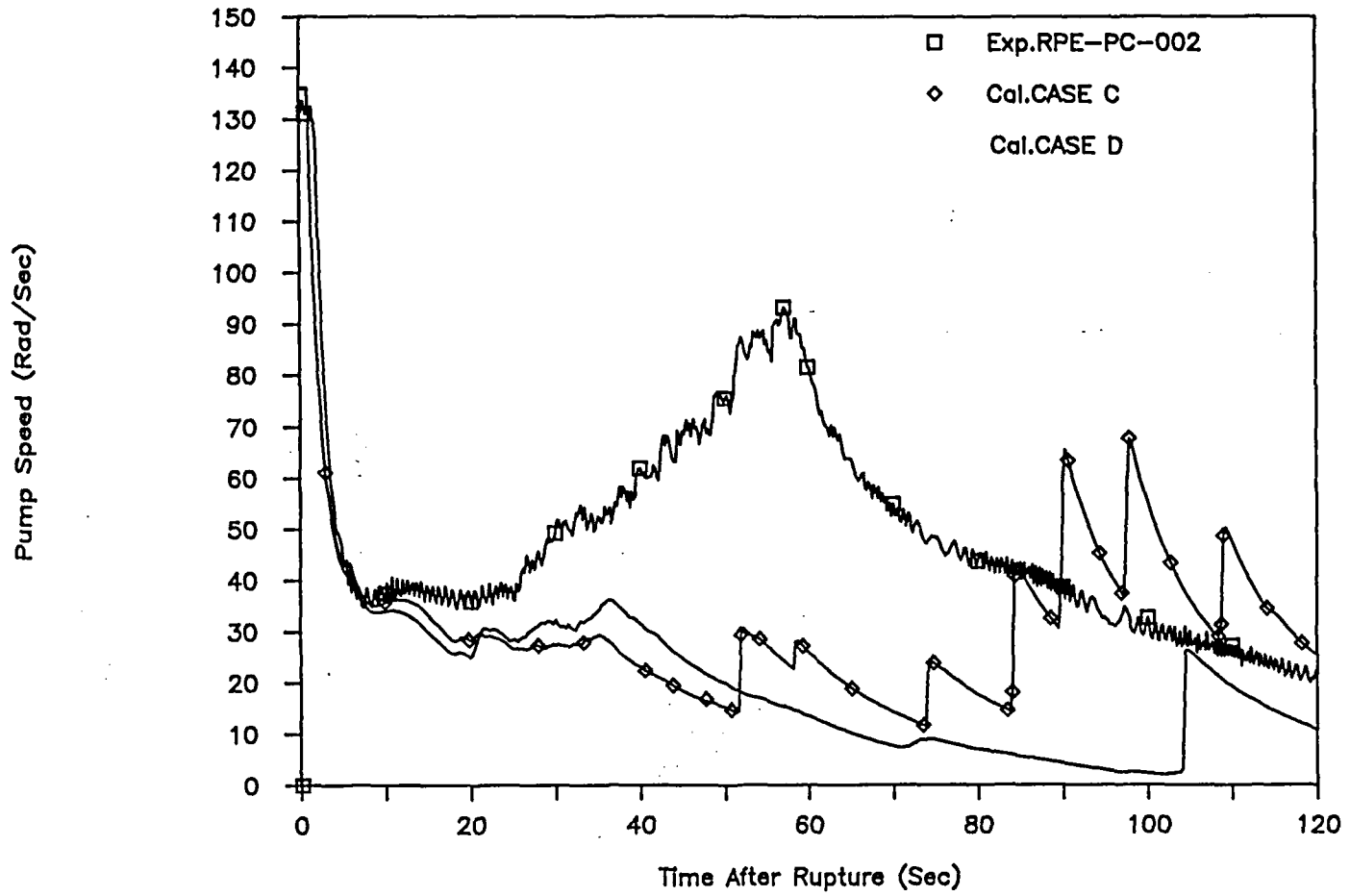


Fig.51 Comparison of primary coolant pump velocity between CASE C and CASE D



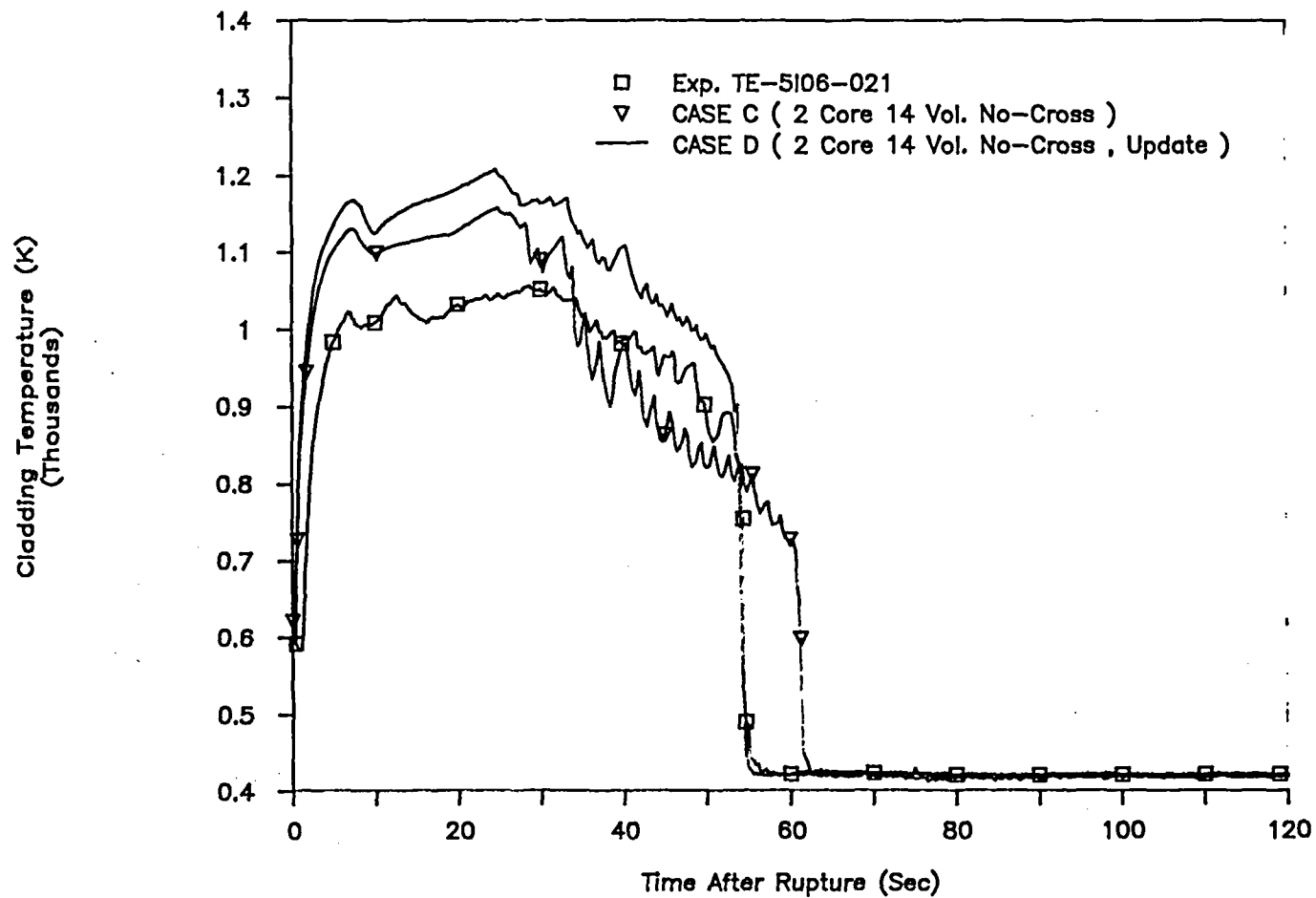


Fig.52 Comparison of cladding temperature at 21 inches of hot fuel between CASE C and CASE D

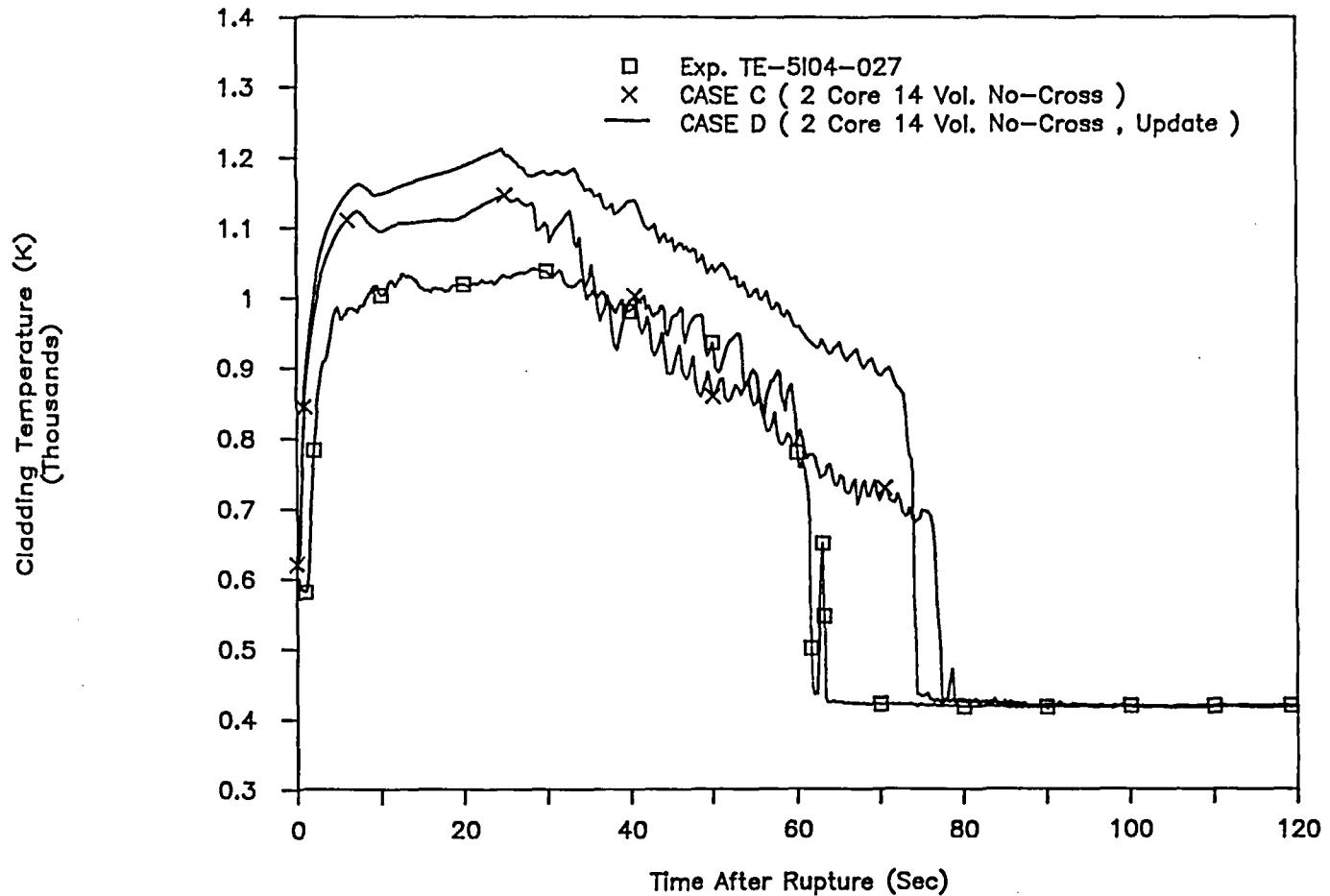


Fig.53 Comparison of cladding temperature at 27 inches of hot fuel between CASE C and CASE D

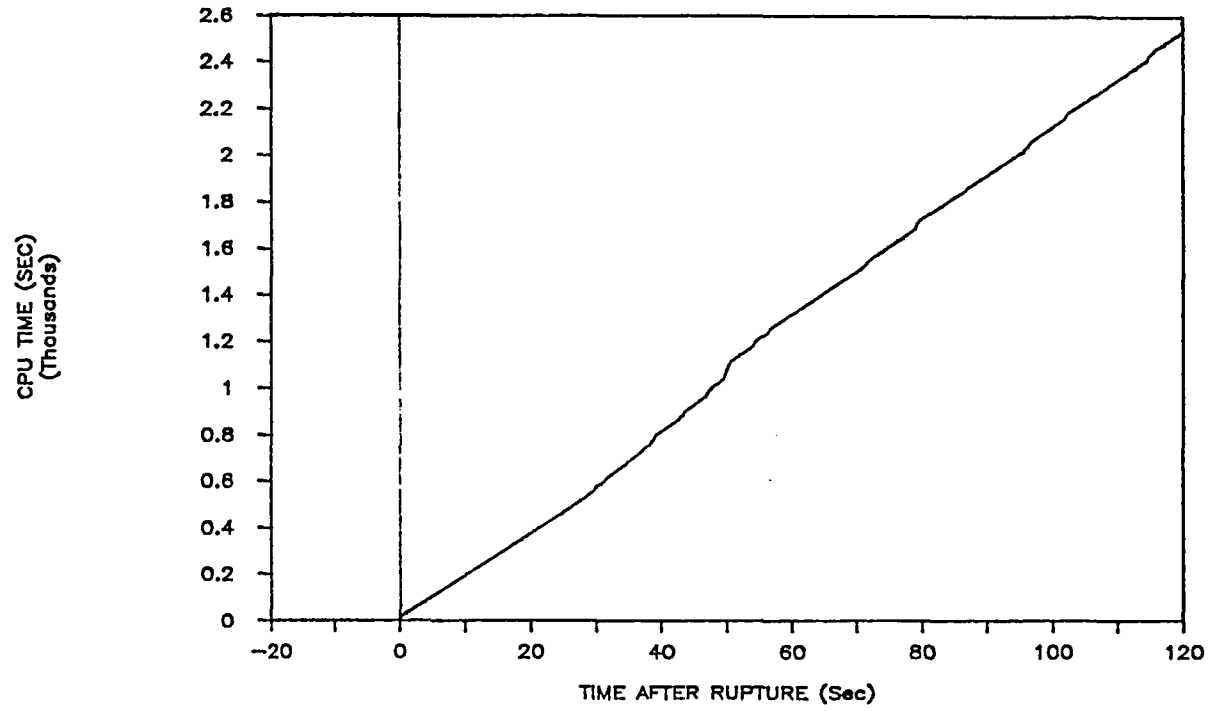


Fig.54 The required CPU time versus the advanced time in base case calculation of L2-5 test

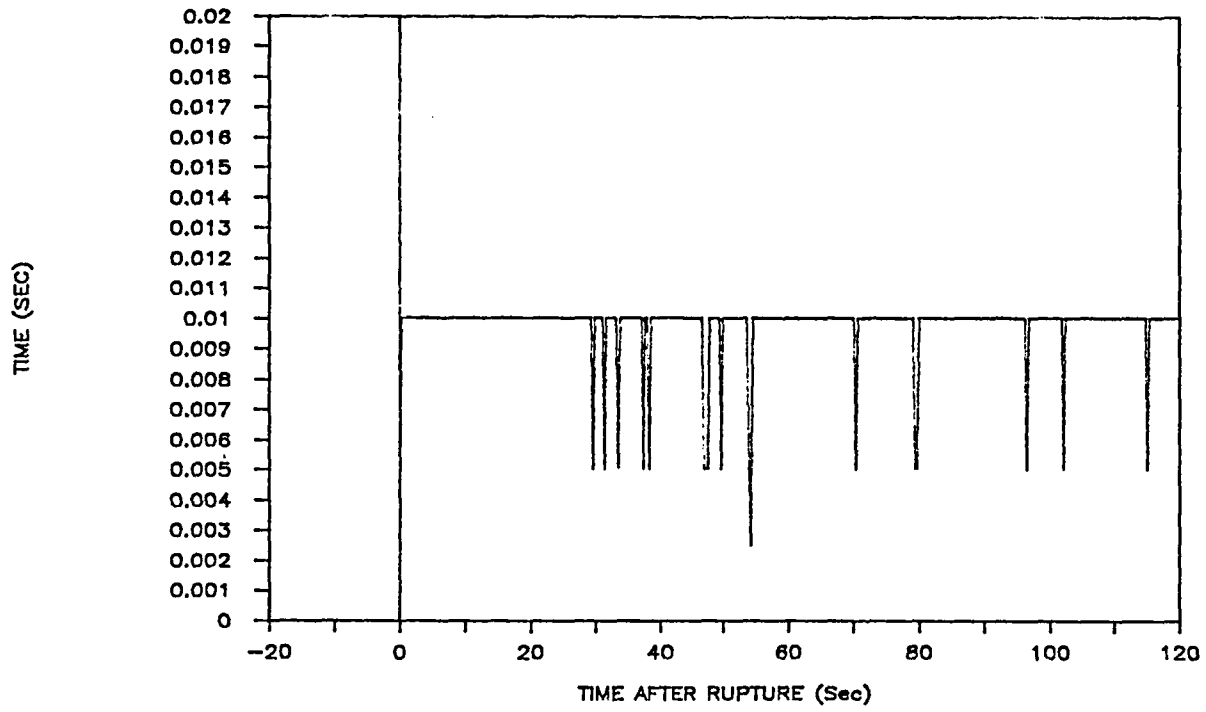


Fig.55 Time step size of base case calculation of L2-5 test

Appendix

APPENDIX A Update list for RELAP5/MOD2 Cycle 36.04

```

/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 DIRECTIVE
* *****
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 STUDEVIK (MR.SANDERVAG)
*/           TO      KWU      (MR.GRUBER)
*/           1987-06-25
*/
*/   COMPILER 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 IRLHT 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 IRLHT IS NOW PROGRAMMED
*/
*COMPILE IRLHT
*I IRLHT.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

```





```

*-----1-----1-----1-----1-----1-----1-----1-----1-----
* FUEL CENTERLINE TEMPERATURES
*-----1-----1-----1-----1-----1-----1-----1-----1-----
0000326  HTTEMP      002100201          *
0000327  HTTEMP      002100301          *
0000328  HTTEMP      002100401          *
*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
*
*     TRIPS
*
*-----1-----1-----1-----1-----1-----1-----1-----1-----
*   501-509  GENERAL TRIPS
*-----1-----1-----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-----1-----1-----
*     BUDGET SAVER CONTROLS
*-----1-----1-----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-VI508 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-----1-----1-----
*   510-519  TEST SPECIFIC TRIPS
*-----1-----1-----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-----1-----1-----

```

```

* LT 555 REFLOOD TRIP
0000555 P 230120000 LE NULL 0 1.0+6 L
*-----1-----1-----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 0.0 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-----

```



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-----1-----								
* SG INLET PLENUM								
*-----1-----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-----1-----								
* SG U-TUBES								
*-----1-----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-----1-----1-----							
* SG OUTLET PLENUM							
*-----1-----1-----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-----1-----1-----							
* PUMP SUCTION PIPING							
*-----1-----1-----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-----1-----1-----							
* PUMP SUCTION TEE							
*-----1-----1-----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	

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-----1-----						
* PUMP1 SUCTION TEE OUTLET						
*-----1-----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-----1-----						
* PUMP 1 INLET						
*-----1-----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-----1-----						
* PRIMARY COOLANT PUMP 1						
*-----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-----1-----						
* PUMP 1 OUTLET PUMP SIDE						
*-----1-----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-----1-----						
* PUMP1 OUTLET PIPE TEE SIDE						
*-----1-----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-----1-----1-----1-----
* PUMP OUTLET TEE
*-----1-----1-----1-----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-----1-----1-----1-----
* PUMP 2 SUCTION TEE OUTLET
*-----1-----1-----1-----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-----1-----1-----1-----
* PUMP 2 INLET PIPE
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
1600000 "PMP2 INLET"     SINGL VOL
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-----1-----1-----1-----
* PRIMARY COOLANT PUMP 2
*-----1-----1-----1-----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-----1-----1-----1-----
* PUMP 2 OUTLET
*-----1-----1-----1-----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-----1-----1-----1-----
* INTACT LOOP COLD LEG PIPE
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
1750000 "ILCL PIPE "     PIPE
1750001 2
1750101 0.0        2
1750201 0.0        1

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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-----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. .00000000 0.0      01
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* JUNCTION - MIDDLE TO LOWER DOWNCOMER INTACT SIDE
*-----1-----1-----1-----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-----1-----1-----1-----
* DOWNCOMER LOWER VOLUME INTACT SIDE
*-----1-----1-----1-----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. .00000000 0.0      01
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* JUNCTION - LOWER DOWNCOMER TO LOWER PLENUM INTACT SIDE
*-----1-----1-----1-----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-----1-----1-----1-----
* INLET ANNULUS UPPER VOLUME BROKEN SIDE
*-----1-----1-----1-----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. .00000000 0.0      01
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* JUNCTION - MIDDLE TO UPPER INLET ANNULUS BROKEN SIDE
*-----1-----1-----1-----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-----1-----1-----1-----
* INLET ANNULUS MIDDLE VOLUME BROKEN SIDE
*-----1-----1-----1-----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-----1-----
* JUNCTION - MIDDLE TO LOWER INLET ANNULUS BROKEN SIDE
*-----1-----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-----1-----
* INLET ANNULUS LOWER VOLUME BROKEN SIDE
*-----1-----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-----1-----
* JUNCTION - INLET ANNULUS TO DOWNCOMER BROKEN SIDE
*-----1-----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-----1-----
* DOWNCOMER UPPER VOLUME BROKEN SIDE
*-----1-----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-----1-----
* JUNCTION - UPPER TO MIDDLE DOWNCOMER BROKEN SIDE
*-----1-----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-----1-----
* DOWNCOMER MIDDLE VOLUME BROKEN SIDE
*-----1-----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-----1-----
* JUNCTION - MIDDLE TO LOWER DOWNCOMER BROKEN SIDE
*-----1-----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-----1-----
* DOWNCOMER LOWER VOLUME BROKEN SIDE
*-----1-----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-----1-----
* JUNCTION - LOWER DOWNCOMER TO LOWER PLENUM BROKEN SIDE
*-----1-----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-----1-----
* CROSSFLOW JUNCTION - UPPER INLET ANNULUS
*-----1-----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-----1-----
* CROSSFLOW JUNCTION - LOWER INLET ANNULUS
*-----1-----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-----1-----
* CROSSFLOW JUNCTION - UPPER DOWNCOMER
*-----1-----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-----1-----
* CROSSFLOW JUNCTION - MIDDLE DOWNCOMER
*-----1-----1-----1-----1-----1-----1-----1-----
7260000 "MIDDCMRXF" 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-----1-----
* CROSSFLOW JUNCTION - LOWER DOWNCOMER

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*-----1-----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-----1-----
* LOWER PLENUM TOP VOLUME
*-----1-----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-----1-----
* LOWER PLENUM BOTTOM VOLUME
*-----1-----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-----1-----
* LOWER CORE SUPPORT STRUCTURE
*-----1-----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-----1-----
* ACTIVE CORE
*-----1-----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	1	1	
* CORE BYPASS VOLUME									
*-----	1	1	1	1	1	1	1	1	
2350000	"CORE BYPASS"		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	1	1	
* UPPER END BOXES AND SUPPORT STRUCTURE									
*-----	1	1	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	1	1	
* UPPER CORE SUPPORT STRUCTURE - CROSS FLOW REGION									
*-----	1	1	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			



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-----1-----1-----1-----  
\* HOT LEG PIPE TO REFLOOD ASSIST BYPASS TEE

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-----1-----1-----1-----  
\* BROKEN LOOP HOT LEG CONTRACTION

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-----1-----1-----1-----  
\* STEAM GENERATOR AND PUMP SIMULAIOR

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				



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-----1-----1-----1-----									
* HOT LEG BREAK VALVE									
*-----1-----1-----1-----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-----1-----1-----1-----									
* REACTOR VESSEL NOZZLE - BROKEN LOOP COLD LEG									
*-----1-----1-----1-----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	1.455594	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-----1-----1-----1-----									
* COLD LEG PIPE TO REFLOOD ASSIST BYPASS TEE									
*-----1-----1-----1-----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			

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-----	1-----	1-----
* BROKEN LOOP COLD LEG RABS TO DTT								
*-----	1-----	1-----	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-----	1-----	1-----
* BROKEN LOOP COLD LEG DTT TO BREAK PLANE								
*-----	1-----	1-----	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-----	1-----	1-----
* COLD LEG BREAK VALVE								
*-----	1-----	1-----	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-----	1-----	1-----
* REFLOOD ASSIST BYPASS PIPING - COLD LEG SIDE								
*-----	1-----	1-----	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-----1-----1-----
* REFLOOD ASSIST BYPASS VALVES
*-----1-----1-----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-----1-----1-----
* REFLOOD ASSIST BYPASS PIPING - HOT LEG SIDE
*-----1-----1-----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-----1-----1-----
* SURGE LINE PCS SIDE
*-----1-----1-----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-----1-----1-----
* PRESSURIZER SURGE LINE
*-----1-----1-----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-----1-----1-----1-----									
* PRESSURIZER SURGE LINE									
*-----1-----1-----1-----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-----1-----1-----1-----									
* PRESSURIZER VESSEL									
*-----1-----1-----1-----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.	1.00000000	0.0			05
4151206	0	15002000.	1586220.	2468160.	1.00000000	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-----1-----1-----1-----									
* PRESSURIZER VESSEL TO TOP HAT									
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----									
4170000	"VSSL-TPHAT"			SNGLJUN					
4170101	415010000	420000000	0.0		0.0		0.0	0000	



\* FEED INLET VOLUME

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*-----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

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\* STEAM GENERATOR DOWNCOMER

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*-----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

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\* JUNCTION - DOWNCOMER TO BOILER

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*-----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

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\* STEAM GENERATOR BOILER

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*-----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-----	1-----
* LOWER PORTION OF STEAM DOME							
*-----	1-----	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-----	1-----
* UPPER PORTION OF STEAM DOME							
*-----	1-----	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-----	1-----
* STEAM PIPE FROM GENERATOR TO CONTROL VALVE							
*-----	1-----	1-----	1-----	1-----	1-----	1-----	1-----
5300000	"STEAM PIPE"		SINGLVOL				
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-----	1-----
* STEAM FLOW CONTROL VALVE							
*-----	1-----	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-----	1-----
* PIPE DOWNSTREAM OF STEAM CONTROL VALVE							
*-----	1-----	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.	2598620.	.86686000		
5411101	541010000	542000000	0.0	0.0	0.0	0100	
5411201	13.013000	25.588000	0.0				
*-----	1-----	1-----	1-----	1-----	1-----	1-----	1-----
* AIR COOLED CONDENSER							
*-----	1-----	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
5420207  0.0      2.069E6  1.0
*-----1-----1-----1-----1-----1-----1-----1-----
* SIMPLIFIED FEED SYSTEM
*-----1-----1-----1-----1-----1-----1-----1-----
* FEED STORAGE TANK
*-----1-----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-----1-----
* FEED WATER
*-----1-----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-----1-----
* ECC CHECK VALVE
*-----1-----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-----1-----
* ECCS HEADER TO PCS
*-----1-----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-----1-----
* ACCUMULATOR VALVE
*-----1-----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-----1-----
* ACCUMULATOR PIPE
*-----1-----1-----1-----1-----1-----1-----1-----
6150000  "ACC PIPE "      SNGLVOL

```



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-----1-----1-----						
* ACCUMULATOR VESSEL						
*-----1-----1-----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-----1-----1-----						
* BWST LPIS						
*-----1-----1-----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-----1-----1-----						
* LOW PRESSURE INJECTION SYSTEM						
*-----1-----1-----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-----1-----1-----						
* BWST HPIS						
*-----1-----1-----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-----1-----1-----						
* HIGH PRESSURE INJECTION SYSTEM						
*-----1-----1-----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	
* \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ * \$ *						

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*
*   CONTAINMENT
*
*-----1-----1-----1-----1-----1-----1-----1-----
* CONTAINMENT BROKEN LOOP HOT LEG
*-----1-----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-----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-----1-----
* ACTIVE CORE
* STATION 116.91 TO 182.94
*-----1-----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          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

```



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	----
* UO2 - THERMAL CONDUCTIVITY				
*----	----	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	----
* UO2 - VOLUMETRIC HEAT CAPACITY				
*----	----	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	----
* HELIUM(GAP) - THERMAL CONDUCTIVITY				
*----	----	1	1	----
20100201	HELIUM	1.00		
*----	----	1	1	----
* HELIUM(GAP) - VOLUMETRIC HEAT CAPACITY				
*----	----	1	1	----
20100251	273.15	5.4		
20100252	5000.0	5.4		
*----	----	1	1	----
* ZIRCALOY-4 - THERMAL CONDUCTIVITY FROM MATPRO				
*----	----	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-----1-----		
* ZIRCALOY-4 - VOLUMETRIC HEAT CAPACITY FROM MATPRO		
*-----1-----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-----1-----		
* S-STEEL - THERMAL CONDUCTIVITY		
*-----1-----1-----1-----1-----1-----1-----1-----		
20100401	273.15	12.98
20100402	1199.82	25.1
*-----1-----1-----1-----1-----1-----1-----1-----		
* S-STEEL - VOLUMETRIC HEAT CAPACITY		
*-----1-----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-----1-----		
* INCONEL-600 - THERMAL CONDUCTIVITY		
*-----1-----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-----1-----
* INCONEL-600 - VOLUMETRIC HEAT CAPACITY
*-----1-----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-----1-----
* 001-006 LEVEL CALCULATORS
*-----1-----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    620010000
* 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		RVDCVLBK	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-----1-----1-----1-----1-----					
* 061-072 PRIMARY SYSTEM MASS CALCULATOR					
*-----1-----1-----1-----1-----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 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	
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	

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			





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-----1-----1-----1-----  
 \* SINGLE PHASE HEAD CURVES

\* HEAD CURVE NO. 1

\*-----1-----1-----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

\* HEAD CURVE NO. 2

\*-----1-----1-----1-----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

\* HEAD CURVE NO. 3

\*-----1-----1-----1-----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

\* HEAD CURVE NO. 4

\*-----1-----1-----1-----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

\* HEAD CURVE NO. 5

\*-----1-----1-----1-----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	2.768000E-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-----1-----		
* HEAD CURVE NO. 6		
*-----1-----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-----1-----		
* HEAD CURVE NO. 7		
*-----1-----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-----1-----		
* HEAD CURVE NO. 8		
*-----1-----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-----1-----		
* SINGLE PHASE TORQUE DATA		
*-----1-----1-----1-----1-----1-----1-----1-----		
* TORQUE CURVE NO. 1		
*-----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	5.952000E-01	8.331000E-01
1351905	7.978200E-01	9.229000E-01
1351906	1.000000E+00	1.000000E+00
*-----1-----1-----1-----1-----1-----1-----1-----		
* TORQUE CURVE NO. 2		
*-----1-----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	6.065940E-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-----

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-----1-----1-----		
* TWO - PHASE MULTIPLIER DATA FROM L3-6 TEST DATA		
*-----1-----1-----1-----1-----1-----1-----1-----1-----		
* HEAD CURVE		
*-----1-----1-----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-----1-----1-----		
* TORQUE CURVE		
*-----1-----1-----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-----1-----1-----		
* PUMP 2-PHASE DIFFERENCE DATA		
*-----1-----1-----1-----1-----1-----1-----1-----1-----		
* HEAD CURVE NO. 1		
*-----1-----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-----1-----1-----		
* HEAD CURVE NO. 2		
*-----1-----1-----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-----1-----1-----		
* HEAD CURVE NO. 3		
*-----1-----1-----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
*----	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-----1-----1-----1-----
* TORQUE CURVE NO. 8
*-----1-----1-----1-----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-----1-----1-----1-----
* SINGLE PHASE HEAD CURVES
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* HEAD CURVE NO. 1
*-----1-----1-----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-----1-----1-----1-----
* HEAD CURVE NO. 2
*-----1-----1-----1-----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-----1-----1-----1-----
* HEAD CURVE NO. 3
*-----1-----1-----1-----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-----1-----1-----1-----
* HEAD CURVE NO. 4
*-----1-----1-----1-----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	5.952000E-01	8.331000E-01

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	4.877000E-01
1652410	1.000000E+00	3.569000E-01
*----	1-----1-----	1-----1-----1-----1-----
* TORQUE CURVE NO. 7		

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*-----1-----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

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-----1-----
* TORQUE CURVE NO. 7
*-----1-----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-----1-----
* TORQUE CURVE NO. 8
*-----1-----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-----1-----
* PRIMARY COOLANT PUMP SPEED CONTROLLERS
*-----1-----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-----1-----
* PRESSURIZER SPRAY VALVE CONTROLLER
*-----1-----1-----1-----1-----1-----1-----1-----
*-----1-----1-----1-----1-----1-----1-----1-----
* SPRAY LINE
*-----1-----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-----1-----
* SPRAY VALVE
*-----1-----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-----1-----
* PRESSURIZER HEATERS IN INITIALIZATION
*-----1-----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-----1-----
* PRESSURIZER HEATERS
*-----1-----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-----1-----1-----							
* PRESSURIZER CYCLING HEATERS							
*-----1-----1-----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-----1-----1-----							
* PRESSURIZER BACKUP HEATERS							
*-----1-----1-----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-----1-----1-----							
* PRESSURIZER LEVEL CONTROL USING CHARGING AND LETDOWN COMPONENTS							
*-----1-----1-----1-----1-----1-----1-----1-----1-----							
* MODIFY PZR LEVEL CONTROL VARIABLE							
*-----1-----1-----1-----1-----1-----1-----1-----1-----							
20500206		0.1249	VOIDF	415060000			
20500207		0.02477	VOIDF	420010000			
20500208		0.02477	VOIDF	420020000			
*-----1-----1-----1-----1-----1-----1-----1-----1-----							
* CHARGING RESERVIOR							
*-----1-----1-----1-----1-----1-----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-----1-----1-----1-----1-----1-----							
* CHARGING VALVE							
*-----1-----1-----1-----1-----1-----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-----1-----1-----1-----1-----1-----							
* CHARGING VALVE POSITION CALCULATOR							
*-----1-----1-----1-----1-----1-----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-----1-----1-----1-----1-----1-----							
* LETDOWN SINK							
*-----1-----1-----1-----1-----1-----1-----1-----1-----							
9900000	"LTDWN SINK"		TMDPVOL				



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			

```

*-----1-----1-----1-----1-----1-----1-----1-----
* SIMPLIFIED FEED SYSTEM CONTROLLER
*-----1-----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-----1-----
* REPLACE REACTOR POWER TABLE
*-----1-----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-----1-----
* REPLACE TRIPS FOR STEADY STATE
*-----1-----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

```



APPENDIX C A base case input deck for a transient calculation

```

/JOB
L25BTR4,T5000.
/USER
ATTACH,RSTIN=L25SR.
ATTACH,STH2XT,RE364BX.
FILE,RSTIN,SBF=NO.
FILE,RSTPLT,SBF=NO.
DEFINE,PLOTFL=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-----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-----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-----1-----1-----1-----
* RENODALIZE PUMP1
*-----1-----1-----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 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 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-----1-----1-----1-----
*
* PUMP DATA
*
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* SINGLE PHASE HEAD CURVES
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----
* HEAD CURVE NO. 1
*-----1-----1-----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-----1-----1-----1-----
* HEAD CURVE NO. 2

```

```

*-----1-----1-----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-----1-----1-----

```

\* HEAD CURVE NO. 3

```

*-----1-----1-----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-----1-----1-----

```

\* HEAD CURVE NO. 4

```

*-----1-----1-----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-----1-----1-----

```

\* HEAD CURVE NO. 5

```

*-----1-----1-----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 2.768000E-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-----1-----1-----

```

\* HEAD CURVE NO. 6

```

*-----1-----1-----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-----1-----1-----

```

\* HEAD CURVE NO. 7

```

*-----1-----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-----1-----
* HEAD CURVE NO. 8
*-----1-----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-----1-----
* SINGLE PHASE TORQUE DATA
*-----1-----1-----1-----1-----1-----1-----1-----
* TORQUE CURVE NO. 1
*-----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-----1-----
* TORQUE CURVE NO. 2
*-----1-----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 6.065940E-01
1352006 8.672300E-01 7.436600E-01
1352007 1.000000E+00 1.000000E+00
*-----1-----1-----1-----1-----1-----1-----1-----
* TORQUE CURVE NO. 3
*-----1-----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-----1-----
* TORQUE CURVE NO. 4
*-----1-----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-----
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-----1-----1-----
* TORQUE CURVE
*-----1-----1-----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-----1-----1-----
* PUMP 2-PHASE DIFFERENCE DATA
*-----1-----1-----1-----1-----1-----1-----1-----1-----
* HEAD CURVE NO. 1
*-----1-----1-----1-----1-----1-----1-----1-----1-----
1354100  1
1354101  0.000000E+00      1.000000E+00
1354102  1.000000E+00      1.000000E+00
*-----1-----1-----1-----1-----1-----1-----1-----1-----
* HEAD CURVE NO. 2
*-----1-----1-----1-----1-----1-----1-----1-----1-----
1354200  1
1354201  0.000000E+00      1.000000E+00
1354202  1.000000E+00      1.000000E+00
*-----1-----1-----1-----1-----1-----1-----1-----1-----
* HEAD CURVE NO. 3
*-----1-----1-----1-----1-----1-----1-----1-----1-----
1354300  1
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-----1-----1-----
* HEAD CURVE NO. 4
*-----1-----1-----1-----1-----1-----1-----1-----1-----
1354400  1
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-----1-----
* HEAD CURVE NO. 5
*-----1-----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-----1-----
* HEAD CURVE NO. 6
*-----1-----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-----1-----
* HEAD CURVE NO. 7
*-----1-----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-----1-----
* HEAD CURVE NO. 8
*-----1-----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-----1-----
* TORQUE CURVE NO. 1
*-----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-----1-----
* TORQUE CURVE NO. 2
*-----1-----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-----1-----
* TORQUE CURVE NO. 3
*-----1-----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-----1-----

```

```

* TORQUE CURVE NO. 4
*-----1-----1-----1-----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-----1-----1-----1-----
* TORQUE CURVE NO. 5
*-----1-----1-----1-----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-----1-----1-----1-----
* TORQUE CURVE NO. 6
*-----1-----1-----1-----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-----1-----1-----1-----
* TORQUE CURVE NO. 7
*-----1-----1-----1-----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-----1-----1-----1-----
* TORQUE CURVE NO. 8
*-----1-----1-----1-----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-----1-----1-----1-----
* RENODALIZE PUMP 2
*-----1-----1-----1-----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

```

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-----1-----1-----1-----									
* REMOVE SPRAY LINE, SPRAY VALVE, AND CALCULATOR									
*-----1-----1-----1-----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-----1-----1-----1-----									
* RENODALIZE PRESSURIZER MASS CALCULATOR									
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----									
20507000	PZRMAS	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-----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 COMPONENTS									
*-----1-----1-----1-----1-----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-----1-----1-----1-----									
* REMOVE PRESSURIZER LEVEL CONTROLLERS, CHARGING COMPONENT, AND									
* LETDOWN COMPONENT									
*-----1-----1-----1-----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-----1-----1-----1-----									
* REMOVE STEAM VALVE CONTROLLER									
*-----1-----1-----1-----1-----1-----1-----1-----1-----1-----									

5400000	"CV-P4-10 "	VALVE							
5400101	530010000	541000000	0.0047772	0.0	0.0	0.0	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-----1-----									
* REMOVE FEED SYSTEM CONTROLLER									
*-----1-----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-----1-----									
* 900 REACTOR POWER VS TIME AFTER SCRAM									
*-----1-----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-----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:ACCORDINGTO1EXP.DAT.REP. L2-5									
0000512	TIME	0	GE	NULL	0	0.94	L		
* HPIS ON									

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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-----1-----
* RENODALIZE DEAD END OF FUEL MODULES
*-----1-----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-----1-----
* MINOR EDIT VARIABLES
*-----1-----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 HTEMP  002100501
0000309 HTEMP  002100110
0000310 HTEMP  002100410
0000311 HTEMP  002100510
0000312 HTEMP  002100810
0000313 HTEMP  002101010
0000314 HTEMP  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 HTEMP  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

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0000356 MELOWJ 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 HTEMP 001100110
0000367 HTEMP 001100410
0000368 HTEMP 001100510
0000369 HTEMP 001100810
0000370 HTEMP 001101010
0000371 HTEMP 001101110
*-----1-----1-----1-----1-----1-----1-----1-----1-----
*-----1-----1-----1-----1-----1-----1-----1-----1-----
*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*$$*
*
* ACCUMULATOR, TRIPS, AND CONTROL VARIABLE
*
*-----1-----1-----1-----1-----1-----1-----1-----1-----
* ACCUMULATOR VALVE TRIPS
*-----1-----1-----1-----1-----1-----1-----1-----1-----
0000579 MELOWJ 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-----1-----1-----
* ACCUMULATOR LEVEL CONTROL VARIABLE
*-----1-----1-----1-----1-----1-----1-----1-----1-----
20500400 ACCMLVL INTEGRAL -6.549E-3 2.10 0
20500401 VELFJ 610000000
*-----1-----1-----1-----1-----1-----1-----1-----1-----
* ECC CHECK VALVE
*-----1-----1-----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-----1-----1-----
* ECCS HEADER TO PCS
*-----1-----1-----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-----1-----1-----
* ACCUMULATOR VALVE
*-----1-----1-----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-----1-----1-----
* ACCUMULATOR PIPE
*-----1-----1-----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-----1-----							
* ACCUMULATOR VESSEL							
*-----1-----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-----1-----							
*							
* RENODALIZE REACTOR VESSEL							
*							
*-----1-----1-----1-----1-----1-----1-----1-----							
* ACTIVE CORE							
*-----1-----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

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-----1-----1-----

\* LOWER CORE SUPPORT STRUCTURE

\*-----1-----1-----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-----1-----1-----

\* UPPER HEAD

\*-----1-----1-----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-----1-----1-----

\* UPPER FLOW SKIRT REGION

\*-----1-----1-----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-----1-----1-----

\* UPPER END BOXES AND SUPPORT STRUCTURE

\*-----1-----1-----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	



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						
*----	1-----	1-----	1-----	1-----	1-----	1-----
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						
*----	1-----	1-----	1-----	1-----	1-----	1-----
8050202	0.5	2.0+5	1.0			
8050203	20.0	2.9+5	1.0			

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-----1-----1-----			
* ZIRCALOY-4 - THERMAL CONDUCTIVITY		FROM MATPRO	
*-----1-----1-----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-----1-----1-----			
* ZIRCALOY-4 - VOLUMETRIC HEAT CAPACITY		FROM MATPRO	
*-----1-----1-----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-----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	

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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 HTEMP 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 HTEMP 001100110
20307100 HTEMP 001100410
20307200 HTEMP 001100510
20307300 HTEMP 001100810
20307400 HTEMP 001101010
20307500 HTEMP 001101110
20307600 CPUTIME 0
20307700 CNTRLVAR 81
* $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ * $ *
*
* CONTROL VARIABLES
*
* ----1----1----1----1----1----1----1----1----
* 001-006 LEVEL CALCULATORS
* ----1----1----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

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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-----1-----1-----1-----1-----					
* 060-072 PRIMARY SYSTEM MASS CALCULATOR					
*-----1-----1-----1-----1-----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	ILHLMAS	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	SGPRIMAS	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	PMPSUMAS	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	ILCLMAS	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	
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		0.083595	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	
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					
*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	TOINEL	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	TOBREL	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		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 DIIRECTIVE
*****
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=REL361L.
GTR,RELAP5I,ADD.REL/*
*DEFINE,RELAP50=RE364TL.
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.
REL,EC=200.
DEFINE,RE364TX.
SEGLOAD,I=R5SEG,B=RE364TX.
LDSET,LIB=RELAP50/ENVRL.
LDSET,PRESETA=NGINDEF,ERR=NONE,MAP=SB.
LDSET,STAT=RSTIN.
LIBLOAD,ENVRL,$HDR=$.
LIBLOAD,FTN5LIB,$FERCAP.$,$RPVCAP.$,$FTNRP2.$,$Q2NTRY.$
NOGO.
RETURN,RELAP50,ENVRL,COMPILE.
SKIP,KKK.
EXIT.
ENDIF,KKK.
DAYFILE,KMRRDAY.
REPLACE,KMRRDAY.
/EOR
*COMPILE DEFINE
*ID CBD3604
*D DMK3601.484
*D PLOTMD.24

```

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901 FORMAT ('OPL0TEL 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.CARAHHER 20MAY87
*/       FIX ONLY CDC-VERSION CODING
*D IHTCMP.1041
    L=(.NOT.MASK(43).AND.IHTPTR(J))+FILNDX(8)
*/
*/       UPDATE ROUTINE IRELHT 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 IRELHT IS NOW PROGRAMMED
*/
*COMPILE IRELHT
*I IRELHT.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)
    IGLREL(I)=(MASK(43).AND.IGLREL(I)).OR.NCOLS
*/
*/       END OF UPDATES SKI01
*/
*/       START OF PSI UPDATE
*/

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*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(INDX)-TEMPF(INDX)))
HCBR=AMAX1(HTV2(INDZ),(CONVAP*TERM1*TERM2*((SATHG(INDX)-SATHG(INDX)))
*D QFHTRC.179
1/AMAX1(TMPBDY-SATT(INDX),0.01)+0.68*CSUBPG(INDX))*9.81/(2.*3.14159)
*D QFHTRC.180
2 *SQRT(9.81*TERM1/SIGMA(INDX))/VISCG(INDX)**0.25*0.62*FACBR)
VELD=AMAX1(VELG(INDX)-VELF(INDX),0.001)
DDROP=3.*SIGMA(INDX)/(RHOG(INDX)*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(INDX)*AMAX1(TMPBDY-SATT(INDX),0.0001)
1 /AMAX1(SATHG(INDX)-SATHE(INDX),0.01))**3.
HCF0=0.4*3.14159/4.*(6.*(1.-VOIDG(INDX))/3.14159)**0.6666667

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1      *(9.81*RHOF(IDX)*RHOG(IDX)*AMAX1(SATHG(IDX)-SATHF(IDX),0.01)
2      *TERM5*CONVAP/(AMAX1(TMPBDY-TEMPF(IDX),0.0001)*VISCQ(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)*VISCQ(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)

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*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.OE-7 IN SUBROUTINE PHAINT
*/
*DELETE,PHAINT.200
    DSTAR(I) =DIAMV(I)*SQRT(9.8*RHOFG/AMAX1(SIGMA(I),1.OE-7))
*DELETE,PHAINT.326
    55 VCRIT=2.5*SQRT(SQRT(AMAX1(SIGMA(I),1.OE-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

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401 IF(XE.GE.XEC)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))

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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
```





**BIBLIOGRAPHIC DATA SHEET**

*(See instructions on the reverse)*

1. REPORT NUMBER  
(Assigned by NRC. Add Vol., Supp., Rev.,  
and Addendum Numbers, if any.)

NUREG/1A-0032

2. TITLE AND SUBTITLE

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

3. DATE REPORT PUBLISHED

MONTH | YEAR

April | 1990

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

Young Seok Bang  
Sang Yong Lee  
Hho Jung Kim

6. TYPE OF REPORT

Technical

7. PERIOD COVERED (Inclusive Dates)

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

Korea Nuclear Safety Center  
Korea Advanced Energy Research Institute  
P.O. Box 7, Daeduk-Danji  
Daejon - Korea

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

10. SUPPLEMENTARY NOTES

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.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

Simulation of the LOFT L2-5 LBLOCA Experiment Using the  
RELAP5/MOD2 Cycle 36.04 Code

13. AVAILABILITY STATEMENT

Unlimited

14. SECURITY CLASSIFICATION

(This Page)

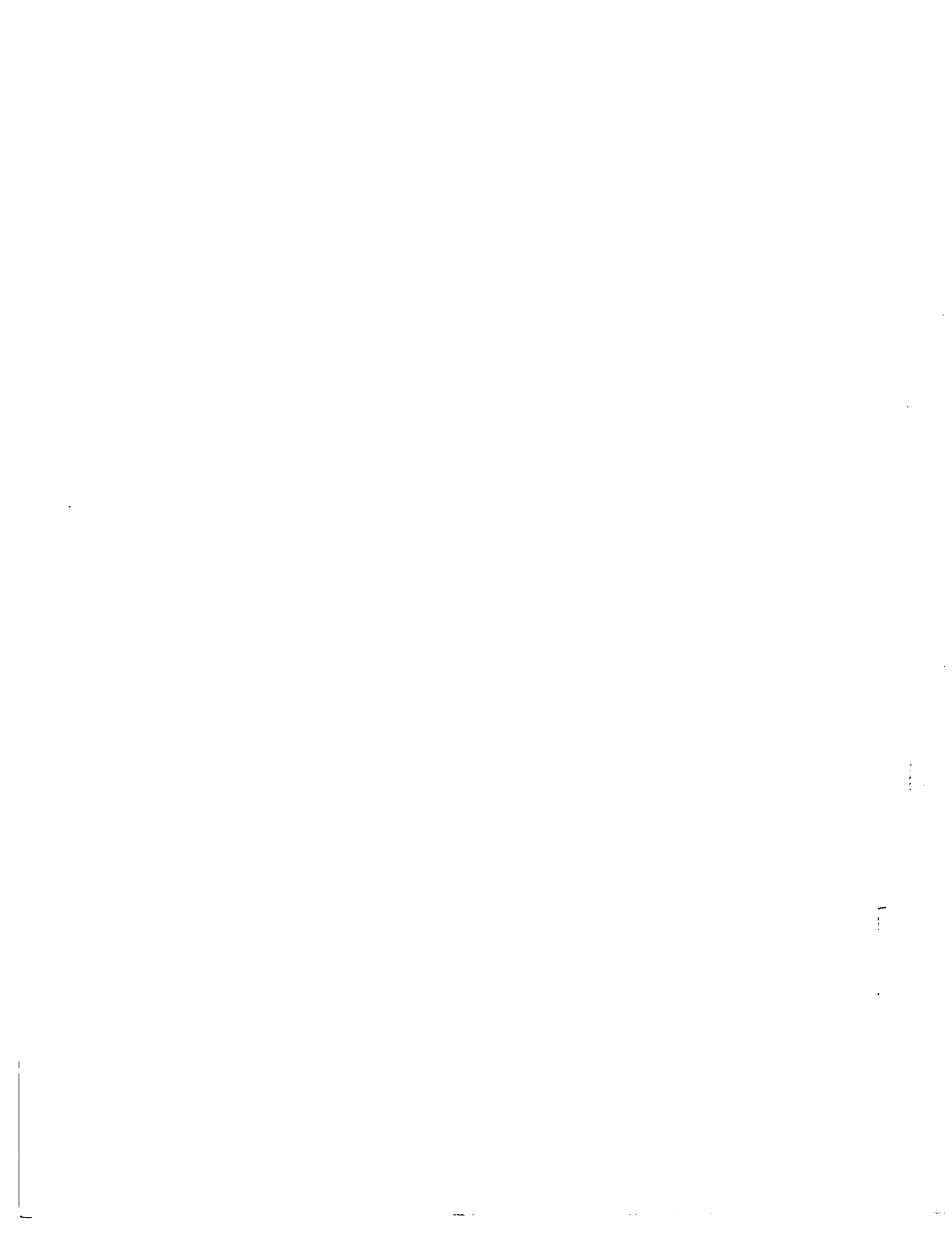
Unclassified

(This Report)

Unclassified

15. NUMBER OF PAGES

16. PRICE





**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555**

**OFFICIAL BUSINESS  
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