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RELAP5 Assessment Using Semiscale SBLOCA Test S–NH–1

Prepared by
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Office of Nuclear Regulatory Research
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Prepared as part of
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under the International Thermal-Hydraulic Code Assessment
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RELAP5 ASSESSMENT USING SEMISCALE SBLOCA TEST S-NH-1

Abstract

2-inch cold leg break test S-NH-1, conducted at the 1/1705 volume scaled facility Semiscale, was analyzed using RELAP5/MOD2 Cycle 36.04 and MOD3 Version 5m5. Loss of HPIS was assumed, and reactor trip occurred on a low PZR pressure signal (13.1 MPa), and pumps began an unpowered coastdown on SI signal (12.5 MPa). The system was recovered by opening ADV's when the PCT became higher than 811 K. Accumulator was finally injected into the system when the primary system pressure was less than 4.0 MPa. The experiment was terminated when the pressure reached the LPIS actuation set point.

RELAP5/MOD2 analysis demonstrated its capability to predict, with a sufficient accuracy, the main phenomena occurring in the depressurization transient, both from a qualitative and quantitative points of view. Nevertheless, several differences were noted regarding the break flow rate and inventory distribution due to deficiencies in two-phase choked flow model, horizontal stratification interfacial drag, and a CCFL model. The main reason for the core to remain nearly fully covered with the liquid was the under-prediction of the break flow by the code.

Several sensitivity calculations were tried using the MOD2 to improve the results by using the different options of break flow modeling(downward, homogeneous, and area increase). The break area compensating concept based on "the integrated break flow matching" gave the best results than downward junction and homogeneous options. And the MOD3 showed improvement in predicting a CCFL in SG and a heatup in the core.

Executive Summary

The Semiscale SBLOCA test S-NH-1 has been analyzed using the RELAP5/MOD2 Cycle 36.04 and MOD3 Version 5m5 to validate its applicability to 0.5 % cold leg break sequence with HPIS unavailable. The objective of the calculation was to improve physical understanding and to identify areas of desirable code model improvements based on comparisons between data and predictions. The main goal of the base case calculation was to assess the simulation capability for the following phenomena during three different phases of sequence:

- top-down drain of coolant in the primary system;
- stratified two-phase flow in horizontal legs;
- loop seal clearing and associated temporary core liquid depression with liquid holdup in steam generator primary side leading to core heatup;
- quick core level recovery after loop seal clearing;
- vessel inventory boiling leading to second core uncovery;
- core reflooding due to accumulator injection.

The base calculation predicted the top-down drain and the cyclic loop seal formation and clearance. However, subcooled break flow was overestimated while the vapor phase break flow was quite underestimated. It finally influenced the time of core uncovery and, therefore, the depressurization rate along with the timing of injection governed the flooding rate of the core by the accumulator.

Thus, sensitivity studies regarding different options for the break (downward junction, homogeneous option, and area compensated one) were motivated to investigate their effects on the T/H results. Among them, the area compensated one, which increased the break area by 17 % to match the boundary condition based on the integrated break flow, gave the best results among all the cases. A downward junction model improved the density and the break flow predictions in early boil-off phase, but not much in the later two-phase and recovery phase after accumulator injection. The improper coding of the interfacial drag in the horizontal stratification regime caused the liquid slug to move from the cold leg not into the break but into the downcomer. The liquid filled downcomer prevented the core from heating up. Also, the liquid holdup experimentally observed in the primary side of the steam generator was not predicted by the RELAP5/MOD2 due to the deficiencies of the CCFL models. These deficiencies overally contributed to predicting inventory mass distribution inaccuratly. A homogeneous option reduced the oscillation of cold leg density. However, the above two options could not predict a heatup because the downcomer was still covered with the liquid slug. However, MOD3 modeling was able to predict the CCFL phenomena in steam generator primary side and the heatup in the core.

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List of Tables

Table 1 Major Design Comparisons of Semiscale and PWR..... 25

Table 2 Comparison of Initial Conditions 26

Table 3 Chronology of Main Events 27

Table 4 Sensitivity Study Matrix 27

List of Figures

Fig. 1 Semiscale Mod-2C..... 29

Fig. 2 Nodalization of Semiscale S-NH-1..... 30

Fig. 3 Break Flow Rate..... 31

Fig. 4 Integrated Break Flow..... 32

Fig. 5 Upper Plenum Pressure..... 33

Fig. 6 Pressurizer Liquid Level..... 34

Fig. 7 Pressurizer Pressure..... 35

Fig. 8 Core Thermal Power..... 36

Fig. 9 ILCL Flowrate..... 37

Fig. 10 BLCL Flowrate..... 38

Fig. 11 IL Feed Flowrate..... 39

Fig. 12 BL Feed Flowrate..... 40

Fig. 13 IL SG Pressure..... 41

Fig. 14 BL SG Pressure..... 42

Fig. 15 Density BLCL..... 43

Fig. 16 IL SG Level..... 44

Fig. 17 BL SG Level..... 45

Fig. 18 DC Liquid Level..... 46

Fig. 19 Vessel Liquid Level..... 47

Fig. 20 Peak Cladding Temperature..... 48

Fig. 21 Intact Loop S/G ADV Relief Flow..... 49

Fig. 22 Broken Loop S/G ADV Relief Flow..... 50

Fig. 23 Intact Loop Accumulator Injection Flow..... 51

Fig. 24 Broken Loop Accumulator Injection Flow..... 52

Fig. 25 MOD3 BLSG Primary Side Liquid Level..... 53

Fig. 26 MOD3 PCT..... 54

Fig. 27 Downcomer Flow rate..... 55

Fig. 28 Time Step Size..... 56

Fig. 29 CPU Time..... 57

List of Contents

Abstract iii

Executive Summary v

Acknowledgment vii

List of Tables viii

List of Figures ix

1. Introduction 1

2. Facility and Test Description 4

3. RELAP5 Modelling Description..... 6

4. Comparisons of Calculations to Measurements..... 8

4.1 Blowdown Phase..... 10

4.2 Core Boiloff Phase..... 12

4.3 Recovery Phase..... 17

5. Run Statistics 19

6. Conclusions 20

References 23

Tables..... 25

Figures..... 29

Appendix

1. Introduction

The International Code Assessment and Application Program (ICAP) has been conducted by fourteen nations under the auspices of the USNRC[1]. For the pressurized water reactor analysis, the USNRC selected two Best Estimate (BE) codes: RELAP5/MOD2 and MOD3 and TRAC/PF1/MOD1 and MOD2. The objective of the ICAP is to provide assessment of the major thermal-hydraulic computer codes against various experimental data and to provide input to code improvement and user guideline enhancement [2]. In addition, the ICAP has an objective of providing the necessary data base for the qualitative characterization of computer codes as applied in a best-estimate fashion to hypothetical accident scenarios.

As a part of the Korean contribution to the ICAP, this report included the results and conclusions of assessment studies involving comparisons between Semiscale Test S-NH-1 data and RELAP5/MOD2 [3] code calculations on a Cyber 170-875 and MOD3 on a Cray-2S. S-NH-1 simulated a small break loss-of-coolant accident (LOCA) event with a break size of 0.5 %, which is equivalent to a 2 inch break of a typical 27.5 inch Pressurized Water Reactor (PWR) cold leg. RELAP5/MOD2 is an advanced, one dimensional, thermal hydraulic computer code used to calculate reactor transient response. Three major deficiencies (critical flow, critica heat flux, and interfacial drag models) have been identified through MOD2 assessment. A MOD3 calculation [4] on a CRAY-2S showed improvements in CCFL in the steam generator primary riser side.

Test S-NH-1 [5],[6] was designed to investigate a small break LOCA with a concurrent failure of high-pressure injection and to look into specified recoveries to mitigate core temperature excursions. Data from S-NH-1 were used to assess the effectiveness of the code in calculating system response to various operator actions taken to mitigate a core heatup. The test assumed a total loss of the high pressure injection system (HPIS) when a break occurred. Without HPIS, operator action would be required to reduce the primary pressure to accumulator set points prior to a heater rod temperature excursion. The Version of the MOD-2 code used in this calculation was Cycle 36.04 with minor modification by Seeberger [7]. A recent assessment of RELAP5/MOD2 against S-NH-1 was done by Yuann [8] who pointed out the deficiencies of the code such as underpredicting break flow, overpredcting interfacial drag, and a delayed core heatup time due to overestimated mass inventory. The Yuann's report contains a description of the test and the RELAP5/MOD2 modeling approaches employed in the calculation.

The main goal of the calculation is the assessment of the code with respect to the simulation capability of the following phenomena occurring during a small break LOCA experiment:

- top-down drain of coolant in the primary system;
- stratified two-phase flow in horizontal legs;
- loop seal clearing and associated temporary core liquid depression, with liquid holdup in SG primary side, leading to core heatup;

- quick core level recovery after loop seal clearing;
- vessel inventory boiling leading to second core uncovery;
- core reflooding due to accumulator injection.

The report describes the results of the calculation performed by the RELAP5/MOD2 and MOD3 code and shows the comparisons of the calculation results with the main variables obtained in the experiment. A brief description of the Semiscale facility and S-NH-1 test is provided in Section 2, and the features of the RELAP5 code and modelling is provided in Section 3. Section 4 discusses the results of the base calculation with the RELAP5/MOD2. The reasons for sensitivity and nodalization studies and their results are also included in Section 4. Four sensitivity calculations were done for downward flow, homogeneous flow, and an increased break area in addition to MOD3 calculation. The code efficiency is evaluated in Section 5 by examining the run statistics. The conclusions drawn from this study are given in Section 6.

2. Facility and Test Description

The Semiscale Mod-2C system is a scaled, two-loop representation of a pressurized water reactor (PWR), with a fluid volume and a core power of about 1/1705 of a full sized PWR. Geometric similarities of component layout have been maintained between the Semiscale system and a PWR, as shown in Figure 1 and Table 1. The Semiscale Mod-2C system consists of a pressure vessel with simulated reactor internals and electrically heated fuel rods and an external downcomer. The intact loop simulates three unaffected loops of a four loop PWR, and the broken loop simulates an affected loop in which a small break is assumed to occur. The unique feature of the Mod-2C system is the installation of Type III steam generator which has an external downcomer to allow gamma densitometers to measure the riser density. The unaffected loop steam generator consists of six inverted U-tubes. The outside diameter of the U-tubes is 0.0222 m, which is similar to the outside diameter of typical PWR steam generator U-tubes (about 0.018 m). The reactor internals consist of a 5X5 array of internally heated electric rods of which 23 are powered. The rods are geometrically similar to nuclear fuel rods, with a heated length of 3.66 m and an outside diameter of 0.011 m. External heaters were wrapped in a relatively uniform manner on the vessel, downcomer, pressurizer, and primary loop piping to offset environmental heat losses.

Test S-NH-1 was conducted in the Semiscale Mod-2C system. The S-NH-1 test represents a 0.5 % centerline pipe break between the broken loop pump and the vessel. The break was simulated by an orifice that has a scaled area equivalent to a 0.051 m (2 inch) diameter break in a PWR. The break was initiated at 0 s, and complete loss of HPIS was assumed to occur. The core scram, primary coolant pump trip, auxiliary feedwater flow initiation, and main steam isolation valve (MSIV) isolation all automatically occurred after the low pressurizer pressure signal was reached. The core power decreased to ANS decay heat corresponding to 3 s after the scram signal was initiated to simulate the control rod drop time. An operator induced recovery was initiated at a peak cladding temperature of 811 K, at which time the steam generator atmospheric dump valves (ADV) in both loops were latched open at 2630 s in experiment. Auxiliary feedwater flow was continued to maintain the secondary level between 9 and 10 m. The steam generator ADVs were cyclically closed and opened when the steam generator level was at 2 and 4 m, respectively. Accumulator injection flow was terminated when the primary system pressure exceeded 4.2 MPa, or when the accumulator emptied. The test was terminated when the pressurizer pressure dropped to 1.38 MPa, which is the nominal low pressure injection (LPIS) set point. No LPIS was used for S-NH-1.

3. RELAP5 Modelling Description

The RELAP5/MOD2 code is an advanced, one dimensional, system analysis computer code developed at the INEL for the U.S. Nuclear Regulatory Commision, Office of Nuclear Reactor Safety Research. Cycle 36.04 of the RELAP5/MOD2 code was used for the assessment studies. The Semiscale Mod-2C input model is represented by the nodalization diagram shown in Figure 2. It consists of 181 hydrodynamic volumes and 256 heat structures. Steam generator secondary sides, emergency core cooling system (ECCS) injection systems, vessel and piping external heaters, and system environmental heat loss were all modeled in detail. Also, a chopped cosine for the core axial power profile was modeled by 12 consecutive heat structures. The non-equilibrium option was applied to all hydrodynamic volumes and junctions except the pump discharge, where the one-velocity, gas-liquid equilibrium momentum equation was used. Modeling concept for MOD3 basically came from the one used for ISP-26 assessment with LSTF [15].

0.5 % break was modeled by 1.23 mm(0.047 inch) nozzle diameter,and a normal, non-homogenous, abrupt and choking option were used for the model. Discharge coefficients, 0.9 and 1.2 were applied to the RELAP5 critical flow model at the break to compensate the overprediction in subcooled and underprediction in two-phase region, respectively. A sensitivity calculation was proposed to increase the nozzle diameter because the code underpredicted the break flow in the overall transient. Operator actions involving the secondary coolant system were modeled with feed and bleed operation using trips and controls.

The RCS auxiliary feed pump was assumed to be on for about 30 min starting at 1 min after scram to simulate the automatic initiation of auxiliary feed for a large PWR, and later an atmospheric dump valve (ADV) was assumed to open, as recovery procedure for bleeding. A PCT higher than 811 K actuated the signal to open ADV.

The vessel and piping external heaters were modeled mechanistically in RELAP5, and the measured power was an input as a boundary condition. The measured core power and normalized pump coastdown speed were also input as boundary condition. Normally, the HPIS flow rates were input as a function of primary system pressure, but not used in this calculation because the HPIS was disabled for the S-NH-1 test.

Desired steady-state initialization was achieved by adjusting the steam generator secondary pressure using control systems to achieve the desired primary cold leg temperature. The results are shown in Table 1 for Test S-NH-1. The calculated and measured initial conditions were compared well with a few exceptions. These exceptions are due to the adjustment of the steam generator pressure[12].

4. Comparisons of Calculations to Measurements

During a small break loss of coolant accident,the primary coolant inventory loss will continue until the break flow rate decreases sufficiently, due to break uncovery or primary system depressurization to allow the emergency core cooling system to make up the coolant loss. Such coolant inventory depletion will involve concurrent liquid level depressions in the downflow side of the cross-over leg , for each loop, and in the vessel riser section (upper plenum and core). Meanwhile, the upflow side of the cross-over leg, cold leg and downcomer will remain liquid filled up to the break elevation. The core level depressions will continue until the downflow-side level of the cross-over leg reaches to the bottom of the legs and thus allows the vapor to clear the liquid seal in the cross-over legs toward the break. When this liquid clearing (loop seal clearing) initiates, the core liquid level starts to recover. This occurs because the vapor can now reach the downcomer and eliminates a back pressure to allow the downcomer liquid to go into the core region[8].

In the present study the RELAP5/MOD2 Cycle 36.04 code was used for the base calculations, and their results are shown in Figures 3 to 29. Figures 25 and 26 show the improved results obtained from MOD3 version 5m5 as a sensitivity calculation. The major initial conditions, as shown in Table 2, and the sequence of events, summarized in Table 3, are compared with the experiment. The calculated steady-state parameters are in good agreement with the corresponding measured values except the temperature rise in the core between inlet and outlet.

The input listing for the base calculations is attached in Appendix. Included in this subsection is a comparison of the calculated results with measured data. Hydraulic behavior can be explained primarily with discharge flow rate, depressurization rate, external ECCS flow, system mass inventory and finally core mixture level. Thermal behavior, then, can be described with the core thermal power, S/G secondary modelling, core void and PCT. Figure 3 shows the break discharge flow rate while Figure 4 depicts the integrated break flow. Figure 5 also shows the depressurization rate of primary system, which characterizes the overall system T/H transient.

Comparisons were made in three different phases:1) the blowdown phase, 2) the primary boiling and core heatup phase and 3) the recovery phase. The first phase was defined for a time interval from 0 to 150 seconds as the pressurizer level decreased to zero, the second phase for a time interval from 150 to 3000 seconds as the core starts to boil and heat up and the third phase for a time interval from 3000 to 5000 seconds as the system is recovered from the actuation of ADV valves and accumulator valves. The assessment parameters are listed in Table 4.

4.1 Blowdown phase (0 to 150 s)

The initiating event in the S-NH-1 test was the opening of the blowdown valve in the broken loop between the pump and vessel. After the break was opened, break flow was first characterized as subcooled critical flow, followed by saturated liquid blowdown and finally two-phase mixture blowdown. The break flow measurement system in Semiscale [12] is subject to a considerable lag time due to the distance between the break plane and the catch tank. Therefore, a direct comparison between the measured and calculated break flow is not meaningful during the early blowdown phase.

However, the pressurizer interfacial liquid level is a good indication of the early water inventory loss, and it suggests good agreement between the calculation and test data as shown in Figure 6. As the pressurizer drained, a rapid depressurization of the primary system resulted as shown in Figure 7. An inflection point observed as about 50.0 s in calculation and 60.0 s in measurement. This abrupt increase in depressurization rate was caused by the pressurizer emptying and the system power trip. The more discharge flow rate, the earlier inflection point was observed.

The power trip signal in the calculation was generated at 39.9 s, which was 21 s earlier than measured. System power responses from both the measurement and calculation are shown on Figure 8. Except for the timing, good agreement can be observed. After the scram signal, the reactor coolant pumps (RCPs) coasted down and the main steam valves of both steam generators began to close.

The trend of volumetric flow rate throughout the system was correctly calculated considering 41 s pump coastdown delay, as shown in Figure 9 through 12 which show flow rates in the intact loop cold leg flowrate, broken loop cold leg, intact and broken loop feed flow rates in the steam generator.

Due to closure of the main steam valve in each steam generator, the steam generator shell side pressure rose sharply and then stabilized, as shown in Figures 13 and 14. The energy transfers from the primary system in both calculation and test are not expected to be different by significant amounts of magnitude. However, the initial stored energy in the metal mass in the steam generator and aux feed pump flow are the areas of possible differences between the test and the calculation. Another important contributor to a lower steam generator pressure was the failure of the loop main steam valve to close completely in experiment, as shown in Figures 13 and 14. As system pressure continuously decreased after the scram, the safety injection system signal was generated at 46 s in the calculation, which was 20.1 s ahead of the test.

4.2 Primary boiloff and core heatup phase (150 to 3000 s)

The period between the completion of automatic responses in the first 150 s and the initiation of the recovery phase is discussed in this subsection. This phase is characterized as a period of low depressurization rate and a boiling of primary inventory leading to core uncovery and core heatup. During this period, auxiliary feedwater flows were terminated on high water level signals in steam generators and normally assumed to operate for about 30 min in this type SBLOCA [13]. Discussion in this subsection includes the break flow response, system pressure and flow responses, primary mass distribution, and core heatup phenomena. The break flow discussion includes the results of a sensitivity study dealing with the effect of the break modeling options (downward,homogenous ,and area increase).

On an overall basis, RELAP5 undercalculates break flow, resulting in consistently more mass in the primary system throughout this period. A comparison of calculated and measured break flow rates is shown in Figure 3. It can be seen that the calculated break flow was initially higher during the phase of saturated liquid blowdown but lower in this second phase, as shown in Figure 3. The calculated transition from saturated to vapor-phase blowdown occurred at 750 s, which was 1250 s earlier than in the test indicating the crtical flow model deficiency. This is evidenced by the responses of the broken loop cold leg density, which are shown in Figure 15. The trend of the calculated break flow followed the measured break flow during the two-phase period; however, again the calculated values were lower than the data.

The total loss of primary water inventory in the calculation was almost consistently 7 kg (15.4 lbm) less than that measured, as shown in Figure 4, which yields the tendency to calculate a later core uncovery and heatup.

In general, both primary and secondary pressures were calculated to be slightly lower than the measured, as shown in Figures 5, 13 and 14. As stated before, the magnitude at which pressure stabilizes is a function of the gross energy balance. For the whole system, such a balance involves core power, external heater power and break energy, environmental heat loss, stored energy and primary-to-secondary heat transfer. The stored energy is a possible area of difference between the test and the calculation. It is probable that the stored energy of the system was not the same condition as in the calculation. Another factor that could have affected the overall energy balance, and thus the primary pressure, is the RELAP5 modeling of global heat loss for S-NH-1.

After the coolant pumps were tripped, a two-phase natural circulation flow was established during the second phase. Figure 18 shows that there was a certain amount of flow sustained in the downcommer, which terminated before the complete drainage of the intact loop steam generator. RELAP5 correctly calculated the two-phase peaking in flow with a slight shift in time. This peaking in flow is related to shifting cold leg mass inventory not into break but into downcomer and is discussed in detail in Reference [14]. The calculated primary mass distribution generally agreed with the test measurement during this phase.

Exceptions were the broken loop steam generator liquid hold-up , liquid slug movement into downcomer and not to break junction in horizontally stratified cold leg volume and the timing of events mainly caused by the difference in break flow and the unphysical liquid slug movement. For this reason, only the increased area case was able to predict the heatup while the other two options failed to predict the core heat up. The primary system void formation generally progressed from the top to down. The sequence of the system drainage was as follows: pressurizer, part of SG primary U-tube, upper vessel, hot and cold legs, pump suction, finally downcommer and core.

Figures 16 and 17 show that the steam generator U-tubes started to drain at approximately the same time as the vessel. For the broken loop, the drainage started about 1500 s earlier in the calculation. The reason for early drainage of the steam generator in the calculation is also related to differences in break flow and CCFL. Significant liquid hold-up was measured in the broken loop steam generator but not calculated by the MOD2 code. In the calculation, the broken loop steam generator was empty by 850 s. The disagreement between RELAP5 and the data could also have been caused by primary-to-secondary heat transfer differences. Even though in the data the broken loop steam generator was at a lower pressure than the calculated one possibly due to the leak, the steam generator remained as a heat sink for both the test and the calculation. Therefore, the code should have calculated condensation occurred in the primary tubes, indicating by a head of fluid rather than the 0 m level shown in Figure 17.

MOD3 with a CCFL modeling predicted the liquid holdup as in Figure 25, and this improved prediction of the liquid level such that a considerable PCT was observed as in Figure 26. Following the drainage of the steam generators, the pump suctions also started to drain. In the calculation, the drainage was completed when the upflow side of the steam generator tubes were empty. When drainage started, a sudden expulsion of water from the broken loop pump suction to the cold leg was observed in the calculation. As a result, a sudden drop of liquid level in the pump suction and a corresponding increase of cold leg density were observed. In turn, a peak of the break flow was induced (Figure 3).

After complete draining of the steam generators and partial draining of the pump suctions, the vessel and downcommer liquid levels decreased at a similar rate in both the calculation and the test, as fluid in the vessel simply boiled off(shown in Figures 18 and 19). Because of differences in draining of loop components, the boiloff of the vessel fluid started about 700 s later for the calculation than the data. With similar boiloff rates, the code showed a core heat-up about 560 s later than the data, as shown in Figure 20. A temporary turnaround in core rod temperature in the data was due to a partial broken loop suction clearing, liquid slug entrained into core rather than into break from the cold leg (Fig. 15,18,19, and 20).

Finally, the recovery setpoint [peak cladding temperature (PCT) = 811 K]was reached at 2630 s in the test, which was about 700 s earlier than in the calculation. Except for differences in event timing, caused by differences in system drain and break flow, the core temperature responses to the vessel level and the core heatup rate show good agreement between the calculation and the test. However, the energy extracted from the coolant is different indicating that system inventory was overestimated and initial stored energy would be different.

Because the primary forcing phenomenon in this transient was the break flow, a sensitivity study was performed. For the base-case study, the break flow was significantly underpredicted when the actual orifice area was used;thus, several options including downward junction and homogeneous options and 17 % increased area method was tested to compensate the underestimation and to match the break flow rate as an important boundary condition. The break flow area sensitivity study results are also shown in Figure 20. In the base-case calculation, the mass flow out the break was significantly underpredicted;and,as a result, sufficient primary system inventory was maintained to prevent a core heat-up in calculation after the observed core heat-up. The core heat-up was calculated to occur about 1000 s after the observed occurrence through the area compensating method. Clearly, among three methods, the area compensation provided the better prediction of the break mass flow during the second phase.

4.3 Recovery phase (3000 to 5000 s)

The period between initiation of recovery actions and the test termination is discussed in this section. Recovery actions consisted of latching open both steam generator ADV valves and normal accumulator injection. The recovery action was taken to increase system depressurization rate to reach accumulator and LPIS set points more quickly. Recovery was initiated when the PCT reached 811 K, which occurred at 2630 s in the test and 3300 s in the calculation. When an ADV valve on each steam generator was manually lifted, the steam flow drastically increased as shown in Figures 21 and 22. Except for the timing, the calculated and measured ADV relief flows are in good agreement in the area compensated case. As a result of ADV relief, the shell side of the steam generators depressurized quickly as in the area increased case, as shown in Figure 13 and 14. The calculated depressurization rate in each steam generator was slower than measured. In turn, a slower primary system depressurization in the calculation resulted. There are two likely causes for the difference between the calculated and actual depressurization rates in the steam generators. The first possibility is that the energy relief rates through the ADV valves were different, and the second possibility is that the stored energy and the aux feed pump flow rates were different.

As a result of a faster primary depressurization rate in the test, the accumulator injection set point [4.2 MPa] was reached earlier in the test than in the calculation. The faster depressurization rate contributed to a faster core quench as shown in Figure 20.

The accumulators injected emergency water into the vessel earlier in the test than in the calculation by about 700 s as shown in Figures 23 and 24. The timing difference was caused by different primary depressurization in both the test and the calculation. Correctly calculating accumulator injection requires correct calculation of the primary depressrization during the injection period.

The PCTs are shown in Figure 20. With less accumulator injection flow rate and the slower system depressurization in the calculation, the core was quenched faster than measured, and the difference in PCTs was about 80 K. The calculation was terminated at 5000 s as the pressure approaches LPIS pressure [1.38 MPa].

5. Run Statistics

CDC 170-875 with NOS Version 2.6.1 was used to calculate S-NH-1 using RELAP5/MOD2 Cycle 36.04. Figures 28 and 29 show the time step size and CPU time vs. the transient time in the base case calculation. The time step control cards chose the minimum and the maximum time step as 1.0E-7 and 5.0, respectively. Grind time and computational efficiency can be summarized as follows:

$$\text{Grind time, } GT = \frac{CPU}{C * DT} = \frac{5749.49}{(181)*(13962)} = 0.002275$$

where CPU: computer time

C: number of volume

DT: number of time step

6. Conclusions

The RELAP5/MOD2 Cycle 36.04 calculation correctly simulated most of the important thermal-hydraulic responses for Test S-NH-1. However, the integrated break flow was undercalculated, and thus the primary mass was greater in the calculation than in the test. To compensate this overestimated mass inventory, 17 % increased break area model was tested as well as downward junction option and homogenous option. A better result was obtained with the increased area option. The improvement implemented in MOD3 Version 5m5 was investigated to see the effect on CCFL prediction. Generally, the RELAP5/MOD3 5m5 calculation produced results qualitatively similar to the test. However, several important differences were observed resulting in the following conclusions and recommendations:

1. The calculated break flow during subcooled was overestimated but, during saturated and two-phase period, underestimeted; and, in overal, the integrated mass was 17 % underestimated at 2500 s before any external ECCS flow injected. Thus, 17 % break area increase with 0.9 and 1.2 of Cd's were used to model the correct break flow rate which lead to a better result. The code also showed a sharp transition from two-phase mixture to single phase vapor break flow probably due to the deficiency in calculating a sound speed and two-phase choking criteria at around 0.1 of void.

2. During the boil-off phase, the liquid slug was delivered from the cold leg not into the break but into the downcomer because the code has deficiency in calculating the interface drag in horizontal stratification flow regime; and it delayed the core heatup.

3. Overall mass inventory overestimated by the MOD2 did not result in the core heatup contrary to the test results; the inaccuracy of predicting the mass distribution in the loop appeared to be the main area to be improved. The improvement should include the break flow model, CCFL ,and horizontal stratification interfacial drag model.

4. The liquid hold-up and condensation observed in the broken loop steam generator during the second phase of the experiment was not predicted. A reason for excessive condensation was no CCFL model available in MOD2. MOD3 predicted the CCFL and the core heatup successfully without even considering the area increased.

References

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9. William E. Burchill, Physical Phenomena of a Small-Break Loss of Coolant Accident in a PWR, Nuclear Safety, Vol 23, No 5, Sep-Oct 1982.
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Table 1 Major Design Comparisons of Semiscale and PWR

	Semiscale Mod-2C
PWR size modelled / No of loops	3411 MWt/4
No of loops	2
Scale (volume)	1:1705
Elevation scale	1:1
Power (MW)	2
Pressure (MPa)	16
Pumps	Active
Steam generator	Active
No of heater rods &	25
size (length & dia)	3.66m/20.72mm
Downcomer	External
Broken leg dia(mm)	33.98
Intact leg dia(mm)	66.95
Break dia (mm)	1.23
No of SG tubes/	6,2
elevation scale	1:1

Table 2. Comparison of Initial Conditions

Parameters	Measured [6]	Calculated, SNHSOT
Pressurizer pressure,MPa	15.64	15.47
Core power, MW	2.00	2.01
Core DT, K	37.00	31.19
Pressurizer liquid level, cm	257.00	257.38
Loop-to-loop fluid temp difference of cold leg, K	4.20	3.13
Cold leg fluid temp, K	550.00	547.82
Primary flow rates, L/s		
Intact loop cold leg	9.10	9.10
Broken loop cold leg	3.20	3.20
Loop flow split	2.84:1	2.84:1
S.G. secondary pressures, MPa		
Intact loop	4.55	4.55
Broken loop	4.48	4.48
S.G. secondary masses, kg		
Intact loop	73	73
Broken loop	23	23
S.G. feedwater flowrates, kg/s		
Intact loop	0.82	0.84
Broken loop	0.25	0.26
S.G. feedwater temp, K	494	505

Table 3. Chronology of Main Events

Events	Specified	Measured [6]	Calculated
Cold leg break	0	0	0
P(PRZ)=13.1 MPa (1887 psig)	T=T(SCRAM)	61	39.92
Main steam valves close	T(SCRAM)	62	40.93
Core power decay initiated	T(SCRAM)+3.2	64.5	
P(PRZ)=12.51 MPa (1801 psig)	T=T(SIS)	67	46.91
Main feedwater secured	T(SIS)	68	47.92
Auxiliary feedwater started	T(SIS)	68	47.92
Reactor coolant pumps tripped	T(SIS)+2	70	48.94
S.G. ADV valves latched open	PCT=811K	2630	3330.00
Accumulator injection begun	P(PRZ)=4.22 MPa	2828	3520.00
Test terminated	P(PRZ)=1.38 MPa	5000	4000.00

Table 4. Sensitivity Study Matrix

	Case 0 (Base)	Case 1	Case 2	Case 3	Case 4
Break	Reference	Downward	Homogeneous	Area	Reference
Option	00100	20100	00110	00100	00100**
Area	12.174e-4	12.174e-4	12.174e-4	14.405e-4	12.174e-4
Code	MOD2	MOD2	MOD2	MOD2	MOD3
Computer	Cyber	Cyber	Cyber	Cyber	Cray

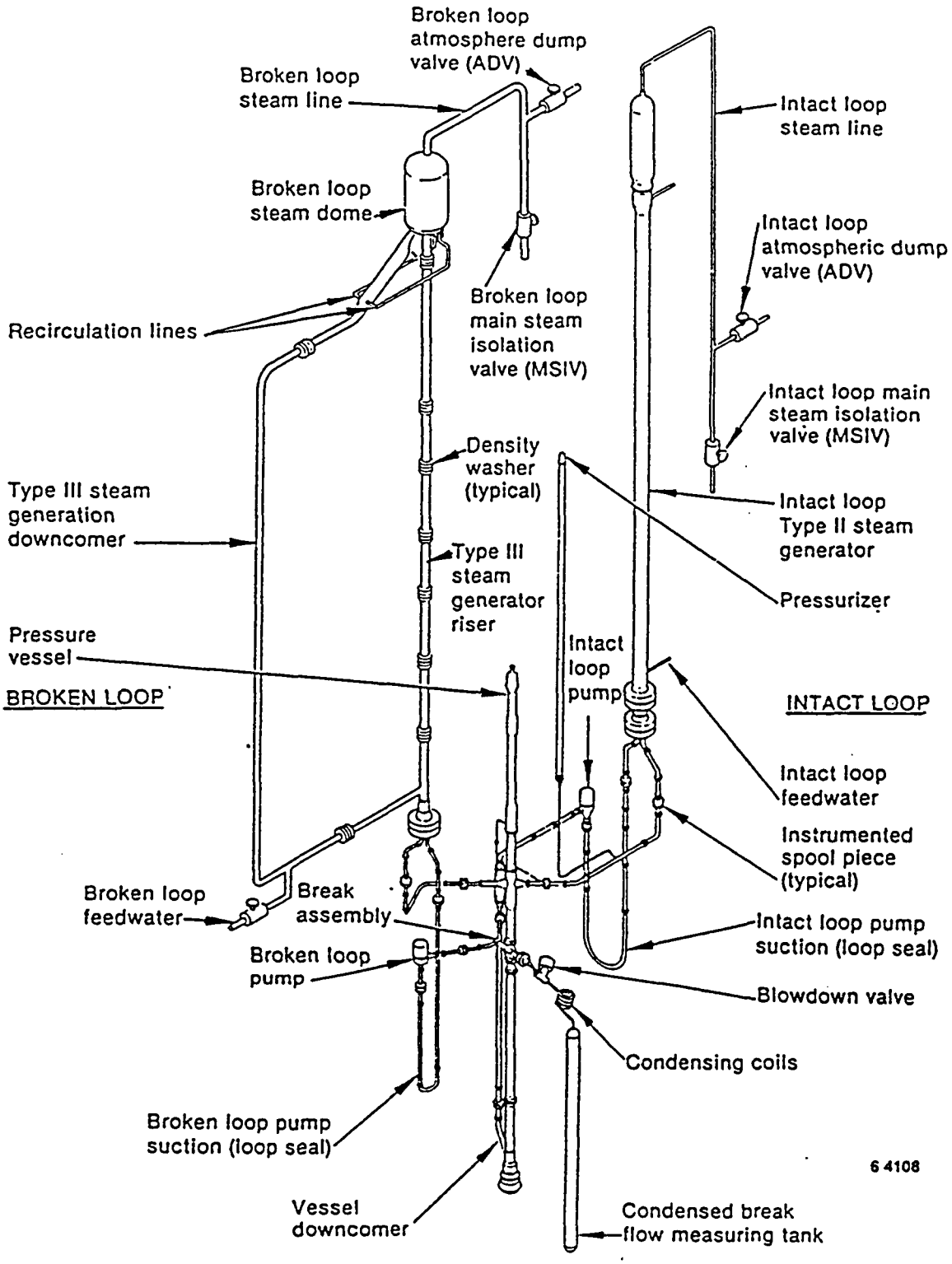
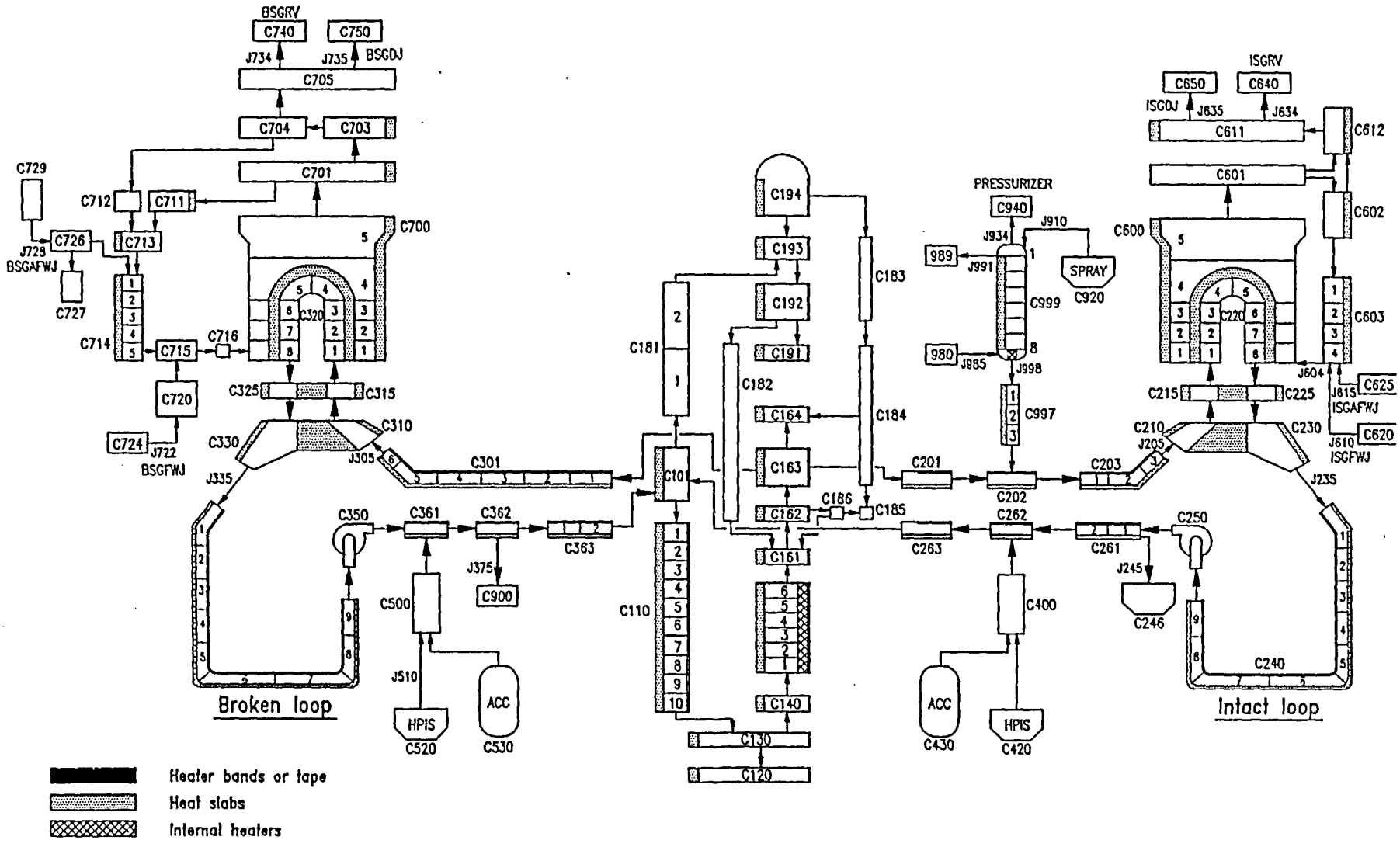


Fig. 1 Semiscale Mod-2C



Semiscale nodalization diagram for TEST S-NH-1 RELAP5 calculation

Fig. 2 Nodalization of Semiscale S-NH-1

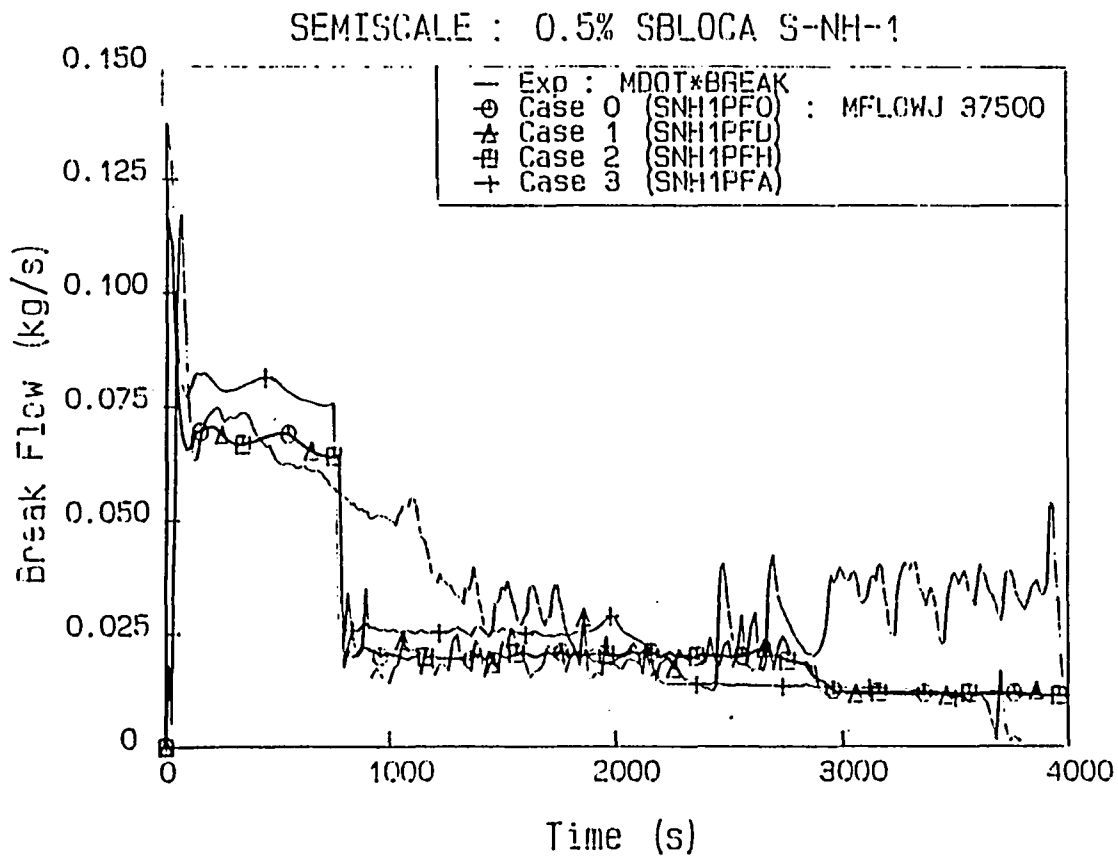


Fig. 3 Break Flow Rate

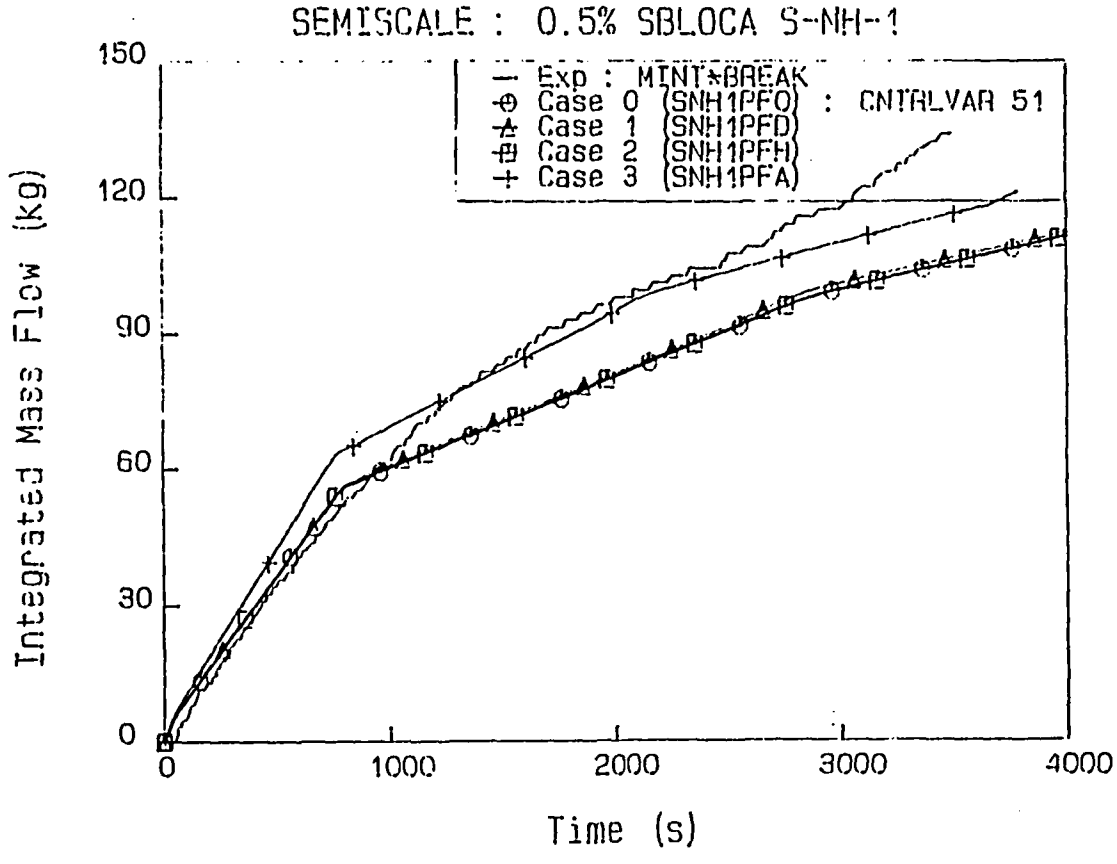


Fig. 4 Integrated Break Flow

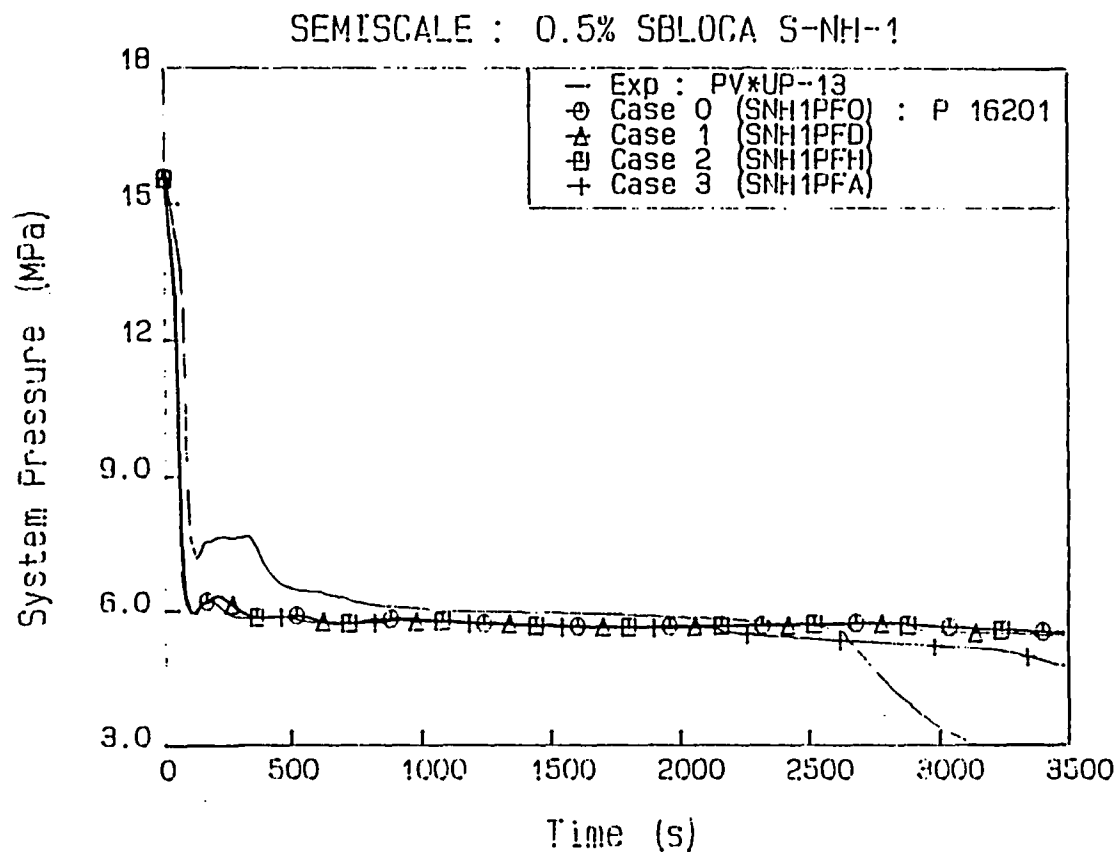


Fig. 5 Upper Plenum Pressure

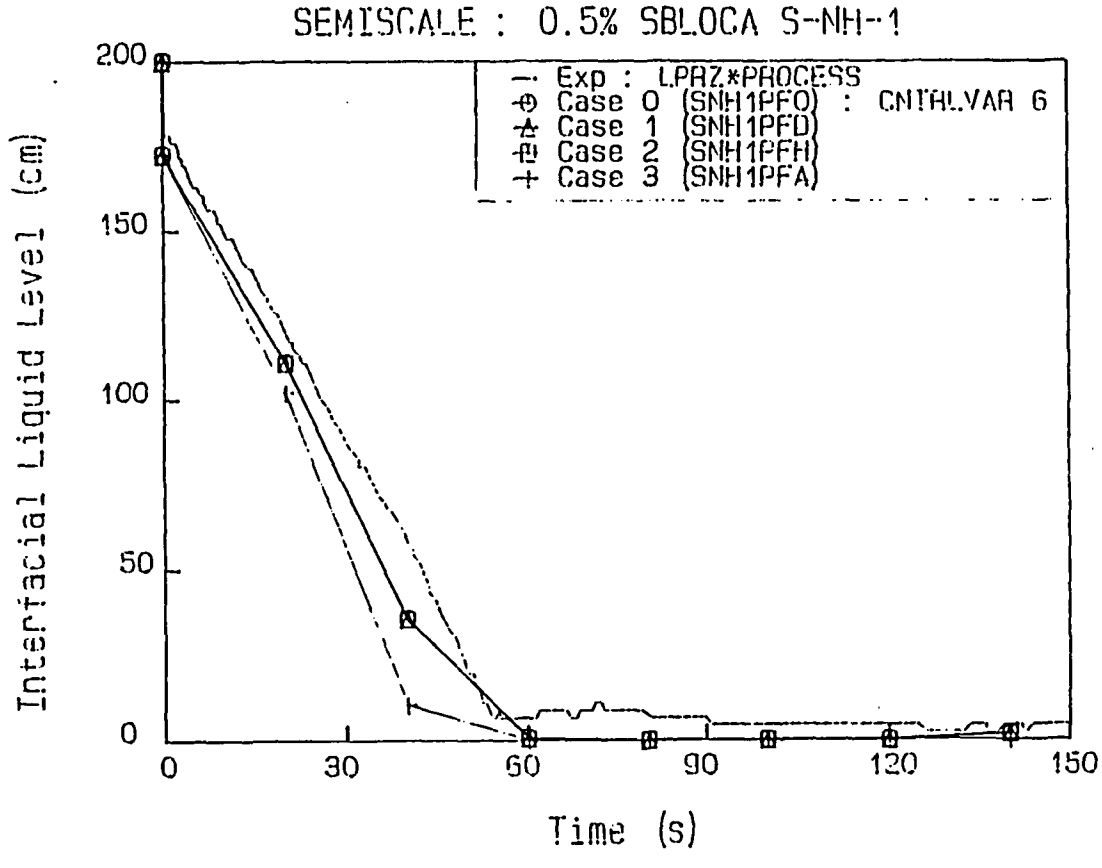


Fig. 6 Pressurizer Liquid Level

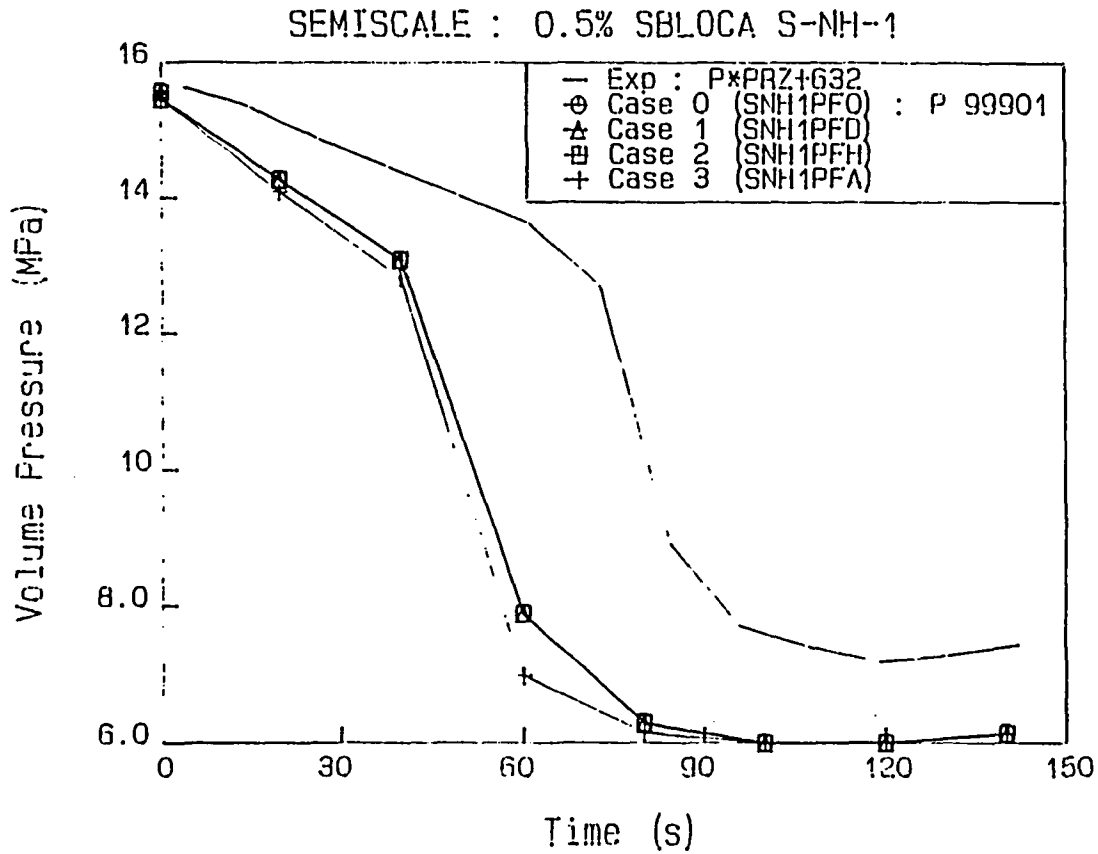


Fig. 7 Pressurizer Pressure

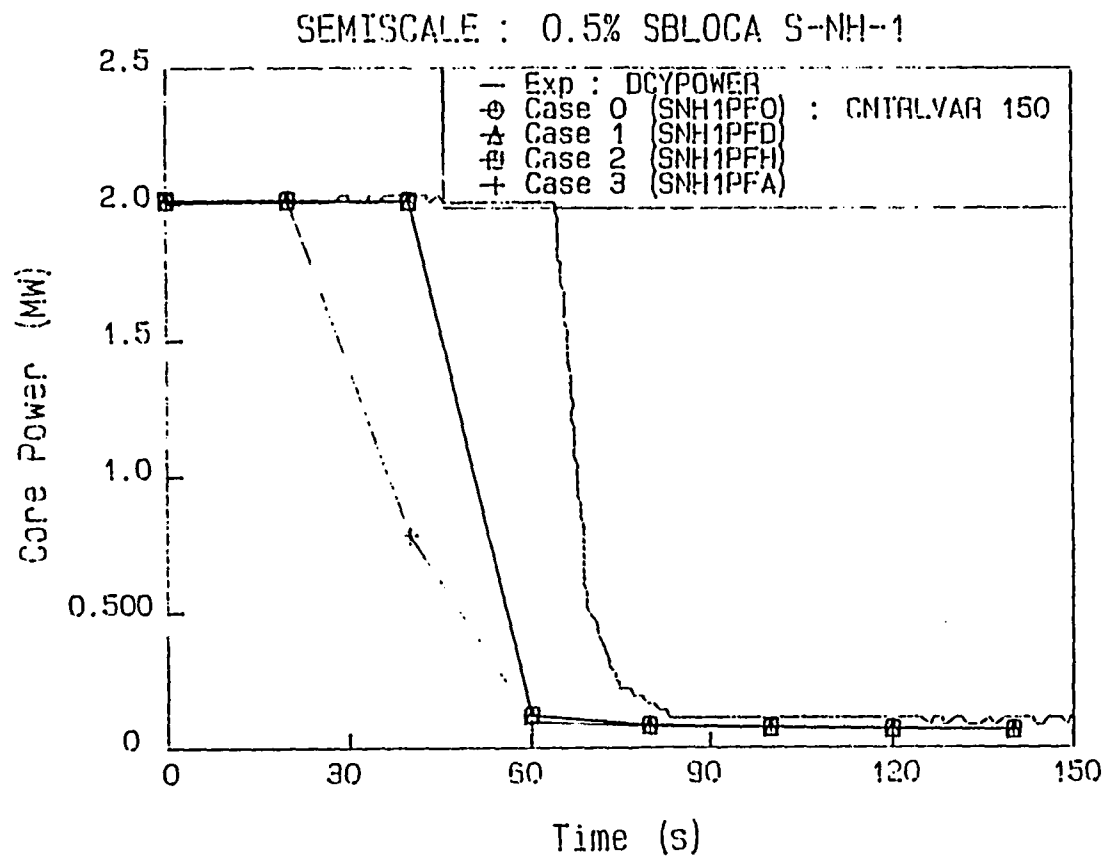


Fig. 8 Core Thermal Power

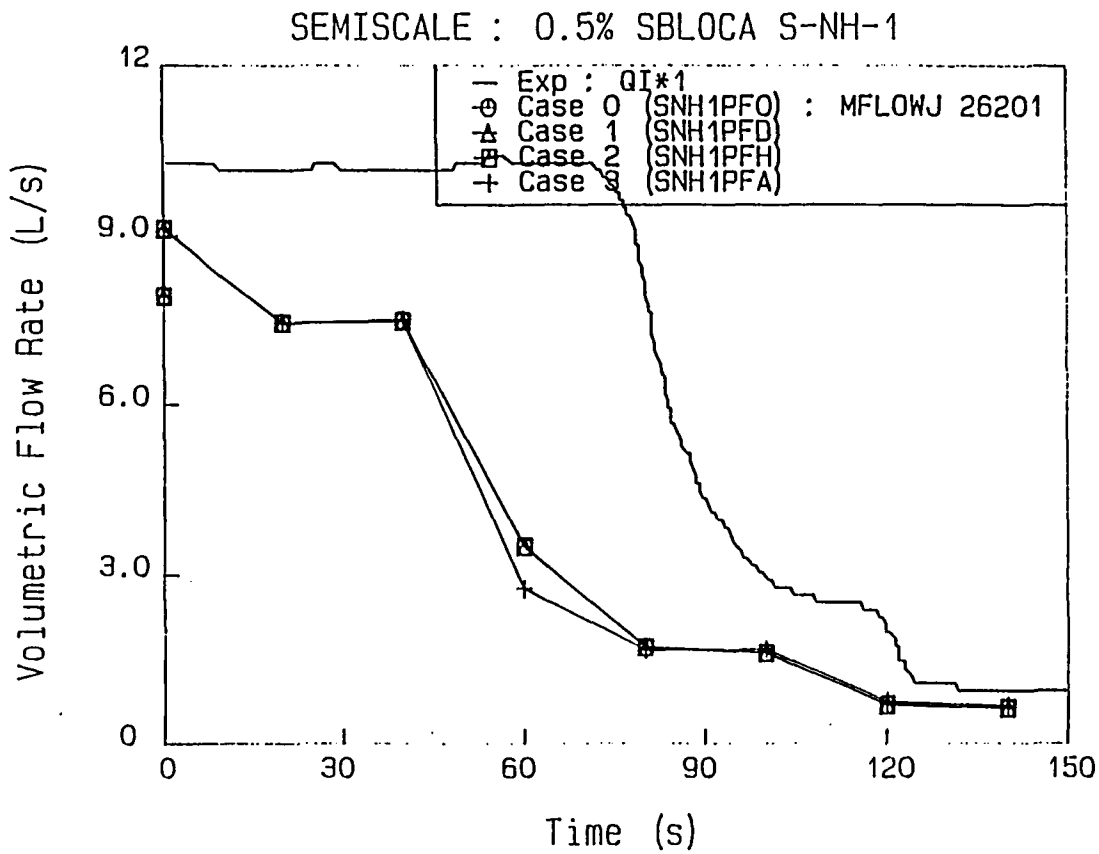


Fig. 9 ILCL Flowrate

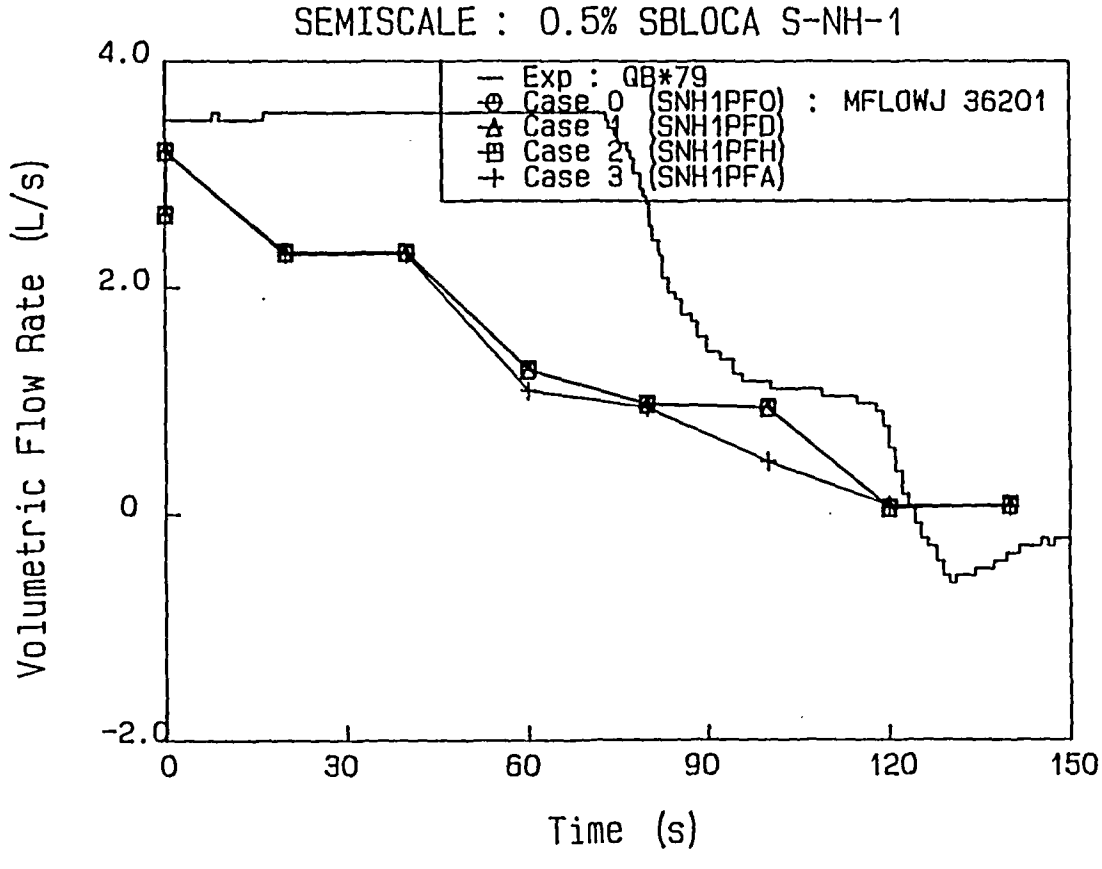


Fig. 10 BLCL Flowrate

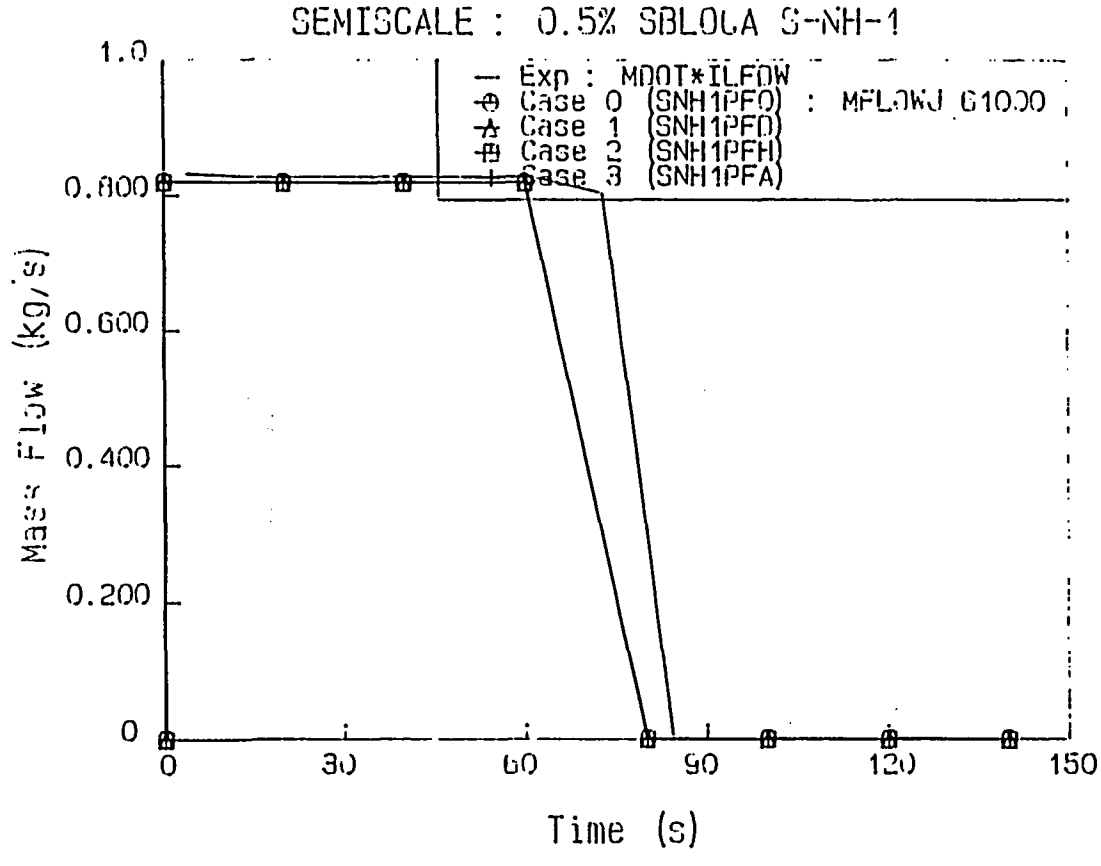


Fig. 11 IL Feed Flowrate

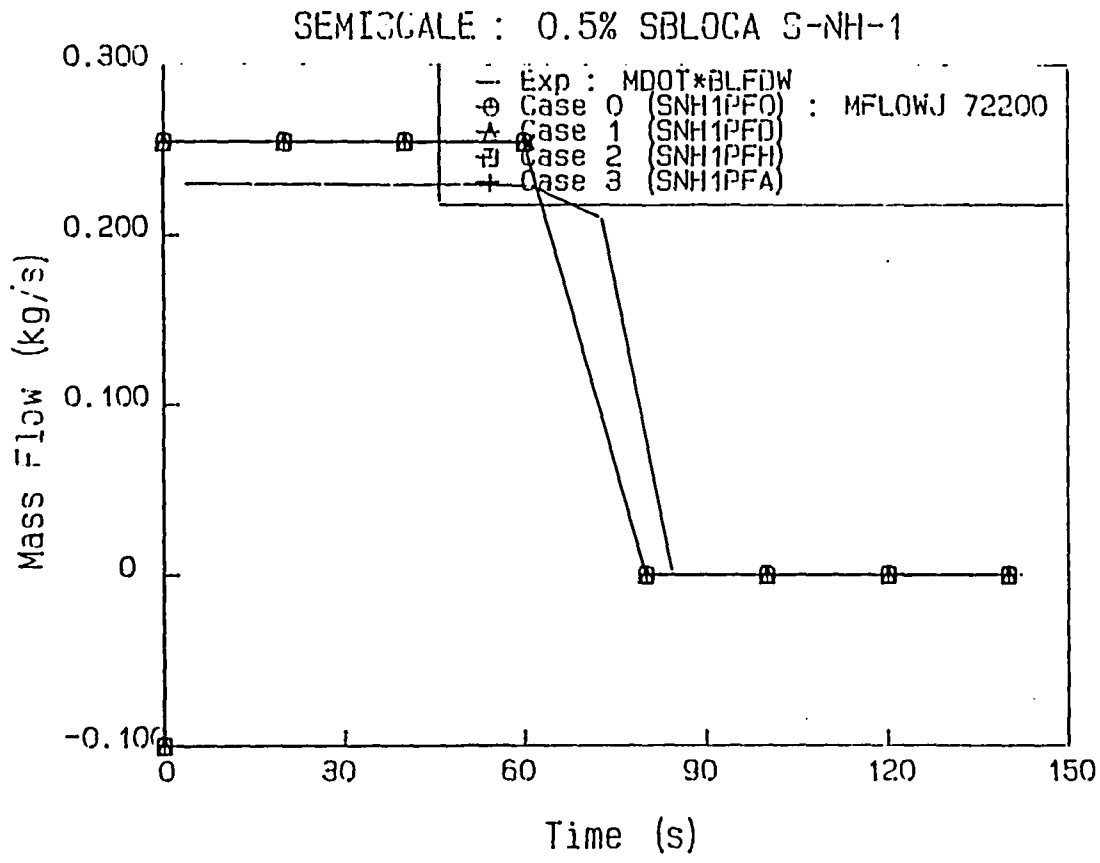


Fig. 12 BL Feed Flowrate

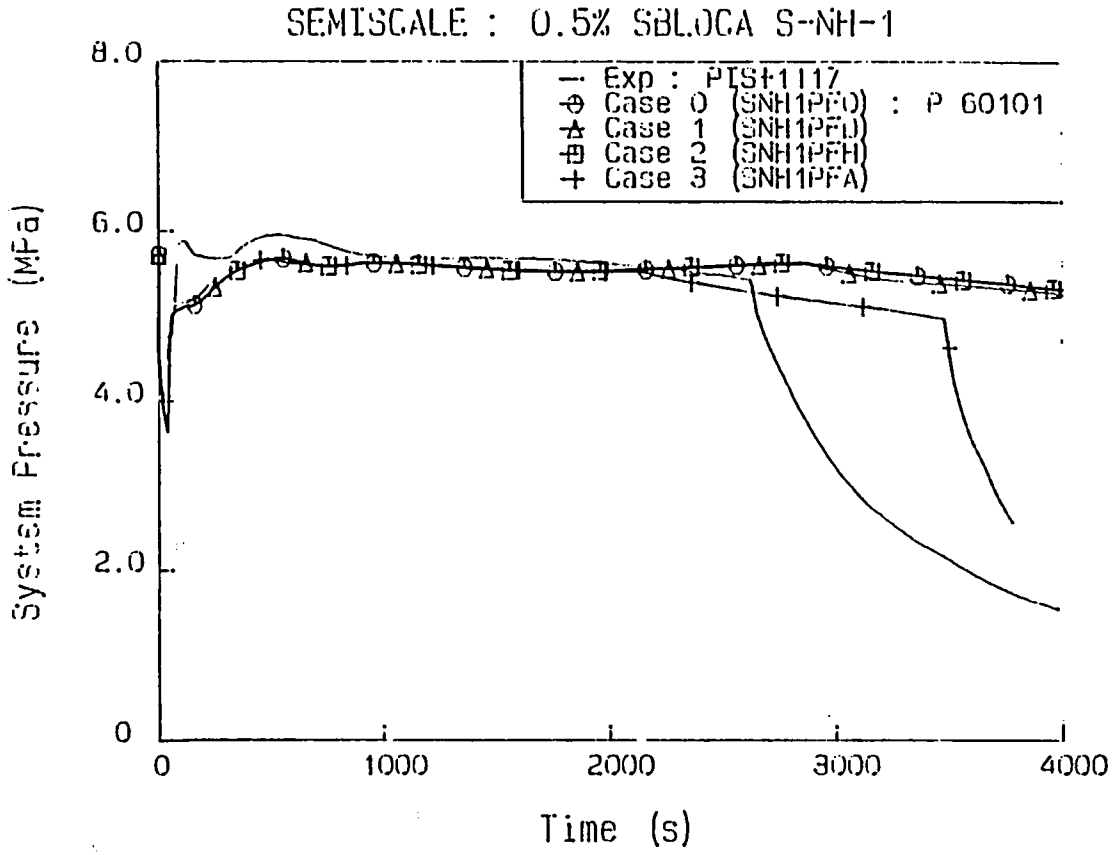


Fig. 13 IL SG Pressure

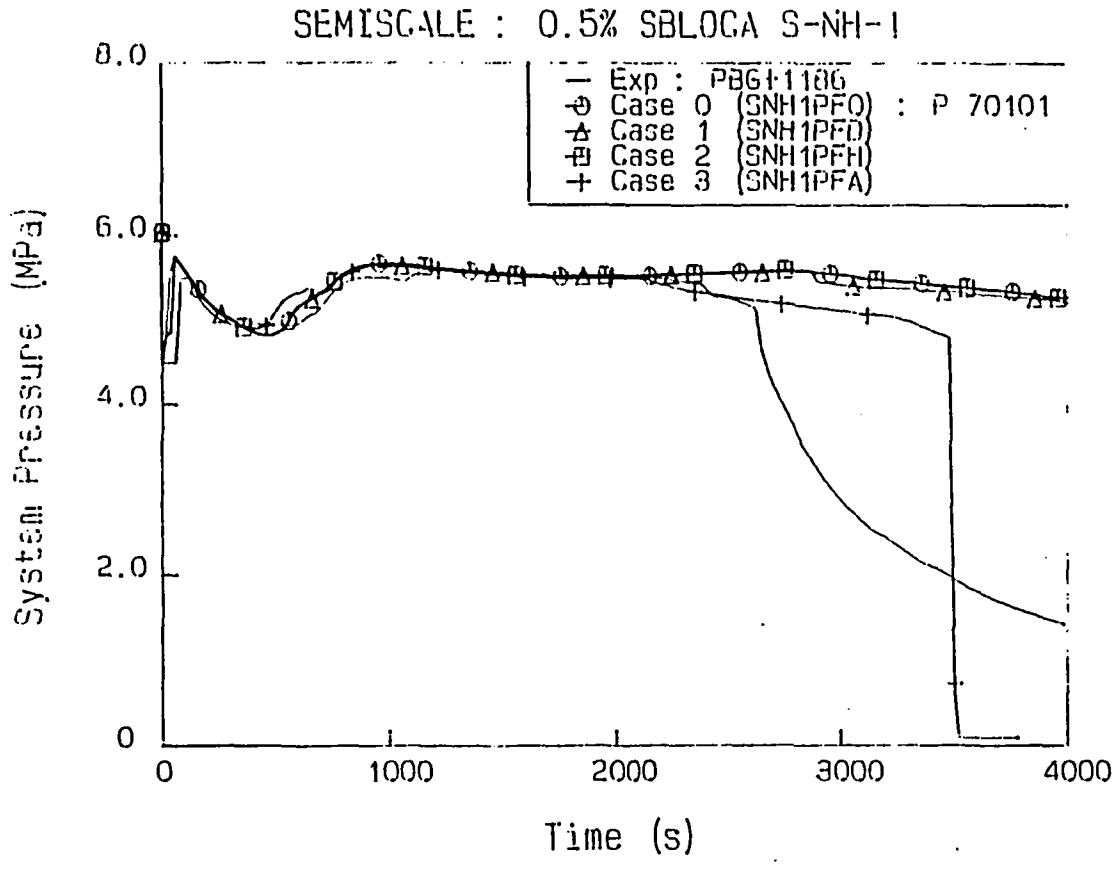


Fig. 14 BL SG Pressure

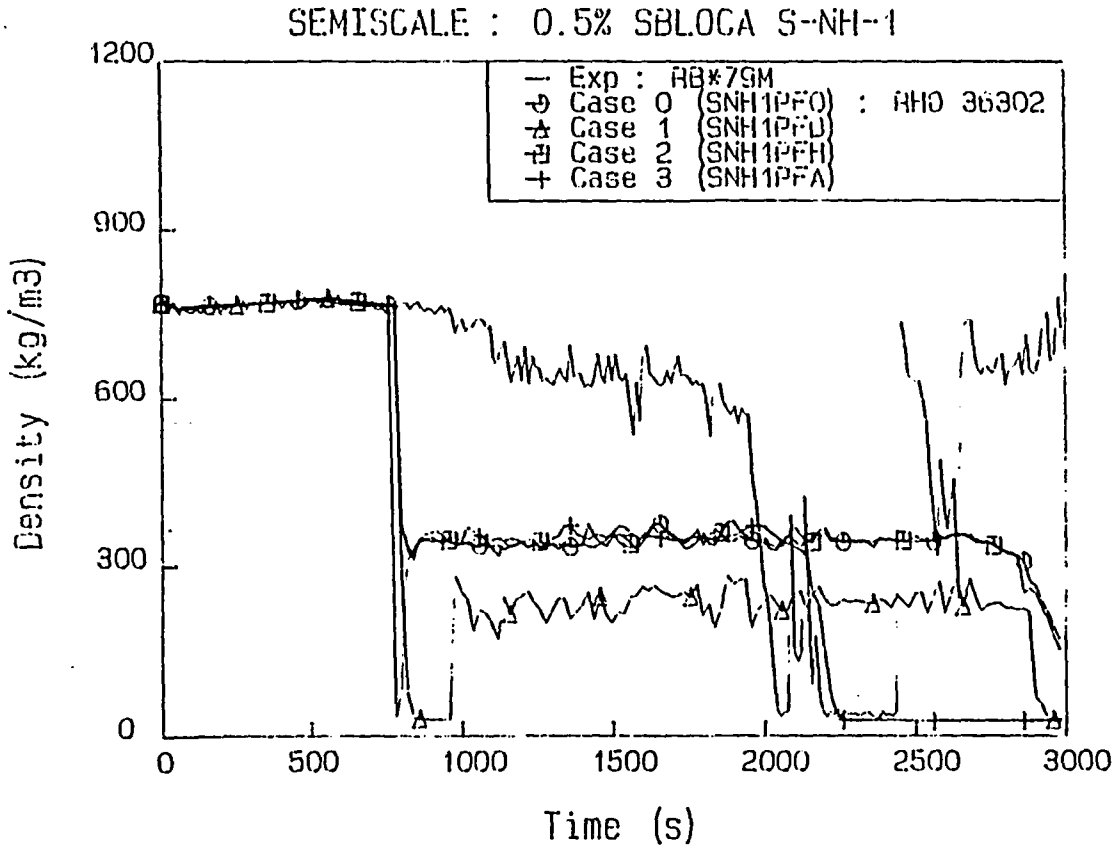


Fig. 15 Density BLCL

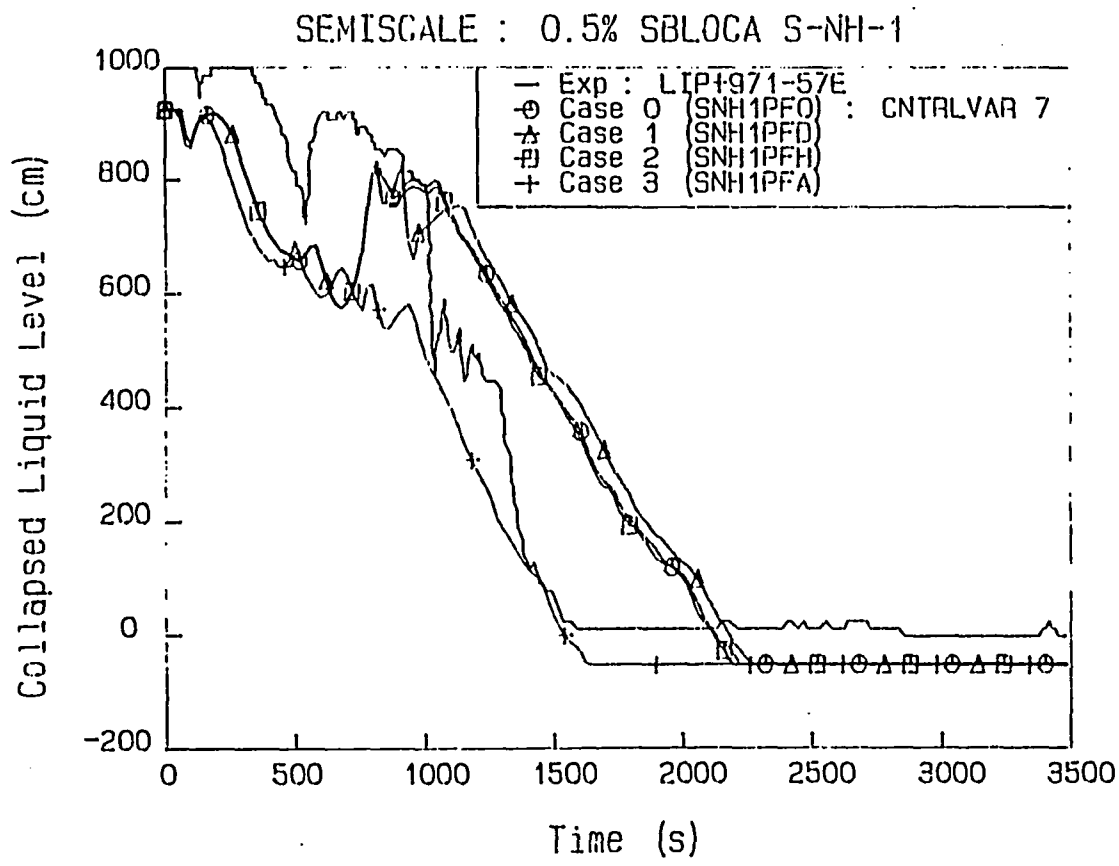


Fig. 16 IL SG Level

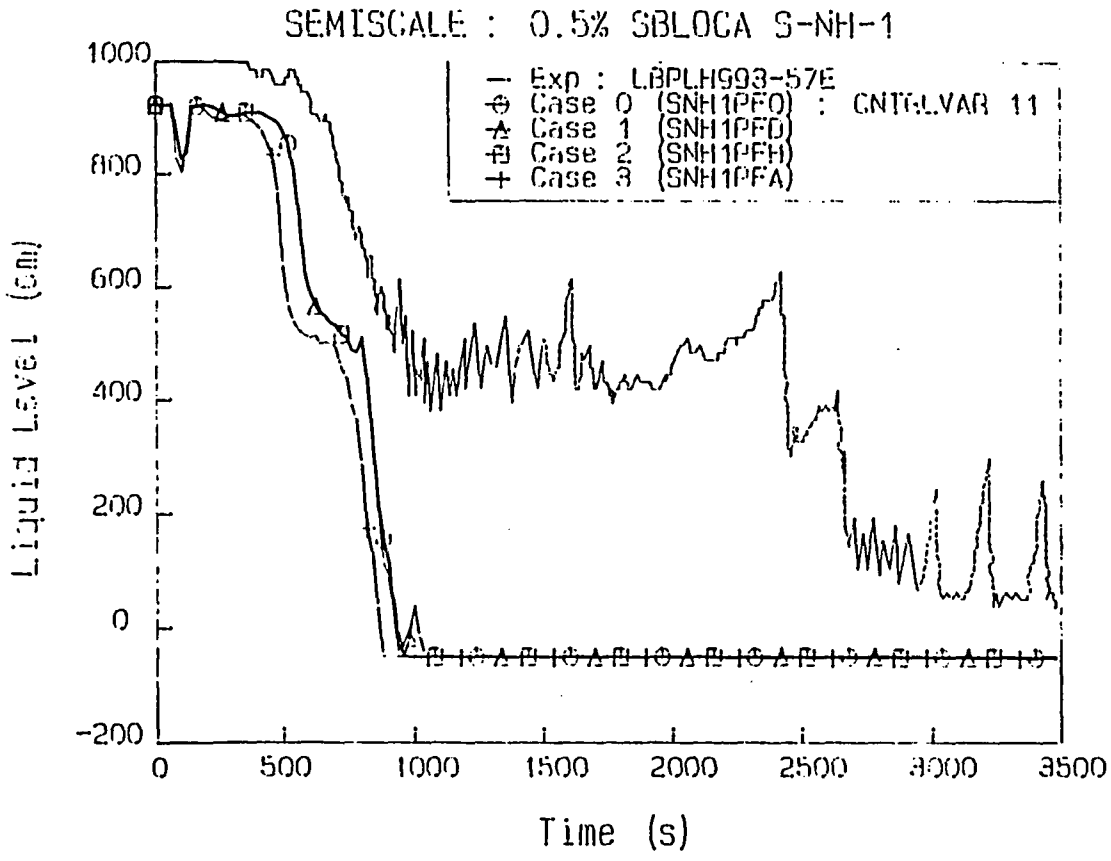


Fig. 17 BL SG Level

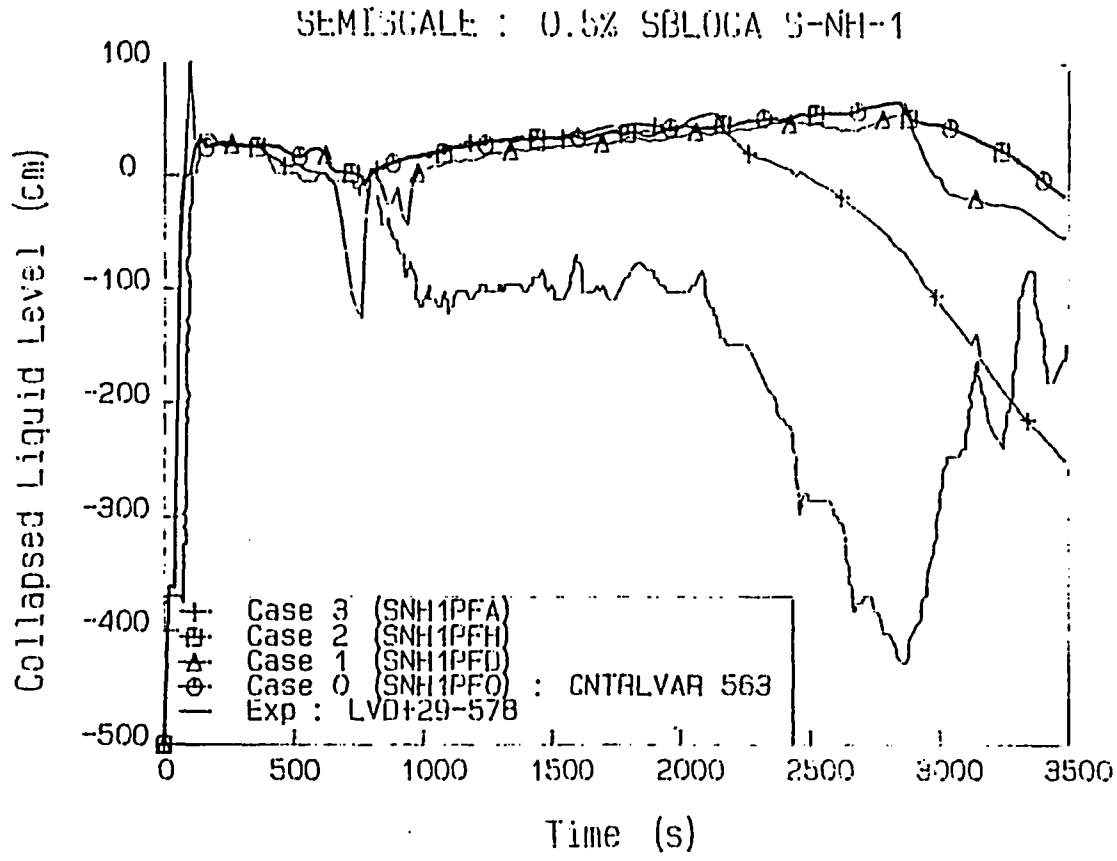


Fig. 16 DC Liquid Level

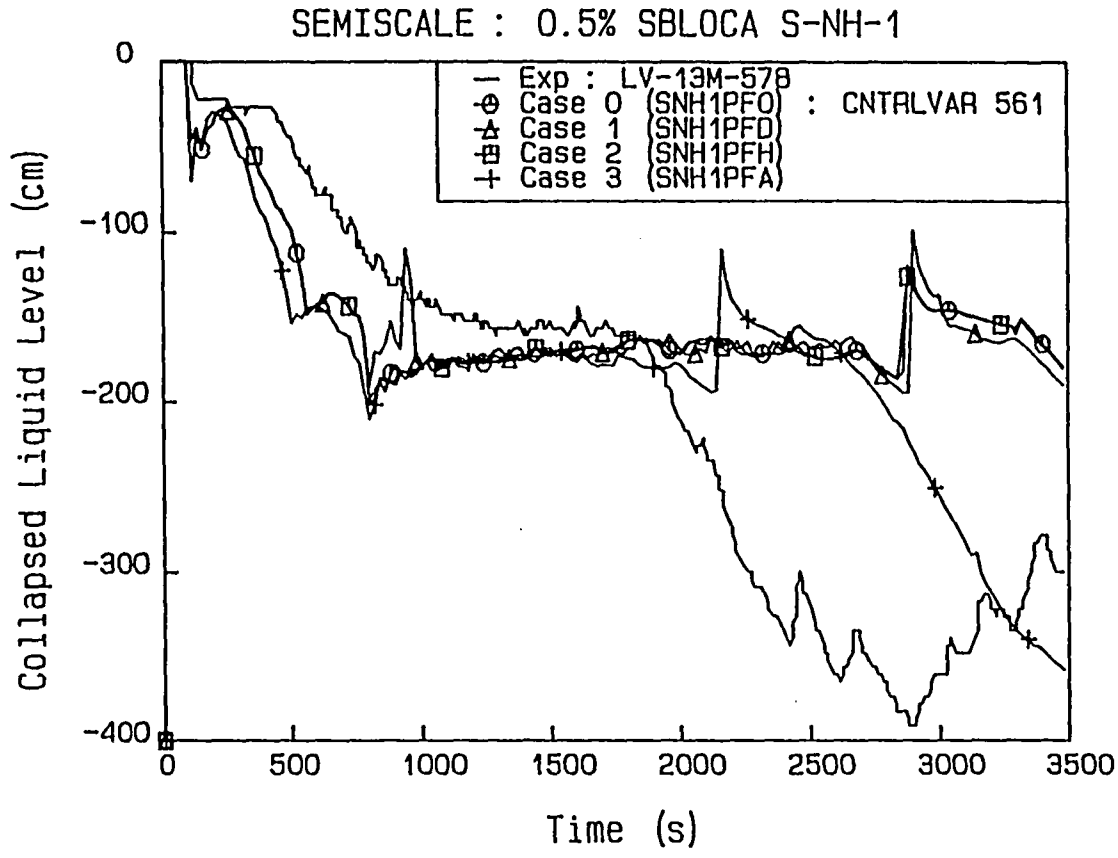


Fig. 19 Vessel Liquid Level

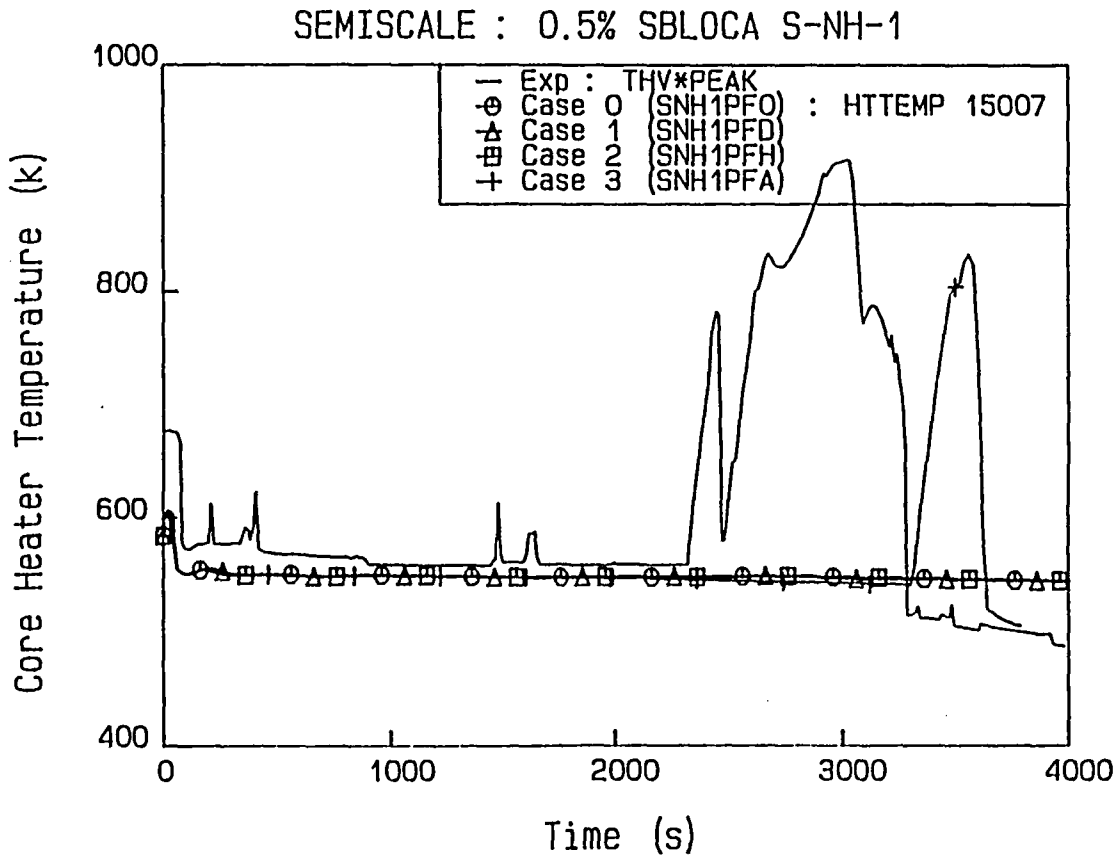


Fig. 20 Peak Cladding Temperature

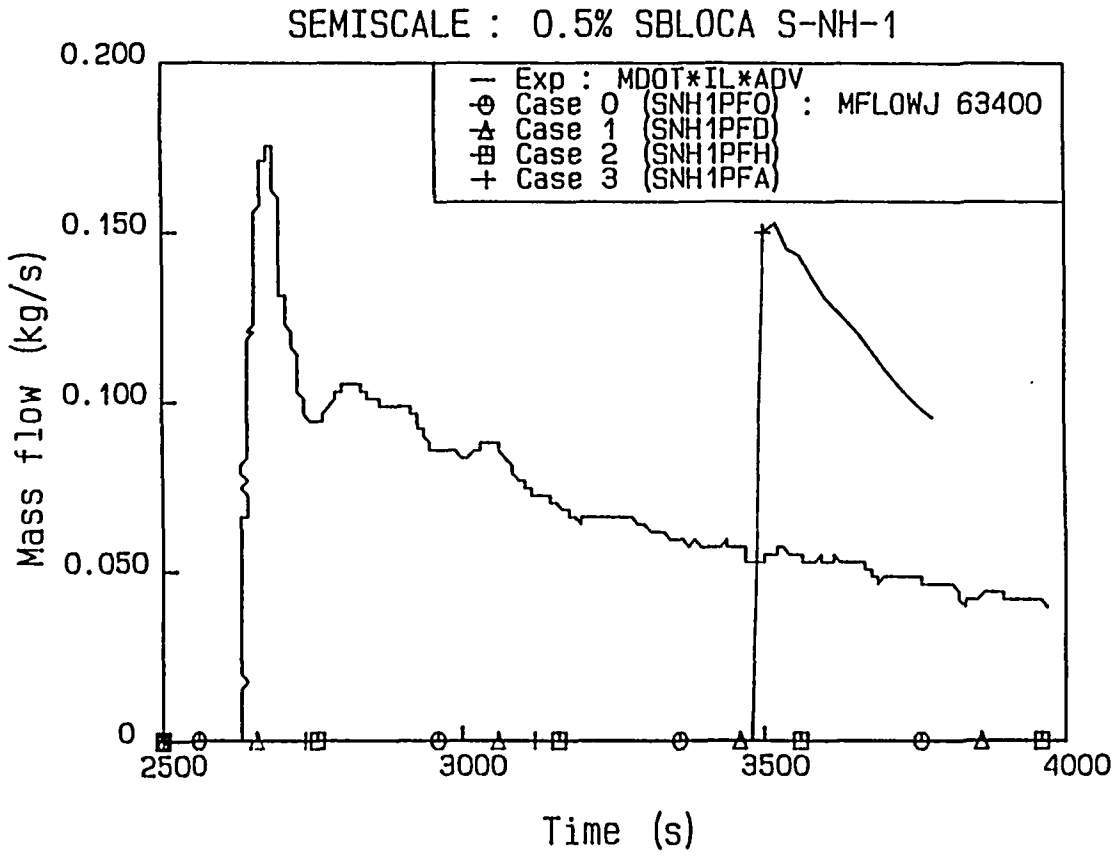


Fig. 21 Intact Loop S/G ADV Relief Flow

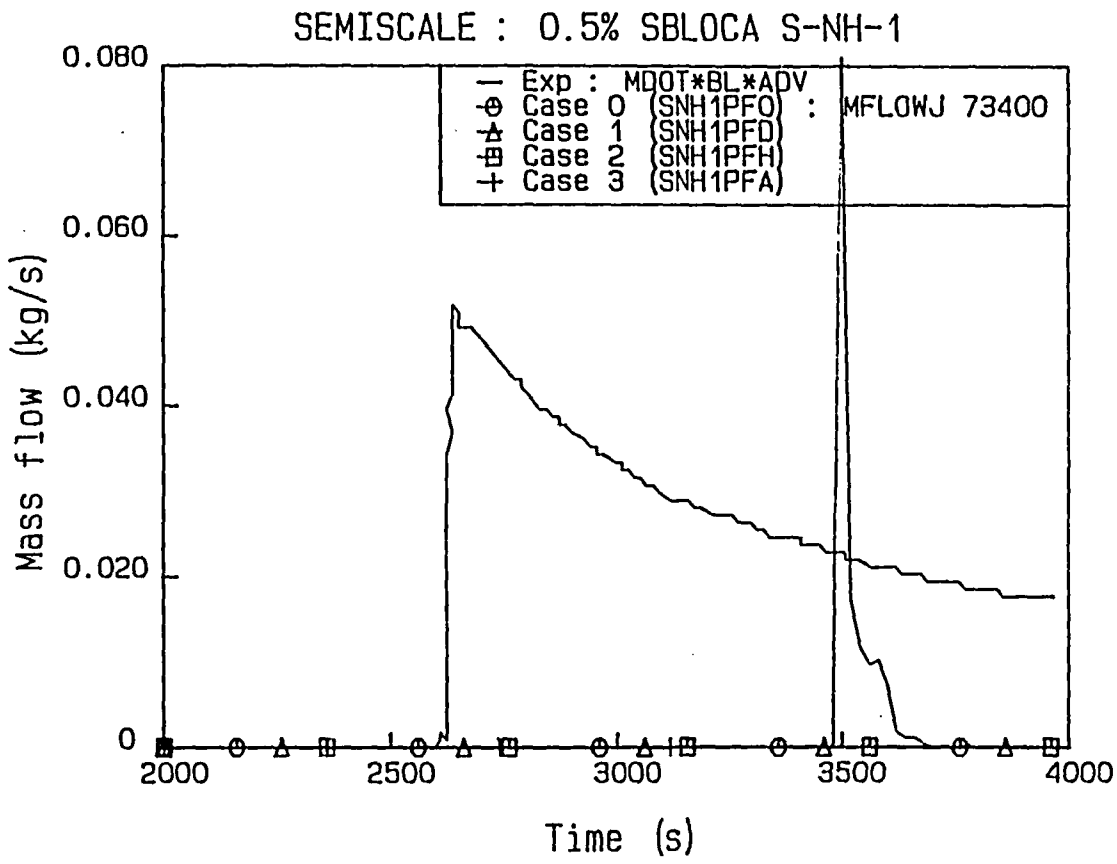


Fig. 22 Broken Loop S/G ADV Relief Flow

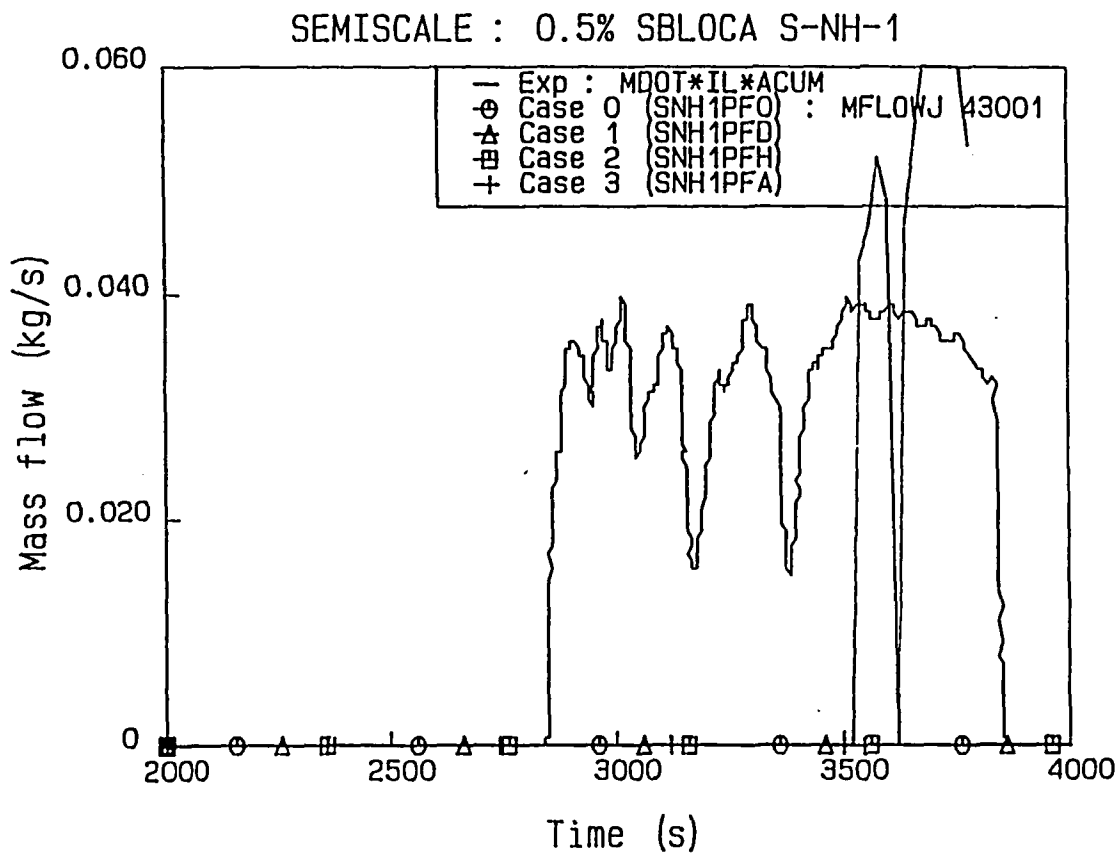


Fig. 23 Intact Loop Accumulator Injection Flow

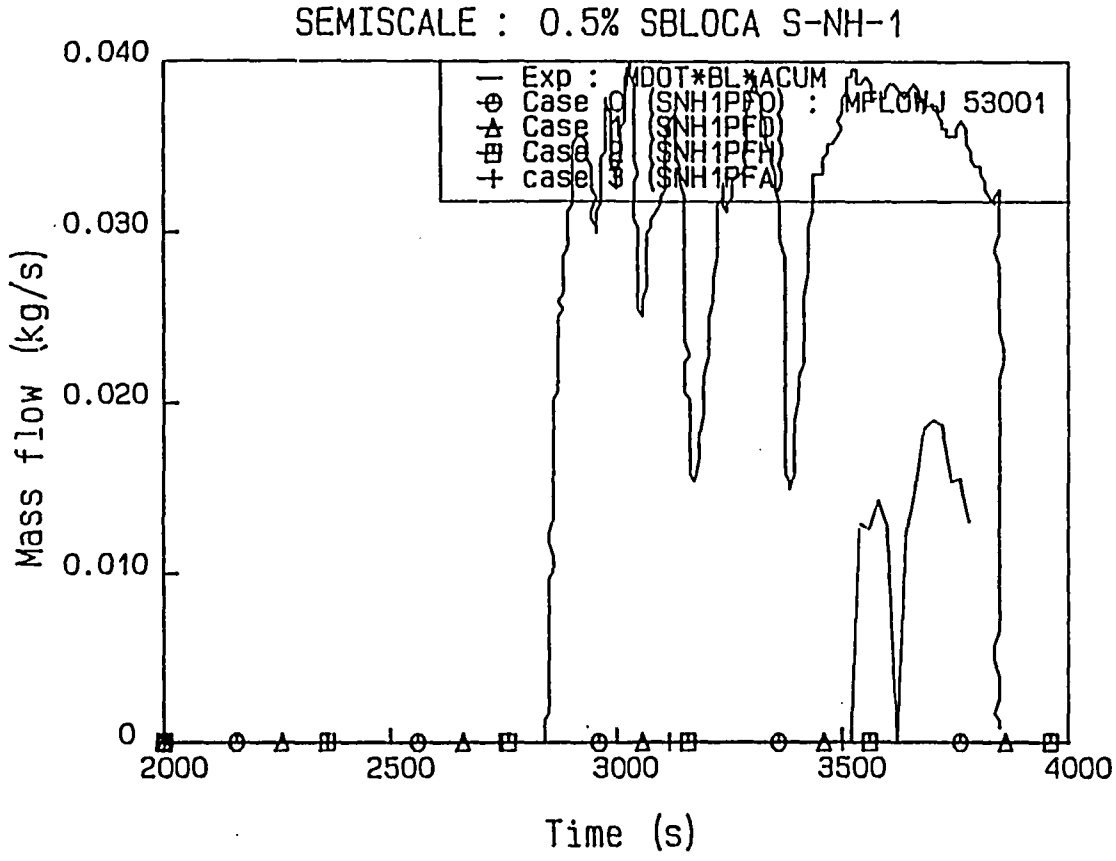


Fig. 24 Broken Loop accumulator Injection Flow

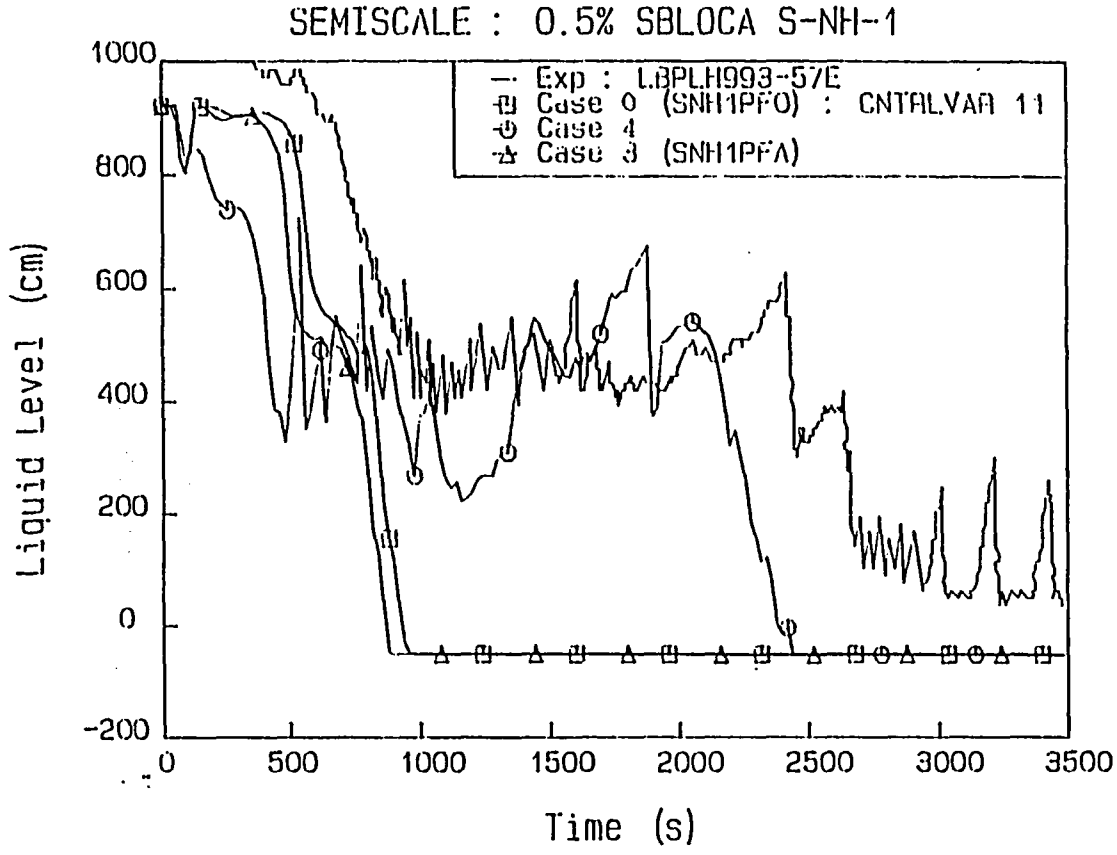


Fig. 25 MOD3 BLSG Primary Side Liquid Level

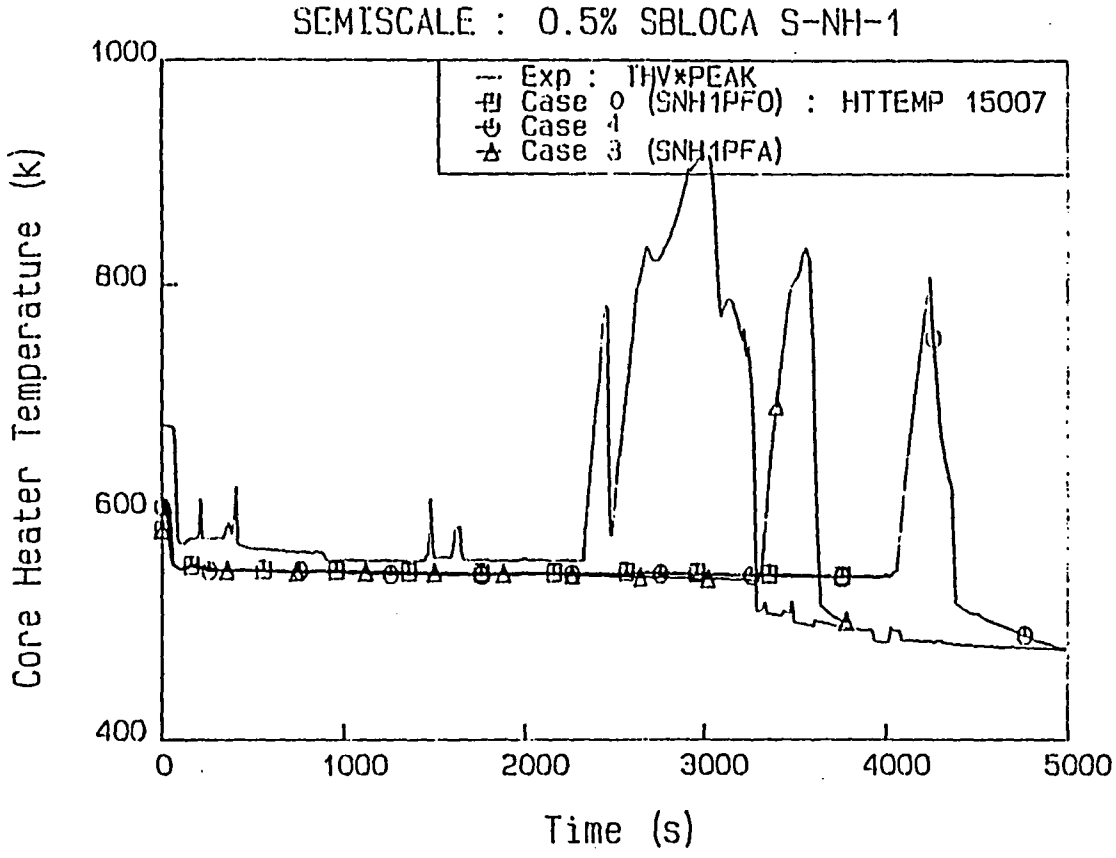


Fig. 26 MOD3 PCT

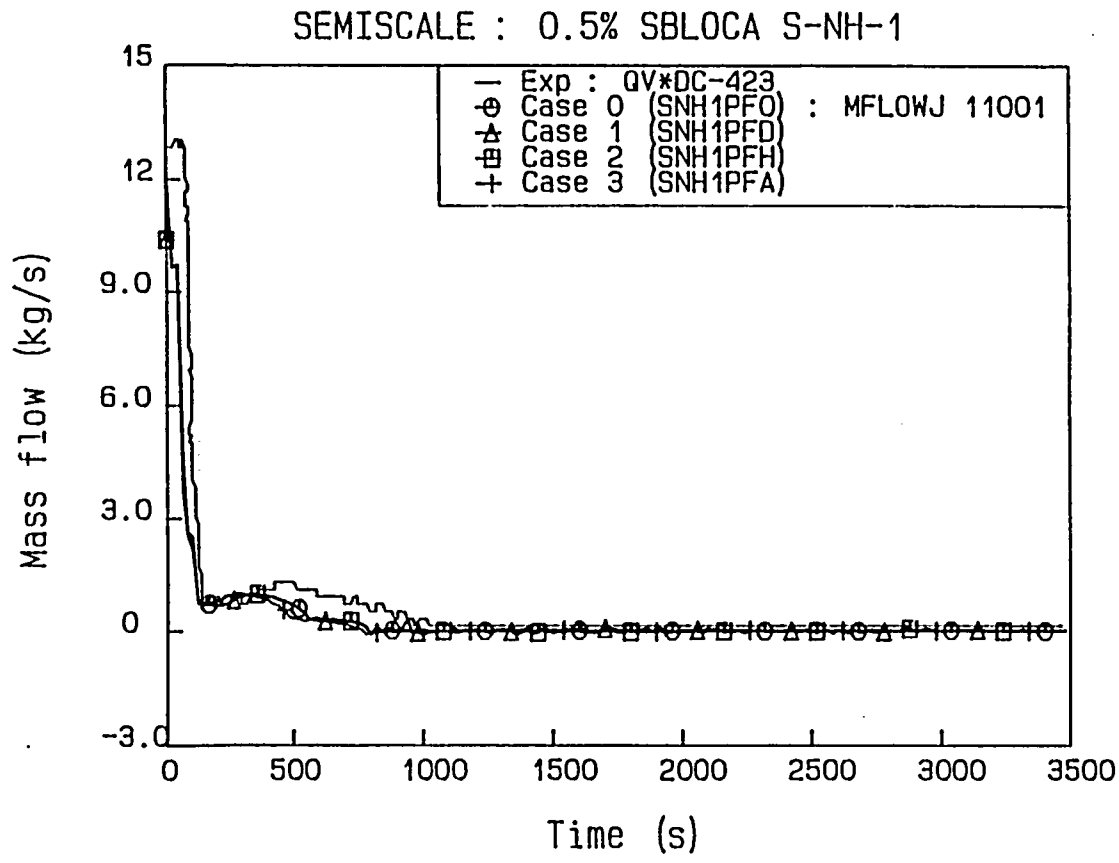


Fig. 27 Downcomer Flow Rate

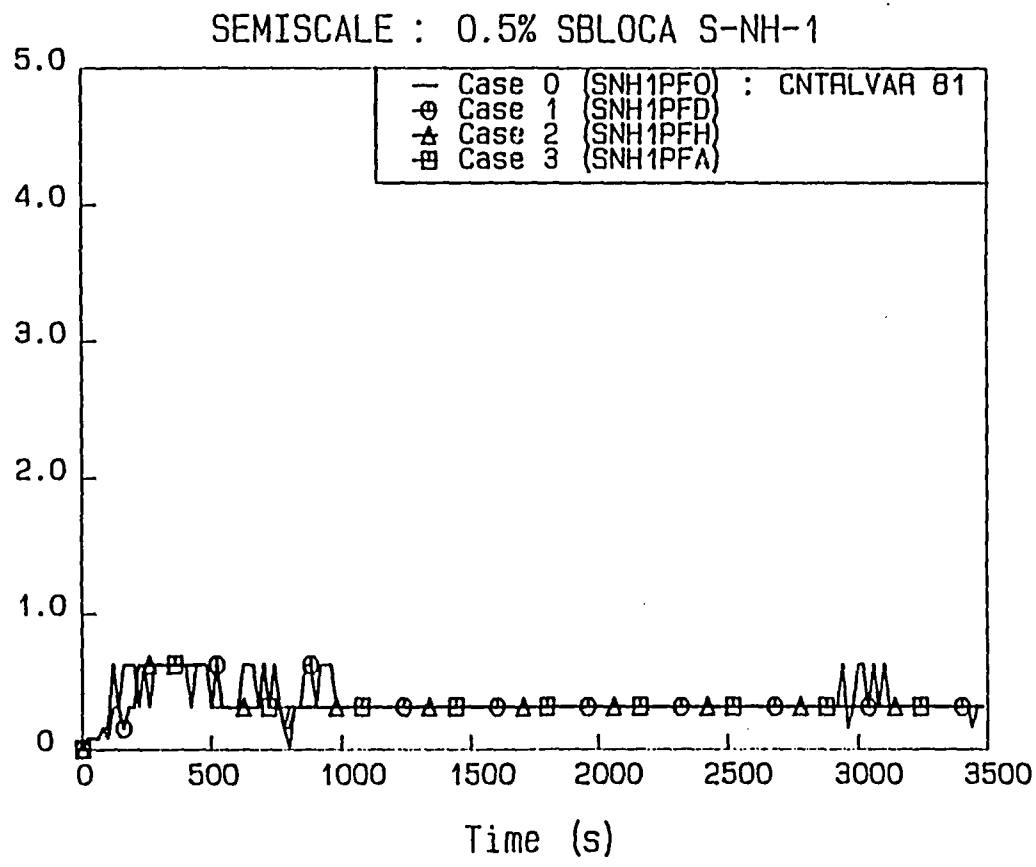


Fig. 28 Time Step Size

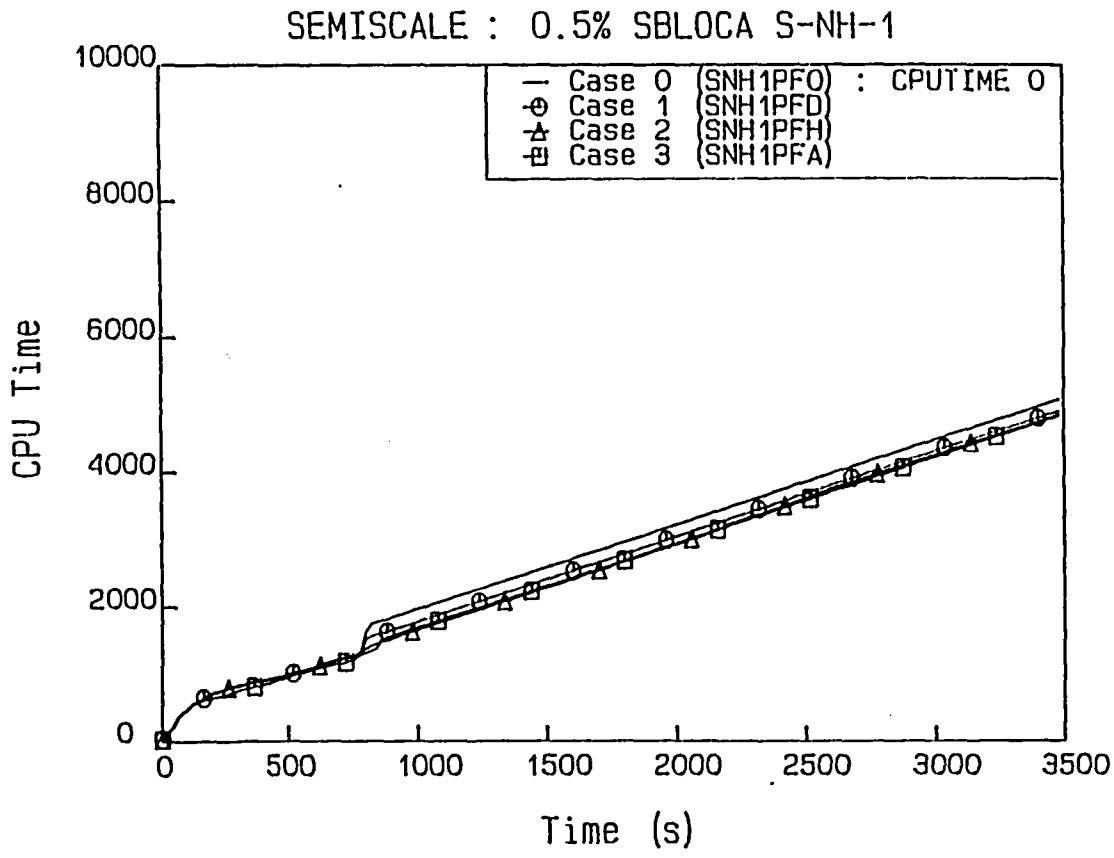


Fig. 29 CPU Time

Appendix

```
/JOB
SNH1S2,T6000.
/USER
ATTACH,STH2XT,RE364BX.
PURGE,SN1S2RP/NA.
DEFINE,RSTPLT=SN1S2RP.
FILE,RSTPLT,SBF=NO.
RFL,CM=370000,EC=200.
REDUCE(-)
RE364BX,,*PL=50000.
/EOR
*********************************************************************
**************************                  **************************
**********************      SEMISCALE MOD-2C     **********************
**************************                  **************************
*********************************************************************
**********************     STANDARD TRANSIENT    **********************
************************       INPUT DECK       ************************
************************    FOR RELAP5/MOD2    ************************
*********************************************************************
*********************************************************************
*******NOTES-                                                 *******
******                                                         ******
*****  1. THIS MODEL IS BASED ON THE STANDARD MOD-2A MODEL      *****
*****     DOCUMENTED IN REFERENCE 2 BELOW.                      *****
*****                                                           *****
*****  2. STEADY STATE RUNS ARE MADE EITHER WITH THE PROVIDED   *****
*****     CONTROL SYSTEMS PACKAGE OR WITH ADDITIONAL COMPONENTS *****
*****     FOR SINGLE CONDITION STEADY STATE CALCULATIONS.       *****
*****                                                           *****
*****  3. VESSEL HEATER TAPE TO OFFSET VESSEL HEAT LOSS IS      *****
*****     INCLUDED WITH THIS MODEL. A CONTROL SYSTEM TO SHUT OFF *****
*****     THE VESSEL HEATERS AND REDISTRIBUTE THE POWER AMONG   *****
*****     THE REMAINING HEATERS IS ALSO INCLUDED IN THIS MODEL. *****
*****                                                           *****
*****  4. THE THERMAL CONDUCTIVITY OF THE INSULATION ON THE     *****
*****     VESSEL AND PIPING HAS BEEN MODIFIED TO GIVE 56 KW     *****
*****     HEAT LOSS. THE THERMAL CONDUCTIVITY OF THE INSULATION *****
*****     ON THE STEAM GENERATORS HAS BEEN MODIFIED TO GIVE     *****
*****     14 KW HEAT LOSS. AN ADDITIONAL 35 KW IS LOST DUE TO   *****
*****     PUMP SEAL COOLING WHEN PUMPS ARE RUNNING AT FULL SPEED. *****
*****     THE HEATER TAPE IS WRAPPED IN THE "NO BREAK"          *****
*****     CONFIGURATION FROM DRAWING 414220.                    *****
*****                                                           *****
*****  5. THE SYSTEM CONFIGURATION INCORPORATED IN THIS MODEL IS *****
*****     THE COMMUNICATIVE COLD LEG BREAK CONFIGURATION.       *****
*****     ALL UHI SYSTEM COMPONENTS ARE REMOVED AND UPPER HEAD  *****
*****     INTERNALS ARE MODELED AS MODIFIED TO REFLECT NON-UHI  *****
*****     PLANT CONFIGURATION.                                  *****
*****                                                           *****
*****  6. STEAM GENERATOR COMPONENTS HAVE BEEN RENODALIZED TO   *****
*****     REFLECT THE PPCC GUIDELINES AS ESTABLISHED BY CAAP    *****
*****     LETTER FROM C. DAVIS.                                 *****
*****                                                           *****
*****  7. STEAM SEPARATOR COMPONENTS REFLECT RECOMMENDED MODEL  *****
*****     CHANGES FROM J. TRAPP. (NO JUNCTIONS ARE ABRUPT, AND  *****
*****     INLET IS HOMOGENEOUS)                                 *****
*****                                                           *****
*****  8. PRIMARY COOLANT PUMP DISCHARGE JUNCTION IS HOMOGENEOUS *****
*****                                                           *****
```

```
***** 9. THE PRESSURIZER IS THE 20 FOOT LONG PRESSURIZER WITH     *****
*****    HEAT STRUCTURE TO MODEL THE WALLS AND WITH HEATER        *****
*****    TAPE AND INSULATION ON THE OUTSIDE.                      *****
*****                                                             *****
***** 10. A LEAK BETWEEN THE UPPER HEAD TO THE UPPER PLENUM       *****
*****    THROUGH THE SUPPORT COLUMNS AROUND THE PLUGS IS          *****
*****    INCLUDED IN THIS MODEL.                                  *****
*****                                                             *****
***** 11. THE PRESSURIZER SPRAY AND ASSOCIATED THERMAL SHOCK      *****
*****    SHIELD ARE INCLUDED IN THIS MODEL.  NORMAL SPRAY GOES    *****
*****    FROM THE INTACT LOOP COLD LEG TO THE PRESSURIZER VIA     *****
*****    TIME DEPENDENT VOLUMES AND JUNCTIONS, MATCHING TEMP.     *****
*****    IF AUXILARY SPRAY IS ALSO USED THE SPRAY TEMP WILL NOT   *****
*****    MATCH THE COLD LEG TEMP.  IF THE THERMAL SHOCK SHIELD    *****
*****    WAS NOT INCLUDED IN THE TEST BOTH THE HYDRAULICS AND     *****
*****    HEAT STRUCTURE OF THE PRESSURIZER MUST BE MODIFIED.      *****
******                                                          ******
*********************************************************************
*                                                                   *
*                            REFERENCES                             *
*                                                                   *
*   1. V. H. RANSOM ET AL., RELAP5/MOD2 CODE MANUAL, VOLUME 1 AND 2, *
*          EGG-SAAM-6377, SEPTEMBER 1983.                           *
*                                                                   *
*   2. M. T. LEONARD, "RELAP5 STANDARD MODEL FOR THE SEMISCALE MOD-2A *
*                                                                   *
*   3. SYSTEM DESIGN DESCRIPTION FOR THE MOD-3 SEMISCALE SYSTEM,     *
*          REVISION B, DECEMBER 1980.                               *
*                                                                   *
*********************************************************************
*
=   RELAP5 MODEL FOR THE SEMISCALE NH-1 POSTTEST - STEADY STATE  (PZR LEVEL 90.10.6)
*
**  FOR CONTROL SYSTEM STEADY STATE RUNS, MAKE APPROPRIATE CHANGES    **
**  IN COMPONENTS -                                                   **
**     610, 635, 710, 735, 980, 989, 991, TRIPS, AND CONTROL SYSTEMS  **
*
*PROBLEM        TYPE    OPTION
0000100          NEW   STDY-ST
*
*            INP-CHK  OR   RUN
0000101                    RUN
*
*UNITS         INPUT    OUTPUT   (SI OR BRITISH)
0000102      BRITISH        SI
*
*TIME OUT        MIN       MAX
0000105        125.0     150.0
*
**            VOL NO      ELEV     FLUID      NAME
*0000120    101010000      1.0     WATER   PRIMARY
*0000121    600010000      0.0     WATER      ILSG
*0000122    700010000      0.0     WATER      BLSG
**
*             T END   MIN ST    MAX ST    ST CL     MR     MJ     WR
*0000201          2.    1.0-7      0.05        3     20     40     40
0000201       1000.    1.0-7      0.05        3     40   2000   2000
*0000202         10.    1.0-7      0.05        3     20    160    160
*0000203         25.    1.0-7      0.05        3     40    300    300
*0000204        100.    1.0-7      0.05        3     40   1500   1500
```

```
*0000205        200.     1.0-7      0.05       3     40   1000   1000
*0000206       1005.     1.0-7      0.05       3     40   2000   2000
*
*************************************************************************
** TRIPS -- TRIP CANCELLATION CARD 400    VARIABLE TRIP CARDS 401-599 **
**       -- TRIP STOP CARD 600            LOGICAL TRIP CARDS  601-699 **
*************************************************************************
**                                                                     **
** 401  TERMINATE CALCULATION                                          **
** 402  OPEN BREAK                                                     **
** 403  ALWAYS FALSE - USED IN MOTOR VALVES THAT ONLY CLOSE, ETC       **
** 406  BEGIN TRANSIENT                                                **
** 407  HPIS PRESSURE SETPOINT                                         **
** 408  BEGIN HPIS                                                     **
** 409  BEGIN CORE DECAY - SCRAM                                       **
** 410  CLOSE MAIN INTACT LOOP STEAM GENERATOR STEAM VALVE             **
** 411  CLOSE MAIN BROKEN LOOP STEAM GENERATOR STEAM VALVE             **
** 412  BEGIN INTACT LOOP PRIMARY COOLANT PUMP COASTDOWN               **
** 413  BEGIN BROKEN LOOP PRIMARY COOLANT PUMP COASTDOWN               **
** 414  CLOSE MAIN INTACT LOOP STEAM GENERATOR FEEDWATER VALVE         **
** 415  CLOSE MAIN BROKEN LOOP STEAM GENERATOR FEEDWATER VALVE         **
** 416  OPEN AUXILARY INTACT LOOP STEAM GENERATOR FEEDWATER VALVE      **
** 417  OPEN AUXILARY BROKEN LOOP STEAM GENERATOR FEEDWATER VALVE      **
** 418  OPEN PRESSURIZER SPRAY VALVE                                   **
** 419  TURN OFF STEAM GENERATOR MASS CONTROLLER                       **
** 420  ALWAYS TRUE                                                    **
** 421  OPEN PRESSURIZER RELIEF VALVE                                  **
** 423  VALVE OUT TIME DEPENDENT VOLUME PRESSURIZER FOR STEADY STATE   **
** 424  OPEN STEAM GENERATOR CROSS-OVER LINE VALVE                     **
** 425  CLOSE STEAM GENERATOR CROSS-OVER LINE VALVE                    **
** 426  MONITOR MAXIMUM HEATER ROD TEMP - MAY WANT TO STOP CALCULATION**
** 429  TURN OFF PRESSURIZER LEVEL CONTROLLER                          **
** 430  BEGIN USING TEST POWER FOR GUARD HEATER BANK 110 (HOT LEGS)    **
** 431  BEGIN USING TEST POWER FOR GUARD HEATER BANK 111 (BL PMP SUC)  **
** 432  BEGIN USING TEST POWER FOR GUARD HEATER BANK 112 (COLD LEGS)   **
** 433  BEGIN USING TEST POWER FOR GUARD HEATER BANK 113 (IL PMP SUC)  **
** 436  BEGIN USING TEST POWER FOR VESSEL EXTERNAL HEATERS (BANK 116)  **
** 437  BEGIN USING TEST POWER FOR PRESSURIZER EXT HEATERS (BANK 117)  **
** 439  TURN ON PRESSURIZER HEATER RODS                                **
** 440  TURN OFF POWER TO UPPER HEAD HEATERS                           **
** 441  TURN OFF POWER TO UPPER VESSEL HEATERS                         **
** 442  TURN OFF POWER TO MIDDLE VESSEL HEATERS                        **
** 443  TURN OFF POWER TO VESSEL AND DOWNCOMER HEATERS                 **
** 460  PRESSURE TO OPEN INTACT LOOP STEAM GENERATOR RELIEF VALVE      **
** 461  PRESSURE TO CLOSE INTACT LOOP STEAM GENERATOR RELIEF VALVE     **
** 462  UPPER LIMIT ON INTACT LOOP SECONDARY PRESSURE FOR STEADY STATE**
** 463  LOWER LIMIT ON INTACT LOOP SECONDARY PRESSURE FOR STEADY STATE**
** 464  RATE TO CLOSE MAIN INTACT LOOP STEAM VALVE FOR STEADY STATE    **
** 465  RATE TO OPEN MAIN INTACT LOOP STEAM VALVE FOR STEADY STATE     **
** 470  PRESSURE TO OPEN BROKEN LOOP STEAM GENERATOR RELIEF VALVE      **
** 471  PRESSURE TO CLOSE BROKEN LOOP STEAM GENERATOR RELIEF VALVE     **
** 472  UPPER LIMIT ON BROKEN LOOP SECONDARY PRESSURE FOR STEADY STATE**
** 473  LOWER LIMIT ON BROKEN LOOP SECONDARY PRESSURE FOR STEADY STATE**
** 474  RATE TO CLOSE MAIN BROKEN LOOP STEAM VALVE FOR STEADY STATE    **
** 475  RATE TO OPEN MAIN BROKEN LOOP STEAM VALVE FOR STEADY STATE     **
** 600  STOP CALCULATION                                               **
** 624  OPEN STEAM GENERATOR CROSS-OVER LINE VALVE                     **
** 640  TURN OFF POWER TO UPPER HEAD HEATERS                           **
** 641  TURN OFF POWER TO UPPER VESSEL HEATERS                         **
** 642  TURN OFF POWER TO MIDDLE VESSEL HEATERS                        **
```

```
** 643  TURN OFF POWER TO VESSEL AND DOWNCOMER HEATERS                  **
** 660  RESET INTACT LOOP STEAM RELIEF VALVE FOR HYSTERESIS EFFECTS     **
** 661  OPEN INTACT LOOP STEAM GENERATOR RELIEF VALVE                   **
** 662  USED IN STEADY STATE CONTROL TO OPEN INTACT LOOP STEAM VALVE    **
** 663  USED IN STEADY STATE CONTROL TO CLOSE INTACT LOOP STEAM VALVE   **
** 670  RESET BROKEN LOOP STEAM RELIEF VALVE FOR HYSTERESIS EFFECTS     **
** 671  OPEN BROKEN LOOP STEAM GENERATOR RELIEF VALVE                   **
** 672  USED IN STEADY STATE CONTROL TO OPEN BROKEN LOOP STEAM VALVE    **
** 673  USED IN STEADY STATE CONTROL TO CLOSE BROKEN LOOP STEAM VALVE   **
**                                                                      **
************************************************************************
*
*  TRIP   VR CO    PARA      RELA  VA CO   PARA     ADD    INDX  TIMEOF
0000401  TIME      0         GE    NULL    0      1000.0   L    -1.
0000402  TIME      0         GE    NULL    0      9999.0   L    -1.
0000403  TIME      0         LT    NULL    0        0.     L    -1.
0000406  TIME      0         GE    NULL    0      9999.0   L    -1.
0000407  P       999010000    LE    NULL    0      1827.5   L    -1.
0000408  TIME      0         GE    TIMEOF  407      26.3   L    -1.
0000409  TIME      0         GE    TIMEOF  407       4.6   L    -1.
0000410  TIME      0         GE    TIMEOF  407       7.3   L    -1.
0000411  TIME      0         GE    TIMEOF  407       7.3   L    -1.
0000412  TIME      0         GE    TIMEOF  407       4.7   L    -1.
0000413  TIME      0         GE    TIMEOF  407       4.35  L    -1.
0000414  TIME      0         GE    TIMEOF  407       0.0   L    -1.
0000415  TIME      0         GE    TIMEOF  407       0.0   L    -1.
0000416  TIME      0         LT    NULL    0         0.0   L    -1.
0000417  TIME      0         LT    NULL    0         0.0   L    -1.
0000418  TIME      0         LT    NULL    0         0.    L    -1.
0000419  TIME      0         LE    NULL    0        50.    N    -1.
0000420  TIME      0         GE    NULL    0         0.    L     0.
0000421  P       999010000    GE    NULL    0      2305.    N    -1.
0000422  TIME      0         GE    TIMEOF  412      64.    L    -1.
0000423  TIME      0         GE    NULL    0      9988.    L    -1.
0000424  TIME      0         LT    NULL    0         0.    L    -1.
0000425  TIME      0         LT    NULL    0         0.    L    -1.
0000426  CNTRLVAR 29         GE    NULL    0       922.0   N    -1.
0000429  TIME      0         LE    NULL    0       340.    N    -1.
0000430  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000431  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000432  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000433  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000436  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000437  TIME      0         GE    TIMEOF  406       0.    L    -1.
0000439  TIME      0         LT    NULL    0         0.    L    -1.
0000440  CNTRLVAR 565        LT    NULL    0      +184.0   N    -1.
0000441  CNTRLVAR 564        LT    NULL    0       +90.0   N    -1.
0000442  CNTRLVAR 561        LT    NULL    0       -62.0   N    -1.
0000443  CNTRLVAR 561        LT    NULL    0      -423.0   N    -1.
0000600    401    426
0000624    424    AND    -425   N    -1.
0000640    422    AND     440   L    -1.
0000641    422    AND     441   L    -1.
0000642    422    AND     442   L    -1.
0000643    422    AND     443   N    -1.
*
* STEAM GENERATOR RELIEF VALVE TRIPS, INCLUDING HYSTERESIS EFFECTS
*
0000460  P       611010000  GT    NULL    0      1048.0   N    -1.
0000461  P       611010000  GT    NULL    0      1045.0   N    -1.
```

```
0000470  P      705010000  GT   NULL     0      1048.0   N    -1.
0000471  P      705010000  GT   NULL     0      1045.0   N    -1.
*
* STEAM GENERATOR RELIEF VALVE LOGIC
*
0000660    461    AND     661   N    -1.
0000661    460     OR     660   N    -1.
0000670    471    AND     671   N    -1.
0000671    470     OR     670   N    -1.
*
**********************************************************************
* TRIPS USED FOR CONTROLLING STEAM GENERATOR PRESSURES IN STEADY-STATE *
* ACCEPTABLE PRESSURE BANDS - TRIPS 462 & 463 (IL) AND 472 & 473 (BL)  *
* MAX AND MIN PRESSURE RATE CHANGES - TRIPS 464, 465(IL), 474, 475(BL) *
* OPEN OR CLOSE STEAM VALVES _ TRIPS 662 & 663 (IL) AND 672 & 673 (BL) *
**********************************************************************
*
*                          INTACT LOOP
0000462  P      611010000  GE   NULL     0       857.7   N    -1.
0000463  P      611010000  LE   NULL     0       853.7   N    -1.
0000464  CNTRLVAR 631      GT   NULL     0     -2500.    N    -1.
0000465  CNTRLVAR 631      LT   NULL     0      2500.    N    -1.
0000662    462    AND     464   N    -1.
0000663    463    AND     465   N    -1.
*
*                          BROKEN LOOP
0000472  P      705010000  GE   NULL     0       857.7   N    -1.
0000473  P      705010000  LE   NULL     0       853.7   N    -1.
0000474  CNTRLVAR 731      GT   NULL     0     -2500.    N    -1.
0000475  CNTRLVAR 731      LT   NULL     0      2500.    N    -1.
0000672    472    AND     474   N    -1.
0000673    473    AND     475   N    -1.
*
*                                                  ******************
*                                                  *                *
*                                                  *    INTACT      *
*                                                  *     LOOP       *
*                                                  *                *
**********************************************************************
* HOT LEG, VESSEL OUTLET TO PRESSURIZER SURGE LINE TEE               *
**********************************************************************
*
*   REF DRAWINGS:  HOT LEG NOZZLE  - 407986
*                  3  PC-1B (SP-1) - 414684
*                  2.5PC-18 (SP-2) - 407346
*                  2.5PC-2  (SP-3) - 415155
*
*   INLET ELEV = OUTLET ELEV = + 8.500 IN.
*
*              NAME      TYPE
2010000        C201      PIPE
*
*            NO VOL
2010001          2
*
*              AREA    VOL NO
2010101     .0396502       1   * HOT VESSEL NOZZLE (ID = 2.880 IN)
2010102     .0314314       2   * 3 IN SCH 160
*
*            LENGTH    VOL NO
```

```
2010301    2.6425000        1
2010302    2.4716667        2   * SPOOL PIECES 1 AND 2
*
*            HZ ANG    VOL NO
2010501       -45.0        1
2010502       -45.0        2
*
*            VR ANG    VOL NO
2010601         0.0        2
*
*            ELV CH    VOL NO
2010701         0.0        2
*
*             ROUGH    HY DIA    VOL NO
2010801     6.667E-5      0.0        2
*
*            F LOSS    R LOSS    JUN NO
2010901        0.05      0.05        1
*
*           CTL FLG    VOL NO
2011001           0        2
*
*             VCAHS    JUN NO
2011101           0        1
*
*       CTL   PRESS     TEMP     ZERO      ZERO   AIR FLG    VOL NO
2011201   3  2258.30   592.30      0.0       0.0         0         1
2011202   3  2258.30   592.30      0.0       0.0         0         2
*
*           CTL FLG
2011300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
2011301      17.450       0.0       0.0         1
*
*********************************************************************
* HOT LEG - PRESSURIZER SURGE LINE TEE                              *
*********************************************************************
*
*   REF DRAWINGS:  2.5PC-2 (SP-3) - 415155
*                  2.5PC-6 (SP-4) - 414431
*
*   PRESSURIZER CONNECTION IS HORIZONTAL TO THE HOT LEG CENTER LINE.
*
*   INLET ELEV = OUTLET ELEV = + 8.500 IN.
*
*              NAME      TYPE
2020000         C202    BRANCH
*
*            NO JUN       CTL
2020001           3         1
*
*              AREA    LENGTH    VOLUME   HZ ANG    VR ANG    ELV CH
2020101     .0246289  2.7433333     0.0      0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
2020102     6.667E-5      0.0         0
*
*       CTL   PRESS     TEMP
2020200   3  2258.30   592.30
```

```
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2021101    201010000 202000000 .0246289     0.075     0.075         0
2022101    202010000 203000000 .0246289     0.075     0.075         0
2023101    997010000 202000000 7.4667E-4      0.0       0.0       101
*
*            FLOW-F    FLOW-G      VELJ
2021201      17.450       0.0       0.0
2022201      17.450       0.0       0.0
2023201       0.000       0.0       0.0
*
************************************************************************
* PRESSURIZER TIME DEPENDENT VOLUME  (FOR STEADY STATE CALCULATIONS)   *
************************************************************************
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE
9890000        C989    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
9890101    .06926263     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
9890102         0.0       0.0         0
*
*           CTL FLG
9890200           2
*
*              TIME  PRESSURE     QUALE
9890201         0.0   2243.73       1.0
*
************************************************************************
* TIME DEPENDENT PRESSURIZER JUNCTION                                  *
************************************************************************
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE
9910000      TMD-PRZ     VALVE
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
9910101    989000000 999000000 .06926263      0.0       0.0       100
*
*        CTL  FLOW-F    FLOW-G      VELJ
9910201    1     0.0       0.0       0.0
*
*          VLV TYPE
9910300      MTRVLV
*
*           OP TRIP   CL TRIP     SLOPE   INIT POS    TABLE
9910301         403       423      0.20       1.0        0
*
************************************************************************
* PRESSURIZER DESIRED LEVEL  TIME DEPENDENT JUNCTION                   *
************************************************************************
*
*   FOR STEADY STATE - INPUT FOR GETTING AND MAINTAINING DESIRED LEVEL
*   ELEV = 87.000 IN.
*
```

```
*              NAME      TYPE
9850000      PZRLVLJ    TMDPJUN
*
*              FROM        TO  JUN AREA
9850101    980000000 999010000      .012
*
*           CTL FLG      TRIP    SEARCH  VARIABLE
9850200           1         0      CNTRLVAR  985
*
*         TABLE TAKES INTO ACCOUNT CONVERSION OF KG TO LB
*              KG      LB
9850201       -10.0  -22.0462       0.0       0.0
9850202         0.0    0.0          0.0       0.0
9850203        10.0   22.0462       0.0       0.0
*
*********************************************************************
* PRESSURIZER DESIRED LEVEL  TIME DEP VOLUME - TEMP FROM BOTTOM PZR    *
*********************************************************************
*
*   FOR STEADY STATE - INPUT FOR GETTING AND MAINTAINING DESIRED LEVEL
*   ELEV = 87.000 IN.
*
*              NAME      TYPE
9800000      PZRLVLV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
9800101        .012     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
9800102         0.0       0.0         0
*
*           CTL FLG      TRIP    SEARCH  VARIABLE
9800200           1         0     TEMPF 999070000
*
*          TEMP (F)  TEMP (F)     QUALE
9800201        80.0      80.0       0.0
9800202       575.0     575.0       0.0
9800203      1340.0    1340.0       0.0
9800204     17540.0   17540.0       0.0
*
*********************************************************************
* PRESSURIZER SPRAY  TIME DEPENDENT JUNCTION                          *
*********************************************************************
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE
9100000      PZRSPRY    TMDPJUN
*
*              FROM        TO  JUN AREA
9100101    920000000 999000000      .012
*
*           CTL FLG      TRIP
9100200           1       418
*
*  CHECK FLOWS FOR 260 - SAME IF NORMAL SPRAY ONLY
*              TIME    FLOW-F    FLOW-G      VELJ
9100201        -1.0    0.0         0.0       0.0
9100202         0.0    0.0         0.0       0.0
9100203      2000.0    0.0         0.0       0.0
```

```
*
*********************************************************************
* PRESSURIZER SPRAY TIME DEP VOLUME - TEMP FROM INTACT LOOP COLD LEG   *
*********************************************************************
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE
9200000      PZRSPRV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
9200101        .012     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
9200102         0.0       0.0         0
*
*****  NORMAL SPRAY  *****
**           CTL FLG      TRIP    SEARCH  VARIABLE
*9200200           1         0    TEMPF 261010000
**
**          TEMP (F)  TEMP (F)     QUALE
*9200201        80.0      80.0       0.0
*9200202       575.0     575.0       0.0
*9200203      1340.0    1340.0       0.0
*9200204     17540.0   17540.0       0.0
**
*****  AUXILARY SPRAY OR COMBINATION  *****
*           CTL FLG
9200200           3
*
*              TIME  PRESSURE      TEMP
9200201         0.0      12.3      80.0
*
*********************************************************************
* PRESSURIZER PRESSURE RELIEF VALVE                                 *
*********************************************************************
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE   * SIMULATE
9340000        PRSRV     VALVE   * SRV
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
9340101    999000000 940000000  1.4748E-5     0.0       0.0       100
*
*               CD1       CD2
9340102         0.7      0.84
*
*       CTL  FLOW-F    FLOW-G     VELJ
9340201   1    0.0       0.0       0.0
*
*          VLV TYPE
9340300      TRPVLV
*
*              TRIP
9340301         421
*
*********************************************************************
* PRESSURIZER RELIEF VALVE - TIME DEP DISCHARGE VOLUME              *
*********************************************************************
```

```
*
*   ELEV = +326.875 IN.
*
*              NAME      TYPE
9400000        PRSDV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
9400101        10.00    10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
9400102         0.0      0.0         0
*
*           CTL FLG
9400200           2
*
*              TIME  PRESSURE     QUALE
9400201         0.0     12.3       1.0
*
*********************************************************************
* LONG PRESSURIZER                                                  *
*********************************************************************
*
*   REF DRAWINGS:  416200 - PZR ASSEMBLY
*                  416199 - PRZ INSTALLATION
*                  418126 - PZR THERMAL SHOCK SHIELD FOR SPRAY, NO LINER
*
*   VESSEL ID = 3.631 IN, TOTAL INTERIOR HEIGHT = 239.875 IN
*   BOTTOM OF PRESSURIZER MODEL IS TOP OF HEATER ROD RETAINER
*   WHICH IS 5.2 INCHES BELOW THE LOWER PRESSURE TAP
*   INCLUDES 6 HEATER RODS 0.75 INCHES DIA.
*
*   TOTAL VOLUME = 2417.26 IN3 WITHOUT THERMAL SHIELD
*
*   INLET ELEV  = TOP    = +326.875 IN.
*   OUTLET ELEV = BOTTOM = + 87.000 IN.
*
*              NAME      TYPE
9990000        C999      PIPE
*
*            NO VOL
9990001           8
*
*              AREA    VOL NO
9990101   0.07190844        1
9990102   0.07190844        7
9990103   0.05350067        8 * INCLUDES 6 HTR RODS, GRID PLATE.
*
*              AREA    JUN NO
9990201   0.07190844        1
9990202   0.07190844        6
9990203   0.05350067        7
*
*            LENGTH    VOL NO
9990301     2.500000        1
9990302     2.562500        6
9990303     2.583333        7
9990304     2.093750        8
*
*            VR ANG    VOL NO
9990601       -90.0        8
```

```
*
*            ELV CH    VOL NO
9990701    -2.500000        1
9990702    -2.562500        6
9990703    -2.583333        7
9990704    -2.093750        8
*
*            ROUGH    HY DIA    VOL NO
9990801     6.667E-5  .2858333       1
9990802     6.667E-5  .3025833       7
9990803     6.667E-5  .1005325       8
*
*           F LOSS    R LOSS    JUN NO
9990901        0.0       0.0        7
*
*          CTL FLG    VOL NO
9991001          0         8
*
*            VCAHS    JUN NO
9991103          0         7
*
*       CTL   PRESS     QUALS      ZERO      ZERO   AIR FLG    VOL NO
9991201   2  2258.30    1.00       0.0       0.0        0         2
9991202   2  2258.30    0.0777     0.0       0.0        0         3
9991203   2  2258.30    0.00       0.0       0.0        0         8
*
*          CTL FLG
9991300          1
*
*           FLOW-F    FLOW-G      VELJ    JUN NO
9991301        0.0       0.0       0.0         7
*
*************************************************************************
* PRESSURIZER VESSEL OUTLET                                             *
*************************************************************************
*
*   REF DRAWINGS:  416204 & 416205
*   OUTLET 6 HOLES + ANNULUS AROUND GRID PLATE
*   ELEV = +87.000 IN.
*
*             NAME      TYPE
9980000       J*998    SNGLJUN
*
*             FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
9980101    999010000 997000000  6.1762E-3     0.0       0.0       100
*
*       CTL  FLOW-F    FLOW-G      VELJ
9980201   1    0.0       0.0       0.0
*
*************************************************************************
* PRESSURIZER SURGE LINE                                                *
*************************************************************************
*
*   REF DRAWINGS:  416119 & 416204
*
*   INLET ELEV  = TOP    = + 87.000 IN.
*   OUTLET ELEV = BOTTOM = +  8.500 IN.
*
*             NAME      TYPE
9970000       C*997     PIPE
```

```
*
*            NO VOL
9970001           3
*
*              AREA    VOL NO
9970101    6.1762E-3        1  * INCLUDES HEATER ROD RETAINER
9970102    7.4667E-4        2
9970103    7.4667E-4        3
*
*            LENGTH    VOL NO
9970301    0.5416667        1
9970302    5.6458333        2
9970303    4.0625000        3
*
*            VR ANG    VOL NO
9970601       -90.0        1
9970602       -90.0        2
9970603       -5.46        3
*
*            ELV CH    VOL NO
9970701   -0.5416667        1
9970702   -5.6458333        2
9970703   -0.3541667        3
*
*             ROUGH    HY DIA    VOL NO
9970801     6.667E-5   .0479447       1
9970802     6.667E-5   .0308333       3
*
*            F LOSS    R LOSS    JUN NO
9970901      7.8434    7.8434        1  *  TOTAL R' = 1.63E9 M**-4
9970902      7.8434    7.8434        2  *  DIVIDED EQUALLY AMONG
*                                       *  THE TWO JUNCTIONS
*                                       *  K = (R')(2A**2)
*           CTL FLG    VOL NO
9971001           0        3
*
*             VCAHS    JUN NO
9971101           0        2
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
9971201   3  2258.30   592.30       0.0       0.0         0         3
*
*           CTL FLG
9971300           1
*            FLOW-F    FLOW-G      VELJ    JUN NO
9971301         0.0       0.0       0.0         2
*
************************************************************************
* HOT LEG PRESSURIZER SURGE LINE TEE TO STEAM GENERATOR INLET          *
************************************************************************
*
*   REF DRAWINGS:  2.5PC-6 (SP-4) - 414431
*                  2.5PC-7 (SP-5) - 414425
*                  2.5PC-8 (SP-6) - 414426
*                  2.5PC-9 (SP-7) - 414427
*                  INLET PLENUM   - 414271
*
*   INLET ELEV  =  + 8.500 IN. (HOT LEG CENTERLINE)
*   OUTLET ELEV = + 73.969 IN. (BOTTOM OF INLET PLENUM)
*
```

```
*                NAME      TYPE
2030000          C203      PIPE
*
*              NO VOL
2030001          3
*
*                AREA    VOL NO
2030101      .0246289        3  * 2.5 IN SCH-160
*
*              LENGTH    VOL NO
2030301    2.6542072         1  * SPOOL PIECES 4,5,6
2030302    2.3329167         2
2030303    2.1884513         3  * SPOOL PIECE 7 & INLET PLENUM CONNECT
*
*              VR ANG    VOL NO
2030601         +45.0        1
2030602         +90.0        2
2030603         +45.0        3
*
*              ELV CH    VOL NO
2030701    1.3941666         1
2030702    2.3329167         2
2030703    1.7286602         3
*
*               ROUGH    HY DIA    VOL NO
2030801    -6.667E-5       0.0         3
*
*              F LOSS    R LOSS    JUN NO
2030901         0.075     0.075         1
2030902         0.050     0.050         2
*
*             CTL FLG    VOL NO
2031001               0        3
*
*               VCAHS    JUN NO
2031101           000        2
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
2031201    3  2258.30    592.30       0.0       0.0         0         1
2031202    3  2258.30    592.30       0.0       0.0         0         2
2031203    3  2258.30    592.30       0.0       0.0         0         3
*
*             CTL FLG
2031300               1
*
*              FLOW-F    FLOW-G      VELJ    JUN NO
2031301        17.450       0.0       0.0         2
*
*                                                 **********************
*                                                 *   INTACT LOOP      *
*                                                 *     TYPE-II        *
*                                                 *  STEAM GENERATOR   *
*********************************************************************
* STEAM GENERATOR INLET                                               *
*********************************************************************
*
*   REF DRAWING:  414271
*
*   ELEV = +73.969 IN.
*
```

```
*                NAME      TYPE
2050000          J205    SNGLJUN
*
*
*                FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2050101     203010000 210000000  0.024629       6.0       0.0       000
*
*        CTL  FLOW-F    FLOW-G      VELJ
2050201    1  17.450       0.0       0.0
*
*********************************************************************
* STEAM GENERATOR INLET PLENUM                                      *
*********************************************************************
*
*   REFERENCE - TYPE-II (INTACT LOOP) STEAM GENERATOR PANT-LEG DRWG,
*                       AND PLENUM DRWG. 414271 (1,2)
*        NOTE - INLET PLENUM ENTRANCE IS CIRCULAR (DIA=2.125 IN),
*               PLENUM TAPERS OUTWARD, NONUNIFORMLY, WITH RISE TO
*               TUBE SHEET INLET (INLET PLENUM OUTLET).
*               OUTLET IS RECTANGULAR WITH RADIUSED CORNERS.
*
*   INLET ELEV  = BOTTOM = + 73.969 IN.
*   OUTLET ELEV = TOP    = + 81.594 IN.
*
*                NAME      TYPE
2100000          C210    SNGLVOL
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2100101           0.0  0.6354167  0.0478680   +90.0     +90.0  0.6354167
*
*               ROUGH    HY DIA       CTL
2100102      6.667E-5  0.2805910        0
*
*        CTL   PRESS      TEMP      ZERO
2100200    3  2258.30   592.30       0.0
*
*********************************************************************
* INTACT LOOP STEAM GENERATOR TUBE SHEET INLET                      *
*********************************************************************
*
*   REF DRAWING:  406416
*
*   INLET ELEV  = BOTTOM = + 81.594 IN. (BOTTOM OF TUBE SHEET)
*   OUTLET ELEV = TOP    = +102.594 IN. (TOP OF TUBE SHEET)
*
*                NAME      TYPE
2150000       ILTS-IN    BRANCH
*
*             NO JUN    IN CTL
2150001            2         1
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2150101      0.019757    1.7500       0.0       0.0      90.0    1.7500
*
*               ROUGH    HY DIA       CTL
2150102      5.000E-6    .06475        0
*
*        CTL   PRESS      TEMP
2150200    3  2258.30   592.30
*
```

```
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2151101    210010000 215000000  0.019757      1.0       0.0       100
2152101    215010000 220000000  0.019757      0.0       0.0       000
*
*            FLOW-F    FLOW-G      VELJ
2151201      17.450       0.0       0.0
2152201      17.450       0.0       0.0
*
*********************************************************************
* STEAM GENERATOR TUBE BUNDLE                                       *
*********************************************************************
*
*   REF DRAWINGS:  413415 & 414271
*
*   INLET ELEV = OUTLET ELEV = +102.594 IN. (TOP OF TUBE SHEET)
*
*   ELEV LONG TUBE   = 391.24 IN. ABOVE TOP OF TUBE SHEET
*   ELEV MIDDLE TUBE = 364.86 IN. ABOVE TOP OF TUBE SHEET
*   ELEV SHORT TUBE  = 336.99 IN. ABOVE TOP OF TUBE SHEET
*
*   ELEV MODEL TUBE  = 364.490 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
2200000      ISGTUB      PIPE
*
*            NO VOL
2200001           8
*
*              AREA    VOL NO
2200101     0.019757         8      * 6 TUBES, ID = 0.777 IN
*
*            LENGTH    VOL NO
2200301    7.9525000         1      * 8 VOLUMES AROUND U-TUBES; 4 UP AND
2200302    7.9108334         3      * 4 DOWN.  LENGTHS ARE EQUIVALENT
2200303    6.6920292         5      * TO SECONDARY SIDE LENGTHS (C600)
2200304    7.9108334         7
2200305    7.9525000         8
*
*            VR ANG    VOL NO
2200601       +90.0         3
2200602       +88.6         4
2200603       -88.6         5
2200604       -90.0         8
*
*            ELV CH    VOL NO
2200701   +7.9525000         1
2200702   +7.9108334         3
2200703   +6.5999883         4
2200704   -6.5999883         5
2200705   -7.9108334         7
2200706   -7.9525000         8
*
*             ROUGH    HY DIA    VOL NO
2200801     5.000E-6    .06475         8
*
*            F LOSS    R LOSS    JUN NO
2200901          0.0       0.0         3
2200902          0.0       0.0         4
2200903          0.0       0.0         7
*
```

```
*            CTL FLG    VOL NO
2201001            0         8
*
*            CTL FLG    JUN NO
2201101            0         7
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
2201201    3  2258.30    592.30       0.0       0.0         0         1
2201202    3  2258.30    592.30       0.0       0.0         0         2
2201203    3  2258.30    592.30       0.0       0.0         0         3
2201204    3  2258.30    592.30       0.0       0.0         0         4
2201215    3  2258.30    531.30       0.0       0.0         0         5
2201216    3  2258.30    531.30       0.0       0.0         0         6
2201217    3  2258.30    531.30       0.0       0.0         0         7
2201218    3  2258.30    531.30       0.0       0.0         0         8
*
*            CTL FLG
2201300            1
*
*             FLOW-F    FLOW-G      VELJ    JUN NO
2201301       17.450       0.0       0.0         7
*
*************************************************************************
* STEAM GENERATOR SECONDARY VOLUME                                      *
*************************************************************************
*
*   REF DRAWINGS:  413463 - ASSEMBLY     406419 - SEPARATOR
*                  413357 - FILLERS      413415 - BAFFLE PLATES
*
*   INLET ELEV  =   0.000 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 436.875 IN. ABOVE TOP OF TUBE SHEET
*
*               NAME      TYPE
6000000       ISGSEC      PIPE
*
*             NO VOL
6000001            5
*
*               AREA    VOL NO
6000101          0.0         5
*
*               AREA    JUN NO
6000201     .0583799         3 * SINGLE BAFFLE PLATE ALONG FLOW PATH
6000202     .0917866         4 * BAFFLE PLATE WHICH SUPPORTS TC-TUBE
*
*             LENGTH    VOL NO
6000301   7.9525000         1 * VOL BEGINS ABOVE TOP OF TUBE SHEET.
6000302   7.9108334         3 * VOLUMES ARE SEPARATED BY JUNCTIONS
6000303   7.4762500         4 * AT BAFFLE PLATES. (NOT ALL PLATES ARE
6000304   5.1558333         5 * CONSIDERED - SOME ARE WITHIN VOLUMES)
*
*              VOLUME    VOL NO
6000401   1.0038417         1
6000402   0.9402046         2
6000403   0.8926058         3
6000404   1.0017945         4
6000405   2.2709806         5
*
*             VR ANG    VOL NO
6000601        +90.0         5
```

```
*
*            ELV CH    VOL NO
6000701    7.9525000        1
6000702    7.9108334        3
6000703    7.4762500        4
6000704    5.1558333        5
*
*             ROUGH    HY DIA    VOL NO
6000801     6.667E-5   .0884737        3
6000802     6.667E-5   .1058911        4
6000803     6.667E-5   .6378870        5
*
*           CTL FLG    VOL NO
6001001           0        5
*
*             VCAHS    JUN NO
6001101         100        4   * BAFFLE PLATES
*
*       CTL   PRESS     QUALS      ZERO      ZERO   AIR FLG    VOL NO
6001201   2  829.600   0.02054       0.0       0.0         0         1
6001202   2  829.600   0.04054       0.0       0.0         0         2
6001203   2  829.600   0.06054       0.0       0.0         0         3
6001204   2  829.600   0.06054       0.0       0.0         0         4
6001205   2  829.600   0.10000       0.0       0.0         0         5
*
*           CTL FLG
6001300           0
*
*             VEL-F     VEL-G      VELJ    JUN NO
6001301         2.800     4.500       0.0         1
6001302         4.700     7.400       0.0         2
6001303         5.200    10.500       0.0         3
6001304         4.000    11.700       0.0         4
*
*************************************************************************
* INTACT LOOP STEAM GENERATOR SECONDARY SEPARATOR                       *
*************************************************************************
*
*   REF DRAWING:  413463
*
*   INLET ELEV  = 436.875 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 446.375 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6010000       ISGDCT    SEPARATR
*
*            NO JUN       CTL
6010001           3         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6010101          0.0   .7916667  .4508175       0.0      90.0   .7916667
*
*             ROUGH    HY DIA       CTL
6010102     6.667E-5       0.0         0
*
*       CTL   PRESS     QUALS
6010200   2  829.600      0.30
*
*              FROM        TO  JUN AREA  F LOSS  R LOSS  CAHS  VOIDGF
6011101    601010000 612000000  .4690572     0.0     0.0  1002    0.50
```

```
6012101    601000000 602000000  .4690572     0.0     0.0  1002    0.15
6013101    600010000 601000000  .5353713     0.0     0.0  1000
*
*             VEL-F     VEL-G      VELJ
6011201      -2.500     1.600       0.0
6012201       1.000     0.0         0.0
6013201       1.600     1.600       0.0
*
************************************************************************
* INTACT LOOP STEAM GENERATOR SECONDARY STEAM DOME                     *
************************************************************************
*
*   REF DRAWING:  413795
*
*   INLET ELEV  = 446.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6110000       ISGSD    SNGLVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6110101         0.0   .748750   .4249623      0.0      90.0   .748750
*
*             ROUGH    HY DIA       CTL
6110102     6.667E-5   .5664365       0
*
*       CTL   PRESS     QUALS      ZERO
6110200   2  829.600     1.00       0.0
*
************************************************************************
* INTACT LOOP STEAM GENERATOR SECONDARY DOWNCOMER (TOP)                *
************************************************************************
*
*   REF DRAWING:  413463
*
*   INLET ELEV  = 441.625 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 375.005 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6020000       ISGSD    BRANCH
*
*            NO JUN       CTL
6020001           1         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6020101         0.0  5.5516667  3.0085308     0.0     -90.0 -5.5516667
*
*             ROUGH    HY DIA       CTL
6020102     6.667E-5   .3369291       0
*
*       CTL   PRESS     QUALS
6020200   2  829.600     0.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
6021101    602010000 603000000  .0819087     0.0       0.0         0
*
*             VEL-F     VEL-G      VELJ
6021201      0.4300   -0.3400      0.0
*
************************************************************************
```

```
* INTACT LOOP STEAM GENERATOR SECONDARY SEPARATOR BYPASS                *
************************************************************************
*
*   REF DRAWING:  413463
*
*   INLET ELEV  = 441.625 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 460.110 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6120000       ISGBY    BRANCH
*
*            NO JUN       CTL
6120001           2         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6120101          0.0 1.5404167  .7816260      0.0      90.0 1.5404167
*
*             ROUGH    HY DIA       CTL
6120102    6.667E-5   .6533449         0
*
*       CTL   PRESS     QUALS
6120200   2  829.600     1.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
6121101    612010000 611000000 0.3139546      0.0       0.0         3
6122101    602000000 612000000 0.7880455      0.0       0.0         0
*
*             VEL-F     VEL-G      VELJ
6121201         0.0       0.0       0.0
6122201         0.0       0.0       0.0
*
************************************************************************
* INTACT LOOP STEAM GENERATOR SECONDARY DOWNCOMER (BOTTOM)              *
************************************************************************
*
*   REF DRAWINGS:  413363 - ASSEMBLY
*                  414048 - FILLERS
*
*   INLET ELEV  = 375.005 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV =   0.000 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6030000      ISGDCB      PIPE
*
*            NO VOL
6030001           4
*
*              AREA    VOL NO
6030101         0.0         4
*
*              AREA    JUN NO
6030201   0.0292836         3
*
*            LENGTH    VOL NO
6030301   7.4762500         1
6030302   7.9108334         3
6030303   7.9525000         4
*
*            VOLUME    VOL NO
6030401     .2211171         1
```

```
6030402      .2316581        2
6030403      .2316581        3
6030404      .3322701        4
*
*            VR ANG    VOL NO
6030601       -90.0        4
*
*            ELV CH    VOL NO
6030701   -7.4762500        1
6030702   -7.9108334        3
6030703   -7.9525000        4
*
*             ROUGH    HY DIA    VOL NO
6030801     6.667E-5   .0128227       1
6030802     6.667E-5   .0126981       3
6030803     6.667E-5   .0201639       4
*
*           CTL FLG    VOL NO
6031001           0        4
*
*             VCAHS    JUN NO
6031101           0        3
*
*       CTL   PRESS     QUALS      ZERO      ZERO   AIR FLG    VOL NO
6031201   2  829.600      0.0       0.0       0.0         0         1
6031202   2  829.600      0.0       0.0       0.0         0         2
6031203   2  829.600      0.0       0.0       0.0         0         3
6031204   2  829.600      0.0       0.0       0.0         0         4
*
*           CTL FLG
6031300           0
*
*             VEL-F     VEL-G      VELJ    JUN NO
6031301       6.450     6.100       0.0         3
*
*********************************************************************
* DOWNCOMER - RISER JUNCTION (THRU FLOW DIVIDER)                    *
*********************************************************************
*
*   REF DRAWING:  413979, FLOW RESTRICTOR, ADJUSTABLE AREA
*
*   ELEV = 0.0 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6040000       ISGFS    SNGLJUN
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
6040101    603010000 600000000  .0417818       0.0       0.0       100
*
*       CTL   VEL-F     VEL-G      VELJ
6040201   0   7.500     7.200       0.0
*
*********************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP FEEDWATER JUNCTION           *
*********************************************************************
*
*   ELEV = 0.0 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6100000       ISGFWJ    TMDPJUN
```

```
*
*              FROM        TO  JUN AREA
6100101    620000000 603010000      .012
*
*           CTL FLG      TRIP
*6100200          1       414
*
*              TIME    FLOW-F    FLOW-G      VELJ
*6100201       -1.0    5.6034       0.0       0.0
*6100202        0.0    5.6034       0.0       0.0
*6100203       24.0    5.6034       0.0       0.0
*6100204       26.0    0.0          0.0       0.0
*
* FOR STEADY STATE - INPUT FOR KEEPING STEAM GENERATOR MASS CONSTANT,
* PUT IN WHAT GOES OUT STEAM VALVE - (COMMENT OUT CARDS 61002XX ABOVE)
*
6100200          1       420       CNTRLVAR  610
*            TABLE TAKES INTO ACCOUNT CONVERSION OF KG TO LB
6100201      -10.0  -22.0462       0.0       0.0
6100202        0.0    0.0          0.0       0.0
6100203        0.1    0.22046      0.0       0.0
6100204       10.0   22.0462       0.0       0.0
*
************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP FEEDWATER VOLUME                *
************************************************************************
*
*   ELEV = 0.0 IN. ABOVE TOP OF TUBE SHEET
*
*   -          NAME      TYPE
6200000      ISGFWV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6200101        .012     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
6200102         0.0       0.0         0
*
*           CTL FLG
6200200           3
*
*              TIME  PRESSURE      TEMP
6200201         0.0    1250.0     450.0
*
************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP AUX FEEDWATER JUNCTION          *
************************************************************************
*
*   ELEV = 0.0 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6150000      ISGAFWJ    TMDPJUN
*
*              FROM        TO  JUN AREA
6150101    625000000 603010000      .012
*
*           CTL FLG      TRIP
6150200           1       416
*
*              TIME    FLOW-F    FLOW-G      VELJ
```

```
6150201        -1.0    0.0         0.0       0.0
6150202         0.0    0.0         0.0       0.0
6150203      2000.0    0.0         0.0       0.0
*
*************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP AUX FEEDWATER VOLUME             *
*************************************************************************
*
*   ELEV = 0.0 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6250000      ISGAFWV   TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6250101        .012     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
6250102         0.0       0.0         0
*
*           CTL FLG
6250200           3
*
*              TIME  PRESSURE      TEMP
6250201         0.0     900.0      80.0
*
*************************************************************************
* STEAM GENERATOR SECONDARY - RELIEF VALVE                              *
*************************************************************************
*
*   ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6340000        ISGRV     VALVE  *  SIMULATE ADV
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
6340101    611010000 640000000  .0002592       0.0       0.0       100
*
*       CTL  FLOW-F    FLOW-G      VELJ
6340201   1     0.0       0.0       0.0
*
*          VLV TYPE
6340300      TRPVLV
*
*              TRIP
6340301         661
*
*************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP RELIEF DISCHARGE VOLUME          *
*************************************************************************
*
*   ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6400000       ISGRDV   TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6400101       .70584     10.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
6400102         0.0       0.0         0
```

```
*
*            CTL FLG
6400200          2
*
*              TIME  PRESSURE     QUALE
6400201         0.0     12.3       1.0
*
*********************************************************************
* STEAM GENERATOR SECONDARY - DISCHARGE JUNCTION VALVE              *
*********************************************************************
*
*   ELEV = 455.360,IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6350000        ISGDJ     VALVE
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
6350101    611010000 650000000      .007    204.67    204.67       100
*
*        CTL  FLOW-F    FLOW-G      VELJ
6350201    1     0.0    5.6034       0.0
*
*          VLV TYPE
*6350300       MTRVLV
*
*          OP TRIP   CL TRIP    SLOPE   INIT POS   TABLE
*6350301        403       410   .33333   0.294088       0
*
*INPUT FOR STEADY STATE CONTROL SYSTEMS (COMMENT OUT CARDS 63503XX)
6350300       SRVVLV
6350301          637
*
*********************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP DISCHARGE VOLUME             *
*********************************************************************
*
*   ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
6500000        ISGDV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
6500101       .70584     10.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
6500102         0.0       0.0         0
*
*           CTL FLG
6500200           2
*
*              TIME  PRESSURE     QUALE
6500201         0.0     12.3       1.0
*
*********************************************************************
* CROSS CONNECTION - JUNCTION FROM IL STEAM DOME TO CONNECTION PIPE *
*********************************************************************
*
*   ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
**             NAME      TYPE
```

```
*6370000        ILCNJ    SNGLJUN
**
**              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
*6370101    611010000 647000000  0.003003       0.0       0.0       000
**
**        CTL   VEL-F     VEL-G      VELJ
*6370201    0     0.0       0.0       0.0
**
*************************************************************************
* INTACT LOOP STEAM DOME CROSS CONNECTION PIPE TO BL STEAM DOME         *
*************************************************************************
*
*   INLET ELEV  = 455.360 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*   NOTE - CROSS-OVER PIPE SNAKES AROUND:
*          VERTICALLY   DOWN    18.000 FT
*          HORIZONTALLY OVER     8.000 FT
*          HORIZONTALLY BACK     6.000 FT
*          VERTICALLY   UP      19.730 FT
*          HORIZONTALLY OVER     5.000 FT, PART OF 746
*          HORIZONTALLY FORWARD  2.000 FT, PART OF 746
*
**              NAME      TYPE
*6470000        ILCNP     PIPE
**
**            NO VOL
*6470001           3
**
**              AREA    VOL NO
*6470101      .003003        3
**
**            LENGTH    VOL NO
*6470301        18.0         1
*6470302        14.0         2
*6470303    19.7304167       3
**
**            VR ANG    VOL NO
*6470601       -90.0         1
*6470602         0.0         2
*6470603       +90.0         3
**
**            ELV CH    VOL NO
*6470701       -18.0         1
*6470702         0.0         2
*6470703    19.7304167       3
**
**              ROUGH    HY DIA    VOL NO
*6470801    6.667E-5       0.0         3
**
**           CTL FLG    VOL NO
*6471001           0         3
**
**             VCAHS    JUN NO
*6471101           0         2
**
**        CTL   PRESS     QUALS      ZERO      ZERO   AIR FLG   VOL NO
*6471201    2  829.600      0.0       0.0       0.0         0        1
*6471202    2  829.600      0.0       0.0       0.0         0        2
*6471203    2  829.600      0.0       0.0       0.0         0        3
```

```
**
**            CTL FLG
*6471300          0
**
**             VEL-F     VEL-G      VELJ    JUN NO
*6471301         0.0       0.0       0.0         2
**
*********************************************************************
* STEAM GENERATOR SECONDARY - CONNECTION VALVE TO BROKEN LOOP SECONDARY*
*********************************************************************
*
*   ELEV = 455.360 IN. ABOVE TOP OF TUBE SHEET
*
**              NAME      TYPE
*6700000        ILBLC     VALVE
**
**              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
*6700101    647010000 746010000  0.000661       0.0       0.0       100
**
**        CTL  FLOW-F    FLOW-G      VELJ
*6700201    1     0.0       0.0       0.0
**
**           VLV TYPE
*6700300       MTRVLV
**
**          OP TRIP   CL TRIP     SLOPE  INIT POS    TABLE
*6700301         624       425       1.0       0.0        0
**
*                                                 *********************
*                                                 *     END OF        *
*                                                 *  STEAM GENERATOR  *
*                                                 *    SECONDARY      *
*********************************************************************
* INTACT LOOP STEAM GENERATOR TUBE SHEET OUTLET                       *
*********************************************************************
*
*   REF DRAWINGS:  406416 & 414271
*
*   INLET ELEV  = +102.594 IN. (TOP OF TUBE SHEET)
*   OUTLET ELEV = + 81.594 IN. (BOTTOM OF TUBE SHEET)
*
*              NAME      TYPE
2250000      ILTS-OT    BRANCH
*
*            NO JUN       CTL
2250001           2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2250101     0.019757    1.7500       0.0       0.0     -90.0   -1.7500
*
*             ROUGH    HY DIA       CTL
2250102     5.000E-6    .06475         0
*
*        CTL   PRESS      TEMP
2250200    3  2258.30    531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2251101    220010000 225000000  0.019757       0.0       0.0       000
2252101    225010000 230000000  0.019757       0.0       1.0       100
*
```

```
*              FLOW-F    FLOW-G      VELJ
2251201        17.450       0.0       0.0
2252201        17.450       0.0       0.0
*
*************************************************************************
* STEAM GENERATOR OUTLET PLENUM                                         *
*************************************************************************
*
*   REF DRAWING:  414271
*
*   SEE NOTE FOR STEAM GENERATOR INLET PLENUM (C210)
*
*   INLET ELEV  = TOP    = + 81.594 IN.
*   OUTLET ELEV = BOTTOM = + 73.969 IN.
*
*               NAME      TYPE
2300000         C230    SNGLVOL
*
*               AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2300101          0.0  0.6354167  0.0478680   +90.0     -90.0 -0.6354167
*
*              ROUGH    HY DIA       CTL
2300102     6.667E-5   .2805910        0
*
*        CTL   PRESS      TEMP      ZERO
2300200    3  2258.30   531.30       0.0
*
*************************************************************************
* STEAM GENERATOR OUTLET                                                *
*************************************************************************
*
*   ELEV = +73.969 IN.
*
*               NAME      TYPE
2350000           J8    SNGLJUN
*
*               FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2350101    230010000 240000000  0.024629       0.0       6.0       000
*
*        CTL  FLOW-F    FLOW-G      VELJ
2350201    1  17.450       0.0       0.0
*
*************************************************************************
* PUMP SUCTION LEG                                                      *
*************************************************************************
*
*   REF DRAWINGS:  INLET PLENUM     - 414271
*                  2.5PC-10 (SP-8)  - 414428
*                  2.5PC-11 (SP-9)  - 414425-2
*                  2.5PC-12 (SP-10) - 414426-2
*                  2.5PC-13 (SP-11) - 414429
*                  2.5PC-14 (SP-12) - 414025-1
*                  2.5PC-15 (SP-13) - 414026
*                  2.5PC-16 (SP-14) - 414027
*                  2.5PC-17 (SP-15) - 414025-2
*                  2.5PC-18 (SP-16) - 414028
*
*   INLET ELEV  = + 73.969 IN.
*   U-BEND BOTTOM ELEV = -110.750 IN.
*   OUTLET ELEV =  - 9.850 IN.
```

```
*
*              NAME      TYPE
2400000        C240      PIPE
*
*            NO VOL
2400001          9
*
*              AREA    VOL NO
2400101    0.024629        9 * 2.5 IN SCH-160
*
*            LENGTH    VOL NO
2400301   1.5217847        1 * SPOOL PIECE - 8
2400302   3.6662500        2 *          SP - 8,9,10
2400303   3.4475000        3 *          SP - 11,12
2400304   2.8958333        4 *          SP - 13
2400305   3.5076302        5 *          SP - 14 STRAIGHT + 30 DEG BEND
2400306   1.5219271        6 *          SP - 14 60 DEG OF BEND
2400307   1.5219271        7 *          SP - 14 60 DEG OF BEND
2400308   3.5076302        8 *          SP - 14 STRAIGHT + 30 DEG BEND
2400309   4.2083333        9 *          SP - 15, 16
*
*            VR ANG    VOL NO
2400601       -45.0        1
2400602       -90.0        4
2400603      -86.79        5
2400604       -30.0        6
2400605       +30.0        7
2400606      +86.79        8
2400607       +90.0        9
*
*            ELV CH    VOL NO
2400701  -1.1836602        1
2400702  -3.6662500        2
2400703  -3.4475000        3
2400704  -2.8958333        4
2400705  -3.4733333        5
2400706  -0.7266667        6
2400707   0.7266667        7
2400708   3.4733333        8
2400709   4.2083333        9
*
*             ROUGH    HY DIA    VOL NO
2400801    6.667E-5        0         9
*
*            F LOSS    R LOSS    JUN NO
2400901         0.0       0.0         1
2400902         0.0       0.0         4
2400903         0.0       0.0         7
2400904         0.3       0.3         8
*
*           CTL FLG    VOL NO
2401001           0         9
*
*           CTL FLG    JUN NO
2401101           0         8
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
2401201   3  2258.30    531.30       0.0       0.0         0         1
2401202   3  2258.30    531.30       0.0       0.0         0         2
2401203   3  2258.30    531.30       0.0       0.0         0         3
```

```
2401204    3  2258.30   531.30       0.0       0.0         0         4
2401205    3  2258.30   531.30       0.0       0.0         0         5
2401206    3  2258.30   531.30       0.0       0.0         0         6
2401207    3  2258.30   531.30       0.0       0.0         0         7
2401208    3  2258.30   531.30       0.0       0.0         0         8
2401209    3  2258.30   531.30       0.0       0.0         0         9
*
*           CTL FLG
2401300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
2401301      17.450       0.0       0.0         8
*
*********************************************************************
* INTACT LOOP PUMP                                                  *
*********************************************************************
*
*   INLET ELEV  = BOTTOM =  - 9.850 IN.
*   OUTLET ELEV = TOP    =  0.000 IN. -- ELEVATION = 4773'-9.25"
*
*              NAME      TYPE
2500000      ILPUMP      PUMP
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2500101         0.0   2.26167   0.05584  +169.102    +90.00  0.8208334
*
*           CTL FLG
2500102           0
*
*            VOL NO  JUN AREA    F LOSS    R LOSS   JUN FLG
2500108    240010000 0.015578      0.0       0.0         0
*
*            VOL NO  JUN AREA    F LOSS    R LOSS   JUN FLG
2500109    261000000 3.739E-3      0.0       0.0        20 * ORIFICE
*
*        CTL   PRESS     TEMP      ZERO
2500200    3  2258.30   531.30       0
*
*        CTL  FLOW-F    FLOW-G      VELJ
2500201    1  17.450       0.0       0.0
*
*        CTL  FLOW-F    FLOW-G      VELJ
2500202    1  17.450       0.0       0.0
*
*INDEX      TAB DATA     PHASE   DIF TAB  TOR TAB  SP TAB  TRIP  REVER
2500301           0         0         0       -1       0     0      1
*
*              R-SP   ISP/RSP      R-FL      R-HD     R-TOR      M-IN
2500302      22500.0   0.91843     159.8     397.0      9.34       0.3
*
*             R-DEN    R-M-TR    FR-TR3    FR-TR1    FR-TR2    FR-TR4
2500303        62.3         0       0.0         0         0         0
*
*STOP DATA    ELS.TM   MX-F-SP   MN-R-SP
2500310         0.0       0.0       0.0
*
*CARD CCCXX00-CCCXX99 SINGLE PHASE PUMP HEAD AND TORQUE CURVE SET
*  SINGLE PHASE 4 QUADRANT HEAD TABLES (HOMOLOGOUS CURVES)
*
2501100   1      1
```

```
2501101  0.000, 1.409    0.174, 1.364    0.349, 1.354    0.495, 1.317
2501102  0.700, 1.224    0.884, 1.093    1.000, 1.000
2501200   1      2
2501201  0.000,-0.650    0.250,-0.475    0.500,-0.194    0.624, 0.000
2501202  0.800, 0.400    0.900, 0.700    1.000, 1.000
2501300   1      3
2501301 -1.000, 2.725   -0.888, 2.470   -0.739, 2.240   -0.492, 1.880
2501302 -0.257, 1.670    0.000, 1.409
2501400   1      4
2501401 -1.000, 2.725   -0.783, 2.050   -0.658, 1.760   -0.484, 1.500
2501402 -0.263, 1.270    0.000, 1.057
2501500   1      5,
2501501  0.000, 0.619    0.226, 0.577    0.411, 0.569    0.654, 0.612
2501502  0.875, 0.759    1.000, 1.000
2501600   1      6
2501601  0.000, 1.057    0.190, 0.888    0.325, 0.831    0.609, 0.807
2501602  0.934, 0.921    1.000, 1.000
2501700   1      7
2501701 -1.000,-0.550   -0.879,-0.275   -0.762, 0.000   -0.561, 0.367
2501702 -0.117, 0.642    0.000, 0.619
2501800   1      8
2501801 -1.000,-0.550   -0.500,-0.600    0.000,-0.650
*
*  SINGLE PHASE 4 QUADRANT TORQUE TABLES
*
2501900   2      1
2501901  0.000, 0.540    0.200, 0.590    0.400, 0.650    0.600, 0.770
2501902  0.800, 0.950    0.900, 0.980    0.950, 0.960    1.000, 0.870
2502000   2      2
2502001  0.000,-0.150    0.200, 0.020    0.400, 0.220    0.600, 0.460
2502002  0.800, 0.710    0.900, 0.810    0.950, 0.850    1.000, 0.870
2502100   2      3
2502101 -1.000, 0.620   -0.800, 0.680   -0.600, 0.530   -0.400, 0.460
2502102 -0.200, 0.490    0.000, 0.540
2502200   2      4
2502201 -1.000, 0.62    -0.800, 0.530   -0.600, 0.460   -0.400, 0.420
2502202 -0.200, 0.390    0.000, 0.360
2502300   2      5
2502301  0.000,-0.630    0.200,-0.510    0.400,-0.390    0.600,-0.290
2502302  0.800,-0.200    0.900,-0.160    1.000,-0.130
2502400   2      6
2502401  0.000, 0.360    0.200, 0.320    0.400, 0.270    0.600, 0.180
2502402  0.800, 0.050    1.000,-0.130
2502500   2      7
2502501 -1.000,-1.440   -0.800,-1.250   -0.600,-1.080   -0.400,-0.920
2502502 -0.200,-0.770    0.000,-0.630
2502600   2      8
2502601 -1.000,-1.440   -0.800,-1.120   -0.600,-0.790   -0.400,-0.520
2502602 -0.200,-0.310    0.000,-0.150
*
*  TWO PHASE HEAD MULTIPLIER TABLES
*
2503000  0
2503001  0.000, 0.000    0.100, 0.000    0.150, 0.050    0.240, 0.800
2503002  0.300, 0.960    0.400, 0.980    0.600, 0.970    0.800, 0.900
2503003  0.900, 0.800    0.960, 0.500    1.000, 0.000.
2503100  0
2503101  0.000,-0.170    .0001,-0.170    0.006, 0.000    0.100, 0.000
2503102  0.150, 0.150    0.240, 0.560    0.800, 0.560    0.960, 0.450
2503103  1.000, 0.000
```

```
*
*  TWO PHASE HEAD DIFFERENCE TABLES
*
2504100  1        1
2504101  0.000, 0.000    0.100, 0.830    0.200, 1.090    0.500, 1.020
2504102  0.700, 1.010    0.900, 0.940    1.000, 1.000
2504200  1        2
2504201  0.000, 0.000    0.100,-0.040    0.200, 0.000    0.300, 0.100
2504202  0.400, 0.210    0.800, 0.670    0.900, 0.800    1.000, 1.000
2504300  1        3
2504301 -1.000,-1.160   -0.900,-1.240   -0.800,-1.770   -0.700,-2.360
2504302 -0.600,-2.790   -0.500,-2.910   -0.400,-2.670   -0.250,-1.690
2504303 -0.100,-0.500    0.000, 0.000
2504400  1        4
2504401 -1.000,-1.160   -0.900,-0.780   -0.800,-0.500   -0.700,-0.310
2504402 -0.600,-0.170   -0.500,-0.080   -0.350, 0.000   -0.200, 0.050
2504403 -0.100, 0.080    0.000, 0.110
2504500  1        5
2504501  0.000, 0.000    0.200,-0.034    0.400,-0.650    0.600,-0.930
2504502  0.800,-1.190    1.000,-1.470
2504600  1        6
2504601  0.000, 0.110    0.100, 0.130    0.250, 0.150    0.400, 0.130
2504602  0.500, 0.070    0.600,-0.040    0.700,-0.230    0.800,-0.510
2504603  0.900,-0.910    1.000,-1.470
2504700  1        7
2504701 -1.000, 0.000    0.000, 0.000
2504800  1        8
2504801 -1.000, 0.000    0.000, 0.000
*
*  TWO PHASE TORQUE DIFFERENCE TABLES
*
2504900  2        1
2504901  0.000, 0.540    0.200, 0.590    0.400, 0.650    0.600, 0.770
2504902  0.800, 0.950    0.900, 0.980    0.950, 0.960    1.000, 0.870
2505000  2        2
2505001  0.000,-0.150    0.200, 0.020    0.400, 0.220    0.600, 0.460
2505002  0.800, 0.710    0.900, 0.810    0.950, 0.850    1.000, 0.870
2505100  2        3
2505101 -1.000, 0.620   -0.800, 0.680   -0.600, 0.530   -0.400, 0.460
2505102 -0.200, 0.490    0.000, 0.540
2505200  2        4
2505201 -1.000, 0.620   -0.800, 0.530   -0.600, 0.460   -0.400, 0.420
2505202 -0.200, 0.390    0.000, 0.360
2505300  2        5
2505301  0.000,-0.630    0.200,-0.510    0.400,-0.390    0.600,-0.290
2505302  0.800,-0.200    0.900,-0.160    1.000,-0.130
2505400  2        6
2505401  0.000, 0.360    0.200, 0.320    0.400, 0.270    0.600, 0.180
2505402  0.800, 0.050    1.000,-0.130
2505500  2        7
2505501 -1.000,-1.440   -0.800,-1.250   -0.600,-1.080   -0.400,-0.920
2505502 -0.200,-0.770    0.000,-0.630
2505600  2        8
2505601 -1.000,-1.440   -0.800,-1.120   -0.600,-0.790   -0.400,-0.520
2505602 -0.200,-0.310    0.000,-0.150
*
* PUMP COAST DOWN TABLE IS GENERAL TABLE 250
* USE CONTROL VARIABLES 250 AND 251 TO SET PUMP SPEED.
*
*                TRIP       PARAMETER
```

```
2506100          420   CNTRLVAR  251
*TABLE TAKES INTO ACCOUNT CONVERSION OF RAD/SEC TO REV/MIN
2506101         -1.0      20665.000
2506102          0.0          0.000
2506103          1.0          9.549
2506104        100.0        954.930
2506105        500.0       4774.297
2506106       1000.0       9549.297
2506107       3000.0      28647.890
*
*********************************************************************
* PRESSURIZER SPRAY LINE TEE - TIME DEPENDENT JUNCTION              *
*********************************************************************
*
*   ELEV = 0.0 IN.
*
*              NAME      TYPE
2600000      PZRSPYT    TMDPJUN
*
*              FROM        TO  JUN AREA
2600101    261000000 290000000      .012
*
*           CTL FLG      TRIP
2600200           1       418
*
*              TIME    FLOW-F    FLOW-G     VELJ
2600201        -1.0    0.0         0.0      0.0
2600202         0.0    0.0         0.0      0.0
2600203      2000.0    0.0         0.0      0.0
*
*********************************************************************
* PRESSURIZER SPRAY LINE - TIME DEPENDENT VOLUME                    *
*********************************************************************
*
*   ELEV = 0.0 IN.
*
*              NAME      TYPE
2900000      PZRSPYL    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2900101        .012     10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
2900102         0.0       0.0         0
*
*           CTL FLG
2900200           3
*
*              TIME  PRESSURE      TEMP
2900201         0.0      12.3      80.0
*
*********************************************************************
* COLD LEG...PUMP OUTLET TO ECC INJECTION POINT TEE                 *
*********************************************************************
*
*   REF DRAWINGS:  3PC-11A (SP-19) - 412544
*                  3PC-12  (SP-20) - 404759
*                  3PC-13  (SP-21) - 404794 OR 3PC-1A - 407718
*                  3PC-19A (SP-22) - 414684-3
*
```

```
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
2610000        C261      PIPE
*
*            NO VOL
2610001          2
*
*              AREA    VOL NO
2610101     .0375539        2 * 3 IN SCH-160 (ID = 2.624 IN)
*
*            LENGTH    VOL NO
2610301    2.0766667        1 * SPOOL PIECE - 19,20
2610302    2.0766667        2 *          SP - 21 & TO ECC TAP IN SP-22
*
*            VR ANG    VOL NO
2610601        0.0        2
*
*            ELV CH    VOL NO
2610701        0.0        2
*
*             ROUGH    HY DIA    VOL NO
2610801     6.667E-5        0         2
*
*            CTL FLG    VOL NO
2611001          0        2
*
*             VCAHS    JUN NO
2611101        000        1
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
2611201   3  2258.30   531.30       0.0       0.0         0         2
*
*           CTL FLG
2611300         1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
2611301      17.450       0.0       0.0         1
*
*************************************************************************
* ECC INJECTION TEE                                                     *
*************************************************************************
*
*   REF DRAWING:  3PC-19A (SP-22) - 414684-3
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
2620000        C262    BRANCH
*
*            NO JUN       CTL
2620001          3         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
2620101     .0375539 2.0766667       0.0     202.5       0.0       0.0
*
*             ROUGH    HY DIA       CTL
2620102     6.667E-5       0.0         0
*
*       CTL   PRESS      TEMP
```

```
2620200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
2621101    261010000 262000000 .0375539      0.30      0.30         0
2622101    262010000 263000000 .0375539      0.30      0.30         0
2623101    400010000 262000000 .0049952      0.0       0.0      20121
*
*            FLOW-F    FLOW-G      VELJ
2621201      17.450      0.0       0.0
2622201      17.450      0.0       0.0
2623201       0.0        0.0       0.0
*
*************************************************************************
* ECC LINE                                                              *
*************************************************************************
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
4000000    ILECCPIPE     PIPE
*
*            NO VOL
4000001         1
*
*              AREA    VOL NO
4000101     .0049952      1
*
*            LENGTH    VOL NO
4000301       10.0        1
*
*            VR ANG    VOL NO
4000601        0.0        1
*
*            ELV CH    VOL NO
4000701        0.0        1
*
*             ROUGH    HY DIA    VOL NO
4000801     6.667E-5     0.0        1
*
*           CTL FLG    VOL NO
4001001         0        1
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
4001201    3  2258.30   531.30      0.0       0.0        0        1
*
*************************************************************************
* HPIS - TIME DEP JUNCTION                                              *
*************************************************************************
*
*   ELEV = 0.0 IN.
*
*              NAME      TYPE
4100000      ILHPISJ    TMDPJUN
*
*              FROM        TO  JUN AREA
4100101    420000000 400000000 .0049952
*
*           CTL FLG      TRIP     TABLE    VOLUME
4100200         1       408         P  262010000
*
```

```
*          PRES(PSIA)    FLOW-F    FLOW-G      VELJ
4100201        -1.0      0.0000      0.0       0.0
4100202         0.0      0.0000      0.0       0.0
4100203        15.0      0.03219     0.0       0.0
4100204       332.25     0.02545     0.0       0.0
4100205       384.51     0.02434     0.0       0.0
4100206       431.70     0.02509     0.0       0.0
4100207       472.88     0.02400     0.0       0.0
4100208       510.39     0.02898     0.0       0.0
4100209       519.09     0.02371     0.0       0.0
4100210       561.93     0.02375     0.0       0.0
4100211       652.46     0.02531     0.0       0.0
4100212       729.93     0.02516     0.0       0.0
4100213       812.43     0.02329     0.0       0.0
4100214       820.29     0.01873     0.0       0.0
4100215      1123.66     0.01480     0.0       0.0
4100216      1158.0      0.01418     0.0       0.0
4100217      1258.0      0.01184     0.0       0.0
4100218      1348.0      0.00968     0.0       0.0
4100219      1407.0      0.00717     0.0       0.0
4100220      1455.0      0.00460     0.0       0.0
4100221      1560.0      0.00        0.0       0.0
4100222      1600.0      0.00        0.0       0.0
*
*********************************************************************
* HPIS TIME DEPENDENT VOLUME                                        *
*********************************************************************
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
4200000      ILHPISV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
4200101        10.0      10.0      0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA      CTL
4200102     6.667E-5     0.0        0
*
*           CTL FLG
4200200         3
*
*              TIME  PRESSURE     TEMP
4200201         0.0     12.3      80.0
*
*********************************************************************
* ACCUMULATOR                                                       *
*********************************************************************
*
*   INLET ELEV  = BOTTOM =   0.000 IN.
*   OUTLET ELEV = TOP    = + 43.066 IN.
*
*              NAME      TYPE
4300000        ILACC     ACCUM
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
4300101      0.7085    3.5888      0.0       0.0      90.0    3.5888
*
*             ROUGH    HY DIA      CTL
4300102     6.667E-5     0.0        10
```

```
*
*          PRESSURE      TEMP
4300200       615.0      80.0
*
*                        TO  JUN AREA    F LOSS    R LOSS     VCAHS
4301101              400000000  .004995  17227.44  17227.44       000
*
*        VLIQ  LIQ LEV  LNLEN  ELEV  THICK HTR-FLG TNKRHO TNKCP NIT-K
4302200  1.582       0   30.0     0  .0574       0      0     0     0
*
*********************************************************************
* COLD LEG...ECC INJECTION POINT TO DOWNCOMER INLET                 *
*********************************************************************
*
*   REF DRAWINGS:  407986 (DOWNCOMER COLD LEG NOZZLE)
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
2630000        C263      PIPE
*
*            NO VOL
2630001          1
*
*              AREA    VOL NO
2630101     .0396802       1 * 3 IN SCH-160 (ID = 2.624 IN)
*
*            LENGTH    VOL NO
2630301      2.1535        1   * COLD LEG DOWNCOMER NOZZLE
*
*            VR ANG    VOL NO
2630601        0.0         1
*
*            ELV CH    VOL NO
2630701        0.0         1
*
*             ROUGH    HY DIA    VOL NO
2630801    6.667E-5      0.0        1
*
*           CTL FLG    VOL NO
2631001          0         1
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
2631201   3  2258.30   531.30       0.0       0.0         0         1
*
*                                                 ********************
*                                                 *                  *
*                                                 *  REACTOR VESSEL  *
*                                                 *     SIMULATOR    *
*                                                 *                  *
*********************************************************************
* COLD LEG INLET ANNULUS TO DOWNCOMER TEE                           *
*********************************************************************
*
*   REF DRAWINGS:  ASSEMBLY    - 407986
*                  INNER LINER - 407990
*                  OUTER LINER - 407991
*
*   INLET ELEV  = TOP    = + 12.000 IN.
*   OUTLET ELEV = BOTTOM = - 12.000 IN.
```

```
*
*              NAME      TYPE
1010000      COLDTEE    BRANCH
*
*            NO JUN       CTL
1010001           4         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1010101     .1056970    2.0000       0.0       0.0     -90.0   -2.0000
*
*             ROUGH    HY DIA       CTL
1010102     6.667E-5   .142750         0
*
*        CTL   PRESS      TEMP
1010200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1011101    101000000 181000000  7.46674E-4     0.0       0.0       100
1012101    101010000 110000000  0.026039      0.0       0.0         0
1013101    263010000 101000000  0.045082      1.5       1.5       001
1014101    363010000 101000000  0.045082      1.5       1.5       001
*
*            FLOW-F    FLOW-G      VELJ
1011201      0.5908       0.0       0.0
1012201      22.900       0.0       0.0
1013201      17.450       0.0       0.0
1014201       5.840       0.0       0.0
*
*********************************************************************
* DOWNCOMER                                                         *
*********************************************************************
*
*   INLET ELEV  = TOP    = - 12.000 IN.
*   OUTLET ELEV = BOTTOM = -214.770 IN.
*
*              NAME      TYPE
1100000      DCOMER      PIPE
*
*            NO VOL
1100001          10
*
*              AREA    VOL NO
1100101     0.030975         1  * INCLUDES REDUCING SECTION OF ANNULUS
1100102     0.026039         8  * DOWNCOMER PIPE
1100103     0.031502         9  * SLANTED PIPE + ENTRANCE HALF ANNULUS
1100104     0.0762104       10  * DISTRIBUTION ANNULUS
*
*            LENGTH    VOL NO
1100301     2.260833         1
1100302     1.000833         2
1100303     2.000000         7
1100304     1.465667         8
1100305     1.434751         9
1100306     0.962500        10
*
*            VR ANG    VOL NO
1100601       -90.0         8
1100602      -55.75         9
1100603       -90.0        10
*
```

```
*              ELV CH     VOL NO
1100701     -2.260833          1
1100702     -1.000833          2
1100703     -2.000000          7
1100704     -1.465667          8
1100705     -1.207667          9
1100706     -0.962500         10
*
*              ROUGH     HY DIA     VOL NO
1100801      6.667E-5   0.159535        1
1100802      6.667E-5   0.0             9
1100803      6.667E-5   0.111833       10
*
*             F LOSS     R LOSS     JUN NO
1100901        0.0        0.0           6
1100902        1.35       1.35          7 * MASS FLOW MEASUREMENT STATION
1100903        0.0        0.0           8
1100904        0.0        0.0           9
*
*            CTL FLG     VOL NO
1101001            0         10
*
*              VCAHS     JUN NO
1101101            0          9
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG   VOL NO
1101201    3  2258.30   531.30       0.0       0.0         0        1
1101202    3  2258.30   531.30       0.0       0.0         0        2
1101203    3  2258.30   531.30       0.0       0.0         0        3
1101204    3  2258.30   531.30       0.0       0.0         0        4
1101205    3  2258.30   531.30       0.0       0.0         0        5
1101206    3  2258.30   531.30       0.0       0.0         0        6
1101207    3  2258.30   531.30       0.0       0.0         0        7
1101208    3  2258.30   531.30       0.0       0.0         0        8
1101209    3  2258.30   531.30       0.0       0.0         0        9
1101210    3  2258.30   531.30       0.0       0.0         0       10
*
*            CTL FLG
1101300            1
*
*             FLOW-F     FLOW-G      VELJ    JUN NO
1101301       22.900       0.0       0.0         9
*
*************************************************************************
* LOWER PLENUM                                                          *
*************************************************************************
*
*   INLET ELEV  = TOP    = -214.770 IN.
*   OUTLET ELEV = BOTTOM = -223.433 IN.
*
*               NAME      TYPE
1300000      LO-PLEN    BRANCH
*
*             NO JUN       CTL
1300001            3         1
*
*               AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1300101     0.322478   0.721917     0.0       0.0     -90.0  -0.721917
*
*              ROUGH    HY DIA       CTL
```

```
1300102     6.667E-5   0.229414        0
*
*        CTL   PRESS      TEMP
1300200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1301101    110010000 130000000  0.0762104     1.0       1.0       100
1302101    130000000 140000000  0.075189      0.0       0.0       100
1303101    130010000 120000000  0.322478      0.0       0.0       000
*
*            FLOW-F    FLOW-G      VELJ
1301201      22.900      0.0       0.0
1302201      22.900      0.0       0.0
1303201       0.0        0.0       0.0
*
*********************************************************************
* LOWER PLENUM LOWER VOLUME                                         *
*********************************************************************
*
*   INLET ELEV  = TOP    = -223.433 IN.
*   OUTLET ELEV = BOTTOM = -229.033 IN.
*
*              NAME      TYPE
1200000      LPLOVOL    SNGLVOL
*
*              AREA    LENGTH   VOLUME   HZ ANG    VR ANG    ELV CH
1200101     0.510279   0.466667     0.0      0.0     -90.0  -0.466667
*
*             ROUGH    HY DIA       CTL
1200102     6.667E-5  0.381247       0
*
*        CTL   PRESS      TEMP      ZERO
1200200    3  2258.30   531.30       0.0
*
*********************************************************************
* CORE INLET                                                        *
*********************************************************************
*
*   INLET ELEV  = BOTTOM = -214.770 IN.
*   OUTLET ELEV = TOP    = -195.140 IN.
*
*              NAME      TYPE
1400000      CORE-IN    SNGLVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1400101     0.075189   1.635833     0.0      0.0      90.0   1.635833
*
*             ROUGH    HY DIA       CTL
1400102     6.667E-5  0.278329       0
*
*        CTL   PRESS      TEMP      ZERO
1400200    3  2258.30   531.30       0.0
*
*********************************************************************
* CORE INLET JUNCTION                                               *
*********************************************************************
*
*   ELEV = -195.140 IN.
*
*              NAME      TYPE
```

```
1450000   COREIN-JUN    SNGLJUN
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1450101    140010000 150000000  0.026780       0.2       0.1         0
*
*        CTL  FLOW-F    FLOW-G      VELJ
1450201    1  22.900       0.0       0.0
*
*********************************************************************
* AVERAGE CHANNEL                                                   *
*********************************************************************
*
*   INLET ELEV  = BOTTOM = -195.140 IN.
*   OUTLET ELEV = TOP    = - 51.140 IN.
*
*              NAME      TYPE
1500000      A-CHNEL      PIPE
*
*            NO VOL
1500001           6
*
*              AREA    VOL NO
1500101     0.030376         6
*
*              AREA    JUN NO
1500201     0.026780         5
*
*            LENGTH    VOL NO
1500301          2.0         6
*
*            VR ANG    VOL NO
1500601        +90.0         6
*
*            ELV CH    VOL NO
1500701          2.0         6
*
*             ROUGH    HY DIA    VOL NO
1500801     6.667E-5  0.032836         6
*
*            F LOSS    R LOSS    JUN NO
1500901         0.10      0.10         5
*
*           CTL FLG    VOL NO
1501001           0         6
*
*             VCAHS    JUN NO
1501101           0         5
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1501201    3  2258.30    531.30       0.0       0.0         0         1
1501202    3  2258.30    531.30       0.0       0.0         0         2
1501203    3  2258.30    531.30       0.0       0.0         0         3
1501204    3  2258.30    591.90       0.0       0.0         0         4
1501205    3  2258.30    591.90       0.0       0.0         0         5
1501206    3  2258.30    591.90       0.0       0.0         0         6
*
*           CTL FLG
1501300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
```

```
1501301      22.900      0.0      0.0       5
*
*************************************************************************
* UPPER CORE                                                            *
*************************************************************************
*
*   INLET ELV  = BOTTOM = -51.140 IN
*   OUTLET ELV = TOP    = -39.130 IN
*
*              NAME      TYPE
1610000      UP-CORE    BRANCH
*
*            NO JUN       CTL
1610001           4         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1610101     0.057859  1.000833      0.0       0.0      90.0  1.000833
*
*             ROUGH    HY DIA       CTL
1610102    6.667E-5   0.07561         0
*
*        CTL   PRESS      TEMP
1610200    3  2258.30   591.90
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1611101    150010000 161000000  0.026780       0.8       0.8       000
1612101    161010000 162000000  0.017208       0.0       0.0       100
1613101    182010000 161010000  0.0016085      0.0       0.0       100
1614101    186010000 161010000  0.004606    .43613    .43613       100
*
*            FLOW-F    FLOW-G      VELJ
1611201      22.900       0.0       0.0
1612201      21.000       0.0       0.0
1613201       0.0         0.0       0.0
1614201      -1.900       0.0       0.0
*
*************************************************************************
* CORE OUTLET                                                           *
*************************************************************************
*
*   INLET ELEV  = BOTTOM = - 39.130 IN.
*   OUTLET ELEV = TOP    = -  6.000 IN.
*
*              NAME      TYPE
1620000      COREOUT    BRANCH
*
*            NO JUN       CTL
1620001           1         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1620101     0.045640  2.760833      0.0       0.0      90.0  2.760833
*
*             ROUGH    HY DIA       CTL
1620102    6.667E-5   0.120892        0
*
*        CTL   PRESS      TEMP
1620200    3  2258.30   591.90
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1621101    186000000 162000000  0.075341    .92664    .77720     00003
```

```
*
*              FLOW-F    FLOW-G      VELJ
1621201         0.500       0.0       0.0
*
*********************************************************************
* HOT LEG OUTLET TEE                                                *
*********************************************************************
*
*   INLET ELEV  = BOTTOM = -  6.000 IN.
*   OUTLET ELEV = TOP    = + 23.000 IN.
*
*                NAME      TYPE
1630000        HOTOUT    BRANCH
*
*              NO JUN       CTL
1630001             4         1
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1630101      0.050621  2.416667       0.0       0.0      90.0  2.416667
*
*               ROUGH    HY DIA       CTL
1630102      6.667E-5  0.143638         0
*
*         CTL   PRESS      TEMP
1630200     3  2258.30    592.30
*
*                FROM        TO  JUN AREA   F LOSS    R LOSS     VCAHS
1631101     163000000 201000000  0.045082       2.5       2.5       002
1632101     163000000 301000000  0.045082       2.5       2.5       002
1633101     162010000 163000000  0.037583       3.0       3.0       000
1634101     163010000 164000000  0.056700       0.0       0.0       000
*
*              FLOW-F    FLOW-G      VELJ
1631201        17.450       0.0       0.0
1632201         5.840       0.0       0.0
1633201        21.500       0.0       0.0
1634201        -2.360       0.0       0.0
*
*********************************************************************
* TOP OF UPPER PLENUM                                               *
*********************************************************************
*
*   INLET ELEV  = BOTTOM = + 23.000 IN.
*   OUTLET ELEV = TOP    = + 53.600 IN.
*
*                NAME      TYPE
1640000        UPPLEN    SNGLVOL
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1640101      0.056700    2.5500       0.0       0.0      90.0    2.5500
*
*               ROUGH    HY DIA       CTL
1640102      6.667E-5  0.168707         0
*
*         CTL   PRESS      TEMP      ZERO
1640200     3  2258.30    588.00       0.0
*
*********************************************************************
* UPPER HEAD TOP VOLUME                                             *
*********************************************************************
```

```
*                                                        * GEOMETRY WITH UHI *
*   INLET ELEV  = TOP    = +166.760 IN.                  *   TUBE REMOVED    *
*   OUTLET ELEV = BOTTOM = +132.190 IN.                  ********************
*
*              NAME      TYPE
1940000      UPHUPV    BRANCH
*
*            NO JUN       CTL
1940001           2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1940101     0.061685  2.880833      0.0       0.0     -90.0  -2.880833
*
*             ROUGH    HY DIA       CTL
1940102     6.667E-5  0.280250         0
*
*        CTL   PRESS      TEMP
1940200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1941101    194010000 183000000  2.19233E-3    0.0       0.0       100
1942101    194010000 193000000  0.053694      0.0       0.0       000
*
*            FLOW-F    FLOW-G      VELJ
1941201      0.5908       0.0       0.0
1942201     -0.5908       0.0       0.0
*
***********************************************************************
* UPPER HEAD - TOP MID VOLUME                                         *
***********************************************************************
*                                                        * GEOMETRY WITH UHI *
*   INLET ELEV  = TOP    = +132.190 IN.                  *   TUBE REMOVED    *
*   OUTLET ELEV = BOTTOM = + 90.750 IN.                  ********************
*
*              NAME      TYPE
1930000      TMUPHD    BRANCH
*
*            NO JUN       CTL
1930001           2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1930101      .053694  3.453333      0.0       0.0     -90.0  -3.453333
*
*             ROUGH    HY DIA       CTL
1930102     6.667E-5  0.206333         0
*
*        CTL   PRESS      TEMP
1930200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1931101    193010000 192000000  0.052330      0.0       0.0       000
1932101    181010000 193010000  7.46674E-4    0.0       0.0       100
*
*            FLOW-F    FLOW-G      VELJ
1931201      0.0          0.0       0.0
1932201      0.5908       0.0       0.0
*
***********************************************************************
* UPPER HEAD MIDDLE VOLUME                                            *
***********************************************************************
```

```
*                                                    * GEOMETRY WITH UHI *
*   INLET ELEV  = TOP    = + 90.750 IN.              *   TUBE REMOVED    *
*   OUTLET ELEV = BOTTOM = + 67.160 IN.              ********************
*
*              NAME      TYPE
1920000      LO-PLEN    BRANCH
*
*            NO JUN       CTL
1920001           2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1920101     0.052330  1.965833     0.0       0.0     -90.0  -1.965833
*
*             ROUGH    HY DIA       CTL
1920102     6.667E-5  0.178630       0
*
*        CTL   PRESS      TEMP
1920200    3  2258.30   592.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1921101    192010000 191000000  0.049603      0.0       0.0       000
1922101    192010000 182000000  0.0016085   5000.0    5000.0       000
*
*            FLOW-F    FLOW-G      VELJ
1921201         0.0       0.0       0.0
1922201         0.0       0.0       0.0
*
*************************************************************************
* UPPERHEAD LOWER VOLUME                                                *
*************************************************************************
*
*   INLET ELEV  = TOP    = + 67.160 IN.
*   OUTLET ELEV = BOTTOM = + 61.440 IN.
*
*              NAME      TYPE
1910000       UPHLOV     PIPE
*
*            NO VOL
1910001           1
*
*              AREA    VOL NO
1910101     0.049603        1
*
*            LENGTH    VOL NO
1910301     0.476667        1
*
*            VR ANG    VOL NO
1910601       -90.0         1
*
*            ELV CH    VOL NO
1910701    -0.476667        1
*
*             ROUGH    HY DIA    VOL NO
1910801     6.667E-5  0.138401       1
*
*           CTL FLG    VOL NO
1911001           0         1
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1911201    3  2258.30   592.30       0.0       0.0         0         1
```

```
*
*************************************************************************
* BYPASS LINE FROM DC UPPER INLET ANNULUS TO UPPER HEAD                 *
*************************************************************************
*
*   INLET ELEV  = BOTTOM = + 12.000 IN.
*   OUTLET ELEV = TOP    = + 90.750 IN.
*
*              NAME      TYPE
1810000      BPLINE      PIPE
*
*            NO VOL
1810001          2
*
*              AREA    VOL NO
1810101   7.46674E-4       2
*
*              AREA    JUN NO
1810201   1.09978E-4       1
*
*            LENGTH    VOL NO
1810301    3.421917        1
1810302    4.390583        2    * INCLUDES HORIZONTAL SECTION
*
*            HZ ANG    VOL NO
1810501        0.0         2
*
*            VR ANG    VOL NO
1810601       90.0         2
*
*            ELV CH    VOL NO
1810701    3.421917        1
1810702    3.140583        2
*
*             ROUGH    HY DIA    VOL NO
1810801    5.000E-6      0.0        2
*
*            F LOSS    R LOSS    JUN NO
1810901      2.5700    2.5700        1   *  ADJUST TO GET 0.9%
*
*           CTL FLG    VOL NO
1811001          0         2
*
*             VCAHS    JUN NO
1811101         000        1
*
*      CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1811201   3  2258.30   531.30      0.0       0.0         0         1
1811202   3  2258.30   531.30      0.0       0.0         0         2
*
*           CTL FLG
1811300          1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
1811301      0.5908      0.0       0.0         1
*
*************************************************************************
* CORE SUPPORT COLUMN(S)  - BOTH MODELED AS SINGLE FLOW PATH            *
*************************************************************************
*
```

```
*   INLET ELEV  = TOP    = + 67.160 IN.
*   OUTLET ELEV = BOTTOM = - 39.130 IN.
*
*              NAME      TYPE
1820000       SUPTUB     PIPE
*
*            NO VOL
1820001          1
*
*              AREA    VOL NO
1820101    0.0016085       1
*
*            LENGTH    VOL NO
1820301     8.85750        1
*
*            VR ANG    VOL NO
1820601      -90.0        1
*
*            ELV CH    VOL NO
1820701    -8.85750       1
*
*             ROUGH    HY DIA    VOL NO
1820801    5.000E-6        0         1
*
*           CTL FLG    VOL NO
1821001       0          1
*
*       CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1821201   3  2258.30   592.30      0.0       0.0        0         1
*
*********************************************************************
* CONTROL ROD GUIDE TUBE (TOP)                                      *
*********************************************************************
*
*   INLET ELEV  = TOP    = +132.190 IN.
*   OUTLET ELEV = BOTTOM = + 84.200 IN.
*
*              NAME      TYPE
1830000      GUITUB1     PIPE
*
*            NO VOL
1830001          1
*
*              AREA    VOL NO
1830101    2.19233E-3      1
*
*            LENGTH    VOL NO
1830301    3.999167        1
*
*            VR ANG    VOL NO
1830601      -90.0         1
*
*            ELV CH    VOL NO
1830701    -3.999167       1
*
*             ROUGH    HY DIA    VOL NO
1830801    5.000E-6       0.0        1
*
*           CTL FLG    VOL NO
1831001          0         1
```

```
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1831201    3  2258.30   592.30       0.0       0.0         0         1
*
************************************************************************
* CROSS-FLOW VOLUME IN GUIDE TUBE THROUGH DRILL HOLES TO UPPER PLENUM  *
************************************************************************
*
*   INLET ELEV  = TOP    = + 84.200 IN.
*   OUTLET ELEV = BOTTOM = + 23.000 IN.
*
*              NAME      TYPE
1840000      GUITUB2    BRANCH
*
*            NO JUN       CTL
1840001           3         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1840101   2.19233E-3    5.1000       0.0       0.0     -90.0   -5.1000
*
*             ROUGH    HY DIA       CTL
1840102     5.000E-6       0.0         0
*
*        CTL   PRESS      TEMP
1840200    3  2258.30   600.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1841101    183010000 184000000  2.19233E-3     0.0       0.0         0
1842101    184010000 185000000  2.19233E-3     0.0       0.0         0
1843101    184000000 164010000  4.26106E-3  5000.0       0.0         2
*  8 -- 5/16 IN. DIAMETER HOLES CONNECT GUIDE TUBE TO UPPER PLENUM (164)
*
*            FLOW-F    FLOW-G      VELJ
1841201       2.3600       0.0       0.0
1842201       2.3600       0.0       0.0
1843201      -1.4000       0.0       0.0
*
************************************************************************
* MIDDLE PART OF GUIDE TUBE                                            *
************************************************************************
*
*   INLET ELEV  = TOP    = + 23.000 IN.
*   OUTLET ELEV = BOTTOM = -  6.000 IN.
*
*              NAME      TYPE
1850000      GUITUB3     PIPE
*
*            NO VOL
1850001           1
*
*              AREA    VOL NO
1850101   2.19233E-3         1
*
*            LENGTH    VOL NO
1850301      2.416667         1
*
*            VR ANG    VOL NO
1850601       -90.0         1
*
*            ELV CH    VOL NO
```

```
1850701     -2.416667        1
*
*              ROUGH    HY DIA    VOL NO
1850801     5.000E-6       0.0         1
*
*            CTL FLG    VOL NO
1851001            0         1
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
1851201    3  2258.30    591.90       0.0       0.0         0         1
*
*********************************************************************
* LOWER PART OF GUIDE TUBE   (SLOTTED SECTION)                      *
*********************************************************************
*
*   REF DRAWING:  408010
*
*   INLET ELEV  = TOP    = -  6.000 IN.
*   OUTLET ELEV = BOTTOM = - 39.130 IN.
*
*               NAME      TYPE
1860000      GUISLOT    BRANCH
*
*             NO JUN       CTL
1860001            1         1
*
*               AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
1860101     0.010809   2.760833     0.0       0.0     -90.0  -2.760833
*
*              ROUGH    HY DIA       CTL
1860102     5.000E-6   0.120415         0
*
*        CTL   PRESS      TEMP
1860200    3  2258.30    591.90
*
*               FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
1861101    185010000 186000000  2.19233E-3  .43613    .43613       100
*
*             FLOW-F    FLOW-G      VELJ
1861201      -1.4000       0.0       0.0
*
*                                                        *************
*                                                        *  BROKEN   *
*                                                        *   LOOP    *
*********************************************************************
* HOT LEG                                                           *
*********************************************************************
*   REF DRAWINGS:  HOT LEG NOZZLE      - 407975
*                  1.5ABL-1   (SP-50) - 407670
*                  1.5ABL-14A (SP-55) - 414670
*                  1.5ABL-30  (SP-56) - 414671
*                  1.5ABL-31  (SP-57) - 414672
*                  1.5ABL-32  (SP-58) - 414673
*                  1.5ABL-33  (SP-59) - 414674
*                  INLET PLENUM       - 414272
*
*   INLET ELEV  =  + 8.500 IN.
*   OUTLET ELEV = + 71.969 IN.
*
*               NAME      TYPE
```

```
3010000        BL-HL      PIPE
*
*            NO VOL
3010001           6
*
*              AREA    VOL NO
3010101    0.0268943        1  * 3 IN. SCH-160
3010102    0.0097643        6  * 1.5 IN SCH-160
*
*            LENGTH    VOL NO
3010301    2.1725000        1  * HOT LEG NOZZLE
3010302    2.2101267        3  * SPOOL PIECE - 50
3010303    2.7245243        4  * SP-55
3010304    2.3580833        5  * SP-56,57,58 & 90 BEND OF 55
3010305    1.9753140        6  * SP-59, AND INLET PLENUM
*
*            HZ ANG    VOL NO
3010501         0.0        6
*
*            VR ANG    VOL NO
3010601         0.0        3
3010602        +45.0        4
3010603        +90.0        5
3010604        +45.0        6
*
*            ELV CH    VOL NO
3010701         0.0        3
3010702    1.4025000        4
3010703    2.3580833        5
3010704    1.5284935        6
*
*             ROUGH    HY DIA    VOL NO
3010801     6.667E-5       0.0         6
*
*            F LOSS    R LOSS    JUN NO
3010901         0.3       0.3         1
3010902         0.1       0.1         2
3010903         0.8       0.8         3
3010904         0.8       0.8         5
*
*           CTL FLG    VOL NO
3011001           0        6
*
*             VCAHS    JUN NO
3011101           0        5
*
*      CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
3011201   3  2258.30   592.30       0.0       0.0         0         1
3011202   3  2258.30   592.30       0.0       0.0         0         2
3011203   3  2258.30   592.30       0.0       0.0         0         3
3011204   3  2258.30   592.30       0.0       0.0         0         4
3011205   3  2258.30   592.30       0.0       0.0         0         5
3011206   3  2258.30   592.30       0.0       0.0         0         6
*
*           CTL FLG
3011300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
3011301        5.840       0.0       0.0         5
*
```

```
************************************************************************
* STEAM GENERATOR INLET                                                *
************************************************************************
*
*   REF DRAWING:  414272 SH.2
*
*   ELEV = +71.969 IN.
*
*              NAME      TYPE
3050000        J305    SNGLJUN
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3050101    301010000 310000000  0.0097643     0.0       0.0       000
*
*       CTL  FLOW-F    FLOW-G      VELJ
3050201   1   5.840      0.0       0.0
*
************************************************************************
* STEAM GENERATOR INLET PLENUM                                         *
************************************************************************
*
*   REFERENCE - TYPE-II (BROKEN LOOP) STEAM GENERATOR PANT-LEG DRWG,
*                       AND PLENUM DRWG. 414272 (1,2)
*        NOTE - INLET PLENUM ENTRANCE IS CIRCULAR (DIA=1.388 IN),
*               PLENUM TAPERS OUTWARD, NONUNIFORMLY, WITH RISE TO
*               TUBE-SHEET INLET (INLET PLENUM OUTLET).
*               OUTLET IS RECTANGULAR WITH RADIUSED CORNERS.
*
*   INLET ELEV  = + 71.969 IN.
*   OUTLET ELEV = + 81.594 IN.
*
*              NAME      TYPE
3100000       BLSGIP    SNGLVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3100101         0.0  0.8020833  .0495847     0.0      90.0  0.8020833
*
*             ROUGH    HY DIA       CTL
3100102     6.667E-5  0.2600218       0
*
*       CTL   PRESS      TEMP      ZERO
3100200   3  2258.30   592.30       0.0
*
************************************************************************
* BROKEN LOOP STEAM GENERATOR TUBE SHEET                               *
************************************************************************
*
*   REF DRAWING:  418972
*
*   INLET ELEV  = + 81.594 IN. (BOTTOM OF TUBE SHEET)
*   OUTLET ELEV = +102.604 IN. (TOP OF TUBE SHEET)
*
*              NAME      TYPE
3150000      BLTS-IN    BRANCH
*
*            NO JUN       CTL
3150001           2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3150101    0.0060544  1.751830     0.0       0.0     88.07   1.7508333
```

```
*
*              ROUGH    HY DIA       CTL
3150102     5.000E-6  .0620833         0
*
*        CTL   PRESS      TEMP      ZERO
3150200    3  2250.00   548.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3151101    310010000 315000000  0.0060544     0.0       0.0       100
3152101    315010000 320000000  0.0060544     0.0       0.0       000
*
*            FLOW-F    FLOW-G      VELJ
3151201       7.310       0.0       0.0
3152201       7.310       0.0       0.0
*
*********************************************************************
* STEAM GENERATOR TUBE BUNDLE                                       *
*********************************************************************
*
*   REF DRAWINGS:  418977 & 418980
*
*   INLET ELEV = OUTLET ELEV = +102.604 IN. (TOP OF TUBE SHEET)
*
*   ELEV LONG TUBE   = 391.00 IN. ABOVE TOP OF TUBE SHEET
*   ELEV SHORT TUBE  = 336.00 IN. ABOVE TOP OF TUBE SHEET
*
*   ELEV MODEL TUBE  = 363.50 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
3200000      BSGTUB      PIPE
*
*            NO VOL
3200001           8
*
*              AREA    VOL NO
3200101    6.0544E-3         8
*
*            LENGTH    VOL NO
3200301    7.7916667         1  * VOLUMES 2 & 3, 6 & 7 HAVE LENGTHS
3200302    7.5000000         3  * AND ELEVATIONS EQUAL TO THEIR CORRES-
3200303    7.5428097         5  * PONDING SECONDARY SIDE VOLUMES.
3200304    7.5000000         7  * VOLUMES 4 & 5 ARE EACH HALF OF THE
3200305    7.7916667         8  * 180 DEGREE BEND.
*
*            HZ ANG    VOL NO
3200501       -90.0         8
*
*            VR ANG    VOL NO
3200601       +90.0         4
3200602       -90.0         8
*
*            ELV CH    VOL NO
3200701   +7.7916667         1
3200702   +7.5000000         3
3200703   +7.5000000         4
3200704   -7.5000000         5
3200705   -7.5000000         7
3200706   -7.7916667         8
*
*              ROUGH    HY DIA    VOL NO
```

```
3200801     5.000E-6  .0620833        8
*
*            F LOSS    R LOSS    JUN NO
3200901        0.34      0.34         7
*
*           CTL FLG    VOL NO
3201001           0         8
*
*           CTL FLG    JUN NO
3201101           0         7
*
*       CTL   PRESS      TEMP      ZERO   ZERO  AIR FLG    VOL NO
3201201   3  2250.00   548.00       0.0    0.0       0         4
3201202   3  2250.00   548.00       0.0    0.0       0         8
*
*           CTL FLG
3201300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
3201301       7.310       0.0       0.0         7
*
*************************************************************************
* STEAM GENERATOR SECONDARY VOLUME                                      *
*************************************************************************
*
*   REF DRAWINGS: ASSEMBLY - $$$$$$     BAFFLE PLATES - $$$$$$
*                 SEPARATOR - $$$$$$
*
*   INLET ELEV   =  13.000 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV  = 445.375 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7000000      BSGSEC      PIPE
*
*           NO VOL
7000001           5
*
*              AREA    VOL NO
7000101         0.0         5
*
*              AREA    JUN NO
7000201    0.0242668         3  * BAFFLE PLATES
7000202    0.0203190         4  * 180 DEG RETURN - TOP OF SHORT TUBE
*
*            LENGTH    VOL NO
7000301    6.7083333         1
7000302    7.5000000         4
7000303    6.8229167         5
*
*            VOLUME    VOL NO
7000401    0.2213819         1
7000402    0.2476839         2
7000403    0.2461911         3
7000404    0.2649840         4
7000405    0.3268035         5
*
*            VR ANG    VOL NO
7000601       +90.0         5
*
*            ELV CH    VOL NO
```

```
7000701    6.7083333        1
7000702    7.5000000        4
7000703    6.8229167        5
*
*             ROUGH    HY DIA    VOL NO
7000802     6.667E-5   0.0659845       3
7000803     6.667E-5   0.0753070       4
7000804     6.667E-5   0.1934227       5
*
*           CTL FLG    VOL NO
7001001           0         5
*
*               AHS    JUN NO
7001101         100         3  *  BAFFLE PLATES
7001102         100         4  *  180 DEG RETURN
*
*       CTL   PRESS     QUALS      ZERO   ZERO   AIR FLG    VOL NO
7001201   2  876.000   0.00880      0.0    0.0         0         5
*
*           CTL FLG
7001300           0
*
*             VEL-F     VEL-G      VELJ    JUN NO
7001301        2.4000    3.4000      0.0         1
7001302        3.5000    4.8000      0.0         2
7001303        4.0000    6.4000      0.0         3
7001304        3.4000    7.6000      0.0         4
*
*************************************************************************
* BROKEN LOOP STEAM GENERATOR SECONDARY RISER (TOP) (SWIRL VANE)        *
*************************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 445.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 461.375 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7010000        SWIRL    BRANCH
*
*            NO JUN       CTL
7010001           2         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7010101         0.0  1.3333333  .5794734      0.0      90.0  1.3333333
*
*             ROUGH    HY DIA       CTL
7010102     6.667E-5   .6944443         0
*
*       CTL   PRESS     QUALS      ZERO
7010200   2  876.000     1.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7011101    700010000 701000000  .0458694      50.0      50.0       100
7012101    701000000 711000000  .0205061       1.5       1.5     00000
*
*             VEL-F     VEL-G      VELJ
7011201        0.3500    0.3300      0.0
7012201        0.0       0.0         0.0
*
```

```
************************************************************************
* BROKEN LOOP STEAM GENERATOR PRELIMINARY SEPARATOR                    *
************************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 461.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 465.875 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7030000      BLSGPSP    BRANCH
*
*            NO JUN       CTL
7030001           1         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7030101          0.0     0.375   .1534235      0.0      90.0     0.375
*
*             ROUGH    HY DIA       CTL
7030102     6.667E-5   .2429779         0
*
*        CTL   PRESS     QUALS      ZERO
7030200    2  876.000     1.0
*
*              FROM        TO  JUN AREA   F LOSS    R LOSS     VCAHS
7031101    701010000 703000000  .3477297      0.0       0.0      100
*
*             VEL-F     VEL-G      VELJ
7031201       0.3500    0.3500       0.0
*
************************************************************************
* BROKEN LOOP STEAM GENERATOR SECONDARY SEPARATOR                      *
************************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 461.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 465.875 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7040000      BSGSEP    SEPARATR
*
*            NO JUN       CTL
7040001           3         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7040101          0.0     0.375   .1002201      0.0      90.0     0.375
*
*             ROUGH    HY DIA       CTL
7040102     6.667E-5       0.0         0
*
*        CTL   PRESS     QUALS      ZERO
7040200    2  876.000     1.00
*
*              FROM        TO  JUN AREA  F LOSS  R LOSS  CAHS  VOIDGF
7041101    704010000 705000000  .0796875    0.0     0.0  1000    1.00
7042101    704000000 712000000  .0032519   50.0    50.0  1000    0.15
7043101    703000000 704000000  .2672536    0.0     0.0  1003
*
*             VEL-F     VEL-G      VELJ
```

```
7041201        0.3500    0.3500       0.0
7042201        0.3500    0.3500       0.0
7043201        0.3500    0.3500       0.0
*
*************************************************************************
* BROKEN LOOP STEAM GENERATOR STEAM DOME                                *
*************************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 465.875 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7050000       BLSGSD    SNGLVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7050101         0.0   .8541667  .0680664     0.0      90.0   .8541667
*
*             ROUGH    HY DIA       CTL
7050102     6.667E-5   .3836702       0
*
*        CTL   PRESS     QUALS      ZERO
7050200    2  876.000     1.00       0.0
*
*************************************************************************
* BROKEN LOOP STEAM GENERATOR RISER TO DOWNCOMER PIPE - MUFFLER         *
*************************************************************************
*
*   REF DRAWING:  ASSEMBLY - $$$$$$
*
*   INLET ELEV  = 445.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7110000       BSGMUF     PIPE
*
*            NO VOL
7110001          1
*
*              AREA    VOL NO
7110101         0.0       1
*
*            LENGTH    VOL NO
7110301    5.5088494       1
*
*            VOLUME    VOL NO
7110401    0.6232431       1
*
*            VR ANG    VOL NO
7110601       -30.0       1
*
*            ELV CH    VOL NO
7110701   -2.8229167       1
*
*             ROUGH    HY DIA    VOL NO
7110801     6.667E-5   .3989363       1
*
*           CTL FLG    VOL NO
7111001          0       1
```

```
*
*        CTL   PRESS     QUALS      ZERO    ZERO   AIR FLG    VOL NO
7111201    2  876.000     0.0       0.0     0.0      0         1
*
*********************************************************************
* BROKEN LOOP STEAM GENERATOR RISER TO DOWNCOMER PIPE - DRAINS      *
*********************************************************************
*
*   REF DRAWING:  ASSEMBLY - $$$$$$
*
*   INLET ELEV  = 461.375 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7120000       BSGDRN     PIPE
*
*            NO VOL
7120001          1
*
*              AREA    VOL NO
7120101         0.0       1
*
*            LENGTH    VOL NO
7120301    8.9387346       1
*
*            VOLUME    VOL NO
7120401    0.0718342       1
*
*            VR ANG    VOL NO
7120601       -30.0       1
*
*            ELV CH    VOL NO
7120701     -4.15625      1
*
*             ROUGH    HY DIA    VOL NO
7120801     6.667E-5   .0751667     1
*
*           CTL FLG    VOL NO
7121001          0       1
*
*        CTL   PRESS     QUALS      ZERO    ZERO   AIR FLG    VOL NO
7121201    2  876.000     0.0       0.0     0.0      0         1
*
*********************************************************************
* BROKEN LOOP STEAM GENERATOR SECONDARY DOWNCOMER (TOP - HORIZONTAL)*
*********************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 411.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7130000       BSGDN    BRANCH
*
*            NO JUN       CTL
7130001          3         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7130101         0.0   3.1426389 .0366917     0.0       0.0       0.0
```

```
*
*              ROUGH    HY DIA       CTL
7130102     6.667E-5   .1316182        0
*
*        CTL   PRESS     QUALS      ZERO
7130200    2  876.000     1.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7131101    711010000 713000000  .0120117      3.5       3.5       000
7132101    712010000 713000000  .0080362     50.0      50.0       000
7133101    713010000 714000000  .0103869      0.0       0.0         0
*
*             VEL-F     VEL-G      VELJ
7131201      0.3500    0.3300       0.0
7132201      0.0       0.0          0.0
7133201      0.3500    0.3300       0.0
*
*************************************************************************
* BROKEN LOOP STEAM GENERATOR SECONDARY DOWNCOMER                       *
*************************************************************************
*
*   REF DRAWING:  ASSEMBLY - $$$$$$
*                 FILLERS  - $$$$$$
*
*   INLET ELEV  = 411.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV =   6.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7140000      BSGDNC      PIPE
*
*            NO VOL
7140001           5
*
*              AREA    VOL NO
7140101     .0103869         5
*
*              AREA    JUN NO
7140201     .0103869         4
*
*            LENGTH    VOL NO
7140301    4.0891869         1
7140302    7.5000000         4
7140303    7.3391869         5
*
*            VR ANG    VOL NO
7140601       -90.0         5
*
*            ELV CH    VOL NO
7140701      -4.0000         1
7140702      -7.5000         4
7140703      -7.2500         5
*
*              ROUGH    HY DIA    VOL NO
7140801     6.667E-5     0.115         5
*
*           CTL FLG    VOL NO
7141001           0         5
*
*               AHS    JUN NO
7141101           0         4
```

```
*
*        CTL   PRESS     QUALS      ZERO    ZERO   AIR FLG    VOL NO
7141201    2  876.000     0.0       0.0     0.0        0         5
*
*            CTL FLG
7141300          0
*
*              VEL-F     VEL-G      VELJ    JUN NO
7141301       6.9000    6.5900      0.0        4
*
*********************************************************************
* BROKEN LOOP STEAM GENERATOR SECONDARY DOWNCOMER (BOTTOM - HORIZONTAL)*
*********************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 6.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 6.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7150000       BSGDNB    BRANCH
*
*            NO JUN       CTL
7150001          3         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7150101         0.0  7.8734167  .0972227     0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
7150102     6.667E-5   .1302273       0
*
*        CTL   PRESS     QUALS      ZERO
7150200    2  876.000     0.00
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7151101    714010000 715000000  .0103869     0.0       0.0       000
7152101    715010000 716000000  .0513379    50.0      50.0     00001
7153101    715000000 720010000  .0103869     0.0       0.0     20002
*
*              VEL-F     VEL-G      VELJ
7151201       0.3500    0.3300      0.0
7152201       0.3500    0.3300      0.0
7153201       0.0       0.0         0.0
*
*********************************************************************
* BROKEN LOOP STEAM GENERATOR RISER BOTTOM VOLUME BELOW FEEDWATER INLET*
*********************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  =  0.000 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 13.000 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7160000       BSGRSB    BRANCH
*
*            NO JUN       CTL
7160001          1         0
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
```

```
7160101          0.0   1.083333  .0344994      0.0      90.0   1.083333
*
*              ROUGH    HY DIA       CTL
7160102     6.667E-5   .0659845         0
*
*        CTL   PRESS     QUALS      ZERO
7160200    2  876.000     0.00
*
*               FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7161101    716010000 700000000  .0242668       0.0       0.0       100
*
*              VEL-F     VEL-G      VELJ
7161201       0.3500    0.3300       0.0
*
*************************************************************************
* BROKEN LOOP STEAM GENERATOR BOTTOM FEEDWATER PIPE                     *
*************************************************************************
*
*   REF DRAWING:  ASSEMBLY - $$$$$$
*
*   INLET ELEV  = -3.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV =  6.500 IN. ABOVE TOP OF TUBE SHEET
*
*               NAME      TYPE
7200000       BSGFED      PIPE
*
*             NO VOL
7200001            1
*
*              AREA    VOL NO
7200101     .0103869         1
*
*            LENGTH    VOL NO
7200301     .8333333         1
*
*            VR ANG    VOL NO
7200601        90.0         1
*
*            ELV CH    VOL NO
7200701     .8333333         1
*
*              ROUGH    HY DIA    VOL NO
7200801     6.667E-5     0.115         1
*
*           CTL FLG    VOL NO
7201001            0         1
*
*        CTL   PRESS     QUALS      ZERO    ZERO   AIR FLG    VOL NO
7201201    2  876.000      0.0       0.0     0.0       0         1
*
*************************************************************************
* STEAM GENERATOR SECONDARY - MAIN FEEDWATER JUNCTION                   *
*************************************************************************
*
*   ELEV = 411.5 IN. ABOVE TOP OF TUBE SHEET - TOP FEED (TO 726)
*   ELEV = 6.5 IN. ABOVE TOP OF TUBE SHEET - BOTTOM FEED (TO 720)
*
*               NAME      TYPE
7220000       BSGFWJ    TMDPJUN
*
```

```
*              FROM        TO  JUN AREA
7220101    724000000 720000000     0.004 * BOT FEED
*
*           CTL FLG      TRIP
*7220200           1       415
*
*              TIME    FLOW-F    FLOW-G      VELJ
*7220201        -1.0   0.56119       0.0       0.0
*7220202         0.0   0.56119       0.0       0.0
*7220203        24.0   0.56119       0.0       0.0
*7220204        26.0   0.0           0.0       0.0
*
* FOR STEADY STATE - INPUT FOR KEEPING STEAM GENERATOR MASS CONSTANT,
* PUT IN WHAT GOES OUT STEAM VALVE - (COMMENT OUT CARDS 71002XX ABOVE)
*
7220200           1       420       CNTRLVAR 710
*            TABLE TAKES INTO ACCOUNT CONVERSION OF KG TO LB
7220201       -10.0  -22.046        0.0       0.0
7220202         0.0    0.0          0.0       0.0
7220203         0.1    0.22046      0.0       0.0
7220204        10.0   22.046        0.0       0.0
*
***********************************************************************
* STEAM GENERATOR SECONDARY - MAIN FEEDWATER VOLUME                   *
***********************************************************************
*
*              NAME      TYPE
7240000       BSGFWV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7240101       10.00     10.00       0.0       0.0       0.0       0.0
*
*
*             ROUGH    HY DIA       CTL
7240102         0.0       0.0         0
*
*           CTL FLG
7240200           3
*
*              TIME  PRESSURE      TEMP
7240201         0.0    1250.0     450.0
*
***********************************************************************
* BREAK VALVE                                                         *
***********************************************************************
*
*   TOP FEEDLINE BREAK CONNECTS FROM 727 INLET
*   BOTTOM FEEDLINE BREAK CONNECTS FROM 720 INLET
*
**             NAME      TYPE
*7250000      BRK-VLV     VALVE
**
**             FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
*7250101    720000000 790000000 0.0097643      0.0       0.0       000
**
**              CD1       CD2
*7250102        0.90      0.80
**
**        CTL  FLOW-F    FLOW-G      VELJ
*7250201    1     0.0       0.0       0.0
```

```
**
**          VLV TYPE
*7250300      TRPVLV
**
**             TRIP
*7250301        402
**
*********************************************************************
* CONTAINMENT                                                       *
*********************************************************************
*
*   ELEV = 0.000 IN.
*
**             NAME      TYPE
*7900000     FEEDCTN    TMDPVOL
**
**             AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
*7900101        10.0      10.0       0.0       0.0       0.0       0.0
**
**            ROUGH    HY DIA       CTL
*7900102        0.0       0.0         0
**
**          CTL FLG
*7900200          2
**
**             TIME  PRESSURE     QUALE
*7900201        0.0      12.3       1.0
**
*********************************************************************
* BROKEN LOOP STEAM GENERATOR TOP FEEDWATER PIPE                    *
*********************************************************************
*
*   REF DRAWING:  $$$$$$
*
*   INLET ELEV  = 411.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*             NAME      TYPE
7260000      BSGXFD    BRANCH
*
*          NO JUN       CTL
7260001          2         0
*
*             AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7260101     .0103869      2.0       0.0       0.0       0.0       0.0
*
*            ROUGH    HY DIA       CTL
7260102    6.667E-5    0.115         0
*
*       CTL   PRESS     QUALS      ZERO
7260200    2  876.000     0.00
*
*             FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7261101    726010000 714000000 .0103869       0.0       0.0       000
7262101    726000000 727010000 .0103869       0.0       0.0     20002
*
*            VEL-F     VEL-G      VELJ
7261201        0.0       0.0       0.0
7262201        0.0       0.0       0.0
*
```

```
************************************************************************
* BROKEN LOOP STEAM GENERATOR TOP FEEDWATER BREAK PIPE                 *
************************************************************************
*
*   REF DRAWING:  ASSEMBLY - $$$$$$
*
*   INLET ELEV  = 411.500 IN. ABOVE TOP OF TUBE SHEET
*   OUTLET ELEV = 401.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7270000      BSGTBK     PIPE
*
*            NO VOL
7270001          1
*
*              AREA    VOL NO
7270101    0.0103869       1
*
*            LENGTH    VOL NO
7270301    0.8333333       1
*
*            VR ANG    VOL NO
7270601       +90.0        1
*
*            ELV CH    VOL NO
7270701   +0.8333333       1
*
*             ROUGH    HY DIA    VOL NO
7270801     6.667E-5    0.115        1
*
*           CTL FLG    VOL NO
7271001          0        1
*
*       CTL   PRESS     QUALS      ZERO    ZERO   AIR FLG    VOL NO
7271201   2  876.000     0.0       0.0     0.0      0         1
*
************************************************************************
* STEAM GENERATOR SECONDARY - AUXILARY FEEDWATER JUNCTION              *
************************************************************************
*
*   ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7280000      BSGAFWJ   TMDPJUN
*
*              FROM        TO  JUN AREA
7280101    729000000 726000000     .004
*
*           CTL FLG      TRIP
7280200          1       417
*
*              TIME    FLOW-F    FLOW-G     VELJ
7280201        -1.0    0.0         0.0      0.0
7280202         0.0    0.0         0.0      0.0
7280206      2000.0    0.0         0.0      0.0
*
************************************************************************
* STEAM GENERATOR SECONDARY - AUXILARY FEEDWATER VOLUME                *
************************************************************************
*
```

```
*   ELEV = 411.500 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7290000      BSGAFWV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7290101        10.00    10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
7290102         0.0       0.0         0
*
*           CTL FLG
7290200           3
*
*              TIME  PRESSURE      TEMP
7290201         0.0     900.0      80.0
*
***************************************************************************
* STEAM GENERATOR SECONDARY - RELIEF VALVE                                *
***************************************************************************
*
*   ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7340000        BSGRV     VALVE
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7340101    705010000 740000000      .007       0.0       0.0       100
*
*        CTL  FLOW-F    FLOW-G      VELJ
7340201    1     0.0       0.0       0.0
*
*          VLV TYPE
7340300      TRPVLV
*
*              TRIP
7340301         671
*
***************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP RELIEF DISCHARGE VOLUME            *
***************************************************************************
*
*   ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7400000      BSGRDV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7400101    10.0          10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
7400102         0.0       0.0         0
*
*           CTL FLG
7400200           2
*
*              TIME  PRESSURE     QUALS
7400201         0.0      12.3       1.0
*
***************************************************************************
```

```
* STEAM GENERATOR SECONDARY - DISCHARGE JUNCTION VALVE                 *
************************************************************************
*
*   ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7350000       BSGDJ     VALVE
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
7350101    705010000 750000000    0.007   1022.36   1022.36       100
*
*       CTL  FLOW-F    FLOW-G      VELJ
7350201   1     0.0   0.56119       0.0
*
*          VLV TYPE
*7350300      MTRVLV
*
*           OP TRIP   CL TRIP     SLOPE   INIT POS    TABLE
*7350301         403       411       0.2  .04367422        0
*
*
*INPUT FOR STEADY STATE CONTROL SYSTEMS (COMMENT OUT CARDS 73503XX ABOVE)
7350300       SRVVLV
7350301          737
*
************************************************************************
* STEAM GENERATOR SECONDARY - TIME DEP DISCHARGE VOLUME                *
************************************************************************
*
*   ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*              NAME      TYPE
7500000       BSGDV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
7500101    10.0          10.00       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
7500102         0.0       0.0         0
*
*           CTL FLG
7500200           2
*
*              TIME  PRESSURE     QUALS
7500201         0.0      12.3       1.0
*
************************************************************************
* CROSS CONNECTION - JUNCTION TO CROSS CONNECTION PIPE FROM BLSG       *
************************************************************************
*
*   ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
**             NAME      TPYE
*7370000       BLCNJ    SNGLJUN
**
**             FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
*7370101    705010000 746000000  0.003003       0.0       0.0       100
**
**       CTL   VEL-F     VEL-G      VELJ
*7370201   0     0.0       0.0       0.0
```

```
**
*********************************************************************
* BROKEN LOOP STEAM DOME CROSS CONNECTION PIPE TO IL STEAM DOME      *
*********************************************************************
*
*   INLET ELEV = OUTLET ELEV = 476.125 IN. ABOVE TOP OF TUBE SHEET
*
*   NOTE - CROSS-OVER PIPE SNAKES AROUND:
*          HORIZONTALLY BACK     2.000 FT
*          HORIZONTALLY OVER     5.000 FT
*          VERTICALLY   DOWN    18.000 FT, PART OF 647
*          HORIZONTALLY FORWARD  6.000 FT, PART OF 647
*          HORIZONTALLY OVER     8.000 FT, PART OF 647
*          VERTICALLY   UP      19.730 FT, PART OF 647
*
**              NAME      TYPE
*7460000        BLCNP     PIPE
**
**            NO VOL
*7460001          1
**
**              AREA    VOL NO
*7460101      .003003       1
**
**            LENGTH    VOL NO
*7460301        7.0         1
**
**            VR ANG    VOL NO
*7460601        0.0         1
**
**            ELV CH    VOL NO
*7460701        0.0         1
**
**             ROUGH    HY DIA    VOL NO
*7460801     6.667E-5     0.0        1
**
**           CTL FLG    VOL NO
*7461001          0        1
**
**        CTL   PRESS     QUALS      ZERO      ZERO   AIR FLG    VOL NO
*7461201    2  675.900     0.0       0.0       0.0        0         1
**
*********************************************************************
* BROKEN LOOP STEAM GENERATOR TUBE SHEET OUTLET                      *
*********************************************************************
*
*   REF DRAWING:  418972
*
*   INLET ELEV  = +102.604 IN. (TOP OF TUBE SHEET)
*   OUTLET ELEV = + 81.594 IN. (BOTTOM OF TUBE SHEET)
*
*              NAME      TYPE
3250000      BLTS-OT    BRANCH
*
*            NO JUN       CTL
3250001          2         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3250101    6.0544E-3  1.751830     0.0       0.0    -88.07  -1.7508333
*
```

```
*                ROUGH    HY DIA       CTL
3250102       5.000E-6  .0620833        0
*
*         CTL   PRESS      TEMP      ZERO
3250200     3  2250.00   547.00
*
*                FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3251101     320010000 325000000  6.0544E-3      0.0       0.0       000
3252101     325010000 330000000  6.0544E-3      0.0       0.0       100
*
*              FLOW-F    FLOW-G      VELJ
3251201         7.310       0.0       0.0
3252201         7.310       0.0       0.0
*
*********************************************************************
* STEAM GENERATOR OUTLET PLENUM                                     *
*********************************************************************
*
*   REF DRAWING:  414272, SH.2, SEE NOTE FOR SG INLET PLENUM (C310)
*
*   INLET ELEV  = TOP    = + 81.594 IN.
*   OUTLET ELEV = BOTTOM = + 71.969 IN.
*
*                NAME      TYPE
3300000      ST-OUTPL    SNGLVOL
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3300101           0.0  0.8020833  .0495847      0.0     -90.0 -0.8020833
*
*                ROUGH    HY DIA       CTL
3300102       6.667E-5  0.2600218        0
*
*         CTL   PRESS      TEMP      ZERO
3300200     3  2258.30   531.30       0.0
*
*********************************************************************
* STEAM GENERATOR OUTLET                                            *
*********************************************************************
*
*   ELEV = +71.969 IN.
*
*                NAME      TYPE
3350000      SG-TO-PS    SNGLJUN
*
*                FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3350101     330010000 340000000  0.0097643      0.0       0.0       000
*
*         CTL  FLOW-F    FLOW-G      VELJ
3350201     1   5.840       0.0       0.0
*
*********************************************************************
* PUMP SUCTION LEG                                                  *
*********************************************************************
*
*   REF DRAWINGS:  INLET PLENUM       - 414272
*                  1.5ABL-34 (SP-60) - 414675-1
*                  1.5ABL-35 (SP-61) - 414676-1
*                  1.5ABL-36 (SP-62) - 414672-2
*                  1.5ABL-37 (SP-63) - 414673-2
*                  1.5ABL-6A (SP-64) - 414677-1
```

```
*                 1.5ABL-7  (SP-65) - 407384-1
*                 1.5ABL-9  (SP-72) - 407380-1
*                 1.5ABL-11 (SP-73) - 407673-1
*
*   INLET ELEV  = + 71.969 IN.
*   U-TUBE BOTTOM ELEV = -110.155 IN.
*   OUTLET ELEV = - 10.640 IN.
*
*              NAME      TYPE
3400000        BL-PS     PIPE
*
*            NO VOL
3400001          9
*
*              AREA    VOL NO
3400101    0.0097643        9   * 1 1/2 IN SCH-160
*
*            LENGTH    VOL NO
3400301    1.6054810        1   * SPOOL PIECE-60 AND INLET PLENUM
3400302    2.3393333        2   *          SP-61,62
3400303    1.6437500        3   *          SP-63 & 64 TO PRESSURE TAP
3400304    4.9431250        4   *          SP-64
3400305    4.2964583        5   *          SP-64 & 65 TO BEND OF U
3400306    1.0157816        6   *          SP-65 1/2 OF BEND
3400307    1.0157816        7   *          SP-65 1/2 OF BEND
3400308    5.3495833        8   *          SP-65,72
3400309    2.2966667        9   *          SP-73
*
*            HZ ANG    VOL NO
3400501        0.0        9
*
*            VR ANG    VOL NO
3400601       -45.0       1
3400602       -90.0       5
3400603       -45.0       6
3400604       +45.0       7
3400605       +90.0       9
*
*            ELV CH    VOL NO
3400701   -1.3076602       1
3400702   -2.3393333       2
3400703   -1.6437500       3
3400704   -4.9431250       4
3400705   -4.2964583       5
3400706   -0.6466667       6
3400707   +0.6466667       7
3400708   +5.3495833       8
3400709   +2.2966667       9
*
*             ROUGH    HY DIA    VOL NO
3400801     6.667E-5     0.0        9
*
*            F LOSS    R LOSS    JUN NO
3400901        0.0       0.0        1
3400902        0.0       0.0        2
3400903        0.0       0.0        7
3400904        1.3       1.3        8
*
*           CTL FLG    VOL NO
3401001           0        9
```

```
*
*            CTL FLG    JUN NO
3401101          0         8
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
3401201    3  2258.30   531.30       0.0       0.0         0         1
3401202    3  2258.30   531.30       0.0       0.0         0         2
3401203    3  2258.30   531.30       0.0       0.0         0         3
3401204    3  2258.30   531.30       0.0       0.0         0         4
3401205    3  2258.30   531.30       0.0       0.0         0         5
3401206    3  2258.30   531.30       0.0       0.0         0         6
3401207    3  2258.30   531.30       0.0       0.0         0         7
3401208    3  2258.30   531.30       0.0       0.0         0         8
3401209    3  2258.30   531.30       0.0       0.0         0         9
*
*            CTL FLG
3401300          1
*
*             FLOW-F    FLOW-G      VELJ    JUN NO
3401301        5.840       0.0       0.0         8
*
*************************************************************************
* BROKEN LOOP PUMP                                                      *
*************************************************************************
*
*  INLET ELEV  = BOTTOM = - 10.640 IN.
*  OUTLET ELEV = TOP    =   0.000 IN. -- ELEVATION = 4773'-9.25"
*
*               NAME      TYPE
3500000       BLPUMP      PUMP
*
*               AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3500101          0.0    1.9635   0.03035       0.0      90.0 0.8866667
*
*            CTL FLG
3500102          0
*
*             VOL NO  JUN AREA    F LOSS    R LOSS   JUN FLG
3500108    340010000 0.0097643       0.0       0.0         0
*
*             VOL NO  JUN AREA    F LOSS    R LOSS   JUN FLG
3500109    361000000 0.0011946       0.0       0.0        20
*
*        CTL   PRESS      TEMP      ZERO
3500200    3  2258.30   531.30         0
*
*        CTL  FLOW-F    FLOW-G      VELJ
3500201    1   5.840       0.0       0.0
*
*        CTL  FLOW-F    FLOW-G      VELJ
3500202    1   5.840       0.0       0.0
*
*INDEX      TAB DATA     PHASE   DIF TAB  TOR TAB  SP TAB  TRIP  REVER
3500301          0         0         0       -1       0     0      1
*
*               R-SP   ISP/RSP      R-FL      R-HD     R-TOR      M-IN
3500302      15250.0   0.90079      51.3     261.0       2.2      0.22
*
*              R-DEN    R-M-TR    FR-TR3    FR-TR1    FR-TR2    FR-TR4
3500303         62.3         0       0.0         0         0         0
```

```
*
*STOP DATA     ELS TM    MX-F-SP    MN-R-SP
3500310          0.0       0.0        0.0
*
*CARD CCCXX00-CCCXX99 SINGLE PHASE PUMP HEAD AND TORQUE CURVE SET
*  SINGLE PHASE 4 QUADRANT HEAD TABLES (HOMOLOGOUS CURVES)
*
3501100   1      1
3501101  0.000,1.7821    .2845,1.7059    0.569, 1.627    .8535,1.1878
3501102  1.000, 1.000
3501200   1      2
3501201  0.000,-1.6359   0.713, 0.000    .8271, .2959    1.000, 1.000
3501300   1      3
3501301 -1.000, 1.500   -0.800, 1.275   -0.600, 1.375   -0.400, 1.375
3501302  0.000, 1.200
3501400   1      4
3501401 -1.000, 1.500   -0.800, 1.150   -0.600, 0.950   -0.400, 0.830
3501402 -0.200, 0.775    0.000, 0.725
3501500   1      5
3501501  0.000, 0.975    0.500, 1.350    1.000, 1.950
3501600   1      6
3501601  0.000, 0.725    0.200, 0.725    0.400, 0.800    0.600, 1.025
3501602  1.000, 1.950
3501700   1      7
3501701 -1.000, 0.175   -0.500, 0.650    0.000, 0.975
3501800   1      8
3501801 -1.000, 0.175   -0.750,-0.150   -0.550,-0.300   -0.275,-0.400
3501802  0.000,-0.350
*
*  SINGLE PHASE 4 QUADRANT TORQUE TABLES
*
3501900   2      1
3501901  0.000, 0.540    0.200, 0.590    0.400, 0.650    0.600, 0.770
3501902  0.800, 0.950    0.900, 0.980    0.950, 0.960    1.000, 0.870
3502000   2      2
3502001  0.000,-0.150    0.200, 0.020    0.400, 0.220    0.600, 0.460
3502002  0.800, 0.710    0.900, 0.810    0.950, 0.850    1.000, 0.870
3502100   2      3
3502101 -1.000, 0.620   -0.800, 0.680   -0.600, 0.530   -0.400, 0.460
3502102 -0.200, 0.490    0.000, 0.540
3502200   2      4
3502201 -1.000, 0.62    -0.800, 0.530   -0.600, 0.460   -0.400, 0.420
3502202 -0.200, 0.390    0.000, 0.360
3502300   2      5
3502301  0.000,-0.630    0.200,-0.510    0.400,-0.390    0.600,-0.290
3502302  0.800,-0.200    0.900,-0.160    1.000,-0.130
3502400   2      6
3502401  0.000, 0.360    0.200, 0.320    0.400, 0.270    0.600, 0.180
3502402  0.800, 0.050    1.000,-0.130
3502500   2      7
3502501 -1.000,-1.440   -0.800,-1.250   -0.600,-1.080   -0.400,-0.920
3502502 -0.200,-0.770    0.000,-0.630
3502600   2      8
3502601 -1.000,-1.440   -0.800,-1.120   -0.600,-0.790   -0.400,-0.520
3502602 -0.200,-0.310    0.000,-0.150
*
*  TWO PHASE HEAD MULTIPLIER TABLES
*
3503000  0
3503001  0.000, 0.000    0.100, 0.000    0.150, 0.050    0.240, 0.800
```

```
3503002  0.300, 0.960    0.400, 0.980    0.600, 0.970    0.800, 0.900
3503003  0.900, 0.800    0.960, 0.500    1.000, 0.000
3503100  0
3503101  0.000,-0.170    .0001,-0.170    0.006, 0.000    0.100, 0.000
3503102  0.150, 0.150    0.240, 0.560    0.800, 0.560    0.960, 0.450
3503103  1.000, 0.000
*
*  TWO PHASE HEAD DIFFERENCE TABLES
*
3504100  1       1
3504101  0.000, 0.000    0.100, 0.830    0.200, 1.090    0.500, 1.020
3504102  0.700, 1.010    0.900, 0.940    1.000, 1.000
3504200  1       2
3504201  0.000, 0.000    0.100,-0.040    0.200, 0.000    0.300, 0.100
3504202  0.400, 0.210    0.800, 0.670    0.900, 0.800    1.000, 1.000
3504300  1       3
3504301 -1.000,-1.160   -0.900,-1.240   -0.800,-1.770   -0.700,-2.360
3504302 -0.600,-2.790   -0.500,-2.910   -0.400,-2.670   -0.250,-1.690
3504303 -0.100,-0.500    0.000, 0.000
3504400  1       4
3504401 -1.000,-1.160   -0.900,-0.780   -0.800,-0.500   -0.700,-0.310
3504402 -0.600,-0.170   -0.500,-0.080   -0.350, 0.000   -0.200, 0.050
3504403 -0.100, 0.080    0.000, 0.110
3504500  1       5
3504501  0.000, 0.000    0.200,-0.034    0.400,-0.650    0.600,-0.930
3504502  0.800,-1.190    1.000,-1.470
3504600  1       6
3504601  0.000, 0.110    0.100, 0.130    0.250, 0.150    0.400, 0.130
3504602  0.500, 0.070    0.600,-0.040    0.700,-0.230    0.800,-0.510
3504603  0.900,-0.910    1.000,-1.470
3504700  1       7
3504701 -1.000, 0.000    0.000, 0.000
3504800  1       8
3504801 -1.000, 0.000    0.000, 0.000
*
*  TWO PHASE TORQUE DIFFERENCE TABLES
*
3504900  2       1
3504901  0.000, 0.540    0.200, 0.590    0.400, 0.650    0.600, 0.770
3504902  0.800, 0.950    0.900, 0.980    0.950, 0.960    1.000, 0.870
3505000  2       2
3505001  0.000,-0.150    0.200, 0.020    0.400, 0.220    0.600, 0.460
3505002  0.800, 0.710    0.900, 0.810    0.950, 0.850    1.000, 0.870
3505100  2       3
3505101 -1.000, 0.620   -0.800, 0.680   -0.600, 0.530   -0.400, 0.460
3505102 -0.200, 0.490    0.000, 0.540
3505200  2       4
3505201 -1.000, 0.620   -0.800, 0.530   -0.600, 0.460   -0.400, 0.420
3505202 -0.200, 0.390    0.000, 0.360
3505300  2       5
3505301  0.000,-0.630    0.200,-0.510    0.400,-0.390    0.600,-0.290
3505302  0.800,-0.200    0.900,-0.160    1.000,-0.130
3505400  2       6
3505401  0.000, 0.360    0.200, 0.320    0.400, 0.270    0.600, 0.180
3505402  0.800, 0.050    1.000,-0.130
3505500  2       7
3505501 -1.000,-1.440   -0.800,-1.250   -0.600,-1.080   -0.400,-0.920
3505502 -0.200,-0.770    0.000,-0.630
3505600  2       8
3505601 -1.000,-1.440   -0.800,-1.120   -0.600,-0.790   -0.400,-0.520
```

```
3505602 -0.200,-0.310    0.000,-0.150
*
*  PUMP COASTDOWN TABLE IS GENERAL TABLE 350
*  USE CONTROL VARIABLES 350 AND 351 TO SET PUMP SPEED.
*
*                TRIP       PARAMETER
3506100           420   CNTRLVAR  351
*TABLE TAKES INTO ACCOUNT CONVERSION OF RAD/SEC TO REV/MIN
3506101          -1.0       16560.000
3506102           0.0           0.000
3506103           1.0           9.549
3506104         100.0         954.930
3506105         500.0        4774.297
3506106        1000.0        9549.297
3506107        3000.0       28647.890
*
*************************************************************************
* PUMP DISCHARGE PIPE AND ECC INJECTION TEE                             *
*************************************************************************
*
*   REF DRAWING:  1.5ABL-12 (SP-74) - 407674
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*               NAME      TYPE
3610000      PMP-DISC   BRANCH
*
*             NO JUN       CTL
3610001            2         1
*
*               AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3610101    0.0097643    1.9700       0.0       0.0       0.0       0.0
*
*              ROUGH    HY DIA       CTL
3610102     6.667E-5       0.0         0
*
*        CTL   PRESS      TEMP
3610200    3  2258.30   531.30
*
*               FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3611101    361010000 362000000  .0097643       1.2       1.2       000
3612101    500010000 361000000  .002695        0.0       0.0     20121
*
*             FLOW-F    FLOW-G      VELJ
3611201        5.840       0.0       0.0
3612201        0.0         0.0       0.0
*
*************************************************************************
* ECC LINE                                                              *
*************************************************************************
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*               NAME      TYPE
5000000    BLECCPIPE      PIPE
*
*             NO VOL
5000001            1
*
*               AREA    VOL NO
```

```
5000101     0.002695        1      * 0.703 IN. ID
*
*            LENGTH    VOL NO
5000301        10.0        1
*
*            VR ANG    VOL NO
5000601         0.0        1
*
*            ELV CH    VOL NO
5000701         0.0        1
*
*             ROUGH    HY DIA    VOL NO
5000801     6.667E-5      0.0         1
*
*           CTL FLG    VOL NO
5001001           0        1
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
5001201    3  2258.30    531.30       0.0       0.0         0         1
*
**********************************************************************
* HPIS INJECTION  JUNCTION                                           *
**********************************************************************
*
*   ELEV = 0.000 IN.
*
*              NAME      TYPE
5100000      BLHPISJ    TMDPJUN
*
*              FROM        TO   JUN-AREA
5100101    520000000 500000000  0.002695
*
*           CTL FLG      TRIP     TABLE    VOLUME
5100200           1       408         P  361010000
*
*         PRES(PSIA)    FLOW-F    FLOW-G      VELJ
5100201         -1.0    0.00         0.0       0.0
5100202          0.0    0.00         0.0       0.0
5100203         15.0    0.0125       0.0       0.0
5100204        333.57   0.01113      0.0       0.0
5100205        581.36   0.01000      0.0       0.0
5100206        609.77   0.00974      0.0       0.0
5100207        770.0    0.00868      0.0       0.0
5100208        881.0    0.00795      0.0       0.0
5100209       1007.23   0.00705      0.0       0.0
5100210       1024.0    0.00683      0.0       0.0
5100211       1158.0    0.0059       0.0       0.0
5100212       1258.0    0.0051       0.0       0.0
5100213       1348.0    0.0039       0.0       0.0
5100214       1407.0    0.0031       0.0       0.0
5100215       1455.0    0.0019       0.0       0.0
5100216       1560.0    0.00         0.0       0.0
5100217       1600.0    0.00         0.0       0.0
*
**********************************************************************
* HPIS VOLUME                                                        *
**********************************************************************
*
*   ELEV = 0.000 IN.
*
```

```
*              NAME      TYPE
5200000      BLHPISV    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
5200101        10.0      10.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
5200102         0.0       0.0         0
*
*           CTL FLG
5200200           3
*
*              TIME  PRESSURE      TEMP
5200201         0.0      12.3      80.0
*
*************************************************************************
* ACCUMULATOR                                                           *
*************************************************************************
*
*   INLET ELEV  = BOTTOM =    0.000 IN.
*   OUTLET ELEV = TOP    = + 13.757 IN.
*
*              NAME      TYPE
5300000       BLACC     ACCUM
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
5300101      0.7085    1.1464       0.0       0.0      90.0    1.1464
*
*             ROUGH    HY DIA       CTL
5300102         0.0       0.0        10
*
*          PRESSURE      TEMP
5300200       615.0      80.0
*
*                        TO  JUN AREA    F LOSS    R LOSS     VCAHS
5301101             500000000  0.002695 50149.59  50149.59       000
*
*        VLIQ  LIQ LEV  LNLEN  ELEV  THICK HTR-FLG TNKRHO TNKCP NIT-K
5302200  0.565       0  20.00     0  .0417       0      0     0     0
*
*************************************************************************
* BROKEN LOOP COLD LEG BREAK TEE                                        *
*************************************************************************
*
*   REF DRAWING:  1.5ABL-17 OR 1.5ABL26A (SP-76) - 407875
*
*   INLET ELEV = OUTLET ELEV = 0.000 IN.
*
*              NAME      TYPE
3620000      BRK-TEE    BRANCH
*
*            NO JUN       CTL
3620001           1         1
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
3620101    0.0097643   1.647500     0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
3620102     6.667E-5      0.0         0
*
```

```
*        CTL   PRESS      TEMP
3620200    3  2258.30   531.30
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3621101    362010000 363000000  .0097643       1.2       1.2       000
*
*            FLOW-F    FLOW-G      VELJ
3621201       5.840       0.0       0.0
*
*********************************************************************
* BROKEN LOOP COLD LEG   ( DOWNSTREAM OF BREAK)                     *
*********************************************************************
*
*   REF DRAWINGS:  1.5ABL-17 (SP-76) - 407875
*                  1.5ABL-15 (SP-79) - 407675
*                  COLD LEG NOZZLE   - 407986
*
*              NAME      TYPE
3630000        BL-CL     PIPE
*
*            NO VOL
3630001           2
*
*              AREA    VOL NO
3630101    0.0097643        1  * 1 1/2 IN SCH-160 PIPE
3630102    0.0375539        2  * DOWNCOMER INLET ANNULUS NOZZLE
*
*            LENGTH    VOL NO
3630301    2.3341667        1  * SP-79
3630302    1.2761677        2  * COLD LEG NOZZLE
*
*            VR ANG    VOL NO
3630601        0.0        2
*
*            ELV CH    VOL NO
3630701        0.0        2
*
*             ROUGH    HY DIA    VOL NO
3630801     6.667E-5      0.0         2
*
*           CTL FLG    VOL NO
3631001           0        2
*
*             VCAHS    JUN NO
3631101           0        1
*
*        CTL   PRESS      TEMP      ZERO      ZERO   AIR FLG    VOL NO
3631201    3  2258.30   531.30       0.0       0.0         0         2
*
*           CTL FLG
3631300           1
*
*            FLOW-F    FLOW-G      VELJ    JUN NO
3631301       5.840       0.0       0.0         1
*
*********************************************************************
* BREAK JUNCTION                                                    *
*********************************************************************
*
*   ELEV = 0.000 IN.
```

```
*
*                                  BREAK SIZES:
*                                    0.5% - 0.00001279  (NOMINAL)
*                                    2.1% - 0.00005116  (NOMINAL)
*                                    2.5% - 0.00006175  (NOMINAL)
*                                    5.0% - 0.00012079  (NOMINAL)
*                                   10.0% - 0.000247    (NOMINAL)
*
*              NAME      TYPE
3750000      BRK-VLV    VALVE
*
*              FROM        TO  JUN AREA    F LOSS    R LOSS     VCAHS
3750101    362010000 900000000 0.00001279    0.0       0.0       100 * (90.9.28)
*
*              CD1       CD2
3750102       0.90      0.90
*
*       CTL  FLOW-F    FLOW-G      VELJ
3750201   1    0.0       0.0       0.0
*
*          VLV TYPE
3750300      TRPVLV
*
*              TRIP
3750301        402
*
*********************************************************************
* CONTAINMENT                                                       *
*********************************************************************
*
*   ELEV = 0.000 IN.
*
*              NAME      TYPE
9000000      CONTAIN    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
9000101        10.0      10.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
9000102         0.0       0.0         0
*
*           CTL FLG
9000200           2
*
*              TIME  PRESSURE     QUALE
9000201         0.0      12.3       1.0
*
*********************************************************************
* HEAT LOSS AMBIENT VOLUMES                                         *
*********************************************************************
*
*              NAME      TYPE
8000000        ILSG    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8000101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8000102         0.0       0.0         0
*
```

```
*            CTL FLG
8000200          1
*
*              TIME      TEMP     QUALE
8000201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8010000        IBHL    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8010101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8010102         0.0       0.0         0
*
*            CTL FLG
8010200          1
*
*              TIME      TEMP     QUALE
8010201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8020000        BLPS    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8020101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8020102         0.0       0.0         0
*
*            CTL FLG
8020200          1
*
*              TIME      TEMP     QUALE
8020201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8030000        IBCL    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8030101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8030102         0.0       0.0         0
*
*            CTL FLG
8030200          1
*
*              TIME      TEMP     QUALE
8030201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
```

```
8040000        ILPS    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8040101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8040102         0.0       0.0         0
*
*           CTL FLG
8040200           1
*
*              TIME      TEMP     QUALE
8040201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8050000       VSLDNC    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8050101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8050102         0.0       0.0         0
*
*           CTL FLG
8050200           1
*
*              TIME      TEMP     QUALE
8050201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8060000       PZRCAP    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8060101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8060102         0.0       0.0         0
*
*           CTL FLG
8060200           1
*
*              TIME      TEMP     QUALE
8060201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8070000        PZRSL    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8070101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8070102         0.0       0.0         0
*
*           CTL FLG
```

```
8070200          1
*
*              TIME      TEMP     QUALE
8070201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8080000        TBSHT    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8080101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8080102         0.0       0.0         0
*
*           CTL FLG
8080200           1
*
*              TIME      TEMP     QUALE
8080201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8090000        BLSG    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8090101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8090102         0.0       0.0         0
*
*           CTL FLG
8090200           1
*
*              TIME      TEMP     QUALE
8090201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8110000       IBHLH    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8110101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8110102         0.0       0.0         0
*
*           CTL FLG
8110200           1
*
*              TIME      TEMP     QUALE
8110201         0.0      80.0       1.0
*
*********************************************************************
*
*              NAME      TYPE
8120000       BLPSH    TMDPVOL
```

```
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8120101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8120102         0.0       0.0         0
*
*           CTL FLG
8120200           1
*
*              TIME      TEMP     QUALE
8120201         0.0      80.0       1.0
*
**********************************************************************
*
*              NAME      TYPE
8130000        IBCLH    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8130101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8130102         0.0       0.0         0
*
*           CTL FLG
8130200           1
*
*              TIME      TEMP     QUALE
8130201         0.0      80.0       1.0
*
**********************************************************************
*
*              NAME      TYPE
8140000        ILPSH    TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8140101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8140102         0.0       0.0         0
*
*           CTL FLG
8140200           1
*
*              TIME      TEMP     QUALE
8140201         0.0      80.0       1.0
*
**********************************************************************
*
*              NAME      TYPE
8150000        VSLDNH   TMDPVOL
*
*              AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8150101        10.0       1.0       0.0       0.0       0.0       0.0
*
*             ROUGH    HY DIA       CTL
8150102         0.0       0.0         0
*
*           CTL FLG
8150200           1
```

```
*
*                TIME      TEMP     QUALE
8150201          0.0      80.0       1.0
*
**********************************************************************
*
*                NAME      TYPE
8160000          PZRH    TMDPVOL
*
*                AREA    LENGTH    VOLUME    HZ ANG    VR ANG    ELV CH
8160101          10.0      1.0       0.0       0.0       0.0       0.0
*
*               ROUGH    HY DIA       CTL
8160102          0.0      0.0         0
*
*             CTL FLG
8160200            1
*
*                TIME      TEMP     QUALE
8160201          0.0      80.0       1.0
*
**********************************************************************
**************************************************                   *
**************************************************  HEAT STRUCTURE   *
**************************************************   INFORMATION     *
**************************************************                   *
**********************************************************************
*
**********************************************************************
* DOWNCOMER INLET ANNULUS HEAT LOSS (ABOVE COLD LEG NOZZLE)          *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 101
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11010000           1         8         2         1   0.271375
*
*MESH         LOC FLG   FRM FLG
11010100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11010101           2   0.279708         1  0.283850         2  0.359375
11010102           2   0.526042
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11010201           1         2         2         3         1         5
11010202           8         7
*
*SOURCE DIS   SOURCE    ITV NO
11010301         0.0         7
*
*INIT TEMP       FLG
11010400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11010401  542.3    3   301.9    6   232.6    7   175.7    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11010501   101010000         0        1        1    0.875000        1
```

```
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11010601   805010000         0     4100        1    0.875000        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11010701           0         0             0             0          1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11010801           0       0.0      0.247955      1.875000          1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11010901           0       0.0           0.0      1.875000          1
*
************************************************************************
* DOWNCOMER INLET ANNULUS HOLLOW CENTER (ABOVE COLD LEG NOZZLE)        *
************************************************************************
*
*  LEFT BOUNDARY  = ADIABATIC
*  RIGHT BOUNDARY = COMPONENT 101
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11011000           1         6         2         1   0.12500
*
*MESH        LOC FLG   FRM FLG
11011100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11011101           2   0.18750         1  0.191667         2   0.20000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11011201           1         2         2         3         1         5
*
*SOURCE DIS   SOURCE    ITV NO
11011301        0.0         5
*
*INIT TEMP       FLG
11011400           0
*
*          TEMP MESH    TEMP MESH
11011401  550.0    3   549.7    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11011501           0         0         0        1    0.87500        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11011601   101010000         0         1        1    0.87500        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11011701           0         0             0             0          1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11011801           0       0.0           0.0           0.0          1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11011901           0       0.0      0.336444       1.87500          1
*
************************************************************************
* DOWNCOMER INLET ANNULUS HEAT LOSS (BELOW COLD LEG NOZZLE)            *
************************************************************************
*
```

```
*  LEFT BOUNDARY  = COMPONENT 102
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11020000           1         8         2         1   0.271375
*
*MESH        LOC FLG   FRM FLG
11020100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11020101           2   0.279708         1   0.283850         2   0.359375
11020102           2   0.526042
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11020201           1         2         2         3         1         5
11020202           8         7
*
*SOURCE DIS   SOURCE    ITV NO
11020301        0.0         7
*
*INIT TEMP       FLG
11020400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11020401  549.0    3   308.0    5   299.6    6   234.6    7   176.9    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11020501   101010000         0        1        1      1.0000         1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11020601   805010000         0     4100        1      1.0000         1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11020701           0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11020801           0       0.0     0.247955      1.87500         1
*
*********************************************************************
* DOWNCOMER INLET ANNULUS HOLLOW CENTER (BELOW COLD LEG NOZZLE)     *
*********************************************************************
*
*  LEFT BOUNDARY  = ADIABATIC
*  RIGHT BOUNDARY = COMPONENT 102
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11021000           1         6         2         1   0.12500
*
*MESH        LOC FLG   FRM FLG
11021100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11021101           2   0.18750         1  0.191667         2   0.20000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11021201           1         2         2         3         1         5
*
*SOURCE DIS   SOURCE    ITV NO
11021301        0.0         5
*
```

```
*INIT TEMP        FLG
11021400            0
*
*           TEMP MESH    TEMP MESH
11021401  550.0    3   550.3    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11021501           0         0        0        1    1.000000        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11021601   101010000         0        1        1    1.000000        1
*
*SOURCE          TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11021701           0         0            0            0          1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11021801           0       0.0          0.0          0.0          1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11021901           0       0.0     0.336444      1.87500          1
*
**********************************************************************
* DOWNCOMER PIPE (HEAT LOSS TO ENVIRONMENT) - UNHEATED               *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 110 (VOLUMES 1,2,3,4,5,6,7,8,9)
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11100000           9        10         2         1   .091041667
*
*MESH        LOC FLG   FRM FLG
11100100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11100101           1  .092541667       2  .107825000       1  .10932500
11100102           3  .145833333       2  .312500000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11100201          10         1        12         3        10         4
11100202           1         7         8         9
*
*SOURCE DIS   SOURCE    ITV NO
11100301         0.0         9
*
*INIT TEMP        FLG
11100400           0
*
*           TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11100401  549.9    2   395.0    3   249.3    8   189.7    9   149.3   10
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11100501   110010000         0        1        1    1.715159        1
11100502   110020000         0        1        1    0.273268        2
11100503   110030000         0        1        1    1.272435        3
11100504   110040000         0        1        1    1.272435        4
11100505   110050000         0        1        1    1.272435        5
11100506   110060000         0        1        1    1.272435        6
11100507   110070000         0        1        1    1.272435        7
11100508   110080000         0        1        1    1.465667        8
```

```
11100509   110090000        0        1        1    1.434751        9
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11100601   805010000        0     4100        1    1.715159        1
11100602   805010000        0     4100        1    0.273268        2
11100603   805010000        0     4100        1    1.272435        3
11100604   805010000        0     4100        1    1.272435        4
11100605   805010000        0     4100        1    1.272435        5
11100606   805010000        0     4100        1    1.272435        6
11100607   805010000        0     4100        1    1.272435        7
11100608   805010000        0     4100        1    1.465667        8
11100609   805010000        0     4100        1    1.434751        9
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11100701           0         0             0             0         9
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11100801           0       0.0           0.0     16.244581         9
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11100901           0       0.0           0.0           1.0         9
*
**********************************************************************
* DOWNCOMER PIPE (EXTERNAL HEATERS)                                  *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 110 (VOLUMES 1,2,3,4,5,6,7)
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11101000           7        13         2         1  .091041667
*
*MESH        LOC FLG   FRM FLG
11101100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11101101           1  .092541667       2  .107825000       1  .109325000
11101102           3  .145833333       1  .145933333       2  .15635
11101103           2  .3230167
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11101201          10         1        12         3        10         4
11101202           1         7        13         8         9        10
11101203           8        12
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11101301         0.0         8       1.0        10       0.0        12
*
*INIT TEMP       FLG
11101400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11101401  549.6    2   401.5    3   263.9    8   277.5   11   198.5   12
11101402  152.6   13
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11101501   110010000        0        1        1    0.545674        1
11101502   110020000        0        1        1    0.727565        2
11101503   110030000        0        1        1    0.727565        3
11101504   110040000        0        1        1    0.727565        4
```

```
11101505   110050000        0        1        1   0.727565        5
11101506   110060000        0        1        1   0.727565        6
11101507   110070000        0        1        1   0.727565        7
*
*R-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11101601   815010000        0     4100        1   0.545674        1
11101602   815010000        0     4100        1   0.727565        2
11101603   815010000        0     4100        1   0.727565        3
11101604   815010000        0     4100        1   0.727565        4
11101605   815010000        0     4100        1   0.727565        5
11101606   815010000        0     4100        1   0.727565        6
11101607   815010000        0     4100        1   0.727565        7
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11101701        10225   .026003             0             0         1
11101702        10225   .035114             0             0         2
11101703        10225   .035114             0             0         3
11101704        10225   .035114             0             0         4
11101705        10225   .035114             0             0         5
11101706        10225   .035114             0             0         6
11101707        10225   .035114             0             0         7
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11101801           0       0.0           0.0     16.244581         7
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11101901           0       0.0           0.0     16.244581         7
*
*************************************************************************
* LOWER DOWNCOMER DISTRIBUTION ANNULUS HEAT LOSS (WITH HONEYCOMB)      *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 110 (VOLUME 10)
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11102000           1        10         2         1  0.244875
*
*MESH        LOC FLG   FRM FLG
11102100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11102101           1 .246541667       2  .256958333       1  .2586250
11102102           3 .411541667       2  .578208333
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11102201          10         1        11         3        10         4
11102202           1         7         8         9
*
*SOURCE DIS   SOURCE    ITV NO
11102301        0.0         9
*
*INIT TEMP       FLG
11102400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11102401  549.3    2   440.6    3   323.7    8   241.6    9   181.1   10
*
*L-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11102501   110100000        0        1        1   0.704681        1
```

```
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11102601   805010000         0     4100        1    0.704681        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11102701           0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11102801           0       0.0     0.198130      0.96250         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11102901           0       0.0          0.0      0.96250         1
*
*********************************************************************
* LOWER DOWNCOMER DISTRIBUTION ANNULUS - EXTERNAL HEATERS           *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 110 (VOLUME 10)
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11103000           1        13         2         1    .244875
*
*MESH        LOC FLG   FRM FLG
11103100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11103101           1  .246541667       2  .256958333       1  .25862500
11103102           3  .411541667       1  .411641667       2  .42605833
11103103           2  .592725000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11103201          10         1        11         3        10         4
11103202           1         7        13         8         9        10
11103203           8        12
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11103301         0.0         8       1.0        10       0.0        12
*
*INIT TEMP       FLG
11103400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11103401  549.3    2   444.1    3   331.6    8   335.1   11   247.6   12
11103402  182.9   13
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11103501   110100000         0        1        1    0.257819        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11103601   815010000         0     4100        1    0.257819        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11103701       10225   .035114            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11103801           0         0     0.198130      0.96250         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11103901           0         0          0.0      0.96250         1
```

```
*
**********************************************************************
* DOWNCOMER DISTRIBUTION ANNULUS TO CORE INLET (THRU LOWER EXTENSION)  *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 140
*  RIGHT BOUNDARY = COMPONENT 110 (VOLUME 10)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11140000           1         3         2         1   0.1796667
*
*MESH        LOC FLG   FRM FLG
11140100          0         1
*
*GEOMETRY     NO ITV     R-COR
11140101           2   0.188958
*
*MATERIALS    CMP NO    ITV NO
11140201           1         2
*
*SOURCE DIS   SOURCE    ITV NO
11140301         0.0         2
*
*INIT TEMP       FLG
11140400           0
*
*          TEMP MESH
11140401  550.0    3
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11140501   140010000         0        1        1     0.96250        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11140601   110100000         0        1        1     0.96250        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11140701           0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11140801           0       0.0          0.0      0.96250         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11140901           0       0.0     0.256760      0.96250         1
*
**********************************************************************
* CORE INLET HEAT LOSS  (CORE HOUS'G LOWER EXT'N ABOVE DNWCR AN'LUS)   *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 140
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11400000           1         6         2         1   .14934039
*
11400100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
11400101           3   .4826737         2   .64934039
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
```

```
11400201          1         3         8         5
*
*SOURCE DIS   SOURCE    ITV NO
11400301        0.0         5
*
*INIT TEMP       FLG
11400400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11400401  547.6    1   494.2    2   459.0    3   432.7    4   328.3    5
11400402  232.4    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11400501   140010000         0        1        1   0.6258333        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11400601   805010000         0     4100        1   0.6258333        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11400701          0         0            0            0          1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11400801          0       0.0          0.0          0.0          1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11400901          0       0.0          0.0          0.0          1
*
*************************************************************************
* VESSEL BOTTOM HEAD  (WITH HONEYCOMB)                                  *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 120
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11200000           1         9         2         1  0.412500
*
*MESH        LOC FLG   FRM FLG
11200100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11200101          1  .414166667       2  .424583333       1  .426250000
11200102          2  .740416666       2  .90708333
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11200201         10         1        11         3        10         4
11200202          1         6         8         8
*
*SOURCE DIS   SOURCE    ITV NO
11200301        0.0         8
*
*INIT TEMP       FLG
11200400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11200401  540.1    2   441.3    3   343.5    5   317.0    6   296.6    7
11200402  237.0    8   179.5    9
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11200501   120010000         0        1        1   0.466667        1
```

```
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11200601   805010000         0     4100        1    0.466667        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11200701           0         0             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11200801           0       0.0           0.0      0.466667         1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11200901           0       0.0           0.0      0.466667         1
*
**********************************************************************
* VESSEL LOWER PLENUM WALL   (WITH HONEYCOMB)                        *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 130
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11300000           1         9         2         1  .363403395
*
*MESH        LOC FLG   FRM FLG
11300100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11300101           1  .365070062         2  .375486729         1  .37715339
11300102           2  .691320063         2  .857986730
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11300201          10         1        11         3        10         4
11300202           1         6         8         8
*
*SOURCE DIS   SOURCE    ITV NO
11300301         0.0         8
*
*INIT TEMP       FLG
11300400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11300401  540.8    2   438.3    3   337.1    5   310.3    6   290.3    7
11300402  232.2    8   176.5    9
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11300501   130010000         0         1        1    0.721917        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11300601   805010000         0     4100        1    0.721917        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11300701           0         0             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11300801           0       0.0           0.0      0.721917         1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11300901           0       0.0           0.0      0.721917         1
*
**********************************************************************
```

```
* HEATED CORE  (ACTIVE LENGTH)                                          *
*************************************************************************
*
*  LEFT BOUNDARY  = ADIABATIC
*  RIGHT BOUNDARY = COMPONENT 150
*
*              NOTE:  THE MOD-2A CORE IS A 5 X 5 ROD MATRIX WITH
*                     TWO (2) UNPOWERED RODS IN OPPOSING CORNERS.
*                     EACH ROD HAS AN OD = 0.422 IN.   EACH POWER
*                     STEP (TWO PER HYDRODYNAMIC VOLUME) IS
*                     MODELED INDIVIDUALLY.
*
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11500000          12        18         2         1       0.0
*
*MESH        LOC FLG   FRM FLG
11500100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11500101          1   0.002917         4  0.009375         4  0.014500
11500102          4   0.015500         4  0.017583
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11500201          3         1         4         5         3         9
11500202          1        13         1        17
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11500301         0.0         1       1.0         5       0.0        17
*
*INIT TEMP       FLG
11500400         -1
*
*TEMP DISTRIBUTION
11500401  692.4  692.4  689.8  683.2  673.1  659.6  638.3  619.6  602.9
+         587.8  585.7  583.7  581.7  579.7  575.7  571.7  567.9  564.2
11500402  822.4  822.4  817.5  804.9  785.6  760.1  717.9  681.2  648.7
+         619.6  615.7  611.9  608.1  604.3  596.7  589.3  582.1  575.2
11500403  979.3  979.3  971.9  952.9  923.8  885.2  818.5  760.9  710.4
+         665.5  659.7  654.1  648.5  642.9  631.6  620.7  610.0  599.5
11500404 1143.1 1143.1 1133.1 1107.0 1067.1 1014.2  917.8  835.8  764.6
+         701.8  694.0  686.3  678.8  671.3  656.0  641.1  626.6  612.4
11500405 1275.5 1275.5 1263.7 1232.9 1185.7 1123.4 1004.1  903.7  817.4
+         741.8  732.7  723.8  715.0  706.3  688.5  671.2  654.3  637.7
11500406 1333.6 1333.6 1320.8 1287.7 1236.9 1169.8 1038.8  929.3  835.4
+         753.5  743.8  734.3  724.9  715.5  696.5  677.9  659.7  641.9
11500407 1350.8 1350.8 1338.1 1304.9 1254.2 1187.1 1055.0  944.6  850.1
+         767.7  758.0  748.6  739.2  729.9  711.0  692.5  674.5  656.8
11500408 1293.2 1293.2 1281.4 1250.6 1203.4 1141.1 1020.7  919.6  832.6
+         756.6  747.6  738.7  730.0  721.3  703.7  686.5  669.6  653.2
11500409 1190.8 1190.8 1180.7 1154.6 1114.7 1061.9  963.3  879.5  806.9
+         743.0  735.4  727.9  720.4  713.1  698.1  683.5  660.2  655.3
11500410 1026.1 1026.1 1018.7  999.7  970.6  932.0  863.9  805.2  753.7
+         707.9  702.3  696.7  691.2  685.8  674.7  663.9  653.5  643.3
11500411  886.2  886.2  881.3  868.7  849.4  823.9  780.6  742.9  709.5
+         679.7  675.9  672.1  668.4  664.8  657.7  650.2  643.2  636.4
11500412  755.6  755.6  753.0  746.4  736.2  722.8  700.9  681.7  664.6
+         649.1  647.1  645.1  643.1  641.2  637.3  633.5  629.8  626.2
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
```

```
11500501          0          0          0          0        0.0         12
*
*R-BNDY       HY-VOL        INC      B-CDT     A-CODE   SURF-AREA   HT-STR-NO
11500601   150010000          0          1          0   2.5410249           1
11500602   150010000          0          1          0   2.5410249           2
11500603   150020000          0          1          0   2.5410249           3
11500604   150020000          0          1          0   2.5410249           4
11500605   150030000          0          1          0   2.5410249           5
11500606   150030000          0          1          0   2.5410249           6
11500607   150040000          0          1          0   2.5410249           7
11500608   150040000          0          1          0   2.5410249           8
11500609   150050000          0          1          0   2.5410249           9
11500610   150050000          0          1          0   2.5410249          10
11500611   150060000          0          1          0   2.5410249          11
11500612   150060000          0          1          0   2.5410249          12
*
*SOURCE         TYPE    IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11500701        10151    0.02584             0             0           1
11500702        10151    0.04917             0             0           2
11500703        10151    0.07416             0             0           3
11500704        10151    0.10166             0             0           4
11500705        10151    0.12001             0             0           5
11500706        10151    0.12916             0             0           6
11500707        10151    0.12916             0             0           7
11500708        10151    0.12001             0             0           8
11500709        10151    0.10166             0             0           9
11500710        10151    0.07416             0             0          10
11500711        10151    0.04917             0             0          11
11500712        10151    0.02584             0             0          12
*
*L-H-ST      CHF-HTR     HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11500801           0        0.0           0.0          12.0          12
*
*R-H-ST      CHF-HTR     HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11500901           0        0.0      0.043992          12.0          12
*
*************************************************************************
* VESSEL CORE BARREL WALL (MOD-3 "STEAM-GAP") - UNHEATED                *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 150
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11501000           6        13         2         1  0.132114
*
*MESH        LOC FLG   FRM FLG
11501100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11501101           2   .133964         1   .135531         2   .143864
11501102           3   .200256         2   .272256         2   .438956
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11501201           1         2         2         3         1         5
11501202           1         8         1        10         8        12
*
*SOURCE DIS   SOURCE    ITV NO
11501301        0.0        12
*
```

```
*INIT TEMP        FLG
11501400           -1
*
*TEMP DISTRIBUTION
11501401  551.6  551.3  551.0  360.7  359.2  357.8  351.9  346.7  342.1
+         334.4  328.0  257.4  186.8
11501402  564.4  564.1  563.7  367.8  366.3  364.8  358.7  353.4  348.6
+         340.7  334.0  261.6  189.2
11501403  581.9  581.5  581.2  377.5  375.5  374.4  368.1  362.5  357.5
+         349.3  342.4  267.4  192.4
11501404  598.5  598.1  597.8  386.9  385.3  383.7  377.1  371.3  366.1
+         357.6  350.5  273.1  195.6
11501405  609.7  609.3  609.0  393.4  391.7  390.0  383.3  377.3  372.0
+         363.3  356.0  276.9  197.8
11501406  614.2  613.8  613.5  395.2  393.5  391.8  384.9  378.9  373.6
+         364.8  357.4  277.9  198.3
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11501501   150010000         0        1        1    0.635984        1
11501502   150020000         0        1        1    0.635984        2
11501503   150030000         0        1        1    0.830843        3
11501504   150040000         0        1        1    0.830843        4
11501505   150050000         0        1        1    0.830843        5
11501506   150060000         0        1        1    0.635984        6
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11501601   805010000         0     4100        1    0.635984        1
11501602   805010000         0     4100        1    0.635984        2
11501603   805010000         0     4100        1    0.830843        3
11501604   805010000         0     4100        1    0.830843        4
11501605   805010000         0     4100        1    0.830843        5
11501606   805010000         0     4100        1    0.635984        6
*
*SOURCE          TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11501701            0         0            0            0             6
*
*L-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11501801            0       0.0     0.129489         12.0             6
*
*R-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11501901            0       0.0          0.0         12.0             6
*
************************************************************************
* VESSEL CORE BARREL WALL - EXTERNAL HEATERS                           *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 150
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG      L-COR
11502000           6        16         2         1   0.132114
*
*MESH        LOC FLG   FRM FLG
11502100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11502101           2   .133964         1   .135531         2   .143864
11502102           3   .200256         2   .272256         1   .272356
11502103           2   .2827727        2   .4494394
*
```

```
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11502201          1         2         2         3         1         5
11502202          1         8         1        10        13        11
11502203          9        13         8        15
*
*SOURCE DIS    SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11502301         0.0        11       1.0        13       0.0        15
*
*INIT TEMP       FLG
11502400          -1
*
*TEMP DISTRIBUTION,
11502401  637.7  637.5  637.2  492.3  491.2  490.1  485.7  481.9  478.7
+         473.8  470.2  466.8  461.8  453.4  344.5  235.6
11502402  643.0  642.8  642.6  497.0  495.9  494.8  490.3  486.5  483.3
+         478.3  474.6  471.1  465.9  457.4  347.3  237.1
11502403  648.7  648.5  648.2  503.1  502.0  500.9  496.4  492.6  489.4
+         484.3  480.4  476.8  471.5  462.8  351.0  239.1
11502404  653.2  653.0  652.8  508.3  507.0  506.1  501.7  497.9  494.6
+         489.4  485.5  481.7  476.3  467.4  354.2  240.9
11502405  653.3  653.1  652.9  510.7  509.6  508.6  504.2  500.4  497.2
+         492.0  488.1  484.3  478.7  469.8  355.8  241.8
11502406  653.4  653.1  652.9  511.5  510.4  509.4  505.0  501.3  498.0
+         492.9  488.9  485.1  479.5  470.6  356.4  242.1
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11502501   150010000         0        1        1    1.364016           1
11502502   150020000         0        1        1    1.364016           2
11502503   150030000         0        1        1    1.169157           3
11502504   150040000         0        1        1    1.169157           4
11502505   150050000         0        1        1    1.169157           5
11502506   150060000         0        1        1    1.364016           6
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11502601   815010000         0     4100        1    1.364016           1
11502602   815010000         0     4100        1    1.364016           2
11502603   815010000         0     4100        1    1.169157           3
11502604   815010000         0     4100        1    1.169157           4
11502605   815010000         0     4100        1    1.169157           5
11502606   815010000         0     4100        1    1.364016           6
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11502701        10225   .122878             0             0           1
11502702        10225   .122878             0             0           2
11502703        10225   .105342             0             0           3
11502704        10225   .105342             0             0           4
11502705        10225   .105342             0             0           5
11502706        10225   .122878             0             0           6
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11502801           0       0.0      0.129489          12.0           6
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
11502901           0       0.0           0.0          12.0           6
*
*********************************************************************
* VESSEL UPPER CORE WALL (NO HONEYCOMB) - UNHEATED                  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 161
```

```
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11610000           1        13         2         1   0.132114
*
*MESH        LOC FLG   FRM FLG
11610100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11610101           2   .133964         1   .135531         2   .143864
11610102           3   .200256         2   .560256         2   .7269227
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11610201          1         2         2         3         1         5
11610202          1         8         1        10         8        12
*
*SOURCE DIS   SOURCE    ITV NO
11610301        0.0        12
*
*INIT TEMP       FLG
11610400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11610401  609.7    3   371.4    6   362.1    7   353.0    9   310.4   10
11610402  286.0   11   228.0   12   173.8   13
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11610501  161010000         0        1        1    0.764104        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11610601   805010000         0     4100        1    0.764104        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11610701          0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11610801          0       0.0     0.173513      1.00083         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11610901          0       0.0          0.0      1.00083         1
*
*********************************************************************
* VESSEL UPPER CORE WALL - EXTERNAL HEATERS                         *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 161
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11611000           1        16         2         1   0.132114
*
*MESH        LOC FLG   FRM FLG
11611100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11611101           2   .133964         1   .135531         2   .143864
11611102           3   .200256         2   .560256         1   .560356
11611103           2   .5707727        2   .7374394
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
```

```
11611201          1        2        2        3        1        5
11611202          1        8        1       10       13       11
11611203          9       13        8       15
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11611301        0.0        11       1.0        13       0.0        15
*
*INIT TEMP       FLG
11611400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11611401  609.7   3   376.5   6   360.8   9   309.5  11   315.1  13
11611402  313.1  14   238.5  15   178.0  16
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11611501   161010000         0        1        1    0.236729        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11611601   815010000         0     4100        1    0.236729        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11611701        10225   .043539             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11611801          0       0.0      0.173513       1.00083         1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11611901          0       0.0           0.0       1.00083         1
*
*********************************************************************
* VESSEL UPPER PLENUM WALL - UNHEATED                               *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 162,163,164
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11600000          3        13         2         1   0.133854
*
*MESH        LOC FLG   FRM FLG
11600100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11600101          2  0.142184         1  0.146351         3   .200518
11600102          4  0.422392         2  0.589059
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11600201          1         2         2         3         1         6
11600202          1        10         8        12
*
*SOURCE DIS   SOURCE    ITV NO
11600301        0.0        12
*
*INIT TEMP       FLG
11600400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11600401  600.0   3   270.0   4   266.0   5   260.0   7   245.0   9
11600402  232.0  11   188.0  12   150.0  13
*
```

```
*L-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11600501   162010000        0        1        1    1.756048        1
11600502   163010000        0        1        1    1.411882        2
11600503   164010000        0        1        1    1.796411        3
*
*R-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11600601   805010000        0     4100        1    1.756048        1
11600602   805010000        0     4100        1    1.411882        2
11600603   805010000        0     4100        1    1.796411        3
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11600701           0         0            0            0         3
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11600801           0       0.0     0.201536     2.760833         1
11600802           0       0.0     0.244660     2.416667         2
11600803           0       0.0     0.255926     2.550000         3
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11600901           0       0.0          0.0          0.0         3
*
*********************************************************************
* VESSEL UPPER PLENUM WALL - EXTERNAL HEATERS                       *
*********************************************************************
*
*  LEFT BOUNDARY = COMPONENTS 162,163,164
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11601000           3        16         2         1  0.133854
*
*MESH        LOC FLG   FRM FLG
11601100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11601101          2  0.142184         1  0.146351         3  0.200518
11601102          4  0.422392         1  0.422492         2  0.4329087
11601103          2  0.5995754
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11601201          1         2         2         3         1         6
11601202          1        10        13        11         9        13
11601203          8        15
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11601301        0.0        11       1.0        13       0.0        15
*
*INIT TEMP       FLG
11601400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11601401  600.0    3   275.0    4   267.4    7   248.7   10   260.0   13
11601402  264.2   14   200.3   15   155.0   16
*
*L-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11601501   162010000        0        1        1    1.004785        1
11601502   163010000        0        1        1    1.004785        2
11601503   164010000        0        1        1    0.753589        3
*
*R-BNDY       HY-VOL      INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
```

```
11601601   815010000        0     4100        1    1.004785       1
11601602   815010000        0     4100        1    1.004785       2
11601603   815010000        0     4100        1    0.753589       3
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11601701       10217   .500072             0             0          1
11601702       10217   .499928             0             0          2
11601703       10212     1.0               0             0          3
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11601801           0       0.0      0.201536      2.760833          1
11601802           0       0.0      0.244660      2.416667          2
11601803           0       0.0      0.255926      2.550000          3
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11601901           0       0.0           0.0           0.0          3
*
*********************************************************************
* UPPER CORE SUPPORT PLATE (SEPARATES UPPER PLENUM AND UPPER HEAD)    *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 164
*  RIGHT BOUNDARY = COMPONENT 191
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11690000           1         4         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
11690100           0         1
*
*GEOMETRY     NO ITV     R-COR
11690101           3     0.654
*
*MATERIALS    CMP NO    ITV NO
11690201           1         3
*
*SOURCE DIS   SOURCE    ITV NO
11690301         0.0         3
*
*INIT TEMP       FLG
11690400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11690401  602.9    1   611.9    2   612.0    3   611.2    4
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
11690501   164010000         0        1        1   0.1263155          1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
11690601   191010000         0        1        1   0.1263155          1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11690701           0         0             0             0          1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11690801           0       0.0           0.0           0.0          1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11690901           0       0.0           0.0           0.0          1
*
```

```
*********************************************************************
* VESSEL UPPER HEAD WALL - TOP & BOTTOM - UNHEATED                  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 191 & 194
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11901000           2        13         2         1   0.133854
*
*MESH        LOC FLG   FRM FLG
11901100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11901101           2   0.142184         1   0.146351         3   0.200518
11901102           4   0.348434         2   0.5151007
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11901201           1         2         2         3         1         6
11901202           1        10         8        12
*
*SOURCE DIS   SOURCE    ITV NO
11901301        0.0        12
*
*INIT TEMP       FLG
11901400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11901401  577.5    3   276.9    4   271.0    6   263.0    8   250.9   11
11901402  197.7   12   155.3   13
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11901501   191010000         0        1        1    0.172152        1
11901502   194010000         0        1        1    2.424058        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11901601   805010000         0     4100        1    0.172152        1
11901602   805010000         0     4100        1    2.424058        2
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11901701           0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11901801           0       0.0     0.209097     8.776667         1
11901802           0       0.0     0.255470     8.776667         2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11901901           0       0.0          0.0     8.776667         2
*
*********************************************************************
* VESSEL UPPER HEAD WALL - MIDDLE - UNHEATED                        *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 192 & 193
*  RIGHT BOUNDARY = AMBIENT VOLUME (805)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11902000           2        13         2         1   0.133854
*
*MESH        LOC FLG   FRM FLG
```

```
11902100          0        1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11902101          2   0.142184        1   0.146351        3   0.200518
11902102          4   0.274476        2   0.441143
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11902201          1         2         2         3         1         6
11902202          1        10         8        12
*
*SOURCE DIS   SOURCE    ITV NO
11902301         0.0        12
*
*INIT TEMP       FLG
11902400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11902401  573.1    3   289.2    4   285.4    5   282.0    6    279.0  7
11902402  272.0   11   211.0   12   162.8   13
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11902501   192010000         0        1        1    1.579266        1
11902502   193010000         0        1        1    2.486916        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11902601   805010000         0     4100        1    1.579266        1
11902602   805010000         0     4100        1    2.486916        2
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT    HT-STR-NO
11902701          0         0            0            0        2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
11902801          0       0.0     0.222013     8.776667        1
11902802          0       0.0     0.228473     8.776667        2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
11902901          0       0.0          0.0          0.0        2
*
*************************************************************************
* VESSEL UPPER HEAD WALL - MIDDLE - EXTERNAL HEATERS                    *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 192 & 193
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11903000          2        16         2         1   0.133854
*
*MESH        LOC FLG   FRM FLG
11903100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11903101          2   0.142184        1   0.146351        3   0.200518
11903102          4   0.274476        1   0.274576        2   0.2849927
11903103          2   0.4516594
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11903201          1         2         2         3         1         6
11903202          1        10        13        11         9        13
11903203          8        15
```

```
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11903301        0.0        11       1.0        13       0.0        15
*
*INIT TEMP       FLG
11903400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11903401  573.1    3   295.6    4   292.0    5   289.0    6   286.8    7
11903402  284.0   10   288.0   11   297.5   12   301.7   13   299.0   14
11903403  221.6   15   166.4   16
*
*L-BNDY       HY-VÓL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11903501   192010000         0        1        1    0.386567        1
11903502   193010000         0        1        1    0.966417        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11903601   815010000         0     4100        1    0.386567        1
11903602   815010000         0     4100        1    0.966417        2
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
11903701        10208   .166667            0            0         1
11903702        10208   .416667            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11903801           0       0.0     0.222013     8.776667         1
11903802           0       0.0     0.228473     8.776667         2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
11903901           0       0.0          0.0          0.0         2
*
*************************************************************************
* VESSEL UPPER HEAD WALL - TOP & BOTTOM - EXTERNAL HEATERS             *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 191 & 194
*  RIGHT BOUNDARY = AMBIENT VOLUME (815)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
11904000           2        16         2         1  0.133854
*
*MESH        LOC FLG   FRM FLG
11904100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
11904101           2  0.142184         1  0.146351         3  0.200518
11904102           4  0.348434         1  0.348534         2  0.3589507
11904103           2  0.5256174
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
11904201           1         2         2         3         1         6
11904202           1        10        13        11         9        13
11904203           8        15
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
11904301        0.0        11       1.0        13       0.0        15
*
*INIT TEMP       FLG
11904400          0
*
```

```
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
11904401  577.9    3   282.0    4   278.1    5   274.8    6    271.7  7
11904402  262.0   10   264.6   11   275.4   12   280.4   13    278.4 14
11904403  209.0   15   159.9   16
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11904501   191010000         0        1        1    0.304515        1
11904502   194010000         0        1        1    0.456772        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
11904601   815010000         0     4100        1    0.304515        1
11904602   815010000         0     4100        1    0.456772        2
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
11904701        10208   .166667             0             0         1
11904702        10208   .250000             0             0         2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11904801           0       0.0      0.209097      8.776667         1
11904802           0       0.0      0.255470      8.776667         2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
11904901           0       0.0           0.0      8.776667         2
*
*************************************************************************
* HEAT SLAB... STEAM GENERATOR TUBE BUNDLE    (INTACT LOOP)             *
*            (RISING PRIMARY COOLANT...FIRST HALF OF U-TUBE)            *
*************************************************************************
*
*  LEFT BOUNDARY  = STEAM GENERATOR PRIMARY COOLANT   (COMPONENT 220)
*  RIGHT BOUNDARY = STEAM GENERATOR SECONDARY COOLANT (COMPONENT 600)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12200000           4         5         2         1   0.032375
*
*MESH        LOC FLG   FRM FLG
12200100          0         1
*
*GEOMETRY     NO ITV     R-COR
12200101           4   0.036458333
*
*MATERIALS    CMP NO    ITV NO
12200201           5         4
*
*SOURCE DIS   SOURCE    ITV NO
12200301         0.0         4
*
*INIT TEMP       FLG
12200400          -1
*
*TEMP DISTRIBUTION
12200401  575.9  565.1  554.5  544.2  534.2
12200402  567.9  558.9  550.1  541.6  533.3
12200403  561.0  553.5  546.3  541.6  533.3
12200404  556.5  550.3  544.3  538.4  532.7
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12200501   220010000         0        1        1   47.715000        1
12200502   220020000     10000        1        1   47.465000        3
12200503   220040000         0        1        1   40.152175        4
```

```
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12200601   600010000         0        1        1   47.715000        1
12200602   600020000     10000        1        1   47.465000        3
12200603   600040000         0        1        1   40.152175        4
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
12200701           0         0             0             0         4
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12200801           0  0.064750      0.064750          29.5         4
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12200901           0  .0887292      .3115210          29.5         3
12200902           0  .1077433      .4104615          29.5         4
*
*********************************************************************
* HEAT SLAB... STEAM GENERATOR TUBE BUNDLE     (INTACT LOOP)        *
*            (DECENDING PRIMARY COOLANT...SECOND HALF OF U-TUBE)    *
*********************************************************************
*
*  LEFT BOUNDARY  = STEAM GENERATOR PRIMARY COOLANT   (COMPONENT 220)
*  RIGHT BOUNDARY = STEAM GENERATOR SECONDARY COOLANT (COMPONENT 600)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12201000           4         5         2         1   0.032375
*
*MESH        LOC FLG   FRM FLG
12201100          0         1
*
*GEOMETRY     NO ITV    R-COR
12201101           4   0.036458333
*
*MATERIALS    CMP NO    ITV NO
12201201           5         4   * INCONEL  600
*
*SOURCE DIS   SOURCE    ITV NO
12201301        0.0         4
*
*INIT TEMP       FLG
12201400          -1
*
*TEMP DISTRIBUTION
12201401  551.9  546.5  541.2  538.4  532.7
12201402  546.5  541.7  537.0  532.5  528.1
12201403  542.2  538.1  534.1  530.2  526.4
12201404  538.5  535.0  531.5  528.3  525.1
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12201501   220050000         0        1        1   40.152175        1
12201502   220060000     10000        1        1   47.465000        3
12201503   220080000         0        1        1   47.715000        4
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12201601   600040000         0        1        1   40.152175        1
12201602   600030000         0        1        1   47.465000        2
12201603   600020000         0        1        1   47.465000        3
12201604   600010000         0        1        1   47.715000        4
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
12201701           0         0             0             0         4
```

```
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12201801           0  .0647500      .0647500          29.5          4
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12201901           0  .1077433      .4104615          29.5          1
12201902           0  .0887292      .3115210          29.5          4
*
*********************************************************************
* HEAT SLAB... INTACT LOOP ST. GENERATOR HEAT TRANSFER FROM         *
*              THE RISER TO THE DOWNCOMER                           *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 600
*  RIGHT BOUNDARY = COMPONENT 602 & 603
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
16000000           5         6         2         1   .2680135
*
*MESH        LOC FLG   FRM FLG
16000100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
16000101           2   .3637826         1   .3665038         2   .3782030
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
16000201          14         2        15         3         1         5
*
*SOURCE DIS   SOURCE    ITV NO
16000301         0.0         5
*
*INIT TEMP       FLG
16000400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
16000401  514.0    1   522.3    2   503.2    3   501.8    4   501.7    5
16000402  501.3    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16000501   600010000         0        1        1   7.9525000         1
16000502   600020000     10000        1        1   7.9108334         3
16000503   600040000         0        1        1   7.4762500         4
16000504   600050000         0        1        1   1.4054167         5
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16000601   603040000         0        1        1   7.9525000         1
16000602   603030000         0        1        1   7.9108334         2
16000603   603020000         0        1        1   7.9108334         3
16000604   603010000         0        1        1   7.4762500         4
16000605   602010000         0        1        1   1.4054167         5
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
16000701           0         0            0            0         5
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
16000801           0  .0884737      .2535283     7.9525000         1
16000802           0  .0884737      .2535283     7.9108334         3
16000803           0  .1058911      .2728816     7.4762500         4
16000804           0  .2145338      .3379099     1.4054167         5
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
```

```
16000901          0  .0201639      .0732836     7.9525000        1
16000902          0  .0126981      .0518749     7.9108334        3
16000903          0  .0128227      .0523927     7.4762500        4
16000904          0  .3369291      .7902365     1.4054167        5
*
*********************************************************************
* HEAT SLAB... STEAM GENERATOR STEAM DOME HEAT LOSS TO ENVIRONMENT    *
*              (INCLUDES UPPER SECTION OF DOWNCOMER)                  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 612,611,602
*  RIGHT BOUNDARY = AMBIENT VOLUME (800)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
16100000           3         6         2         1    .6719167
*
*MESH        LOC FLG   FRM FLG
16100100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
16100101          2     0.750         3     1.000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
16100201          1         2        17         5
*
*SOURCE DIS   SOURCE    ITV NO
16100301        0.0         5
*
*INIT TEMP       FLG
16100400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
16100401  516.5    3   376.6    4   239.5    5    96.4    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16100501   612010000         0        1        1   1.1334992       1
16100502   611010000         0        1        1   0.1497007       2
16100503   602010000         0        1        1   4.8530686       3
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16100601   800010000         0     4100        1   1.1334992       1
16100602   800010000         0     4100        1   0.1497007       2
16100603   800010000         0     4100        1   4.8530686       3
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT    HT-STR-NO
16100701          0         0            0            0        3
*
*L-H-ST     CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
16100801          0   .6533449    .6533449    1.5404167        1
16100802          0   .5664365   2.6896228    0.7487500        2
16100803          0   .3369291    .5873578    5.5516667        3
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
16100901          0      0.0          0.0          0.0        3
*
*********************************************************************
* HEAT SLAB... BROKEN LOOP ST. GENERATOR HEAT TRANSFER FROM           *
*              THE RISER TO THE DOWNCOMER (TOP)                       *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 600, 601
```

```
*  RIGHT BOUNDARY = COMPONENTS 602
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
16001000           2         3         2         1   .4341667
*
*MESH        LOC FLG   FRM FLG
16001100           0         1
*
*GEOMETRY     NO ITV     R-COR
16001101           2   .4479167
*
*MATERIALS    CMP NO    ITV NO
16001201           1         2
*
*SOURCE DIS   SOURCE    ITV NO
16001301         0.0         2
*
*INIT TEMP       FLG
16001400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH
16001401  519.1    1   501.3    2   488.0    3
*
*L-BNDY      HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH  HT-STR-NO
16001501   600050000         0        1        1   3.5802339       1
16001502   601010000         0        1        1   0.4375000       2
*
*R-BNDY      HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH  HT-STR-NO
16001601   602010000         0        1        1   3.5802339       1
16001602   602010000         0        1        1   0.4375000       2
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT    HT-STR-NO
16001701           0         0            0            0        2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
16001801           0   .7932265     .8251205    3.7504167        1
16001802           0   .8683333     .8683333    0.4375000        2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
16001901           0   .3369291     .7902365    3.7504167        1
16001902           0   .3369291     .7902365    0.4375500        2
*
*************************************************************************
* HEAT SLAB... INTACT LOOP STEAM GENERATOR DOWNCOMER FILLERS           *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT  602, 603
*  RIGHT BOUNDARY = COMPONENTS 602, 603
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
16031000           5         3         2         1   .3645833
*
*MESH        LOC FLG   FRM FLG
16031100           0         1
*
*GEOMETRY     NO ITV     R-COR
16031101           2   .3958333
*
*MATERIALS    CMP NO    ITV NO
16031201           1         2
*
```

```
*SOURCE DIS   SOURCE    ITV NO
16031301        0.0        2
*
*INIT TEMP       FLG
16031400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH
16031401  524.5    1   528.7    2   517.9    3
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16031501   602010000         0        1        1   1.1902917        1
16031502   603010000         0        1        1   6.3963472        2
16031503   603020000         0        1        1   6.7681575        3
16031504   603030000         0        1        1   6.7681575        4
16031505   603040000         0        1        1   5.3422315        5
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16031601   602010000         0        1        1   1.1902917        1
16031602   603010000         0        1        1   6.3963472        2
16031603   603020000         0        1        1   6.7681575        3
16031604   603030000         0        1        1   6.7681575        4
16031605   603040000         0        1        1   5.3422315        5
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
16031701           0         0             0             0             5
*
*L-H-ST      CHF-HTR     HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
16031801           0   .3369291      .7902365     1.3912500             1
16031802           0   .0128227      .0523927     7.4762500             2
16031803           0   .0126981      .0518749     7.9108334             3
16031804           0   .0126981      .0518749     7.9108334             4
16031805           0   .0126981      .0518749     6.2441667             5
*
*R-H-ST      CHF-HTR     HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
16031901           0   .3369291      .7902365     1.3912500             1
16031902           0   .0128227      .0472456     7.4762500             2
16031903           0   .0126981      .0467818     7.9108334             3
16031904           0   .0126981      .0467818     7.9108334             4
16031905           0   .0126981      .0467818     6.2441667             5
*
*********************************************************************
* HEAT SLAB... INTACT LOOP STEAM GENERATOR DOWNCOMER                *
*              HEAT TRANSFER TO THE ENVIRONMENT                     *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 603
*  RIGHT BOUNDARY = AMBIENT VOLUME (800)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
16030000           4         6         2         1   .3985000
*
*MESH        LOC FLG   FRM FLG
16030100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
16030101          2   .4479167       3   .6979167
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
16030201          1         2        17         5
*
*SOURCE DIS   SOURCE    ITV NO
```

```
16030301        0.0        5
*
*INIT TEMP      FLG
16030400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
16030401  514.1    1   514.0    2   513.9    3   369.0    4   232.0    5
16030402   95.3    6
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16030501   603010000         0        1        1   7.4762500       1
16030502   603020000         0        1        1   7.9108334       2
16030503   603030000         0        1        1   7.9108334       3
16030504   603040000         0        1        1   7.9525000       4
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
16030601   800010000         0     4100        1   7.4762500       1
16030602   800010000         0     4100        1   7.9108334       3
16030603   800010000         0     4100        1   7.9525000       4
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT    HT-STR-NO
16030701           0         0             0             0        4
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
16030801           0   .0128227     .0472456     7.4762500         1
16030802           0   .0126981     .0467818     7.9108334         2
16030803           0   .0126981     .0467818     7.9108334         3
16030804           0   .0201639     .0667482     7.9525000         4
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
16030901           0       0.0           0.0           0.0         4
*
************************************************************************
* HEAT SLAB... STEAM GENERATOR TUBE BUNDLE     (BROKEN LOOP)           *
*          (RISING PRIMARY COOLANT...FIRST HALF OF U-TUBES)            *
************************************************************************
*
*  LEFT BOUNDARY  = STEAM GENERATOR PRIMARY COOLANT   (COMPONENT 320)
*  RIGHT BOUNDARY = STEAM GENERATOR SECONDARY COOLANT (COMPONENT 700)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13200000           5         5         2         1   0.0310417
*
*MESH        LOC FLG   FRM FLG
13200100           0         1
*
*GEOMETRY     NO ITV     R-COR
13200101           4  0.0364583
*
*MATERIALS    CMP NO    ITV NO
13200201           5         4   *INCONEL 600
*
*SOURCE DIS   SOURCE    ITV NO
13200301        0.0         4
*
*INIT TEMP       FLG
13200400          -1
*
*TEMP DISTRIBUTION
13200401  579.0  569.2  559.6  550.3  541.2
13200402  575.0  566.0  552.3  548.8  540.5
```

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13200403  570.9  562.8  554.9  547.2  539.7
13200404  567.5  560.1  552.9  545.9  539.0
13200405  564.1  557.4  550.9  544.5  538.3
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13200501   320010000         0        1        1   2.1666667           1
13200502   320010000         0        1        1  13.4166667           2
13200503   320020000     10000        1        1  15.0000000           4
13200504   320040000         0        1        1  15.0856194           5
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13200601   716010000         0        1        1   2.1666667           1
13200602   700010000         0        1        1  13.4166667           2
13200603   700020000     10000        1        1  15.0000000           4
13200604   700040000         0        1        1  15.0856194           5
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
13200701           0         0             0             0             5
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13200801           0  .0620833      .0620833           0.0             5
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13200901           0  .0659845      .2900678           0.0             4
13200902           0  .0753070      .3067184           0.0             5
*
*********************************************************************
* HEAT SLAB... STEAM GENERATOR TUBE BUNDLE     (BROKEN LOOP)        *
*          (DECENDING PRIMARY COOLANT...SECOND HALF OF U-TUBES)     *
*********************************************************************
*
*  LEFT BOUNDARY  = STEAM GENERATOR PRIMARY COOLANT   (COMPONENT 320)
*  RIGHT BOUNDARY = STEAM GENERATOR SECONDARY COOLANT (COMPONENT 700)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13201000           5         5         2         1  0.0310417
*
*MESH        LOC FLG   FRM FLG
13201100           0         1
*
*GEOMETRY     NO ITV     R-COR
13201101           4  0.0364583
*
*MATERIALS    CMP NO    ITV NO
13201201           5         4   *INCONEL 600
*
*SOURCE DIS   SOURCE    ITV NO
13201301         0.0         4
*
*INIT TEMP       FLG
13201400          -1
*
*TEMP DISTRIBUTION
13201401  554.5  549.6  544.9  540.3  535.8
13201402  552.4  547.9  543.6  539.4  535.3
13201403  550.2  546.2  542.2  538.4  534.7
13201404  548.4  544.7  541.1  537.6  534.2
13201405  546.6  543.2  540.0  536.8  533.7
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13201501   320050000         0        1        1  15.0856194           1
```

```
13201502   320060000     10000        1        1  15.0000000          3
13201503   320080000         0        1        1  13.4166667          4
13201504   320080000         0        1        1   2.1666667          5
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13201601   700040000         0        1        1  15.0856194          1
13201602   700030000    -10000        1        1  15.0000000          3
13201603   700010000         0        1        1  13.4166667          4
13201604   716010000         0        1        1   2.1666667          5
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
13201701           0         0             0             0             5
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13201801           0  .0620833      .0620833           0.0             5
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13201901           0  .0753070      .3067184           0.0             1
13201902           0  .0659845      .2900678           0.0             5
*
*********************************************************************
* HEAT SLAB... STEAM GENERATOR STEAM DOME HEAT LOSS TO ENVIRONMENT    *
*              (INCLUDES UPPER SECTION OF RISER AND SEPARATOR)        *
*********************************************************************
*
*  LEFT BOUNDARY  = C
*  RIGHT BOUNDARY = A
*
*GL DATA          NH
17023000           2
*
*MESH        LOC FLG
17023100           0
*
*GEOMETRY     NO ITV
17023101           2
*
*MATERIALS    CMP NO
17023201           1
*
*SOURCE DIS   SOURCE
17023301         0.0
*
*INIT TEMP       FLG
17023400           0
*
*          TEMP MESH
17023401  516.5    2
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17023501   701010000         0        1        1   1.3615856          1
17023502   703010000         0        1        1   0.7925179          2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17023601   809010000         0     4300        1   1.3615856          1
17023602   809010000         0     4300        1   0.7925179          2
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
17023701           0         0             0             0             2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
```

```
17023801          0  .6944443      .6944443      0.0                 1
17023802          0  .2429779      .3342205      0.0                 2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
17023901          0       0.0           0.0           0.0             2
*
**********************************************************************
* HEAT SLAB... BROKEN LOOP ST. GENERATOR SECONDARY RISER HEAT LOSS    *
*              TO THE ENVIRONMENT                                     *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 700 & 716
*  RIGHT BOUNDARY = AMBIENT VOLUME (809)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
17000000          6         5         2         1   .1278333
*
*MESH        LOC FLG   FRM FLG
17000100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
17000101          2  .1458333         2  .3135000
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
17000201          1         2        32         4
*
*SOURCE DIS - SOURCE  - ITV NO
17000301        0.0         4
*
*INIT TEMP       FLG
17000400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
17000401  519.1    1   501.3    2   488.9    3   320.6    4    94.1    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17000501   700010000         0        1        1   6.7083333           1
17000502   700020000     10000        1        1   7.5000000           4
17000503   700050000         0        1        1   6.8229167           5
17000504   716010000         0        1        1   1.0833333           6
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17000601   809010000         0     4400        1   6.7083333           1
17000602   809010000         0     4400        1   7.5000000           4
17000603   809010000         0     4400        1   6.8229167           5
17000604   809010000         0     4400        1   1.0833333           6
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
17000701          0         0            0            0             6
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
17000801          0  .0659845      .1654559          0.0             3
17000802          0  .0753070      .1759521          0.0             4
17000803          0  .1934227      .2385353          0.0             5
17000804          0  .0659845      .1654559          0.0             6
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
17000901          0       0.0           0.0           0.0             6
*
**********************************************************************
* HEAT SLAB... BROKEN LOOP ST. GENERATOR RISER TO DOWNCOMER           *
```

```
*              HEAT LOSS TO THE ENVIRONMENT                              *
***********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT  711
*  RIGHT BOUNDARY = AMBIENT VOLUME (809)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
17110000           1         5         2         1   .2102917
*
*MESH        LOC FLG   FRM FLG
17110100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
17110101           2  .2317917         2  .3984584
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
17110201           1         2        32         4
*
*SOURCE DIS   SOURCE    ITV NO
17110301         0.0         4
*
*INIT TEMP       FLG
17110400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
17110401  514.5    1   514.7    2   513.9    3   300.0    4   95.3    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17110501   711010000         0        1        1   4.6776013           1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17110601   809010000         0     4400        1   4.6776013           1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
17110701           0         0            0            0             1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
17110801           0  .3989363     .3989363          0.0             1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
17110901           0      0.0      0.                0.0             1
*
***********************************************************************
* HEAT SLAB... BROKEN LOOP ST. GENERATOR DOWNCOMER                     *
*              HEAT LOSS TO THE ENVIRONMENT                              *
***********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 713, 714, & 715
*  RIGHT BOUNDARY = AMBIENT VOLUME (809)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
17140000           7         5         2         1     .0575
*
*MESH        LOC FLG   FRM FLG
17140100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
17140101           2  .0691667         2  .2358334
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
17140201           1         2        32         4
```

```
*
*SOURCE DIS   SOURCE    ITV NO
17140301        0.0        4
*
*INIT TEMP       FLG
17140400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
17140401  514.1    1   514.0    2   513.9    3   300.0    4    95.3    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17140501   713010000         0        1        1   3.1426389           1
17140502   714010000         0        1        1   4.0891869           2
17140503   714020000     10000        1        1   7.5000000           5
17140504   714050000         0        1        1   7.4537703           6
17140505   715010000         0        1        1   7.8734167           7
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
17140601   809010000         0     4500        1   3.1426389           1
17140602   809010000         0     4500        1   4.0891869           2
17140603   809010000         0     4500        1   7.5000000           5
17140604   809010000         0     4500        1   7.4537703           6
17140605   809010000         0     4500        1   7.8734167           7
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT    HT-STR-NO
17140701           0         0            0            0            7
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
17140801           0  .1316182     .1316182          0.0            1
17140802           0  .1150000     .1150000          0.0            6
17140803           0  .1303373     .1303373          0.0            7
*
*R-H-ST      CHF-HTR     HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
17140901           0        0.0          0.0          0.0            7
*
************************************************************************
* HEAT SLAB... IL SG INLET-OUTLET PLENUM - TOP RECTANGULAR SECTION     *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 210 & 230
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12100000           2        10         2         1   .329989
*
*MESH        LOC FLG   FRM FLG
12100100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
12100101           7   .958333         2     1.125
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
12100201           1         7        26         9
*
*SOURCE DIS   SOURCE    ITV NO
12100301        0.0        9
*
*INIT TEMP       FLG
12100400         -1
*
*TEMP DISTRIBUTION
```

```
12100401  606.0  600.0  597.0  594.0  591.0  588.0  585.0  582.0  325.0
+          68.0
12100402  540.0  534.0  531.0  528.0  525.0  522.0  519.0  516.0  292.0
+          68.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12100501   210010000         0        1        1    0.078125        1
12100502   230010000         0        1        1    0.078125        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12100601   808010000         0     4100        1    0.078125        1
12100602   808010000         0     4100        1    0.078125        2
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
12100701           0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12100801           0  .3258603     .5192263     0.156250         2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12100901           0       0.0          0.0     0.156250         2
*
*************************************************************************
* HEAT SLAB... IL SG INLET-OUTLET PLENUM - MIDDLE TRAPIZOIDAL SECTION  *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 210 & 230
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12101000           2        11         2         1   .243733
*
*MESH        LOC FLG   FRM FLG
12101100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12101101           1   .333333         7   .958333         2     1.125
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
12101201           1         8        26        10
*
*SOURCE DIS   SOURCE    ITV NO
12101301        0.0        10
*
*INIT TEMP       FLG
12101400          -1
*
*TEMP DISTRIBUTION
12101401  606.0  603.0  600.0  597.0  594.0  591.0  588.0  585.0  582.0
+         325.0   68.0
12101402  540.0  537.0  534.0  531.0  528.0  525.0  522.0  519.0  516.0
+         292.0   68.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12101501   210010000         0        1        1    0.072917        1
12101502   230010000         0        1        1    0.072917        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12101601   808010000         0     4100        1    0.072917        1
12101602   808010000         0     4100        1    0.072917        2
*
```

```
*SOURCE          TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
12101701            0         0             0             0          2
*
*L-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12101801            0  .2513333      .4800904      0.145834          2
*
*R-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12101901            0      0.0           0.0      0.145834          2
*
*********************************************************************
* HEAT SLAB... IL SG INLET-OUTLET PLENUM - BOTTOM TRAPIZOIDAL SECTION  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 210 & 230
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA           NH        NP      TYPE     S-FLG     L-COR
12102000            2         4         2         1   .243733
*
*MESH         LOC FLG   FRM FLG
12102100            0         1
*
*GEOMETRY      NO ITV     R-COR    NO ITV     R-COR
12102101            1   .333333         2       0.5
*
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO
12102201            1         1        26         3
*
*SOURCE DIS    SOURCE    ITV NO
12102301           0.0         3
*
*INIT TEMP        FLG
12102400           -1
*
*TEMP DISTRIBUTION
12102401  606.0  582.0  325.0   80.0
12102402  540.0  516.0  292.0   80.0
*
*L-BNDY        HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12102501   210010000         0        1        1    0.166667         1
12102502   230010000         0        1        1    0.166667         2
*
*R-BNDY        HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12102601   808010000         0     4100        1    0.166667         1
12102602   808010000         0     4100        1    0.166667         2
*
*SOURCE          TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
12102701            0         0             0             0          2
*
*L-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12102801            0  .2513333      .4800904      0.333334          2
*
*R-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12102901            0      0.0           0.0      0.333334          2
*
*********************************************************************
* HEAT SLAB... IL SG PLENUM BETWEEN UP & DN STREAM RECTANGULAR SECTION *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 210
*  RIGHT BOUNDARY = COMPONENT 230
```

```
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12103000           1         4         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
12103100           0         1
*
*GEOMERTY     NO ITV     R-COR
12103101           3    .095417
*
*MATERIALS    CMP NO    ITV NO
12103201           1         3
*
*SOURCE DIS   SOURCE    ITV NO
12103301         0.0         3
*
*INIT TEMP       FLG
12103400          -1
*
*TEMP DISTRIBUTION
12103401  606.0  584.0  562.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12103501   210010000         0        1        0   0.102761        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12103601   230010000         0        1        0   0.102761        1
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
12103701           0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12103801           0  .3258603     0.875000     0.156250         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12103901           0  .3258603     0.875000     0.156250         1
*
************************************************************************
* HEAT SLAB... IL SG PLENUM BETWEEN UP & DN STREAM TRAPIZOIDAL SECTION *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 210
*  RIGHT BOUNDARY = COMPONENT 230
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12104000           1         4         1         1       0.0
*
*MESH         LOC FLG   FRM FLG
12104100           0         1
*
*GEOMERTY     NO ITV     R-COR
12104101           3    .162938
*
*MATERIALS    CMP NO    ITV NO
12104201           1         3
*
*SOURCE DIS   SOURCE    ITV NO
12104301         0.0         3
*
*INIT TEMP       FLG
12104400          -1
```

```
*
*TEMP DISTRIBUTION
12104401  606.0  584.0  562.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12104501   210010000         0        1        0    0.229152        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12104601   230010000         0        1        0    0.229152        1
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
12104701           0         0             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12104801           0  .2513333      .5274709      0.479167         1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12104901           0  .2513333      .5274709      0.479167         1
*
*********************************************************************
* HEAT SLABS... IL SG TUBE SHEET FLANGES - UP(1) & DOWNSTREAM(2)      *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 215 & 225
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA        NH        NP      TYPE     S-FLG     L-COR
12150000           2        14         2         1   .212031
*
*MESH        LOC FLG   FMT FLG
12150100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12150101           1   .216114         1   .216406         3   .447917
12150102           1   .528545         5   .958333         2   1.12500
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
12150201           5         1        13         2        25        11
12150202          26        13
*
*SOURCE DIS   SOURCE    ITV NO
12150301         0.0        13
*
*INIT TEMP       FLG
12150400          -1
*
*TEMP DISTRIBUTION
12150401  606.0  605.5  605.0  604.5  604.0  601.0  600.0  598.0  596.0
+         594.0  592.0  590.0  329.0   80.0
12150402  540.0  539.5  539.0  538.6  538.2  536.4  534.6  532.8  531.0
+         529.2  527.4  526.6  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12150501   215010000         0        1        1    0.380208        1
12150502   225010000         0        1        1    0.380208        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12150601   808010000         0     4100        1    0.380208        1
12150602   808010000         0     4100        1    0.380208        2
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
```

```
12150701          0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12150801          0  0.064750      0.120724      0.760417         2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12150901          0      0.0           0.0      0.760417         2
*
**********************************************************************
* HEAT SLABS... IL SG TUBE SHEET CONICAL SECTION - UP(1), DOWNSTREAM(2)*
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 215 & 225
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12151000           2         9         2         1   .212031
*
*MESH        LOC FLG   FMT FLG
12151100          0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12151101          1    .216114         1   .216406         3   .447917
12151102          1    .528545         2   .695211
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
12151201          5         1        13         2        25         6
12151202         26         8
*
*SOURCE DIS   SOURCE    ITV NO
12151301        0.0         8
*
*INIT TEMP       FLG
12151400         -1
*
*TEMP DISTRIBUTION
12151401  606.0  605.5  605.0  604.0  600.0  595.0  590.0  329.0   80.0
12151402  540.0  539.5  539.0  536.4  534.6  530.8  526.6  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12151501   215010000         0        1        1    0.327925         1
12151502   225010000         0        1        1    0.327925         2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12151601   808010000         0     4100        1    0.327925         1
12151602   808010000         0     4100        1    0.327925         2
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
12151701          0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12151801          0  0.064750      0.120724      0.655849         2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12151901          0      0.0           0.0      0.739583         2
*
**********************************************************************
* HEAT SLABS... IL SG TUBE SHEET CENTER SECTION - UP(1) & DOWNSTREAM(2)*
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 215 & 225
```

```
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12152000           2         8         2         1   .212031
*
*MESH        LOC FLG   FMT FLG
12152100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12152101           1   .216114         1   .216406         3   .447917
12152102           2   .614583
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
12152201           5         1        13         2        25         5
12152202          26         7
*
*SOURCE DIS   SOURCE    ITV NO
12152301         0.0         7
*
*INIT TEMP       FLG
12152400          -1
*
*TEMP DISTRIBUTION
12152401  606.0  605.5  605.0  604.0  600.0  590.0  329.0   80.0
12152402  540.0  539.5  539.0  536.4  534.6  530.8  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT.   A-CODE   CY-LENGTH   HT-STR-NO
12152501   215010000         0         1         1   0.166867         1
12152502   225010000         0         1         1   0.166867         2
*
*R-BNDY       HY-VOL       INC    B-CDT    A-CODE   CY-LENGTH   HT-STR-NO
12152601   808010000         0      4100         1   0.166867         1
12152602   808010000         0      4100         1   0.166867         2
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
12152701           0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12152801           0  0.064750     0.120724     0.333734         2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
12152901           0       0.0          0.0     0.333734         2
*
*********************************************************************
* HEAT SLAB... IL SG TUBE SHEET BETWEEN UP & DN STREAM  HYD. VOLUMES   *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 215
*  RIGHT BOUNDARY = COMPONENT 225
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12153000           1         4         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
12153100           0         1
*
*GEOMERTY     NO ITV     R-COR
12153101           3   .256517
*
*MATERIALS    CMP NO    ITV NO
12153201          25         3
```

```
*
*SOURCE DIS   SOURCE    ITV NO
12153301        0.0        3
*
*INIT TEMP       FLG
12153400         -1
*
*TEMP DISTRIBUTION
12153401  606.0  584.0  562.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12153501   215010000        0        1        0    0.693967        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
12153601   225010000        0        1        0    0.693967        1
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
12153701           0        0             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12153801           0  0.064750      0.139652          1.75         1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12153901           0  0.064750      0.139652          1.75         1
*
**********************************************************************
* HEAT SLAB... BL SG INLET-OUTLET PLENUM - TOP RECTANGULAR SECTION   *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 310 & 330
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13100000           2        10         2         1    .329960
*
*MESH        LOC FLG   FMT FLG
13100100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR
13100101           7    .958333         2     1.125
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
13100201           1         7        26         9
*
*SOURCE DIS   SOURCE    ITV NO
13100301        0.0        9
*
*INIT TEMP       FLG
13100400         -1
*
*TEMP DISTRIBUTION
13100401  606.0  600.0  597.0  594.0  591.0  588.0  585.0  582.0  325.0
+          68.0
13100402  540.0  534.0  531.0  528.0  525.0  522.0  519.0  516.0  292.0
+          68.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13100501   310010000        0        1        1    0.078125        1
13100502   330010000        0        1        1    0.078125        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
```

```
13100601   808010000        0     4100        1    0.078125       1
13100602   808010000        0     4100        1    0.078125       2
*
*SOURCE          TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
13100701            0         0             0             0          2
*
*L-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13100801            0  .3258603      .5192263      0.156250          2
*
*R-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13100901            0      0.0           0.0      0.156250          2
*
*********************************************************************
* HEAT SLAB... BL SG INLET-OUTLET PLENUM - MIDDLE TRAPIZOIDAL SECTION  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 310 & 330
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13101000           2        11         2         1   .247205
*
*MESH        LOC FLG   FMT FLG
13101100          0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
13101101           1   .333333         7   .958333         2     1.125
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
13101201           1         8        26        10
*
*SOURCE DIS   SOURCE    ITV NO
13101301        0.0        10
*
*INIT TEMP       FLG
13101400          -1
*
*TEMP DISTRIBUTION
13101401  606.0  603.0  600.0  597.0  594.0  591.0  588.0  585.0  582.0
+         325.0   68.0
13101402  540.0  537.0  534.0  531.0  528.0  525.0  522.0  519.0  516.0
+         292.0   68.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13101501   310010000         0        1        1    0.072917       1
13101502   330010000         0        1        1    0.072917       2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13101601   808010000         0     4100        1    0.072917       1
13101602   808010000         0     4100        1    0.072917       2
*
*SOURCE          TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
13101701            0         0             0             0          2
*
*L-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13101801            0  .2243822      .3974532      0.145834          2
*
*R-H-ST       CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13101901            0      0.0           0.0      0.145834          2
*
*********************************************************************
```

```
* HEAT SLAB... BL SG INLET-OUTLET PLENUM - BOTTOM TRAPIZOIDAL SECTION  *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 310 & 330
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13102000           2         4         2         1    .247205
*
*MESH        LOC FLG   FMT FLG
13102100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR
13102101           1    .333333         2       0.5
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
13102201           1         1        26         3
*
*SOURCE DIS   SOURCE    ITV NO
13102301         0.0         3
*
*INIT TEMP       FLG
13102400          -1
*
*TEMP DISTRIBUTION
13102401  606.0  582.0  325.0   80.0
13102402  540.0  516.0  292.0   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13102501   310010000         0        1        1    0.250000        1
13102502   330010000         0        1        1    0.250000        2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13102601   808010000         0     4100        1    0.250000        1
13102602   808010000         0     4100        1    0.250000        2
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13102701           0         0            0            0         2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13102801           0  .2243822     .3974532     0.500000         2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13102901           0       0.0          0.0     0.500000         2
*
************************************************************************
* HEAT SLAB... BL SG PLENUM BETWEEN UP & DN STREAM RECTANGULAR SECTION *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 310
*  RIGHT BOUNDARY = COMPONENT 330
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13103000           1         4         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
13103100           0         1
*
*GEOMERTY     NO ITV     R-COR
13103101           3    .095333
*
```

```
*MATERIALS    CMP NO    ITV NO
13103201         1         3
*
*SOURCE DIS   SOURCE    ITV NO
13103301        0.0         3
*
*INIT TEMP       FLG
13103400         -1
*
*TEMP DISTRIBUTION
13103401  606.0  584.0  562.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
13103501   310010000         0        1        0    0.102753        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
13103601   330010000         0        1        0    0.102753        1
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13103701           0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13103801           0  .3258603     .5192263     0.156250         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13103901           0  .3258603     .5192263     0.156250         1
*
***************************************************************************
* HEAT SLAB... BL SG PLENUM BETWEEN UP & DN STREAM TRAPIZOIDAL SECTION *
***************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 310
*  RIGHT BOUNDARY = COMPONENT 330
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13104000           1         4         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
13104100           0         1
*
*GEOMERTY     NO ITV     R-COR
13104101           3    .222145
*
*MATERIALS    CMP NO    ITV NO
13104201         1         3
*
*SOURCE DIS   SOURCE    ITV NO
13104301        0.0         3
*
*INIT TEMP       FLG
13104400         -1
*
*TEMP DISTRIBUTION
13104401  606.0  584.0  562.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
13104501   310010000         0        1        0    0.228673        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF-AREA   HT-STR-NO
13104601   330010000         0        1        0    0.228673        1
*
```

```
*SOURCE          TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13104701            0         0            0            0             1
*
*L-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13104801            0  .2243822     .5152883     0.479167             1
*
*R-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13104901            0  .2243822     .5152883     0.479167             1
*
*************************************************************************
* HEAT SLABS... BL SG TUBE SHEET FLANGES - UP(1) & DOWNSTREAM(2)        *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 315 & 325
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA           NH        NP      TYPE     S-FLG     L-COR
13150000            2        15         2         1   .1277344
*
*MESH         LOC FLG   FRM FLG
13150100            0         1
*
*GEOMERTY      NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
13150101            1   .1331511         1   .1334427         1   .1958013
13150102            1   .2916667         2   .4634361         6   .9583333
13150103            2  1.1250000
*
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13150201            5         1        13         2        25        12
13150202           26        14
*
*SOURCE DIS    SOURCE    ITV NO
13150301          0.0        14
*
*INIT TEMP        FLG
13150400           -1
*
*TEMP DISTRIBUTION
13150401  606.0  605.5  605.0  604.5  604.0  601.0  600.0  598.0  596.0
+         594.0  593.0  592.0  590.0  329.0   80.0
13150402  540.0  539.5  539.0  538.6  538.2  536.4  534.6  532.8  531.0
+         529.2  528.3  527.4  526.2  296.6   80.0
*
*L-BNDY        HY-VOL       INC     B-CDT    A-CODE    CY-LENGTH    HT-STR-NO
13150501   315010000         0         1         1     0.203125            1
13150502   325010000         0         1         1     0.203125            2
*
*R-BNDY        HY-VOL       INC     B-CDT    A-CODE    CY-LENGTH    HT-STR-NO
13150601   808010000         0      4100         1     0.203125            1
13150602   808010000         0      4100         1     0.203125            2
*
*SOURCE          TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13150701            0         0            0            0             2
*
*L-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13150801            0  .0620833     .1167128     0.406250             2
*
*R-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13150901            0      0.0          0.0     0.406250             2
*
*************************************************************************
```

```
* HEAT SLABS... BL SG TUBE SHEET CONICAL SECTION - UP(1), DOWNSTREAM(2)*
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 315 & 325
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13151000           2         9         2         1   .1277344
*
*MESH        LOC FLG   FRM FLG
13151100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
13151101           1   .1331511         1   .1334427         1   .1958013
13151102           1   .2916667         2   .4634361         2   .6301027
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13151201           5         1        13         2        25         6
13151202          26         8
*
*SOURCE DIS   SOURCE    ITV NO
13151301         0.0         8
*
*INIT TEMP       FLG
13151400          -1
*
*TEMP DISTRIBUTION
13151401  606.0  605.5  605.0  604.0  600.0  595.0  590.0  329.0   80.0
13151402  540.0  539.5  539.0  536.4  534.6  530.8  526.6  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13151501   315010000         0        1        1   .2966746           1
13151502   325010000         0        1        1   .2966746           2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13151601   808010000         0     4100        1   .2966746           1
13151602   808010000         0     4100        1   .2966746           2
*
*SOURCE         TYPE   IS-MLPR      L DR-HT      R-DR-HT     HT-STR-NO
13151701           0         0            0            0             2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13151801           0  .0620833     .1167128    0.6770833             2
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13151901           0      0.0          0.0    0.6770833             2
*
************************************************************************
* HEAT SLABS... BL SG TUBE SHEET CYLINDRICAL SECTION - UP(1) & DOWN(2) *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 315 & 325
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13152000           2         7         2         1   .1277344
*
*MESH        LOC FLG   FRM FLG
13152100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
```

```
13152101          1   .1331511        1   .1334427        1   .1958013
13152102          1   .2916667        2   .4583333
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13152201          5         1        13         2        25         4
13152202         26         6
*
*SOURCE DIS   SOURCE    ITV NO
13152301        0.0         6
*
*INIT TEMP       FLG
13152400         -1
*
*TEMP DISTRIBUTION
13152401  606.0  605.0  604.0  600.0  590.0  329.0   80.0
13152402  540.0  539.0  536.4  534.6  530.8  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13152501   315010000         0        1        1   0.2920754           1
13152502   325010000         0        1        1   0.2920754           2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13152601   808010000         0     4100        1   0.2920754           1
13152602   808010000         0     4100        1   0.2920754           2
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13152701           0         0            0           0             2
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH     HT-STR-NO
13152801           0  .0620833     .1167128    0.5841508             2
*
*R-H-ST
13152901           0       0.0          0.0    0.5841508             2
*
*********************************************************************
* HEAT SLABS... BL SG TUBE SHEET HUB SECTION - UP(1) & DOWNSTREAM(2)  *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 315 & 325
*  RIGHT BOUNDARY = AMBIENT VOLUME (808)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13153000           2         6         2         1   .1277344
*
*MESH        LOC FLG   FRM FLG
13153100           0         1
*
*GEOMERTY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
13153101           1   .1331511        1   .1334427        1   .1958013
13153102           2   .3624679
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13153201           5         1        13         2        25         3
13153202          26         5
*
*SOURCE DIS   SOURCE    ITV NO
13153301        0.0         5
*
*INIT TEMP       FLG
13153400         -1
*
```

```
*TEMP DISTRIBUTION
13153401  606.0  604.0  600.0  590.0  329.0   80.0
13153402  540.0  536.4  534.6  530.8  296.6   80.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13153501   315010000         0        1        1   0.0835417           1
13153502   325010000         0        1        1   0.0835417           2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13153601   808010000         0     4100        1   0.0835417           1
13153602   808010000         0     4100        1   0.0835417           2
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
13153701           0         0             0             0             2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13153801           0  .0620833      .1167128     0.1670833             2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13153901           0      0.0           0.0     0.1670833             2
*
***********************************************************************
* HEAT SLAB... BL SG TUBE SHEET BETWEEN UP & DN STREAM  HYD. VOLUMES   *
***********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 315
*  RIGHT BOUNDARY = COMPONENT 325
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13154000           1         3         1         1       0.0
*
*MESH        LOC FLG   FRM FLG
13154100           0         1
*
*GEOMERTY     NO ITV     R-COR
13154101           2   .165750
*
*MATERIALS    CMP NO    ITV NO
13154201          25         2
*
*SOURCE DIS   SOURCE    ITV NO
13154301         0.0         2
*
*INIT TEMP       FLG
13154400          -1
*
*TEMP DISTRIBUTION
13154401  606.0  573.0  540.0
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF AREA   HT-STR-NO
13154501   315010000         0        1        0   0.4135420           1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   SURF AREA   HT-STR-NO
13154601   325010000         0        1        0   0.4135420           1
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
13154701           0         0             0             0             1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13154801           0  .6020833      .1326376      1.751830             1
*
```

```
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13154901           0  0.064750      0.064750      1.751830             1
*
*********************************************************************
* HEAT SLAB... INTACT & BROKEN LOOP, 3 IN. SCH-160 PIPING           *
*            NOTE - CONTAINS ONLY VOLUME LENGTHS WHICH              *
*                   ARE HEATED BY HEATER TAPE.                      *
*********************************************************************
*
*  LEFT BOUNDARY  = COMPONENTS 201,261,262,263,301,363
*  RIGHT BOUNDARY = AMBIENT VOLUMES (811 & 813)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12002000           8         8         2         1  .10933333
*
*MESH        LOC FLG   FRM FLG
12002100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12002101           2  .14583333         1   .1459333         2   .156350
12002102           2  .32301667
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
12002201           1         2        13         3         9         5
12002202          16         7
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
12002301         0.0         3       1.0         5       0.0         7
*
*INIT TEMP       FLG
12002400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
12002401  548.9    1   560.4    2   570.4    3   590.2    4   604.8    5
12002402  606.3    6   357.7    7   154.3    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12002501   201010000         0        1        1     0.18189         1
12002502   201020000         0        1        1     0.54567         2
12002503   261010000         0        1        1     1.03188         3
12002504   261020000         0        1        1     0.78704         4
12002505   262010000         0        1        1     0.72757         5
12002506   263010000         0        1        1     0.54567         6
12002507   301010000         0        1        1     0.72757         7
12002508   363020000         0        1        1     0.36378         8
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12002601   811010000         0     4100        1     0.18189         1
12002602   811010000         0     4100        1     0.54567         2
12002603   813010000         0     4100        1     1.03188         3
12002604   813010000         0     4100        1     0.78704         4
12002605   813010000         0     4100        1     0.72757         5
12002606   813010000         0     4100        1     0.54567         6
12002607   811010000         0     4100        1     0.72757         7
12002608   813010000         0     4100        1     0.36378         8
*
*SOURCE          TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
12002701          110   .013207            0            0             1
12002702          110   .039077            0            0             2
12002703          112   .246930            0            0             3
12002704          112   .186657            0            0             4
```

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12002705        112   .174759          0          0        5
12002706        112   .129414          0          0        6
12002707        110   .052769          0          0        7
12002708        112   .087280          0          0        8
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
12002801          0       0.0          0.0     0.218666        8
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
12002901          0       0.0          0.0     0.218666        8
*
*********************************************************************
* HEAT SLAB... INTACT LOOP, 3 IN. SCH-160 PIPING                    *
*            NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH    *
*                   ARE NOT HEATED                                  *
*********************************************************************
*
*  LEFT BOUNDARY  = INTACT LOOP PRIMARY COOLANT (201,261,262,263)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (801 & 803)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12003000           6         5         2         1   0.10933333
*
*MESH        LOC FLG   FRM FLG
12003100          0         1
*
*       ACTUAL WALL THK. MULT BY 2.0 TO ACCOUNT FOR CLAMP+HUB MASS
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
12003101          2   0.182333        2    0.349000
*                                          0.43233  FOR 3 IN. OF INSUL
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
12003201          1         2        16         4
*
*SOURCE DIS   SOURCE    ITV NO
12003301        0.0         4
*
*INIT TEMP       FLG
12003400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
12003401  550.5    1   544.9    2   540.8    3   328.2    4   147.7    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12003501   201010000         0        1        1     2.46061        1
12003502   201020000         0        1        1     0.75516        2
12003503   261010000         0        1        1     1.04479        3
12003504   261020000         0        1        1     1.28963        4
12003505   262010000         0        1        1     1.34910        5
12003506   263010000         0        1        1     1.60783        6
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12003601   801010000         0     4100        1     2.46061        1
12003602   801010000         0     4100        1     0.75516        2
12003603   803010000         0     4100        1     1.04479        3
12003604   803010000         0     4100        1     1.28963        4
12003605   803010000         0     4100        1     1.34910        5
12003606   803010000         0     4100        1     1.60783        6
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT    HT-STR-NO
12003701          0         0            0            0        6
```

```
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12003801           0       0.0           0.0      0.218666          6
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12003901           0       0.0           0.0      0.218666          6
*
**********************************************************************
* HEAT SLAB... INTACT LOOP , 2 1/2 IN. SCH-160 PIPING                *
*            NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH     *
*                   ARE HEATED WITH HEATER TAPE.                     *
**********************************************************************
*
*  LEFT BOUNDARY  = INTACT LOOP PRIMARY COOLANT (201,202,203,240)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (811 & 814)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12004000          15         8         2         1   0.088542
*
*MESH        LOC FLG   FRM FLG
12004100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
12004101           2  0.119792         1  0.119892         2  0.130309
12004102           2  0.296975
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
12004201           1         2        13         3         9         5
12004202          16         7
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
12004301         0.0         3       1.0         5       0.0         7
*
*INIT TEMP       FLG
12004400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
12004401  563.0    4   583.4    5   582.8    6   342.0    7   149.9    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12004501   201020000         0        1        1     0.88573        1
12004502   202010000         0        1        1     1.77146        2
12004503   203010000         0        1        1     1.99290        3
12004504   203020000         0        1        1     0.66430        4
12004505   203030000         0        1        1     0.88573        5
12004506   240010000         0        1        1     0.88573        6
12004507   240020000         0        1        1     1.55003        7
12004508   240030000         0        1        1     0.66430        8
12004509   240030000         0        1        1     1.77146        9
12004510   240040000         0        1        1     2.21433       10
12004511   240050000         0        1        1     3.08856       11
12004512   240060000         0        1        1     1.34009       12
12004513   240070000         0        1        1     1.34009       13
12004514   240080000         0        1        1     3.08856       14
12004515   240090000         0        1        1     2.65719       15
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12004601   811010000         0     4100        1     0.88573        1
12004602   811010000         0     4100        1     1.77146        2
12004603   811010000         0     4100        1     1.99290        3
12004604   811010000         0     4100        1     0.66430        4
```

```
12004605   811010000        0     4100        1     0.88573       5
12004606   811010000        0     4100        1     0.88573       6
12004607   811010000        0     4100        1     1.55003       7
12004608   811010000        0     4100        1     0.66430       8
12004609   814010000        0     4100        1     1.77146       9
12004610   814010000        0     4100        1     2.21433      10
12004611   814010000        0     4100        1     3.08856      11
12004612   814010000        0     4100        1     1.34009      12
12004613   814010000        0     4100        1     1.34009      13
12004614   814010000        0     4100        1     3.08856      14
12004615   814010000        0     4100        1     2.65719      15
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
12004701         110   .052769             0             0         1
12004702         110   .105537             0             0         2
12004703         110   .118744             0             0         3
12004704         110   .039077             0             0         4
12004705         110   .052769             0             0         5
12004706         110   .052769             0             0         6
12004707         110   .091845             0             0         7
12004708         110   .039077             0             0         8
12004709         113   .114289             0             0         9
12004710         113   .142829             0             0        10
12004711         113   .199265             0             0        11
12004712         113   .086459             0             0        12
12004713         113   .086459             0             0        13
12004714         113   .199265             0             0        14
12004715         113   .171434             0             0        15
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12004801           0       0.0           0.0      0.177084        15
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12004901           0       0.0           0.0      0.177084        15
*
*************************************************************************
* HEAT SLAB... INTACT LOOP , 2 1/2 IN. SCH-160 PIPING                   *
*             NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH       *
*                    ARE NOT HEATED.                                    *
*************************************************************************
*
*  LEFT BOUNDARY  = INTACT LOOP PRIMARY COOLANT (201,202,203,240)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (801 & 804)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12005000          14         5         2         1   0.088542
*
*MESH        LOC FLG   FRM FLG
12005100          0         1
*
*        ACTUAL WALL THK. MULT. BY 2.0 TO ACCOUNT FOR CLAMP + HUB MASS
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
12005101           2  0.151042         2  0.317709
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
12005201           1         2        16         4
*
*SOURCE DIS   SOURCE    ITV NO
12005301        0.0         4
*
*INIT TEMP       FLG
```

```
12005400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
12005401  550.1    1   545.2    2   541.5    3   323.6    4   146.1    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12005501   201020000         0        1        1     0.28510        1
12005502   202010000         0        1        1     0.97187        2
12005503   203010000         0        1        1     0.66131        3
12005504   203020000         0        1        1     1.66862        4
12005505   203030000         0        1        1     1.30272        5
12005506   240010000         0        1        1     0.63605        6
12005507   240020000         0        1        1     2.11622        7
12005508   240030000         0        1        1     1.01174        8
12005509   240040000         0        1        1     0.68150        9
12005510   240050000         0        1        1     0.41907       10
12005511   240060000         0        1        1     0.18183       11
12005512   240070000         0        1        1     0.18183       12
12005513   240080000         0        1        1     0.41907       13
12005514   240090000         0        1        1     1.55114       14
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12005601   801010000         0     4100        1     0.28510        1
12005602   801010000         0     4100        1     0.97187        2
12005603   801010000         0     4100        1     0.66131        3
12005604   801010000         0     4100        1     1.66862        4
12005605   801010000         0     4100        1     1.30272        5
12005606   801010000         0     4100        1     0.63605        6
12005607   801010000         0     4100        1     2.11622        7
12005608   804010000         0     4100        1     1.01174        8
12005609   804010000         0     4100        1     0.68150        9
12005610   804010000         0     4100        1     0.41907       10
12005611   804010000         0     4100        1     0.18183       11
12005612   804010000         0     4100        1     0.18183       12
12005613   804010000         0     4100        1     0.41907       13
12005614   804010000         0     4100        1     1.55114       14
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
12005701           0         0             0             0        14
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12005801           0       0.0           0.0      0.177084        14
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12005901           0       0.0           0.0      0.177084        14
*
*************************************************************************
* HEAT SLAB... BROKEN LOOP  - 1 1/2 IN. SCH 160 PIPING                  *
*            NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH        *
*                   ARE HEATED BY HEATER BANDS                          *
*************************************************************************
*
*  LEFT BOUNDARY = BROKEN LOOP PRIMARY COOLANT (340 - VOLUMES 4,5,7)
*  RIGHT BOUNDARY = AMBIENT VOLUME (812)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13001000           3        11         2         1   .0557500
*
*MESH        LOC FLG   FRM FLG
13001100           0         1
*
```

```
*GEOMETRY      NO ITV     R-COR     NO ITV     R-COR     NO ITV     R-COR
13001101          2   .07916667       1   .0792000        1   .081804167
13001102          3   .09222083       1   .094824997      2   .261491663
*
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13001201          1         2        13         3         1         4
13001202          9         7         1         8        16        10
*
*SOURCE DIS    SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
13001301         0.0         5       1.0         6       0.0        10
*
*INIT TEMP       FLG
13001400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
13001401  555.0    1   573.4    2   588.8    3   605.0    5   640.0    6
13001402  652.8    7   648.0    9   363.3   10   145.0   11
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13001501   340040000         0        1        1     2.29167        1
13001502   340050000         0        1        1     2.25000        2
13001504   340090000         0        1        1     0.20833        3
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13001601   812010000         0     4100        1     2.29167        1
13001602   812010000         0     4100        1     2.25000        2
13001604   812010000         0     4100        1     0.20833        3
*
*SOURCE          TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
13001701          111   .399475             0             0         1
13001702          111   .392056             0             0         2
13001704          111   .036122             0             0         3
*
*L-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
13001801            0       0.0           0.0      0.111500         3
*
*R-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
13001901            0       0.0           0.0      0.111500         3
*
*************************************************************************
* HEAT SLAB... BROKEN LOOP  - 1 1/2 IN. SCH-160 PIPING                  *
*              NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH      *
*                     ARE HEATED WITH HEATER TAPE.                      *
*************************************************************************
*
*  LEFT BOUNDARY  = BROKEN LOOP PRIMARY COOLANT (301,340,361,362,363)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (811,812,813)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13002000          17         8         2         1   .05575000
*
*MESH        LOC FLG   FRM FLG
13002100          0         1
*
*GEOMETRY      NO ITV     R-COR     NO ITV     R-COR
13002101          2   .07916667       1   .07920000
13002102          2   .0896840        2   .256350
*
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
13002201          1         2        13         3         9         5
13002202         16         7
```

```
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
13002301        0.0         3       1.0         5       0.0         7
*
*INIT TEMP       FLG
13002400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
13002401  548.7    1   545.0    3   542.7    4   536.9    5   531.6    6
13002402  299.4    7   139.1    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13002501   301010000         0        1        1     0.33506         1
13002502   301020000         0        1        1     0.67013         2
13002503   301030000         0        1        1     1.34025         3
13002504   301040000         0        1        1     1.34025         4
13002505   301050000         0        1        1     0.67013         5
13002506   301060000         0        1        1     1.00519         6
13002507   340010000         0        1        1     0.67013         7
13002508   340020000         0        1        1     0.67013         8
13002509   340030000         0        1        1     0.67013         9
13002510   340040000         0        1        1     1.34026        10
13002511   340050000         0        1        1     0.33506        11
13002512   340060000         0        1        1     0.67013        12
13002513   340070000         0        1        1     0.67013        13
13002514   340080000         0        1        1     4.35581        14
13002515   361010000         0        1        1     0.33506        15
13002516   362010000         0        1        1     0.67013        16
13002517   363010000         0        1        1     0.33506        17
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13002601   811010000         0     4100        1     0.33506         1
13002602   811010000         0     4100        1     0.67013         2
13002603   811010000         0     4100        1     1.34025         3
13002604   811010000         0     4100        1     1.34025         4
13002605   811010000         0     4100        1     0.67013         5
13002606   811010000         0     4100        1     1.00519         6
13002607   811010000         0     4100        1     0.67013         7
13002608   811010000         0     4100        1     0.67013         8
13002609   811010000         0     4100        1     0.67013         9
13002610   811010000         0     4100        1     1.34026        10
13002611   812010000         0     4100        1     0.33506        11
13002612   812010000         0     4100        1     0.67013        12
13002613   812010000         0     4100        1     0.67013        13
13002614   812010000         0     4100        1     4.35581        14
13002615   813010000         0     4100        1     0.33506        15
13002616   813010000         0     4100        1     0.67013        16
13002617   813010000         0     4100        1     0.33506        17
*
*SOURCE          TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
13002701          110   .013207             0             0         1
13002702          110   .026384             0             0         2
13002703          110   .052769             0             0         3
13002704          110   .052738             0             0         4
13002705          110   .026354             0             0         5
13002706          110   .039077             0             0         6
13002707          110   .026354             0             0         7
13002708          110   .026354             0             0         8
13002709          110   .026354             0             0         9
13002710          110   .052769             0             0        10
13002711          111   .009585             0             0        11
```

```
13002712        111   .019147          0          0       12
13002713        111   .019147          0          0       13
13002714        111   .124468          0          0       14
13002715        112   .043740          0          0       15
13002716        112   .087480          0          0       16
13002717        112   .043740          0          0       17
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
13002801          0       0.0          0.0     0.111500        17
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
13002901          0       0.0          0.0     0.111500        17
*
*************************************************************************
* HEAT SLAB... BROKEN LOOP - 1 1/2 IN. SCH-160 PIPING                   *
*            NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH        *
*                   ARE NOT HEATED.                                     *
*************************************************************************
*
*  LEFT BOUNDARY  = BROKEN LOOP PRIMARY COOLANT (301,340,361,362,363)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (801,802,803)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13003000          18         5         2         1   0.0557500
*
*MESH        LOC FLG   FRM FLG
13003100          0         1
*
*        ACTUAL WALL THK. MULT BY 2.0 TO ACCT FOR CLAMP+HUB MASS
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
13003101          2   0.1002584       2   0.2669251
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
13003201          1         2        16         4
*
*SOURCE DIS   SOURCE    ITV NO
13003301        0.0         4
*
*INIT TEMP       FLG
13003400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
13003401  549.7    1   544.8    2   541.5    3   306.7    4   140.5    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13003501   301010000         0        1        1     0.49827        1
13003502   301020000         0        1        1     1.54000        2
13003503   301030000         0        1        1     0.86987        3
13003504   301040000         0        1        1     1.38427        4
13003505   301050000         0        1        1     1.68796        5
13003506   301060000         0        1        1     0.97012        6
13003507   340010000         0        1        1     0.93535        7
13003508   340020000         0        1        1     1.66920        8
13003509   340030000         0        1        1     0.97362        9
13003510   340040000         0        1        1     1.31120       10
13003511   340050000         0        1        1     1.71140       11
13003512   340060000         0        1        1     0.34565       12
13003513   340070000         0        1        1     0.34565       13
13003514   340080000         0        1        1     0.99377       14
13003515   340090000         0        1        1     2.08834       15
13003516   361010000         0        1        1     1.63494       16
```

```
13003517   362010000        0        1        1     0.97737      17
13003518   363010000        0        1        1     1.99911      18
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13003601   801010000        0     4100        1     0.49827       1
13003602   801010000        0     4100        1     1.54000       2
13003603   801010000        0     4100        1     0.86987       3
13003604   801010000        0     4100        1     1.38427       4
13003605   801010000        0     4100        1     1.68796       5
13003606   801010000        0     4100        1     0.97012       6
13003607   801010000        0     4100        1     0.93535       7
13003608   801010000        0     4100        1     1.66920       8
13003609   801010000        0     4100        1     0.97362       9
13003610   801010000        0     4100        1     1.31120      10
13003611   802010000        0     4100        1     1.71140      11
13003612   802010000        0     4100        1     0.34565      12
13003613   802010000        0     4100        1     0.34565      13
13003614   802010000        0     4100        1     0.99377      14
13003615   802010000        0     4100        1     2.08834      15
13003616   803010000        0     4100        1     1.63494      16
13003617   803010000        0     4100        1     0.97737      17
13003618   803010000        0     4100        1     1.99911      18
*
*SOURCE         TYPE   IS-MLPR      L-DR-HT      R-DR-HT     HT-STR-NO
13003701           0         0            0            0        18
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
13003801           0       0.0          0.0     0.111500        18
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
13003901           0       0.0          0.0     0.111500        18
*
*********************************************************************
* HEAT SLAB... BROKEN LOOP, VESSEL NOZZLES (3 IN. SCH-160)          *
*            NOTE - HEAT SLAB CONTAINS ONLY VOLUME LENGTHS WHICH    *
*                   ARE NOT HEATED                                  *
*********************************************************************
*
*  LEFT BOUNDARY  = BROKEN LOOP PRIMARY COOLANT VESSEL NOZZLES (301,363)
*  RIGHT BOUNDARY = AMBIENT VOLUMES (801,803)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13004000           2         5         2         1   0.10933333
*
*MESH        LOC FLG   FRM FLG
13004100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
13004101           2  0.145833         2  0.312500
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
13004201           1         2        16         4
*
*SOURCE DIS   SOURCE    ITV NO
13004301         0.0         4
*
*INIT TEMP       FLG
13004400          -1
*
*TEMP DISTRIBUTION
13004401  610.1  606.8  604.3  352.4  152.5
```

```
13004402  546.9  544.1  541.9  318.8  144.8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13004501   301010000         0        1        1     0.61160        1
13004502   363020000         0        1        1     0.91239        2
*
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13004601   801010000         0     4100        1     0.61160        1
13004602   803010000         0     4100        1     0.91239        2
*
*SOURCE         TYPE   IS-MLPR       L-DR-HT       R-DR-HT     HT-STR-NO
13004701           0         0             0             0         2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13004801           0       0.0           0.0      0.218666         2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13004901           0       0.0           0.0      0.218666         2
*
************************************************************************
* HEAT SLAB... INTACT LOOP PUMP                                        *
*      NOTE - HEAT SLAB MODELS HEAT LOSS DUE TO PUMP SEAL COOLING      *
************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 250
*  RIGHT BOUNDARY = SPECIFIED IN TABLE 251
*
* PUMP HEAT LOSS IS TABULATED AS A LINEAR FUNCTION OF PUMP ANGULAR SPEED
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
12500000           1         4         2         1   0.08865
*
*MESH        LOC FLG   FRM FLG
12500100           0         1
*
*GEOMETRY     NO ITV     R-COR
12500101           3    0.1500
*
*MATERIALS    CMP NO    ITV NO
12500201           1         3
*
*SOURCE DIS   SOURCE    ITV NO
12500301         0.0         3
*
*INIT TEMP       FLG
12500400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
12500401  540.7    1   436.6    2   345.9    3   265.0    4
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12500501   250010000         0        1        1     2.26167        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
12500601           0         0     2251        1     2.26167        1
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
12500701           0         0             0             0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
```

```
12500801          0       0.0          0.0       2.26167        1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
12500901          0       0.0          0.0       2.26167        1
*
**********************************************************************
* HEAT SLAB... BROKEN LOOP PUMP                                      *
*      NOTE - HEAT SLAB MODELS HEAT LOSS DUE TO PUMP SEAL COOLING    *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 350
*  RIGHT BOUNDARY = SPECIFIED IN TABLE 351
*
* PUMP HEAT LOSS IS TABULATED AS A LINEAR FUNCTION OF PUMP ANGULAR SPEED
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
13500000          1         4        2         1    0.07014
*
*MESH        LOC FLG   FRM FLG
13500100          0         1
*
*GEOMETRY     NO ITV     R-COR
13500101          3    0.12325
*
*MATERIALS    CMP NO    ITV NO
13500201          1         3
*
*SOURCE DIS   SOURCE    ITV NO
13500301        0.0         3
*
*INIT TEMP       FLG
13500400          0
*
*          TEMP MESH    TEMP MESH    TEMP MESH    TEMP MESH
13500401  531.1    1   434.0    2   350.8    3   277.4    4
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13500501   350010000         0        1        1      1.9635        1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
13500601          0         0     2351        1      1.9635        1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT     HT-STR-NO
13500701          0         0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13500801          0       0.0          0.0       1.9635        1
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
13500901          0       0.0          0.0       1.9635        1
*
**********************************************************************
* HEAT SLAB... PRESSURIZER HEAT TRANSFER TO PRESSURIZER WALLS        *
*              WITHOUT LINER - ALUMINUM SHEATH HEATED BY HEATER TAPE *
**********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 999
*  RIGHT BOUNDARY = AMBIENT VOLUME (816)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
19990000          8        14        2         1   .1512917
```

```
*
*MESH          LOC FLG   FRM FLG
19990100           0         1
*
*GEOMETRY      NO ITV     R-COR     NO ITV     R-COR     NO ITV     R-COR
19990101           3   .187500         4   .270833         1   .272167
19990102           1   .272267         2   .282683         2   .449350
*
*MATERIALS     CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
19990201           1         3        19         7        20         8
19990202          13         9         9        11        30        13
*
*SOURCE DIS    SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
19990301          0.0         9       1.0        11       0.0        13
*
*INIT TEMP        FLG
19990400           0
*
*          TEMP MESH    TEMP MESH    TEMP MESH
19990401  602.0    2   602.0   12   140.0   14
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19990501   999010000         0        1        1    2.500000         1
19990502   999020000     10000        1        1    2.562500         6
19990503   999070000         0        1        1    2.583333         7
19990504   999080000         0        1        1    2.093750         8
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19990601   816010000         0     4100        1    2.500000         1
19990602   816010000         0     4100        1    2.562500         6
19990603   816010000         0     4100        1    2.583333         7
19990604   816010000         0     4100        1    2.093750         8
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
19990701         117   .125065             0             0         1
19990702         117   .128192             0             0         6
19990703         117   .129234             0             0         7
19990704         117   .104742             0             0         8
*
*L-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
19990801           0  .2858333     .2914500      2.500000         1
19990802           0  .3025833     .3025833      2.562500         6
19990803           0  .3025833     .3025833      2.583333         7
19990804           0  .1005325     .2251253      2.093750         8
*
*R-H-ST       CHF-HTR    HY-DIA     H-EQ-DIA     CH-LENGTH     HT-STR-NO
19990901           0       0.0         0.0      2.500000         1
19990902           0       0.0         0.0      2.562500         6
19990903           0       0.0         0.0      2.583333         7
19990904           0       0.0         0.0      2.093750         8
*
*********************************************************************
* HEAT SLAB... PRESSURIZER HEATER RODS  -----  DATA FROM RAMA CORP.,  *
*              HEATER ROD MANUFACTURER                               *
*********************************************************************
*
*  LEFT BOUNDARY  = ADIABATIC
*  RIGHT BOUNDARY = COMPONENT 999
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
19992000           1         8         2         1       0.0
```

```
*
*MESH        LOC FLG   FRM FLG
19992100          0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR    NO ITV     R-COR
19992101          2   2.1539E-2       1   2.1833E-2       2   2.6958E-2
19992102          2   3.1042E-2
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO    CMP NO    ITV NO
19992201         21         2        22         3        21         5
19992202         23         7
*
*SOURCE DIS   SOURCE    ITV NO    SOURCE    ITV NO    SOURCE    ITV NO
19992301        0.0         2       1.0         3       0.0         7
*
*INIT TEMP       FLG
19992400          0
*
*          TEMP MESH
19992401  631.0    8
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19992501          0         0        0        0        0.0         1
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19992601   999080000         0        1        1       12.0         1
*
*SOURCE         TYPE   IS-MPLR      L-DR-HT      R-DR-HT    HT-STR-NO
19992701        10999      1.0            0            0         1
*
*L-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
19992801          0      0.0          0.0     2.093750         1
*
*R-H-ST      CHF-HTR    HY-DIA     H-EQ-DIA    CH-LENGTH    HT-STR-NO
19992901          0  .1005325     .1901660     2.093750         1
*
*************************************************************************
* HEAT SLAB... PRESSURIZER HEAT TRANSFER OUT END CAPS AND INSTRUMENT   *
*              PORTS - THERMAL CONDUCTIVITY CALCULATED TO MATCH TEST   *
*************************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 999
*  RIGHT BOUNDARY = AMBIENT VOLUME (806)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
19993000          8         3         2         1  .1512917
*
*MESH        LOC FLG   FRM FLG
19993100          0         1
*
*GEOMETRY     NO ITV     R-COR
19993101          2   .449350
*
*MATERIALS    CMP NO    ITV NO
19993201         31         2
*
*SOURCE DIS   SOURCE    ITV NO
19993301        0.0         2
*
*INIT TEMP       FLG
19993400          0
```

```
*
*          TEMP MESH    TEMP MESH    TEMP MESH
19993401  602.0    1   370.0    2   140.0    3
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19993501   999010000         0        1        1   2.500000        1
19993502   999020000     10000        1        1   2.562500        6
19993503   999070000         0        1        1   2.583333        7
19993504   999080000         0        1        1   2.093750        8
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19993601   806010000         0     4100        1   2.500000        1
19993602   806010000         0     4100        1   2.562500        6
19993603   806010000         0     4100        1   2.583333        7
19993604   806010000         0     4100        1   2.093750        8
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
19993701           0         0             0             0         8
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
19993801           0  .2858333      .2914500      2.500000         1
19993802           0  .3025833      .3025833      2.562500         6
19993803           0  .3025833      .3025833      2.583333         7
19993804           0  .1005325      .2251253      2.093750         8
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA     CH-LENGTH     HT-STR-NO
19993901           0       0.0           0.0      2.500000         1
19993902           0       0.0           0.0      2.562500         6
19993903           0       0.0           0.0      2.583333         7
19993904           0       0.0           0.0      2.093750         8
*
***********************************************************************
* HEAT SLAB... PRESSURIZER SURGE LINE HEAT LOSS                       *
***********************************************************************
*
*  LEFT BOUNDARY  = COMPONENT 997
*  RIGHT BOUNDARY = AMBIENT VOLUME (807)
*
*GL DATA          NH        NP      TYPE     S-FLG     L-COR
19970000           2         5         2         1   .0154167
*
*MESH        LOC FLG   FRM FLG
19970100           0         1
*
*GEOMETRY     NO ITV     R-COR    NO ITV     R-COR
19970101           2   .035000         2   .054460
*
*MATERIALS    CMP NO    ITV NO    CMP NO    ITV NO
19970201           1         2        24         4
*
*SOURCE DIS   SOURCE    ITV NO
19970301        0.0         4
*
*INIT TEMP       FLG
19970400           0
*
*          TEMP MESH    TEMP MESH
19970401  602.0    2   602.0    5
*
*L-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19970501   997020000         0        1        1   5.6458333        1
```

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19970502   997030000        0        1        1   4.0625000       2
*
*R-BNDY       HY-VOL       INC    B-CDT   A-CODE   CY-LENGTH   HT-STR-NO
19970601   807010000        0     4100        1   5.6458333       1
19970602   807010000        0     4100        1   4.0625000       2
*
*SOURCE         TYPE   IS-MPLR       L-DR-HT       R-DR-HT     HT-STR-NO
19970701           0         0             0             0         2
*
*L-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA      CH-LENGTH   HT-STR-NO
19970801           0       0.0           0.0           0.0         2
*
*R-H-ST      CHF-HTR    HY-DIA      H-EQ-DIA      CH-LENGTH   HT-STR-NO
19970901           0       0.0           0.0           0.0         2
*
************************************************************************
************************************************************************
**********    HEAT STRUCTURE THERMAL PROPERTY DATA    ******************
************************************************************************
************************************************************************
*
*               TYPE    CN FLG    CA FLG
*316L STAINLESS STEEL
20100100    TBL/FCTN         1         1
*
*AVERAGE TWO PHASE DATA
20100200    TBL/FCTN         1         1
*
*BORON NITRIDE
20100300    TBL/FCTN         1         1
*
*CONSTANTAN
20100400    TBL/FCTN         1         1
*
*INCONEL 600
20100500    TBL/FCTN         1         1
*
*GRAFOIL (GRAFOIL IS A TRADE NAME OF A UNION CARBIDE PRODUCT)
20100600    TBL/FCTN         1         1
*
*COPPER CA 102 (OXYEN FREEN COPPER)
20100700    TBL/FCTN         1         1
*
*CAL-TEMP INSULATION  (MODIFIED VALUES FOR VESSEL HEAT LOSS)
20100800    TBL/FCTN         1         1
*
*ALUMINA   (ALUMINUN OXIDE)
20100900    TBL/FCTN         1         1
*
*INCONEL 718
20101000    TBL/FCTN         1         1
*
*HONEYCOMB - HEXAGONAL MATRIX CORE
20101100    TBL/FCTN         1         1
*
*HONEYCOMB - SQUARE MATRIX CORE
20101200    TBL/FCTN         1         1
*
*CONTACT RESISTANCE PROPERTIES (CONDUCTIVITY OF AIR; STORAGE = 0.0)
20101300    TBL/FCTN         1         1
*
```

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*STEAM GENERATOR FILLER PIECE CONSTRUCTION
20101400    TBL/FCTN        1        1
*
*WATER
20101500    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (MODIFIED VALUES FOR PIPING HEAT LOSS)
20101600    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (MODIFIED VALUES FOR STEAM GENERATOR HEAT LOSS)
20101700    TBL/FCTN        1        1
*
*THERMAL LINER - JOHN'S MANVILLE MIN-K 2000, 30-35 PCF
20101800    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (MODIFIED VALUES FOR PRESSURIZER HEAT LOSS)
20101900    TBL/FCTN        1        1
*
*ALUMINUM  (USED IN PRESSURIZER GUARD HEATERS)
20102000    TBL/FCTN        1        1
*
*MAGNESIUM OXIDE  (USED IN PRESSURIZER HEATER RODS)
20102100    TBL/FCTN        1        1
*
*NICHROME V  (USED IN PRESSURIZER HEATER RODS)
20102200    TBL/FCTN        1        1
*
*INCOLOY 800  (USED IN PRESSUIZER HEATER RODS)
20102300    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (FOR PRESSURIZER SURGE LINE HEAT LOSS)
20102400    TBL/FCTN        1        1
*
*  0.35% CARBON STEEL USED FOR SG TUBE SHEETS
20102500    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (FOR INLET PLENUM HEAT LOSS)
20102600    TBL/FCTN        1        1
*
*UO2 USED IN NUCLEAR CORE
20102700    TBL/FCTN        1        1
*
*ZIRCALOY USED IN NUCLEAR CORE
20102800    TBL/FCTN        1        1
*
*GAP USED IN NUCLEAR CORE
20102900    TBL/FCTN        1        1
*
*TEMP-MAT INSULATION  (MODIFIED VALUES FOR PRESSURIZER HEAT LOSS)
20103000    TBL/FCTN        1        1
*
*PRESSURIZER END CAP AND INSTRUMENT HEAT LOSS - CALCULATED VALUES
20103100    TBL/FCTN        1        1
*
*CAL-TEMP INSULATION  (MODIFIED VALUES FOR BL STEAM GENERATOR HEAT LOSS)
20103200    TBL/FCTN        1        1
*
*.............................................................
*
*THERMAL CONDUCTIVITY    BTU/(S FT F)
*
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*                TEMP      COND      TEMP      COND      TEMP      COND
*316L STAINLESS STEEL
20100101        32.00   .00215
20100102       100.00   .00215    800.00   .00306   1600.00   .00397
20100103      4000.00   .00397
*
*AVERGE TWO PHASE DATA
20100201        32.00   .000006
20100202       212.00   .000006   572.00   .000008  4000.00   .000008
*
* BORON NITRIDE (NEW CURVE FROM C.FINEMAN..IN 1/30/79 BY DMK)
20100301        32.00   .00255
20100302       200.00   .00241    500.00   .00216   1000.00   .00174
20100303      1500.00   .00133   2000.00   .000909  2500.00   .000491
20100304      3000.00   .000074  3500.00   .000074  4000.00   .000074
*
*CONSTANTAN
20100401         0.00   .00389   3000.00   .00389   4000.00   .00389
*
*INCONEL 600
20100501        32.00   .00236
20100502       100.00   .00236    300.00   .00267    500.00   .00294
20100503       700.00   .00322    900.00   .00350   1100.00   .00378
20100504      4000.00   .00378
*
*GRAFOIL
20100601        32.00   .000799
20100602       250.00   .000799   500.00   .000683   750.00   .000579
20100603      1000.00   .000509  1250.00   .000484  1500.00   .000468
20100604      2000.00   .000463  3000.00   .000486  4000.00   .000486
*
*COPPER CA 102
20100701        32.00   .0622     212.00   .0606     572.00   .0589
20100702       932.00   .0575    4000.00   .0575
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 35.0 FOR VESSEL HEAT LOSS)
20100801         0.00  3.2410E-4   100.00  3.2410E-4   200.00  3.4420E-4
20100802       300.00  3.8500E-4   400.00  4.0540E-4   500.00  4.4530E-4
20100803       600.00  4.8610E-4   700.00  5.3290E-4   800.00  5.8720E-4
*
*ALUMINA   (ALUMINUM OXIDE)
20100901         0.00 .00034722   3300.00 .00034722
*
*INCONEL 718
20101001         0.00  .0021667    200.00  .0022778    400.00  .0023333
20101002       600.00  .0025556    800.00  .0028056   1000.00  .0030556
20101003      1200.00  .0033333   1400.00  .0035556   1600.00  .0038333
*
*HONEYCOMB - HEXAGONAL MATRIX CORE
20101101         0.00 2.61110E-5   700.00 2.61110E-5
*
*HONEYCOMB - SQUARE MATRIX CORE
20101201         0.00 2.27780E-5   700.00 2.27780E-5
*
*CONTACT RESISTANCE (HEATERS TO PIPING)     (CONDUCTIVITIES OF AIR)
20101301         0.00  3.5750E-6    80.00  4.2110E-6   170.00  4.8190E-6
20101302       260.00  5.4000E-6   350.00  5.9500E-6   440.00  6.4810E-6
20101303       530.00  6.9970E-6   620.00  7.4780E-6   710.00  7.9500E-6
20101304       800.00  8.3940E-6   890.00  8.8420E-6   980.00  9.2750E-6
*
*STEAM GENERATOR FILLER PIECES (CONDUCTIVITIES FROM TEST GRB-14-82)
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20101401      80.00  3.0280E-4   260.00  3.3610E-4   440.00  3.6950E-4
20101402     620.00  4.0280E-4   800.00  4.3610E-4
*
*WATER
20101501      32.0  88.6110E-6   104.0 100.8330E-6   176.0 107.2220E-6
20101502     248.0 110.0000E-6   356.0 108.3370E-6   464.0 101.9440E-6
20101503     500.0  98.0550E-6   572.0  86.6660E-6   700.0  86.6660E-6
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 7.0 FOR PIPING HEAT LOSS)
20101601       0.00  6.4810E-5   100.00  6.4810E-5   200.00  6.8830E-5
20101602     300.00  7.7000E-5   400.00  8.1080E-5   500.00  8.9050E-5
20101603     600.00  9.7220E-5   700.00 10.6580E-5   800.00 11.7440E-5
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 2.6125 FOR ILSG HEAT LOSS)
20101701       0.00  2.4189E-5   100.00  2.4189E-5   200.00  2.5697E-5
20101702     300.00  2.8740E-5   400.00  3.0255E-5   500.00  3.3233E-5
20101703     600.00  3.6596E-5   700.00  3.9784E-5   800.00  4.3987E-5
*
*THERMAL LINER - JOHN'S MANVILLE MIN-K 2000, 30-35 PCF
20101801     300.00  1.1110E-5   600.00  1.2730E-5  1000.00  1.4810E-5
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 1.0 FOR PRESSURIZER HEAT LOSS)
20101901       0.00  9.2600E-6   100.00  9.2600E-6   200.00  9.8330E-6
20101902     300.00  1.1000E-5   400.00  1.1580E-5   500.00  1.2720E-5
20101903     600.00  1.3890E-5   700.00  1.5230E-5   800.00  1.6780E-5
20101904    1000.00  1.9880E-5
*
*ALUMINUM  (USED IN PRESSURIZER GUARD HEATERS)
20102001      32.00  3.2434E-2   212.00  3.3076E-2   392.00  3.4521E-2
20102002     572.00  3.6609E-2   752.00  3.9980E-2  1000.00  4.2608E-2
*
*MAGNESIUM OXIDE  (USED IN PRESSURIZER HEATER RODS)
20102101     100.00  4.6296E-4  1000.00  3.3796E-4
*
*NICHROME V  (USED IN PRESSURIZER HEATER RODS)
20102201      32.00  1.9749E-3   212.00  2.2158E-3   392.00  2.5048E-3
20102202     572.00  2.7456E-3   752.00  2.8902E-3  1112.00  3.6127E-3
*
*INCOLOY 800  (USED IN PRESSURIZER HEATER RODS)
20102301      70.00  1.8519E-3  1000.00  3.2176E-3  1500.00  4.0278E-3
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 1.0  PZR SURGE LINE HEAT LOSS)
20102401       0.00  9.2600E-6   100.00  9.2600E-6   200.00  9.8330E-6
20102402     300.00  1.1000E-5   400.00  1.1580E-5   500.00  1.2720E-5
20102403     600.00  1.3890E-5   700.00  1.5230E-5   800.00  1.6780E-5
*
*  0.35% CARBON STEEL USED FOR SG TUBE SHEETS
20102501      32.00   .00944      68.00   .00917     212.00   .00889
20102502     392.00   .00817     572.00   .00750     752.00   .00694
20102503    1112.00   .00564    1472.00   .00478
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 1.0 FOR INLET PLENUM HEAT LOSS)
20102601       0.00  9.2600E-6   100.00  9.2600E-6   200.00  9.8330E-6
20102602     300.00  1.1000E-5   400.00  1.1580E-5   500.00  1.2720E-5
20102603     600.00  1.3890E-5   700.00  1.5230E-5   800.00  1.6780E-5
20102604    1000.00  1.9880E-5
*
*UO2 USED IN NUCLEAR CORE
20102701      32.00   .00152     200.00   .00120     400.00   .00100
20102702     600.00   .00090     800.00   .00074    1000.00   .00066
20102703    1200.00   .00059    1500.00   .00052    2000.00   .00044
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20102704     2500.00   .00039    3000.00   .00037    4000.00   .00038
*
*ZIRCALOY USED IN NUCLEAR CORE
20102801       32.00   .00197    1099.50   .00320    1199.80   .00330
20102802     1478.80   .00366    1498.60   .00369    1529.20   .00373
20102803     1579.80   .00381    1599.60   .00384    1619.70   .00387
20102804     1639.70   .00391    1759.80   .00411    1999.20   .00458
*
*GAP USED IN NUCLEAR CORE
20102901       32.00  2.2500E-5   602.30  3.8520E-5   998.33  4.6500E-5
20102902     1502.30  5.7800E-5  2006.30  6.7420E-5  5408.33  1.2040E-5
*
*TEMP-MAT INS (INCREASED BY A FACTOR OF 1.0 FOR PRESSURIZER HEAT LOSS)
20103001        0.00  4.9770E-6   100.00  5.7870E-6   200.00  6.5970E-6
20103002      300.00  7.6390E-6   400.00  8.7960E-6   500.00  1.0420E-5
20103003      600.00  1.2040E-5   700.00  1.4120E-5   800.00  1.6320E-5
20103004     1000.00  1.6960E-5
*
*PRESSURIZER END CAP AND INSTRUMENT HEAT LOSS - CALCULATED VALUES
20103101        0.00  1.8334E-6  1000.00  1.8334E-6
*
*CAL-TEMP INSUL (INCREASED BY FACTOR OF 2.2040 FOR BLSG HEAT LOSS)
20103201        0.00  2.0340E-5   100.00  2.0340E-5   200.00  2.1671E-5
20103202      300.00  2.4238E-5   400.00  2.5521E-5   500.00  2.8028E-5
20103203      600.00  3.0606E-5   700.00  3.3564E-5   800.00  3.6975E-5
20103204     1000.00  4.3794E-5
*
*.............................................................
*
*VOLUMETRIC HEAT CAPACITY DATA      (BTU/CUFT-F)
*                TEMP       CAP      TEMP       CAP      TEMP       CAP
*316L STAINLESS STEEL
20100151       32.00     61.30    400.00     61.30    600.00     64.60
20100152      800.00     67.10   1000.00     69.35   4000.00     69.35
*
*AVERAGE TWO PHASE
20100251       32.00      1.00    212.00      1.00    572.00     64.00
20100252     4000.00     64.00
*
*BORON NITRIDE
20100351       32.00     37.50    400.00     37.50    800.00     48.30
20100352     1200.00     54.60   1600.00     58.30   2000.00     60.00
20100353     2400.00     61.40   3400.00     62.50   4000.00     62.50
*
*CONSTANTAN
20100451       32.00     56.00    212.00     56.00    572.00     61.00
20100452      932.00     67.00   1472.00     73.00   2192.00     78.00
20100453     2552.00     84.00   3000.00     90.00   4000.00     90.00
*
*INCONEL 600
20100551       32.00    52.225   4000.00    52.225
*
*GRAFOIL
20100651       32.00     11.90     80.40     11.90    170.40     14.70
20100652      260.40     17.15    350.40     19.60    440.40     21.35
20100653      530.40     22.40    620.40     23.80    710.40     25.20
20100654      800.40     26.32   4000.00     26.32
*
*COPPER CA 102
20100751       32.00    51.336   4000.00    51.336
*
```

```
*CAL-TEMP INSULATION
20100851        0.00      2.898   1000.00      2.898
*
*ALUMINA    (ALUMINUM OXIDE)
20100951        0.00     55.20   3300.00     55.20
*
*INCONEL 718
20101051        0.00   48.5797    200.00   53.7597    400.00    56.458
20101052      600.00   61.5912    800.00   65.1840   1000.00    69.290
20101053     1200.00   74.4227   1400.00   76.9890   1600.00    82.121
*
*HONEYCOMB - HEXAGONAL MATRIX CORE
20101151        0.00   2.28969    200.00   2.53081    400.00    2.6512
20101152      600.00   2.89224    800.00   3.06095   1000.00    3.2537
20101153     1200.00   3.49379   1400.00   3.61530   1600.00    3.8563
*
*HONEYCOMB - SQUARE MATRIX CORE
20101251        0.00   2.15978    200.00   2.38713    400.00    2.5008
20101252      600.00   2.71815    800.00   2.88729   1000.00    3.0691
20101253     1200.00   3.29651   1400.00   3.41018   1600.00    3.6375
*
*CONTACT RESISTANCE  (HEATERS TO PIPING)
20101351        0.00      0.00   3300.00      0.00
*
*STEAM GENERATOR FILLER PIECE  (CALCULATION FROM TEST GRB-14-82)
20101451        0.00     13.00   1000.00     13.00
*
*WATER  (SATURATED)
20101551       32.00    63.033    104.00    61.966    176.00    60.950
20101552      248.00    59.895    356.00    58.553    464.00    57.845
20101553      500.00    57.989    572.00    60.999    700.00    62.576
*
*CAL-TEMP INSULATION
20101651        0.00     2.898   1000.00     2.898
*
*CAL-TEMP INSULATION
20101751        0.00     2.898   1000.00     2.898
*
*THERMAL LINER - JOHN'S MANVILLE MIN-K 2000, 30-35 PCF
20101851      400.00     7.475    800.00     8.125
20101852     1200.00     8.775   1600.00     8.775
*
*CAL-TEMP INSULATION
20101951        0.00     2.898   1000.00     2.898
*
*ALUMINUM  (USED IN PRESSURIZER GUARD HEATERS)
20102051       32.00    36.177  10000.00    36.177
*
*MAGNESIUM OXIDE  (USED IN PRESSURIZER HEATER RODS)
20102151       10.00     43.07  10000.00     43.07
*
*NICHROME V  (USED IN PRESSURIZER HEATER RODS)
20102251       10.00     55.07  10000.00     55.07
*
*INCOLOY 800  (USED IN PRESSURIZER HEATER RODS)
20102351       10.00     61.00  10000.00     61.00
*
*CAL-TEMP INSULATION
20102451        0.00     2.898   1000.00     2.898
*
*  0.35% CARBON STEEL
```

```
20102551       68.00     51.40   3000.00     51.40
*
*CAL-TEMP INSULATION
20102651        0.00     2.898   1000.00     2.898
*
*UO2 USED IN NUCLEAR CORE
20102751       32.00    43.255    200.00    45.394    400.00    47.459
20102752      600.00    49.072    800.00    50.308   1000.00    51.238
20102753     1200.00    51.939   1500.00    52.721   2000.00    53.920
20102754     2500.00    55.994   3000.00    60.096   4000.00    79.014
*
*ZIRCALOY USED IN NUCLEAR CORE
20102851       32.00    27.820   1099.50    33.550   1199.80    35.190
20102852     1478.80    35.190   1498.60    53.180   1529.20    59.330
20102853     1579.80    62.190   1599.60    73.640   1619.70    77.790
20102854     1639.70    79.780   1759.80    34.790   1999.20    34.790
*
*GAP USED IN NUCLEAR CORE
20102951       32.00   8.051E-5  5408.30  8.0514E-5
*
*TEMP-MAT INSULATION
20103051        0.00     2.125   1000.00     2.125
*
*PRESSURIZER END CAP AND INSTRUMENT HEAT LOSS
20103151        0.00     0.000   1000.00     0.000
*
*CAL-TEMP INSULATION
20103251        0.00     2.898   1000.00     2.898
*
*
*************************************************************************
*                              TABLES                                   *
*************************************************************************
*
*     ********************   CORE POWER   ********************
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20215000      POWER       409          1.0         1.000   * MW
*
*              TIME            POWER   (ANS STANDARD DECAY CURVE)
20215001       0.0            1.000
20215002       1.1957          .98216
20215003       5.9783          .29432
20215004       7.1739          .22553
20215005      10.7608          .11781
20215006      11.9565          .10006
20215007      21.5217          .05289
20215008      31.0870          .04263
20215009      51.4130          .03880
20215010      81.3048          .03500
20215011     100.4348          .03313
20215012     979.2388          .02080
*
*************************************************************************
*
*     ************   PRESSURIZER HEATER ROD POWER   ************
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20299900      POWER       439          1.0    10.4200E-3   * MW
*
*              TIME            POWER
```

```
20299901        0.0          0.000
20299902    10000.0          0.000
*
*************************************************************************
*                PUMP SPEED TABLES (NORMALIZED SPEED)                   *
*************************************************************************
*
*            TABLE      TRIP
20225000    REAC-T      412    * INTACT LOOP PUMP
*
*             TIME      NORM PUMP SPEED
20225001      -1.0          1.0
20225002       0.0          1.0
20225003       1.1956       0.97220
20225004       8.3695       0.55521
20225005       9.5652       0.50440
20225006      19.1304       0.32739
20225007      29.8913       0.23488
20225008      38.2608       0.22025
20225009      59.7826       0.21159
20225010      62.1739       0.19573
20225011      64.5652       0.18887
20225012      66.9565       0.04289
20225013      68.1521       0.0
20225014    4000.0          0.0
*
20235000    REAC-T      413    * BROKEN LOOP PUMP
20235001      -1.0          1.0
20235002       0.0          1.0
20235003       1.1956       0.98527
20235004       8.3695       0.63678
20235005      10.7608       0.55975
20235006      20.3260       0.42278
20235007      40.6521       0.40220
20235008      59.7826       0.40315
20235009      60.9782       0.32766
20235010      64.5652       0.25842
20235011      65.7608       0.16130
20235012      69.3478       0.0
20235013    4000.0          0.0
*
*************************************************************************
*                                                                       *
*                   SYSTEM HEAT LOSS TABLES                             *
*                                                                       *
*************************************************************************
*
*HEAT LOSS DUE TO INTACT LOOP PUMP PASSIVE COOLING, 20.0 KW AT FULL FLOW
*     1.0 BTU = 1055.056 JOULES (INTERNATIONAL TABLE)
**
**           TABLE      TRIP     TIME COEF     RATE COEF
*20225100  HTRNRATE     412          1.0        8.8931   * BTU/S)FT2
**
**            TIME      NORM H.T.RATE
*20225101     -1.0          1.000
*20225102      0.0          1.000
*20225103     10.4          0.505
*20225104     20.8          0.325
*20225105     32.0          0.227
*20225106     42.4          0.181
*20225107     62.4          0.150
```

```
*20225108        64.0            0.000
*20225109      4000.0            0.000
**
*HEAT LOSS DUE TO INTACT LOOP PUMP ACTIVE COOLING, 4.3 KW ALWAYS
*
*              TABLE      TRIP     TIME COEF     RATE COEF
20225100     HTRNRATE      412          1.0        1.9120  * BTU/S-FT2
*
*               TIME      NORM H.T.RATE
20225101         0.0           1.000
20225102     20000.0           1.000
*
*************************************************************************
*HEAT LOSS DUE TO BROKEN LOOP PUMP PASSIVE COOLING, 14.7 KW AT FULL FLOW
*     FROM TEST SO-2B-38, H. S. CRAPO, HSC-2-84, 3 FEB 1984
*     1.0 BTU = 1055.056 JOULES (INTERNATIONAL TABLE)
**
**             TABLE      TRIP     TIME COEF     RATE COEF
*20235100     HTRNRATE      413          1.0        9.1631   * BTU/S-FT2
**
**              TIME      NORM H.T.RATE
*20235101        -1.0           1.000
*20235102         0.0           1.000
*20235103         9.6           0.590
*20235104        13.6           0.498
*20235105        20.8           0.407
*20235106        30.4           0.385
*20235107        60.0           0.385
*20235108        64.8           0.000
*20235109      4000.0           0.000
**
*HEAT LOSS DUE TO BROKEN LOOP PUMP ACTIVE COOLING, 4.3 KW ALWAYS
*     FROM TEST SO-2B-38, H. S. CRAPO, HSC-2-84, 3 FEB 1984
*
*              TABLE      TRIP     TIME COEF     RATE COEF
20235100     HTRNRATE      413          1.0        2.6804  * BTU/S-FT2
*
*               TIME      NORM H.T.RATE
20235101         0.0           1.000
20235102     20000.0           1.000
*
*************************************************************************
*
* SPECIFIED HEAT TRANSFER COEFFICIENTS ON PIPING INSULATION SURFACE
*   (VALUES CALCULATED FOR FREE CONVECTON IN AIR + RADIATION)
*
*              TABLE
20210000     HTC-TEMP
*
*               TEMP      H.T.COEF   (BTU/S-FT2-F)
20210001       100.0       0.00136
20210002       150.0       0.00206
20210003       200.0       0.00247
20210004       300.0       0.00302
20210005       500.0       0.00374
20210006       750.0       0.00438
*
* SPECIFIED HEAT TRANSFER COEFFICIENTS ON ILSG INSULATION SURFACE
*   (VALUES CALCULATED FOR FREE CONVECTON IN AIR + RADIATION)
*
*              TABLE
```

```
20220000    HTC-TEMP     0  1.0   0.0   3.5426
*
*              TEMP       H.T.COEF   (BTU/S-FT2-F)
20220001       100.0       0.00136
20220002       150.0       0.00206
20220003       200.0       0.00247
20220004       300.0       0.00302
20220005       500.0       0.00374
20220006       750.0       0.00438
*
* SPECIFIED HEAT TRANSFER COEFFICIENTS ON BLSG STEAM DOME INSULATION
* SURFACE  (VALUES CALCULATED FOR FREE CONVECTON IN AIR + RADIATION)
*
*             TABLE
20230000    HTC-TEMP     0     1.0     0.0     3.35
*
*              TEMP       H.T.COEF   (BTU/S-FT2-F)
20230001       100.0       0.00136
20230002       150.0       0.00206
20230003       200.0       0.00247
20230004       300.0       0.00302
20230005       500.0       0.00374
20230006       750.0       0.00438
*
* SPECIFIED HEAT TRANSFER COEFFICIENTS ON BLSG RISER INSULATION
* SURFACE  (VALUES CALCULATED FOR FREE CONVECTON IN AIR + RADIATION)
*
*             TABLE
20240000    HTC-TEMP     0     1.0     0.0     3.35
*
*              TEMP       H.T.COEF   (BTU/S-FT2-F)
20240001       100.0       0.00136
20240002       150.0       0.00206
20240003       200.0       0.00247
20240004       300.0       0.00302
20240005       500.0       0.00374
20240006       750.0       0.00438
*
* SPECIFIED HEAT TRANSFER COEFFICIENTS ON BLSG DOWNCOMER INSULATION
* SURFACE  (VALUES CALCULATED FOR FREE CONVECTON IN AIR + RADIATION)
*
*             TABLE
20250000    HTC-TEMP     0     1.0     0.0     3.35
*
*              TEMP       H.T.COEF   (BTU/S-FT2-F)
20250001       100.0       0.00136
20250002       150.0       0.00206
20250003       200.0       0.00247
20250004       300.0       0.00302
20250005       500.0       0.00374
20250006       750.0       0.00438
*
*************************************************************************
*              POWER TABLES FOR PIPING HEATERS                          *
*************************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 110   *****
*      *****   (POWER TO INTACT AND BROKEN LOOP HOT LEGS)   *****
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211000      POWER       430          1.0     8.4380E-3   * MW
```

```
*
*              TIME            POWER
20211001        0.0             1.00
20211002    10000.0             1.00
*
*********************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 111   *****
*      ********   (POWER TO BROKEN LOOP PUMP SUCTION)    ********
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211100      POWER       431          1.0     4.0130E-3   * MW
*
*              TIME            POWER
20211101        0.0             1.00
20211102    10000.0             1.00
*
*********************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 112   *****
*      *****   (POWER TO INTACT AND BROKEN LOOP COLD LEGS)  *****
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211200      POWER       432          1.0     3.1220E-3   * MW
*
*              TIME            POWER
20211201        0.0             1.00
20211202    10000.0             1.00
*
*********************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 113   *****
*      ********   (POWER TO INTACT LOOP PUMP SUCTION)    ********
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211300      POWER       433          1.0     8.2610E-3   * MW
*
*              TIME            POWER
20211301        0.0             1.00
20211302    10000.0             1.00
*
*********************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 116   *****
*      *   (POWER TO EXTERNAL HEATERS ON VESSEL AND DOWNCOMER)  *
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211600      POWER       436          1.0    19.8320E-3   * MW
*
*              TIME            POWER
20211601        0.0             1.00
20211602    10000.0             1.00
*
*********************************************************************
*
*      *****   POWER TABLE FOR GUARD HEATER POWER BUS 117   *****
*      *****   (POWER TO EXTERNAL HEATERS ON PRESSURIZER)   *****
*
*             TABLE      TRIP     TIME COEF    POWER COEF
20211700      POWER       437          1.0     1.5930E-3   * MW
*
```

```
*                TIME            POWER
20211701        -1.0             1.00
20211702         0.0             0.00
20211703     10000.0             0.00
*
*********************************************************************
*                          CONTROL VARIABLES                        *
*********************************************************************
**                                                                 **
**   1  VESSEL INTERFACE LEVEL (-13 -578)                          **
**   2  CORE INTERFACE LEVEL (105 -501)                            **
**   3  DOWNCOMER INTERFACE LEVEL (+29 -578)                       **
**   4  UPPER PLENUM INTERFACE LEVEL (+153 -13)                    **
**   5  UPPER HEAD INTERFACE LEVEL (+421 +160)                     **
**   6  PRESSURIZER INTERFACE LEVEL                                **
**   7  INTACT LOOP U-TUBE UP SIDE INTERFACE LEVEL                 **
**   8  INTACT LOOP U-TUBE DOWN SIDE INTERFACE LEVEL               **
**   9  INTACT LOOP PUMP SUCTION DOWN SIDE INTERFACE LEVEL         **
**  10  INTACT LOOP PUMP SUCTION UP SIDE INTERFACE LEVEL           **
**  11  BROKEN LOOP U-TUBE UP SIDE INTERFACE LEVEL                 **
**  12  BROKEN LOOP U-TUBE DOWN SIDE INTERFACE LEVEL               **
**  13  BROKEN LOOP PUMP SUCTION DOWN SIDE INTERFACE LEVEL         **
**  14  BROKEN LOOP PUMP SUCTION UP SIDE INTERFACE LEVEL           **
**  15  INTACT LOOP STEAM GENERATOR RISER INTERFACE LEVEL          **
**  16  INTACT LOOP STEAM GENERATOR DOWNCOMER INTERFACE LEVEL      **
**  17  BROKEN LOOP STEAM GENERATOR RISER INTERFACE LEVEL          **
**  18  BROKEN LOOP STEAM GENERATOR DOWNCOMER INTERFACE LEVEL      **
**  19  INTACT LOOP STEAM GENERATOR SECONDARY RISER MASS           **
**  20  INTACT LOOP STEAM GENERATOR SECONDARY DOWNCOMER MASS       **
**  21  INTACT LOOP STEAM GENERATOR SECONDARY TOTAL MASS           **
**  22  BROKEN LOOP STEAM GENERATOR SECONDARY RISER MASS           **
**  23  BROKEN LOOP STEAM GENERATOR SECONDARY DOWNCOMER MASS       **
**  24  BROKEN LOOP STEAM GENERATOR SECONDARY TOTAL MASS           **
**  25  TOTAL STEAM GENERATOR SECONDARY MASS                       **
**  26  ENERGY REMOVED FROM PRIMARY TO SECONDARY BY INTACT LOOP SG **
**  27  ENERGY REMOVED FROM PRIMARY TO SECONDARY BY BROKEN LOOP SG **
**  28  ENERGY REMOVED FROM CORE HEATER RODS TO PRIMARY COOLANT    **
**  29  MAXIMUM CORE HEATER ROD TEMPERATURE                        **
** 150-151 CONTROL SYSTEM FOR CORE HEATER ROD POWER                **
** 200-221 CONTROL SYSTEM TO REDISTRIBUTE POWER ON VESSEL HEATERS  **
** 250-251 CONTROL SYSTEM TO OBTAIN DESIRED INTACT LOOP MASS FLOW RATE**
** 350-351 CONTROL SYSTEM TO OBTAIN DESIRED BROKEN LOOP MASS FLOW RATE**
** 400  FLUID MASS IN DOWNCOMER                                    **
** 401  FLUID MASS IN LOWER PLENUM                                 **
** 402  FLUID MASS IN CORE                                         **
** 403  FLUID MASS IN UPPER PLENUM                                 **
** 404  FLUID MASS IN UPPER HEAD                                   **
** 405  FLUID MASS IN BYPASS LINE, SUPPORT COLUMNS, GUIDE TUBES    **
** 406  FLUID MASS IN PRESSURIZER                                  **
** 407  FLUID MASS IN INTACT LOOP HOT LEG                          **
** 408  FLUID MASS IN INTACT LOOP U-TUBES                          **
** 409  FLUID MASS IN INTACT LOOP COLD LEG                         **
** 410  FLUID MASS IN BROKEN LOOP HOT LEG                          **
** 411  FLUID MASS IN BROKEN LOOP U-TUBES                          **
** 412  FLUID MASS IN BROKEN LOOP COLD LEG                         **
** 413  TOTAL PRIMARY COOLANT SYSTEM FLUID MASS                    **
** 501  VESSEL DELTA P -13 TO -578 CM                              **
** 502  VESSEL CORE DELTA P -105 TO -501 CM                        **
** 503  VESSEL DOWNCOMER DELTA P 29 TO -578 CM                     **
** 504  VESSEL UPPER PLENUM DELTA P 135 TO -13 CM                  **
** 505  VESSEL UPPER HEAD DELTA P 421 TO 160 CM                    **
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** 506  PRESSURIZER DELTA P 632 TO 30 CM                          **
** 507  INTACT LOOP STEAM GENERATOR U-TUBE UPSIDE DELTA P 926 TO -57E **
** 508  INTACT LOOP STEAM GENERATOR U-TUBE DNSIDE DELTA P 926 TO -57X **
** 509  INTACT LOOP PUMP SUCTION DOWNSIDE DELTA P -57X TO I14       **
** 510  INTACT LOOP PUMP SUCTION UPSIDE DELTA P I14 TO I16         **
** 511  BROKEN LOOP STEAM GENERATOR U-TUBE UPSIDE DELTA P 925 TO -57E **
** 512  BROKEN LOOP STEAM GENERATOR U-TUBE DNSIDE DELTA P 925 TO -57X **
** 513  BROKEN LOOP PUMP SUCTION DOWNSIDE DELTA P -57X TO B65      **
** 514  BROKEN LOOP PUMP SUCTION UPSIDE DELTA P B65 TO B73         **
** 515  INTACT LOOP STEAM GENERATOR RISER DELTA P 1117 TO 89 CM    **
** 516  INTACT LOOP STEAM GENERATOR DOWNCOMER DELTA P 1117 TO 51 CM **
** 517  BROKEN LOOP STEAM GENERATOR RISER DELTA P 1186 TO -7 CM    **
** 518  BROKEN LOOP STEAM GENERATOR DOWNCOMER DELTA P 1186 TO 18 CM **
** 519  BROKEN LOOP STEAM GENERATOR DOWNCOMER DELTA P BETWEEN HORIZS **
** 531  VESSEL COLLAPSED LEVEL -13 TO -578(REF)  CM                **
** 532  VESSEL CORE COLLAPSED LEVEL -105 TO -501(REF)  CM          **
** 533  VESSEL DOWNCOMER COLLAPSED LEVEL 29 TO -578(REF)  CM       **
** 534  VESSEL UPPER PLENUM COLLAPSED LEVEL 135 TO -13(REF) CM     **
** 535  VESSEL UPPER HEAD COLLAPSED LEVEL 421 TO 160(REF) CM       **
** 536  PRESSURIZER COLLAPSED LEVEL 632 TO 30(REF)  CM             **
** 537  ILSG U-TUBE UPSIDE COLLAPSED LEVEL 926 TO -57E(REF)  CM    **
** 538  ILSG U-TUBE DOWNSIDE COLLAPSED LEVEL 926 TO -57X(REF)  CM  **
** 539  INTACT LOOP PUMP SUCTION DOWNSIDE COLLAPSED LEVEL REF I16  CM **
** 540  INTACT LOOP PUMP SUCTION UPSIDE COLLAPSED LEVEL REF I16  CM **
** 541  BLSG U-TUBE UPSIDE COLLAPSED LEVEL 925 TO -57E(REF)  CM    **
** 542  BLSG U-TUBE DOWNSIDE COLLAPSED LEVEL 925 TO -57X(REF)  CM  **
** 543  BROKEN LOOP PUMP SUCTION DOWNSIDE COLLAPSED LEVEL REF B65 CM **
** 544  BROKEN LOOP PUMP SUCTION UPSIDE COLLAPSED LEVEL REF B65  CM **
** 545  INTACT LOOP STEAM GENERATOR RISER COLLAPSED LEVEL REF 89 CM **
** 546  INTACT LOOP STEAM GENERATOR DOWNCOMER COLLAPSED LEVEL REF 51CM**
** 547  BROKEN LOOP STEAM GENERATOR RISER COLLAPSED LEVEL REF -7 CM **
** 548  BROKEN LOOP STEAM GENERATOR DOWNCOMER COLLAPSED LEVEL REF 18CM**
** 549  BROKEN LOOP STEAM GENERATOR DNCMR HOR COLLAPSED LEVEL REF 18CM**
** 561  VESSEL COLLAPSED LEVEL -13 TO -578  REF COLD LEG           **
** 562  VESSEL CORE COLLAPSED LEVEL -105 TO -501 REF COLD LEG      **
** 563  VESSEL DOWNCOMER COLLAPSED LEVEL 29 TO -578 REF COLD LEG   **
** 564  VESSEL UPPER PLENUM COLLAPSED LEVEL 135 TO -13 REF COLD LEG **
** 565  VESSEL UPPER HEAD COLLAPSED LEVEL 421 TO 160 REF COLD LEG  **
** 566  PRESSURIZER COLLAPSED LEVEL 632 TO 30 REF ZERO CM          **
** 567  ILSG U-TUBE UPSIDE COLLAPSED LEVEL 926 TO -57E REF TUBE SHEET **
** 568  ILSG U-TUBE DOWNSIDE COLLAPSED LEVEL 926 TO -57X REF TUB SHT **
** 569  INTACT LOOP PUMP SUCTION DOWNSIDE COLLAPSED LEVEL REF COLD LEG**
** 570  INTACT LOOP PUMP SUCTION UPSIDE COLLAPSED LEVEL REF COLD LEG **
** 571  BLSG U-TUBE UPSIDE COLLAPSED LEVEL 925 TO -57E REF TUBE SHEET **
** 572  BLSG U-TUBE DOWNSIDE COLLAPSED LEVEL 925 TO -57X REF TUB SHT **
** 573  BROKEN LOOP PUMP SUCTION DOWNSIDE COLLAPSED LEVEL REF COLD LEG**
** 574  BROKEN LOOP PUMP SUCTION UPSIDE COLLAPSED LEVEL REF COLD LEG **
** 575  INTACT LOOP STEAM GENERATOR RISER COLLAPSED LEVEL REF TUB SHT **
** 576  INTACT LOOP STEAM GENERATOR DOWNCOMER COLLPSD LVL REF TUB SHT **
** 577  BROKEN LOOP STEAM GENERATOR RISER COLLAPSED LEVEL REF TUB SHT **
** 578  BROKEN LOOP STEAM GENERATOR DOWNCOMER COLLPSD LVL REF TUB SHT **
** 579  BROKEN LOOP STEAM GENERATOR DNCMR HOR COLLPSD LVL REF TUB SHT **
** 606-610 CONTROL SYSTEM TO OBTAIN DESIRED MASS IN INTACT LOOP SG **
** 620  INTACT LOOP STEAM GENERATOR RECIRCULATION RATIO            **
** 625  INTACT LOOP STEAM GENERATOR CIRCULATION RATIO              **
** 630-637 CONTROL SYSTEM TO HOLD IL STEAM DOME PRESSURE WITHIN BAND **
** 706-710 CONTROL SYSTEM TO OBTAIN DESIRED MASS IN BROKEN LOOP SG **
** 720  BROKEN LOOP STEAM GENERATOR RECIRCULATION RATIO            **
** 725  BROKEN LOOP STEAM GENERATOR CIRCULATION RATIO              **
** 730-737 CONTROL SYSTEM TO HOLD BL STEAM DOME PRESSURE WITHIN BAND **
** 800  TOTAL HEAT LOSS MONITORING SYSTEM                          **
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** 980-985 CONTROL SYSTEM TO OBTAIN DESIRED PRESSURIZER LIQUID LEVEL  **
** 990-999 CONTROL SYSTEM FOR PRESSURIZER INTERNAL HEATER RODS        **
**                                                                    **
**********************************************************************
*
*     CONTROL VARIABLES FOR COMPARISON TO EQUIVALENT SEMISCALE DATA
*      ********************  LIQUID LEVELS  ********************
*
*            NAME   TYPE    COEF    INIT VAL  FLG
*.
20500100    VSLLVL   SUM   30.48    -13.000    1   * VESSEL LEVEL (CM)
*                                                  * (-13 TO -578)
20500101  -19.08608  0.073491     VOIDF  163010000
20500102             2.760833     VOIDF  162010000
20500103             1.000833     VOIDF  161010000
20500104             2.0          VOIDF  150060000
20500105             2.0          VOIDF  150050000
20500106             2.0          VOIDF  150040000
20500107             2.0          VOIDF  150030000
20500108             2.0          VOIDF  150020000
20500109             2.0          VOIDF  150010000
20500110             1.635833     VOIDF  140010000
20500111             0.721917     VOIDF  130010000
20500112             0.466667     VOIDF  120010000
*
20500200   CORELVL   SUM   30.48   -105.092    1   * CORE LEVEL (CM)
*                                                  * (-105. TO -501.)
20500201  -16.42833  0.16667      VOIDF  140010000
20500202             2.00000      VOIDF  150010000
20500203             2.00000      VOIDF  150020000
20500204             2.00000      VOIDF  150030000
20500205             2.00000      VOIDF  150040000
20500206             2.00000      VOIDF  150050000
20500207             2.00000      VOIDF  150060000
20500208             0.81375      VOIDF  161010000
*
20500300   DNCRLVL   SUM   30.48     30.480    1   * DOWNCOMER LVL (CM)
*                                                  * (+29 TO -578)
20500301  -19.08608  2.0          VOIDF  101010000
20500302             2.260833     VOIDF  110010000
20500303             1.000833     VOIDF  110020000
20500304             2.0          VOIDF  110030000
20500305             2.0          VOIDF  110040000
20500306             2.0          VOIDF  110050000
20500307             2.0          VOIDF  110060000
20500308             2.0          VOIDF  110070000
20500309             1.465667     VOIDF  110080000
20500310             1.207667     VOIDF  110090000
20500311             0.962500     VOIDF  110100000
20500312             0.721917     VOIDF  130010000
20500313             0.466667     VOIDF  120010000
*
20500400   UPLMLVL   SUM   30.48    136.144    1   * UP PLENUM LVL (CM)
*                                                  * (+135 TO -13)
20500401  -0.426509  2.550000     VOIDF  164010000
20500402             2.343176     VOIDF  163010000
*
20500500    UHLVL    SUM   30.48    423.570    1   * UP. HEAD LVL (CM)
*                                                  * (+421 TO +160)
20500501  +5.120     2.880833     VOIDF  194010000
20500502             3.453333     VOIDF  193010000
```

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20500503              1.965833     VOIDF  192010000
20500504              0.476667     VOIDF  191010000
*
20500600    PZRLVL    SUM   30.48    625.793    1   * PZR LEVEL (CM)
*
20500601   0.0        2.50         VOIDF  999010000
20500602              2.5625       VOIDF  999020000
20500603              2.5625       VOIDF  999030000
20500604              2.5625       VOIDF  999040000
20500605              2.5625       VOIDF  999050000
20500606              2.5625       VOIDF  999060000
20500607              2.583333     VOIDF  999070000
20500608              2.09375      VOIDF  999080000
20500609              0.541667     VOIDF  997010000
*
*
20500700     ILUTU    SUM   30.48    925.830    1   * IL U-TUBE UP
*                                                   * (CM) - FROM
20500701  -1.75       1.7500000    VOIDF  215010000  * -57 CM BELOW
20500702              7.9525000    VOIDF  220010000  * TOP OF TUBE SHEET
20500703              7.9108334    VOIDF  220020000  * TO TOP OF MODEL
20500704              7.9108334    VOIDF  220030000  * U-TUBE
20500705              6.5999883    VOIDF  220040000
*
20500800     ILUTD    SUM   30.48    925.830    1   * IL -TUBE DOWN
*                                                   * (CM) - FROM
20500801  -1.75       1.7500000    VOIDF  225010000  * -57 CM BELOW
20500802              6.5999883    VOIDF  220050000  * TOP OF TUBE SHEET
20500803              7.9108334    VOIDF  220060000  * TO TOP OF MODEL
20500804              7.9108334    VOIDF  220070000  * U-TUBE
20500805              7.9525000    VOIDF  220080000
*
20500900     ILPSD    SUM   30.48    151.803    1   * IL P-S DOWN (CM)
*                                                   * (DPI-57X*14)
20500901  -9.229167   0.6354167    VOIDF  230010000
20500902              1.1836602    VOIDF  240010000
20500903              3.6662500    VOIDF  240020000
20500904              3.4475000    VOIDF  240030000
20500905              2.8958333    VOIDF  240040000
20500906              3.4733333    VOIDF  240050000
20500907              0.7266667    VOIDF  240060000
*
20501000     ILPSU    SUM   30.48    -25.019    1   * IL P-S UP  (CM)
*                                                   * (DPI*14B*16)
20501001  -9.229167   0.7266667    VOIDF  240070000
20501002              3.4733333    VOIDF  240080000
20501003              4.2083333    VOIDF  240090000
*
*
20501100     BLUTU    SUM   30.48    923.290    1   * BL U-TUBE UP
*                                                   * (CM) - FROM
20501101  -1.7508333  1.7508333    VOIDF  315010000  * -57 CM BELOW
20501102              7.7916667    VOIDF  320010000  * TOP OF TUBE SHEET
20501103              7.5000000    VOIDF  320020000  * TO TOP OF MODEL
20501104              7.5000000    VOIDF  320030000  * U-TUBE
20501105              7.5000000    VOIDF  320040000
*
20501200     BLUTD    SUM   30.48    923.290    1   * BL -TUBE DOWN
*                                                   * (CM) - FROM
20501201  -1.7508333  1.7508333    VOIDF  325010000  * -57 CM BELOW
20501202              7.5000000    VOIDF  320050000  * TOP OF TUBE SHEET
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20501203              7.5000000    VOIDF  320060000  * TO TOP OF MODEL
20501204              7.5000000    VOIDF  320070000  * U-TUBE
20501205              7.7916667    VOIDF  320080000
*
20501300     BLPSD    SUM   30.48    142.944    1    * BL P-S DOWN (CM)
*                                                    * (DPB-57X*65A)
20501301  -9.179583   0.8020833    VOIDF  330010000
20501302              1.3076602    VOIDF  340010000
20501303              2.3393333    VOIDF  340020000
20501304              1.6437500    VOIDF  340030000
20501305              4.9431250    VOIDF  340040000
20501306              4.2964583    VOIDF  340050000
20501307              0.6466667    VOIDF  340060000
*
20501400     BLPSU    SUM   30.48    -27.026    1    * BL P-S UP (CM)
*                                                    * (DPB*65*73A)
20501401  -9.179583   0.6466667    VOIDF  340070000
20501402              5.3495833    VOIDF  340080000
20501403              2.2966667    VOIDF  340090000
*
*
20501500   ILSGRSL    SUM   30.48   1130.780    1    * I.L. S.G. LVL (CM)
*                                                    * (TOP OF TUBE
20501501   0.0        7.9525000    VOIDF  600010000  *  SHEET TO TOP OF
20501502              7.9108334    VOIDF  600020000  *  CENT. SEPARATOR)
20501503              7.9108334    VOIDF  600030000  *  (0 TO +1130)
20501504              7.4762500    VOIDF  600040000  * RISER SIDE
20501505              5.1558333    VOIDF  600050000
*
20501600   ILSGDCL    SUM   30.48   1130.780    1    * I.L. S.G. LVL (CM)
*                                                    * (TOP OF TUBE
20501601   0.0        7.4762500    VOIDF  603010000  *  SHEET TO TOP OF
20501602              7.9108334    VOIDF  603020000  *  CENT. SEPARATOR
20501603              7.9108334    VOIDF  603030000  *  (0 TO +1130)
20501604              7.9525000    VOIDF  603040000  * DOWNCOMER SIDE
20501605              5.5516667    VOIDF  602010000
20501606              1.5404167    VOIDF  612010000
*
20501700   BLSGRSL    SUM   30.48   1120.150    1    * B.L.S.G. LVL (CM)
*                                                    * (TOP OF TUBE
20501701   0.0        1.0833333    VOIDF  716010000  *  SHEET TO TOP OF
20501702              6.7083333    VOIDF  700010000  *  GRAV. SEPARATOR)
20501703              7.5000000    VOIDF  700020000  * (0.0 TO 1172)
20501704              7.5000000    VOIDF  700030000  * RISER SIDE
20501705              7.5000000    VOIDF  700040000
20501706              6.8229167    VOIDF  700050000
20501707              1.3333333    VOIDF  701010000
*
20501800   BLSGDCL    SUM   30.48   1120.140    1    * B.L.S.G. LVL (CM)
*                                                    * (TOP OF TUBE
20501801   .5416667   4.0000000    VOIDF  714010000  *  SHEET TO BOT OF
20501802              7.5000000    VOIDF  714020000  *  GRAV. SEPARATOR)
20501803              7.5000000    VOIDF  714030000  * (0.0 TO 1131)
20501804              7.5000000    VOIDF  714040000  * DOWNCOMER SIDE
20501805              7.2500000    VOIDF  714050000
20501806              2.8229167    VOIDF  711010000
*
*
*
20501900    ILSGMR    SUM  .028316846  0.0      1    * IL S.G. SECONDARY
*                                                    * RISER MASS (KG)
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```
20501901   0.0       1.0038417    RHO    600010000
20501902             0.9402046    RHO    600020000
20501903             0.8926058    RHO    600030000
20501904             1.0017945    RHO    600040000
20501905             2.2709806    RHO    600050000
20501906             0.4508175    RHO    601010000
20501907             0.4249623    RHO    611010000
*
20502000    ILSGMD    SUM  .028316846  0.0      1   * IL S.G. SECONDARY
*                                                   * DOWNCOMER MASS(KG)
20502001   0.0       3.0085308    RHO    602010000
20502002             0.7816260    RHO    612010000
20502003             0.2211171    RHO    603010000
20502004             0.2316581    RHO    603020000
20502005             0.2316581    RHO    603030000
20502006             0.3322701    RHO    603040000
*
20502100     ILSGM    SUM     1.0      0.0      1   * IL S.G. SECONDARY
*                                                   * MASS (KG)
20502101   0.0       1.00         CNTRLVAR      19
20502102             1.00         CNTRLVAR      20
*
*
20502200    BLSGMR    SUM  .028316846  0.0      1   * BL S.G. SECONDARY
*                                                   * RISER MASS (KG)
20502201   0.0       0.0344994    RHO    716010000
20502202             0.2213819    RHO    700010000
20502203             0.2476839    RHO    700020000
20502204             0.2461911    RHO    700030000
20502205             0.2649840    RHO    700040000
20502206             0.3268035    RHO    700050000
20502207             0.5794734    RHO    701010000
20502208             0.1534235    RHO    703010000
20502209             0.1002201    RHO    704010000
20502210             0.0680664    RHO    705010000
*
20502300    BLSGMD    SUM  .028316846  0.0      1   * BL S.G. SECONDARY
*                                                   * DOWNCOMER MASS(KG)
20502301   0.0       0.6232431    RHO    711010000
20502302             0.0718342    RHO    712010000
20502303             0.0366917    RHO    713010000
20502304             0.0424740    RHO    714010000
20502305             0.0779018    RHO    714020000
20502306             0.0779018    RHO    714030000
20502307             0.0779018    RHO    714040000
20502308             0.0774216    RHO    714050000
20502309             0.0972227    RHO    715010000
*
20502400     BLSGM    SUM     1.0      0.0      1   * BL S.G. SECONDARY
*                                                   * LIQUID MASS (KG)
20502401   0.0       1.00         CNTRLVAR      22
20502402             1.00         CNTRLVAR      23
*
*
20502500    TOTSGM    SUM     1.0      0.0      1   * TOTAL SECONDARY
*                                                   * LIQUID MASS (KG)
20502501   0.0       1.00         CNTRLVAR      21
20502502             1.00         CNTRLVAR      24
*
*
*
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20502600    ILSGQ    SUM  -1.0E-3     0.0      1   * IL SG Q (KW)
*
20502601   0.0       1.00         Q      220010000
20502602             1.00         Q      220020000
20502603             1.00         Q      220030000
20502604             1.00         Q      220040000
20502605             1.00         Q      220050000
20502606             1.00         Q      220060000
20502607             1.00         Q      220070000
20502608             1.00         Q      220080000
*
20502700    BLSGQ    SUM  -1.0E-3     0.0      1   * BL SG Q (KW)
*
20502701   0.0       1.00         Q      320010000
20502702             1.00         Q      320020000
20502703             1.00         Q      320030000
20502704             1.00         Q      320040000
20502705             1.00         Q      320050000
20502706             1.00         Q      320060000
20502707             1.00         Q      320070000
20502708             1.00         Q      320080000
*
20502800    CORPOW   SUM .23607E-3    0.0      1   * CORE POWER (KW)
*
20502801   0.0       1.00         HTRNR  150000101
20502802             1.00         HTRNR  150000201
20502803             1.00         HTRNR  150000301
20502804             1.00         HTRNR  150000401
20502805             1.00         HTRNR  150000501
20502806             1.00         HTRNR  150000601
20502807             1.00         HTRNR  150000701
20502808             1.00         HTRNR  150000801
20502809             1.00         HTRNR  150000901
20502810             1.00         HTRNR  150001001
20502811             1.00         HTRNR  150001101
20502812             1.00         HTRNR  150001201
*
*
*
20502900    MAXROD   STDFNCTN   1.0      0.0      1   * MAX ROD TEMP
*
20502901             MAX          HTTEMP 150000118
20502902                          HTTEMP 150000218
20502903                          HTTEMP 150000318
20502904                          HTTEMP 150000418
20502905                          HTTEMP 150000518
20502906                          HTTEMP 150000618
20502907                          HTTEMP 150000718
20502908                          HTTEMP 150000818
20502909                          HTTEMP 150000918
20502910                          HTTEMP 150001018
20502911                          HTTEMP 150001118
20502912                          HTTEMP 150001218
*
************************************************************************
*            CONTROL BLOCK FOR PRIMARY COOLANT SYSTEM MASS             *
************************************************************************
*
20540000   DNCRMAS    SUM .028316846   0.0      1   * DOWNCOMER MASS
*                                                   * (KG)
20540001   0.0       0.2113940    RHO    101010000
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20540002              0.0700293    RHO    110010000
20540003              0.0260607    RHO    110020000
20540004              0.0520780    RHO    110030000
20540005              0.0520780    RHO    110040000
20540006              0.0520780    RHO    110050000
20540007              0.0520780    RHO    110060000
20540008              0.0520780    RHO    110070000
20540009              0.0381645    RHO    110080000
20540010              0.0451975    RHO    110090000
20540011              0.0733525    RHO    110100000
*
20540100   LPLMMAS    SUM .028316846   0.0      1   * LOWER PLENUM
*                                                   * MASS (KG)
20540101   0.0        0.2381304    RHO    120010000
20540102              0.2328024    RHO    130010000
20540103              0.1229966    RHO    140010000
*
20540200   COREMAS    SUM .028316846   0.0      1   * CORE MASS (KG)
*
20540201   0.0        0.0607520    RHO    150010000
20540202              0.0607520    RHO    150020000
20540203              0.0607520    RHO    150030000
20540204              0.0607520    RHO    150040000
20540205              0.0607520    RHO    150050000
20540206              0.0607520    RHO    150060000
*
20540300   UPLMMAS    SUM .028316846   0.0      1   * UPPER PLENUM
*                                                   * MASS (KG)
20540301   0.0        0.0579072    RHO    161010000
20540302              0.1260044    RHO    162010000
20540303              0.1223341    RHO    163010000
20540304              0.1445850    RHO    164010000
*
20540400   UPHDMAS    SUM .028316846   0.0      1   * UPPER HEAD
*                                                   * MASS (KG)
20540401   0.0        0.0236441    RHO    191010000
20540402              0.1028720    RHO    192010000
20540403              0.1854233    RHO    193010000
20540404              0.1777042    RHO    194010000
*
20540500   BYSCGT     SUM .028316846   0.0      1   * BYPASS LINE,
*                                                   * SUPPORT COLUMNS,
20540501   0.0        0.0025551    RHO    181010000  * AND GUIDE TUBE
20540502              0.0032783    RHO    181020000  * MASS (KG)
20540503              0.0142473    RHO    182010000
20540504              0.0087675    RHO    183010000
20540505              0.0111809    RHO    184010000
20540506              0.0052981    RHO    185010000
20540507              0.0298418    RHO    186010000
*
20540600   PZRMASS    SUM .028316846   0.0      1   * PRESSURIZER
*                                                   * MASS (KG)
20540601   0.0        0.0033454    RHO    997010000
20540602              0.0042156    RHO    997020000
20540603              0.0030333    RHO    997030000
20540604              0.1731566    RHO    999010000
20540605              0.1842654    RHO    999020000
20540606              0.1842654    RHO    999030000
20540607              0.1842654    RHO    999040000
20540608              0.1842654    RHO    999050000
20540609              0.1842654    RHO    999060000
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20540610              0.1857634    RHO    999070000
20540611              0.1120170    RHO    999080000
*
20540700   IHOTMAS    SUM .028316846   0.0      1   * INTACT LOOP
*                                                   * HOT LEG
20540701   0.0        0.1047757    RHO    201010000  * MASS (KG)
20540702              0.0776879    RHO    201020000
20540703              0.0675653    RHO    202010000
20540704              0.0653702    RHO    203010000
20540705              0.0574572    RHO    203020000
20540706              0.0538994    RHO    203030000
20540707              0.0478680    RHO    210010000
20540708              0.0345748    RHO    215010000
*
20540800   ITUBMAS    SUM .028316846   0.0      1   * INTACT LOOP
*                                                   * U-TUBE
20540801   0.0        0.1571175    RHO    220010000  * MASS (KG)
20540802              0.1562943    RHO    220020000
20540803              0.1562943    RHO    220030000
20540804              0.1322144    RHO    220040000
20540805              0.1322144    RHO    220050000
20540806              0.1562943    RHO    220060000
20540807              0.1562943    RHO    220070000
20540808              0.1571175    RHO    220080000
*
20540900   ICLDMAS    SUM .028316846   0.0      1   * INTACT LOOP
*                                                   * COLD LEG
20540901   0.0        0.0345748    RHO    225010000  * MASS (KG)
20540902              0.0478680    RHO    230010000
20540903              0.0374799    RHO    240010000
20540904              0.0902957    RHO    240020000
20540905              0.0849081    RHO    240030000
20540906              0.0713212    RHO    240040000
20540907              0.0863894    RHO    240050000
20540908              0.0374835    RHO    240060000
20540909              0.0374835    RHO    240070000
20540910              0.0863894    RHO    240080000
20540911              0.1036466    RHO    240090000
20540912              0.0558400    RHO    250010000
20540913              0.0779869    RHO    261010000
20540914              0.0779869    RHO    261020000
20540915              0.0779869    RHO    262010000
20540916              0.0854513    RHO    263010000
*
20541000   BHOTMAS    SUM .028316846   0.0      1   * BROKEN LOOP
*                                                   * HOT LEG
20541001   0.0        0.0584279    RHO    301010000  * MASS (KG)
20541002              0.0215803    RHO    301020000
20541003              0.0215803    RHO    301030000
20541004              0.0266031    RHO    301040000
20541005              0.0230250    RHO    301050000
20541006              0.0192876    RHO    301060000
20541007              0.0495847    RHO    310010000
20541008              0.0115250    RHO    315010000
*
20541100   BTUBMAS    SUM .028316846   0.0      1   * BROKEN LOOP
*                                                   * U-TUBE
20541101   0.0        0.0471739    RHO    320010000  * MASS (KG)
20541102              0.0454080    RHO    320020000
20541103              0.0454080    RHO    320030000
20541104              0.0456672    RHO    320040000
```

```
20541105            0.0456672    RHO    320050000
20541106            0.0454080    RHO    320060000
20541107            0.0454080    RHO    320070000
20541108            0.0471739    RHO    320080000
*
20541200   BCLDMAS    SUM .028316846   0.0      1   * BROKEN LOOP
*                                                   * COLD LEG
20541201   0.0      0.0115250    RHO    325010000   * MASS (KG)
20541202            0.0495847    RHO    330010000
20541203            0.0156764    RHO    340010000
20541204            0.0228420    RHO    340020000
20541205            0.0160501    RHO    340030000
20541206            0.0482662    RHO    340040000
20541207            0.0419519    RHO    340050000
20541208            0.0099184    RHO    340060000
20541209            0.0099184    RHO    340070000
20541210            0.0522349    RHO    340080000
20541211            0.0224253    RHO    340090000
20541212            0.0303500    RHO    350010000
20541213            0.0192357    RHO    361010000
20541214            0.0160867    RHO    362010000
20541215            0.0227915    RHO    363010000
20541216            0.0479251    RHO    363020000
*
20541300   PCSMASS    SUM      1.0      0.0      1   * TOTAL PRIMARY
*                                                   * COOLANT SYSTEM
20541301   0.0      1.00         CNTRLVAR    400    * MASS (KG)
20541302            1.00         CNTRLVAR    401
20541303            1.00         CNTRLVAR    402
20541304            1.00         CNTRLVAR    403
20541305            1.00         CNTRLVAR    404
20541306            1.00         CNTRLVAR    405
20541307            1.00         CNTRLVAR    406
20541308            1.00         CNTRLVAR    407
20541309            1.00         CNTRLVAR    408
20541310            1.00         CNTRLVAR    409
20541311            1.00         CNTRLVAR    410
20541312            1.00         CNTRLVAR    411
20541313            1.00         CNTRLVAR    412
*
*********************************************************************
*                    CNTRLVAR DELTA P (KPA)                         *
*********************************************************************
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550100    VESDP     SUM     1.0E-3     100.0     1   * VESSEL LEVEL DP
*                                                      * -13 TO -578 CM
20550101   0.0    1.0    P  120010000    0.3303    RHO   120010000
20550102         -1.0    P  163010000   -3.3898    RHO   163010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550200   COREDP     SUM     1.0E-3     100.0     1   * CORE LEVEL DP
*                                                      * -105 TO -501 CM
20550201   0.0    1.0    P  140010000   -1.9198    RHO   140010000
20550202         -1.0    P  161010000    0.9447    RHO   161010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550300  DWNCMDP     SUM     1.0E-3     100.0     1   * DWNCM LEVEL DP
*                                                      * 29 TO -578 CM
20550301   0.0    1.0    P  120010000    0.3303    RHO   120010000
20550302         -1.0    P  101010000    2.8420    RHO   101010000
```

```
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550400   VESUPDP    SUM     1.0E-3     100.0     1   * VESSEL UPPER
*                                                      * PLENUM DP
*                                                      * 135 TO -13 CM
20550401    0.0    1.0    P   163010000    3.3898    RHO   163010000
20550402          -1.0    P   164010000    3.6964    RHO   164010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550500   VESUHDP    SUM     1.0E-3     100.0     1   * VESSEL UPPER
*                                                      * HEAD DP
*                                                      * 421 TO 160 CM
20550501    0.0    1.0    P   191010000    0.3256    RHO   191010000
20550502          -1.0    P   194010000    4.0503    RHO   194010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550600     PRZDP    SUM     1.0E-3     100.0     1   * PRESSURIZER
*                                                      * 632 TO 30 CM
20550601    0.0    1.0    P   999080000    1.8327    RHO   999080000
20550602          -1.0    P   999010000    4.3145    RHO   999010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550700   ISGUPDP    SUM     1.0E-3     100.0     1   * ILSG UPSIDE
*                                                      * 926 TO -57E CM
20550701    0.0    1.0    P   210010000   -0.5900    RHO   210010000
20550702          -1.0    P   220040000    9.8588    RHO   220040000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550800   ISGDNDP    SUM     1.0E-3     100.0     1   * ILSG DOWNSIDE
*                                                      * 926 TO -57X CM
20550801    0.0    1.0    P   230010000   -0.5900    RHO   230010000
20550802          -1.0    P   220050000    9.8588    RHO   220050000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20550900   IPSDNDP    SUM     1.0E-3     100.0     1   * IL PUNP SUCTION
*                                                      * DOWNSIDE
*                                                      * -57X TO I14
20550901    0.0    0.5    P   240060000    0.5115    RHO   240060000
20550902           0.5    P   240070000    0.5115    RHO   240070000
20550903          -1.0    P   230010000    0.5900    RHO   230010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551000   IPSUPDP    SUM     1.0E-3     100.0     1   * IL PUNP SUCTION
*                                                      * UPSIDE
*                                                      * I14 TO I16
20551001    0.0    0.5    P   240060000    0.5115    RHO   240060000
20551002           0.5    P   240070000    0.5115    RHO   240070000
20551003          -1.0    P   240090000    4.3006    RHO   240090000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551100   BSGUPDP    SUM     1.0E-3     100.0     1   * BLSG UPSIDE
*                                                      * 925 TO -57E
20551101    0.0    1.0    P   310010000   -0.8393    RHO   310010000
20551102          -1.0    P   320040000   10.0822    RHO   320040000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551200   BSGDNDP    SUM     1.0E-3     100.0     1   * BLSG DOWNSIDE
*                                                      * 925 TO -57X
20551201    0.0    1.0    P   330010000   -0.8393    RHO   330010000
20551202          -1.0    P   320050000   10.0822    RHO   320050000
*
```

```
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551300   BPSDNDP    SUM     1.0E-3     100.0     1   * BL PUMP SUCTION
*                                                      * DOWNSIDE
*                                                      * -57X TO B65
20551301    0.0    0.5    P   340060000    0.4829    RHO   340060000
20551302           0.5    P   340070000    0.4829    RHO   340070000
20551303          -1.0    P   330010000    0.8393    RHO   330010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551400   BPSUPDP    SUM     1.0E-3     100.0     1   * BL PUMP SUCTION
*                                                      * UPSIDE
*                                                      * B65 TO B73
20551401    0.0    0.5    P   340060000    0.4829    RHO   340060000
20551402           0.5    P   340070000    0.4829    RHO   340070000
20551403          -1.0    P   340090000    0.6504    RHO   340090000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551500   ILSGRDP    SUM     1.0E-3     100.0     1   * ILSG RISER
*                                                      * 1117 TO 89 CM
20551501    0.0    1.0    P   600010000    3.1356    RHO   600010000
20551502          -1.0    P   602010000    7.8576    RHO   602010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551600   ILSGDDP    SUM     1.0E-3     100.0     1   * ILSG DOWNCOMER
*                                                      * 1117 TO 51 CM
20551601    0.0    1.0    P   603040000    6.9282    RHO   603040000
20551602          -1.0    P   602010000    7.8576    RHO   602010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551700   BLSGRDP    SUM     1.0E-3     100.0     1   * BLSG RISER
*                                                      * 1186 TO -7 CM
20551701    0.0    1.0    P   716010000    2.3040    RHO   716010000
20551702          -1.0    P   703010000    0.5601    RHO   703010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551800   BLSGDDP    SUM     1.0E-3     100.0     1   * BLSG DOWNCOMER
*                                                      * 1186 TO 18 CM
20551801    0.0    1.0    P   715010000
20551802          -1.0    P   703010000    0.5601    RHO   703010000
*
*            NAME    TYPE      SCALE  INIT VAL   FLG
20551900  BLSGDHDP    SUM     1.0E-3     100.0     1   * BLSG DWN HORIZ
*                                                      * 1036 TO 18 CM
20551901    0.0    1.0    P   715010000
20551902          -1.0    P   713010000
*
*
*************************************************************************
*                  CNTRLVAR COLLAPSED LIQUID LEVEL CM                   *
*************************************************************************
*
*            NAME   TYPE       SCALE    VALO  FLG   * VESSEL CLSPD
20553100    VESCL    DIV    10204.082    100.    1   * LEVEL -13 TO
*                                                    * -578  REF -578
20553101   RHOF   163010000     CNTRLVAR   501
*
*
*            NAME   TYPE       SCALE    VALO  FLG   * CORE CLSPD
20553200   CORECL    DIV    10204.082    100.    1   * LEVEL -105 TO
*                                                    * -501  REF -501
20553201   RHOF   161010000     CNTRLVAR   502
```

```
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * DWNCM CLSPD
20553300    DWNCMCL    DIV    10204.082    100.    1   * LEVEL 29 TO
*                                                      * -578  REF -578
20553301    RHOF   101010000      CNTRLVAR   503
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * VES UP CLSPD
20553400    VESUPCL    DIV    10204.082    100.    1   * LEVEL 135 TO
*                                                      * -13  REF -13
20553401    RHOF   164010000      CNTRLVAR   504
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * VES UH CLSPD
20553500    VESUHCL    DIV    10204.082    100.    1   * LEVEL 421 TO
*                                                      * 160  REF 160
20553501    RHOF   194010000      CNTRLVAR   505
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * PRZ CLSPD
20553600      PRZCL    DIV    10204.082    100.    1   * LEVEL 632 TO
*                                                      * 30  REF 30
20553601    RHOF   999010000      CNTRLVAR   506
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * ILSG UP CLSPD
20553700    ISGUPCL    DIV    10204.082    100.    1   * LEVEL 926 TO
*                                                      * -57E REF -57
20553701    RHOF   220040000      CNTRLVAR   507
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * ILSG DN CLSPD
20553800    ISGDNCL    DIV    10204.082    100.    1   * LEVEL 926 TO
*                                                      * -57X REF -57
20553801    RHOF   220050000      CNTRLVAR   508
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * ILPS DN CLSPD
20553900    IPSDNCL    DIV    10204.082    100.    1   * LEVEL -57X TO
*                                                      * I14  REF I14
20553901    RHOF   230010000      CNTRLVAR   509
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * ILPS UP CLSPD
20554000    IPSUPCL    DIV    10204.082    100.    1   * LEVEL I14 TO
*                                                      * I16  REF I14
20554001    RHOF   240090000      CNTRLVAR   510
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * BLSG UP CLSPD
20554100    BSGUPCL    DIV    10204.082    100.    1   * LEVEL 925 TO
*                                                      * -57E  REF -57
20554101    RHOF   320040000      CNTRLVAR   511
*
*
*              NAME   TYPE        SCALE    VALO  FLG   * BLSG DN CLSPD
20554200    BSGDNCL    DIV    10204.082    100.    1   * LEVEL 925 TO
*                                                      * -57X  REF -57
20554201    RHOF   320050000      CNTRLVAR   512
*
```

```
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLPS DN CLSPD
20554300   BPSDNCL   DIV    10204.082    100.   1   * LEVEL -57X TO
*                                                   * B65  REF B65
20554301   RHOF   330010000      CNTRLVAR   513
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLPS UP CLSPD
20554400   BPSUPCL   DIV    10204.082    100.   1   * LEVEL B65 TO
*                                                   * B73  REF B65
20554401   RHOF   340090000      CNTRLVAR   514
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG RIS CLSPD
20554500   ILSGRCL   DIV    10204.082    100.   1   * LEVEL 1117 TO
*                                                   * 89  REF 89
20554501   RHOF   611010000      CNTRLVAR   515
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG DWN CLSPD
20554600   ILSGDCL   DIV    10204.082    100.   1   * LEVEL 1117 TO
*                                                   * 51  REF 51
20554601   RHOF   611010000      CNTRLVAR   516
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG RIS CLSPD
20554700   BLSGRCL   DIV    10204.082    100.   1   * LEVEL 1186 TO
*                                                   * -7  REF -7
20554701   RHOF   703010000      CNTRLVAR   517
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG DWN CLSPD
20554800   BLSGDCL   DIV    10204.082    100.   1   * LEVEL 1186 TO
*                                                   * 18  REF 18
20554801   RHOF   703010000      CNTRLVAR   518
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG DNHZ CLSPD
20554900  BLSGDHCL   DIV    10204.082    100.   1   * LEVEL 1036 TO
*                                                   * 18  REF 18
20554901   RHOF   703010000      CNTRLVAR   519
*
*************************************************************************
*
*            NAME   TYPE        SCALE    VALO  FLG   * VESSEL CLSPD
20556100    VESCLR   SUM          1.0   -13.0   1   * LEVEL -13 TO
*                                                   * -578  REF ZERO
20556101   -578.0  1.0      CNTRLVAR    531
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * CORE CLSPD
20556200   CORECLR   SUM          1.0  -105.0   1   * LEVEL -105 TO
*                                                   * -501  REF ZERO
20556201   -501.0   1.0     CNTRLVAR    532
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * DWNCM CLSPD
20556300  DWNCMCLR   SUM          1.0   +29.0   1   * LEVEL 29 TO
*                                                   * -578  REF ZERO
20556301   -578.0   1.0     CNTRLVAR    533
*
```

```
*
*            NAME   TYPE        SCALE    VALO  FLG   * VES UP CLSPD
20556400  VESUPCLR   SUM          1.0  +135.0   1   * LEVEL 135 TO
*                                                    * -13  REF ZERO
20556401    -13.0   1.0     CNTRLVAR    534
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * VES UH CLSPD
20556500  VESUHCLR   SUM          1.0  +421.0   1   * LEVEL 421 TO
*                                                    * 160  REF ZERO
20556501    160.0   1.0     CNTRLVAR    535
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * PRZ CLSPD
20556600    PRZCLR   SUM          1.0  +632.0   1   * LEVEL 632 TO
*                                                    * 30  REF ZERO
20556601     30.0   1.0     CNTRLVAR    536
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG UP CLSPD
20556700  ISGUPCLR   SUM          1.0  +926.0   1   * LEVEL 926 TO
*                                                    * -57E REF ZERO
20556701    -57.0   1.0     CNTRLVAR    537
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG DN CLSPD
20556800  ISGDNCLR   SUM          1.0  +926.0   1   * LEVEL 926 TO
*                                                    * -57X REF ZERO
20556801    -57.0   1.0     CNTRLVAR    538
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILPS DN CLSPD
20556900  IPSDNCLR   SUM          1.0   203.6   1   * LEVEL -57X TO
*                                                    * I14  REF ZERO
20556901   -281.3   1.0     CNTRLVAR    539
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILPS UP CLSPD
20557000  IPSUPCLR   SUM          1.0     0.0   1   * LEVEL I14 TO
*                                                    * I16  REF ZERO
20557001   -281.3   1.0     CNTRLVAR    540
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG UP CLSPD
20557100  BSGUPCLR   SUM          1.0  +925.0   1   * LEVEL 925 TO
*                                                    * -57E  REF ZERO
20557101    -57.0   1.0     CNTRLVAR    541
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG DN CLSPD
20557200  BSGDNCLR   SUM          1.0  +925.0   1   * LEVEL 925 TO
*                                                    * -57X  REF ZERO
20557201    -57.0   1.0     CNTRLVAR    542
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLPS DN CLSPD
20557300  BPSDNCLR   SUM          1.0   203.6   1   * LEVEL -57X TO
*                                                    * B65  REF ZERO
20557301   -279.8   1.0     CNTRLVAR    543
*
*
```

```
*            NAME   TYPE        SCALE    VALO  FLG   * BLPS UP CLSPD
20557400   BPSUPCLR   SUM         1.0     0.0    1   * LEVEL B65 TO
*                                                    * B73  REF ZERO
20557401    -279.8  1.0     CNTRLVAR    544
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG RIS CLSPD
20557500   ILSGRCLR   SUM         1.0 +1117.0    1   * LEVEL 1117 TO
*                                                    * 89  REF ZERO
20557501      89.2  1.0     CNTRLVAR    545
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * ILSG DWN CLSPD
20557600   ILSGDCLR   SUM         1.0 +1117.0    1   * LEVEL 1117 TO
*                                                    * 51  REF ZERO
20557601      50.5  1.0     CNTRLVAR    546
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG RIS CLSPD
20557700   BLSGRCLR   SUM         1.0 +1186.0    1   * LEVEL 1186 TO
*                                                    * -7  REF ZERO
20557701      -7.0  1.0     CNTRLVAR    547
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG DWN CLSPD
20557800   BLSGDCLR   SUM         1.0 +1186.0    1   * LEVEL 1186 TO
*                                                    * 18  REF ZERO
20557801      16.51 1.0     CNTRLVAR    548
*
*
*            NAME   TYPE        SCALE    VALO  FLG   * BLSG DNHZ CLSPD
20557900   BLSGHCLR   SUM         1.0     0.0    1   * LEVEL 1036 TO
*                                                    * 18  REF ZERO
20557901      16.51 1.0     CNTRLVAR    549
*
*********************************************************************
*                 CONTROL BLOCK FOR CORE POWER                      *
*********************************************************************
*
20515000  DCYPOWER  FUNCTION 2.0147538 0.0      1   * MW
20515001    TIME          0          150
*
20515100  ACTPOWER   SUM     1.0      0.0      1
20515101   0.0       1.000        CNTRLVAR     150  * WATTS 1.5 % ?
*
*
*********************************************************************
*        CONTROL BLOCK FOR PRESSURIZER HEATER RODS                  *
*********************************************************************
*
20599500  VARPOWER  FUNCTION  1.0      0.0      1   * MW
20599501    TIME          0          999
*
20599900  PZRPOWER   SUM     1.0      0.0      1
20599901   0.0       1.0          CNTRLVAR     995  * WATTS
*
*********************************************************************
* INTERNAL PZR HEATER CONTROLS    ( REF   GWJ-9-82)                 *
*********************************************************************
**
*20599000      T698  TRIPUNIT  1.0      0.0      1
```

```
*20599001      698
**
*20599100 ONOFFHTRS    SUM   875.0      0.0      1
*20599101   0.0       1.0          CNTRLVAR     990
**
*20599200      T495  TRIPUNIT  1.0      0.0      1
*20599201                495
**
*20599300      T497  TRIPUNIT  1.0      0.0      1
*20599301                497
**
*20599400      T699  TRIPUNIT  1.0      0.0      1
*20599401      699
**
*20599500  PROPPWR1    SUM   250.0      0.0      1
*20599501   0.0       1.0          CNTRLVAR     993
**
*20599600  INTERMED    SUM  1.25E-3     0.0      1
*20599601     15.6E6   -1.0  P 999010000
**
*20599700  PROPPWR2   MULT     1.0      0.0      1
*20599701     CNTRLVAR 994    CNTRLVAR 996    CNTRLVAR 992
**
*20599800 PZRINTHTRS   SUM     1.0      0.0      1
*20599801  0.  1.0 CNTRLVAR 995   1.0 CNTRLVAR 997   1.0 CNTRLVAR 991
*
*
*************************************************************************
*                 CONTROL BLOCK FOR PRESSURIZER LEVEL                   *
*************************************************************************
*
* OBTAIN SPECIFIED AND MAINTAIN CONSTANT MASS IN THE PRESSURIZER
*
20598000      T429  TRIPUNIT  1.0      0.0      1
20598001                429
*
20598100    PZRERR    SUM     0.01     0.0      1   * INPUT DESIRED
20598101  175.0     -1.0          CNTRLVAR      6   * LEVEL IN CM 90.10.6
*
20598200   PZRCORR   MULT     1.0      0.0      0   * CORRECT LEVEL IN
20598201     CNTRLVAR     980     CNTRLVAR     981   * PZR UNTIL T529
*
20598500     PZRFW   MULT  .0066805   0.0      0   * PRESSURIZER
20598501     RHO    999070000     CNTRLVAR     982   * FEED FLOW RATE
*
*************************************************************************
*                  CONTROL BLOCK FOR PUMPS                              *
*************************************************************************
*
*                  ********** STEADY STATE **********
*
*INTACT LOOP PUMP SPEED --- INPUT DESIRED INTACT LOOP FLOW RATE (KG/S)*
20525000    ILMERR    SUM     1.0      0.0      1
20525001   9.10000  -1.0          MFLOWJ 163010000  * 90.9.18
*
20525100    ILPSPD  INTEGRAL 20.0   1873.37     1
20525101     CNTRLVAR     250
*
*
*BROKEN LOOP PUMP SPEED --- INPUT DESIRED BROKEN LOOP FLOW RATE (KG/S)*
20535000    BLMERR    SUM     1.0      0.0      1
```

```
20535001   3.20000  -1.0          MFLOWJ 163020000  * 90.9.18
*
20535100    BLPSPD  INTEGRAL 60.0   1492.32     1
20535101     CNTRLVAR     350
*
*                 ************ TRANSIENT ************
*
*                              INTACT LOOP
*
*20525100  ILPMPSPD  FUNCTION 1873.37   0.0      1   * FROM CNTRLVAR 251
*20525101     TIME          0          250          * IN STEADY-STATE
*
*                              BROKEN LOOP
*
*20535100  BLPMPSPD  FUNCTION 1492.32   0.0      1   * FROM CNTRLVAR 351
*20535101     TIME          0          350          * IN STEADY STATE
*
*********************************************************************
*                 CONTROL BLOCK FOR STEAM GENERATORS                *
*********************************************************************
*
* OBTAIN SPECIFIED AND MAINTAIN CONSTANT MASS IN THE STEAM GENERATORS
*
20560600      T419  TRIPUNIT  1.0      0.0      1
20560601                419    * 90.9.18
*
20560700    ILMERR    SUM     1.0      0.0      1   * INPUT DESIRED ILSG
20560701   73.0     -1.0          CNTRLVAR      21  * LIQUID MASS IN KG *90.9.18*90.9.18
*
20560800   ILMCORR   MULT     1.0      0.0      0   * CORRECT MASS IN
20560801     CNTRLVAR     606     CNTRLVAR     607  * ILSG UNTIL T519
*
20560900    ILSGLS    SUM     1.0      0.0      0   * MASS FLOW OUT ILSG
20560901   0.0       1.0          MFLOWJ 635000000
*20560902             1.0          MFLOWJ 637000000
*
20561000    ILSGFW    SUM     1.0      0.0      0   * INTACT LOOP
20561001   0.0       1.0          CNTRLVAR     608  * FEED FLOW RATE
20561002             1.0          CNTRLVAR     609
*
20562000    IRCRCR    DIV     1.0      0.0      1   * RECIRC RATIO
20562001    MFLOWJ  601010000     MFLOWJ 601020000
*
20562500    ICRCR     DIV     1.0      0.0      1   * CIRCULATION RATIO
20562501    MFLOWJ  601010000     MFLOWJ 601030000
*
*
20570600      T419  TRIPUNIT  1.0      0.0      1
20570601                419  * 90.9.18
*
20570700    BLMERR    SUM     1.0      0.0      1   * INPUT DESIRED BLSG
20570701  23.0      -1.0          CNTRLVAR      24  * LIQUID MASS IN KG 90.9.18
*
20570800   BLMCORR   MULT     1.0      0.0      0   * CORRECT MASS IN
20570801     CNTRLVAR     706     CNTRLVAR     707  * BLSG UNTIL T519
*
20570900    BLSGLS    SUM     1.0      0.0      0   * MASS FLOW OUT BLSG
20570901   0.0       1.0          MFLOWJ 735000000
*20570902             1.0          MFLOWJ 737000000
*
20571000    BLSGFW    SUM     1.0      0.0      0   * BROKEN LOOP
```

```
20571001   0.0       1.0          CNTRLVAR     708  * FEED FLOW RATE
20571002             1.0          CNTRLVAR     709
*
20572000    BRCRCR    DIV     1.0      0.0      1   * RECIRC RATIO
20572001    MFLOWJ  704010000     MFLOWJ 713030000
*
20572500    BCRCR     DIV     1.0      0.0      1   * CIRCULATION RATIO
20572501    MFLOWJ  704010000     MFLOWJ 701010000
*
*
* CONTROL INTACT LOOP STEAM VALVE TO HOLD STEAM DOME PRESSURE IN
* BAND GIVEN BY TRIPS 462 AND 463 - OPEN AND CLOSE STEAM VALVE AT
* RATES GIVEN IN TRIPS 464 AND 465 - OPEN OR CLOSE DEPENDING ON
* TRIPS 662 AND 663
*
20563000      PERR    SUM    -1.0      0.0      1   * DESIRED PRESSURE
20563001   4.55E6   -1.0          P      611010000  * PASCALS - MID BAND90.9.18
*
20563100     DPERR  DIFFREND  1.0      0.0      1
20563101     CNTRLVAR     630
*
20563200   POSDPDT  TRIPUNIT  1.0      0.0      1
20563201                662
*
20563300   NEGDPDT  TRIPUNIT  1.0      0.0      1
20563301                663

20563400      OPEN   MULT     1.0      0.0      1
20563401     CNTRLVAR     630     CNTRLVAR     632
*
20563500     CLOSE   MULT     1.0      0.0      1
20563501     CNTRLVAR     630     CNTRLVAR     633
*
20563600      RATE    SUM     1.E-8    0.0      0
20563601   0.0       1.0          CNTRLVAR     634
20563602             1.0          CNTRLVAR     635
*
20563700      POSN  INTEGRAL  1.0    0.294088   0
20563701     CNTRLVAR     636
*
*
* CONTROL BROKEN LOOP STEAM VALVE TO HOLD STEAM DOME PRESSURE IN
* BAND GIVEN BY TRIPS 472 AND 473 - OPEN AND CLOSE STEAM VALVE AT
* RATES GIVEN IN TRIPS 474 AND 475 - OPEN OR CLOSE DEPENDING ON
* TRIPS 672 AND 673
*
20573000      PERR    SUM    -1.0      0.0      1   * DESIRED PRESSURE
20573001   4.48E6   -1.0          P      705010000  * PASCALS - MID BAND90.9.18
*
20573100     DPERR  DIFFREND  1.0      0.0      1
20573101     CNTRLVAR     730
*
20573200   POSDPDT  TRIPUNIT  1.0      0.0      1
20573201                672
*
20573300   NEGDPDT  TRIPUNIT  1.0      0.0      1
20573301                673
*
20573400      OPEN   MULT     1.0      0.0      1
20573401     CNTRLVAR     730     CNTRLVAR     732
*
```

```
20573500     CLOSE   MULT     1.0      0.0      1
20573501     CNTRLVAR     730     CNTRLVAR     733
*
20573600      RATE    SUM     4.E-9    0.0      0
20573601   0.0       1.0          CNTRLVAR     734
20573602             1.0          CNTRLVAR     735
*
20573700      POSN  INTEGRAL  1.0    0.04367422 0
20573701     CNTRLVAR     736
*
*********************************************************************
*          VESSEL, DOWNCOMER, AND UPPER HEAD EXTERNAL HEATERS        *
*********************************************************************
*
20520000   PWRBASE  FUNCTION  1.0      0.0      0
20520001     TIME          0          116
*
20520100    VSLPWR   MULT     1.0      1.0      0
20520101     CNTRLVAR     200
*
20520200    UHTRIP  TRIPUNIT  1.0      0.0      1
20520201                640
*
20520300    UVTRIP  TRIPUNIT  1.0      0.0      1
20520301                641
*
20520400    MVTRIP  TRIPUNIT  1.0      0.0      1
20520401                642
*
20520500    INVUHT    SUM     1.0      1.0      1
20520501   1.0      -1.0          CNTRLVAR     202
*
20520600    INVUVT    SUM     1.0      1.0      1
20520601   1.0      -1.0          CNTRLVAR     203
*
20520700    INVMVT    SUM     1.0      1.0      1
20520701   1.0      -1.0          CNTRLVAR     204
*
20520800     UHPWR   MULT     0.13193  1.0      1
20520801     CNTRLVAR     201     CNTRLVAR     205
*
20520900    UVPWRA   MULT     0.06597  1.0      1
20520901     CNTRLVAR     201
*
20521000    UVPWRB   MULT     0.01003  1.0      1
20521001     CNTRLVAR     201     CNTRLVAR     202
*
20521100    UVPWRT    SUM     1.0      1.0      1
20521101   0.0       1.0          CNTRLVAR     209
*20521102             1.0          CNTRLVAR     210
*
20521200     UVPWR   MULT     1.0      1.0      1
20521201     CNTRLVAR     211     CNTRLVAR     206
*
20521300    MVPWRA   MULT     0.17589  1.0      1
20521301     CNTRLVAR     201
*
20521400    MVPWRB   MULT     0.02673  1.0      1
20521401     CNTRLVAR     201     CNTRLVAR     202
*
20521500    MVPWRC   MULT     0.01667  1.0      1
```

```
20521501     CNTRLVAR     201     CNTRLVAR     203
*
20521600    MVPWRT    SUM     1.0      1.0      1
20521601   0.0       1.0          CNTRLVAR     213
*20521602             1.0          CNTRLVAR     214
*20521603             1.0          CNTRLVAR     215
*
20521700     MVPWR   MULT     1.0      1.0      1
20521701     CNTRLVAR     216     CNTRLVAR     207
*
20521800    VSPWRA   MULT     0.62621  1.0      1
20521801     CNTRLVAR     201
*
20521900    VSPWRB   MULT     0.09517  1.0      1
20521901     CNTRLVAR     201     CNTRLVAR     202
*
20522000    VSPWRC   MULT     0.05933  1.0      1
20522001     CNTRLVAR     201     CNTRLVAR     203
*
20522100    VSPWRD   MULT     0.21929  1.0      1
20522101     CNTRLVAR     201     CNTRLVAR     204
*
20522200     VSPWR    SUM     1.0      1.0      1
20522201   0.0       1.0          CNTRLVAR     218
*20522202             1.0          CNTRLVAR     219
*20522203             1.0          CNTRLVAR     220
*20522204             1.0          CNTRLVAR     221
*
*
20522300     VTRIP  TRIPUNIT  1.0      0.0      1
20522301                643
*
20522400     INVVT    SUM     1.0      1.0      1
20522401   1.0      -1.0          CNTRLVAR     223
*
20522500     VSPWR   MULT     1.0      1.0      1
```

```
/JOB
SNH1T5,T6000.
/USER
ATTACH,STH2XT,RE364BX.
PURGE,SN1T1RP/NA.
DEFINE,RSTPLT=SN1T1RP.
PURGE,SNH1PF5/NA.
DEFINE,PLOTFL=SNH1PF5.
ATTACH,RSTIN=SN1S2RP.
FILE,RSTIN,SBF=NO.
FILE,RSTPLT,SBF=NO.
RFL,CM=370000,EC=200.
REDUCE(-)
RE364BX,,*PL=50000.
/EOR
*
=   RELAP5 MODEL FOR THE SEMISCALE NH-1 POSTTEST - TRANSIENT RUN
    (BRK  0.000012079 , ALL LEVEL 090.10.10) 16:30
*
*
*PROBLEM        TYPE    OPTION
0000100          RESTART   TRANSNT
*
*            INP-CHK  OR   RUN
0000101                    RUN
*
*UNITS         INPUT     OUTPUT   (SI OR BRITISH)
0000102      BRITISH        SI
0000103   14170    *(90.10.8. 09:20)  FROM SNH1S2, SN1S2RP  PZR INTERFACE LEVEL CHECK
*
*TIME OUT      MIN       MAX
*0000105        125.0     150.0
*
*              T END    MIN ST    MAX ST    ST CL     MR     MJ     WR
0000201        5000.    1.0-7      0.05        3    40  2000  2000
*
3750000   BRK-VLV   VALVE
3750101   362010000   900000000    0.000012079  0.0  0.0  100  * (90.9.28)
3750102   0.90  0.90
3750201   1  0.0  0.0  0.0
3750300   TRPVLV
3750301   402
*
20505100   INTBRK   INTEGRAL  1.0  0.0  0
20505101   MFLOWJ   375000000
*
* DELETE PUMP S.S. CONTROLLER
*20525000  ILMERR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*20535000  BLMERR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
* ADD PUMP TRANSIENT CONTROLLER
20525100  ILPMPSPD  FUNCTION  1873.37  0.0  1
20525191  TIME   0  250
20535100  BLPMPSPD  FUNCTION  1492.32  0.0  1
20535101  TIME   0  350
* DELETE PZR LEVEL CONTROLLER
20598000  T419  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20598100  PZRERR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20598200  PZRCORR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20598500  PZRFW  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
* DELETE PZR COMPONENT
9100000  PZRSPRY  DELETE
```

```
9850000  PZRLVLJ  DELETE
9910000  TMD-PRZ  DELETE
* DELETE S/G LEVEL CONTROLLER
20560600   T419    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20560700  ILMERR   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20560800  ILMCORR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20560900  ILSGLS   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20561000  ILSGFW   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20562000  IRCRCR   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20562500  ICRCR    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20570600  T419     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20570700  BLMERR   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20570800  BLMCORR  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20570900  BLSGLS   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20571000  BLSGFW   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20572000  BRCRCR   DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20572500  BCRCR    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*20563000  PERR     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*20563100  DPERR    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563200  POSDPDT  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563300  NEGDPDT  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563400  OPEN     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563500  CLOSE    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563600  RATE     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20563700  POSN     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*20573000  PERR     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*20573100  DPERR    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573200  POSDPDT  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573300  NEGDPDT  DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573400  OPEN     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573500  CLOSE    DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573600  RATE     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
20573700  POSN     DELETE  0.0 0.0 0.0 0.0 0.0 0.0
*
20598000  T429  TRIPUNIT  1.0  0.0  1
20598001        429
20598100  PZRERR  SUM  0.01  0.0  1
20598101  340.0  -1.0  CNTRLVAR   6
*
*  S-NH-1 TRIP SEQUENCE
* OPEN BREAK
0000402  TIME   0  GE   NULL  0  0.0  L -1.
* SCRAM SIGNAL
0000407  P  999010000   LE   NULL  0  1900.0  L  -1.
* MAIN STEAM VALVE CLOSE (INTACT & BROKEN)
0000410  TIME  0  GE  TIMEOF  407  1.0  L  -1.
0000411  TIME  0  GE  TIMEOF  407  1.0  L  -1.
* SI SIGNAL GENERATED
0000421  P  999010000  LE  NULL  0  1815.0  L  -1.
* MAIN FW STOPPED
0000414  TIME  0  GE  TIMEOF  421  1.0  L  -1.
0000415  TIME  0  GE  TIMEOF  421  1.0  L  -1.
* AUX FW ACTUATED
0000416  TIME  0  GE  TIMEOF  421  1.0  L  -1.
0000417  TIME  0  GE  TIMEOF  421  1.0  L  -1.
*
6150000  ISGAFWJ  TMDPJUN
6150101  625000000  603010000   0.012
6150200  1  416
6150201  -1.0  0.0  0.0  0.0
6150202   0.0  0.0  0.0  0.0
```

```
6150203  2000.0  0.0  0.0  0.0
*
6340000  ISGRV  VALVE  * SIMULATED ADV
6340101  611010000  640000000  0.0002592  0.0  0.0  100
6340201  1  0.0  0.0  0.0
6340300  TRPVLV
6340301  661
*
7280000  BSGAFWJ  TMDPJUN
7280101  729000000  726000000  0.004
7280200  1  417
7280201  -1.0  0.0  0.0  0.0
7280202   0.0  0.0  0.0  0.0
7280206  2000.0  0.0  0.0  0.0
*
7340000  BSGRV  VALVE  * SIMULATED B ADV
7340101  705010000  740000000  0.007    0.0  0.0  100
7340201  1  0.0 0.0 0.0
7340300  TRPVLV
7340301  671
* PUMP COASTDOWN
0000412  TIME  0  GE  TIMEOF  421  2.0  L  -1.
0000413  TIME  0  GE  TIMEOF  421  2.0  L  -1.
* MAX PCT
0000426  CNTRLVAR  29   GE  NULL  0  811.0  N  -1.
*  STEAM ADV VALVE OPEN
0000661  426  AND 426   N  -1.
0000671  426  AND 426   N  -1.
*  ACC INJECTION TIME
0000450   MFLOWJ  430010000  GT  NULL  0  0.0  N -1.
0000451   MFLOWJ  530010000  GT  NULL  0  0.0  N  -1.
*  LPIS SET POINT TIME
0000499   P   999010000   LT  NULL  0  0.0  L  -1.
* ADD SG MAIN FW COMPONENT
6100000   ISGFWJ   TMDPJUN
6100101   620000000  603010000    0.012
6100200   1  414
6100201  -1.0  1.8078   0.0  0.0  * 90.10.08
6100202   0.0  1.8078   0.0  0.0
6100203  24.0  1.8078   0.0  0.0
6100204  26.0  0.0      0.0  0.0
*
7220000   BSGFWJ   TMDPJUN
7220101   724000000  720000000   0.004
7220200   1   415
7220201  -1.0   0.56119  0.0  0.0
7220202   0.0   0.56119  0.0  0.0
7220203  24.0   0.56119  0.0  0.0
7220204  26.0   0.0      0.0  0.0
*
*  6150000 (T416)  & 7280000 (T417) FOR AUX FW
*
*
6350000   ISGDJ   VALVE
*************************************************************************
6350101   611010000  650000000  0.007  204.67  204.67  100
6350201  1  0.0  5.6034  0.0
6350300   MTRVLV
6350301  403  410  .3333 .2940  0
*
7350000  BSGDJ   VALVE
```

```
7350101  705010000  750000000  0.007  1022.36  1022.36  100
7350201  1  0.0  0.56119  0.0
7350300   MTRVLV
7350301   403  411  0.2  0.04367   0
*
** TRIPS -- TRIP CANCELLATION CARD 400    VARIABLE TRIP CARDS 401-599 **
**       -- TRIP STOP CARD 600            LOGICAL TRIP CARDS  601-699 **
*
*  MINOR EDIT VARIABLES
*
*
0000301    CNTRLVAR     1            * VESSEL LEVEL
0000302    CNTRLVAR     2            * CORE LEVEL
0000303    CNTRLVAR     6            * PZR LEVEL
0000304    CNTRLVAR     9            * ILPMP DOWN LEVEL
0000305    CNTRLVAR    10            * ILPMP UP LEVEL
0000306    CNTRLVAR    13            * BLPMP DOWN LEVEL
0000307    CNTRLVAR    14            * BLPMP UP LEVEL
0000308    CNTRLVAR    15            * ILSG2UP LEVEL
0000309    CNTRLVAR    16            * ILSG2DN LEVEL
0000310    CNTRLVAR    17            * BLSG2UP LEVEL
0000311    CNTRLVAR    18            * BLSG2DN LEVEL
0000312    CNTRLVAR    26            * ILSG HEAT (KW)
0000313    CNTRLVAR    27            * BLSG HEAT (KW)
0000314    CNTRLVAR    28            * CORE POWER (KW)
0000315    CNTRLVAR    29            * MAX ROD TEMP
0000316    CNTRLVAR   150            * DCY POWER (MW)
0000317    CNTRLVAR   151            * ACT POWER (WATT)
0000318    CNTRLVAR   501            * VESSEL LEVEL DP
0000319    CNTRLVAR   502            * CORE LEVEL DP
0000320    CNTRLVAR   506            * PZR LEVEL DP
0000321    CNTRLVAR   509            * ILPMP DOWN DP
0000322    CNTRLVAR   510            * ILPMP UP DP
0000323    CNTRLVAR   513            * BLPMP DOWN DP
0000324    CNTRLVAR   514            * BLPMP UP DP
0000325    CNTRLVAR   531            * VESSEL COLLAPSED LEVEL
0000326    CNTRLVAR   532            * CORE COLLAPSED LEVEL
0000327    P          162010000      * PVUP
0000328    P          601010000      * PISG2
0000329    P          701010000      * PBSG2
0000330    P          999010000      * PPZR
0000331    MFLOWJ     375000000      * BREAK FLOWRATE
0000332    MFLOWJ     635000000      * MISG2 OUT (MAIN)
0000333    MFLOWJ     735000000      * MBSG2[C[C[C[C
0000334    MFLOWJ     610000000      * MISG2 IN
0000335    MFLOWJ     722000000      * MBSG2 IN
*0000336    MFLOWJ     420010000      * MIHPIS
0000337    MFLOWJ     430010000      * MIACC
*0000338    MFLOWJ     520010000      * MBHPIS
0000339    MFLOWJ     530010000      * MBACC
0000340    MFLOWJ     615000000      * MISGAUX
0000341    MFLOWJ     728000000      * MBSGAUX
0000342    MFLOWJ     634000000      * MISGADV
0000343    MFLOWJ     734000000      * MBSGADV
0000344    MFLOWJ     262010000      * MIL
0000345    MFLOWJ     362010000      * MBL
0000346    PMPVEL     250            * VIPUMP
0000347    PMPVEL     350            * VBPUMP
0000348    VELF       301060000      * LIQUID VELOCITY BLHL
0000349    VELG       301060000      * VAPOR VELOCITY BLHL
0000350    VELF       203030000      * LIQ VEL ILHL
```

```
0000351    VELG       203030000       * VAP VEL ILHL
0000352    RHO        201010000       * DENSITY ILHL
0000353    RHO        263010000       * DENSITY ILCL
0000354    RHO        301010000       * DENSITY BLHL
0000355    RHO        363020000       * DENSITY BLCL
0000356    RHO        150010000       * DENSITY VESSEL AT 012
0000357    RHO        150030000       * DENSITY VESSEL AT 183
0000358    RHO        150060000       * DENSITY VESSEL AT 342
0000359    VOIDF      220010000       * VOID IL SG
0000360    VOIDF      220020000       *
0000361    VOIDF      220030000       *
0000362    VOIDF      220040000       *
0000363    VOIDF      220050000       *
0000364    VOIDF      220060000       *
0000365    VOIDF      220070000       *
0000366    VOIDF      220080000       *
0000367    VOIDF      320010000       * VOID BL SG
0000368    VOIDF      320020000
0000369    VOIDF      320030000
0000370    VOIDF      320040000
0000371    VOIDF      320050000
0000372    VOIDF      320060000
0000373    VOIDF      320070000
0000374    VOIDF      320080000
0000375    VOIDF      240080000       * VOID IL PUMP SUCTION UP
0000376    VOIDF      240090000
0000377    VOIDF      340080000       * VOID BL PUMP SUCTION UP
0000399    VOIDF      340090000       *
0000378    VOIDF      150010000       * VOID CORE
0000379    VOIDF      150020000
0000380    VOIDF      150030000
0000381    VOIDF      150040000
0000382    VOIDF      150050000
0000383    VOIDF      150060000
0000384    HTTEMP     150000112       * CORE HEATER TEMP (DOWN)
0000385    HTTEMP     150000612       *                  (MID)
0000386    HTTEMP     150001212       *                  (UP)
0000387    TEMPF      162010000       * UPPER PLENUM LIQ TEMP
0000388    TEMPF      140010000       * LOWER PLENUM LIQ TEMP
0000389    TEMPF      620010000       * SG FDW TEMP
0000390     CNTRLVAR   15     * SG1IUP
0000391     CNTRLVAR   17     * SG1BUP
0000392   MFLOWJ   110010000     * DC
0000393   CNTRLVAR   51    *  INT BRK
*
* PLOT VARIABLES
*
20300100   P          162010000     * PVUP [MPA]    (PV*UP-13)
20300200   P          201010000     * PIHL          (PI*1)
20300300   P          263010000     * PICL          (PI*23A)
20300400   P          301010000     * PBHL          (PB*50)
20300500   P          363010000     * PBCL          (PB*79)
20300600   P          601010000     * PISG2         (PIS+1117)
20300700   P          701010000     * PBSG2         (PBG+1186)
20300800   P          999010000     * PPZR          (P*PRZ+632)
20300900   MFLOWJ     375000000     * MBRK [KG/S]   (MDOT*BREAK)
20301000   MFLOWJ     635000000     * MISG20        (MDOT*ILSTM)
20301100   MFLOWJ     735000000     * MBSG20        (MDOT*BLSTM)
20301200   MFLOWJ     610000000     * MISG2I        (MDOT*ILFDW)
20301300   MFLOWJ     722000000     * MBSG2I        (MDOT*BLFDW)
20301400   MFLOWJ     615000000     * MISG2AUXI     (MDOT*IGAXFW)
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20301500	MFLOWJ	728000000	* MBSG2AUXI	(MDOT*BGAXFW)
20301600	MFLOWJ	634000000	* MISG2ADVO	(MDOT*IL*ADV)
20301700	MFLOWJ	734000000	* MBSG2ADVO	(MDOT*BL*ADV)
*20301800	MFLOWJ	420010000	* MIHP	
20301900	MFLOWJ	430010000	* MIACC	(MDOT*IL*ACUM)
*20302000	MFLOWJ	520010000	* MBHP	
20302100	MFLOWJ	530010000	* MBACC	(MDOT*BL*ACUM)
20302200	MFLOWJ	262010000	* MILHL	
20302300	MFLOWJ	362010000	* MBLHL	
20302400	CNTRLVAR	509	* DPIPD	(DPI-57X*14A)
20302500	CNTRLVAR	510	* DPIPD	(DPI*14B*16)
20302600	CNTRLVAR	513	* DPBPD	(DPB-57X*65A)
20302700	CNTRLVAR	514	* DPBPU	(DPB*65*73A)
20302800	CNTRLVAR	1	* LV1	(LV-13M-578)
20302900	CNTRLVAR	4	* LV4	(LV+135-13M)
20303000	CNTRLVAR	5	* LV5	(LV+421+160)
20303100	CNTRLVAR	3	* LVDC	(LVD+29-578)
20303200	CNTRLVAR	6	* LVPZR	(LPRZ*PROCESS)
20303300	RHO	201010000	* DILHL [KG/M3]	(RI*1B)
20303400	RHO	263010000	* DILCL	(RI*23A*B)
20303500	RHO	301010000	* DBLHL	(RB*50B)
20303600	RHO	363020000	* DBLCL	(RB*99B)
20303700	RHO	150010000	* DV012	(RV*23+12)
20303800	RHO	150030000	* DV183	(RV*23+183)
20303900	RHO	150060000	* DV342	(RV*23+342)
20304000	VELF	301060000	* VLBLHL [M/S]	
20304100	VELG	301060000	* VGBLHL	
20304200	VELF	203030000	* VLILHL	
20304300	VELG	203030000	* VGILHL	
20304400	VOIDF	220010000	* VDISG1	
20304500	VOIDF	220020000		
20304600	VOIDF	220030000		
20304700	VOIDF	220040000		
20304800	VOIDF	220050000		
20304900	VOIDF	220060000		
20305000	VOIDF	220070000		
20305100	VOIDF	220080000		
20305200	VOIDF	320010000	* VDBSG1	
20305300	VOIDF	320020000		
20305400	VOIDF	320030000		
20305500	VOIDF	320040000		
20305600	VOIDF	320050000		
20305700	VOIDF	320060000		
20305800	VOIDF	320070000		
20305900	VOIDF	320080000		
20306000	VOIDF	240010000	* VDIPMP	
20306100	VOIDF	240020000		
20306200	VOIDF	240030000		
20306300	VOIDF	240040000		
20306400	VOIDF	240050000		
20306500	VOIDF	240060000		
20306600	VOIDF	240070000		
20306700	VOIDF	240080000		
20306800	VOIDF	240090000		
20306900	VOIDF	340010000	* VDBPMP	
20307000	VOIDF	340020000		
20307100	VOIDF	340030000		
20307200	VOIDF	340040000		
20307300	VOIDF	340050000		
20307400	VOIDF	340060000		
20307500	VOIDF	340070000		

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20307600   VOIDF      340080000
20307700   VOIDF      340090000
20307800   VOIDF      150010000
20307900   VOIDF      150020000
20308000   VOIDF      150030000
20308100   VOIDF      150040000
20308200   VOIDF      150050000
20308300   VOIDF      150060000
20308400   CNTRLVAR   150            * DCYPOWER [MW]    (CORE POWER)
20308500   PMPVEL     250            * VIPUMP [R/S]     (WI*PUMP)
20308600   PMPVEL     350            * VBPUMP           (WB*PUMP)
20308700   HTTEMP     150000112      * TH043H [K]       (THV*B3+43)
20308800   HTTEMP     150000612      * THPEAK           (THV*PEAK)
20308900   HTTEMP     150001212      * TH352H           (THV*D2+352)
20309000   TEMPF      162010000      * TFVUP            (TFV*UP-13M)
20309100   TEMPF      140010000      * TFVLP            (TFV*LP-552)
20309200   TEMPF      620010000      * TFIFDW           (TFSC*IGFDW)
20309300    CNTRLVAR     15     * SG1IUP  (LIP+971-57E)
20309400    CNTRLVAR     17     * SG1BUP  (LBPLH993-57E)
20309500   MFLOWJ   110010000    * DC
20309600    CNTRLVAR  51    * INT BRK
   $$$$$$$$$$   ******    END OF RELAP5 INPUT   ******   $$$$$$$$$$
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10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

2-inch cold leg break test S-NH-1, conducted at the 1/1705 volume scaled facility Semiscale, was analyzed using RELAP5/MOD2 Cycle 36.04 and MOD3 Version 5m5. Loss of HPIS was assumed, and reactor trip occurred on a low PZR pressure signal (13.1 MPa), and pumps began an unpowered coastdown on SI signal (12.5 MPa). The system was recovered by opening ADV's when the PCT became higher than 811 K. Accumulator was finally injected into the system when the primary system pressure was less than 4.0 MPa. The experiment was terminated when the pressure reached the LPIS actuation set point. RELAP5/MOD2 analysis demonstrated its capability to predict, with a sufficient accuracy, the main phenomena occurring in the depressurization transient, both from a qualitative and quantitative points of view. Nevertheless, several differences were noted regarding the break flow rate and inventory distribution due to deficiencies in two-phase choked flow model, horizontal stratification interfacial drag, and a CCFL model. The main reason for the core to remain nearly fully covered with the liquid was the under-prediction of the break flow by the code. Several sensitivity calculations were tried using the MOD2 to improve the results by using the different options of break flow modeling (downward, homogeneous, and area increase). The break area compensating concept based on "the integrated break flow matching" gave the best results than downward junction and homogeneous options. And the MOD3 showed improvement in predicting a CCFL in SG and a heatup in the core.

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