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International Agreement Report

Assessment of BETHSY Test 9.1.b Using RELAP5/MOD3

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ICAP

ASSESSMENT OF BETHSY TEST 9.1.b USING RELAP5/MOD3

Abstract

2" cold leg break test 9.1.b, conducted at the BETHSY facility was analyzed using the RELAP5/MOD3 Version 5m5 code.

The test 9.1.b was conducted with the main objective being the investigation of the thermal-hydraulic mechanisms responsible for the large core uncover and fuel heat-up, requiring the implementation of an ultimate procedure.

The present analysis demonstrates the code's capability to predict, with sufficient accuracy, the main phenomena occurring in the depressurization transient, both from a qualitative and quantitative point of view. Nevertheless, several differences regarding the evolution of phenomena and affecting the timing order have to be pointed out in the base calculation.

Three calculations were carried out to study the sensitivity to change of the nodalization in the components of the loop seal cross-over legs, and of the auxiliary feedwater control logics, and of the break discharge coefficient.

Executive Summary

The BETHSY Test 9.1.b has been analyzed using the RELAP5/MOD3 version 5m5 codes to assess the code's ability for a 2 inch cold leg break LOCA, to improve common understanding of PWR thermal-hydraulic response during such a transient and to identify areas for desirable model improvements based on comparisons between data and predictions.

The main goal of the calculation is the assessment of the simulation capability of the code for the following phenomena occurring during the small break LOCA experimental test, particularly for the large core uncover and fuel heat-up, requiring the implementation of an ultimate procedure.

The calculated overall trend agreed well with the test data. However, several differences regarding the evolution of phenomena and affecting the timing order have to be point out.

In the base calculation with the RELAP5/MOD3, one can observe three fundamental disagreements between calculated and experimental transient sequences. The first is the overestimation of the calculated break flow rate between 1500 and 2500 seconds leading to an excessive mass discharge from the primary system and therefore from the pressure vessel. This may cause faster depressurization, earlier opening of steam generator steam dump system and earlier accumulator injection compared with the test. The second is the occurrence of loop seal

clearing in the cross-over leg. In the experiment, loop seal clearing occurred in the cross-over leg of the loop 2 (intact), while it occurred first in that of the loop 2 and next in that of the loop 1 (broken) in the present calculation. The third discrepancy of the calculation in comparison with the experiment is the auxiliary feedwater flow rate to each steam generator. In the experiment the auxiliary feedwater flow was controlled by the steam generator narrow range liquid level. This discrepancy may cause the large differences in the steam generator mass inventory.

Three calculations were carried out to study the sensitivity to change of the nodalization in the components of the loop seal cross-over legs, and of the auxiliary feedwater control logics, and of the break flow discharge coefficient. The change of the nodalization into twice than the base case in the cross-over leg resulted in little differences in the transient thermal-hydraulic behavior and its timing order. However the changes of the auxiliary feedwater control logic with steam generator wide range liquid level shows better prediction of the auxiliary feedwater supply. And the change of the break discharge coefficient from 0.85 to 1.0 for the subcooled liquid causes in excessive mass discharge from the break leads to earlier core heatup and earlier opening of SG steam dump system.

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1. Introduction

The International Code Assessment and Application Program (ICAP) has been conducted by fourteen nations and multinational organizations under the auspices of the USNRC[1]. For the pressurized water reactor analysis, the USNRC selected two best estimate (BE) codes: RELAP5/MOD2 and TRAC/PF1/MOD1[2]. The goal of the program is to assess the prediction capabilities of the current BE thermal hydraulic codes utilizing the available facility test and plant data. At present the ICAP activities in Korea help to quantify uncertainties in the codes so that the codes may be used for regulatory purposes.

This report is a part of the Korean contribution to the ICAP. The RELAP5/MOD3[3] Version 5m5 were used in the present calculations simulating the test 9.1.b of the BETHSY facility [4-6].

The main goal of the calculation is the assessment of the simulation capability of the code for the following phenomena occurring during the small break LOCA experimental test, particularly for the large core uncover and fuel heat-up, requiring the implementation of an ultimate procedure.

The report describes the results of the calculation performed by the RELAP5/MOD3 codes and shows the comparisons with the major variables obtained in the experiment. A brief description of the BETHSY and 9.1.b test is provided in Section 2, and Section 3 describes

the features of the RELAP5 code and modeling to be assessed. Section 4 discusses the results of the base calculations with the RELAP5/MOD3. The motivations for the sensitivity and nodalization studies and their results are included in Section 5. The code efficiency is evaluated in Section 6 through run statistics. The conclusions drawn from this study are given in Section 7.

2. Facility and Test Description

2.1 Facility Description

The BETHSY integral test facility has been designed for the analysis of PWR accident situations controlled by automatic circuits and/or operator actions.

The main objectives of the BETHSY test program are to contribute to:

- improve the knowledge of the physical phenomena which occur during PWR accidents, particularly when two-phase flow takes place at the primary coolant system
- assess safety computer codes, especially the advanced code CATHARE
- validate the physical assumptions of event and state oriented Emergency Operating Procedures.

2.1.1 General design

BETHSY is designed to model a 3 loop - 2775 MWt - Framatome PWR as shown in Fig. 1. The overall scaling factor is 1/100 while the elevations are 1/1, and the design pressures are 17.2 MPa and 8 MPa for the primary and the secondary coolant systems which can play a role during an accident transient.

2.1.2 Main characteristics

i) Pressure vessel

The cylindrical core consists of 428 full length - 17 x 17 design - heater rods and 29 guide thimbles. The axial peaking factor is 1.5 and the radially uniform core power is up to 3 MW (i.e. about 10% of the scaled nominal value).

The core bypass is represented and the external downcomer is linked to the upper head through calibrated orifices in order to simulate the downcomer to upper head spray nozzles.

ii) Primary coolant piping and pumps

BETHSY has the same number of loops as the reference reactor. The inner diameter of all the piping is 118mm as given by the Froude number conservation applied to the hot legs, and the elevation of the horizontal part of the crossover leg is preserved. The primary coolant pumps are capable of delivering the nominal flow rate but have also a controllable rotation speed in order to obtain, when necessary, both the right initial energy distribution at the primary side and to simulate the pump coastdown. The elevation of the pump diffuser with respect to the cold leg is preserved.

iii) Pressurizer

Connected either to an intact or broken loop, the pressurizer is equipped with on-off and proportional heaters, the normal and the auxiliary spray systems, a relief circuit with adjustable setpoints and

relief capacity.

iv) Secondary coolant system

Each of the three steam generators includes 34 U-tubes of the same radial dimensions and height stepping (9 to 10.5 m) as in the reference steam generators, and so arranged that the hydraulic diameter of the secondary side is preserved and the tube lane is true to scale.

The main and auxiliary feedwater systems can operate at adjustable flow rate and temperature, and the steam system in particular includes isolation valves and steam dumps to the atmosphere or to the condenser (adjustable setpoints and relief capacities).

v) Safety injection systems

All the emergency core cooling systems (HPIS, accumulators, LPIS) are represented and BETHSY is designated for ECC water to be injected not only in the cold legs but also at other locations such as the hot legs, the top of the downcomer, the lower and the upper plenum. HPIS and LPIS flow rates are controlled by the primary coolant system pressure so as to obtain scaled flow rates at every time.

Three volume scaled accumulators pressurized with nitrogen can supply the primary coolant system with room temperature water at a pressure up to 7 MPa.

vi) Trace Heating

The primary coolant system and the steam generators are equipped with trace heaters in order to compensate for the heat losses which are never to scale on an integral test facility and which could distort certain phenomena especially in steady state conditions or along slow transients.

vii) Instrumentation

Detailed information on thermal-hydraulic phenomena which take place both at the primary and secondary side is provided by more than 1200 transducers whose signal is scanned at a sampling rate of 2 Hz.

viii) Control system

The BETHSY control system - distributed microcomputer type - enables the facility to be operated from three operator stations and is designed for an automatic control of sequences (simulation of automatic reactor systems and operator actions).

2.2 Test Description

The test 9.1.b belongs to the multiple failure transient category, and is involved in accident management studies : it consists in a 2" cold leg break, while high pressure safety injection system (HPIS) is assumed unavailable. This transient leads to a large core uncover and fuel heat-up, requiring the implementation of an ultimate procedure.

In the presently studied scenario, the start of the procedure is delayed, and the following trigger criterion is used : when the maximum heater rod cladding temperature reaches 450 C, the 3 steam generator steam dump to atmosphere are fully opened (condenser is unavailable).

This action allows the primary coolant circuit to depressurize, up to the accumulator injection threshold, then to LPIS actuation.

The end of the test is reached as soon as a safe state of the primary coolant circuit is recovered, i.e. when the conditions required for the actuation of the residual heat removal system are obtained.

3. Code and Modeling Description

3.1 Code Description

The RELAP5/MOD2 code has been developed for best-estimate transient simulation of PWRs and associated systems. The code is based on a non-homogeneous and non-equilibrium model for one dimensional, two-phase system that is solved by a fast, partially implicit numerical scheme to permit economical evaluation of system transients. Recently, the RELAP5/MOD3 code development program has been initiated to develop a code version suitable for the analysis of all transients and postulated accidents in PWR systems including both large and small break LOCAs as well as the full range of operational transients. Although the emphasis of the RELAP5/MOD3 development is on large break LOCA, improvements to existing code models, based on the results of assessments against small break LOCA and operational transient test data, are also being made.

In the present assessment the RELAP5/MOD3 Version 5m5 was used.

3.2 Modeling Description

The nodalization used to simulate the BETHSY Test facility with the RELAP5 code is shown in Fig. 2. The model is based on 261 volumes

connected by 272 junctions and 263 heat structures.

In the reactor vessel element (volumes 11 to 22) the volumes corresponding to the downcomer, the lower plenum, the core, the upper plenum, the upper head, the guide tubes, and the downcomer bypass are defined. The core is modeled by one channel arranged in 7 hydraulic volumes, in which only one series of heat structures is adopted to simulate the fuel assembly.

The three loops of the BETHSY system are represented by the two intact loops (volumes 41 to 59) and the broken loop (volumes 31 to 39) in an almost symmetrical way. In fact, each of the three loops present the hot leg, the SG inlet and outlet plena, the SG U-tube channel, the loop seal, the reactor coolant pump, the cold leg. In addition, the pressurizer is connected to the broken loop hot leg by means of the surge line element and the break system is connected to the broken loop cold leg.

In the volumes representing the pressurizer vessel, an additional heat structure is introduced to simulate the effects of the proportional and back-up heaters.

The three steam generator secondary sides (volumes 60 to 89) are simulated using an identical schematization. They can be subdivided into the downcomer, the boiling section, and the steam dome. The steam and feedwater lines are simulated by using Time Dependent Junctions (i.e. with imposed flow rates) because they must be excluded during the transient phase of the calculation. In fact, in the experimental

test, the two mentioned lines are closed in coincidence with the reactor scram signal, few seconds after break opening, to isolate the SG secondary side. Steam dump systems are also connected to the SG steam dome using Time Dependent Junction in which the operational setpoints and conditions are specified to be the same as the experiment.

The steam generators as well as the pressurizer are provided with two systems devoted to the control of the pressure and the liquid level during the steady-state period and to maintain them at the specified initial values.

The physical boundaries of the entire system, i.e., the reactor containment and the relief and safety discharge tanks, are reproduced by means of Time Dependent Volumes with constant internal conditions during the calculation.

On the BETHSY loop, heat losses are compensated by electrical trace heating, located on every component and piping of the primary coolant system (except downcomer to upper head bypass, pumps, hot and cold legs spool pieces), and the steam generators (except their external downcomers). This trace heating system was compensated by modeling the heat structure surfaces as insulated boundaries.

To allow the accumulator injection to start correspondingly to the cold leg pressure specified in the experiment, a valve is arranged on each of the accumulator surge lines.

The choked flow option is specified in the valve simulating the

break and to avoid the code calculating mass flow rates to be inconsistent with the experimental data, the subcooled and two-phase discharge coefficients are chosen as 0.85 and 1.0, respectively.

4. Base Calculations

A major safety issue in PWR design is the Loss-of-coolant accident, in which a break in the primary coolant circuit leads to depressurization, boiling of the coolant, consequent reduced cooling of the reactor core, and unless remedial measures are taken, overheating of the fuel rods. The control of LOCAs in PWR is in general considered to be ensured by existing ECCSs and by the secondary side of the steam generators as additional heat sink in particular for small break LOCAs.

In the present study the RELAP5/MOD3 code was used for the base calculations and their results are shown in the figures from 3 to 68.

The calculated results for the principal events are compared with the experimental values in Table 3. All the major phenomena observed during the experiment were reproduced by the code.

i) Primary and Secondary Pressures

Fig. 3 and Fig. 4 show the primary and secondary pressures in comparison with the experimental values. The code predicts well the primary and secondary pressure trend, whereas, despite a good qualitative agreement, it highlights some differences in the behavior of the primary and secondary depressurization in the region between 2000 and 2500 seconds due to earlier opening of steam dump systems than experiment.

When the RCS pressure reaches the hot leg saturation pressure at

about 7.5 MPa boiling appears in the upper head, the upper plenum and the hot legs. The upper head draining is complete at about 1000 seconds and the upper plenum level reaches the hot leg nozzle as shown in Fig. 5 and Fig.6, respectively. At this time two-phase natural circulation is settled, and the RCS pressure drops to 7.25 MPa. The primary pressure depressurization became slower after flashing started in the primary loop hot side. The primary pressure remained higher than the secondary pressure all through the transient.

From 900 to 1700 seconds the mixture level in the downcomer and in the core remains fairly constant as shown in Fig. 7. At 1770 seconds the water level in the downflow side of the loop seal cross-over leg is such that a manometric unbalancing is built between hot and cold legs. This pressure difference leads to a liquid level depression in the pressure vessel which causes the mixture level drop below the hot leg elevation.

ii) Break Flow Rate

Fig. 8 and Fig.9 show that the break flow rate is well reproduced by the code with the break discharge coefficient of 0.85 and 1.0 for subcooled liquid and two-phase flow, respectively. However the calculated break flow rate between 1500 and 2500 seconds leads to an excessive mass discharge from the primary system and therefore from the pressure vessel. This may cause faster depressurization, consequently earlier opening of steam generator steam dump system and earlier

accumulator injection compared with the test as shown in Figs. 10 to 12.

iii) SG U-tube differential Pressure

Figs. 13 to 21 show the differential pressures in SG U-tubes, inlet plenum, upflow and downflow side. The agreement between measured and calculated data is acceptable concerning the downflow side, but the weak liquid holdup in the upflow side of the SG U-tubes was observed particularly in loop 1.

iv) Loop Seal Cross-over Legs

In the experiment, loop seal clearing occurred in the cross-over leg of the loop 2 (intact), while it occurred first in that of the loop 2 and next in that of the loop 1 (broken) in the present calculation as shown in Figs. 22 to 27. The reason for this behavior are not yet well understood. Possible geometrical discrepancies have been checked on BETHSY : no differences in elevation larger than 1 cm were observed between 3 loops (loop seal + cold leg). A temperature differences as small as 2 °C between intermediate legs could result in the same 1 cm discrepancy on the liquid level in the downflow side, and lead to asymmetrical loop seal clearing [7]. It is particularly noticeable that during the two other 2' cold leg break test performed on BETHSY (Test 4.2a), loop seal clearing was observed first on the broken loop 1 then on the other intact loop 3 [8].

v) Core Thermal-Hydraulic Responses

The differential pressures in the core and the upper plenum are presented in Fig. 28 and Fig. 6 respectively, in which the code achieves a good simulation of the core level depression. One can observe, however, that the first core uncover and consequent recovery occurred at about same time, whereas the second core level depression is anticipated earlier about 100 seconds. The reason for this behavior resides in the simultaneous occurrence of several effects. The duration of the first core heatup, associated with loop seal clearing, was almost identical. However it is considered that the first loop seal clearing occurred partially in loop 2 and the faster linear depressurization predicted by the calculation after loop seal clearing lead to an early second core uncover and to the anticipated vessel mass inventory boil-off.

The core level was depressed manometrically, concurrently with the level drop in cross-over legs, and took a minimum immediately before the loop seal clearing started. This minimum core level was lower than the cross-over leg liquid level which was at the bottom of the leg.

Fig. 29 and Fig. 30 show rod surface temperatures at the average-power bundles. The core liquid level depression resulted in rod temperature excursions starting from about 2200 seconds. The peak cladding temperature was about 1075 K (vs. 1000 K in the experiment) for the average-powered bundles as shown in Fig. 31. After the loop seal clearing, the core liquid level recovered quickly and heater rods

were quenched.

vi) Transient Behavior of Other Variables

The transient behavior of the other variables are shown in Figs. 32 to 68. The variables, such as void fractions, flow rates, pressure differences, and fluid temperatures in the primary and secondary loops, etc., were in good agreement with the experiment.

However a large discrepancy occurred in the SG auxiliary feedwater flowrate and SG mass inventory as shown in Fig. 32 and Fig. 33. The calculated auxiliary feedwater flowrate was generally underpredicted with large fluctuation. During the calculation the auxiliary feedwater flowrate was controlled by the SG narrow range liquid level same as the experiment. This discrepancy may cause the large differences in the SG mass inventory, whereas, it didn't affect much in the primary system transient.

After the accumulator injection into two intact loops, calculated accumulator inject flowrate was larger than the test and this may cause the depletion of the mass inventory in the accumulator tank before reaching the accumulator isolation set point (1.5 MPa) as shown in Fig. 11 and Fig. 12. Moreover, the requiring CPU time highly increases (i.e., about 10 times longer than before the accumulator injection) to proceed to the next step since the time step size is too small. The identical problem has been occurred after the Low Pressure Safety Injection, therefore the calculation was terminated by the user due to

requiring too much CPU time.

5. Sensitivity and Nodalization Studies

The base calculations agreed well with the test data. However the timing order of the principal phenomena, the loop seal clearing and refilling, and the auxiliary feedwater flowrate has to be pointed out.

5.1 Sensitivity

In Figs. 69 to 80 the results from the change of the auxiliary feedwater control logic and of the break discharge coefficient are represented as "CALC:AUX" and "CALC:CD1.0" respectively.

i) Auxiliary Feedwater Control Logic

In the experiment the auxiliary feedwater flowrate was controlled by the SG narrow range liquid level. However the results from the base calculation showed that the underprediction of the auxiliary feedwater flowrate and large difference in SG mass inventory. Thus the auxiliary feedwater control logic is now changed from the SG narrow range liquid level into the wide range liquid level. The results shows that the nearly identical auxiliary feedwater flowrate to the test is observed even with relatively larger SG mass inventory than the test as shown in Fig. 69 and Fig. 70.

ii) Break Flow Discharge Coefficient

In the base calculation the break discharge coefficient for the subcooled liquid was 0.85. In order to take a look at the effects of this coefficient the break discharge coefficient of 1.0 is used. As is to be expected larger coefficient shown in Figs. 71 to 76 leads to an excessive mass discharge from the primary system and this may cause faster depressurization, earlier opening of the SG steam dump system, and earlier accumulator injection.

As shown in Figs. 77 to 80 the occurrence of the loop seal clearing was only on the loop 1 (broken). Therefore it may be considered that the occurrence of the loop seal clearing is dependent not only on the break flowrate but also on the flow resistance of the loop seal cross-over legs which would determine the vapor flow partition among the loops. The detailed reason for this behavior are not yet well understood.

5.2 Nodalization

In the base calculation the loop seal clearing and refilling have occurred as is observed in the test, however the complete loop seal clearing was not appeared in the intact loop 2 and the second loop seal clearing was appeared in the broken loop. This was different from the test which was observed in the intact loop only. Therefore the

nodalization may be necessary to evaluate the effectiveness of the nodalization and to quantify their effects on the loop seal behavior. In this calculation the number of the volumes increased twice than the base case, particularly in the three loop seal cross-over legs. The calculated results shows no differences in predicting the loop seal clearing and refilling behavior. Thus it is expected from this that the nodalization in the base calculation was sufficient to predict this phenomena.

6. Run Statistics

CRAY2S/4-128 for calculation using RELAP5/MOD3 Code was used. The size of the time step was chosen to be $10E-6$ and $10E-1$ seconds at the minimum and the maximum time step, respectively, for all calculations. During the calculation the water property errors were occurred about at 2585 seconds. Therefore, restart calculation with reduced time step of 0.05 seconds were applied for the next 50 seconds to overcome this. It is also noted that the required CPU time vs the transient time is extremely increased by about 5 to 10 times just after the accumulator injection to cold legs have started. Similar trend occurred when the Low Pressure Safety Injections have started. The computational efficiency is summarized in Table 4 from the major edit for base calculations and can be obtained as follows.

Calculation	Computer Time (CPU),sec	Number of Time Step (DT),	Number of Volume (N)	Grind Time $CPU/(N*DT)$
RELAP5/MOD3	27271.3	151456	261	0.000689

7. Conclusions

The BETHSY Test 9.1.b has been analyzed using the RELAP5/MOD3 version 5m5 codes to assess the code's ability for a 2 inch cold leg break LOCA, particularly for the large core uncover and fuel heat-up, requiring the implementation of an ultimate procedure, to improve common understanding of PWR thermal-hydraulic response during such a transient and to identify areas for desirable model improvements based on comparisons between data and predictions.

The present study demonstrates the code's capability to predict, with sufficient accuracy, the major phenomena occurring in the depressurization transient, both from a qualitative and quantitative point of view. In addition, it was shown that the actuation of accumulator and LPSI resulting from RCS depressurization through SG steam dump could be an effective means to mitigate the accident with above initiating event.

Based on this result, analyses of the various sequences of events may provide an useful information on the implementation of an ultimate procedure for accident mitigation and be used to validate the physical assumptions of Emergency Operating Procedures.

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Table 1. Specified Operational Setpoints and Conditions
For BETHSY Test 9.1.b

Reactor Scram Signal	13.1 MPa
Safety Injection (SI) Signal	11.9 MPa
Core Power Trip Starts	17 sec After Scram Signal
Initiation of RC Pump Coastdown	300 sec After Scram Signal
High Pressure Charging	Not Actuated
High Pressure Safety Injection	Not Actuated
Main feedwater termination	With SI Signal
Turbine Bypass Valve Closure	With SI Signal
Auxiliary Feedwater Starts	30 sec After SI Signal
Full Opening of 3 Steam Dumps To Atmosphere	At Max. Core Cladding Temperature of 450 C
Accumulator Injection (2 Intact Loops Only)	4.18 MPa
Accumulator Termination	1.5 MPa
Low pressure Safety Injection (2 Intact Loops Only)	0.91 MPa
Stable RHR Operating Conditions Prevails (Termination of Transient)	Core Outlet Temp. < 177 C PZR Pressure < 2.5 MPa Saturation Margin > 20 C

Table 2. Comparison of Initial Conditions

Parameter	Units	Measured	Calculated
PRIMARY LOOP			
Core Differential Temperature = (Hot-Leg Temperature) - (Cold-Leg Temperature)	K	3.58	3.49
Hot-Leg Pressure	MPa	15.51	15.55
Hot-Leg Temperature	K	563.3	564.8
Mass Flow Rate Per Loop	kg/s	50.0	51.1
Pump Differential Pressure	MPa		0.476
Pump Rotational Speed	rpm	2940	2808.8
PRESSURE VESSEL			
Core Power	kW	2587	2587
Core Differential Pressure	MPa		0.1313
Upper Head Temperature	K		561.3
Lower Plenum Temperature	K		561.3
Core Inlet Temperature	K	559.8	561.3
PRESSURIZER			
Pressure	MPa	15.51	15.51
Liquid Level	m	4.08	4.00
Liquid Volume	m ³		0.407
Vapor Volume	m ³		0.273
Temperature (Bottom)	K		599.5
Primary System Total Mass Inventory	kg	1960	1948.8
Primary System Total Volume	m ³		2.86
SECONDARY SYSTEM			
SG Steam Dome Pressure	MPa	6.91	6.91
Steam Flow Rate	cm ³ /s	620	620
Feedwater Flow Rate	cm ³ /s	620	620
Feedwater Temperature	K	491.1	491.1
Downcomer Water Level	m	13.45	13.43
Secondary Side Mass Inventory For Each SG	kg	820	820.0
Secondary Side Total Volume	m ³	6.0615	6.062

Table 2. Comparison of Initial Conditions

Parameter	Units	Measured	Calculated
EMERGENCY CORE COOLING SYSTEM			
Accumulator Pressure	MPa	4.18	4.18
Accumulator Liquid Temperature	K	290	290
Accumulator Liquid Volume	m3	0.286	0.286
Accumulator Gas Volume	m3	0.137	0.137
EXTERNAL CIRCUITS			
Trace Heating	kW	107.5	
Pump Connected Cooling Circuits	kW	25	25

Table 3. Chronology of Main Events

(Unit : Second)

	Measured	Calculated
Transient Initiation	0	0
Scram Signal (P=13.1 MPa)	41	32
Pressurizer Empty	50	60
Safety Injection Signal Generated (P=11.9 MPa)	54	58
Main Feedwater Off	54	58
Turbine Bypass Valve Closure	54	58
Core Power Decay Starts 17 s After Scram Signal	58	49
Auxiliary Feedwater On (30 s After SI Signal)	82	88
Voiding Appears in Hot Leg 1	126	125
Pump Coastdown Starts 300 s After SI Signal	356	358
End of Pump Coastdown	971	973
Start of the First Core Uncovery	1830	1850
First Loop Seal Clearing in Loop 2	1944	1995
Start of the Second Core Uncovery	2180	2080
Ultimate Procedure Initiation (Max. Core Cladding Temperature Reaches 450 C)	2562	2503

Table 3. Chronology of Main Events

(Unit : Second)

	Measured	Calculated
Atmospheric Steam Dump Opening (3 SG) in 5 s	2567	2503
Loop Seal Reformation in Loop 2	2750	2525
Accumulator Injection Starts (P=4.2 MPa)	2962	2803
Minimum Primary Mass Inventory (400 kg)	2970	2805
Second Loop Seal Clearing in Loop 2	3040	2965 *
Loop Seal Reformation in Loop 2	3680	3555 *
Accumulator Isolation (P=1.5 MPa)	3831	3525
LPIS Starts at P=0.91 MPa (On Intact Loop Only)	5177	5015
End of the Test (RHRS Stable Operating Conditions Are Reached)	8330	5245 **

* : Appeared in Loop 1 (broken)

** : Calculation terminated by user due to requiring too much CPU time

Table 4. Run Statistics Data in Base Case

Transient time (sec)	CPU Time (sec)	Attempted ADV
0	4.4	0
500	2069.5	12478
1000	3571.2	20790
1500	5177.8	29597
2000	8102.8	45865
2500	8737.6	49511
3000	10031.5	56627
3250	10149.2	63043
3500	18521.9	103696
4000	23737.5	132438
4500	25431.3	141517
5000	27271.3	151456

Fig. 1 General Structure of BETHSY Test Facility

Fig. 2 Nodalization of BETHSY for RELAP5/MOD3 Code

Fig. 3 Primary Pressure

Fig. 4 SG Steam Dome Pressure

Fig. 5 Upper Head Diff. Pressure

Fig. 6 Upper Plenum Diff. Pressure

Fig. 7 Core Collapsed Level

Fig. 8 Break Flowrate

Fig. 9 Integrated Break Mass Flow

Fig. 10 SG Steamline Steam Flowrate

Fig. 11 Accumulator Pressure

Fig. 12 Accumulator Mass

Fig. 13 SG 1 U-tube Inlet-To-Outlet Diff. Pressure

Fig. 14 SG 1 Inlet Plenum Diff. Pressure

Fig. 15 SG 1 U-tube Upflow Side Diff. Pressure

Fig. 16 SG 2 U-tube Inlet-To-Outlet Diff. Pressure

Fig. 17 SG 2 Inlet Plenum Diff. Pressure

Fig. 18 SG 2 U-tube Upflow Side Diff. Pressure

Fig. 19 SG 3 U-tube Inlet-To-Outlet Diff. Pressure

Fig. 20 SG 3 Inlet Plenum Diff. Pressure

Fig. 21 SG 3 U-tube Upflow Side Diff. Pressure

Fig. 22 Loop Seal 1 Downflow Side Diff. Pressure

Fig. 23 Loop Seal 1 Upflow Side Diff. Pressure

Fig. 24 Loop Seal 2 Downflow Side Diff. Pressure

Fig. 25 Loop Seal 2 Upflow Side Diff. Pressure

Fig. 26 Loop Seal 3 Downflow Side Diff. Pressure

Fig. 27 Loop Seal 3 Upflow Side Diff. Pressure

Fig. 28 Core Heated Length Diff. Pressure

Fig. 29 Heater Rod Temperatures

Fig. 30 Heater Rod Temperatures

Fig. 31 Maximum Clad Temperature

Fig. 32 SG Feedwater Mass Flowrate

Fig. 33 SG Mass Inventory

Fig. 34 Hot Leg 1 Void Fractions

Fig. 35 Hot Leg 2 Void Fractions

Fig. 36 Hot Leg 3 Void Fractions

Fig.37 Cold Leg 1 Void Fractions

Fig. 38 Cold Leg 2 Void Fractions

Fig. 39 Cold Leg 3 Void Fractions

Fig. 40 Guide Tube Diff. Pressure

Fig. 41 Downcomer-To-Upper Head Diff. Pressure

Fig.42 Pressure Vessel Diff. Pressure

Fig. 43 Cold Leg 1 To Hot Leg 1 Diff. Pressure

Fig. 44 Pump 1 Diff. Pressure

Fig. 45 Cold Leg 2 To Hot Leg 2 Diff. Pressure

Fig. 46 Pump 2 Diff. Pressure

Fig. 47 Cold Leg 3 To Hot Leg 3 Diff. Pressure

Fig. 48 Pump 3 Diff. Pressure

Fig. 49 SG 1 Boiler Section Diff. Pressure

Fig. 50 SG 2 Boiler Section Diff. Pressure

Fig. 51 SG 3 Bolier Section Diff. Pressure

Fig. 52 Pressurizer Diff. Pressure

Fig. 53 LPSI Mass Flowrate

Fig. 54 Integrated LPSI Mass Flow

Fig. 55 Primary and Secondary Pressure

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Fig. 56 Mass Flow Rate

Fig. 57 Core Inlet & Outlet Temperatures

Fig. 58 Upper Head Temperatures

Fig. 59 Loop 1 Temperature

Fig. 60 Loop 2 Temperature

Fig. 61 Loop 3 Temperature

Fig. 62 Bottom SG Downcomer Temperature

Fig. 63 RCP Rotational Speed

Fig. 64 Core Power

Fig. 65 Time Step

Fig. 66 Pressurizer Level

Fig. 67 SG 1 Wide Range Level

Fig. 68 Primary Side Mass Inventory

Fig. 69 SG Feedwater Mass Flowrate

Fig. 70 SG Mass Inventory

Fig. 71 Break Flowrate

Fig. 72 Integrated Break Mass Flow

Fig. 73 Primary Pressure

Fig. 74 SG Steamline Steam Flowrate

Fig. 75 Maximum Clad Temperature

Fig. 76 Core Collapsed Level

Fig. 77 Loop Seal 1 Downflow Side Diff. Pressure

Fig. 78 Loop Seal 1 Upflow Side Diff. Pressure

Fig. 79 Loop Seal 2 Downflow Side Diff. Pressure

Fig. 80 Loop Seal 2 Upflow Side Diff. Pressure

Appendix

```

*****
*   This contains a RELAP5 model of the French experimental facility   *
*   BETHSY. The intended use of the model is for simulation of BETHSY  *
*   test 9.1.b which studies the 2 inch cold leg break without hpsi    *
*   and with delayed ultimate procedure.                               *
*****
*
= 2 inch cold leg break : bethsy test 9.1.b
*
100  new    stdy-st
101  run
102  si     si
105  2.     4.
*
110  nitrogen
115  1.0
*
120  13010000  0.0  water  primary
121  60010000  7.1057 water  secndry
122  70010000  7.1057 water  seclopb
123  80010000  7.1057 water  seclopc
*
201  500.0  1.e-6  0.05  3  20  2000  2000
*
*****
*  minor edit variables
*****
*
301  p      091050000
302  p      068010000
303  p      078010000
304  p      088010000
305  p      034010000
306  p      034220000
307  p      044010000
308  p      044220000
309  p      054010000
310  p      054220000
314  tempf  031010000
315  tempf  039010000
316  tempf  041010000
317  tempf  049010000
318  tempf  051010000
319  tempf  059010000
323  mflowj 012010000
324  mflowj 099010000
325  mflowj 301000000
326  mflowj 401000000

```

```

327 mflowj 501000000
328 mflowj 039010000
329 mflowj 049010000
330 mflowj 059010000
331 mflowj 608000000
332 mflowj 708000000
333 mflowj 808000000
337 pmpvel 36
338 pmphead 36
339 cntrlvar 424
340 cntrlvar 425
341 cntrlvar 1
342 cntrlvar 4
343 cntrlvar 159
344 cntrlvar 199
345 cntrlvar 319
346 cntrlvar 2
347 cntrlvar 22
348 cntrlvar 330
349 mflowj 601000000
350 mflowj 606000000
351 cntrlvar 266

```

*

* self initialization controller cards

*

140	0		3		3		
143	606	266	706	276	806	286	
145	601	263	701	273	801	283	

*

* trips

*

```

407 time 0 lt null 0 99999. n 0.
507 time 0 lt null 0 10000.0 1

```

*

* hydradynamic components

*

*lower plenum components

*

* component 11 - lower portion of lower plenum

```

*****
*
0110000  lowerpl  branch
0110001  2  0
0110101  0.0 1.00 0.15323 0.0 -90. -1.00 4.57e-5 0.039 00100
0110200  003 15745056. 559.8
0111101  022010000 011000000 0.0 0.0 0.0 01100
0112101  011000000 012000000 0.0 0.0 0.0 01100
0111110  .045 0. 1. 1.
0112110 .01587 0. 1. 1.
0111201  7.480417 7.590417 0. * 10.43635
0112201  3.364479 3.4044795 0. * 10.43636
*
*****
* component 12 - upper portion of lower plenum
*****
*
0120000  upperlp  branch
0120001  2  0
0120101  0.0 1.054 0.0620907 0.0 90. 1.054 4.57e-5 0.01543 00100
0120200  003 15737400. 559.8
0121101  012010000 013000000 .0428 1.5 1.5 01100
0122101  012010000 014000000 0.0 13.5 13.5 01000
0121110  .01130 0. 1. 1.
0122110  .004 0. 1. 1.
0121201  4.161302 4.221302 0. * 10.06651
0122201  1.41488 1.64488 0. * .3698466
*
*****
*core and core bypass components
*****
*
*****
* component 13 - core
*****
*
0130000  core  pipe
0130001  7
0130101  0.0 1 *volume areas
0130102  0.0428 6
0130103  0.0 7
0130201  0.0 6 *junction areas
0130301  0.11 1 *volume length
0130302  0.788 2
0130303  0.78 3
0130304  0.52 4
0130305  0.78 5
0130306  0.788 6

```

0130307	0.35	7						
0130401	0.004708	1			*volume	volume		
0130402	0.0	6						
0130403	0.018066	7						
0130601	90.0	7			*vert	angle		
0130701	.11	1			*delta	z		
0130702	.788	2						
0130703	.78	3						
0130704	.52	4						
0130705	.78	5						
0130706	.788	6						
0130707	.35	7						
0130801	4.57e-5	.01130	1		*roughness	diam		
0130802	4.57e-5	.01130	6					
0130803	4.57e-5	.06584	7					
0130901	.31	.31	6		*junction	loss coef		
0131001	00100	7			*volume	flags pvbfe		
0131101	01000	6			*junction	flags vcahs		
0131201	003	15712976.	559.8	0.	0.		0. 1	
0131202	003	15699616.	560.2	0.	0.		0. 2	
0131203	003	15673800.	561.1	0.	0.		0. 3	
0131204	003	15659048.	562.0	0.	0.		0. 4	
0131205	003	15644392.	562.5	0.	0.		0. 5	
0131206	003	15618848.	563.0	0.	0.		0. 6	
0131207	003	15604872.	563.3	0.	0.		0. 7	
0131300	0							
0131301	4.161303	4.1913034	0.	1	*	10.06651		
0131302	4.173902	4.1939024	0.	2	*	10.0665		
0131303	4.189569	4.209569	0.	3	*	10.0665		
0131304	4.194801	4.204801	0.	4	*	10.0665		
0131305	4.201244	4.201244	0.	5	*	10.0665		
0131306	4.214391	4.214391	0.	6	*	10.06651		
0131401	.0113	0.	1.		1.	6		

*

* component 14 - core bypass

*

0140000	cbypass	pipe						
0140001	7							
0140101	1.421e-2	7			*volume	areas		
0140201	0.0	6			*junction	areas		
0140301	0.11	1			*volume	length		
0140302	0.788	2						
0140303	0.78	3						
0140304	0.52	4						
0140305	0.78	5						
0140306	0.788	6						

```

0140307 0.35 7
0140401 0.0 7 *volume volume
0140601 90.0 7 *vert angle
0140701 .11 1 *delta z
0140702 .788 2
0140703 .78 3
0140704 .52 4
0140705 .78 5
0140706 .788 6
0140707 .35 7
0140801 4.57e-5 .0247 7 *roughness diam
0140901 1.072 1.072 6 *junction loss coef
0140901 16.0 16.0 6 *junction loss coef
0141001 00000 7 *volume flags pvbfe
0141101 01000 6 *junction flags vcahs
0141201 003 15723096. 559.8 0.0 0. 0. 1
0141202 003 15709768. 560.1 0.0 0. 0. 2
0141203 003 15683984. 560.5 0.0 0. 0. 3
0141204 003 15669224. 561.0 0.0 0. 0. 4
0141205 003 15654520. 561.5 0.0 0. 0. 5
0141206 003 15638920. 562.0 0. 0. 0. 6
0141207 003 15614888. 562.5 0.0 0. 0. 7
0141300 0
0141301 1.4149 1.4038 0. 1 * .3698466
0141302 1.41042 1.41076 0. 2 * .369632
0141303 1.41723 1.44268 0. 3 * .369634
0141304 1.41531 1.47611 0. 4 * .369634
0141305 1.41644 1.40702 0. 5 * .3696346
0141306 0.50139 0.590595 0. 6 * .369635
0141401 .0247 0. 1. 1. 6
*****
*upper plenum components
*****
*
*****
* component 99 upper plenum 1
*****
*
0990000 upplen1 branch
0990001 4 0
0990101 0.0 0.5525 5.0302e-2 0.0 90. 0.5525 4.57e-5 .2380 00000
0990200 003 15600120. 563.
0991101 014010000 099000000 0.0 13.5 13.5 01000
0992101 013010000 099000000 0.0 1.5 1.5 01100
0993101 099010000 015000000 0.0 0.0 0.0 01000
0994101 099010000 017000000 0.0 0.92 .998 01000
0991201 1.41158 1.585256 0. * .3696344
0992201 3.49723 3.54723 0. * 10.06651

```

```

0993201 2.344489 2.559943 0. * 10.18996
0994201 1.582433 1.582433 0. * .246178
0991110 .004 0. 1. 1.
0992110 .238 0. 1. 1.
0993110 .2081 0. 1. 1.
0994110 .0603 0. 1. 1.
*
*****
* component 15 upper plenum 2
*****
*
0150000 upplen2 branch
0150001 4 0
0150101 0.0 1.051 .091564 0.0 90. 1.051 4.57e-5 .182 00000
0150200 003 15596200. 563.3
0151101 015010000 016000000 0.08706 0.0 0.0 01000
0152101 015010000 031000000 0.010936 .46 .834 01002
0153101 015010000 041000000 0.010936 .46 .834 01002
0154101 015010000 051000000 0.010936 .46 .834 01002
0151201 -0.8027-4 -0.10387-4 0. * -.002072645
0152201 6.171221 6.541802 0. * 3.39708
0153201 6.261221 6.641802 0. * 3.39708
0154201 6.261221 6.641802 0. * 3.39708
0151110 .2081 0. 1. 1.
0152110 .118 0. 1. 1.
0153110 .118 0. 1. 1.
0154110 .118 0. 1. 1.
*
*****
* component 16 - flow area from upper plenum to upper head
*****
*
0160000 upplen2 snglvol
0160101 0.0 2.206 .11263 0.0 90.0 2.206 4.57e-5 .129 000000
0160200 003 15586312. 563.0
*****
* component 17 - guide tubes
*****
*
0170000 gtubes snglvol
0170101 .00 3.257 9.0671e-3 0.0 90. 3.257 4.57e-5 .0603 00000
0170200 003 15586824. 563.0
*
*****
* component 18 - upper head
*****
*
0180000 uphead branch

```

```

0180001 3 0
0180101 0.0 0.4475 4.9072e-2 0.0 90.0 0.4475 4.57e-5 0.0 00000
0180200 003 15595592. 563.0
0181101 016010000 018000000 7.0686e-6 0.0 0.0 01100
0182101 017010000 018000000 7.063e-4 0.92 .998 01000
0183101 018000000 019000000 0.0 0.0 0.0 01100
0181201 -5.4422-4 -5.5422-4 0. * -.00201577
0182201 -6.05085 -6.05085 0. * .246176
0183201 -0.0639743 -0.0763554 0. * .2439847
0181110 .003 0. 1. 1.
0182110 .0203 0. 1. 1.
0183110 .170 0. 1. 1.
*
*****
* component 19 - upper head to downcomer bypass
*****
*
0190000 dcbypas snglvol
0190101 0.0 1.37786 8.9259e-2 0.0 -90. -1.37786 4.57e-5 .135 00000
0190200 003 15591856. 560.0
*
*****
* component 200 - junction to downcomer bypass
*****
*
2000000 dcbyun sngljun
2000101 019010000 021000000 2.454e-4 1.15 1.15 01000
2000201 0 -17.3342 -44.0342 0. * .243605
2000110 6.25e-3 0. 1. 1.
*
*****
* component 21 - downcomer bypass
*****
*
0210000 dcbypas pipe
0210001 3 *nvol
0210101 0.0 3 *volume area
0210201 0.0 2 *jun area
0210301 1.7614 1 *volume length
0210302 1.142635 2
0210303 0.2095 3
0210401 3.7831e-3 1 *volume volume
0210402 2.4414e-3 2
0210403 0.9697e-3 3
0210601 -18.2 1 *vert angle
0210602 -21.6 2
0210603 -90.0 3
0210701 -.55049 1 *delta z

```



```

0210702 -.42005      2
0210703 -.2095      3
0210801 4.57e-5 0.0 3 *roughness diam
0210901 0.1 0.1 1 *junction f-loss r-loss
0210902 0.0 0.0 2
0211001 00000 3 *volume flags
0211101 01000 2 *junction vcahs
0211201 003 15730808. 560.0 0.0 0. 0. 1
0211202 003 15741144. 560.0 0.0 0. 0. 2
0211203 003 15743320. 560.0 0.0 0. 0. 3
0211300 0
0211301 -2.023346 -2.023346 0. 1 * .24359
0211302 -2.02334 -2.02334 0. 2 * .2435797
0211401 .0492 0. 1. 1. 2
*
*****
* component 20 - downcomer inlet
*****
*
0200000 dcinlet branch
0200001 5 0
0200101 0.0 0.927 .0433233 0.0 -90. -0.927 4.57e-5 0.0 00000
0200200 003 15757472. 560.
0201101 021010000 020000000 0.0 0.0 0.0 01100
0202101 039010000 020000000 1.0936e-2 .834 .46 01001
0203101 049010000 020000000 1.0936e-2 .834 .46 01001
0204101 059010000 020000000 1.0936e-2 .834 .46 01001
0205101 020010000 022000000 0.0 0.10 0.10 01100
0201201 -0.93435 -0.934447 0. * .243576
0202201 6.510582 6.810582 0. * 3.397646
0203201 6.510582 6.810582 0. * 3.397646
0204201 6.510582 6.810582 0. * 3.397646
0205201 8.442823 8.862246 0. * 10.43632
0201110 0.0 0. 1. 1.
0202110 .118 0. 1. 1.
0203110 .118 0. 1. 1.
0204110 .118 0. 1. 1.
0205110 .1731 0. 1. 1.
*
*****
* component 22 - downcomer
*****
*
0220000 dcomer pipe
0220001 7 *nvol
0220101 0.0 7 *volume area
0220201 0.0 6 *junction area
0220301 1.011625 4 *volume length

```

0220302	.31919	5					
0220303	.4602	6					
0220304	1.054	7					
0220401	23.9771e-3	4	*volume	volumes			
0220402	7.5115e-3	5					
0220403	10.8295e-3	6					
0220404	27.9758e-3	7					
0220601	-90.0	4	*vertical	angles			
0220602	-55.8	5					
0220603	-46.0	6					
0220604	-90.0	7					
0220701	-1.011625	4	*delta	z			
0220702	-.26396	5					
0220703	-.33003	6					
0220704	-0.85412	7					
0220801	4.57e-5	.1731	6	*roughness	diam		
0220802	4.57e-5	4.5e-2	7				
0220901	0.0	0.0	3	*junction	f-loss	r-loss	
0220902	.054	.054	4	*junction	f-loss	r-loss	
0220903	.017	.017	5	*junction	f-loss	r-loss	
0220904	.285	.285	6	*junction	f-loss	r-loss	
0221001	00000	7		*volume	flags		
0221101	01000	6		*junction	vcahs		
0221201	003	15720472.	560.0	0.0	0.		0. 1
0221202	003	15725952.	560.0	0.0	0.		0. 2
0221203	003	15730440.	560.0	0.0	0.		0. 3
0221204	003	15735920.	560.0	0.0	0.		0. 4
0221205	003	15737624.	560.0	0.0	0.		0. 5
0221206	003	15738816.	560.0	0.0	0.		0. 6
0221207	003	15735168.	560.0	0.0	0.		0. 7
0221300	0						
0221301	8.382818	8.764339	0.	1 *	10.43633		
0221302	8.382813	8.764312	0.	2 *	10.43633		
0221303	8.382808	8.764285	0.	3 *	10.43633		
0221304	8.436977	8.768767	0.	4 *	10.43634		
0221305	8.436996	8.758048	0.	5 *	10.43634		
0221306	8.436994	8.786994	0.	6 *	10.43635		
0221401	.1731	0.	1.	1. 5			
0221402	4.5e-2	0.	1.	1. 6			

*

 * primary loop piping components single loop-a

 *

 * component 31 - single loop (loop a) hot leg

 *

```

0310000 hotlga1 snglvol
0310101 1.0936e-2 1.1941 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0310200 003 15576088. 563.3
*
*****
* component 32 - pressure surge line nozzle in single loop
*****
*
0320000 hotlga2 branch
0320001 0 1
0320101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0320200 003 15576080. 563.3
*
*****
* component 33 - single loop hot leg to sg
*****
*
0330000 hotlga3 pipe
0330001 3
0330101 1.0936e-2 3 *volume area
0330201 1.0936e-2 2 *junction area
0330301 0.79775 1 *volume length
0330302 1.44800 2
0330303 0.5506 3
0330401 0.0 3 *volume volumes
0330601 0.0 1 *vert angle
0330602 90. 2
0330603 50. 3
0330701 0.0 1 *delta z
0330702 1.44800 2
0330703 0.4637 3
0330801 4.57e-5 .118 3 *rough diam
0330901 0.117 0.117 1 *junction f-loss r-loss
0330902 0.065 0.065 2 *junction f-loss r-loss
0331001 00000 3 * vol flags
0331101 01000 2 * vcahs
0331201 003 15636072. 563.3 0.0 0. 0. 1
0331202 003 15651056. 563.3 0.0 0. 0. 2
0331203 003 15654440. 563.3 0.0 0. 0. 3
0331300 0
0331301 6.28299 6.41299 0. 1 * 3.397625
0331302 6.26303 6.54904 0. 2 * 3.39762
0331401 .118 0. 1. 1. 2
*
*****
* component 301 - h.l. junction to pressurizer surge nozzle
*****
*

```

```

3010000 hotlg4a sngljun
3010101 031010000 032000000 0.0 0.0 0.0 01000
3010201 0 6.17222 6.25222 0. * 3.39708
3010110 .118 0. 1. 1.
*
*****
* component 302 - h.l. junction from pressurizer surge nozzle
*****
*
3020000 hotlg5a sngljun
3020101 032010000 033000000 0.0 0.0 0.0 01000
3020201 0 6.262985 6.342985 0. * 3.39763
3020110 .118 0. 1. 1.
*
*****
* component 303 - junction from surge line to h.l. nozzle (tripvalve)
*****
*
3030000 prsurgj sngljun
3030101 032010000 090000000 0.0 0.0 0.0 01000
3030201 0 -0.83763-4 -1.29763-4 0. * -5.45044-4
3030110 .0429 0. 1. 1.
*
*****
* component 35 - single loop cold leg pump suction piping
*****
*
0350000 pumpsa pipe
0350001 5
0350101 0.0 5 *volume areas
0350201 1.0936e-2 4 *junction areas
0350301 0.4189 1 *volume lengths
0350302 1.94015 2
0350303 2.22285 3
0350304 0.820 4
0350305 2.0697 5
0350401 4.5810e-3 1
0350402 21.2175e-3 2
0350403 24.3095e-3 3
0350404 8.9670e-3 4
0350405 22.6340e-3 5
0350601 -50.00 1 *vertical angle
0350602 -90. 3
0350603 0.0 4
0350604 90. 5
0350701 -.3404 1 *delta z
0350702 -1.94015 2
0350703 -2.12015 3
0350704 0.0 4

```

```

0350705 1.9671 5
0350801 4.57e-5 0.0 5 *volume roughnes diam
0350901 .065 .065 1 *f-loss r-loss
0350902 0.0 0.0 2 *f-loss r-loss
0350903 .117 .117 3
0350904 .117 .117 4
0351001 00000 5 * volume flags
0351101 01000 4 *junction vcahs
0351201 003 15284064. 560.0 0.0 0. 0. 1
0351202 003 15292512. 560.0 0.0 0. 0. 2
0351203 003 15307552. 560.0 0.0 0. 0. 3
0351204 003 15305400. 560.0 0.0 0. 0. 4
0351205 003 15298072. 560.0 0.0 0. 0. 5
0351300 0
0351301 6.20586 6.37195 0. 1 * 3.3976
0351302 6.20582 6.461855 0. 2 * 3.397604
0351303 6.20575 6.47146 0. 3 * 3.39761
0351304 6.205716 6.345716 0. 4 * 3.397614
0351401 .118 0. 1. 1. 4

```

*

* component 37 - single loop pump discharge piping

*

```

0370000 cldlga1 pipe
0370001 2
0370101 1.0936e-2 2 *volume areas
0370201 1.0936e-2 1 *junction areas
0370301 1.05 1 *volume lengths
0370302 0.859 2 *volume lengths
0370401 0.0 2 *volume volumes
0370501 0.0 2 *horiz angle
0370601 0.0 2 *vertical angle
0370701 0.0 2 *delta z
0370801 4.57e-5 0.0 2 *roughness diam
0370901 0.0 0.0 1 *junction f-loss r-loss
0371001 00 2 *volume fe
0371101 01000 1 *junction vcahs
0371201 003 15757504. 560.0 0.0 0. 0. 1
0371202 003 15757496. 560.0 0.0 0. 0. 2
0371300 0
0371301 6.185816 6.275816 0. 1 * 3.39763
0371401 .118 0. 1. 1. 1

```

*

* component 38 - single loop accumulator nozzle

*

```

0380000 accnoza branch
0380001 2 0
0380101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0380200 003 15757488. 560.0
0381101 037010000 038000000 1.0936e-2 0.0 0.0 01000
0382101 038010000 039000000 1.0936e-2 0.0 0.0 01000
0381201 6.18582 6.26582 0. * 3.397636
0382201 6.18582 6.26582 0. * 3.39764
0381110 .118 0. 1. 1.
0382110 .118 0. 1. 1.
*
*****
* component 39 - single loop cold leg piping
*****
*
0390000 cldlga2 pipe
0390001 2
0390101 1.0936e-2 2 *volume areas
0390201 1.0936e-2 1 *junction areas
0390301 .78406 1 *volume lengths
0390302 .53586 2
0390401 0.0 2 *=volume volumes
0390601 0.0 2 *vertical angle
0390701 0.0 2 *delta z
0390801 4.57e-5 0.0 2 *roughness diam
0390901 .144 .144 1 *junction f-loss r-loss
0391001 00000 2 *volume flags
0391101 01000 1 *junction vcahs
0391201 003 15757480. 560.0 0.0 0. 0. 1
0391202 003 15747464. 560.0 0.0 0. 0. 2
0391300 0
0391301 6.17582 6.31582 0. 1 * 3.39764
0391401 .118 0. 1. 1. 1
*
*****
* component 36 - inlet portion of single loop pump
*****
0360000 pumpa pump
0360101 0.0 0.350 0.02062 0.0 41.518 0.232 00000
0360108 035010000 1.0936e-2 0.0 0.0 01000
0360109 037000000 1.0936e-2 0.0 0.0 01000
0360200 003 15534160. 560.0
0360201 0 6.20575 5.60145 0. * 3.39762
0360202 0 6.23 6.51 0. * 3.397625
0360110 .118 0. 1. 1.
0360111 .118 0. 1. 1.
*
0360301 0 0 0 -1 0 000 0

```

0360302 311. 0.9899 6.3056e-2 78.0 144.75 37.3 750.0 0. 0. 4.65e-2 0. 0
 *

* hethsy pump single phase homologous curves *

*

* han

0361100	1	1	0.0	1.3257	0.1	1.3317	0.2	1.3273	0.3	1.3135	0.4	1.2909
0361101			0.5	1.2603	0.6	1.2223	0.7	1.1780	0.75	1.1536	0.775	1.1409
0361102			0.8	1.1279	0.825	1.1146	0.85	1.1009	0.875	1.0870	0.9	1.0728
0361103			0.925	1.0583	0.95	1.0437	0.975	1.0287	0.987	1.0215	1.0	1.0135

* ban

0361200	2	1	0.0	0.5139	0.1	0.5633	0.2	0.6128	0.3	0.6622	0.4	0.7116
0361201			0.5	0.7610	0.6	0.8105	0.7	0.8599	0.75	0.8846	0.775	0.8969
0361202			0.8	0.9093	0.825	0.9216	0.85	0.9340	0.875	0.9463	0.9	0.9587
0361203			0.925	0.9710	0.95	0.9834	0.975	0.9957	0.987	1.0017	1.0	1.0081

* hvn

0361300	1	2	0.0	-0.5772	0.1	-0.4471	0.2	-0.3169	0.3	-0.1868	0.4	-0.0567
0361301			0.5	0.0733	0.6	0.2035	0.7	0.3572	0.75	0.4471	0.775	0.4951
0361302			0.8	0.5450	0.825	0.5969	0.85	0.6508	0.875	0.7066	0.9	0.7643
0361303			0.925	0.8238	0.95	0.8852	0.975	0.9485	0.987	0.9795	1.0	1.0135

* bvn

0361400	2	2	0.0	-0.5772	0.1	-0.4145	0.2	-0.2518	0.3	-0.0891	0.4	0.0735
0361401			0.5	0.2362	0.6	0.3989	0.7	0.5616	0.75	0.6429	0.775	0.6836
0361402			0.8	0.7243	0.825	0.7579	0.85	0.7915	0.875	0.8263	0.9	0.8611
0361403			0.925	0.8972	0.95	0.9333	0.975	0.9707	0.987	0.9886	1.0	1.0081

* had

0361500	1	3	-1.	1.3257	0.0	1.3257
---------	---	---	-----	--------	-----	--------

* bad

0361600	2	3	-1.	0.5139	0.0	0.5139
---------	---	---	-----	--------	-----	--------

* hvd

0361700	1	4	-1.0	1.3257	-.900	1.2801	-.800	1.2346	-.700	1.1889	-.600	1.1434
0361701			-.500	1.0978	-.400	1.0522	-.300	1.0067	-.275	0.9953	-.250	0.9839
0361702			-.225	0.9725	-.200	0.9611	-.175	0.9497	-.150	0.9383	-.125	0.9269
0361703			-.100	0.9156	-.075	0.9042	-.050	0.8928	-.025	0.8814	0.00	0.8700

* bvd

0361800	2	4	-1.0	0.5139	0.00	0.5139
---------	---	---	------	--------	------	--------

* hat

0361900	1	5	0.0	1.3257	1.00	1.3257
---------	---	---	-----	--------	------	--------

* bat

0362000	2	5	0.0	0.5139	1.00	0.5139
---------	---	---	-----	--------	------	--------

* hvt

0362100	1	6	.0	0.8700	.025	0.8814	.050	0.8928	.075	0.9042	.100	0.9156
0362101			.125	0.9269	.150	0.9383	.175	0.9497	.200	0.9611	.225	0.9725
0362102			.250	0.9839	.275	0.9953	.300	1.0067	.400	1.0522	.500	1.0978
0362103			.600	1.1434	.700	1.1889	.800	1.2346	.900	1.2801	1.00	1.3257

* bvt

0362200	2	6	0.0	0.5139	1.000	0.5139
---------	---	---	-----	--------	-------	--------

```

*
*****
*
*   the following four curves were not provided in the bethsy data base
*   the values used were estimated from the relap5/mod2 manual examples
*
*****
*
*   har
0362300 1 7 -1.0 0.1 0.0 1.3257
*   bar
0362400 2 7 -1.0 -1.5 0.0 .5139
*   hvr
0362500 1 8 -1.0 0.1 0.0 -.5772
*   bvr
0362600 2 8 -1.0 -1.5 0.0 -.5772
*
*
0363000 0 0.0 0.0 0.1 0.0 0.2 0.0 0.3 0.50
0363001 0.4 1.00 0.6 1.0 0.7 1.0 0.8 1.00
0363002 0.9 1.00 1.0 0.0
0363100 0 0.0 0.0 0.1 0.0 0.2 0.0 0.3 0.50
0363101 0.4 1.00 0.6 1.0 0.7 1.0 0.8 1.00
0363102 0.9 1.00 1.0 0.0
*
*   two-phase difference tables from semiscale
*
0364100 1 1 0.0 0.00 0.1 0.83 0.2 1.09
0364101 0.5 1.02 0.6 1.015 0.7 1.01
0364102 0.9 0.94 1.0 1.00
0364200 1 2 0.0 0.00 0.1 -0.04 0.2 0.00 0.3 0.11
0364201 0.4 0.21 0.8 0.67 0.9 0.80 1.0 1.0
0364300 1 3 -1.0 -1.06 -0.9 -1.24 -0.8 -1.77
0364301 -0.7 -2.36 -0.6 -2.79 -0.5 -2.91 -0.4 -2.67
0364302 -0.25 -1.69 -0.1 -0.50 0.0 0.00
0364400 1 4 -1.0 -1.16 -0.9 -0.78 -0.8 -0.05
0364401 -0.7 -0.31 -0.6 -0.17 -0.5 -0.17
0364402 -0.35 0.00 -0.2 0.05 0.0 0.11
0364500 1 5 0.0 0.00 0.2 -0.34
0364501 0.4 -0.65 0.6 -0.95
0364502 0.8 -1.19 1.0 -1.47
0364600 1 6 0.0 0.11 0.1 0.13 0.25 0.15
0364601 0.4 0.13 0.5 0.07 0.6 -0.04 0.7 -0.23
0364602 0.8 -0.51 0.9 -0.91 1.0 -1.47
0364700 1 7 0.0 0.0 1.0 0.0
0364800 1 8 0.0 0.0 1.0 0.0
0364900 2 1 0.0 0.0 1.0 0.0
0365000 2 2 0.0 0.0 1.0 0.0

```



```

0365100 2 3 0.0 0.0 1.0 0.0
0365200 2 4 0.0 0.0 1.0 0.0
0365300 2 5 0.0 0.0 1.0 0.0
0365400 2 6 0.0 0.0 1.0 0.0
0365500 2 7 0.0 0.0 1.0 0.0
0365600 2 8 0.0 0.0 1.0 0.0
*
*****
* pump speed controller for steady calculation
*****
*
0366100 0 cntrlvar,425
0366101 0.0 0.0
0366102 2400.0 2400.0
*
*
20542400 mserr sum 1.0 0.0 1
20542401 51.1 -1.0 mflowj,301000000
20542500 rcpspp integral 0.1 311. 0
20542501 cntrlvar,424
*
*****
* primary loop piping components -single loop b
*****
*
*****
* component 41 - single loop (loop b) hot leg
*****
*
0410000 hotlgb1 snglvol
0410101 1.0936e-2 1.1941 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0410200 003 15576088. 563.3
*
*****
* component 42 - single loop
*****
*
0420000 hotlgb2 snglvol
0420101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0420200 003 15576080. 563.3
*
*****
* component 43 - single loop hot leg to sg
*****
*
0430000 hotlgb3 pipe
0430001 3
0430101 1.0936e-2 3 *volume area

```

```

0430201 1.0936e-2 2 *junction area
0430301 0.79775 1 *volume length
0430302 1.44800 2
0430303 0.5506 3
0430401 0.0 3 *volume volumes
0430601 0.0 1 *vert angle
0430602 90. 2
0430603 50. 3
0430701 0.0 1 *delta z
0430702 1.44800 2
0430703 0.4637 3
0430801 4.57e-5 .118 3 *rough diam
0430901 0.117 0.117 1 *junction f-loss r-loss
0430902 0.065 0.065 2 *junction f-loss r-loss
0431001 00000 3 * vol flags
0431101 01000 2 * vcahs
0431201 003 15560072. 563.3 0.0 0. 0. 1
0431202 003 15565056. 563.3 0.0 0. 0. 2
0431203 003 15565440. 563.3 0.0 0. 0. 3
0431300 0
0431301 6.26299 6.41299 0. 1 * 3.397625
0431302 6.26303 6.56904 0. 2 * 3.39762
0431401 .118 0. 1. 1. 2

```

*

* component 401 - h.l. junction to hot leg

*

```

4010000 hotlg4b sngljun
4010101 041010000 042000000 0.0 0.0 0.0 01000
4010201 0 6.261222 6.331222 0. * 3.39708
4010110 .118 0. 1. 1.

```

*

* component 402 - h.l. junction from pressurizer surge nozzle

*

```

4020000 hotlg5b sngljun
4020101 042010000 043000000 0.0 0.0 0.0 01000
4020201 0 6.261298 6.3412985 0. * 3.39763
4020110 .118 0. 1. 1.

```

*

* component 45 - single loop cold leg pump suction piping

*

```

0450000 pumpsa pipe
0450001 5

```

0450101	0.0	5	*volume areas	
0450201	1.0936e-2	4	*junction areas	
0450301	0.4189	1	*volume lengths	
0450302	1.94015	2		
0450303	2.22285	3		
0450304	0.820	4		
0450305	2.0697	5		
0450401	4.5810e-3	1		
0450402	21.2175e-3	2		
0450403	24.3095e-3	3		
0450404	8.9670e-3	4		
0450405	22.6340e-3	5		
0450601	-50.00	1	*vertical angle	
0450602	-90.	3		
0450603	0.0	4		
0450604	90.	5		
0450701	-.3404	1	*delta z	
0450702	-1.94015	2		
0450703	-2.12015	3		
0450704	0.0	4		
0450705	1.9671	5		
0450801	4.57e-5	0.0	5 *volume roughnes diam	
0450901	.065	.065	1 *f-loss r-loss	
0450902	0.0	0.0	2 *f-loss r-loss	
0450903	.117	.117	3	
0450904	.117	.117	4	
0451001	00000	5	* volume flags	
0451101	01000	4	*junction vcahs	
0451201	003	15284064.	560.0 0.0 0.	0. 1
0451202	003	15292512.	560.0 0.0 0.	0. 2
0451203	003	15307552.	560.0 0.0 0.	0. 3
0451204	003	15305400.	560.0 0.0 0.	0. 4
0451205	003	15298072.	560.0 0.0 0.	0. 5
0451300	0			
0451301	6.210586	6.350195	0. 1 *	3.3976
0451302	6.210582	6.4701855	0. 2 *	3.397604
0451303	6.210575	6.470146	0. 3 *	3.39761
0451304	6.210571	6.3705716	0. 4 *	3.397614
0451401	.118	0.	1. 1. 4	

*

* component 47 - single loop pump discharge piping

*

0470000 cldlga1 pipe

0470001 2

0470101 1.0936e-2 2 *volume areas

0470201 1.0936e-2 1 *juntion areas

```

0470301 1.05      1  *volume lengths
0470302 0.859     2  *volume lengths
0470401 0.0       2  *volume volumes
0470501 0.0       2  *horiz angle
0470601 0.0       2  *vertical angle
0470701 0.0       2  *delta z
0470801 4.57e-5 0.0 2  *roughness diam
0470901 0.0      0.0 1  *junction f-loss r-loss
0471001 00       2  *volume fe
0471101 01000    1  *junction vcahs
0471201 003     15757504. 560.0 0.0 0. 0. 1
0471202 003     15757496. 560.0 0.0 0. 0. 2
0471300 0
0471301 6.190581 6.2805816 0. 1 * 3.39763
0471401 .118     0. 1. 1. 1
*
*****
* component 48 - single loop accumulator nozzle
*****
*
0480000 accnoza  branch
0480001 2 0
0480101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0480200 003 15757488. 560.0
0481101 047010000 048000000 1.0936e-2 0.0 0.0 01000
0482101 048010000 049000000 1.0936e-2 0.0 0.0 01000
0481201 6.180582 6.270582 0. * 3.397636
0482201 6.180582 6.270582 0. * 3.39764
0481110 .118 0. 1. 1.
0482110 .118 0. 1. 1.
*
*****
* component 49 - single loop cold leg piping
*****
*
0490000 cldlga2  pipe
0490001 2
0490101 1.0936e-2 2 *volume areas
0490201 1.0936e-2 1 *junction areas
0490301 .78406 1 *volume lengths
0490302 .53586 2
0490401 0.0 2 *=volume volumes
0490601 0.0 2 *vertical angle
0490701 0.0 2 *delta z
0490801 4.57e-5 0.0 2 *roughness diam
0490901 .144 .144 1 *junction f-loss r-loss
0491001 00000 2 *volume flags
0491101 01000 1 *junction vcahs

```

```

0491201 003 15757480. 560.0 0.0 0. 0. 1
0491202 003 15747464. 560.0 0.0 0. 0. 2
0491300 0
0491301 6.180582 6.320582 0. 1 * 3.39764
0491401 .118 0. 1. 1. 1
*
*****
* component 46 - inlet portion of single loop pump
*****
0460000 pumpb pump
0460101 0.0 0.350 0.02062 0.0 41.518 0.232 00000
0460108 045010000 1.0936e-2 0.0 0.0 01000
0460109 047000000 1.0936e-2 0.0 0.0 01000
0460200 003 15534160. 560.0
0460201 0 6.200575 6.360145 0. * 3.39762
0460202 0 6.23 6.51 0. * 3.397625
0460110 .118 0. 1. 1.
0460111 .118 0. 1. 1.
*
0460301 36 36 36 -1 36 000 0
*
0460302 311. 0.9899 6.3056e-2 78.0 144.75 37.3 750.0 0. 0. 4.65e-2 0. 0
*
*****
* primary loop piping components - single loop c
*****
*
*****
* component 51 - single loop (loop c) hot leg
*****
*
0510000 hotlgc1 snglvol
0510101 1.0936e-2 1.1941 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0510200 003 15576088. 563.3
*
*****
* component 52 - pressure surge line nozzle in single loop
*****
*
0520000 hotlgc2 snglvol
0520101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0520200 003 15576080. 563.3
*
*****
* component 53 - single loop hot leg to sg
*****
*
0530000 hotlgc3 pipe

```

```

0530001 3
0530101 1.0936e-2 3 *volume area
0530201 1.0936e-2 2 *junction area
0530301 0.79775 1 *volume length
0530302 1.44800 2
0530303 0.5506 3
0530401 0.0 3 *volume volumes
0530601 0.0 1 *vert angle
0530602 90. 2
0530603 50. 3
0530701 0.0 1 *delta z
0530702 1.44800 2
0530703 0.4637 3
0530801 4.57e-5 .118 3 *rough diam
0530901 0.117 0.117 1 *junction f-loss r-loss
0530902 0.065 0.065 2 *junction f-loss r-loss
0531001 00000 3 * vol flags
0531101 01000 2 * vcahs
0531201 003 15560072. 563.3 0.0 0. 0. 1
0531202 003 15565056. 563.3 0.0 0. 0. 2
0531203 003 15565440. 563.3 0.0 0. 0. 3
0531300 0
0531301 6.261299 6.411299 0. 1 * 3.397625
0531302 6.261303 6.561904 0. 2 * 3.39762
0531401 .118 0. 1. 1. 2
*
*****
* component 501 - h.l. junction to pressurizer surge nozzle
*****
*
5010000 hotlg4c sngljun
5010101 051010000 052000000 0.0 0.0 0.0 01000
5010201 0 6.261222 6.331222 0. * 3.39708
5010110 .118 0. 1. 1.
*
*****
* component 502 - h.l. junction from pressurizer surge nozzle
*****
*
5020000 hotlg5c sngljun
5020101 052010000 053000000 0.0 0.0 0.0 01000
5020201 0 6.261298 6.3312985 0. * 3.39763
5020110 .118 0. 1. 1.
*
*****
* component 55 - single loop cold leg pump suction piping
*****
*

```

```

0550000 pumpsc pipe
0550001 5
0550101 0.0 5 *volume areas
0550201 1.0936e-2 4 *junction areas
0550301 0.4189 1 *volume lengths
0550302 1.94015 2
0550303 2.22285 3
0550304 0.820 4
0550305 2.0697 5
0550401 4.5810e-3 1
0550402 21.2175e-3 2
0550403 24.3095e-3 3
0550404 8.9670e-3 4
0550405 22.6340e-3 5
0550601 -50.00 1 *vertical angle
0550602 -90. 3
0550603 0.0 4
0550604 90. 5
0550701 -.3404 1 *delta z
0550702 -1.94015 2
0550703 -2.12015 3
0550704 0.0 4
0550705 1.9671 5
0550801 4.57e-5 0.0 5 *volume roughnes diam
0550901 .065 .065 1 *f-loss r-loss
0550902 0.0 0.0 2 *f-loss r-loss
0550903 .117 .117 3
0550904 .117 .117 4
0551001 00000 5 * volume flags
0551101 01000 4 *junction vcahs
0551201 003 15284064. 560.0 0.0 0. 0. 1
0551202 003 15292512. 560.0 0.0 0. 0. 2
0551203 003 15307552. 560.0 0.0 0. 0. 3
0551204 003 15305400. 560.0 0.0 0. 0. 4
0551205 003 15298072. 560.0 0.0 0. 0. 5
0551300 0
0551301 6.200586 6.370195 0. 1 * 3.3976
0551302 6.200582 6.4701855 0. 2 * 3.397604
0551303 6.200575 6.470146 0. 3 * 3.39761
0551304 6.200571 6.3505716 0. 4 * 3.397614
0551401 .118 0. 1. 1. 4
*
*****
* component 57 - single loop pump discharge piping
*****
*
0570000 cldlga1 pipe
0570001 2

```

```

0570101 1.0936e-2 2 *volume areas
0570201 1.0936e-2 1 *junction areas
0570301 1.05 1 *volume lengths
0570302 0.859 2 *volume lengths
0570401 0.0 2 *volume volumes
0570501 0.0 2 *horiz angle
0570601 0.0 2 *vertical angle
0570701 0.0 2 *delta z
0570801 4.57e-5 0.0 2 *roughness diam
0570901 0.0 0.0 1 *junction f-loss r-loss
0571001 00 2 *volume fe
0571101 01000 1 *junction vcahs
0571201 003 15757504. 560.0 0.0 0. 0. 1
0571202 003 15757496. 560.0 0.0 0. 0. 2
0571300 0
0571301 6.190581 6.2805816 0. 1 * 3.39763
0571401 .118 0. 1. 1. 1
*
*****
* component 58 - single loop accumulator nozzle
*****
*
0580000 accnoz branch
0580001 2 0
0580101 1.0936e-2 0.5 0.0 0.0 0.0 0.0 4.57e-5 .118 00000
0580200 003 15757488. 560.0
0581101 057010000 058000000 1.0936e-2 0.0 0.0 01000
0582101 058010000 059000000 1.0936e-2 0.0 0.0 01000
0581201 6.180582 6.270582 0. * 3.397636
0582201 6.180582 6.270582 0. * 3.39764
0581110 .118 0. 1. 1.
0582110 .118 0. 1. 1.
*
*****
* component 59 - single loop cold leg piping
*****
*
0590000 cldlgc2 pipe
0590001 2
0590101 1.0936e-2 2 *volume areas
0590201 1.0936e-2 1 *junction areas
0590301 .78406 1 *volume lengths
0590302 .53586 2
0590401 0.0 2 *volume volumes
0590601 0.0 2 *vertical angle
0590701 0.0 2 *delta z
0590801 4.57e-5 0.0 2 *roughness diam
0590901 .144 .144 1 *junction f-loss r-loss

```



```

0591001 00000 2          *volume flags
0591101 01000 1          *junction vcahs
0591201 003 15757480. 560.0 0.0 0. 0. 1
0591202 003 15747464. 560.0 0.0 0. 0. 2
0591300 0
0591301 6.180582 6.320582 0. 1 * 3.39764
0591401 .118 0. 1. 1. 1
*
*****
* component 56 - inlet portion of broken loop pump
*****
0560000 pumpc pump
0560101 0.0 0.35 0.02062 0.0 41.518 0.232 00000
0560108 055010000 1.0936e-2 0.0 0.0 01000
0560109 057000000 1.0936e-2 0.0 0.0 01000
0560200 003 15534160. 560.0
0560201 0 6.200559 6.360128 0. * 3.39762
0560202 0 6.23 6.51 0. * 3.39762
0560110 .118 0. 1. 1.
0560111 .118 0. 1. 1.
*
0560301 36 36 36 -1 36 000 0
*
0560302 311. 0.9899 6.3056-2 78.0 144.75 37.3 750.0 0. 0. 4.65e-2 0. 0.
*
*****
*
* description of primary system steam generator components
*
*****
* single loop a : broken loop
*****
*
0340000 stmgena pipe
0340001 22
0340101 0.0 1
0340102 1.0342e-2 21
0340103 0.0 22
0340201 1.0342e-2 21
0340301 0.798 1
0340302 0.2 2
0340303 0.4 3
0340304 0.6 4
0340305 0.8 5
0340306 1.0 6
0340307 1.5 10
0340308 0.725 12
0340309 1.5 16

```

0340310	1.0	17		
0340311	0.8	18		
0340312	0.6	19		
0340313	0.4	20		
0340314	0.2	21		
0340315	0.798	22		
0340401	35.0607e-3	1		
0340402	0.0	21		
0340403	35.0607e-3	22		
0340601	90.	11		
0340602	-90.	22		
0340701	0.7523	1		
0340702	0.2	2		
0340703	0.4	3		
0340704	0.6	4		
0340705	0.8	5		
0340706	1.0	6		
0340707	1.5	10		
0340708	0.685	11		
0340709	-0.685	12		
0340710	-1.5	16		
0340711	-1.0	17		
0340712	-0.8	18		
0340713	-0.6	19		
0340714	-0.4	20		
0340715	-0.2	21		
0340716	-0.7523	22		
0340801	4.57e-5	.229	1	
0340802	1.0e-6	1.968e-2	21	
0340803	4.57e-5	.229	22	
0340901	.182	.530	1	
0340901	0.0	0.0	1	
0340902	0.0	0.0	10	
0340903	.078	.078	11	
0340903	0.0	0.0	11	
0340904	0.0	0.0	20	
0340905	.530	.182	21	
0340905	0.0	0.0	21	
0341001	00	22		
0341101	11000	1	*ccfl on	
0341102	01000	20	*ccfl off for j's 2-20	
0341103	11000	21	*ccfl on	
0341201	0	15510264.	1274710.	2443832. 0. 1
0341202	0	15496888.	1265522.	2443912. 0. 2
0341203	0	15484768.	1249498.	2443962. 0. 3
0341204	0	15471200.	1229853.	2444046. 0. 4
0341205	0	15456160.	1209553.	2444166. 0. 5
0341206	0	15449608.	1290901.	2444320. 0. 6

```

0341207 0      15440416. 1272667. 2444538. 0.      0. 7
0341208 0      15429320. 1260562. 2444800. 0.      0. 8
0341209 0      15318176. 1252372. 2445062. 0.      0. 9
0341210 0      15307000. 1246720. 2445328. 0.      0. 10
0341211 0      15398832. 1244427. 2445520. 0.      0. 11
0341212 0      15398768. 1242560. 2445522. 0.      0. 12
0341213 0      15306760. 1240036. 2445332. 0.      0. 13
0341214 0      15317744. 1238388. 2445072. 0.      0. 14
0341215 0      15328736. 1237328. 2444812. 0.      0. 15
0341216 0      15239736. 1236668. 2444554. 0.      0. 16
0341217 0      15248904. 1236374. 2444336. 0.      0. 17
0341218 0      15255504. 1236190. 2444180. 0.      0. 18
0341219 0      15260640. 1236035. 2444060. 0.      0. 19
0341220 0      15264304. 1235918. 2443974. 0.      0. 20
0341221 0      15266504. 1235825. 2443922. 0.      0. 21
0341222 0      15270096. 1235824. 2443836. 0.      0. 22
0341300 0
0341301 6.06659 6.06659 0. 1 * 3.397596
0341302 6.04233 6.04233 0. 2 * 3.397594
0341303 6.00105 6.00105 0. 3 * 3.39759
0341304 6.051265 6.051265 0. 4 * 3.39759
0341305 6.002835 6.002835 0. 5 * 3.39759
0341306 6.05996 6.05996 0. 6 * 3.397585
0341307 6.01923 6.01923 0. 7 * 3.39758
0341308 6.09331 6.09331 0. 8 * 3.39758
0341309 6.07625 6.07625 0. 9 * 3.39758
0341310 6.06467 6.06467 0. 10 * 3.39758
0341311 6.0599 6.0599 0. 11 * 3.39758
0341312 6.05599 6.05599 0. 12 * 3.39758
0341313 6.0507 6.0507 0. 13 * 3.397585
0341314 6.04723 6.04723 0. 14 * 3.397585
0341315 6.04499 6.04499 0. 15 * 3.39759
0341316 6.04358 6.04358 0. 16 * 3.39759
0341317 6.04293 6.04293 0. 17 * 3.39759
0341318 6.04252 6.04252 0. 18 * 3.39759
0341319 6.042175 6.042175 0. 19 * 3.39759
0341320 6.041915 6.041915 0. 20 * 3.39759
0341321 6.04171 6.04171 0. 21 * 3.39759
0341401 1.968e-2 0. 1. 0.725 1 *ccfl on
0341402 1.968e-2 0. 1. 1. 20 *ccfl off for j's 2-20
0341403 1.968e-2 0. 1. 0.725 21 *ccfl on
*
*****
* steamgenerator inlet junction
*****
*
3040000 sgina sngljun
3040101 033010000 034000000 1.0936e-2 0.0 0.0 01100

```

```

3040201 0 6.26308 6.41928 0. * 3.397615
3040110 .118 0. 1. 1.
*
*****
* steam generator outlet junction
*****
*
3050000 sgouta sngljun
3050101 034010000 035000000 1.093578e-2 0.0 0.0 01100
3050201 0 6.20596 6.40623 0. * 3.3976
3050110 .118 0. 1. 1.
*
*****
* single loop b
*****
*
0440000 stmgenb pipe
0440001 22
0440101 0.0 1
0440102 1.0342e-2 21
0440103 0.0 22
0440201 1.0342e-2 21
0440301 0.798 1
0440302 0.2 2
0440303 0.4 3
0440304 0.6 4
0440305 0.8 5
0440306 1.0 6
0440307 1.5 10
0440308 0.725 12
0440309 1.5 16
0440310 1.0 17
0440311 0.8 18
0440312 0.6 19
0440313 0.4 20
0440314 0.2 21
0440315 0.798 22
0440401 35.0607e-3 1
0440402 0.0 21
0440403 35.0607e-3 22
0440601 90. 11
0440602 -90. 22
0440701 0.7523 1
0440702 0.2 2
0440703 0.4 3
0440704 0.6 4
0440705 0.8 5
0440706 1.0 6

```

0440707	1.5	10		
0440708	0.685	11		
0440709	-0.685	12		
0440710	-1.5	16		
0440711	-1.0	17		
0440712	-0.8	18		
0440713	-0.6	19		
0440714	-0.4	20		
0440715	-0.2	21		
0440716	-0.7523	22		
0440801	4.57e-5	.229	1	
0440802	1.0e-6	1.968e-2	21	
0440803	4.57e-5	.229	22	
0440901	.182	.530	1	
0440901	0.0	0.0	1	
0440902	0.0	0.0	10	
0440903	.078	.078	11	
0440903	0.0	0.0	11	
0440904	0.0	0.0	20	
0440905	.530	.182	21	
0440905	0.0	0.0	21	
0441001	00	22		
0441101	11000	1	*ccfl on	
0441102	01000	20	*ccfl off for j's 2-20	
0441103	11000	21	*ccfl on	
0441201	0	15510264.	1274710.	2443832. 0. 1
0441202	0	15496888.	1265522.	2443912. 0. 2
0441203	0	15484768.	1249498.	2443962. 0. 3
0441204	0	15471200.	1229853.	2444046. 0. 4
0441205	0	15466160.	1209553.	2444166. 0. 5
0441206	0	15449608.	1290901.	2444320. 0. 6
0441207	0	15440416.	1272667.	2444538. 0. 7
0441208	0	15429320.	1260562.	2444800. 0. 8
0441209	0	15318176.	1252372.	2445062. 0. 9
0441210	0	1.5307+7	1246720.	2445328. 0. 10
0441211	0	15398832.	1244427.	2445520. 0. 11
0441212	0	15398768.	1242560.	2445522. 0. 12
0441213	0	15306760.	1240036.	2445332. 0. 13
0441214	0	15317744.	1238388.	2445072. 0. 14
0441215	0	15328736.	1237328.	2444812. 0. 15
0441216	0	15299736.	1236668.	2444554. 0. 16
0441217	0	15288904.	1236374.	2444336. 0. 17
0441218	0	15275504.	1236190.	2444180. 0. 18
0441219	0	15260640.	1236035.	2444060. 0. 19
0441220	0	15264304.	1235918.	2443974. 0. 20
0441221	0	15266504.	1235825.	2443922. 0. 21
0441222	0	15270096.	1235824.	2443836. 0. 22
0441300	0			

```

0441301 6.06659 6.06659 0. 1 * 3.397596
0441302 6.04233 6.04233 0. 2 * 3.397594
0441303 6.00105 6.00105 0. 3 * 3.39759
0441304 6.051265 6.051265 0. 4 * 3.39759
0441305 6.002835 6.002835 0. 5 * 3.39759
0441306 6.05996 6.05996 0. 6 * 3.397585
0441307 6.01923 6.01923 0. 7 * 3.39758
0441308 6.09331 6.09331 0. 8 * 3.39758
0441309 6.07625 6.07625 0. 9 * 3.39758
0441310 6.06467 6.06467 0. 10 * 3.39758
0441311 6.0599 6.0599 0. 11 * 3.39758
0441312 6.05599 6.05599 0. 12 * 3.39758
0441313 6.0507 6.0507 0. 13 * 3.397585
0441314 6.04723 6.04723 0. 14 * 3.397585
0441315 6.04499 6.04499 0. 15 * 3.39759
0441316 6.04358 6.04358 0. 16 * 3.39759
0441317 6.04293 6.04293 0. 17 * 3.39759
0441318 6.04252 6.04252 0. 18 * 3.39759
0441319 6.042175 6.042175 0. 19 * 3.39759
0441320 6.041915 6.041915 0. 20 * 3.39759
0441321 6.04171 6.04171 0. 21 * 3.39759
0441401 1.968e-2 0. 1. 0.725 1 *ccfl on
0441402 1.968e-2 0. 1. 1. 20 *ccfl off for j's 2-20
0441403 1.968e-2 0. 1. 0.725 21 *ccfl on
*
*****
* steam generator inlet junction
*****
*
4040000 sginb sngljun
4040101 043010000 044000000 1.0936e-2 0.0 0.0 01100
4040201 0 6.26308 6.40928 0. * 3.397615
4040110 .113 0. 1. 1.
*
*****
* steam generator outlet junction
*****
*
4050000 sgouth sngljun
4050101 044010000 045000000 1.093578e-2 0.0 0.0 01100
4050201 0 6.20596 6.40623 0. * 3.3976
4050110 .118 0. 1. 1.
*
*****
* single loop -c
*****
*
0540000 stmgenc pipe

```

0540001	22	
0540101	0.0	1
0540102	1.0342e-2	21
0540103	0.0	22
0540201	1.0342e-2	21
0540301	0.798	1
0540302	0.2	2
0540303	0.4	3
0540304	0.6	4
0540305	0.8	5
0540306	1.0	6
0540307	1.5	10
0540308	0.725	12
0540309	1.5	16
0540310	1.0	17
0540311	0.8	18
0540312	0.6	19
0540313	0.4	20
0540314	0.2	21
0540315	0.798	22
0540401	35.0607e-3	1
0540402	0.0	21
0540403	35.0607e-3	22
0540601	90.	11
0540602	-90.	22
0540701	0.7523	1
0540702	0.2	2
0540703	0.4	3
0540704	0.6	4
0540705	0.8	5
0540706	1.0	6
0540707	1.5	10
0540708	0.685	11
0540709	-0.685	12
0540710	-1.5	16
0540711	-1.0	17
0540712	-0.8	18
0540713	-0.6	19
0540714	-0.4	20
0540715	-0.2	21
0540716	-0.7523	22
0540801	4.57e-5	.229 1
0540802	1.0e-6	1.968e-2 21
0540803	4.57e-5	.229 22
0540901	.182	.530 1
0540901	0.0	0.0 1
0540902	0.0	0.0 10
0540903	.078	.078 11

0540903	0.0	0.0	11		
0540904	0.0	0.0	20		
0540905	.530	.182	21		
0540905	0.0	0.0	21		
0541001	00	22			
0541101	11000	1	*ccf1 on		
0541102	01000	20	*ccf1 off for j's 2-20		
0541103	11000	21	*ccf1 on		
0541201	0	15514264.	1274710.	2443832.	0. 1
0541202	0	15496888.	1265522.	2443912.	0. 2
0541203	0	15484768.	1249498.	2443962.	0. 3
0541204	0	15471200.	1229853.	2444046.	0. 4
0541205	0	15456160.	1209553.	2444166.	0. 5
0541206	0	15449608.	1290901.	2444320.	0. 6
0541207	0	15440416.	1272667.	2444538.	0. 7
0541208	0	15329320.	1260562.	2444800.	0. 8
0541209	0	15318176.	1252372.	2445062.	0. 9
0541210	0	1.5307+7	1246720.	2445328.	0. 10
0541211	0	15338832.	1244427.	2445520.	0. 11
0541212	0	15338768.	1242560.	2445522.	0. 12
0541213	0	15336760.	1240036.	2445332.	0. 13
0541214	0	15337744.	1238388.	2445072.	0. 14
0541215	0	15338736.	1237328.	2444812.	0. 15
0541216	0	15239736.	1236668.	2444554.	0. 16
0541217	0	15238904.	1236374.	2444336.	0. 17
0541218	0	15255504.	1236190.	2444180.	0. 18
0541219	0	15260640.	1236035.	2444060.	0. 19
0541220	0	15264304.	1235918.	2443974.	0. 20
0541221	0	15266504.	1235825.	2443922.	0. 21
0541222	0	15670096.	1235824.	2443836.	0. 22
0541300	0				
0541301	6.06659	6.06659	0. 1	* 3.397596	
0541302	6.04233	6.04233	0. 2	* 3.397594	
0541303	6.00105	6.00105	0. 3	* 3.39759	
0541304	6.051265	6.051265	0. 4	* 3.39759	
0541305	6.002835	6.002835	0. 5	* 3.39759	
0541306	6.05996	6.05996	0. 6	* 3.397585	
0541307	6.01923	6.01923	0. 7	* 3.39758	
0541308	6.09331	6.09331	0. 8	* 3.39758	
0541309	6.07625	6.07625	0. 9	* 3.39758	
0541310	6.06467	6.06467	0. 10	* 3.39758	
0541311	6.0599	6.0599	0. 11	* 3.39758	
0541312	6.05599	6.05599	0. 12	* 3.39758	
0541313	6.0507	6.0507	0. 13	* 3.397585	
0541314	6.04723	6.04723	0. 14	* 3.397585	
0541315	6.04499	6.04499	0. 15	* 3.39759	
0541316	6.04358	6.04358	0. 16	* 3.39759	
0541317	6.04293	6.04293	0. 17	* 3.39759	


```

0541318 6.04252 6.04252 0. 18 * 3.39759
0541319 6.042175 6.042175 0. 19 * 3.39759
0541320 6.041915 6.041915 0. 20 * 3.39759
0541321 6.04171 6.04171 0. 21 * 3.39759
0541401 1.968e-2 0. 1. 0.725 1 *ccfl on
0541402 1.968e-2 0. 1. 1. 20 *ccfl off-for j's 2-20
0541403 1.968e-2 0. 1. 0.725 21 *ccfl on

```

*

* component 504 steam generator inlet junction

*

```

5040000 sginc sngljun
5040101 053010000 054000000 1.0936e-2 0.0 0.0 01100
5040201 0 6.26308 6.41928 0. * 3.397615
5040110 .118 0. 1. 1.

```

*

* component 505 steam generator outlet junction

*

```

5050000 sgouta sngljun
5050101 054010000 055000000 1.093578e-2 0.0 0.0 01100
5050201 0 6.20596 6.40623 0. * 3.3976
5050110 .118 0. 1. 1.

```

*

*

*

pressurizer and pressurizer surge line

*

* component 90 pressurizer surge line

```

0900000 prsurg pipe
0900001 3
0900101 0.0 1 *volume areas
0900102 1.445e-3 2
0900103 0.0 3
0900201 1.445e-3 2 *junction areas
0900301 0.850 1 *volume lengths
0900302 0.0 2
0900303 2.69 3
0900401 1.11865e-3 1 *volume volumes
0900402 9.0406e-3 2
0900403 3.86375e-3 3
0900601 90. 1 *vertical angles
0900602 0.92 2

```

```

0900603 90. 3
0900701 0.850 1 *elevation changes
0900702 0.1 2
0900703 2.69 3
0900801 4.57e-5 0.0429 3 *roughness diam
0900901 2.05 2.05 2 *junction loss coef
0901001 00 3 *volume fe
0901101 01000 2 *junction vcahs
0901201 003 15546480. 563.0 0.0 0. 0. 1
0901202 003 15544504. 563.0 0.0 0. 0. 2
0901203 003 15536800. 563.0 0.0 1.600417-5 0. 3
0901300 0
0901301 -5.88719-4 -5.8872-4 0. 1 * -5.41856-4
0901302 -5.8603-4 .016745 0. 2 * -5.38514-4
0901401 .0429 0. 1. 1. 2

```

*

* component 91 - pressurizer

*

```

0910000 preszr pipe
0910001 5
0910101 0.0 5 *volume areas
0910201 3.1276e-2 1 *junction areas
0910202 3.4636e-2 4
0910301 0.105 1 *volume lengths
0910302 0.892 2
0910303 5.4145 4
0910304 0.105 5
0910401 2.1616e-3 1 *volume volumes
0910402 2.7890e-2 2
0910403 0.187535 4
0910404 2.4245e-3 5
0910601 90. 5 *vertical angles
0910801 4.57e-5 0.210 5 *roughness diam
0910901 0.0 0.0 4 *junction loss coef
0911001 00 5 *volume flags fe
0911101 01000 4 *junction flags vcahs
0911201 0 15528088. 1512193. 2.444+6 0.0 0. 1
0911202 0 15525984. 1512645. 2444076. 0. 0. 2
0911203 0 15518704. 1512336. 2452160. 0.5 0. 3
0911204 0 15512504. 1512835. 2452246. 1.0 0. 4
0911205 0 15510744. 1512734. 2452922. 1.0 0. 5
0911300 0
0911301 -2.700723-5 1.078118-4 0. 1 * -5.36641-4
0911302 -5.00261-5 .612779 0. 2 * -5.28403-4
0911303 -.406981 -3.83528-5 0. 3 * -1.353289-4
0911304 -4.8759-7 -4.87571-7 0. 4 * -1.717944-6

```

```

0911401 .210 0. 1. 1. 4
*
*****
* component 93 trip valve for pzs steady state
*****
*
0930000 pzrvlv valve
0930101 91010000 94000000 0.02 10. 10. 01100
0930201 1 0.0 0.0 0.0
0930300 trpvlv
0930301 507
*
*****
* component 94 time dependent volume for pzs stp
*****
*
0940000 pzs-tmdp tmdpvol
0940101 0. 1. 100. 0. 90. 1. 0. 0. 11
0940200 002 0
0940201 0 15.51e6 1.0
*
*****
* component 901 - pressurizer to surge line
*****
*
9010000 prtosur sngljun
9010101 090010000 091000000 0.0 0.0 0.0 01100
9010201 0 -5.88604-4 .001109272 0. * -5.37312-4
9010110 .0429 0. 1. 1.
*
*****
*
*****
* steam generator secondary system components - single loop a
*
*****
*
*****
* component 60 - sg riser
*****
*
0600000 tubeun pipe
0600001 10
0600101 0.0 10 *volume areas
0600201 0.0 9 *junction areas
0600301 0.2 1 *volume lengths
0600302 0.4 2 *volume lengths
0600303 0.6 3 *volume lengths
0600304 0.8 4 *volume lengths

```

0600305	1.0	5	*volume lengths				
0600306	1.5	9	*volume lengths				
0600307	1.8025	10	*volume lengths				
0600401	0.01151	1	*volume volumes				
0600402	0.02303	2	*volume volumes				
0600403	0.03454	3	*volume volumes				
0600404	0.04605	4	*volume volumes				
0600405	0.05756	5	*volume volumes				
0600406	0.08635	9	*volume volumes				
0600407	0.10376	10	*volume volumes				
0600601	90.	10	*vertiical angles				
0600801	4.57e-5	0.03503	10	*roughness diam			
0600901	0.709	0.709	9	*junction resistance			
0601001	00100	10	*flags pvbfe				
0601101	01000	9	*flags vcahs				
0601201	0	7028456.	1248771.	2582846.	.042479	0.	1
0601202	0	7026396.	1249808.	2582862.	.0791885	0.	2
0601203	0	7023096.	1250779.	2582890.	.100384	0.	3
0601204	0	7018676.	1251212.	2582926.	.1024675	0.	4
0601205	0	7013236.	1251169.	2582972.	.1001885	0.	5
0601206	0	7016020.	1250842.	2583030.	.137237	0.	6
0601207	0	7017640.	1250435.	2583100.	.1617664	0.	7
0601208	0	6999476.	1250028.	2583166.	.20956	0.	8
0601209	0	6991468.	1249626.	2583234.	.253402	0.	9
0601210	0	6982900.	1249192.	2583306.	.319663	0.	10
0601300	0						
0601301	.291368	.293318	0. 1 *	8.3189			
0601302	.296823	.3436065	0. 2 *	8.32017			
0601303	.3058306	.414301	0. 3 *	8.32394			
0601304	.318744	.485924	0. 4 *	8.32663			
0601305	.335345	.542248	0. 5 *	8.32915			
0601306	.3635625	.6048185	0. 6 *	8.33147			
0601307	.4178196	.661324	0. 7 *	8.33338			
0601308	.444346	.713936	0. 8 *	8.33501			
0601309	.565791	.775627	0. 9 *	8.33651			
0601401	.03503	0.	1.	1.	9		

*

* component 61 - lower steam dome

*

0610000	lstmdom	pipe
0610001	3	
0610101	0.0	3 *volume area
0610201	0.0	2 *junction area
0610301	0.158	1 *volume length
0610302	0.7925	2
0610303	0.900	3

```

0610401 0.010393 1 *volume volumes
0610402 0.03861 2 *volume volumes
0610403 0.04385 3 *volume volumes
0610601 90. 3
0610801 4.57e-5 .249 3 *rough diam
0610901 0.0 0.0 2 *junction f-loss r-loss
0611001 00000 3 * vol flags
0611101 01000 2 * vcahs
0611201 0 6977848. 1248987. 2583346. .1070403 0. 1
0611202 0 6965112. 1248752. 2583374. .124302 0. 2
0611203 0 6969880. 1248488. 2583418. .1005756 0. 3
0611300 0
0611301 .426618 1.27186 0. 1 * 8.28098
0611302 .432377 1.227373 0. 2 * 8.30996
0611401 .249 0. 1. 1. 2
*
```

```

*****
* component 62 - middle steam dome and separator
*****
```

```

*
0620000 mstmdom branch
0620001 3 0
0620101 0.0 2.16 0.59549 0.0 90. 2.16 4.57e-5 .249 00
0620200 0 6953520. 1248202. 2583470. .64374
0621101 062010000 068000000 .502655 .816 .452 01000
0622101 062000000 063000000 44.915e-2 .060 .014 01002
0623101 061010000 062000000 4.8695e-2 0.0 0.0 01000
0621201 -0.49608 .04985623 0. * .283642
0622201 .3790846 2.01394252 0. * 8.05382
0623201 .50494 2.84995 0. * 8.2958
0621110 .800 0. 1. 1.
0622110 .539 0. 1. 1.
0623110 .249 0. 1. 1.
*
```

```

*****
* component 63 - upper downcomer
*****
```

```

*
0630000 updwnc snglvol
0630101 0.0 0.3375 .14922 0.0 -90. -.3375 4.57e-5 .539 00
0630200 0 6953596. 1248164. 2583470. .594008
*
```

```

*****
* component 64 - upper feedwater ring
*****
```

```

*
0640000 ufwring snglvol
0640101 0.0 1.6055 0.15856 0.0 -90. -1.6055 4.57e-5 0.176 00
```

```

0640200 0      6965196. 1248192. 2583464. .388591
*
*****
*   component 65 - lower feedwater ring
*****
*
0650000  lfwring  branch
0650001      2      0
0650101  0.0      .8275      .08172      0.0 -90.      -.8275  4.57e-5 .176  00
0650200  0      6970192. 1246853. 2583416. .022155
0651101  064010000  065000000      .09648      0.0  0.0      01000
0652101  065010000  066000000  3.0415e-2      .339  .459  01000
0651201      .2679376  .09100312  0.  *  8.05953
0652201      .651864  0.076746  0.  *  10.24751
0651110      .176  0.  1.  1.
0652110      .05983  0.  1.  1.
*
*****
*   component 66 - 11 tube region
*****
*
0660000  dc11tube  snglvol
0660101  0.0  1.9815  0.06336  0.0 -90.  -1.9815  4.57e-5 .05983 00
0660200  0      6988432. 1247671. 2583348. .071796
*
*****
*   component 67 - sg-dc bottom part (4 tube region and bottom annulus)
*****
*
0670000  dc4tube  pipe
0670001      9
0670101  0.0      9      *volume areas
0670201  0.0      8      *junction areas
0670301  1.481      1      *volume lengths
0670302  1.5      4      *volume lengths
0670303  1.0      5      *volume lengths
0670304  0.8      6      *volume lengths
0670305  0.6      7      *volume lengths
0670306  0.4      8      *volume lengths
0670307  0.2      9      *volume lengths
0670401  8.6429e-3  1      *volume volumes
0670402  8.7538e-3  4      *volume volumes
0670403  5.8359e-3  5      *volume volumes
0670404  4.6687e-3  6      *volume volumes
0670405  3.5015e-3  7      *volume volumes
0670406  2.3343e-3  8      *volume volumes
0670407  4.0563e-3  9      *volume volumes
0670601  -90.      9      *vertiical angles

```

```

0670801 4.57e-5 0.0431 9 *roughness diam
0670901 0.0 0.0 7 *junction resistance
0670902 0.5 1.0 8 *junction resistance
0671001 00100 9 *flags pvbfe
0671101 01000 8 *flags vcahs
0671201 0 6986060. 1247739. 2583284. .0517344 0. 1
0671202 0 6995548. 1247816. 2583204. .0487328 0. 2
0671203 0 7005052. 1247899. 2583124. .0467894 0. 3
0671204 0 7004576. 1247988. 2583046. .0447651 0. 4
0671205 0 7012532. 1248050. 2582978. .0433005 0. 5
0671206 0 7018268. 1248102. 2582930. .0424226 0. 6
0671207 0 7022724. 1248145. 2582894. .0435893 0. 7
0671208 0 7025876. 1248196. 2582866. .0598894 0. 8
0671209 0 7028420. 1248220. 2582846. .02781746 0. 9
0671300 0
0671301 2.913655 1.79785 0. 1 * 8.31366
0671302 2.910042 1.791977 0. 2 * 8.30743
0671303 2.905814 1.799384 0. 3 * 8.30815
0671304 2.901764 1.793686 0. 4 * 8.30803
0671305 2.998793 1.79058 0. 5 * 8.30793
0671306 2.997078 1.7928 0. 6 * 8.30804
0671307 2.99953 1.7996 0. 7 * 8.3067
0671308 2.934037 1.79198 0. 8 * 8.31625
0671401 .0431 0. 1. 1. 8
*
*****
* component 609 - feedwater source
*****
*
0690000 feedwtr tmdpvol
0690101 1.0e6 1.0 0.0 0.0 0.0 0.0 0.0 0.0 11
0690200 103 0
0690201 0.0 6.910e6 491.1
*
*****
* component 68 - top of steam dome
*****
*
0680000 tstmdom snglvol
0680101 0.0 0.4 0.13404 0.0 90. 0.4 4.57e-5 .653 00
0680200 0 6952032. 1247984. 2583424. 1.
*
*****
* component 69 - steamline
*****
*
0690000 stmlne pipe
0690001 2

```

```

0690101    0.0    2          *volume areas
0690201    0.0    1          *junction areas
0690301   15.825  2          *volume lengths
0690401   34.25e-3 2          *volume volumes
0690601   -90.    2          *vertical angles
0690701   -8.049  2          *delta z
0690801   4.57e-5 0.0525 2  *roughness diam
0690901    2.888   2.888   1  *junction loss coef
0691001    00     2          * fe
0691101   01000   1          *vcchs
0691201    0      6941284. 1247946. 2583452. 1.      0. 1
0691202    0      6941772. 1247971. 2583498. 1.      0. 2
0691300    0
0691301    6.25976 6.49588 0. 1 * .283683
0691401    .0525   0.     1.    1. 1
*
*****
*   feedwater
*****
*
*****
*   component 601 - feedwater junction
*****
*
6010000          "fedwtr"          tmdpjun
6010101    609000000    065000000    0.0
6010200          1          0          cntrlvar          263          * feedctl
*
6010201   -1.0e+75          0.0          0.0          0.0
6010202   -1.1e+10          0.0          0.0          0.0
6010203   -1.0e+10         -1.0e+10          0.0          0.0
6010204   -1.0e+9          -1.0e+9          0.0          0.0
6010205   -1.0e+8          -1.0e+8          0.0          0.0
6010206   -1.0e+7          -1.0e+7          0.0          0.0
6010207   -1.0e+6          -1.0e+6          0.0          0.0
6010208   -8.0e+5          -8.0e+5          0.0          0.0
6010209   -6.0e+5          -6.0e+5          0.0          0.0
6010210   -4.0e+5          -4.0e+5          0.0          0.0
6010211   -2.0e+5          -2.0e+5          0.0          0.0
6010212    0.0            0.0            0.0          0.0
6010213    2.0e+5          2.0e+5          0.0          0.0
6010214    4.0e+5          4.0e+5          0.0          0.0
6010215    6.0e+5          6.0e+5          0.0          0.0
6010216    8.0e+5          8.0e+5          0.0          0.0
6010217    1.0e+6          1.0e+6          0.0          0.0
6010218    1.0e+7          1.0e+7          0.0          0.0
6010219    1.0e+8          1.0e+8          0.0          0.0
6010220    1.0e+9          1.0e+9          0.0          0.0

```



```

6010221 1.0e+10 1.0e+10 0.0 0.0
*
*****
* component 602 - junction between 11-tube and 4-tube regions
*****
*
6020000 sgdwnc sngljun
6020101 066010000 067000000 .005836 1.5 1.5 01000
6020201 0 3.3464 2.72928 0. * 8.25925
6020110 .0431 0. 1. 1.
*
*****
* component 603 - downcomer to tube bundle
*****
*
6030000 sgdcbot sngljun
6030101 067010000 060000000 .025761 1.0 0.5 01000
6030201 0 .758816 .5368226 0. * 8.30314
6030110 .02 0. 1. 1.
*
*****
* component 604 - steamdome to downcomer
*****
*
6040000 sgdc top sngljun
6040101 063010000 064000000 .09648 0.0 0.0 01000
6040201 0 6.98816 .01109985 0. * 8.05694
6040110 .176 0. 1. 1.
*
*****
* component 605 - tube bundle to steam dome
*****
*
6050000 ristodm sngljun
6050101 060010000 061000000 .084496 0.0 0.0 01000
6050201 0 .1872706 .329899 0. * 8.31636
6050110 0.328 0. 1. 1.
*
*****
* component 608 - top steam dome to steam line
*****
*
6080000 tostmln sngljun
6080101 068010000 069000000 .0011401 0.0 0.0 01100
6080201 0 6.396664 6.48532 0. * .2836816
6080110 .0381 0. 1. 1.
*
*****

```

```

*   component 606 - steamline outlet
*****
*
6060000      "trb st n"      valve
6060101      069010000      607000000      1.14e-3      0.0      0.0      00000
6060201      1      0.      .5234      0
6060300      srvvlv
6060301      266      0 * steamctl...tcctl
6060401      0.0      0.      0.0
6060402      1.0      9357.2735      0.0 * this must be doubled
6060110      .0525      0.      1.      1.
*
*****
*   component 607 - steamline sink volume
*****
*
6070000      stmsink      tmdpvol
6070101      1.0e6      1.0      0.0      0.0      0.0      0.0      0.0      10
6070200      102      0
6070201      0.0      1.013e5      1.0
*
*****
*
*steam generator secondary system components - single loop b
*
*****
*
*****
*   component 70 - sg riser
*****
*
0700000      tube bun      pipe
0700001      10
0700101      0.0      10      *volume areas
0700201      0.0      9      *junction areas
0700301      0.2      1      *volume lengths
0700302      0.4      2      *volume lengths
0700303      0.6      3      *volume lengths
0700304      0.8      4      *volume lengths
0700305      1.0      5      *volume lengths
0700306      1.5      9      *volume lengths
0700307      1.8025      10      *volume lengths
0700401      0.01151      1      *volume volumes
0700402      0.02303      2      *volume volumes
0700403      0.03454      3      *volume volumes
0700404      0.04605      4      *volume volumes
0700405      0.05756      5      *volume volumes
0700406      0.08635      9      *volume volumes

```

```

0700407 0.10376 10 *volume volumes
0700601 90. 10 *vertical angles
0700801 4.57e-5 0.03503 10 *roughness diam
0700901 0.709 0.709 9 *junction resistance
0701001 00100 10 *flags pvbfe
0701101 01000 9 *flags vcahs
0701201 0 7028456. 1248771. 2582846. .042479 0. 1
0701202 0 7026396. 1249808. 2582862. .0791885 0. 2
0701203 0 7023096. 1250779. 2582890. .100384 0. 3
0701204 0 7018676. 1251212. 2582926. .1024675 0. 4
0701205 0 7013236. 1251169. 2582972. .1001885 0. 5
0701206 0 7016020. 1250342. 2583030. .137237 0. 6
0701207 0 7017640. 1250435. 2583100. .1617664 0. 7
0701208 0 6999476. 1250028. 2583166. .20956 0. 8
0701209 0 6991468. 1249626. 2583234. .253402 0. 9
0701210 0 6982900. 1249192. 2583306. .319663 0. 10
0701300 0
0701301 .231368 .253318 0. 1 * 8.3189
0701302 .2968235 .3436065 0. 2 * 8.32017
0701303 .3058306 .414301 0. 3 * 8.32394
0701304 .318744 .485924 0. 4 * 8.32663
0701305 .3353457 .542248 0. 5 * 8.32915
0701306 .3635625 .6048185 0. 6 * 8.33147
0701307 .3508196 .661324 0. 7 * 8.33338
0701308 .417346 .713936 0. 8 * 8.33501
0701309 .444791 .775627 0. 9 * 8.33651
0701401 .03503 0. 1. 1. 9

```

*

* component 71 - lower steam dome

*

```

0710000 lstmdom pipe
0710001 3
0710101 0.0 3 *volume area
0710201 0.0 2 *junction area
0710301 0.158 1 *volume length
0710302 0.7925 2
0710303 0.900 3
0710401 0.010393 1 *volume volumes
0710402 0.03861 2 *volume volumes
0710403 0.04385 3 *volume volumes
0710601 90. 3
0710801 4.57e-5 .249 3 *rough diam
0710901 0.0 0.0 2 *junction f-loss r-loss
0711001 00000 3 * vol flags
0711101 01000 2 * vcahs
0711201 0 6977848. 1248987. 2583346. .1070403 0. 1

```

```

0711202 0      6975112. 1248752. 2583374. .124302 0. 2
0711203 0      6969880. 1248488. 2583418. .1005756 0. 3
0711300 0
0711301 .426618 1.27186 0. 1 * 8.28098
0711302 .432377 1.227373 0. 2 * 8.30996
0711401 .249 0. 1. 1. 2
*
*****
* component 72 - middle steam dome and separator
*****
*
0720000 mstmdom branch
0720001 3 0
0720101 0.0 2.16 0.59549 0.0 90. 2.16 4.57e-5 .249 00
0720200 0 6953520. 1248202. 2583470. .64374
0721101 072010000 078000000 .502655 .816 .452 01000
0722101 072000000 073000000 44.915e-2 .060 .014 01002
0723101 071010000 072000000 4.8695e-2 0.0 0.0 01000
0721201 -0.49608 .04985623 0. * .283642
0722201 .3790846 2.01394252 0. * 8.05382
0723201 .50494 2.04995 0. * 8.2958
0721110 .800 0. 1. 1.
0722110 .539 0. 1. 1.
0723110 .249 0. 1. 1.
*
*****
* component 73 - upper downcomer
*****
*
0730000 updwnc snglvol
0730101 0.0 0.3375 .14922 0.0 -90. -.3375 4.57e-5 .539 00
0730200 0 6953596. 1248164. 2583470. .594008
*
*****
* component 74 - upper feedwater ring
*****
*
0740000 ufwring snglvol
0740101 0.0 1.6055 0.15856 0.0 -90. -1.6055 4.57e-5 0.176 00
0740200 0 6965196. 1248192. 2583464. .388591
*
*****
* component 75 - lower feedwater ring
*****
*
0750000 lfwring branch
0750001 2 0
0750101 0.0 .8275 .08172 0.0 -90. -.8275 4.57e-5 .176 00

```

```

0750200 0      6970192. 1246853. 2583416. .022155
0751101 074010000 075000000 .09648 0.0 0.0 01000
0752101 075010000 076000000 3.0415e-2 .339 .459 01000
0751201 .2679376 .09100312 0. * 8.05953
0752201 .651864 0.086746 0. * 10.24751
0751110 .176 0. 1. 1.
0752110 .05983 0. 1. 1.
*
*****
* component 76 - 11 tube region
*****
*
0760000 dc11tube snglvol
0760101 0.0 1.9815 0.06336 0.0 -90. -1.9815 4.57e-5 .05983 00
0760200 0      6988432. 1247671. 2583348. .071796
*
*****
* component 77 - sg-dc bottom part (4 tube region and bottom annulus)
*****
*
0770000 dc4tube pipe
0770001 9
0770101 0.0 9 *volume areas
0770201 0.0 8 *junction areas
0770301 1.481 1 *volume lengths
0770302 1.5 4 *volume lengths
0770303 1.0 5 *volume lengths
0770304 0.8 6 *volume lengths
0770305 0.6 7 *volume lengths
0770306 0.4 8 *volume lengths
0770307 0.2 9 *volume lengths
0770401 8.6429e-3 1 *volume volumes
0770402 8.7538e-3 4 *volume volumes
0770403 5.8359e-3 5 *volume volumes
0770404 4.6687e-3 6 *volume volumes
0770405 3.5015e-3 7 *volume volumes
0770406 2.3343e-3 8 *volume volumes
0770407 4.0563e-3 9 *volume volumes
0770601 -90. 9 *vertiical angles
0770801 4.57e-5 0.0431 9 *roughness diam
0770901 0.0 0.0 7 *junction resistance
0770902 0.5 1.0 8 *junction resistance
0771001 00100 9 *flags pvbfe
0771101 01000 8 *flags vcahs
0771201 0 6986060. 1247739. 2583284. .0517344 0. 1
0771202 0 6995548. 1247816. 2583204. .0487328 0. 2
0771203 0 7005052. 1247899. 2583124. .0467894 0. 3
0771204 0 7004576. 1247988. 2583046. .0447651 0. 4

```

```

0771205 0 7012532. 1248050. 2582978. .0433005 0. 5
0771206 0 7018268. 1248102. 2582930. .0424226 0. 6
0771207 0 7022724. 1248145. 2582894. .0435893 0. 7
0771208 0 7025876. 1248196. 2582866. .0598894 0. 8
0771209 0 7028420. 1248220. 2582846. .02781746 0. 9
0771300 0
0771301 2.941365 1.779785 0. 1 * 8.31366
0771302 2.940042 1.7791977 0. 2 * 8.30743
0771303 2.945814 1.7799384 0. 3 * 8.30815
0771304 2.941764 1.7793686 0. 4 * 8.30803
0771305 2.948793 1.779058 0. 5 * 8.30793
0771306 2.947078 1.77928 0. 6 * 8.30804
0771307 2.94953 1.77196 0. 7 * 8.3067
0771308 2.944037 1.798198 0. 8 * 8.31625
0771401 .0431 0. 1. 1. 8
*
*****
* component 709 - feedwater source
*****
*
0790000 feedwtr tmdpvol
0790101 1.0e6 1.0 0.0 0.0 0.0 0.0 0.0 0.0 11
0790200 103 0
0790201 0.0 6.910e6 491.1
*
*****
* component 78 - top of steam dome
*****
*
0780000 tstmdom snglvol
0780101 0.0 0.4 0.13404 0.0 90. 0.4 4.57e-5 .653 00
0780200 0 6952032. 1247984. 2583424. 1.
*
*****
* component 79 - steamline
*****
*
0790000 stmline pipe
0790001 2
0790101 0.0 2 *volume areas
0790201 0.0 1 *junction areas
0790301 15.825 2 *volume lengths
0790401 34.25e-3 2 *volume volumes
0790601 -90. 2 *vertical angles
0790701 -8.049 2 *delta z
0790801 4.57e-5 0.0525 2 *roughness diam
0790901 2.888 2.888 1 *junction loss coef
0791001 00 2 * fe

```

```

0791101 01000 1          *vcahs
0791201 0      6941284. 1247946. 2583452. 1.      0. 1
0791202 0      6931772. 1247971. 2583498. 1.      0. 2
0791300 0
0791301 6.25976 6.49588 0. 1 * .283683
0791401 .0525 0. 1. 1. 1
*
*****
* feedwater
*****
*
*****
* component 701 - feedwater junction
*****
*
7010000 "fedwtr" tmdpjun
7010101 709000000 075000000 0.0
7010200 1 0 cntrlvar 273 * feedctl
7010201 -1.0e+75 0.0 0.0 0.0
7010202 -1.1e+10 0.0 0.0 0.0
7010203 -1.0e+10 -1.0e+10 0.0 0.0
7010204 -1.0e+9 -1.0e+9 0.0 0.0
7010205 -1.0e+8 -1.0e+8 0.0 0.0
7010206 -1.0e+7 -1.0e+7 0.0 0.0
7010207 -1.0e+6 -1.0e+6 0.0 0.0
7010208 -8.0e+5 -8.0e+5 0.0 0.0
7010209 -6.0e+5 -6.0e+5 0.0 0.0
7010210 -4.0e+5 -4.0e+5 0.0 0.0
7010211 -2.0e+5 -2.0e+5 0.0 0.0
7010212 0.0 0.0 0.0 0.0
7010213 2.0e+5 2.0e+5 0.0 0.0
7010214 4.0e+5 4.0e+5 0.0 0.0
7010215 6.0e+5 6.0e+5 0.0 0.0
7010216 8.0e+5 8.0e+5 0.0 0.0
7010217 1.0e+6 1.0e+6 0.0 0.0
7010218 1.0e+7 1.0e+7 0.0 0.0
7010219 1.0e+8 1.0e+8 0.0 0.0
7010220 1.0e+9 1.0e+9 0.0 0.0
7010221 1.0e+10 1.0e+10 0.0 0.0
*
*****
* component 702 - junction between 11-tube and 4-tube regions
*****
*
7020000 sgdwnc sngljun
7020101 076010000 077000000 .005836 1.5 1.5 01000
7020201 0 3.3464 2.801928 0. * 8.25925
7020110 .0431 0. 1. 1.

```

```

*
*****
*   component 703 - downcomer to tube bundle
*****
*
7030000  sgdcbot  sngljun
7030101  077010000  070000000 .025761 1.0  0.5  01000
7030201  0 .758816 .5368226 0. * 8.30314
7030110  .02  0.  1.  1.
*
*****
*   component 704 - steamdome to downcomer
*****
*
7040000  sgdc top  sngljun
7040101  073010000  074000000 .09648 0.0  0.0  01000
7040201  0 6.98816 .01109985 0. * 8.05694
7040110  .176 0.  1.  1.
*
*****
*   component 705 - tube bundle to steam dome
*****
*
7050000  ristodm  sngljun
7050101  070010000  071000000 .084496 0.0  0.0  01000
7050201  0 .1872706 .329899 0. * 8.31636
7050110  0.328 0.  1.  1.
*
*****
*   component 708 - top steam dome to steam line
*****
*
7080000  tostmln  sngljun
7080101  078010000  079000000 .0011401 0.0  0.0  01100
7080201  0 6.396664 6.48532 0. * .2836816
7080110  .0381 0.  1.  1.
*
*****
*   component 706 - steamline outlet
*****
*
7060000  "trb st n"  valve
7060101  079010000  707000000 1.14e-3 0.0  0.0  00000
7060201  1 0. .5234 0
7060300  srvvlv
7060301  276 0 * steamctl...tcctl
7060401  0.0 0. 0.0
7060402  1.0 9357.2735 0.0 * this must be doubled

```


0801206	0	7016020.	1250842.	2583030.	.137237	0.	6
0801207	0	7017640.	1250435.	2583100.	.1617664	0.	7
0801208	0	6999476.	1250028.	2583166.	.20956	0.	8
0801209	0	6991468.	1249626.	2583234.	.253402	0.	9
0801210	0	6982900.	1249192.	2583306.	.319663	0.	10
0801300	0						
0801301		.291368	.253318	0. 1 *	8.3189		
0801302		.2968235	.3436065	0. 2 *	8.32017		
0801303		.3058306	.414301	0. 3 *	8.32394		
0801304		.318744	.485924	0. 4 *	8.32663		
0801305		.3353457	.542248	0. 5 *	8.32915		
0801306		.3635625	.6048185	0. 6 *	8.33147		
0801307		.3908196	.661324	0. 7 *	8.33338		
0801308		.417346	.713936	0. 8 *	8.33501		
0801309		.444791	.775627	0. 9 *	8.33651		
0801401		.03503	0.	1.	1.	9	

*

* component 81 - lower steam dome

*

0810000	lstmdom	pipe					
0810001	3						
0810101	0.0	3	*volume area				
0810201	0.0	2	*junction area				
0810301	0.158	1	*volume length				
0810302	0.7925	2					
0810303	0.900	3					
0810401	0.010393	1	*volume volumes				
0810402	0.03861	2	*volume volumes				
0810403	0.04385	3	*volume volumes				
0810601	90.	3					
0810801	4.57e-5	.249	3	*rough diam			
0810901	0.0	0.0	2	*junction f-loss	r-loss		
0811001	00000	3	* vol flags				
0811101	01000	2	* vcahs				
0811201	0	6977848.	1248987.	2583346.	.1070403	0. 1	
0811202	0	6965112.	1248752.	2583374.	.124302	0. 2	
0811203	0	6969880.	1248488.	2583418.	.1005756	0. 3	
0811300	0						
0811301	.426618	1.271086	0. 1 *	8.28098			
0811302	.432377	1.227373	0. 2 *	8.30996			
0811401	.249	0.	1.	1.	2		

*

* component 82 - middle steam dome and separator

*

```

0820000 mstmdom branch
0820001 3 0
0820101 0.0 2.16 0.59549 0.0 90. 2.16 4.57e-5 .249 00
0820200 0 6953520. 1248202. 2583470. .64374
0821101 082010000 088000000 .502655 .816 .452 01000
0822101 082000000 083000000 44.915e-2 .060 .014 01002
0823101 081010000 082000000 4.8695e-2 0.0 0.0 01000
0821201 -0.49608 .04985623 0. * .283642
0822201 .3790846 2.01394252 0. * 8.05382
0823201 .50494 2.04995 0. * 8.2958
0821110 .800 0. 1. 1.
0822110 .539 0. 1. 1.
0823110 .249 0. 1. 1.
*
*****
* component 83 - upper downcomer
*****
*
0830000 updwnc snglvol
0830101 0.0 0.3375 .14922 0.0 -90. -.3375 4.57e-5 .539 00
0830200 0 6953596. 1248164. 2583470. .594008
*
*****
* component 84 - upper feedwater ring
*****
*
0840000 ufwring snglvol
0840101 0.0 1.6055 0.15856 0.0 -90. -1.6055 4.57e-5 0.176 00
0840200 0 6965196. 1248192. 2583464. .388591
*
*****
* component 85 - lower feedwater ring
*****
*
0850000 lfwring branch
0850001 2 0
0850101 0.0 .8275 .08172 0.0 -90. -.8275 4.57e-5 .176 00
0850200 0 6970192. 1246853. 2583416. .022155
0851101 084010000 085000000 .09648 0.0 0.0 01000
0852101 085010000 086000000 3.0415e-2 .339 .459 01000
0851201 .2679376 .09100312 0. * 8.05953
0852201 .651864 0.076746 0. * 10.24751
0851110 .176 0. 1. 1.
0852110 .05983 0. 1. 1.
*
*****
* component 86 - 11 tube region
*****

```

```

*
0860000  dc11tube  snglvol
0860101  0.0  1.9815  0.06336  0.0  -90.  -1.9815  4.57e-5  .05983  00
0860200  0  6988432.  1247671.  2583348.  .071796
*
*****
*  component 87 - sg-dc bottom part (4 tube region and bottom annulus)
*****
*
0870000  dc4tube  pipe
0870001  9
0870101  0.0  9  *volume areas
0870201  0.0  8  *junction areas
0870301  1.481  1  *volume lengths
0870302  1.5  4  *volume lengths
0870303  1.0  5  *volume lengths
0870304  0.8  6  *volume lengths
0870305  0.6  7  *volume lengths
0870306  0.4  8  *volume lengths
0870307  0.2  9  *volume lengths
0870401  8.6429e-3  1  *volume volumes
0870402  8.7538e-3  4  *volume volumes
0870403  5.8359e-3  5  *volume volumes
0870404  4.6687e-3  6  *volume volumes
0870405  3.5015e-3  7  *volume volumes
0870406  2.3343e-3  8  *volume volumes
0870407  4.0563e-3  9  *volume volumes
0870601  -90.  9  *vertiical angles
0870801  4.57e-5  0.0431  9  *roughness diam
0870901  0.0  0.0  7  *junction resistance
0870902  0.5  1.0  8  *junction resistance
0871001  00100  9  *flags pvbfe
0871101  01000  8  *flags vcahs
0871201  0  6986060.  1247739.  2583284.  .0517344  0.  1
0871202  0  6995548.  1247816.  2583204.  .0487328  0.  2
0871203  0  7005052.  1247899.  2583124.  .0467894  0.  3
0871204  0  7004576.  1247988.  2583046.  .0447651  0.  4
0871205  0  7012532.  1248050.  2582978.  .0433005  0.  5
0871206  0  7018268.  1248102.  2582930.  .0424226  0.  6
0871207  0  7022724.  1248145.  2582894.  .0435893  0.  7
0871208  0  7025876.  1248196.  2582866.  .0598894  0.  8
0871209  0  7028420.  1248220.  2582846.  .02781746  0.  9
0871300  0
0871301  2.943655  1.79785  0.  1  *  8.31366
0871302  2.940042  1.791977  0.  2  *  8.30743
0871303  2.945814  1.799384  0.  3  *  8.30815
0871304  2.941764  1.793686  0.  4  *  8.30803
0871305  2.948793  1.79058  0.  5  *  8.30793

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```

0871306    2.947078    1.7928    0. 6 * 8.30804
0871307    2.94953    1.7996    0. 7 * 8.3067
0871308    2.944037    1.79198    0. 8 * 8.31625
0871401    .0431      0.      1.      1.      8
*
*****
*   component 809 - feedwater source
*****
*
8090000    feedwtr    tmdpv01
8090101    1.0e6      1.0      0.0      0.0      0.0      0.0      0.0      11
8090200      103      0
8090201      0.0      6.910e6    491.1
*
*****
*   component 88 - top of steam dome
*****
*
0880000    tstmdom    snglv01
0880101      0.0      0.4      0.13404    0.0      90.      0.4      4.57e-5 .653    00
0880200      0      6952032. 1247984. 2583424. 1.
*
*****
*   component 89 - steamline
*****
*
0890000    stmline    pipe
0890001      2
0890101      0.0      2      *volume areas
0890201      0.0      1      *junction areas
0890301      15.825      2      *volume lengths
0890401      34.25e-3      2      *volume volumes
0890601      -90.      2      *vertical angles
0890701      -8.049      2      *delta z
0890801      4.57e-5      0.0525      2      *roughness diam
0890901      2.888      2.888      1      *junction loss coef
0891001      00      2      * fe
0891101      01000      1      *vcchs
0891201      0      6941284. 1247946. 2583452. 1.      0. 1
0891202      0      6931772. 1247971. 2583498. 1.      0. 2
0891300      0
0891301      6.25976      6.49588      0. 1 * .283683
0891401      .0525      0.      1.      1.      1
*
*****
*   feedwater
*****
*

```

```

*****
*   component 801 - feedwater junction
*****
*
8010000      "fedwtr"      tmdpjun
8010101      809000000    085000000    0.0-
8010200      1            0            cntrlvar      283      * feedctl
8010201      -1.0e+75      0.0            0.0            0.0
8010202      -1.1e+10      0.0            0.0            0.0
8010203      -1.0e+10      -1.0e+10      0.0            0.0
8010204      -1.0e+9       -1.0e+9       0.0            0.0
8010205      -1.0e+8       -1.0e+8       0.0            0.0
8010206      -1.0e+7       -1.0e+7       0.0            0.0
8010207      -1.0e+6       -1.0e+6       0.0            0.0
8010208      -8.0e+5       -8.0e+5       0.0            0.0
8010209      -6.0e+5       -6.0e+5       0.0            0.0
8010210      -4.0e+5       -4.0e+5       0.0            0.0
8010211      -2.0e+5       -2.0e+5       0.0            0.0
8010212      0.0           0.0           0.0            0.0
8010213      2.0e+5        2.0e+5        0.0            0.0
8010214      4.0e+5        4.0e+5        0.0            0.0
8010215      6.0e+5        6.0e+5        0.0            0.0
8010216      8.0e+5        8.0e+5        0.0            0.0
8010217      1.0e+6        1.0e+6        0.0            0.0
8010218      1.0e+7        1.0e+7        0.0            0.0
8010219      1.0e+8        1.0e+8        0.0            0.0
8010220      1.0e+9        1.0e+9        0.0            0.0
8010221      1.0e+10       1.0e+10       0.0            0.0
*
*****
*   component 802 - junction between 11-tube and 4-tube regions
*****
*
8020000      sgdwnc      sngljun
8020101      086010000    087000000    .005836    1.5    1.5    01000
8020201      0    3.3464    2.801928    0.    *    8.25925
8020110      .0431    0.    1.    1.
*
*****
*   component 803 - downcomer to tube bundle
*****
*
8030000      sgdcbot      sngljun
8030101      087010000    080000000    .025761    1.0    0.5    01000
8030201      0    .758816    .5358226    0.    *    8.30314
8030110      .02    0.    1.    1.
*
*****

```

```

*   component 804 - steamdome to downcomer
*****
*
8040000  sgdc top  sngljun
8040101  083010000  084000000 .09648  0.0  0.0  01000
8040201  0  6.98816  .01109985  0.  *  8.05694
8040110  .176  0.  1.  1.
*
*****
*   component 805 - tube bundle to steam dome
*****
*
8050000  ristodm  sngljun
8050101  080010000  081000000 .084496  0.0  0.0  01000
8050201  0  .1872706  .329899  0.  *  8.31636
8050110  0.328  0.  1.  1.
*
*****
*   component 808 - top steam dome to steam line
*****
*
8080000  tostmln  sngljun
8080101  088010000  089000000 .0011401  0.0  0.0  01100
8080201  0  6.396664  6.48532  0.  *  .2836816
8080110  .0381  0.  1.  1.
*
*****
*   component 806 - steamline outlet
*****
*
8060000  "trb st n"  valve
8060101  089010000  807000000  1.14e-3  0.0  0.0  00000
8060201  1  0.  .5234  0
8060300  srvvlv
8060301  286  0  * steamctl...tcctl
8060401  0.0  0.  0.0
8060402  1.0  9357.2735  0.0
8060110  .0525  0.  1.  1.
*
*****
*   component 807 - steamline sink volume
*****
*
8070000  stmsink  tmdpv01
8070101  1.0e6  1.0  0.0  0.0  0.0  0.0  0.0  10
8070200  102  0
8070201  0.0  1.013e5  1.0
*

```

```

*****
* reactor vessel heat structures
*****
*
*****
* core heater rod heat structures
*****
*
10131000 12 8 2 1 0.0
10131100 0 1
10131101 4 0.00415
10131102 3 0.00475
10131201 2 4
10131202 1 7
10131301 1.0 4
10131302 0.0 7
10131401 623. 5
10131402 573. 8
10131501 0 0 0 0 0.0 1
10131502 0 0 0 0 0.0 2
10131503 0 0 0 0 0.0 3
10131504 0 0 0 0 0.0 4
10131505 0 0 0 0 0.0 5
10131506 0 0 0 0 0.0 6
10131507 0 0 0 0 0.0 7
10131508 0 0 0 0 0.0 8
10131509 0 0 0 0 0.0 9
10131510 0 0 0 0 0.0 10
10131511 0 0 0 0 0.0 11
10131512 0 0 0 0 0.0 12
10131601 013020000 0 1 0 6.744 1
10131602 013020000 0 1 0 3.321 2
10131603 013030000 0 1 0 3.321 5
10131604 013040000 0 1 0 3.321 7
10131605 013050000 0 1 0 3.321 10
10131606 013060000 0 1 0 3.321 11
10131607 013060000 0 1 0 6.744 12
10131701 1 0.076480 0 0 1
10131702 1 0.049032 0 0 2
10131703 1 0.068217 0 0 3
10131704 1 0.087402 0 0 4
10131705 1 0.105168 0 0 5
10131706 1 0.113701 0 0 6
10131707 1 0.113701 0 0 7
10131708 1 0.105168 0 0 8
10131709 1 0.087402 0 0 9
10131710 1 0.068217 0 0 10
10131711 1 0.049032 0 0 11

```



```

10131712 1 0.076480 0 0 12
10131801 0.0 10. 10. 0. 0. 0. 0. 1.0 12
10131901 1.178e-2 10. 10. 0. 0. 0. 0. 1.0 12
*
*****
*
* core baffle heat structure
*
*****
*
10141000 7 4 2 1 0.214572 0
10141100 0 1
10141101 3 .215772
10141201 1 3
10141301 0.0 3
10141401 588.8 4
10141501 013010000 00000 1 1 0.11 1
10141502 013020000 00000 1 1 0.788 2
10141503 013030000 00000 1 1 0.78 3
10141504 013040000 00000 1 1 0.52 4
10141505 013050000 00000 1 1 0.78 5
10141506 013060000 00000 1 1 0.788 6
10141507 013070000 00000 1 1 0.35 7
10141601 014010000 00000 1 1 0.11 1
10141602 014020000 00000 1 1 0.788 2
10141603 014030000 00000 1 1 0.78 3
10141604 014040000 00000 1 1 0.52 4
10141605 014050000 00000 1 1 0.78 5
10141606 014060000 00000 1 1 0.788 6
10141607 014070000 00000 1 1 0.35 7
10141701 0 0.0 0.0 0.0 7
10141801 0.0 10. 10. 0. 0. 0. 0. 1.0 7
10141901 0.0 10. 10. 0. 0. 0. 0. 1.0 7
*
*****
* lowest part of pressure vessel
*****
10110000 1 4 2 1 0.250000 0
10110100 0 1
10110101 3 0.282000
10110201 1 3
10110301 0.0 3
10110401 558.8 4
10110501 011010000 00000 1 1 1.54900 1
10110601 000000000 00000 0 1 1.549 1
10110701 0 0.0 0.0 0.0 1
10110801 0.0 10. 10. 0. 0. 0. 0. 1.0 1
10110901 0.0 10. 10. 0. 0. 0. 0. 1.0 1

```

```

*
*****
* lowest 2nd-part of pressure vessel
*****
10120000 1 4 2 1 0.171500 0
10120100 0 1
10120101 3 0.181500
10120201 1 3
10120301 0.0 3
10120401 558.8 4
10120501 012010000 00000 1 1 0.51985 1
10120601 022070000 00000 1 1 0.51985 1
10120701 0 0.0 0.0 0.0 1
10120801 0.0 10. 10. 0. 0. 0. 0. 1.0 1
10120901 0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* pressure vessel surrounded by core bypass volume
*****
10140000 7 4 2 1 0.171500 0
10140100 0 1
10140101 3 0.199500
10140201 1 3
10140301 0.0 3
10140401 558.8 4
10140501 014010000 00000 1 1 0.12353 1
10140502 014020000 00000 1 1 0.86882 2
10140503 014030000 00000 1 1 0.86000 3
10140504 014040000 00000 1 1 0.57334 4
10140505 014050000 00000 1 1 0.86000 5
10140506 014060000 00000 1 1 0.86882 6
10140507 014070000 00000 1 1 0.12353 7
10140601 000000000 00000 0 1 0.12353 1
10140602 000000000 00000 0 1 0.86882 2
10140603 000000000 00000 0 1 0.86000 3
10140604 000000000 00000 0 1 0.57334 4
10140605 000000000 00000 0 1 0.86000 5
10140606 000000000 00000 0 1 0.86882 6
10140607 000000000 00000 0 1 0.12353 7
10140701 0 0.0 0.0 0.0 7
10140801 0.0 10. 10. 0. 0. 0. 0. 1.0 7
10140901 0.0 10. 10. 0. 0. 0. 0. 1.0 7
*
*****
* upper part of pressure vessel
*****
10990000 1 4 2 1 0.171500 0
10990100 0 1

```

```

10990101      3      0.199500
10990201      1 3
10990301      0.0 3
10990401      558.8 4
10990501      099010000 00000 1 1 0.55248 1
10990601      000000000 00000 0 1 0.55248 1
10990701      0 0.0 0.0 0.0 1
10990801      0.0 10. 10. 0. 0. 0. 0. 1.0 1
10990901      0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper plenum of pressure vessel
*****
10150000      1 4 2 1 0.171500 0
10150100      0 1
10150101      3      0.199500
10150201      1 3
10150301      0.0 3
10150401      558.8 4
10150501      015010000 00000 1 1 1.02406 1
10150601      000000000 00000 0 1 1.02406 1
10150701      0 0.0 0.0 0.0 1
10150801      0.0 10. 10. 0. 0. 0. 0. 1.0 1
10150901      0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* extended upper plenum structure
*****
10160000      1 4 2 1 0.171500 0
10160100      0 1
10160101      3      0.199500
10160201      1 3
10160301      0.0 3
10160401      558.8 4
10160501      016010000 00000 1 1 0.75747 1
10160601      000000000 00000 0 1 0.75747 1
10160701      0 0.0 0.0 0.0 1
10160801      0.0 10. 10. 0. 0. 0. 0. 1.0 1
10160901      0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper plenum to upper head side structure ( part1 )
*****
10161000      1 4 2 1 0.129000 0
10161100      0 1
10161101      3      0.146000
10161201      1 3
10161301      0.0 3

```

```

10161401    558.8    4
10161501    016010000    00000    1    1    0.57534    1
10161601    019010000    00000    1    1    0.57534    1
10161701    0    0.0    0.0    0.0    1
10161801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10161901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper plenum to upper head side structure ( part 2)
*****
10162000    1    4    2    1    0.100000    0
10162100    0    1
10162101    3    0.105000
10162201    1    3
10162301    0.0 3
10162401    558.8    4
10162501    016010000    00000    1    1    0.86798    1
10162601    019010000    00000    1    1    0.86798    1
10162701    0    0.0    0.0    0.0    1
10162801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10162901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper plenum to upper head side structure ( part 3) : rectangular
*****
10163000    1    4    1    1    0.000000    0
10163100    0    1
10163101    3    0.010000
10163201    1    3
10163301    0.0 3
10163401    558.8    4
10163501    016010000    00000    1    1    0.01670    1
10163601    018010000    00000    1    1    0.01670    1
10163701    0    0.0    0.0    0.0    1
10163801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10163901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper plenum to upper head side structure ( part 4) : rectangular
*****
10164000    1    4    1    1    0.000000    0
10164100    0    1
10164101    3    0.035000
10164201    1    3
10164301    0.0 3
10164401    558.8    4
10164501    016010000    00000    1    1    0.12900    1
10164601    019010000    00000    1    1    0.12900    1

```

```

10164701    0    0.0    0.0    0.0    1
10164801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10164901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper head structure ( part 1 )
*****
10180000    1    4    2    1    0.190000    0
10180100    0 1
10180101    3    0.218000
10180201    1 3
10180301    0.0 3
10180401    558.8 4
10180501    018010000    00000    1    1    0.37030 1
10180601    000000000    00000    0    1    0.37030 1
10180701    0    0.0    0.0    0.0    1
10180801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10180901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upper head structure ( part 2 )
*****
10190000    1    4    2    1    0.190000    0
10190100    0 1
10190101    3    0.218000
10190201    1 3
10190301    0.0 3
10190401    558.8 4
10190501    019010000    00000    1    1    2.72586 1
10190601    000000000    00000    0    1    2.72586 1
10190701    0    0.0    0.0    0.0    1
10190801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10190901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* upperhead to downcomer structure
*****
10210000    3    4    2    1    0.024600    0
10210100    0 1
10210101    3    0.030150
10210201    1 3
10210301    0.0 3
10210401    558.8 4
10210501    021010000    00000    1    1    9.25200 1
10210502    021020000    00000    1    1    6.00900 2
10210503    021030000    00000    1    1    1.10200 3
10210601    000000000    00000    0    1    9.25200 1
10210602    000000000    00000    0    1    6.00900 2

```

```

10210603 000000000 00000 0 1 1.10200 3
10210701 0 0.0 0.0 0.0 3
10210801 0.0 10. 10. 0. 0. 0. 0. 1.0 3
10210901 0.0 10. 10. 0. 0. 0. 0. 1.0 3
*
*****
* upper downcomer : connecting cold legs
*****
10200000 1 4 2 1 0.125000 0
10200100 0 1
10200101 3 0.164150
10200201 1 3
10200301 0.0 3
10200401 558.8 4
10200501 020010000 00000 1 1 0.92300 1
10200601 000000000 00000 0 1 0.923 1
10200701 0 0.0 0.0 0.0 1
10200801 0.0 10. 10. 0. 0. 0. 0. 1.0 1
10200901 0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* internal trefoil shaped pieces in upper downcomer : Rectangular
*****
10201000 1 4 1 1 0.000000 0
10201100 0 1
10201101 3 0.003000
10201201 1 3
10201301 0.0 3
10201401 558.8 4
10201501 020010000 00000 1 1 0.33000 1
10201601 000000000 00000 0 1 0.33 1
10201701 0 0.0 0.0 0.0 1
10201801 0.0 10. 10. 0. 0. 0. 0. 1.0 1
10201901 0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*****
* downcomer heat structure
*****
10220000 6 4 2 1 0.086500 0
10220100 0 1
10220101 3 0.105000
10220201 1 3
10220301 0.0 3
10220401 558.8 4
10220501 022010000 00000 1 1 1.41700 1
10220502 022020000 00000 1 1 1.41700 2
10220503 022030000 00000 1 1 1.41700 3
10220504 022040000 00000 1 1 1.41700 4

```

```

10220505    022050000    00000    1    1    0.40900    5
10220506    022060000    00000    1    1    0.58900    6
10220601    000000000    00000    0    1    1.41700    1
10220602    000000000    00000    0    1    1.41700    2
10220603    000000000    00000    0    1    1.41700    3
10220604    000000000    00000    0    1    1.41700    4
10220605    000000000    00000    0    1    0.40900    5
10220606    000000000    00000    0    1    0.58900    6
10220701    0    0.0    0.0    0.0    6
10220801    0.0 10. 10. 0. 0. 0. 0. 1.0 6
10220901    0.0 10. 10. 0. 0. 0. 0. 1.0 6
*
*****
* lower downcomer : connecting lower plenum
*****
10221000    1    4    2    1    0.199000    0
10221100    0    1
10221101    3    0.247000
10221201    1    3
10221301    0.0    3
10221401    558.8    4
10221501    022070000    00000    1    1    0.80202    1
10221601    000000000    00000    0    1    0.80202    1
10221701    0    0.0    0.0    0.0    1
10221801    0.0 10. 10. 0. 0. 0. 0. 1.0 1
10221901    0.0 10. 10. 0. 0. 0. 0. 1.0 1
*
*
*****
* loop heat structures
*****
*
*****
* ht str no. 31, 32, 33
*****
*
10311000    21    6    2    1    0.059    0
10311100    0    1
10311101    5    0.075
10311201    1    5
10311301    0.0    5
10311400    0
10311401    563.300    6
10311501    031010000    10000    1    1    1.1941    1
10311502    032010000    10000    1    1    0.5    2
10311503    033010000    10000    1    1    0.7977    3
10311504    033020000    0    1    1    1.4480    4
10311505    033030000    0    1    1    0.5506    5

```

10311506	034010000	0	1	1	0.7980	6	
10311507	034220000	0	1	1	0.7980	7	
10311508	041010000	10000	1	1	1.1941	8	
10311509	042010000	10000	1	1	0.5	9	
10311510	043010000	10000	1	1	0.7977	10	
10311511	043020000	0	1	1	1.4480	11	
10311512	043030000	0	1	1	0.5506	12	
10311513	044010000	0	1	1	0.7980	13	
10311514	044220000	0	1	1	0.7980	14	
10311515	051010000	10000	1	1	1.1941	15	
10311516	052010000	10000	1	1	0.5941	16	
10311517	053010000	10000	1	1	0.7977	17	
10311518	053020000	0	1	1	1.4480	18	
10311519	053030000	0	1	1	0.5506	19	
10311520	054010000	0	1	1	0.7980	20	
10311521	054220000	0	1	1	0.7980	21	
10311601	000000000	10000	0	1	1.1941	1	
10311602	000000000	10000	0	1	0.5	2	
10311603	000000000	10000	0	1	0.7977	3	
10311604	000000000	0	0	1	1.4480	4	
10311605	000000000	0	0	1	0.5506	5	
10311606	000000000	0	0	1	0.7980	6	
10311607	000000000	0	0	1	0.7980	7	
10311608	000000000	10000	0	1	1.1941	8	
10311609	000000000	10000	0	1	0.5	9	
10311610	000000000	10000	0	1	0.7977	10	
10311611	000000000	0	0	1	1.4480	11	
10311612	000000000	0	0	1	0.5506	12	
10311613	000000000	0	0	1	0.7980	13	
10311614	000000000	0	0	1	0.7980	14	
10311615	000000000	10000	0	1	1.1941	15	
10311616	000000000	10000	0	1	0.5941	16	
10311617	000000000	10000	0	1	0.7977	17	
10311618	000000000	0	0	1	1.4480	18	
10311619	000000000	0	0	1	0.5506	19	
10311620	000000000	0	0	1	0.7980	20	
10311621	000000000	0	0	1	0.7980	21	
10311701	0	0	0	0	0	21	
10311801	0.	10.0	10.0	0.	0.	0. 1.	21
10311901	0.	10.0	10.0	0.	0.	0. 1.	21

*

*

ht str no. 35, 45, 55

10351000	15	6	2	1	0.059	0
10351100		0		1		
10351101		5		0.075		
10351201		1		5		

10351301	0.0		5			
10351400			0			
10351401	559.000		6			
10351501	035010000	0	1	1	0.4189	1
10351502	035020000	0	1	1	1.94015	2
10351503	035030000	0	1	1	2.22285	3
10351504	035040000	0	1	1	0.820	4
10351505	035050000	10000	1	1	2.0697	5
10351506	045010000	0	1	1	0.4189	6
10351507	045020000	0	1	1	1.94015	7
10351508	045030000	0	1	1	2.22285	8
10351509	045040000	0	1	1	0.820	9
10351510	045050000	10000	1	1	2.0697	10
10351511	055010000	0	1	1	0.4189	11
10351512	055020000	0	1	1	1.94015	12
10351513	055030000	0	1	1	2.22285	13
10351514	055040000	0	1	1	0.820	14
10351515	055050000	0	1	1	2.0697	15
10351601	000000000	0	0	1	0.4189	1
10351602	000000000	0	0	1	1.94015	2
10351603	000000000	0	0	1	2.22285	3
10351604	000000000	0	0	1	0.820	4
10351605	000000000	0	0	1	2.0697	5
10351606	000000000	0	0	1	0.4189	6
10351607	000000000	0	0	1	1.94015	7
10351608	000000000	0	0	1	2.22285	8
10351609	000000000	0	0	1	0.820	9
10351610	000000000	0	0	1	2.0697	10
10351611	000000000	0	0	1	0.4189	11
10351612	000000000	0	0	1	1.94015	12
10351613	000000000	0	0	1	2.22285	13
10351614	000000000	0	0	1	0.820	14
10351615	000000000	0	0	1	2.0697	15
10351701	0	0	0	0	0	15
10351801	0.	10.0	10.0	0.	0.	0. 0. 1. 15
10351901	0.	10.0	10.0	0.	0.	0. 0. 1. 15

*

*

ht str no. 36-1, 46-1, 56-1

*

10361000	3	6	2	1	0.059	0
10361100		0		1		
10361101		5		0.060		
10361201		1		5		
10361301	0.0			5		
10361400				0		
10361401	559.			6		

10361501	036010000	0	1	1	0.350	1
10361502	046010000	0	1	1	0.350	2
10361503	056010000	0	1	1	0.350	3
10361601	000000000	0	2777	1	0.350	1
10361602	000000000	0	2777	1	0.350	2
10361603	000000000	0	2777	1	0.350	3
10361701	0	0	0	0	0	3
10361801	0.	10.0	10.0	0.	0.	0. 0. 1. 3
10361901	0.	10.0	10.0	0.	0.	0. 0. 1. 3

*

* ht str no. 36-2, 46-2, 56-2

*

10362000	3	6	2	1	0.059	0
10362100		0		1		
10362101		5		0.06008		
10362201		1		5		
10362301	0.0			5		
10362400				0		
10362401	559.			6		
10362501	036010000	0	1	1	0.35	1
10362502	046010000	0	1	1	0.35	2
10362503	056010000	0	1	1	0.35	3
10362601	000000000	0	2778	1	0.35	1
10362602	000000000	0	2778	1	0.35	2
10362603	000000000	0	2778	1	0.35	3
10362701	0	0	0	0	0	3
10362801	0.	10.0	10.0	0.	0.	0. 0. 1. 3
10362901	0.	10.0	10.0	0.	0.	0. 0. 1. 3

*

* ht str no. 37, 38, 39

10371000	15	6	2	1	0.059	0
10371100		0		1		
10371101		5		0.075		
10371201		1		5		
10371301	0.0			5		
10371400				0		
10371401	559.000			6		
10371501	037010000	0	1	1	1.05	1
10371502	037020000	10000	1	1	8.59	2
10371503	038010000	10000	1	1	0.5	3
10371504	039010000	0	1	1	0.78406	4
10371505	039020000	10000	1	1	0.53586	5
10371506	047010000	0	1	1	1.05	6
10371507	047020000	10000	1	1	8.59	7

10371508	048010000	10000	1	1	0.5	8
10371509	049010000	0	1	1	0.78406	9
10371510	049020000	10000	1	1	0.53586	10
10371511	057010000	0	1	1	1.05	11
10371512	057020000	10000	1	1	8.59	12
10371513	058010000	10000	1	1	0.5	13
10371514	059010000	0	1	1	0.78406	14
10371515	059020000	0	1	1	0.53586	15
10371601	000000000	0	0	1	1.05	1
10371602	000000000	0	0	1	8.59	2
10371603	000000000	0	0	1	0.5	3
10371604	000000000	0	0	1	0.78406	4
10371605	000000000	0	0	1	0.53586	5
10371606	000000000	0	0	1	1.05	6
10371607	000000000	0	0	1	8.59	7
10371608	000000000	0	0	1	0.5	8
10371609	000000000	0	0	1	0.78406	9
10371610	000000000	0	0	1	0.53586	10
10371611	000000000	0	0	1	1.05	11
10371612	000000000	0	0	1	8.59	12
10371613	000000000	0	0	1	0.5	13
10371614	000000000	0	0	1	0.78406	14
10371615	000000000	0	0	1	0.53586	15
10371701	0	0	0	0	0	15
10371801	0.	10.0	10.0	0.0	0.0	15
10371901	0.	10.	10.	0.0	0.0	15

*

 *
 * steam generator tubes heat structures (single loop)
 *

 *

10341000	20	4	2	1	0.00984
10341100	0	1			
10341101	3	0.01111			
10341201	3	3			
10341301	0.0	3			
10341401	560.	4			
10341501	034020000	10000	1	0	.42042
10341502	034030000	10000	1	0	.84084
10341503	034040000	10000	1	0	1.26126
10341504	034050000	10000	1	0	1.68168
10341505	034060000	10000	1	0	2.10210
10341506	034070000	10000	1	0	3.15315
10341507	034110000	10000	1	0	1.52402
10341508	034130000	10000	1	0	3.15315
10341509	034170000	10000	1	0	2.10210

10341510	034180000	10000	1	0	1.68168	17
10341511	034190000	10000	1	0	1.26126	18
10341512	034200000	10000	1	0	.84084	19
10341513	034210000	10000	1	0	.42042	20
10341601	060010000	10000	1	0	.47468	1
10341602	060020000	10000	1	0	.94936	2
10341603	060030000	10000	1	0	1.42405	3
10341604	060040000	10000	1	0	1.89873	4
10341605	060050000	10000	1	0	2.37341	5
10341606	060060000	10000	1	0	3.56012	9
10341607	060100000	10000	1	0	1.72072	10
10341608	060100000	-10000	1	0	1.72072	11
10341609	060090000	-10000	1	0	3.56012	15
10341610	060050000	-10000	1	0	2.37341	16
10341611	060040000	-10000	1	0	1.89873	17
10341612	060030000	-10000	1	0	1.42405	18
10341613	060020000	-10000	1	0	.94936	19
10341614	060010000	-10000	1	0	.47468	20
10341701	0	0.0	0.0	0.0	20	
10341801	0.01968	10.	10.	0.	0.	1.0 20
10341901	.03503	10.	10.	0.	0.	0. 1.0 20 * d=inter tube dist.

*

*

*steam generator tubes heat structures : loop b

*

*

10441000	20	4	2	1	0.00984
----------	----	---	---	---	---------

10441100	0	1
----------	---	---

10441101	3	0.01111
----------	---	---------

10441201	3	3
----------	---	---

10441301	0.0	3
----------	-----	---

10441401	560.	4
----------	------	---

10441501	044020000	10000	1	0	.42042	1
----------	-----------	-------	---	---	--------	---

10441502	044030000	10000	1	0	.84084	2
----------	-----------	-------	---	---	--------	---

10441503	044040000	10000	1	0	1.26126	3
----------	-----------	-------	---	---	---------	---

10441504	044050000	10000	1	0	1.68168	4
----------	-----------	-------	---	---	---------	---

10441505	044060000	10000	1	0	2.10210	5
----------	-----------	-------	---	---	---------	---

10441506	044070000	10000	1	0	3.15315	9
----------	-----------	-------	---	---	---------	---

10441507	044110000	10000	1	0	1.52402	11
----------	-----------	-------	---	---	---------	----

10441508	044130000	10000	1	0	3.15315	15
----------	-----------	-------	---	---	---------	----

10441509	044170000	10000	1	0	2.10210	16
----------	-----------	-------	---	---	---------	----

10441510	044180000	10000	1	0	1.68168	17
----------	-----------	-------	---	---	---------	----

10441511	044190000	10000	1	0	1.26126	18
----------	-----------	-------	---	---	---------	----

10441512	044200000	10000	1	0	.84084	19
----------	-----------	-------	---	---	--------	----

10441513	044210000	10000	1	0	.42042	20
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10441601	070010000	10000	1	0	.47468	1
----------	-----------	-------	---	---	--------	---

10541607	080100000	10000	1	0	1.72072	10	
10541608	080100000	-10000	1	0	1.72072	11	
10541609	080090000	-10000	1	0	3.56012	15	
10541610	080050000	-10000	1	0	2.37341	16	
10541611	080040000	-10000	1	0	1.89873	17	
10541612	080030000	-10000	1	0	1.42405	18	
10541613	080020000	-10000	1	0	.94936	19	
10541614	080010000	-10000	1	0	.47468	20	
10541701	0	0.0	0.0	0.0	20		
10541801	0.01968	10.	10.	0.	0.	1.0 20	
10541901	.03503	10.	10.	0.	0.	0.	1.0 20 * d=inter tube dist.

*

*

* ht str no. 60, 70, 80

*

10601000	30	6	2	1	0.028775	0	
10601100		0		1			
10601101		5		0.03555			
10601201		1		5			
10601301		0.0		5			
10601400		0					
10601401		560.0		6			
10601501	060010000	0	1	1	0.2	1	
10601502	060020000	0	1	1	0.4	2	
10601503	060030000	0	1	1	0.6	3	
10601504	060040000	0	1	1	0.8	4	
10601505	060050000	10000	1	1	1.0	5	
10601506	060090000	0	1	1	1.5	9	
10601507	060100000	0	1	1	1.8025	10	
10601508	070010000	0	1	1	0.2	11	
10601509	070020000	0	1	1	0.4	12	
10601510	070030000	0	1	1	0.6	13	
10601511	070040000	0	1	1	0.8	14	
10601512	070050000	10000	1	1	1.0	15	
10601513	070090000	0	1	1	1.5	19	
10601514	070100000	0	1	1	1.8025	20	
10601515	080010000	0	1	1	0.2	21	
10601516	080020000	0	1	1	0.4	22	
10601517	080030000	0	1	1	0.6	23	
10601518	080040000	0	1	1	0.8	24	
10601519	080050000	10000	1	1	1.0	25	
10601520	080090000	0	1	1	1.5	29	
10601521	080100000	0	1	1	1.8025	30	
10601601	000000000	0	0	1	0.2	1	
10601602	000000000	0	0	1	0.4	2	
10601603	000000000	0	0	1	0.6	3

AIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910

301/587-8202

Centimeter

Inches

3 of 3

10541607	080100000	10000	1	0	1.72072	10
10541608	080100000	-10000	1	0	1.72072	11
10541609	080090000	-10000	1	0	3.56012	15
10541610	080050000	-10000	1	0	2.37341	16
10541611	080040000	-10000	1	0	1.89873	17
10541612	080030000	-10000	1	0	1.42405	18
10541613	080020000	-10000	1	0	.94936	19
10541614	080010000	-10000	1	0	.47468	20
10541701	0	0.0	0.0	0.0	20	
10541801	0.01968	10.	10.	0.	0.	0.
10541901	.03503	10.	10.	0.	0.	0.

20 * d=inter tube dist.

*

*

* ht str no. 60, 70, 80

*

10601000	30	6	2	1	0.028775	0
10601100		0		1		
10601101		5		0.03555		
10601201		1		5		
10601301		0.0		5		
10601400		0				
10601401		560.0		6		
10601501	060010000	0	1	1	0.2	1
10601502	060020000	0	1	1	0.4	2
10601503	060030000	0	1	1	0.6	3
10601504	060040000	0	1	1	0.8	4
10601505	060050000	10000	1	1	1.0	5
10601506	060090000	0	1	1	1.5	9
10601507	060100000	0	1	1	1.8025	10
10601508	070010000	0	1	1	0.2	11
10601509	070020000	0	1	1	0.4	12
10601510	070030000	0	1	1	0.6	13
10601511	070040000	0	1	1	0.8	14
10601512	070050000	10000	1	1	1.0	15
10601513	070090000	0	1	1	1.5	19
10601514	070100000	0	1	1	1.8025	20
10601515	080010000	0	1	1	0.2	21
10601516	080020000	0	1	1	0.4	22
10601517	080030000	0	1	1	0.6	23
10601518	080040000	0	1	1	0.8	24
10601519	080050000	10000	1	1	1.0	25
10601520	080090000	0	1	1	1.5	29
10601521	080100000	0	1	1	1.8025	30
10601601	000000000	0	0	1	0.2	1
10601602	000000000	0	0	1	0.4	2
10601603	000000000	0	0	1	0.6	3

10601604	000000000	0	0	1	0.8	4			
10601605	000000000	0	0	1	1.0	5			
10601606	000000000	0	0	1	1.5	9			
10601607	000000000	0	0	1	1.8025	10			
10601608	000000000	0	0	1	0.2	11			
10601609	000000000	0	0	1	0.4	12			
10601610	000000000	0	0	1	0.6	13			
10601611	000000000	0	0	1	0.8	14			
10601612	000000000	0	0	1	1.0	15			
10601613	000000000	0	0	1	1.5	19			
10601614	000000000	0	0	1	1.8025	20			
10601615	000000000	0	0	1	0.2	21			
10601616	000000000	0	0	1	0.4	22			
10601617	000000000	0	0	1	0.6	23			
10601618	000000000	0	0	1	0.8	24			
10601619	000000000	0	0	1	1.0	25			
10601620	000000000	0	0	1	1.5	29			
10601621	000000000	0	0	1	1.8025	30			
10601701	0	0	0	0	0	30			
10601801	0.	10.0	10.0	0.	0.	0.	0.	1.	30
10601901	0.	10.0	10.0	0.	0.	0.	0.	1.	30

*

* ht str no. 61-1, 71-1, 81-1

*

10611000	3	6	2	1	0.03290	0			
10611100		0		1					
10611101		5		0.04038					
10611201		1		5					
10611301		0.0		5					
10611400				0					
10611401		560.		6					
10611501	061010000	0	1	1	0.158	1			
10611502	071010000	10000	1	1	0.158	2			
10611503	081010000	0	1	1	0.158	3			
10611601	000000000	0	0	1	0.158	1			
10611602	000000000	0	0	1	0.158	2			
10611603	000000000	0	0	1	0.158	3			
10611701	0	0	0	0	0	3			
10611801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10611901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

* ht str no. 61-2, 71-2, 81-2

*

10612000	6	6	2	1	0.02499	0
----------	---	---	---	---	---------	---

10612100	0		1						
10612101	5		0.03211						
10612201	1		5						
10612301	0.0		5						
10612400			0						
10612401	560.		6						
10612501	061020000	0	1	1	0.7952				1
10612502	061030000	10000	1	1	0.900				2
10612503	071020000	0	1	1	0.7952				3
10612504	071030000	10000	1	1	0.900				4
10612505	081020000	0	1	1	0.7952				5
10612506	081030000	0	1	1	0.900				6
10612601	000000000	0	0	1	0.7952				1
10612602	000000000	0	0	1	0.900				2
10612603	000000000	0	0	1	0.7952				3
10612604	000000000	0	0	1	0.900				4
10612605	000000000	0	0	1	0.7952				5
10612606	000000000	0	0	1	0.900				6
10612701	0	0	0	0	0				6
10612801	0.	10.0	10.0	0.	0.	0.	0.	1.	6
10612901	0.	10.0	10.0	0.	0.	0.	0.	1.	6

*

 * ht str no. 62, 72, 82

10621000	3	6	2	1	0.1245	0			
10621100		0		1					
10621101		5		0.137					
10621201		1		5					
10621301		0.0		5					
10621400				0					
10621401		560.		6					
10621501	062010000	10000	1	1	2.16				1
10621502	072010000	10000	1	1	2.16				2
10621503	082010000	0	1	1	2.16				3
10621601	000000000	0	0	1	2.16				1
10621602	000000000	0	0	1	2.16				2
10621603	000000000	0	0	1	2.16				3
10621701	0	0	0	0	0				3
10621801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10621901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

 * ht str no. 63, 73, 83

10631000	3	6	2	1	0.2695	0			
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10631100	0		1						
10631101	5		0.282						
10631201	1		5						
10631301	0.0		5						
10631400			0						
10631401	560.		6						
10631501	063010000	10000	1	1	2.16				1
10631502	073010000	10000	1	1	2.16				2
10631503	083010000	0	1	1	2.16				3
10631601	000000000	0	0	1	2.16				1
10631602	000000000	0	0	1	2.16				2
10631603	000000000	0	0	1	2.16				3
10631701	0	0	0	0	0				3
10631801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10631901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

* ht str no. 64, 65, 74, 75, 84, 85

10641000	6	6	2	1	0.088	0			
10641100		0		1					
10641101		5		0.0955					
10641201		1		5					
10641301	0.0			5					
10641400				0					
10641401	550.			6					
10641501	064010000	10000	1	1	0.3375				1
10641502	065010000	10000	1	1	0.8275				2
10641503	074010000	10000	1	1	0.3375				3
10641504	075010000	10000	1	1	0.8275				4
10641505	084010000	10000	1	1	0.3375				5
10641506	085010000	0	1	1	0.8275				6
10641601	000000000	0	0	1	0.3375				1
10641602	000000000	0	0	1	0.8275				2
10641603	000000000	0	0	1	0.3375				3
10641604	000000000	0	0	1	0.8275				4
10641605	000000000	0	0	1	0.3375				5
10641606	000000000	0	0	1	0.8275				6
10641701	0	0	0	0	0				6
10641801	0.	10.0	10.0	0.	0.	0.	0.	1.	6
10641901	0.	10.0	10.0	0.	0.	0.	0.	1.	6

*

* ht str no. 66, 76, 86

10661000	3	6	2	1	0.02991	0			
10661100		0		1					
10661101		5		0.03741					

10661201		1		5					
10661301	0.0			5					
10661400				0					
10661401	550.		6						
10661501	066010000	10000	1	1	1.9815				1
10661502	076010000	10000	1	1	1.9815				2
10661503	086010000	0	1	1	1.9815				3
10661601	000000000	0	0	1	1.9815				1
10661602	000000000	0	0	1	1.9815				2
10661603	000000000	0	0	1	1.9815				3
10661701	0	0		0	0				3
10661801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10661901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

* ht str no. 68, 78, 88

*

10681000	3	6	2	1	0.3265	0			
10681100		0		1					
10681101		5		0.3365					
10681201		1		5					
10681301	0.0			5					
10681400				0					
10681401	560.		6						
10681501	068010000	10000	1	1	0.4				1
10681502	078010000	10000	1	1	0.4				2
10681503	088010000	0	1	1	0.4				3
10681601	000000000	0	0	1	0.4				1
10681602	000000000	0	0	1	0.4				2
10681603	000000000	0	0	1	0.4				3
10681701	0	0		0	0				3
10681801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10681901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

* ht str no. 67-1/8, 77-1/8, 87-1/8

*

10671000	24	6	2	1	0.04309	0			
10671100		0		1					
10671101		5		0.05109					
10671201		1		5					
10671301	0.0			5					
10671400				0					
10671401	550.0		6						
10671501	067010000	10000	1	1	1.481				1
10671502	067040000	0	1	1	1.5				4

10671503	067050000	0	1	1	1.0	5
10671504	067060000	0	1	1	0.8	6
10671505	067070000	0	1	1	0.6	7
10671506	067080000	0	1	1	0.4	8
10671507	077010000	10000	1	1	1.481	9
10671508	077040000	0	1	1	1.5	12
10671509	077050000	0	1	1	1.0	13
10671510	077060000	0	1	1	0.8	14
10671511	077070000	0	1	1	0.6	15
10671512	077080000	0	1	1	0.4	16
10671513	087010000	10000	1	1	1.481	17
10671514	087040000	0	1	1	1.5	20
10671515	087050000	0	1	1	1.0	21
10671516	087060000	0	1	1	0.8	22
10671517	087070000	0	1	1	0.6	23
10671518	087080000	0	1	1	0.4	24
10671601	000000000	0	0	1	1.481	1
10671602	000000000	0	0	1	1.5	4
10671603	000000000	0	0	1	1.0	5
10671604	000000000	0	0	1	0.8	6
10671605	000000000	0	0	1	0.6	7
10671606	000000000	0	0	1	0.4	8
10671607	000000000	0	0	1	1.481	9
10671608	000000000	0	0	1	1.5	12
10671609	000000000	0	0	1	1.0	13
10671610	000000000	0	0	1	0.8	14
10671611	000000000	0	0	1	0.6	15
10671612	000000000	0	0	1	0.4	16
10671613	000000000	0	0	1	1.481	17
10671614	000000000	0	0	1	1.5	20
10671615	000000000	0	0	1	1.0	21
10671616	000000000	0	0	1	0.8	22
10671617	000000000	0	0	1	0.6	23
10671618	000000000	0	0	1	0.4	24
10671701	0	0	0	0	0	24
10671801	0.	10.0	10.0	0.	0.	0. 1. 24
10671901	0.	10.0	10.0	0.	0.	0. 1. 24

*

* ht str no. 67-9, 77-9, 87-9

*

10672000	3	6	2	1	0.08034	0
10672100		0		1		
10672101		5		0.08784		
10672201		1		5		
10672301	0.0			5		
10672400				0		

10672401	557.		6						
10672501	067090000	0	1	1	0.2				1
10672502	077090000	10000	1	1	0.2				2
10672503	087090000	0	1	1	0.2				3
10672601	000000000	0	0	1	0.2				1
10672602	000000000	0	0	1	0.2				2
10672603	000000000	0	0	1	0.2				3
10672701	0	0		0	0				3
10672801	0.	10.0	10.0	0.	0.	0.	0.	1.	3
10672901	0.	10.0	10.0	0.	0.	0.	0.	1.	3

*

* pressurizer heat structures

*

* ht str no. 91-1

10911000	1	6	2	1	0.08093	0			
10911100		0		1					
10911101		5		0.09593					
10911201	1			5					
10911301	0.0			5					
10911400				0					
10911401	563.			6					
10911501	091010000	0	1	1	0.105				1
10911601	000000000	0	0	1	0.105				1
10911701	0	0		0	0				1
10911801	0.	10.0	10.0	0.	0.	0.	0.	1.	1
10911901	0.	10.0	10.0	0.	0.	0.	0.	1.	1

*

* ht str no. 91-2

10912000	1	6	2	1	0.09974	0			
10912100		0		1					
10912101		5		0.11474					
10912201	1			5					
10912301	0.0			5					
10912400				0					
10912401	563.			6					
10912501	091020000	0	1	1	0.892				1
10912601	000000000	0	0	1	0.892				1
10912701	0	0		0	0				1
10912801	0.	10.0	10.0	0.	0.	0.	0.	1.	1
10912901	0.	10.0	10.0	0.	0.	0.	0.	1.	1

*

```

*                ht str no. 91-3
*****
10913000      2      6      2      1      0.10499      0
10913100              0              1
10913101              5              0.11999
10913201              1              5
10913301              0.0              5
10913400              0
10913401              563.              6
10913501      091030000      0      1      1      5.4145      2
10913601      000000000      0      0      1      5.4145      2
10913701              0      0      0      0      2
10913801              0.      10.0      10.0      0.      0.      0.      0.      1.      2
10913901              0.      10.0      10.0      0.      0.      0.      0.      1.      2
*
*****
*                ht str no. 91-4
*****
10914000      1      6      2      1      0.08573      0
10914100              0              1
10914101              5              0.10073
10914201              1              5
10914301              0.0              5
10914400              0
10914401              563.              6
10914501      091050000      0      1      1      0.105      1
10914601      000000000      0      0      1      0.105      1
10914701              0      0      0      0      1
10914801              0.      10.0      10.0      0.      0.      0.      0.      1.      1
10914901              0.      10.0      10.0      0.      0.      0.      0.      1.      1
*
*****
*                ht str no. 90
*****
*
10901000      3      6      2      1      0.02046      0
10901100              0              1
10901101              5              0.02916
10901201              1              5
10901301              0.0              5
10901400              0
10901401              563.              6
10901501      090010000      0      1      1      0.850      1
10901502      090020000      0      1      1      6.256      2
10901503      090030000      0      1      1      2.690      3
10901601      000000000      0      0      1      0.850      1
10901602      000000000      0      0      1      6.256      2
10901603      000000000      0      0      1      2.690      3

```


10901701	0	0	0	0	0	3
10901801	0.	10.0	10.0	0.	0.	0. 1. 3
10901901	0.	10.0	10.0	0.	0.	0. 1. 3

*

* ht str no. 91-5 prizer htrs ht struct

10915000	2	3	2	1	0.0	0
10915100		0		1		
10915101		2		0.00525		
10915201		1		2		
10915301	1.0			2		
10915400				0		
10915401	563.			3		
10915501	0	0	0	0	0.0	2
10915601	91010000	10000	1	1	0.535	2
10915701	789	0.5		0.0	0.0	2
10915801	0. 10.	10. 0.	0. 0.	0. 0.	1. 2	
10915901	0.	10.0	10.0	0.	0.	0. 0. 1. 2

*

* power table

20200100	power	0
20200101	0.0	2.857e+6

*

* rcp heat loss

*

20277700	htrnrate	407
20277701	0.	159155.

*

20277800	htrnrate	
20277801	0.	30315.

*

* pwr heater

*

20278900	power	407
20278901	0.	1400.

*

* calculate liquid levels in pressurizer and steam generators

20500100	preslev	sum	1.0	4.08	1
20500101	0.0	0.105	voidf	091010000	

20500102		0.892	voidf	091020000
20500103		5.4145	voidf	091030000
20500104		5.4145	voidf	091040000
20500105		0.105	voidf	091050000
*				
20500400	veslev	sum	1.0	10.421 1
20500401	0.0	1.0	voidf	011010000
20500402		1.054	voidf	012010000
20500403		0.11	voidf	013010000
20500404		0.788	voidf	013020000
20500405		0.78	voidf	013030000
20500406		0.52	voidf	013040000
20500407		0.78	voidf	013050000
20500408		0.788	voidf	013060000
20500409		0.35	voidf	013070000
20500410		1.0195	voidf	099010000
20500411		0.117	voidf	015010000
20500412		2.713	voidf	016010000
20500413		0.4015	voidf	018010000
.				
20500200	sgalev	sum	1.0	10.60282 1
20500201	0.0	0.2	voidf	060010000
20500202		0.4	voidf	060020000
20500203		0.6	voidf	060030000
20500204		0.8	voidf	060040000
20500205		1.0	voidf	060050000
20500206		1.5	voidf	060060000
20500207		1.5	voidf	060070000
20500208		1.5	voidf	060080000
20500209		1.5	voidf	060090000
20500210		1.8025	voidf	060100000
20500211		0.158	voidf	061010000
20500212		0.7925	voidf	061020000
20500213		0.9	voidf	061030000
20500214		2.16	voidf	062010000
20500215		0.4	voidf	068010000
*				
20500300	sgblev	sum	1.0	10.61266 1
20500301	0.0	0.2	voidf	070010000
20500302		0.4	voidf	070020000
20500303		0.6	voidf	070030000
20500304		0.8	voidf	070040000
20500305		1.0	voidf	070050000
20500306		1.5	voidf	070060000
20500307		1.5	voidf	070070000
20500308		1.5	voidf	070080000
20500309		1.5	voidf	070090000
20500310		1.8025	voidf	070100000

20500311	0.158	voidf	071010000
20500312	0.7925	voidf	071020000
20500313	0.9	voidf	071030000
20500314	2.16	voidf	072010000
20500315	0.4	voidf	078010000
*			
20500500	sgcleve sum	1.0	10.61266 1
20500501	0.0 0.2	voidf	080010000
20500502	0.4	voidf	080020000
20500503	0.6	voidf	080030000
20500504	0.8	voidf	080040000
20500505	1.0	voidf	080050000
20500506	1.5	voidf	080060000
20500507	1.5	voidf	080070000
20500508	1.5	voidf	080080000
20500509	1.5	voidf	080090000
20500510	1.8025	voidf	080100000
20500511	0.158	voidf	081010000
20500512	0.7925	voidf	081020000
20500513	0.9	voidf	081030000
20500514	2.16	voidf	082010000
20500515	0.4	voidf	088010000
*			
20502200	sgalevd sum	1.0	12.00412 1
20502201	0.0 1.481	voidf	067010000
20502202	1.5	voidf	067020000
20502203	1.5	voidf	067030000
20502204	1.5	voidf	067040000
20502205	1.0	voidf	067050000
20502206	0.8	voidf	067060000
20502207	0.6	voidf	067070000
20502208	0.4	voidf	067080000
20502209	0.2	voidf	067090000
20502212	1.9815	voidf	066010000
20502213	0.8275	voidf	065010000
20502214	1.6055	voidf	064010000
20502215	0.3375	voidf	063010000
20502216	1.08	voidf	062010000
20502217	0.4	voidf	068010000
*			
20503300	sgblevd sum	1.0	12.00995 1
20503301	0.0 1.481	voidf	077010000
20503302	1.5	voidf	077020000
20503303	1.5	voidf	077030000
20503304	1.5	voidf	077040000
20503305	1.0	voidf	077050000
20503306	0.8	voidf	077060000
20503307	0.6	voidf	077070000

20503308	0.4	voidf	077080000
20503309	0.2	voidf	077090000
20503312	1.9815	voidf	076010000
20503313	0.8275	voidf	075010000
20503314	1.6055	voidf	074010000
20503315	0.3375	voidf	073010000
20503316	1.08	voidf	072010000
20503317	0.4	voidf	078010000

*

20504400	sgclevd	sum	1.0	12.00995	1
20504401	0.0	1.481	voidf	087010000	
20504402		1.5	voidf	087020000	
20504403		1.5	voidf	087030000	
20504404		1.5	voidf	087040000	
20504405		1.0	voidf	087050000	
20504406		0.8	voidf	087060000	
20504407		0.6	voidf	087070000	
20504408		0.4	voidf	087080000	
20504409		0.2	voidf	087090000	
20504412		1.9815	voidf	086010000	
20504413		0.8275	voidf	085010000	
20504414		1.6055	voidf	084010000	
20504415		0.3375	voidf	083010000	
20504416		1.08	voidf	082010000	
20504417		0.4	voidf	088010000	

*

* primary system masses

*

20515100	sgamas1	sum	1.0	99.3376	1
20515101	0.0	0.0350607	rho	034010000	
20515102		2.068400e-3	rho	034020000	
20515103		4.136800e-3	rho	034030000	
20515104		6.205200e-3	rho	034040000	
20515105		8.273600e-3	rho	034050000	
20515106		1.034200e-2	rho	034060000	
20515107		1.551300e-2	rho	034070000	
20515108		1.551300e-2	rho	034080000	
20515109		1.551300e-2	rho	034090000	
20515110		1.551300e-2	rho	034100000	
20515111		7.497950e-3	rho	034110000	

*

20514100	sgamas2	sum	1.0	102.5563	1
20514112	0.0	7.497950e-3	rho	034120000	
20514113		1.551300e-2	rho	034130000	
20514114		1.551300e-2	rho	034140000	
20514115		1.551300e-2	rho	034150000	

20514116		1.551300e-2	rho 034160000
20514117		1.034200e-2	rho 034170000
20514118		8.273600e-3	rho 034180000
20514119		6.205200e-3	rho 034190000
20514120		4.136800e-3	rho 034200000
20514121		2.068400e-3	rho 034210000
20514122		0.0350607	rho 034220000
*			
20515200	sgbmas1	sum 1.0	99.3376 1
20515201	0.0	0.0350607	rho 044010000
20515202		2.068400e-3	rho 044020000
20515203		4.136800e-3	rho 044030000
20515204		6.205200e-3	rho 044040000
20515205		8.273600e-3	rho 044050000
20515206		1.034200e-2	rho 044060000
20515207		1.551300e-2	rho 044070000
20515208		1.551300e-2	rho 044080000
20515209		1.551300e-2	rho 044090000
20515210		1.551300e-2	rho 044100000
20515211		7.497950e-3	rho 044110000
*			
20514200	sgbmas2	sum 1.0	102.5563 1
20514212	0.0	7.497950e-3	rho 044120000
20514213		1.551300e-2	rho 044130000
20514214		1.551300e-2	rho 044140000
20514215		1.551300e-2	rho 044150000
20514216		1.551300e-2	rho 044160000
20514217		1.034200e-2	rho 044170000
20514218		8.273600e-3	rho 044180000
20514219		6.205200e-3	rho 044190000
20514220		4.136800e-3	rho 044200000
20514221		2.068400e-3	rho 044210000
20514222		0.0350607	rho 044220000
*			
20516100	sgcmas1	sum 1.0	99.3376 1
20516101	0.0	0.0350607	rho 054010000
20516102		2.068400e-3	rho 054020000
20516103		4.136800e-3	rho 054030000
20516104		6.205200e-3	rho 054040000
20516105		8.273600e-3	rho 054050000
20516106		1.034200e-2	rho 054060000
20516107		1.551300e-2	rho 054070000
20516108		1.551300e-2	rho 054080000
20516109		1.551300e-2	rho 054090000
20516110		1.551300e-2	rho 054100000
20516111		7.497950e-3	rho 054110000
*			
20516200	sgamas2	sum 1.0	102.5563 1

20516212	0.0	7.497950e-3	rho 054120000
20516213		1.551300e-2	rho 054130000
20516214		1.551300e-2	rho 054140000
20516215		1.551300e-2	rho 054150000
20516216		1.551300e-2	rho 054160000
20516217		1.034200e-2	rho 054170000
20516218		8.273600e-3	rho 054180000
20516219		6.205200e-3	rho 054190000
20516220		4.136800e-3	rho 054200000
20516221		2.068400e-3	rho 054210000
20516222		0.0350607	rho 054220000

*

20515300	cormas	sum 1.0	407.052 1
20515301	0.0	0.15323	rho 011010000
20515302		6.20907e-2	rho 012010000
20515303		4.70800e-3	rho 013010000
20515304		3.37264e-2	rho 013020000
20515305		3.33840e-2	rho 013030000
20515306		2.22560e-2	rho 013040000
20515307		3.33840e-2	rho 013050000
20515308		3.37264e-2	rho 013060000
20515309		1.80660e-2	rho 013070000
20515310		1.56310e-3	rho 014010000
20515312		1.11975e-2	rho 014020000
20515313		1.10838e-2	rho 014030000
20515314		7.38920e-3	rho 014040000
20515315		1.10838e-2	rho 014050000
20515316		1.11975e-2	rho 014060000
20515317		4.97350e-3	rho 014070000
20515318		9.13340e-2	rho 099010000
20515319		1.02950e-2	rho 015010000

*

20515400	vesmas	sum 1.0	361.04 1
20515401	0.0	.15418	rho 016010000
20515402		8.08300e-3	rho 017010000
20515403		4.89190e-2	rho 018010000
20515404		8.92590e-2	rho 019010000
20515405		4.33233e-2	rho 020010000
20515406		3.78310e-3	rho 021010000
20515407		2.44140e-3	rho 021020000
20515408		9.69700e-4	rho 021030000
20515410		2.39771e-2	rho 022010000
20515411		2.39771e-2	rho 022020000
20515412		2.39771e-2	rho 022030000
20515413		2.39771e-2	rho 022040000
20515414		7.51150e-3	rho 022050000
20515415		1.08295e-2	rho 022060000
20515416		2.79758e-2	rho 022070000

```

*
20515500 hlamas sum 1.0 34.57254 1
20515501 0.0 1.305868e-2 rho 031010000
20515502 5.46800e-3 rho 032010000
20515503 8.724194e-3 rho 033010000
20515504 1.583533e-2 rho 033020000
20515505 6.021362e-3 rho 033030000
*
20515600 hibmas sum 1.0 34.57254 1
20515601 0.0 1.305868e-2 rho 041010000
20515602 5.46800e-3 rho 042010000
20515603 8.724194e-3 rho 043010000
20515604 1.583533e-2 rho 043020000
20515605 6.021362e-3 rho 043030000
*
20516600 hlcmas sum 1.0 34.57254 1
20516601 0.0 1.305868e-2 rho 051010000
20516602 5.46800e-3 rho 052010000
20516603 8.724194e-3 rho 053010000
20516604 1.583533e-2 rho 053020000
20516605 6.021362e-3 rho 053030000
*
20515700 clamas sum 1.0 108.3605 1
20515701 0.0 4.581000e-3 rho 035010000
20515702 2.123175e-2 rho 035020000
20515703 2.430950e-2 rho 035030000
20515704 8.967000e-3 rho 035040000
20515705 2.263400e-2 rho 035050000
20515706 2.062890e-2 rho 036010000
*20515708 8.921154e-3 rho 362010000
20515709 1.14828e-2 rho 037010000
20515710 9.394024e-3 rho 037020000
20515711 5.46800e-3 rho 038010000
20515712 8.57448e-3 rho 039010000
20515713 5.860165e-3 rho 039020000
*
20515800 clbmas sum 1.0 108.3605 1
20515801 0.0 4.581000e-3 rho 045010000
20515802 2.123175e-2 rho 045020000
20515803 2.430950e-2 rho 045030000
20515804 8.967000e-3 rho 045040000
20515805 2.263400e-2 rho 045050000
20515806 2.06277890e-2 rho 046010000
*20515808 8.921154e-3 rho 462010000
20515809 1.14828e-2 rho 047010000
20515810 9.394024e-3 rho 047020000
20515811 5.46800e-3 rho 048010000
20515812 8.57448e-3 rho 049010000

```

20515813		5.860165e-3	rho 049020000
*			
20516800	clcmass	sum 1.0	108.3605 1
20516801	0.0	4.581000e-3	rho 055010000
20516802		2.123175e-2	rho 055020000
20516803		2.430950e-2	rho 055030000
20516804		8.967000e-3	rho 055040000
20516805		2.263400e-2	rho 055050000
20516806		2.062290e-2	rho 056010000
20516809		1.14828e-2	rho 057010000
20516810		9.394024e-3	rho 057020000
20516811		5.46800e-3	rho 058010000
20516812		8.57448e-3	rho 059010000
20516813		5.860165e-3	rho 059020000
*			
20515900	prsrmas	sum 1.0	114.4755 1
20515901	0.0	1.118650e-3	rho 090010000
20515902		9.040600e-3	rho 090020000
20515903		3.863750e-3	rho 090030000
20515904		2.161600e-3	rho 091010000
20515905		2.789000e-2	rho 091020000
20515906		0.187535	rho 091030000
20515907		0.187535	rho 091040000
20515908		2.424500e-3	rho 091050000
*			
20519900	totmas	sum 1.0	1802.557 1
20519901	0.0	1.0 cntrlvar 151	
20519902		1.0 cntrlvar 141	
20519903		1.0 cntrlvar 152	
20519904		1.0 cntrlvar 142	
20519905		1.0 cntrlvar 153	
20519906		1.0 cntrlvar 154	
20519907		1.0 cntrlvar 155	
20519908		1.0 cntrlvar 156	
20519909		1.0 cntrlvar 157	
20519910		1.0 cntrlvar 158	
20519911		1.0 cntrlvar 159	
20519912		1.0 cntrlvar 161	
20519913		1.0 cntrlvar 166	
20519914		1.0 cntrlvar 168	
20519915		1.0 cntrlvar 162	
*			
20533000	tvesmas	sum 1.0	768.092 1
20533001	0.0	1.0 cntrlvar 153	
20533002		1.0 cntrlvar 154	
*			
20531700	sgasm1	sum 1.0	605.622 1
20531701	0.0	1.151e-2	rho 060010000

20531702	2.303e-2	rho	060020000
20531703	3.454e-2	rho	060030000
20531704	4.605e-2	rho	060040000
20531705	5.756e-2	rho	060050000
20531706	8.635e-2	rho	060060000
20531707	8.635e-2	rho	060070000
20531708	8.635e-2	rho	060080000
20531709	8.635e-2	rho	060090000
20531710	0.10376	rho	060100000
20531711	1.0393e-2	rho	061010000
20531712	3.861e-2	rho	061020000
20531713	4.385e-2	rho	061030000
20531714	0.59549	rho	062010000

*

20531800	sgasm2	sum	1.0	187.0125	1
20531815	0.0	0.14922	rho	063010000	
20531816		0.15856	rho	064010000	
20531817		8.172e-2	rho	065010000	
20531818		6.336e-2	rho	066010000	
20531819		8.6429e-3	rho	067010000	
20531820		8.7538e-3	rho	067020000	
20531821		8.7538e-3	rho	067030000	
20531822		8.7538e-3	rho	067040000	
20531823		5.8359e-3	rho	067050000	
20531824		4.6687e-3	rho	067060000	
20531825		3.5015e-3	rho	067070000	
20531826		2.3343e-3	rho	067080000	
20531827		4.0563e-3	rho	067090000	
20531828		0.13404	rho	063010000	
20531829		3.425e-2	rho	069010000	
20531830		3.425e-2	rho	069020000	

*

20531900	sgasmt	sum	1.0	792.635	1
20531923	0.0	1.0	cntrlvar	317	
20531924		1.0	cntrlvar	318	

*

20532000	sgasm1	sum	1.0	605.622	1
20532001	0.0	1.151e-2	rho	070010000	
20532002		2.303e-2	rho	070020000	
20532003		3.454e-2	rho	070030000	
20532004		4.605e-2	rho	070040000	
20532005		5.756e-2	rho	070050000	
20532006		8.635e-2	rho	070060000	
20532007		8.635e-2	rho	070070000	
20532008		8.635e-2	rho	070080000	
20532009		8.635e-2	rho	070090000	
20532010		0.10376	rho	070100000	
20532011		1.0393e-2	rho	071010000	

20532012		3.861e-2	rho	071020000
20532013		4.385e-2	rho	071030000
20532014		0.59549	rho	072010000
*				
20532100	sgasm2	sum	1.0	187.0125 1
20532101	0.0	0.14922	rho	073010000
20532102		0.15856	rho	074010000
20532103		8.172e-2	rho	075010000
20532104		6.336e-2	rho	076010000
20532105		8.6429e-3	rho	077010000
20532106		8.7538e-3	rho	077020000
20532107		8.7538e-3	rho	077030000
20532108		8.7538e-3	rho	077040000
20532109		5.8359e-3	rho	077050000
20532110		4.6687e-3	rho	077060000
20532111		3.5015e-3	rho	077070000
20532112		2.3343e-3	rho	077080000
20532113		4.0563e-3	rho	077090000
20532114		0.13404	rho	078010000
20532115		3.425e-2	rho	079010000
20532116		3.425e-2	rho	079020000
*				
20532200	sgasmt	sum	1.0	792.635 1
20532201	0.0	1.0	cntrlvar	320
20532202		1.0	cntrlvar	321
*				
20532300	sgasm1	sum	1.0	605.622 1
20532301	0.0	1.151e-2	rho	080010000
20532302		2.303e-2	rho	080020000
20532303		3.454e-2	rho	080030000
20532304		4.605e-2	rho	080040000
20532305		5.756e-2	rho	080050000
20532306		8.635e-2	rho	080060000
20532307		8.635e-2	rho	080070000
20532308		8.635e-2	rho	080080000
20532309		8.635e-2	rho	080090000
20532310		0.10376	rho	080100000
20532311		1.0393e-2	rho	081010000
20532312		3.861e-2	rho	081020000
20532313		4.385e-2	rho	081030000
20532314		0.59549	rho	082010000
*				
20532400	sgasm2	sum	1.0	187.0125 1
20532415	0.0	0.14922	rho	083010000
20532416		0.15856	rho	084010000
20532417		8.172e-2	rho	085010000
20532418		6.336e-2	rho	086010000
20532419		8.6429e-3	rho	087010000

20532420	8.7538e-3	rho	087020000
20532421	8.7538e-3	rho	087030000
20532422	8.7538e-3	rho	087040000
20532423	5.8359e-3	rho	087050000
20532424	4.6687e-3	rho	087060000
20532425	3.5015e-3	rho	087070000
20532426	2.3343e-3	rho	087080000
20532427	4.0563e-3	rho	087090000
20532428	0.13404	rho	088010000
20532429	3.425e-2	rho	089010000
20532430	3.425e-2	rho	089020000

*
20532500 sgasmt sum 1.0 792.635 1
20532501 0.0 1.0 cntrlvar 323
20532502 1.0 cntrlvar 324

*

* self initialization cards

*
20526200 sgllsp function 1.0 820. 0
20526201 time 0 4
20526300 fwlcntl feedctl 1.0 .52514 0 3 0.0 10.0
20526301 cntrlvar 262 cntrlvar 319
20526302 50.0 * sk
20526303 mflowj 606000000 * sgl steam out
20526304 mflowj 601000000 * sgl fw in
20526305 2.5 10.0 4.0 *sm=maxdt t6=1/int.gain t5=1/prop.gain
20527200 sg2lsp function 1.0 820. 0
20527201 time 0 4
*
20527300 fw2cntl feedctl 1.0 .52514 0 3 0.0 10.0
20527301 cntrlvar 272 cntrlvar 322
20527302 50.0 * sk
20527303 mflowj 706000000 * sg2 steam out
20527304 mflowj 701000000 * sg2 fw in
20527305 2.5 10.0 4.0 *sm=maxdt t6=1/int.gain t5=1/prop.gain
*
20528200 sg3lsp function 1.0 820. 0
20528201 time 0 4
*
20528300 fw3cntl feedctl 1.0 .52514 0 3 0.0 10.0
20528301 cntrlvar 282 cntrlvar 325
20528302 50.0 * sk
20528303 mflowj 806000000 * sg3 steam out
20528304 mflowj 801000000 * sg3 fw in
20528305 2.5 10.0 4.0 *sm=maxdt t6=1/int.gain t5=1/prop.gain
*

```

*****
*      pressure setpoint for single loop sg
*****
*
20526500      sglpsp      function 1.0  6.91+6  0
20526501      time       0      2
*
20526600      stmlcntl1  steamctl1 -1.34e-6 .0238706  0 3  0.0  1.0
20526601      cntrlvar 265          p 068010000
20526602      1.5          *sj
20526603      50.0        2.0          *t4=1/int.gain  t3=1/prop.gain
*
20527500      sg2psp      function 1.0  6.91+6  0
20527501      time       0      2
20527600      stm2cntl1  steamctl1 -1.34e-6 .0238706  0 3  0.0  1.0
*
20527601      cntrlvar 275          p 078010000
20527602      1.5          *s
20527603      50.0        2.0          *t4=1/int.gain  t5=1/prop.gain
*
20528500      sg3psp      function 1.0  6.91+6  0
20528501      time       0      2
*
20528600      stmlcntl1  steamctl1 -1.34e-6 .0238706  0 3  0.0  1.0
20528601      cntrlvar 285          p 088010000
20528602      1.5          *sj
20528603      50.0        2.0          *t4=1/int.gain  t3=1/prop.gain
*
*****
*sgl pressure setpoint table
20200200      power      0
20200201      0.0        6.91e6
*
*sgl mass setpoint table
20200400      power      0
20200401      0.0        820.0
*
*****
*      thermal properties
*****
*
*thermal properties for stainless steel
*      thermal conductivity
20100100      tbl/fctn   1      1
20100101      293.       13.9
20100102      373.       15.1
20100103      473.       16.7
20100104      573.       18.3

```

```

20100105    673.    19.8
20100106    873.    23.0
20100107   1073.    26.1
*   volumetric specific heat
20100151    293.    3.58e6
20100152    373.    3.89e6
20100153    473.    4.10e6
20100154    573.    4.21e6
20100155    673.    4.26e6
20100156    873.    4.41e6
20100157   1073.    4.66e6
*thermal properties for boron nitride
20100200   tbl/fctn    2    2
*   function for thermal conductivity
20100201    293.   2000.   24.818  -0.00276  0.0  0.0  0.0  0.0  0.0
*   function for volumetric specific heat
20100251    293.   423.    1.22e6   1.4e3    0.0  0.0  0.0  0.0  0.0
20100252    423.  1173.    1.46e6   1.62e3    0.0  0.0  0.0  0.0  0.0
*
*thermal properties for inconel 600
*   thermal conductivity
20100300   tbl/fctn    1    1
20100301    323.    14.9
20100302    373.    15.6
20100303    473.    17.2
20100304    673.    20.4
20100305    873.    23.7
20100306   1073.    27.4
*   volumetric specific heat
20100351    323.    3.76e6
20100352    373.    3.86e6
20100353    473.    4.03e6
20100354    673.    4.26e6
20100355    873.    4.68e6
20100356   1073.    4.98e6
*
```

```

=====
* This contains a RELAP5 model of the French experimental facility
* BETHSY. The intended use of the model is for simulation of BETHSY
* test 9.1.b which studies the 2 inch cold leg break without hpsi
* ans with delayed ultimate procedure.
=====
*
* transient input deck of bethsy test 9.1.b
* = 2 inch cold leg break : bethsy test 9.1.b
*
100 restart transnt
101 run
102 si si
103 9283
105 2. 4.
*
201 2500. 1.e-6 0.5 3 10 2000 1000
*
*****
* minor edit variables
*****
*
301 voidg 031010000
302 voidg 039010000
303 voidg 041010000
304 voidg 049010000
305 voidg 051010000
306 voidg 059010000
307 cntrlvar 111
308 cntrlvar 112
309 cntrlvar 113
310 cntrlvar 114
311 cntrlvar 311
312 cntrlvar 100
313 cntrlvar 51
314 cntrlvar 95
315 cntrlvar 63
316 cntrlvar 96
317 cntrlvar 52
318 cntrlvar 102
319 cntrlvar 103
320 cntrlvar 97
321 cntrlvar 53
322 cntrlvar 105
323 cntrlvar 106
324 cntrlvar 98
325 cntrlvar 316
326 cntrlvar 60

```

327	cntrlvar	314	
328	cntrlvar	500	
329	cntrlvar	326	
330	cntrlvar	70	
331	cntrlvar	399	
332	cntrlvar	501	
333	cntrlvar	336	
334	cntrlvar	80	
335	cntrlvar	334	
336	cntrlvar	502	
337	cntrlvar	73	
338	cntrlvar	768	* time integrated break flow
339	cntrlvar	738	
340	cntrlvar	319	
341	cntrlvar	323	
342	cntrlvar	326	
343	cntrlvar	721	
344	cntrlvar	722	
345	p	068010000	
346	p	078010000	
347	p	088010000	
348	p	091050000	
349	p	721010000	
350	p	722010000	
351	mflowj	022030000	
352	cntrlvar	34	
353	cntrlvar	35	
354	cntrlvar	36	
355	mflowj	768000000	
356	mflowj	608000000	
357	mflowj	708000000	
358	mflowj	808000000	
359	mflowj	732000000	
360	mflowj	735000000	
361	sathf	037010000	
362	sathg	037010000	
363	tempf	020010000	
364	tempf	015010000	
365	tempf	019010000	
366	tempf	018010000	
367	tempf	033010000	
368	tempf	038010000	
369	tempf	043010000	
370	tempf	048010000	
371	tempf	053010000	
372	tempf	058010000	
373	tempf	060010000	
374	tempf	070010000	

```

375 tempf 080010000
376 httemp 013100708
377 httemp 013100808
378 httemp 013100908
379 httemp 013101008
380 httemp 013101108
381 httemp 013101208
382 cntrlvar 901
383 pmpvel 036
384 pmpvel 046
385 pmpvel 056
386 cntrlvar 888
387 cntrlvar 818
388 cntrlvar 821
389 cntrlvar 889
390 cntrlvar 1
391 cntrlvar 2
392 cntrlvar 22
393 cntrlvar 199
394 cntrlvar 12
395 mflowj 605000000
396 cntrlvar 13
397 cntrlvar 14
398 cntrlvar 15
399 cputime 0

```

*

* trips

*

407 discard

507 discard

*

```

501 time 0 ge null 0 0.0 1 * cl break
502 p 91050000 lt null 0 1.31e7 1 *scram signal
503 time 0 ge timeof 502 17.0 1 * core power trip
504 p 91050000 lt null 0 1.19e7 1 * si signal
505 time 0 ge timeof 504 6.0 1 * tbn bypass & main feed off
506 time 0 ge timeof 504 30.0 1 * aux feed on
507 time 0 ge timeof 504 300.0 1 * pump coastdown
508 cntrlvar 901 ge null 0 823.15 1 * opening of steam dump
509 p 91050000 gt null 0 1.46e6 n * accumulator isolation
510 tempf 013070000 lt null 0 450.1 1 * transnt termination
511 p 91050000 lt null 0 2.5e6 1 * transnt termination
512 cntrlvar 740 lt null 0 20.0 1 * transnt termination
513 cntrlvar 22 lt null 0 13.72 n * auxfeed on
514 cntrlvar 33 lt null 0 13.72 n * auxfeed on
515 cntrlvar 44 lt null 0 13.72 n * auxfeed on

```



```

516  p      91050000  lt  null  0 0.91e6  1  * lpsi
*
518  time    0      lt  timeof  505  0.0  n  0.  * tbn bypass & aux off
519  p      91050000  lt  null  0  4.16e6  n * accum on
520  time    0      ge  timeof  504  1000.  1 *rcp heater reduced
*
*600      666
603      506  and   513  n   * auxfeed-a on
604      506  and   514  n   * auxfeed-b on
605      506  and   515  n   * auxfeed-c on
*
608      509  and   519  n   * accum on
*666      510  and   511  n   * transient termination
*
*****
*  hydrodynamic components
*****
*
*****
*  component 36 - inlet portion of single loop pump
*****
*
0360000  pumpa  pump
0360101  0.0    0.350  0.02062  0.0  45.518  0.232  00000
0360108  035010000  1.0936e-2  0.0  0.0  01000
0360109  037000000  1.0936e-2  0.0  0.0  01000
0360200  0      15518260.  1253919.  2449436.  0.
0360201  0      6.23355  6.51145  0.  *  3.39762
0360202  0      6.224798  6.504798  0.  *  3.397625
0360110  .118    0.  1.  1.
0360111  .118    0.  1.  1.
0360301  0      0      0      -1      0      0      1
0360302  311.  0.94578  6.3056e-2  78.  144.75  37.3  750.0  0.  0.  4.65e-2  0.  0
*
*****
*  bethsy pump single phase homologous curves
*****
*
0361100  1  1  0.0  1.3257  0.1  1.3317  0.2  1.3273  0.3  1.3135  0.4  1.2909
0361101      0.5  1.2603  0.6  1.2223  0.7  1.1780  0.75  1.1536  0.775  1.1409
0361102      0.8  1.1279  0.825  1.1146  0.85  1.1009  0.875  1.0870  0.9  1.0728
0361103      0.925  1.0583  0.95  1.0437  0.975  1.0287  0.987  1.0215  1.0  1.0135
0361200  2  1  0.0  0.5139  0.1  0.5633  0.2  0.6128  0.3  0.6622  0.4  0.7116
0361201      0.5  0.7610  0.6  0.8105  0.7  0.8599  0.75  0.8846  0.775  0.8969
0361202      0.8  0.9093  0.825  0.9216  0.85  0.9340  0.875  0.9463  0.9  0.9587
0361203      0.925  0.9710  0.95  0.9834  0.975  0.9957  0.987  1.0017  1.0  1.0081
0361300  1  2  0.0  -0.5772  0.1  -0.4471  0.2  -0.3169  0.3  -0.1868  0.4  -0.0567
0361301      0.5  0.0733  0.6  0.2035  0.7  0.3572  0.75  0.4471  0.775  0.4951

```

0361302			0.8	0.5450	0.825	0.5969	0.85	0.6508	0.875	0.7066	0.9	0.7643
0361303			0.925	0.6238	0.95	0.8852	0.975	0.9485	0.987	0.9795	1.0	1.0135
0361400	2	2	0.0	-0.5772	0.1	-0.4145	0.2	-0.2518	0.3	-0.0891	0.4	0.0735
0361401			0.5	0.2362	0.6	0.3989	0.7	0.5616	0.75	0.6429	0.775	0.6836
0361402			0.8	0.7243	0.825	0.7579	0.85	0.7915	0.875	0.8263	0.9	0.8611
0361403			0.925	0.8972	0.95	0.9333	0.975	0.9707	0.987	0.9886	1.0	1.0081
0361500	1	3	-1.	1.3257	0.0	1.3257						
0361600	2	3	-1.	0.5139	0.0	0.5139						
0361700	1	4	-1.0	1.3257	-.900	1.2801	-.800	1.2346	-.700	1.1889	-.600	1.1434
0361701			-.500	1.0978	-.400	1.0522	-.300	1.0067	-.275	0.9953	-.250	0.9839
0361702			-.225	0.9725	-.200	0.9611	-.175	0.9497	-.150	0.9383	-.125	0.9269
0361703			-.100	0.9156	-.075	0.9042	-.050	0.8928	-.025	0.8814	0.00	0.8700
0361800	2	4	-1.0	0.5139	0.00	0.5139						
0361900	1	5	0.0	1.3257	1.00	1.3257						
0362000	2	5	0.0	0.5139	1.00	0.5139						
0362100	1	6	.0	0.8700	.025	0.8814	.050	0.8928	.075	0.9042	.100	0.9156
0362101			.125	0.9269	.150	0.9383	.175	0.9497	.200	0.9611	.225	0.9725
0362102			.250	0.9839	.275	0.9953	.300	1.0067	.400	1.0522	.500	1.0978
0362103			.600	1.1434	.700	1.1889	.800	1.2346	.900	1.2801	1.00	1.3257
0362200	2	6	0.0	0.5139	1.000	0.5139						
0362300	1	7	-1.0	0.1	0.0	1.3257						
0362400	2	7	-1.0	-1.5	0.0	.5139						
0362500	1	8	-1.0	0.1	0.0	-.5772						
0362600	2	8	-1.0	-1.5	0.0	-.5772						

*

0363000	0	0.0	0.0	0.1	0.0	0.2	0.0	0.3	0.5
0363001		0.4	1.0	0.6	1.0	0.8	1.0	0.9	1.0
0363002		1.0	0.0						
0363100	0	0.0	0.0	0.1	0.0	0.2	0.0	0.3	0.5
0363101		0.4	1.0	0.6	1.0	0.8	1.0	0.9	1.0
0363102		1.0	0.0						

*

* two-phase difference tables from semiscale

*

0364100	1	1	0.0	0.00	0.1	0.83	0.2	1.09		
0364101			0.5	1.02	0.6	1.015	0.7	1.01		
0364102			0.9	0.94	1.0	1.00				
0364200	1	2	0.0	0.00	0.1	-0.04	0.2	0.00	0.3	0.11
0364201			0.4	0.21	0.8	0.67	0.9	0.80	1.0	1.0
0364300	1	3	-1.0	-1.06	-0.9	-1.24	-0.8	-1.77		
0364301			-0.7	-2.36	-0.6	-2.79	-0.5	-2.91	-0.4	-2.67
0364302			-0.25	-1.69	-0.1	-0.50	0.0	0.00		
0364400	1	4	-1.0	-1.16	-0.9	-0.78	-0.8	-0.05		
0364401			-0.7	-0.31	-0.6	-0.17	-0.5	-0.17		
0364402			-0.35	0.00	-0.2	0.05	0.0	0.11		
0364500	1	5	0.0	0.00	0.2	-0.34				
0364501			0.4	-0.65	0.6	-0.95				
0364502			0.8	-1.19	1.0	-1.47				

0364600	1	6	0.0	0.11	0.1	0.13	0.25	0.15		
0364601			0.4	0.13	0.5	0.07	0.6	-0.04	0.7	-0.23
0364602			0.8	-0.51	0.9	-0.91	1.0	-1.47		
0364700	1	7	0.0	0.0	1.0	0.0				
0364800	1	8	0.0	0.0	1.0	0.0				
0364900	2	1	0.0	0.0	1.0	0.0				
0365000	2	2	0.0	0.0	1.0	0.0				
0365100	2	3	0.0	0.0	1.0	0.0				
0365200	2	4	0.0	0.0	1.0	0.0				
0365300	2	5	0.0	0.0	1.0	0.0				
0365400	2	6	0.0	0.0	1.0	0.0				
0365500	2	7	0.0	0.0	1.0	0.0				
0365600	2	8	0.0	0.0	1.0	0.0				

*

* pump speed controller for steady calculation

*

0366100	504	
0366101	0.0	294.1
0366102	300.0	294.1
0366103	305.0	201.0
0366104	310.0	141.3
0366105	320.0	113.0
0366106	330.0	87.9
0366107	340.0	75.3
0366108	350.0	62.8
0366109	370.0	47.1
0366110	400.0	37.6
0366111	500.0	21.9
0366112	700.0	15.7
0366113	916.0	10.4
0366114	1000.0	0.0

*

^

20542400	mserr delete	0.	0.	0.	0.	0.	0.
20542500	rcpspp delete	0.	0.	0.	0.	0.	0.

*

* component 46 - inlet portion of single loop pump

0460000	pumpb	pump					
0460101	0.0	0.350	0.02062	0.0	45.518	0.232	00000
0460108	045010000	1.0936e-2	0.0	0.0	01000		
0460109	047000000	1.0936e-2	0.0	0.0	01000		
0460200	0	15518260.	1253919.		2449436.	0.	
0460201	0	6.23355	6.51145	0.	*	3.39762	
0460202	0	6.224798	6.504798	0.	*	3.397625	

```

0460110 .118 0. 1. 1.
0460111 .118 0. 1. 1.
0460301 36 36 36 -1 0 0 1
0460302 311. 0.94578 6.3056e-2 78. 144.75 37.3 750.0 0. 0. 4.65e-2 0. 0

```

*

*

```

0466100 504
0466101 0.0 294.1
0466102 300.0 294.1
0466103 305.0 201.0
0466104 310.0 141.3
0466105 320.0 113.0
0466106 330.0 87.9
0466107 340.0 75.3
0466108 350.0 62.8
0466109 370.0 47.1
0466110 400.0 37.6
0466111 500.0 21.9
0466112 700.0 15.7
0466113 916.0 10.4
0466114 1000.0 0.0

```

*

* component 56 - inlet portion of broken loop pump

*

```

0560000 pumpc pump
0560101 0.0 0.350 0.02062 0.0 45.518 0.232 00000
0560108 055010000 1.0936e-2 0.0 0.0 01000
0560109 057000000 1.0936e-2 0.0 0.0 01000
0560200 0 15518260. 1253919. 2449436. 0.
0560201 0 6.23355 6.51145 0. * 3.39762
0560202 0 6.224798 6.504798 0. * 3.397625
0560110 .118 0. 1. 1.
0560111 .118 0. 1. 1.
0560301 36 36 36 -1 0 0 1
0560302 311. 0.94578 6.3056-2 78. 144.75 37.3 750.0 0. 0. 4.65e-2 0. 0.

```

*

*

```

0566100 504
0566101 0.0 294.1
0566102 300.0 294.1
0566103 305.0 201.0
0566104 310.0 141.3
0566105 320.0 113.0
0566106 330.0 87.9
0566107 340.0 75.3
0566108 350.0 62.8

```

0566109	370.0	47.1
0566110	400.0	37.6
0566111	500.0	21.9
0566112	700.0	15.7
0566113	916.0	10.4
0566114	1000.0	0.0

*

*

break nodalization

*

*7000000	breakjn	sngljun				
*7000101	037010000	767000000	2.083e-5	0.	100.	01100
*7000201	1 0.	0. 0.				

*

*7670000	breakpp	pipe				
*7670001	2					
*7670101	1.6619e-3	2				
*7670301	0.7953	2				
*7670601	0.0	2				
*7670801	4.0e-5	0.0 2				
*7671001	00 2					
*7671101	01000 1					
*7671201	003 15.5e6	565.0	0. 0. 0.	2		
*7671300	1					
*7671301	0. 0. 0.	1				

*

7680000	breakvlv	valve				
7680101	037010000	900000000	2.0830e-5	0.	0.	00100
7680102	0.85 1.					
7680201	1 0. 0. 0.					
7680300	trpvlv					
7680301	501					

*

9000000	containm	tmdpv01				
9000101	1.0e+8 10.0	0. 0. 0. 0.				
9000102	0.0 0. 00					
9000200	002					
9000201	0.0 0.101e6	1.0				

*

*

aux feedwater

*

7110000	auxfeeda	tmdpv01					
7110101	10.0 5.0	0. 0. 0. 0. 0. 00					
7110200	3						
7110201	0. 5.9e6	307.15					

```

*
7120000 auxfeeda tmdpjun
7120101 711000000 065000000 0.004
7120200 1 506 cntrlvar 13
7120201 -1.0 0. 0. 0.
7120202 0.0 0.30451 0. 0.
7120203 13.32 0.30451 0. 0.
7120204 13.42 0.22863 0. 0.
7120205 13.52 0.15275 0. 0.
7120206 13.62 0.07687 0. 0.
7120207 13.72 0.0 0. 0.
7120208 14.00 0.0 0. 0.
7120209 20.00 0.0 0. 0.
*
7130000 auxfeedb tmdpv01
7130101 10.0 5.0 0. 0. 0. 0. 0 00
7130200 3
7130201 0. 5.9e6 307.15
*
7140000 auxfeedb tmdpjun
7140101 713000000 075000000 0.004
7140200 1 506 cntrlvar 14
7140201 -1.0 0. 0. 0.
7140202 0.0 0.30451 0. 0.
7140203 13.32 0.30451 0. 0.
7140204 13.42 0.22863 0. 0.
7140205 13.52 0.15275 0. 0.
7140206 13.62 0.07687 0. 0.
7140207 13.72 0.0 0. 0.
7140208 14.00 0.0 0. 0.
7140209 20.00 0.0 0. 0.
*
7150000 auxfeedc tmdpv01
7150101 10.0 5.0 0. 0. 0. 0. 0 00
7150200 3
7150201 0. 5.9e6 307.15
*
7160000 auxfeedc tmdpjun
7160101 715000000 085000000 0.004
7160200 1 605 cntrlvar 15
7160201 -1.0 0. 0. 0.
7160202 0.0 0.30451 0. 0.
7160203 13.32 0.30451 0. 0.
7160204 13.42 0.22863 0. 0.
7160205 13.52 0.15275 0. 0.
7160206 13.62 0.07687 0. 0.
7160207 13.72 0.0 0. 0.
7160208 14.00 0.0 0. 0.

```

7160209 20.00 0.0 0. 0.

*

* accumulator injection

*

	accub	accum							
7210000									
7210101	0.0	8.376	0.423	0.0	90.0	8.376	3.3e-5	0.	00
7210200	4.18e6	290.15							
7211101	048000000	1.14e-3	19.0	19.0	0				
7212200	0.2562	0.0	21.0	9.780	0.00927	0	0	0	608

*

	accuc	accum							
7220000									
7220101	0.0	8.376	0.423	0.0	90.0	8.376	3.3e-5	0.	00
7220200	4.18e6	290.15							
7221101	058000000	1.14e-3	19.0	19.0	0				
7222200	0.2562	0.0	21.75	9.780	0.00927	0	0	0	608

*

*

* component 48 - single loop accumulator nozzle

*

	accnoza	branch							
0480000									
0480001	3	0							
0480101	1.0936e-2	0.5	0.0	0.0	0.0	0.0	4.57e-5	.118	00000
0480200	003	15737388.	561.3						
0481101	047010000	048000000	1.0936e-2	0.0	0.0	0.0	01000		
0482101	048010000	049000000	1.0936e-2	0.0	0.0	0.0	01000		
0483101	733010000	048000000	1.0936e-2	0.0	0.0	0.0	01000		
0481201	6.2291	6.2291	0.0						
0482201	6.2291	6.2291	0.0						
0483201	0.0	0.0	0.0						
0481110	0.118	0.0	1.0	1.0					
0482110	0.118	0.0	1.0	1.0					
0483110	0.118	0.0	1.0	1.0					

*

* component 58 - single loop accumulator nozzle

*

	accnoz	branch							
0580000									
0580001	3	0							
0580101	1.0936e-2	0.5	0.0	0.0	0.0	0.0	4.57e-5	.118	00000
0580200	003	15737388.	561.3						
0581101	057010000	058000000	1.0936e-2	0.0	0.0	0.0	01000		
0582101	058010000	059000000	1.0936e-2	0.0	0.0	0.0	01000		
0583101	736010000	058000000	1.0936e-2	0.0	0.0	0.0	01000		

0581201	6.2291	6.2291	0.0
0582201	6.2291	6.2291	0.0
0583201	0.0	0.0	0.0
0581110	0.118	0.0	1.0
0582110	0.118	0.0	1.0
0583110	0.118	0.0	1.0

*

* low pressure safety injection

*

7310000	lpsib	tmdpvol						
7310101	4.375	10.	0.	0.	0.	0.	0.	00
7310200	3							
7310201	0.0	1.013e5	307.15					

*

7320000	lpsib	tmdpjun			
7320101	731000000	733000000	2.55e03		
7320200	1 516	p 091050000			
7320201	-1.0	0.	0.	0.	
7320202	0.	1.9749	0.	0.	
7320203	0.1e6	1.8633	0.	0.	
7320204	0.2e6	1.7445	0.	0.	
7320205	0.3e6	1.6169	0.	0.	
7320206	0.4e6	1.4785	0.	0.	
7320207	0.5e6	1.3256	0.	0.	
7320208	0.6e6	1.1527	0.	0.	
7320209	0.7e6	0.9487	0.	0.	
7320210	0.8e6	0.6866	0.	0.	
7320211	0.9e6	0.2070	0.	0.	
7320212	0.91e6	0.0	0.	0.	

*

7330000	lpsijun	snglvol					
7330101	2.55e-3	16.0	0.	0.	0.	0.	3.33e-5
7330102	0.0	00					
7330200	0	15738000.0	1253920.	2442260.	0.0		

*

7340000	lpsic	tmdpvol					
7340101	4.375	10.	0.	0.	0.	0.	00
7340200	3						
7340201	0.0	1.013e5	307.15				

*

7350000	lpsib	tmdpjun			
7350101	734000000	736000000	2.55e03		
7350200	1 516	p 091050000			
7350201	-1.0	0.	0.	0.	
7350202	0.	1.9749	0.	0.	
7350203	0.1e6	1.8633	0.	0.	

7350204	0.2e6	1.7445	0.	0.
7350205	0.3e6	1.6169	0.	0.
7350206	0.4e6	1.4785	0.	0.
7350207	0.5e6	1.3256	0.	0.
7350208	0.6e6	1.1527	0.	0.
7350209	0.7e6	0.9487	0.	0.
7350210	0.8e6	0.6866	0.	0.
7350211	0.9e6	0.2070	0.	0.
7350212	0.91e6	0.0	0.	0.

*

7360000	lpsijun	snglvol					
7360101	2.55e-3	16.0	0.	0.	0.	0.	3.33e-5
7360102	0.0	00					
7360200	0	15738000.0	1253920.	2442260.	0.0		

*

* description of primary system components

*

* component 93 trip valve for pzs steady state

*

0930000	pzrvlv	delete
---------	--------	--------

*

* component 94 time dependent volume for pzs stp

*

0940000	pzs-tmdp	delete
---------	----------	--------

*

*

* steam generator secondary system components

*

20526200	sg1lsp	delete	0.0	0.0	0.0	0.0	0.0
20526300	fw1cnt1	delete	0.0	0.0	0.0	0.0	0.0
20527200	sg2lsp	delete	0.0	0.0	0.0	0.0	0.0
20527300	fw2cnt1	delete	0.0	0.0	0.0	0.0	0.0
20528200	sg3lsp	delete	0.0	0.0	0.0	0.0	0.0
20528300	fw3cnt1	delete	0.0	0.0	0.0	0.0	0.0
20526500	sg1psp	delete	0.0	0.0	0.0	0.0	0.0
20526600	stm1cnt1	delete	0.0	0.0	0.0	0.0	0.0
20527500	sg2psp	delete	0.0	0.0	0.0	0.0	0.0
20527600	stm2cnt1	delete	0.0	0.0	0.0	0.0	0.0
20528500	sg3psp	delete	0.0	0.0	0.0	0.0	0.0
20528600	stm3cnt1	delete	0.0	0.0	0.0	0.0	0.0

```

*
*****
*   component 609 - feedwater source
*****
*
6090000  feedwtr  tmdpvol
6090101 1.0e6  1.0  0.0  0.0  0.0  0.0  0.0  0.0  11
6090200 103  0
6090201 0.0  6.910e6  491.1
*
*****
*   component 601 - feedwater junction
*****
*
6010000          "fedwtr"          tmdpjun
6010101 609000000  065000000  0.0
6010200 1  518
6010201 -1.0  0.0  0.0  0.0
6010202 0.0  0.52514  0.0  0.0
6010203 100.0  0.52514  0.0  0.0
*
*****
*   component 606 - steamline outlet
*****
*
6060000          "trb st n"          valve
6060101 069010000  607000000  4.94e-5  0.0  0.0  00000
6060201 1  0.  .52514  0
6060300          trpvlv
6060301 518
*
*****
*   component 607 - steamline sink volume
*****
*
6070000 stmsink  tmdpvol
6070101 1.0e6  1.0  0.0  0.0  0.0  0.0  0.0  0.0  10
6070200 102  0
6070201 0.0  0.101e6  1.0
*
*****
*   component 648 - steam bypass
*****
*
6480000 stmbypas  tmdpjun
6480101 069010000  607000000  1.14e-3
6480200 1  505  p  68010000
6480201 -1.0  0.0  0.0  0.0

```

6480202	7.03e+6	0.0	0.0	0.0
6480203	7.05e+6	0.0	0.5	0.0
6480204	7.06e+6	0.0	1.0	0.0

*

* component 610 - steam dump valve

*

6100000	stdump	tmdpjun		
6100101	069010000	607000000	1.8506e-4	
6100200	1	508	p	68010000
6100201	-1.0	0.0	0.0	0.0
6100202	0.1e6	0.0	0.0	0.0
6100203	7.03e6	0.0	0.55555	0.0
6100204	8.0e6	0.0	0.95238	0.0

*

* component 709 - feedwater source

*

7090000	feedwtr	tmdpv01		
7090101	1.0e6	1.0	0.0	0.0 0.0 0.0 0.0 11
7090200	103	0		
7090201	0.0	6.910e6	491.1	

*

* component 701 - feedwater junction

*

7010000		"fedwtr"		tmdpjun
7010101	709000000	075000000	0.0	
7010200	1	518		
7010201	-1.0	0.0	0.0	0.0
7010202	0.0	0.52514	0.0	0.0
7010203	100.0	0.52514	0.0	0.0

*

* component 706 - steamline outlet

*

7060000		"trb st n"		valve	
7060101	079010000	707000000	4.94e-5	0.0	0.0 00000
7060201	1	0.	.52514	0	
7060300		trpvlv			
7060301	518				

*

* component 707 - steamline sink volume

```

*****
*
7070000  stmsink  tmdpv01
7070101  1.0e6  1.0  0.0  0.0  0.0  0.0  0.0  0.0  10
7070200  102  0
7070201  0.0  0.101e6  1.0
*
*****
*   component 748 - steam bypass
*****
*
7480000  stmbypas  tmdpj01
7480101  079010000  707000000  1.14e-3
7480200  1  505  p  78010000
7480201  -1.0  0.0  0.0  0.0
7480202  7.03e+6  0.0  0.0  0.0
7480203  7.05e+6  0.0  0.5  0.0
7480204  7.06e+6  0.0  1.0  0.0
*
*****
*   component 710 - steam dump valve
*****
*
7100000  stmdump  tmdpj01
7100101  079010000  707000000  1.8506e-4
7100200  1  508  p  78010000
7100201  -1.0  0.0  0.0  0.0
7100202  0.1e6  0.0  0.0  0.0
7100203  7.03e6  0.0  0.55555  0.0
7100204  8.0e6  0.0  0.95238  0.0
*
*****
*   component 809 - feedwater source
*****
*
8090000  feedwtr  tmdpv01
8090101  1.0e6  1.0  0.0  0.0  0.0  0.0  0.0  0.0  11
8090200  103  0
8090201  0.0  6.910e6  499.1
*
*****
*   component 801 - feedwater junction
*****
*
8010000  "fedwtr"  tmdpj01
8010101  809000000  085000000  0.0
8010200  1  518
8010201  -1.0  0.0  0.0  0.0

```

```

8010202    0.0    0.52514    0.0    0.0
8010203   100.0    0.52514    0.0    0.0
*
*****
*   component 806 - steamline outlet
*****
*
8060000      "trb st n"      valve
8060101   089010000   807000000   4.94e-5   0.0   0.0   00000
8060201      1      0.      .52514      0
8060300      trpvlv
8060301      518
*
*****
*   component 807 - steamline sink volume
*****
*
8070000   stmsink   tmdpv01
8070101   1.0e6   1.0   0.0   0.0   0.0   0.0   0.0   10
8070200   102   0
8070201   0.0   0.101e6   1.0
*
*****
*   component 848 - steam bypass
*****
*
8480000   stmbypas   tmdpj01
8480101   089010000   807000000   1.14e-3
8480200   1   505   p   88010000
8480201   -1.0   0.0   0.0   0.0
8480202   7.03e+6   0.0   0.0   0.0
8480203   7.05e+6   0.0   0.5   0.0
8480204   7.06e+6   0.0   1.0   0.0
*
*****
*   component 810 - steam dump valve
*****
*
8100000   stmdump   tmdpj01
8100101   089010000   807000000   1.8506e-4
8100200   1   508   p   88010000
8100201   -1.0   0.0   0.0   0.0
8100202   0.1e6   0.0   0.0   0.0
8100203   7.03e6   0.0   0.55555   0.0
8100204   8.0e6   0.0   0.95238   0.0
*
*****
*   power table

```

```

*****
20200100      power      502
20200101      -1.0      2.857e6
20200102        0.0      2.857e6 17.0      2.857e6 17.6      2.720e6 19.0      2.578e6
20200103      21.5      2.434e6 24.0      2.290e6 26.8      2.148e6 29.7      2.005e6
20200104      32.6      1.862e6 36.0      1.750e6 44.0      1.550e6 52.0      1.385e6
20200105      63.0      1.265e6 74.0      1.170e6 84.0      1.110e6 94.0      1.050e6
20200106     104.0      0.990e6 123.0      0.964e6 153.0      0.906e6 198.0      0.854e6
20200107     273.0      0.812e6 373.0      0.750e6 423.0      0.726e6 523.0      0.706e6
20200108     623.0      0.680e6 723.0      0.662e6 823.0      0.647e6 923.0      0.629e6
20200109    1923.0      0.510e6 3123.0      0.439e6 5123.0      0.380e6
20200110    7123.0      0.340e6 9123.0      0.324e6 18123.0      0.271e6
*
*****
*  delete rcp and pzs heaters
*****
20277700      htrnrate      520
20277701      -1.0      159155.
20277702        0.0        0.0
*
20277800      htrnrate
20277801        0.0      51556.1
*
20278900      power      501
20278901        0.        0.
*
*****
*                      control variables
*****
*
*calculate time-integrated break mass flow
*
20576800      breakfl      integral      1.0      0.0      1
20576801      mflowj      768000000
*
* calculate time-integrated lpsi flow
*
20573200      lpsib      integral      1.0      0.0      1
20573201      mflowj      732000000
*
20573500      lpsic      integral      1.0      0.0      1
20573501      mflowj      735000000
*
20573800      lpsisum      sum      1.0      0.0      1
20573801      0.0      1.0      cntrlvar      732
20573802      1.0      cntrlvar      735
*
20574000      smargin      sum      1.0      0.0      1

```

20574001	0.0	1.0	sattemp	039010000
20574002		-1.0	tempf	039010000
*				
20531700	sgasm1	sum	1.0	605.622 1
20531701	0.0	1.151e-2	rho	060010000
20531702		2.303e-2	rho	060020000
20531703		3.454e-2	rho	060030000
20531704		4.605e-2	rho	060040000
20531705		5.756e-2	rho	060050000
20531706		8.635e-2	rho	060060000
20531707		8.635e-2	rho	060070000
20531708		8.635e-2	rho	060080000
20531709		8.635e-2	rho	060090000
20531710		0.10376	rho	060100000
20531711		1.0393e-2	rho	061010000
20531712		3.861e-2	rho	061020000
20531713		4.385e-2	rho	061030000
20531714		0.59549	rho	062010000
*				
20531800	sgasm2	sum	1.0	187.0125 1
20531801	0.0	0.14922	rho	063010000
20531802		0.15856	rho	064010000
20531803		8.172e-2	rho	065010000
20531804		6.336e-2	rho	066010000
20531805		8.6429e-3	rho	067010000
20531806		8.7538e-3	rho	067020000
20531807		8.7538e-3	rho	067030000
20531808		8.7538e-3	rho	067040000
20531809		5.8359e-3	rho	067050000
20531810		4.6687e-3	rho	067060000
20531811		3.5015e-3	rho	067070000
20531812		2.3343e-3	rho	067080000
20531813		4.0563e-3	rho	067090000
20531814		0.13404	rho	068010000
20531815		3.425e-2	rho	069010000
20531816		3.425e-2	rho	069020000
*				
20531900	sgasmt	sum	1.0	792.635 1
20531901	0.0	1.0	cntrlvar 317	
20531902		1.0	cntrlvar 318	
*				
20532000	sgbsm1	sum	1.0	605.622 1
20532001	0.0	1.151e-2	rho	070010000
20532002		2.303e-2	rho	070020000
20532003		3.454e-2	rho	070030000
20532004		4.605e-2	rho	070040000
20532005		5.756e-2	rho	070050000
20532006		8.635e-2	rho	070060000

20532007		8.635e-2	rho	070070000
20532008		8.635e-2	rho	070080000
20532009		8.635e-2	rho	070090000
20532010		0.10376	rho	070100000
20532011		1.0393e-2	rho	071010000
20532012		3.861e-2	rho	071020000
20532013		4.385e-2	rho	071030000
20532014		0.59549	rho	072010000
*				
20532100	sgbsm2	sum	1.0	187.0125 1
20532101	0.0	0.14922	rho	073010000
20532102		0.15856	rho	074010000
20532103		8.172e-2	rho	075010000
20532104		6.336e-2	rho	076010000
20532105		8.6429e-3	rho	077010000
20532106		8.7538e-3	rho	077020000
20532107		8.7538e-3	rho	077030000
20532108		8.7538e-3	rho	077040000
20532109		5.8359e-3	rho	077050000
20532110		4.6687e-3	rho	077060000
20532111		3.5015e-3	rho	077070000
20532112		2.3342e-3	rho	077080000
20532113		4.0563e-3	rho	077090000
20532114		0.13404	rho	078010000
20532115		3.425e-2	rho	079010000
20532116		3.425e-2	rho	079020000
*				
20532200	sgbsmt	sum	1.0	792.635 1
20532201	0.0	1.0	cntrlvar	320
20532202		1.0	cntrlvar	321
*				
20532300	sgcsm1	sum	1.0	605.622 1
20532301	0.0	1.151e-2	rho	080010000
20532302		2.303e-2	rho	080020000
20532303		3.454e-2	rho	080030000
20532304		4.605e-2	rho	080040000
20532305		5.756e-2	rho	080050000
20532306		8.635e-2	rho	080060000
20532307		8.635e-2	rho	080070000
20532308		8.635e-2	rho	080080000
20532309		8.635e-2	rho	080090000
20532310		0.10376	rho	080100000
20532311		1.0393e-2	rho	081010000
20532312		3.861e-2	rho	081020000
20532313		4.385e-2	rho	081030000
20532314		0.59549	rho	082010000
*				
20532400	sgcsm2	sum	1.0	187.0125 1


```

20532401      0.0      0.14922      rho      083010000
20532402      0.15856      rho      084010000
20532403      8.172e-2      rho      085010000
20532404      6.336e-2      rho      086010000
20532405      8.6429e-3      rho      087010000
20532406      8.7538e-3      rho      087020000
20532407      8.7538e-3      rho      087030000
20532408      8.7538e-3      rho      087040000
20532409      5.8359e-3      rho      087050000
20532410      4.6687e-3      rho      087060000
20532411      3.5015e-3      rho      087070000
20532412      2.3343e-3      rho      087080000
20532413      4.0563e-3      rho      087090000
20532414      0.13404      rho      088010000
20532415      3.425e-2      rho      089010000
20532416      3.425e-2      rho      089020000
*
20532500      sgcent      sum      1.0      792.635      1
20532501      0.0      1.0      cntrlvar      323
20532502      1.0      cntrlvar      324
*
*mass inventory of accumulator b
*
20572100      accmass      mult      1.0      0.      1
20572101      rhof      721010000      acvliq      721
*
20572200      accmasc      mult      1.0      0.0      1
20572201      rhof      722010000      acvliq      722
*
* core collapsed level
*
20581800      corelvl      sum      1.0      0.0      1
20581801      0.0      0.11      voidf      013010000
20581802      0.788      voidf      013020000
20581803      0.78      voidf      013030000
20581804      0.52      voidf      013040000
20581805      0.78      voidf      013050000
20581806      0.788      voidf      013060000
20581807      0.35      voidf      013070000
20581808      1.054      voidf      012010000
20581809      0.600      voidf      011010000
*
* run statistics
*
20581900      oldtime      sum      1.0      0.0      0
20581901      0.0      1.0      cntrlvar      820
20582000      newtime      sum      1.0      0.0      0
20582001      0.0      1.0      time      0

```

20582100	timstep	sum	1.0	0.0	0.0
20582101	0	-1.	cntrlvar	819	
20582102		1.	cntrlvar	820	

*

* calculate liquid levels in pressurizer and steam generators

20500100	preslev	sum	1.0	4.08	1
20500101	0.0	0.105	voidf	091010000	
20500102		0.892	voidf	091020000	
20500103		5.4145	voidf	091030000	
20500104		5.4145	voidf	091040000	
20500105		0.105	voidf	091050000	

*

20500400	veslev	sum	1.0	10.421	1
20500401	0.0	1.0	voidf	011010000	
20500402		1.054	voidf	012010000	
20500403		0.11	voidf	013010000	
20500404		0.788	voidf	013020000	
20500405		0.78	voidf	013030000	
20500406		0.52	voidf	013040000	
20500407		0.78	voidf	013050000	
20500408		0.788	voidf	013060000	
20500409		0.35	voidf	013070000	
20500410		1.0195	voidf	099010000	
20500411		0.117	voidf	015010000	
20500412		2.713	voidf	016010000	
20500413		0.4015	voidf	018010000	

*

20500200	sgalev	sum	1.0	10.60282	1
20500201	0.0	0.2	voidf	060010000	
20500202		0.4	voidf	060020000	
20500203		0.6	voidf	060030000	
20500204		0.8	voidf	060040000	
20500205		1.0	voidf	060050000	
20500206		1.5	voidf	060060000	
20500207		1.5	voidf	060070000	
20500208		1.5	voidf	060080000	
20500209		1.5	voidf	060090000	
20500210		1.8025	voidf	060100000	
20500211		0.158	voidf	061010000	
20500212		0.7925	voidf	061020000	
20500213		0.9	voidf	061030000	
20500214		2.16	voidf	062010000	
20500215		0.4	voidf	068010000	

*

20500300	sgblev	sum	1.0	10.61266	1
20500301	0.0	0.2	voidf	070010000	

20500302	0.4	voidf	070020000
20500303	0.6	voidf	070030000
20500304	0.8	voidf	070040000
20500305	1.0	voidf	070050000
20500306	1.5	voidf	070060000
20500307	1.5	voidf	070070000
20500308	1.5	voidf	070080000
20500309	1.5	voidf	070090000
20500310	1.8025	voidf	070100000
20500311	0.158	voidf	071010000
20500312	0.7925	voidf	071020000
20500313	0.9	voidf	071030000
20500314	2.16	voidf	072010000
20500315	0.4	voidf	078010000
*			
20500500	sgclev	sum	1.0 10.61266 1
20500501	0.0	0.2	voidf 080010000
20500502		0.4	voidf 080020000
20500503		0.6	voidf 080030000
20500504		0.8	voidf 080040000
20500505		1.0	voidf 080050000
20500506		1.5	voidf 080060000
20500507		1.5	voidf 080070000
20500508		1.5	voidf 080080000
20500509		1.5	voidf 080090000
20500510		1.8025	voidf 080100000
20500511		0.158	voidf 081010000
20500512		0.7925	voidf 081020000
20500513		0.9	voidf 081030000
20500514		2.16	voidf 082010000
20500515		0.4	voidf 088010000
*			
20502200	sgalevd	sum	1.0 12.00412 1
20502201	0.0	1.481	voidf 067010000
20502202		1.5	voidf 067020000
20502203		1.5	voidf 067030000
20502204		1.5	voidf 067040000
20502205		1.0	voidf 067050000
20502206		0.8	voidf 067060000
20502207		0.6	voidf 067070000
20502208		0.4	voidf 067080000
20502209		0.2	voidf 067090000
20502212		1.9815	voidf 066010000
20502213		0.8275	voidf 065010000
20502214		1.6055	voidf 064010000
20502215		0.3375	voidf 063010000
20502216		2.16	voidf 062010000
20502217		0.4	voidf 068010000

```

*
20503300  sgblevd    sum    1.0    12.00995 1
20503301  0.0      1.481    voidf  077010000
20503302          1.5      voidf  077020000
20503303          1.5      voidf  077030000
20503304          1.5      voidf  077040000
20503305          1.0      voidf  077050000
20503306          0.8      voidf  077060000
20503307          0.6      voidf  077070000
20503308          0.4      voidf  077080000
20503309          0.2      voidf  077090000
20503312          1.9815   voidf  076010000
20503313          0.8275   voidf  075010000
20503314          1.6055   voidf  074010000
20503315          0.3375   voidf  073010000
20503316          2.16     voidf  072010000
20503317          0.4      voidf  078010000

```

```

*
*
20504400  sgclevd    sum    1.0    12.00995 1
20504401  0.0      1.481    voidf  087010000
20504402          1.5      voidf  087020000
20504403          1.5      voidf  087030000
20504404          1.5      voidf  087040000
20504405          1.0      voidf  087050000
20504406          0.8      voidf  087060000
20504407          0.6      voidf  087070000
20504408          0.4      voidf  087080000
20504409          0.2      voidf  087090000
20504412          1.9815   voidf  086010000
20504413          0.8275   voidf  085010000
20504414          1.6055   voidf  084010000
20504415          0.3375   voidf  083010000
20504416          2.16     voidf  082010000
20504417          0.4      voidf  088010000

```

```

*
*****

```

```

* calculate pressure differences

```

```

*****

```

```

20500600  p02      sum    1.0    15694560. 1
20500601  0.0      1.0      p      013070000
20500602          -0.441    rho    013070000

```

```

*
20504100  dp461f    sum    1.e-3    260.256 1
20504101  0.0      1.0      p 060010000
20504102          -1.0      p 060060000
20504103          +0.49     rho 060010000
20504104          +5.635     rho 060060000

```

```

*
20504200 dp561f sum 1.e-3 260.3635 1
20504201 0.0 1.0 p 070010000
20504202 -1.0 p 070060000
20504203 +0.49 rho 070010000
20504204 +5.635 rho 070060000
*
20504300 dp661f sum 1.e-3 260.3635 1
20504301 0.0 1.0 p 080010000
20504302 -1.0 p 080060000
20504303 +0.49 rho 080010000
20504304 +5.635 rho 080060000
*
20505100 dp1 sum 1.e-3 13.9222 1
20505101 0.0 1.0 p 039010000
20505102 -1.0 p 031010000
*
20505200 dp2 sum 1.e-3 13.92278 1
20505201 0.0 1.0 p 049010000
20505202 -1.0 p 041010000
*
20505300 dp3 sum 1.e-3 13.92278 1
20505301 0.0 1.0 p 059010000
20505302 -1.0 p 051010000
*
20505900 dp11v sum 1.e-3 102.8206 1
20505901 0.0 1.0 p 033010000
20505902 -1.0 p 033030000
20505903 -1.9213 rho 033030000
*
20506000 dp41 sum 1.e-3 70.6971 1
20506001 0.0 1.0 p 033030000
20506002 -1.0 p 034010000
20506003 1.9213 rho 033030000
20506004 2.189 rho 034010000
*
20506100 d11v41 sum 1.e-3 173.5176 1
20506101 0.0 1.0 cntrlvar 59
20506102 +1.0 cntrlvar 60
*
20506200 dp44 sum 1.e-3 77.5905 1
20506201 0.0 1.0 p 035010000
20506202 -1.0 p 034220000
20506203 +2.8204 rho 035010000
20506204 +2.189 rho 034220000
*
20506300 dp12vg sum 1.e-3 287.572 1
20506301 0.0 1.0 p 035040000

```

20506302	-1.0	p	035010000		
20506303	-.579	rho	035040000		
20506304	-2.8204	rho	035010000		
*					
20506400	d4412vg	sum	1.e-3	365.162	1
20506401	0.0	1.0	cntrlvar	62	
20506402		+1.0	cntrlvar	63	
*					
20506800	dp0r3	sum	1.e-3	497.097	1
20506801	0.0	1.0	p	011010000	
20506802		-1.0	p	031010000	
20506803		+.981	rho	011010000	
*					
20507100	dp0r2	sum	1.e-3	218.743	1
20507101	0.0	1.0	p	031010000	
20507102		-1.0	p	018010000	
20507104		+1.9545	rho	018010000	
*					
20533100	dp0r2a3	sum	1.e-3	7.1584	1
20533101	0.0	1.0	cntrlvar	68	
20533102		1.0	cntrlvar	71	
*					
20507300	dpp1	sum	1.e-3	269.995	1
20507301	0.0	1.0	p	091020000	
20507302		-1.0	p	091050000	
20507303		-.491	rho	091020000	
20507304		.716	rho	091050000	
*					
20507400	dpp2	sum	1.e-3	231.885	1
20507401	0.0	1.0	p	091030000	
20507402		-1.0	p	091040000	
20507403		+25.182	rho	091030000	
20507404		+19.384	rho	091040000	
*					
20507500	dpp3	sum	1.e-3	264.0964	1
20507501	0.0	1.0	p	032010000	
20507502		-1.0	p	091020000	
20507503		+.491	rho	091020000	
*					
20509100	dp4r1	sum	1.e-3	761.492	1
20509101	0.0	1.0	p	067080000	
20509102		-1.0	p	062010000	
20509103		+0.981	rho	067080000	
20509104		+9.614	rho	062010000	
*					
20509300	dp5r1	sum	1.e-3	762.19	1
20509301	0.0	1.0	p	077080000	
20509302		-1.0	p	072010000	

```

20509303      +0.981      rho 077080000
20509304      +9.614      rho 072010000
*
20509500  dp12p      sum  1.e-3  46.7045  1
20509501      0.0      1.0      p 035050000
20509502      -1.0      p 037010000
20509503      -7.794      rho 035050000
*
20510000  dp0r1      sum  1.e-3  717.201  1
20510001      0.0      1.0      p 011010000
20510002      -1.0      p 018010000
20510003      0.981      rho 011010000
20510004      2.148      rho 018010000
*
*****
*
20511100  dp0200      sum  1.e-3  0.      1
20511101      0.0      1.0      p 011010000
20511102      -1.0      p 013070000
20511103      1.715      rho 013070000
20511104      4.9      rho 011010000
*
20511200  dpup1      sum  1.e-3  0.      1
20511201      0.0      1.0      p 099010000
20511202      -1.0      p 016010000
20511203      4.993      rho 099010000
20511204      5.370      rho 016010000
*
20511300  dp034      sum  1.e-3  0.      1
20511301      0.0      1.0      p 099010000
20511302      -1.0      p 017010000
20511303      -4.9955      rho 099010000
20511304      13.867      rho 017010000
*
20511400  dpuhead      sum  1.e-3  0.      1
20511401      0.0      -1.0      p 018010000
20511402      1.0      p 019010000
20511403      0.7203      rho 019010000
20511404      2.19275      rho 018010000
*
20509600  dp12vp      sum  1.e-3  0.      1
20509601      0.0      1.0      p 035040000
20509602      -1.0      p 035050000
20509603      5.07      rho 035050000
*
20509700  dp22vp      sum  1.e-3  0.      1
20509701      0.0      1.0      p 045040000
20509702      -1.0      p 045050000

```

20509703		5.07	rho	045050000	
*					
20509800	dp32vp	sum	1.e-3	0.	1
20509801	0.0	1.0	p	055040000	
20509802		-1.0	p	055050000	
20509803		5.07	rho	055050000	
*					
20510200	dp22p	sum	1.e-3	46.7045	1
20510201	0.0	1.0	p	045050000	
20510202		-1.0	p	047010000	
20510203		-7.794	rho	045050000	
*					
20510300	dp22vg	sum	1.e-3	287.572	1
20510301	0.0	1.0	p	045040000	
20510302		-1.0	p	045010000	
20510303		-.579	rho	045040000	
20510304		-2.8204	rho	045010000	
*					
20510500	dp32p	sum	1.e-3	46.7045	1
20510501	0.0	1.0	p	055050000	
20510502		-1.0	p	057010000	
20510503		-7.794	rho	055050000	
*					
20510600	dp32vg	sum	1.e-3	287.572	1
20510601	0.0	1.0	p	055040000	
20510602		-1.0	p	055010000	
20510603		-.579	rho	055040000	
20510604		-2.8204	rho	055010000	
*					
20507000	dp51	sum	1.e-3	70.6971	1
20507001	0.0	1.0	p	043030000	
20507002		-1.0	p	044010000	
20507003		1.9213	rho	043030000	
20507004		2.189	rho	044010000	
*					
20508000	dp61	sum	1.e-3	70.6971	1
20508001	0.0	1.0	p	053030000	
20508002		-1.0	p	054010000	
20508003		1.9213	rho	053030000	
20508004		2.189	rho	054010000	
*					
20550000	dp4r2	sum	1.e-3	0.	1
20550001	0.0	1.0	p	061030000	
20550002		-1.0	p	068010000	
20550003		1.96	rho	068010000	
20550004		4.41	rho	061030000	
*					
20550100	dp5r2	sum	1.e-3	0.	1


```

20550101    0.0    1.0    p 071030000
20550102    -1.0    p 078010000
20550103    1.96    rho    078010000
20550104    4.41    rho    071030000
*
20550200    dp6r2    sum    1.e-3    0.    1
20550201    0.0    1.0    p 081010000
20550202    -1.0    p 088010000
20550203    1.96    rho    088010000
20550204    4.41    rho    081030000
*
*****
* primary system masses
*****
*
20515100    sgamas1    sum    1.0    99.3376    1
20515101    0.0    0.0350607    rho    034010000
20515102    2.068400e-3    rho    034020000
20515103    4.136800e-3    rho    034030000
20515104    6.205200e-3    rho    034040000
20515105    8.273600e-3    rho    034050000
20515106    1.034200e-2    rho    034060000
20515107    1.551300e-2    rho    034070000
20515108    1.551300e-2    rho    034080000
20515109    1.551300e-2    rho    034090000
20515110    1.551300e-2    rho    034100000
20515111    7.497950e-3    rho    034110000
*
20514100    sgamas2    sum    1.0    102.5563    1
20514112    0.0    7.497950e-3    rho    034120000
20514113    1.551300e-2    rho    034130000
20514114    1.551300e-2    rho    034140000
20514115    1.551300e-2    rho    034150000
20514116    1.551300e-2    rho    034160000
20514117    1.034200e-2    rho    034170000
20514118    8.273600e-3    rho    034180000
20514119    6.205200e-3    rho    034190000
20514120    4.136800e-3    rho    034200000
20514121    2.068400e-3    rho    034210000
20514122    0.0350607    rho    034220000
*
20515200    sgbmas1    sum    1.0    99.3376    1
20515201    0.0    0.0350607    rho    044010000
20515202    2.068400e-3    rho    044020000
20515203    4.136800e-3    rho    044030000
20515204    6.205200e-3    rho    044040000
20515205    8.273600e-3    rho    044050000
20515206    1.034200e-2    rho    044060000

```

20515207		1.551300e-2	rho 044070000
20515208		1.551300e-2	rho 044080000
20515209		1.551300e-2	rho 044090000
20515210		1.551300e-2	rho 044100000
20515211		7.497950e-3	rho 044110000
*			
20514200	sgbmas2	sum 1.0	102.5563 1
20514212	0.0	7.497950e-3	rho 044120000
20514213		1.551300e-2	rho 044130000
20514214		1.551300e-2	rho 044140000
20514215		1.551300e-2	rho 044150000
20514216		1.551300e-2	rho 044160000
20514217		1.034200e-2	rho 044170000
20514218		8.273600e-3	rho 044180000
20514219		6.205200e-3	rho 044190000
20514220		4.136800e-3	rho 044200000
20514221		2.068400e-3	rho 044210000
20514222		0.0350607	rho 044220000
*			
20516100	sgcmas1	sum 1.0	99.3376 1
20516101	0.0	0.0350607	rho 054010000
20516102		2.068400e-3	rho 054020000
20516103		4.136800e-3	rho 054030000
20516104		6.205200e-3	rho 054040000
20516105		8.273600e-3	rho 054050000
20516106		1.034200e-2	rho 054060000
20516107		1.551300e-2	rho 054070000
20516108		1.551300e-2	rho 054080000
20516109		1.551300e-2	rho 054090000
20516110		1.551300e-2	rho 054100000
20516111		7.497950e-3	rho 054110000
*			
20516200	sgamas2	sum 1.0	102.5563 1
20516212	0.0	7.497950e-3	rho 054120000
20516213		1.551300e-2	rho 054130000
20516214		1.551300e-2	rho 054140000
20516215		1.551300e-2	rho 054150000
20516216		1.551300e-2	rho 054160000
20516217		1.034200e-2	rho 054170000
20516218		8.273600e-3	rho 054180000
20516219		6.205200e-3	rho 054190000
20516220		4.136800e-3	rho 054200000
20516221		2.068400e-3	rho 054210000
20516222		0.0350607	rho 054220000
*			
20515300	cormas	sum 1.0	407.052 1
20515301	0.0	0.15323	rho 011010000
20515302		6.20907e-2	rho 012010000

20515303		4.70800e-3	rho 013010000
20515304		3.37264e-2	rho 013020000
20515305		3.33840e-2	rho 013030000
20515306		2.22560e-2	rho 013040000
20515307		3.33840e-2	rho 013050000
20515308		3.37264e-2	rho 013060000
20515309		1.80660e-2	rho 013070000
20515310		1.56310e-3	rho 014010000
20515312		1.11975e-2	rho 014020000
20515313		1.10838e-2	rho 014030000
20515314		7.38920e-3	rho 014040000
20515315		1.10838e-2	rho 014050000
20515316		1.11975e-2	rho 014060000
20515317		4.97350e-3	rho 014070000
20515318		5.03000e-2	rho 099010000
20515319		9.15640e-2	rho 015010000
*			
20515400	vesmas	sum 1.0	361.04 1
20515401	0.0	.11263	rho 016010000
20515402		9.06700e-3	rho 017010000
20515403		4.90700e-2	rho 018010000
20515404		8.92590e-2	rho 019010000
20515405		4.33233e-2	rho 020010000
20515406		3.78310e-3	rho 021010000
20515407		2.44140e-3	rho 021020000
20515408		9.69700e-4	rho 021030000
20515410		2.39771e-2	rho 022010000
20515411		2.39771e-2	rho 022020000
20515412		2.39771e-2	rho 022030000
20515413		2.39771e-2	rho 022040000
20515414		7.51150e-3	rho 022050000
20515415		1.08295e-2	rho 022060000
20515416		2.79758e-2	rho 022070000
*			
20515500	hlamas	sum 1.0	34.57254 1
20515501	0.0	1.305868e-2	rho 031010000
20515502		5.46800e-3	rho 032010000
20515503		8.724194e-3	rho 033010000
20515504		1.583533e-2	rho 033020000
20515505		6.021362e-3	rho 033030000
*			
20515600	hlbmas	sum 1.0	34.57254 1
20515601	0.0	1.305868e-2	rho 041010000
20515602		5.46800e-3	rho 042010000
20515603		8.724194e-3	rho 043010000
20515604		1.583533e-2	rho 043020000
20515605		6.021362e-3	rho 043030000

```

*
*
20516600 hlcmas sum 1.0 34.57254 1
20516601 0.0 1.305868e-2 rho 051010000
20516602 5.46800e-3 rho 052010000
20516603 8.724194e-3 rho 053010000
20516604 1.583533e-2 rho 053020000
20516605 6.021362e-3 rho 053030000
*
20515700 clamas sum 1.0 108.3605 1
20515701 0.0 4.581000e-3 rho 035010000
20515702 2.123175e-2 rho 035020000
20515703 2.430950e-2 rho 035030000
20515704 8.967000e-3 rho 035040000
20515705 2.263400e-2 rho 035050000
20515706 2.062890e-2 rho 036010000
*20515708 8.921154e-3 rho 362010000
20515709 1.14828e-2 rho 037010000
20515710 9.394024e-3 rho 037020000
20515711 5.46800e-3 rho 038010000
20515712 8.57448e-3 rho 039010000
20515713 5.860165e-3 rho 039020000
*
20515800 clbmas sum 1.0 108.3605 1
20515801 0.0 4.581000e-3 rho 045010000
20515802 2.123175e-2 rho 045020000
20515803 2.430950e-2 rho 045030000
20515804 8.967000e-3 rho 045040000
20515805 2.263400e-2 rho 045050000
20515806 2.062890e-2 rho 046010000
*20515808 8.921154e-3 rho 462010000
20515809 1.14828e-2 rho 047010000
20515810 9.394024e-3 rho 047020000
20515811 5.46800e-3 rho 048010000
20515812 8.57448e-3 rho 049010000
20515813 5.860165e-3 rho 049020000
*
20516800 clcmas sum 1.0 108.3605 1
20516801 0.0 4.581000e-3 rho 055010000
20516802 2.123175e-2 rho 055020000
20516803 2.430950e-2 rho 055030000
20516804 8.967000e-3 rho 055040000
20516805 2.263400e-2 rho 055050000
20516806 2.06277890e-2 rho 056010000
*20516808 8.921154e-3 rho 562010000
20516809 1.14828e-2 rho 057010000
20516810 9.394024e-3 rho 057020000
20516811 5.46800e-3 rho 058010000

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20516812		8.57448e-3	rho	059010000
20516813		5.860165e-3	rho	059020000
*				
20515900	prsrmas	sum 1.0	114.4755	1
20515901	0.0	1.118650e-3	rho	090010000
20515902		9.040600e-3	rho	090020000
20515903		3.863750e-3	rho	090030000
20515904		2.161600e-3	rho	091010000
20515905		2.789000e-2	rho	091020000
20515906		0.187535	rho	091030000
20515907		0.187535	rho	091040000
20515908		2.424500e-3	rho	091050000
*				
20519900	totmas	sum 1.0	1802.557	1
20519901	0.0	1.0 cntrlvar	151	
20519902		1.0 cntrlvar	141	
20519903		1.0 cntrlvar	152	
20519904		1.0 cntrlvar	142	
20519905		1.0 cntrlvar	153	
20519906		1.0 cntrlvar	154	
20519907		1.0 cntrlvar	155	
20519908		1.0 cntrlvar	156	
20519909		1.0 cntrlvar	157	
20519910		1.0 cntrlvar	158	
20519911		1.0 cntrlvar	159	
20519912		1.0 cntrlvar	161	
20519913		1.0 cntrlvar	162	
20519914		1.0 cntrlvar	166	
20519915		1.0 cntrlvar	168	
*				
20533000	tvesmas	sum 1.0	768.092	1
20533001	0.0	1.0 cntrlvar	153	
20533002		1.0 cntrlvar	154	
*				
20530400	dp461c	sum 1.e-3	130.9371	1
20530401	0.0 1.0	p	060010000	
20530402	-1.0	p	060050000	
20530403	+0.49	rho	060010000	
20530404	-4.1202	rho	060050000	
*				
20530500	dp462c	sum 1.e-3	129.352	1
20530501	0.0 1.0	p	060050000	
20530502	-1.0	p	060060000	
20530503	+4.1202	rho	060050000	
20530504	+5.6408	rho	060060000	
*				
20530600	dp463c	sum 1.e-3	123.3542	1
20530601	0.0 1.0	p	060060000	

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20530602      -1.0    p    060080000
20530603      -5.6408 rho 060060000
20530604      -1.7756 rho 060080000
*
20530700      dp464c  sum  1.e-3  102.3876 1
20530701      0.0    1.0    p    060080000
20530702      -1.0    p    060090000
20530703      +1.7756 rho 060080000
20530704      +2.3642 rho 060090000
*
20530800      dp465c  sum  1.e-3  54.6744 1
20530801      0.0    1.0    p    060090000
20530802      -1.0    p    060100000
20530803      -2.3642 rho 060090000
20530804      -3.5537 rho 060100000
*
20530900      dp466c  sum  1.e-3  57.5067 1
20530901      0.0    11.124 rho 060100000
*
20531000      dp47    sum  1.e-3  185.7087 1
20531001      0.0    1.0    p    060100000
20531002      -1.0    p    062010000
20531003      -7.571 rho 060100000
20531004      +9.614 rho 062010000
*
20531100      dp050   sum  1.e-3  84.0194 1
20531101      0.0    1.0    p    021020000
20531102      -1.0    p    019010000
20531103      0.1092 rho 021020000
20531104      -1.369 rho 019010000
*
20531200      dp051   sum  1.e-3  146.4596 1
20531201      0.0    1.0    p    039020000
20531202      -1.0    p    019010000
20531204      -1.369 rho 019010000
*
20531300      dp052   sum  1.e-3  364.221 1
20531301      0.0    1.0    p    022060000
20531302      -1.0    p    039020000
20531303      +0.0896 rho 022060000
*
20531400      dp423t6 sum  1.e-3  724.238 1
20531401      0.0    1.0    p    034010000
20531402      -1.0    p    034110000
20531403      -2.189 rho 034010000
20531404      3.360 rho 034110000
*
20531500      dp433t6 sum  1.e-3  722.064 1

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20531501	0.0	1.0	p	034220000	
20531502		-1.0	p	034120000	
20531503		-2.189	rho	034220000	
20531504		+3.360	rho	034120000	
*					
20531600	dp4	sum	1.e-3	-33.6086	1
20531601	0.0	1.0	p	034220000	
20531602		-1.0	p	034010000	
20531603		-2.189	rho	034220000	
20531604		-2.189	rho	034010000	
*					
20539900	dp523t6	sum	1.e-3	724.238	1
20539901	0.0	1.0	p	044010000	
20539902		-1.0	p	044110000	
20539903		-2.189	rho	044010000	
20539904		3.360	rho	044110000	
*					
20533700	dp533t6	sum	1.e-3	722.064	1
20533701	0.0	1.0	p	044220000	
20533702		-1.0	p	044120000	
20533703		-2.189	rho	044220000	
20533704		+3.360	rho	044120000	
*					
20532600	dp5	sum	1.e-3	-33.6086	1
20532601	0.0	1.0	p	044220000	
20532602		-1.0	p	044010000	
20532603		-2.189	rho	044220000	
20532604		-2.189	rho	044010000	
*					
20533400	dp623t6	sum	1.e-3	724.238	1
20533401	0.0	1.0	p	054010000	
20533402		-1.0	p	054110000	
20533403		-2.189	rho	054010000	
20533404		3.360	rho	054110000	
*					
20533500	dp633t6	sum	1.e-3	722.064	1
20533501	0.0	1.0	p	054220000	
20533502		-1.0	p	054120000	
20533503		-2.189	rho	054220000	
20533504		+3.360	rho	054120000	
*					
20533600	dp6	sum	1.e-3	-33.6086	1
20533601	0.0	1.0	p	054220000	
20533602		-1.0	p	054010000	
20533603		-2.189	rho	054220000	
20533604		-2.189	rho	054010000	
*					
*					

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20588800   corepow   function   1.e-3   0.0   1
20588801   time     0         1
*
20588900   masserr   sum       1.0   0.0   1
20588901   -2510.23  1.0     cntrlvar 199
20588902           1.0     cntrlvar 721
20588903           1.0     cntrlvar 722
20588904           1.0     cntrlvar 768
*
20500700   coredefn  sum       0.111111 746.84 1
20500701   0.0     1.0     rhof     011010000
20500702           1.0     rhof     012010000
20500703           1.0     rhof     013010000
20500704           1.0     rhof     013020000
20500705           1.0     rhof     013030000
20500706           1.0     rhof     013040000
20500707           1.0     rhof     013050000
20500708           1.0     rhof     013060000
20500709           1.0     rhof     013070000
*
20500800   coredegn  sum       0.111111 104.0 1
20500801   0.0     1.0     rhog     011010000
20500802           1.0     rhog     012010000
20500803           1.0     rhog     013010000
20500804           1.0     rhog     013020000
20500805           1.0     rhog     013030000
20500806           1.0     rhog     013040000
20500807           1.0     rhog     013050000
20500808           1.0     rhog     013060000
20500809           1.0     rhog     013070000
*
20501000   coredep   sum       0.10204   0.0   1
20501001   0.0     1.0     p       011010000
20501002           -1.0    p       013070000
20501003           1.715   rho     013070000
20501004           -52.038 cntrlvar 8
*
20501100   dendiff   sum       1.0   0.0   1
20501101   0.0     1.0     cntrlvar 7
20501102           -1.0    cntrlvar 8
*
20501200   corelvl   div       1.0   0.0   1
20501201   cntrlvar 11   cntrlvar 10
*
20501300   auxlvla   sum       1.0   13.45 1
20501301   11.255   0.158   voidf   061010000
20501302           0.7925  voidf   061020000
20501303           0.9     voidf   061030000

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20501304          2.16   voidf   062010000
*
20501400  auxlvlb   sum   1.0   13.45   1
20501401  11.255   0.158   voidf   071010000
20501402          0.7925 voidf   071020000
20501403          0.9     voidf   071030000
20501404          2.16   voidf   072010000
*
20501500  auxvlc   sum   1.0   13.45   1
20501501  11.255   0.158   voidf   081010000
20501502          0.7925 voidf   081020000
20501503          0.9     voidf   081030000
20501504          2.16   voidf   082010000
*
20590100  maxtempc stdfnctn 1.0   0.0   1
20590101  max      httmp   13100108
20590102          httmp   13100208
20590103          httmp   13100308
20590104          httmp   13100408
20590105          httmp   13100508
20590106          httmp   13100608
20590107          httmp   13100708
20590108          httmp   13100808
20590109          httmp   13100908
20590110          httmp   13101008
20590111          httmp   13101108
20590112          httmp   13101208
*
20503400  feed1    sum   1.0   0.0   1
20503401  0.0      1.0   mflowj  601000000
20503402          1.0   mflowj  712000000
*
*
20503500  feed2    sum   1.0   0.0   1
20503501  0.0      1.0   mflowj  701000000
20503502          1.0   mflowj  714000000
*
20503600  feed3    sum   1.0   0.0   1
20503601  0.0      1.0   mflowj  801000000
20503602          1.0   mflowj  716000000
*
* end of input

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**DATE
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END