



International Agreement Report

An Assessment of TRACE V4.160 Code Against PACTEL LOF-10 Experiment

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ABSTRACT

This report has been written as an International Agreement Report under the Thermal Hydraulic Code Applications and Maintenance Program (CAMP) coordinated by the United States Nuclear Regulatory Commission. The calculations presented in the report comprise an assessment case which is a part of the in-kind contribution of Finland to the CAMP program. The assessed case was to first build up a TRACE thermal hydraulic code simulation model for horizontal steam generator of the Parallel Channel Test Loop (PACTEL) facility. Secondly, the case consisted of calculations to test the TRACE code capabilities. A loss-of feedwater, LOF-10, experiment was chosen for this assessment. The calculation results showed that the TRACE code is capable in simulating the horizontal steam generator behavior both in steady state and during loss-of feedwater transient. Three models with different nodalization were introduced. The calculation results differed from experiment to some extent. At the final state the calculated secondary side collapsed level decrease was more than in the experiment. The heat transfer from primary to the secondary side degraded gradually during the uncovering of the heat exchange tubes. The calculations overestimated this heat transfer. In the experiment the steam started to superheat immediately when the uppermost tube layer had uncovered. The steam superheating in the calculations was possible only after the uppermost cell on the secondary side had voided thoroughly. Because of the use of lumped pipe representation of the heat exchange pipes in the calculations the timing of the superheating initiation was much later than in the experiment with the coarse nodalization models. More detailed representation of the heat exchange tubes gave more accurate results.

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1 INTRODUCTION

This report has been written as an International Agreement Report under the Thermal Hydraulic Code Applications and Maintenance Program (CAMP) coordinated by the United States Nuclear Regulatory Commission. The calculations presented in the report comprise an assessment case which is a part of the in-kind contribution of Finland to the CAMP program.

The Parallel Channel Test Loop (PACTEL) facility (Tuunanen et al. 1998), constructed in 1990, is one of the largest facilities of its kind. It was originally designed to model the thermal hydraulic behavior of the VVER-440 type pressurized water reactors (PWR) currently used in Finland.

A new TRACE V4.160 thermal hydraulic code has been recently implemented in the Laboratory of Nuclear Engineering at Lappeenranta University of Technology (LUT) in Finland. The first modeling exercise in the way towards whole model of the PACTEL facility was to prepare a model for horizontal steam generator of the PACTEL facility using the Symbolic Nuclear Analysis Package (SNAP) model editor. One of the many loss-of-feedwater experiments carried out with the PACTEL facility the LOF-10 experiment (Kouhia and Puustinen, 1998) was chosen to test the modeling capabilities of TRACE code. The TRACE/SNAP modeling of the steam generator was based on the guidelines of previous RELAP5 model of PACTEL steam generator (Riikonen, 1994). Three different nodalization cases; 4, 5 and 8 layers of heat exchange pipes were prepared. All cases showed a good performance achieving the stabilized state. The actual transient results of the four and five calculation cases agreed also fairly well with the experiment without departing significantly from each other. The most detailed nodalization with eight heat exchange pipe layers produced the best calculation results.

2 TEST FACILITY AND EXPERIMENT

2.1 PACTEL Facility Description

Parallel Channel Test Loop, PACTEL, is a volumetrically scaled (1:305) out-of-pile model of the VVER-440 type nuclear power plants located at Loviisa and managed by Fortum Power and Heat. All the main parts of the reference reactor primary loop are included in PACTEL: a pressure vessel, main circulation loops, steam generators and a pressurizer. Besides the emergency core cooling systems are simulated in PACTEL. The original elevations have been kept to preserve the natural circulation pressure heads.

The maximum primary side pressure is 8.0 MPa, and on the secondary side the peak pressure is 5.0 MPa. The core consists of 144 electrically heated fuel rod simulators. The maximum heating power in the core is 1000 kW which is roughly 20% of the scaled down nominal power (nominal thermal power of reference reactor after modernization is now 1500 MW). The PACTEL test facility consists of three primary loops while the reference reactor has six primary loops. The PACTEL test loop is shown in Figure 1.

The steam generators of PACTEL contain 118 horizontal heat exchange U-tubes in 14 layers. The average length of the tubes is 2.8 m (about 9 m in the power plant). The inner diameter of the tubes is 13.0 mm whereas the inner diameter of the reference tubes is 13.2 mm. The 16 mm outer diameter of the reference tubes has been kept and the space between tubes in horizontal direction is the same as in the reference steam generator (horizontal pitch 30 mm). The distance between the tubes in vertical direction is widened from the original 24 mm to 48 mm to increase the height of the tube cluster. That creates an oversize scaled down secondary side volume. The heat transfer area of the tube bundles and the volume of each steam generator is scaled down so that one steam generator in PACTEL corresponds to two steam generators in the reference reactor. A side-view of the PACTEL steam generator is presented in Figure 2. Figure 3 shows a cross-sectional view of the steam generator. Figure 4 shows the thermocouple locations in axial direction in the heat exchange tubes.

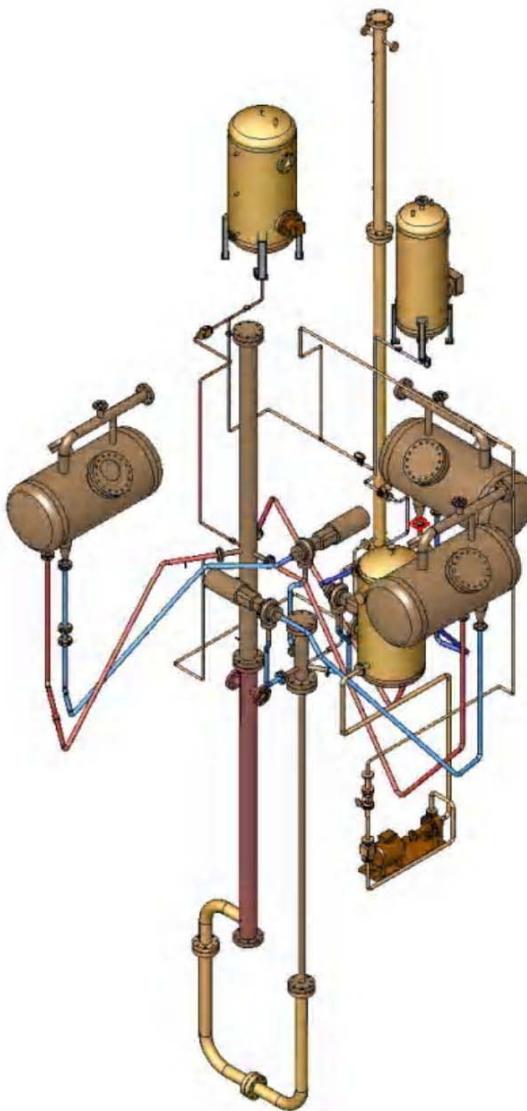


Figure 1. The PACTEL facility.

Table 1. The PACTEL facility characteristics compared with the Loviisa VVER-440.

	PACTEL	Loviisa VVER-440
Reference Power Plant	VVER-440	-
Volumetric scaling ratio	1:305	-
Scaling factor of component heights and elevations	1:1	-
Number of primary loops	3	6
Maximum heating power/thermal power	1 MW	1500 MW (1375 MW)
Number of rods	144	39438
Outer diameter of fuel rod simulators	9.1 mm	9.1 mm
Fuel rod pitch	12.2 mm	12.2 mm
Heated length of fuel rod simulators	2.42 m	2.42 m
Axial power distribution	Chopped cosine	-
Max. cladding temperature	800 °C	-
Max operating pressure	8.0 MPa	12.3 MPa
Max operating temperature	300 °C	300 °C
Max secondary pressure	5.0 MPa	5.0 MPa
Max secondary temperature	260 °C	260 °C
Feedwater tank pressure	2.5 MPa	2.5 MPa
Feedwater tank temperature	225 °C	225 °C
Accumulator pressure	5.5 MPa	5.5 MPa
Low-pressure ECC-water pressure	0.7 MPa	0.7 MPa
High-pressure ECC-water pressure	8.0 MPa	8.0 MPa
ECC-water temperature	30-50 °C	30-50 °C

2.2 PACTEL Horizontal Steam Generator

The horizontal steam generator used in the experiment is presented in Fig. 2. The primary side of the steam generator contains vertical primary collectors and horizontal heat exchange tubes. The 118 U-shape tubes are arranged in 14 layers and 9 vertical columns. The height of the tube bundle is 624 mm. The horizontal pitch of the tubes is the same as in the reference steam generator (30 mm) but the vertical pitch (48 mm) is doubled. The outer diameter of the tubes is 16 mm. Although the average tube length (2.8 m) is much smaller than in the reference steam generator (9.0 m), the heat transfer area of the tube bundle corresponds to two steam generators of the reference reactor. The secondary side differs from the reference steam generator more than the primary side. Although the height of the shell is only 0.95 m (reference 3.21 m) and the length is reduced to 2.2 m (reference 11.8 m), the volume of the secondary side is larger than it should be according to the scaling factor. So, the coolant inventory is larger and the transients in the steam generator are slower than in the reference steam generator. This has to be taken into account when the results are scaled to the full scale.

The structure of the secondary side differs also slightly from the reference steam generator, which has two primary tube bundles and collector between them in the middle of the steam generator. The PACTEL steam generator has only one tube bundle. This means more empty space in the vicinity of the primary collectors. The scaling and the dimensions of the steam generator cause extra volume on the both sides of the tube bundle. The effect of this volume has been reduced by steel plates.

The instrumentation of the steam generator contains mainly temperature measurements. The primary and secondary side temperatures are measured in several tubes. The inlet and outlet temperature of the primary coolant are measured as well as the primary mass flow rate, mass flow rate of the feed water and the differential pressure on the secondary side. The collapsed level is based on the differential pressure measurement. The uncertainties of the temperature and mass flow rate measurements are ± 1.5 °C and 2.5 %, respectively. The accuracy of the determined secondary side collapsed level is ± 25 mm.

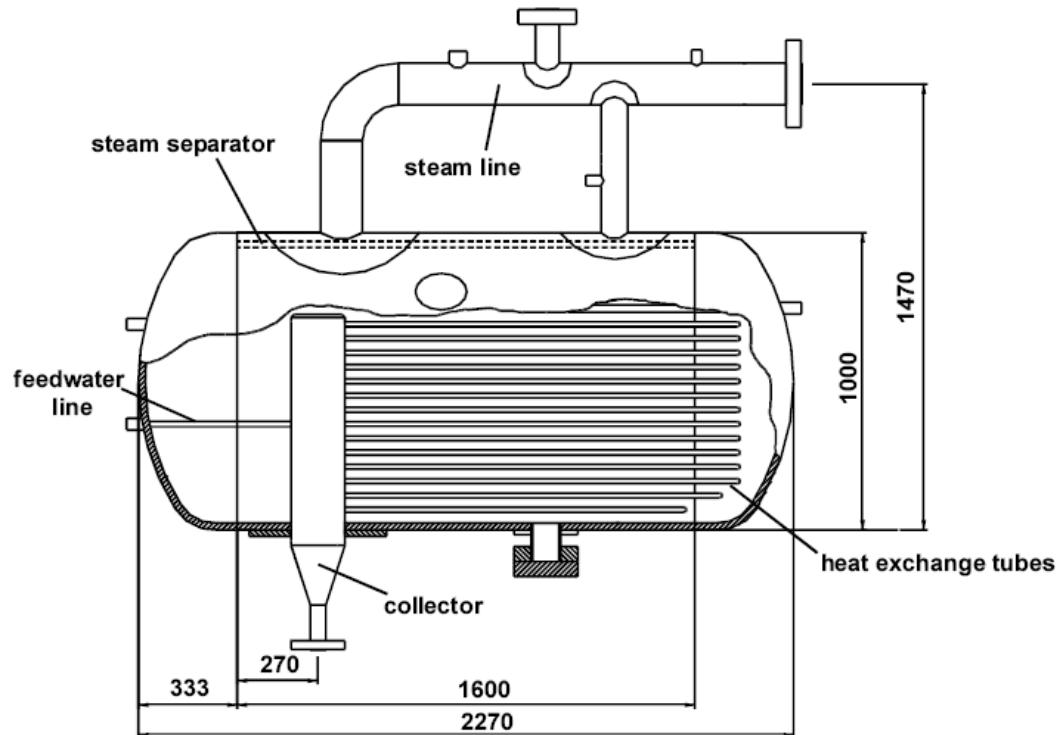


Figure 2. Steam generator model of PACTEL, side-view.

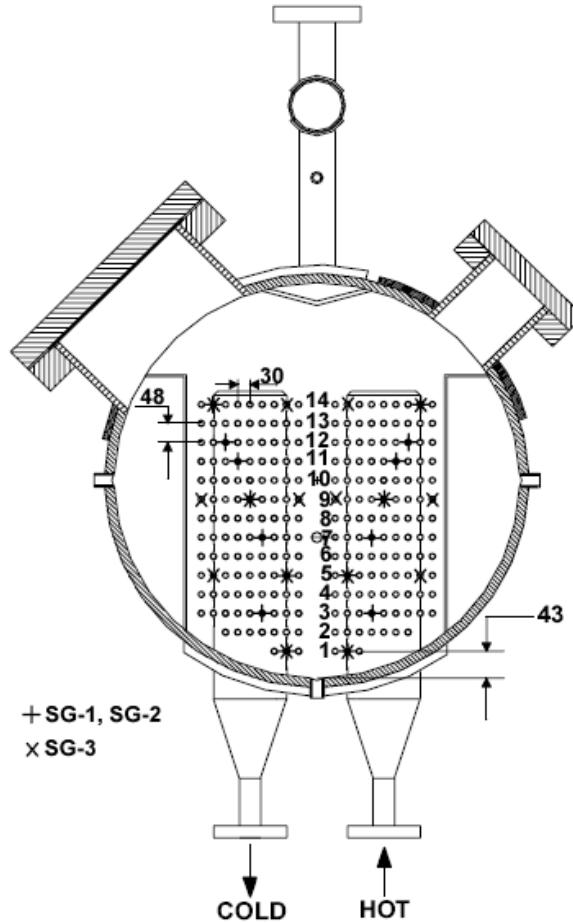


Figure 3. Cross-section of the PACTEL steam generator. Tubes marked with X-signs have thermocouples in steam generator 3, which was used in LOF-10. The other signs (+) refer to the other two loops.

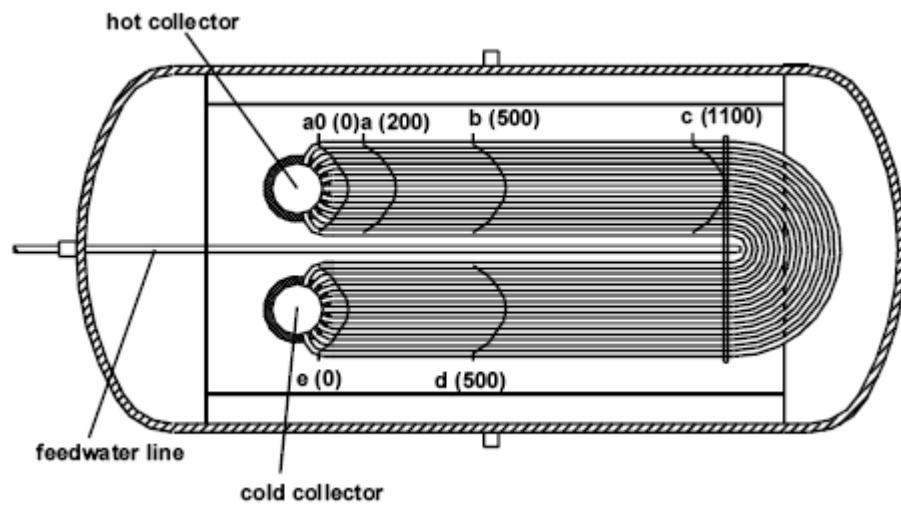


Figure 4. Thermocouple measurement locations in the PACTEL steam generator. Locations 'a0' and 'e' were not used in loop 3. The distance from the collector is presented in brackets (mm).

2.3 PACTEL Experiment LOF-10

Experiment LOF-10 was performed to study behavior of VVER reactor geometry during a loss-of-feedwater transient. The main objective was to provide data for validation of safety analysis computer codes. LOF-10 was a single loop test where low core power was used throughout the experiment. So, the test did not simulate what we normally call a loss-of-feedwater transient, but it was a boil-off experiment. However, the test data is useful for verification of the steam generator models used in thermal hydraulic computer codes. Only one primary loop was used (Loop 3) in the experiment. The operators closed the primary loop isolation valves in the other two loops. Although the pressurizer was connected to loop 1, it was operable, because a pressurizer surge line connection is situated before the isolation valve in direction of the loop flow.

LOF-10 was started from steady-state conditions which lasted 1,000 seconds. The water-level in the steam generator secondary side was above the entire heat exchange tube bundle. The primary circulating pump was running during the equilibrium. After 1,000 seconds the PACTEL operators stopped the pump and no feedwater was injected to the secondary side. The pressurizer heaters were used to maintain the primary pressure. No operator actions were taken during the test. The experiment was terminated at 16,000 seconds. The heating power in this test was 75 kW, corresponding to 1.5 % power in the reference reactor. Table 2 lists the initial conditions in LOF-10.

Table 2. Initial conditions in experiment LOF-10.

Parameter	Value
Core power:	75 kW
Upper plenum pressure	7.3 MPa
Secondary side pressure	4.0 MPa
Level in SG	71.2 cm
Core outlet temperature	255 °C
Loop mass flow rate	4.99 kg/s

The 2 kW pressurizer heater was on during the whole experiment. The 4 kW heater was switched on and off according to the pressure limits. The primary pressure controller turned the 4 kW heater on when the primary pressure was 7.29 MPa and the heater was switched off when pressure increased up to 7.42 MPa. The oscillating secondary pressure caused the fluctuation in the temperature measurements. The steam flow rate through a secondary pressure control valve was so low that the control valve opened and closed periodically. The closing and opening of the pressure control valve had the most eye-catching effect on the steam generator level measurement. The secondary level was determined with a differential pressure transducer. Steam flow caused pressure loss in the steam separator and in the steam line entrance, when the valve was open. The pressure loss increased the calculated secondary level.

The main primary loop parameters started to change when the main circulating pump was halted and natural circulation flow was established at 1000 s. The loop fluid temperatures reached a new equilibrium when about 2500 s was elapsed. The constant temperatures were observed until

the uppermost layer of heat exchange tubes in the steam generator secondary side uncovered, that is the swell level in the steam generator secondary side dropped below these tubes. The temperature measurements in the uppermost tube layer shows how heat transfer started to degrade at 5000 s, and the tube was uncovered at 5500 s. The temperature distribution in the tube became almost uniform, which suggested that the heat transfer from the primary to the secondary side was lost.

When the uppermost layer of tubes in the steam generator secondary side was no longer covered by water, steam in the secondary side started to superheat. At the end of the experiment, steam in the top of steam generator secondary side was about 10 °C superheated.

3 TRACE MODEL

The TRACE model was constructed from scratch. The new input deck was prepared with the SNAP graphical model editor tool by using newest updates as they appeared (recent SNAP version 0.25.1). The main intention was to maintain the structure of the RELAP5 input deck, which had been prepared already on 1997 for the PACTEL facility and its steam generators.

The steam generator input deck was modeled using mainly the pipe components of TRACE. The structure of the models is listed in Table 3. The ASCII format input files for the TRACE code are listed in Appendices I-III. The primary side tubing was described first with four pipe layers each pipe corresponding (from highest to lowest) 27, 36, 36 and 19 tubes in the PACTEL steam generator. The schematic view of the four pipe layer input deck is shown in Fig. 5. More detailed input decks with five and eight pipe layers were also prepared (Figures 7 and 8). In the five pipe case the uppermost pipe layer, which corresponded 27 tubes in the four pipe model, was divided to 9 (uppermost row solely) and 18 tubes. In the eight pipe case the four pipe model was modified by dividing the uppermost pipe into three pipes, where each divided pipe corresponded 9 tubes. The next two pipes were divided in two corresponding 18 pipes in PACTEL steam generator. The upper part of the secondary side of the steam generator was modeled in all cases with the separator component (number 1546). In all cases each primary pipe had corresponding heat sink cell in the secondary side component (643). The number of cells in the hot and cold collectors also corresponded to the number of heat exchange pipes.

Table 3. Structure of the TRACE steam generator models.

Component	4 pipe layers	5 pipe layers	8 pipe layers
Pipe	11	12	15
Separator	1	1	1
Fill	2	2	2
Break	2	2	2
Heat structures	15	17	15
Pipe walls	6	6	10
Signal variables	25	28	24
Control blocks	9	12	6

Since the steam generator was modeled separately, the inlet and outlet boundary conditions had to be modeled both in primary and secondary side. The boundaries were modeled with FILL and BREAK components. At the primary inlet the mass flow was set constant and at outlet the pressure was set constant (7.3 MPa). The secondary inlet mass flow was adjusted with PI controller in order to achieve constant collapsed level in the secondary side. The PI-controller received input from the combined water level signal values from pipe components 643 and 1546. The second input parameter was the constant value representing the wanted set point value.

The heat transfer from primary side to secondary was modeled using the pipe wall functionality. The heat transfers mostly via tube walls to secondary, minor part of the heat transfers from hot and cold tube collectors (241, 122). The heat transfer from secondary to the environment was lead via separate heat structure components. The heat structures were prepared with built-in material stainless steel 304. A special user defined material was introduced for modeling the insulating mineral wool of the PACTEL facility.

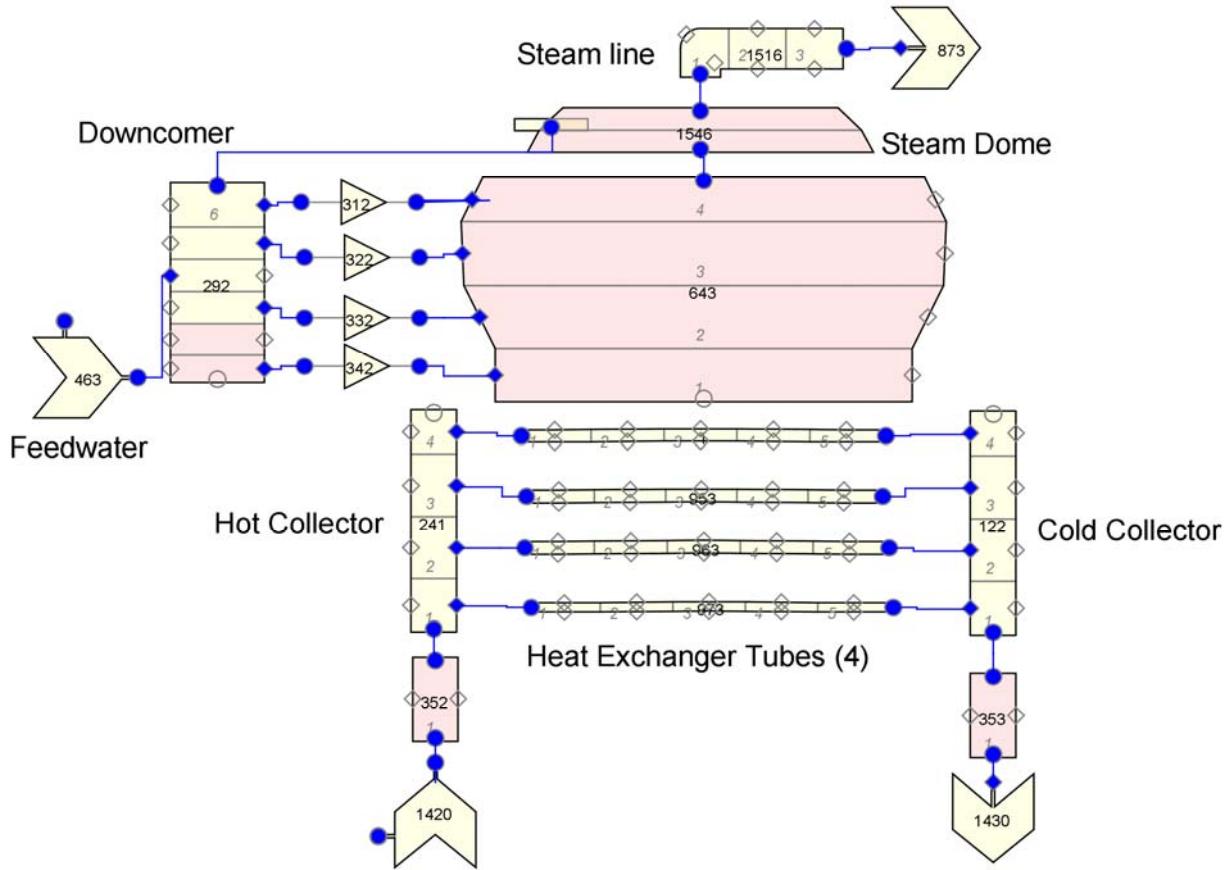


Figure 5. The SNAP scheme of PACTEL steam generator with 4 pipe layers.

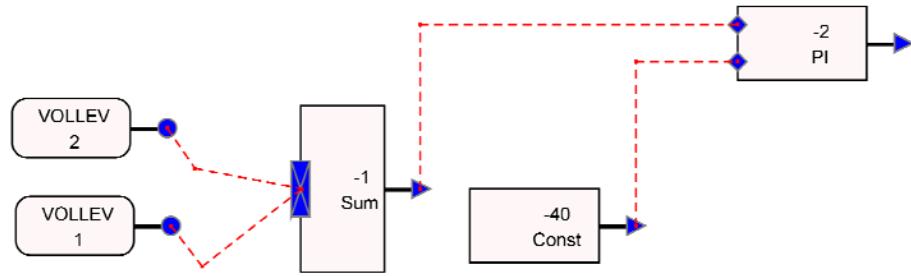


Figure 6. The SNAP scheme of the control system of secondary side collapsed level with feed water.

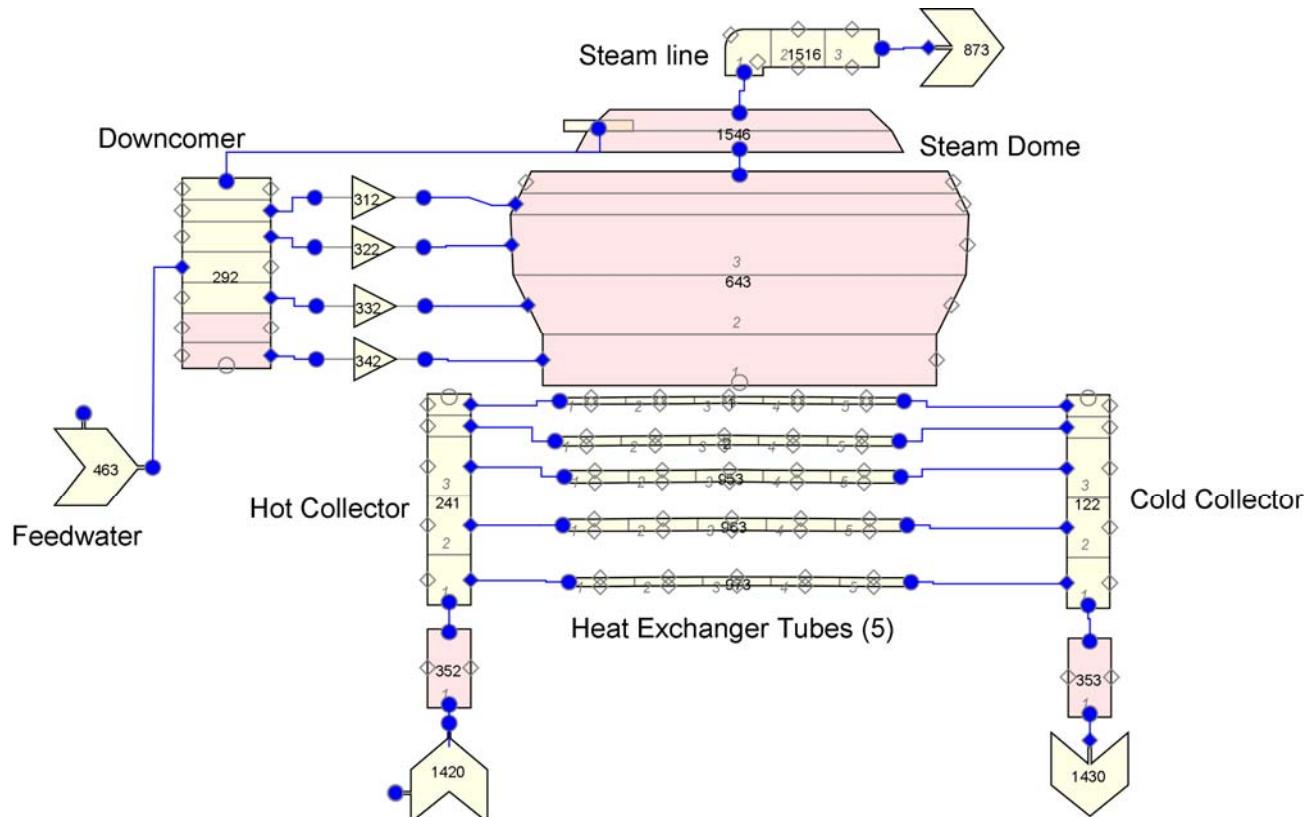


Figure 7. The SNAP scheme of PACTEL steam generator with 5 pipe layers.

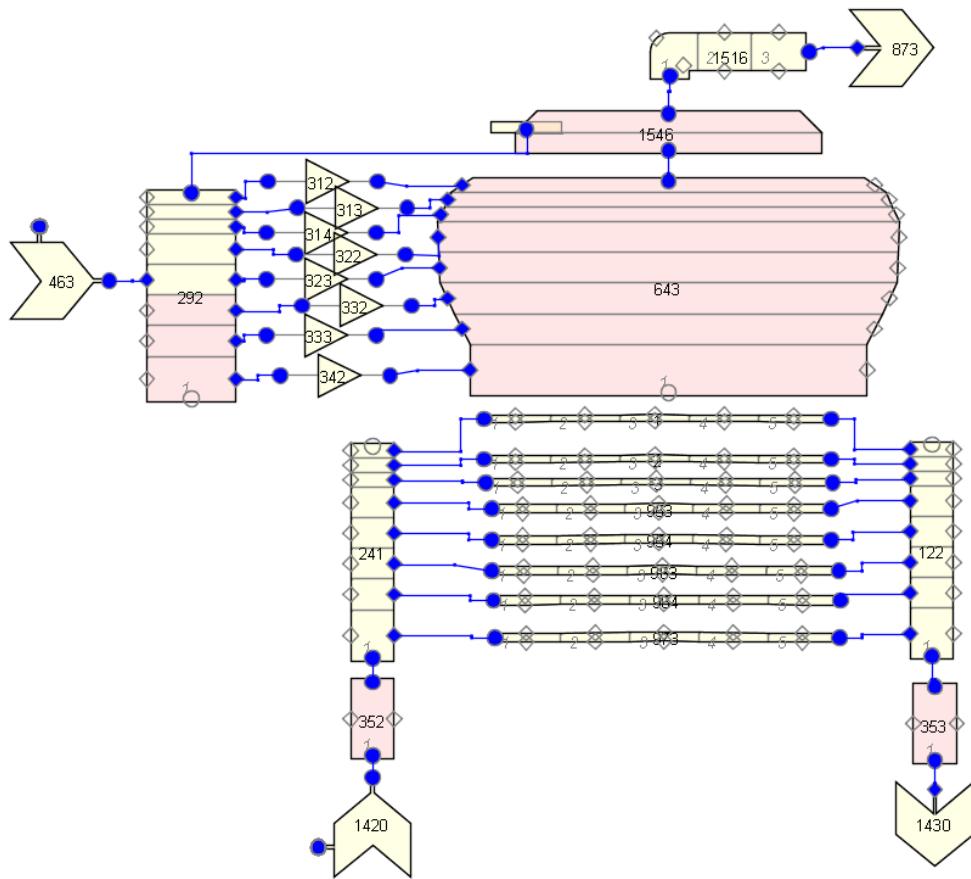


Figure 8. The SNAP scheme of PACTEL steam generator with 8 pipe layers.

4 CALCULATION RESULTS

4.1 Steady state

Before actual transient calculation a stabilizing calculation of 10000 s was performed in order to achieve the average conditions at the time 0 s of the experiment. However, no steady state options of the TRACE were used. Calculations with these options were tried at first. Since oscillations of the feedwater were in some degree large and caused that no steady state could be found by the time of 10000 s, the use of steady state options were abandoned. The calculation using PI-controlled feedwater was stabilizing to such extent that at 10000 s the thermal hydraulic conditions could be considered as steady state. By the time of 10000 s calculation all the main parameters had reached the initial state of the LOF-10 experiment. At the primary inlet the mass flow was set to constant 5 kg/s and at outlet the pressure was set to constant 7.3 MPa. At the secondary inlet, the feed water mass flow was induced by PI-controller and at the outlet the pressure was set to constant 4 MPa.

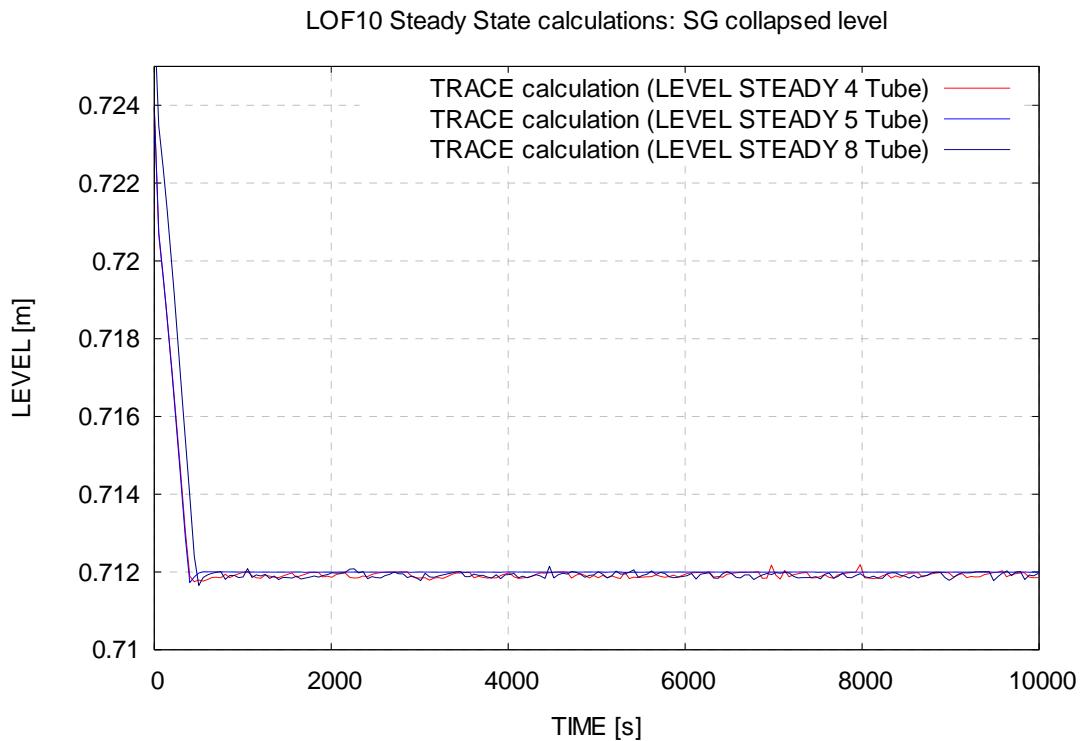


Figure 9. Steam generator collapsed level in stabilizing steady state calculations.

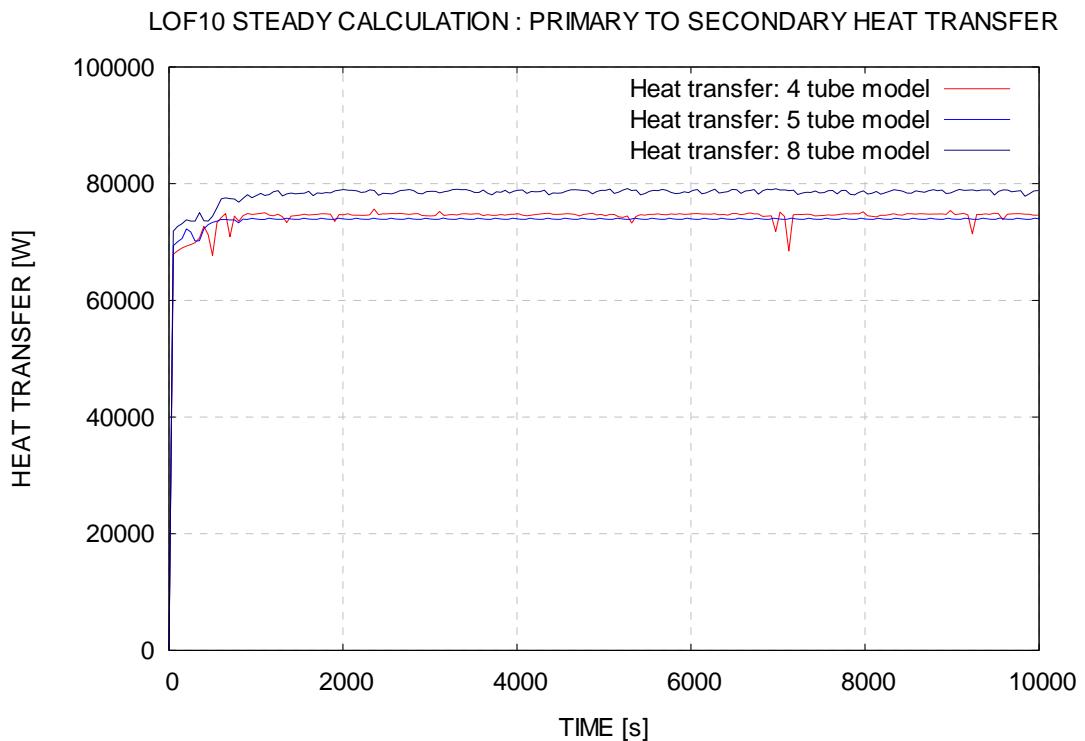


Figure 10. Heat transfer from primary to secondary side in stabilizing steady state calculations.

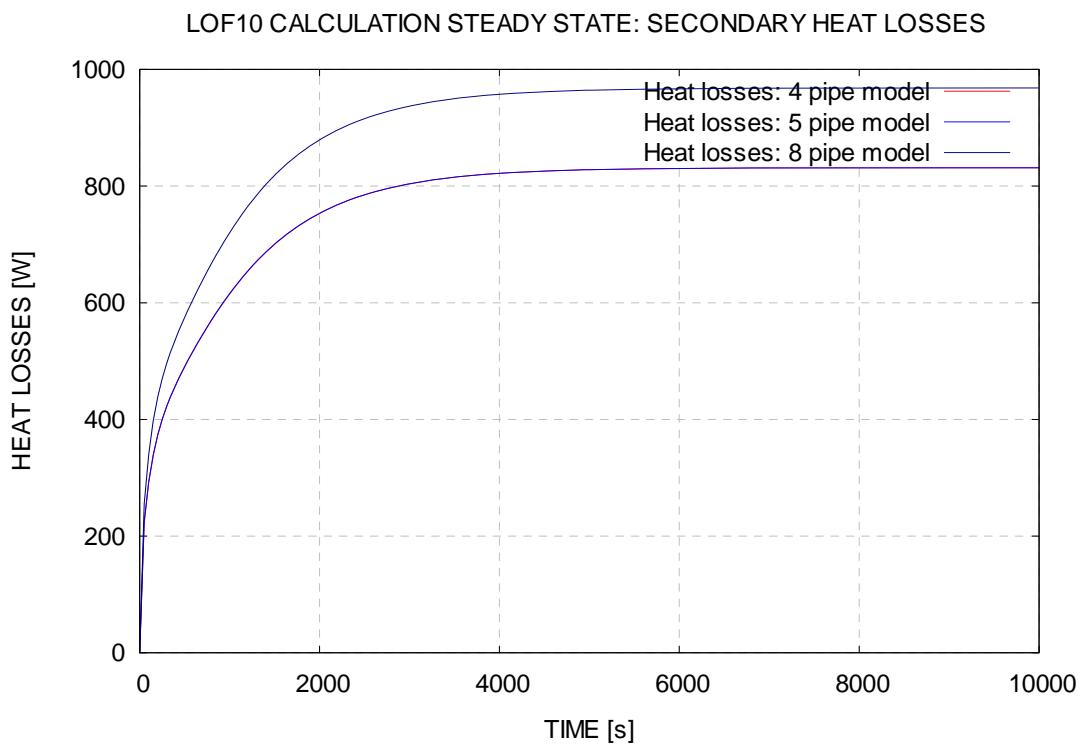


Figure 11. Secondary side heat losses in stabilizing steady state calculations.

4.2 Transient calculations

The actual transient calculation was a restart calculation from the stabilizing calculation. The restart calculation was performed by using text editor jEdit and its SNAP plug-in. The transient calculation followed the experiment procedure. After 1000 s the steady state period the primary flow changed to natural circulation. Hence, at this point the primary inlet flow in the calculation was changed from 5 kg/s to 0.6055 kg/s changing linearly towards the end of the transient to 0.5965 kg/s. The evolution of the primary flow is illustrated in Figure 12. The primary inlet temperature was also let to change at this moment according to the experiment data (see Figures 14, 15 and 16). In the beginning of the restart run the set point of the secondary feed water PI-controller was changed from constant component (number 40, see Fig. 6) to a function. With this change it was possible to vary the set point value to reach zero immediately after 1000 s run. Since there was no feed water injected after 1000 s of the start the remaining water in the secondary side started to boil-off and the collapsed level started to decrease similarly with the experiment. Figure 13 provide a comparison between the evolution of collapsed levels in all three calculation cases and in the experiment. The calculated levels agreed well with the experiment until 5000 s. Since that the four and five pipe cases stayed together but separating from the experiment more than the eight pipe case, which remained closest to the experiment. Later on at 10000 s the four and five pipe case collapsed levels separated from each other also. At the end of the transient the discrepancy of the collapsed levels from the experiment was approximately 7 cm in the four pipe case and 10 cm in the five pipe case and less than 5 cm in the eight pipe case.

In the four tube layer model the uppermost pipe corresponded three layers (total 27) of tubes in the PACTEL steam generator. In the five tube layer model the uppermost pipe of four tube layer model was divided in two pipes corresponding 9 and 18 tubes in the PACTEL steam generator. When in the experiment the uppermost tube layer started to uncover, the heat transfer started to degrade simultaneously at 5000 s, and was uncovered at 5500 s. When the uppermost layer of tubes in the steam generator secondary side was no longer covered by water in the experiment, steam in the secondary side started to superheat continuously. Obviously, this phenomenon was not taking place at the same time neither of the four nor five pipe calculation cases. In the calculations the superheating of the steam (see Figures 22, 23, 24) was possible only after the uppermost cell on the secondary side had voided thoroughly (Figures 25, 26, 27). In the eight pipe case the superheating of the steam started almost simultaneously with the experiment, but with stepwise manner and it was even slightly overestimated (Fig. 24).

The primary outlet temperature in the four pipe model (Fig. 13) followed the rising trend of the experiment while in the five pipe model (Fig. 14) the temperature remained constant until increasing step at the last moment of the transient. The best calculation result was achieved with the eight pipe model, where the simulated outlet temperature followed slightly stepwise but still quite accurately the experiment (Fig. 16). Similar phenomena took place also in the uppermost pipe temperatures illustrated in Figures 17, 18 and 19, which are picked from point c in experiment and middle (3rd) cell in the calculations. The temperature stepped up after 8000 s in four pipe model while in five pipe model the temperature did not increase at all. In the eight pipe model the uppermost pipe temperature jump was observed almost at the same time as in experiment, but the increase was too fast and too high. However, in the five pipe model the third

row temperature increased just before the end of the simulation and in the eight pipe model the corresponding temperature rose already at 2000 s before the end (Fig. 20). So, this temperature rise was just a sign of the degraded heat transfer from primary to secondary side. This heat transfer in all three calculation cases is illustrated in Figure 21.

The calculations were performed with a PC of 1.6 GHz processor with 1024 MB memory. An example of the time step behavior in calculation of five pipe model is illustrated in Figure 27. The maximum time step was set to 1 s and time step went below 0.1 s only occasionally. The CPU time and time step history used for each calculation case is presented in Table 4. The calculation histories show opposite behaviour than was expected. The more pipes in the model the quicker the calculation and less time steps to calculate. Probably cause for this unexpected tendency was that when the model was more detailed described the changes and gradients in the thermal parameters are smoother and smaller and therefore longer time step could be used.

Table 4. Used CPU and time step history in the calculations.

Number of heat exchange pipes	4	5	8
CPU time used	1425.5 s	1063.9 s	638.8s
Number of time steps	111459	75095	30116

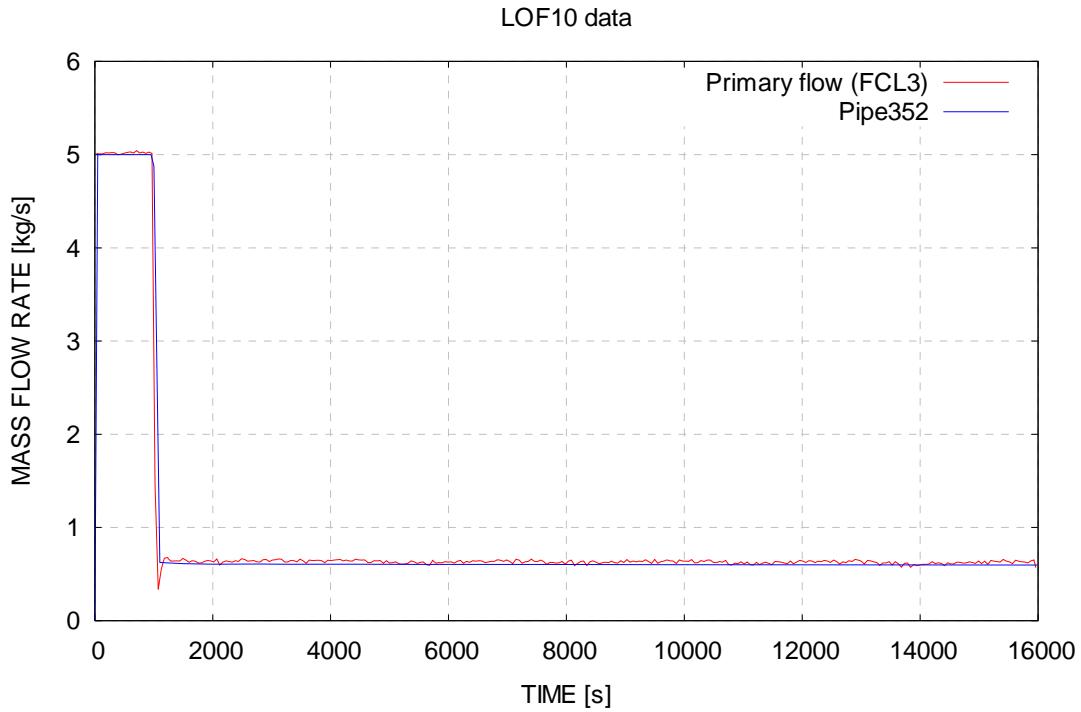


Figure 12. Primary mass flow in experiment LOF-10 and TRACE calculations.

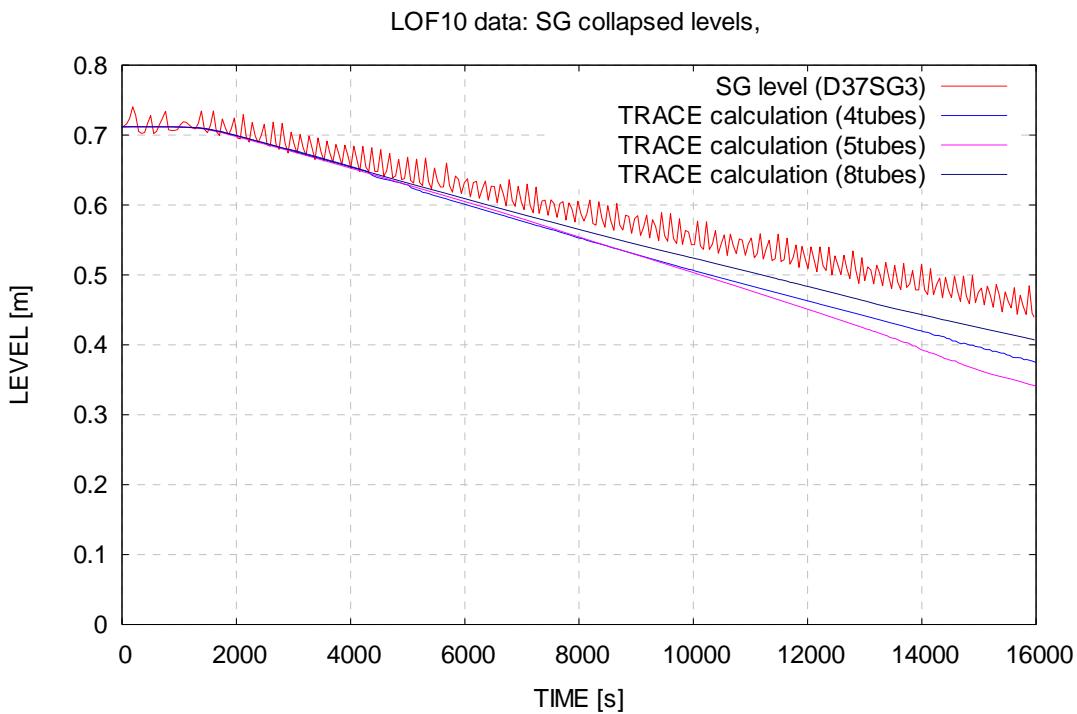


Figure 13. Steam generator collapsed levels.

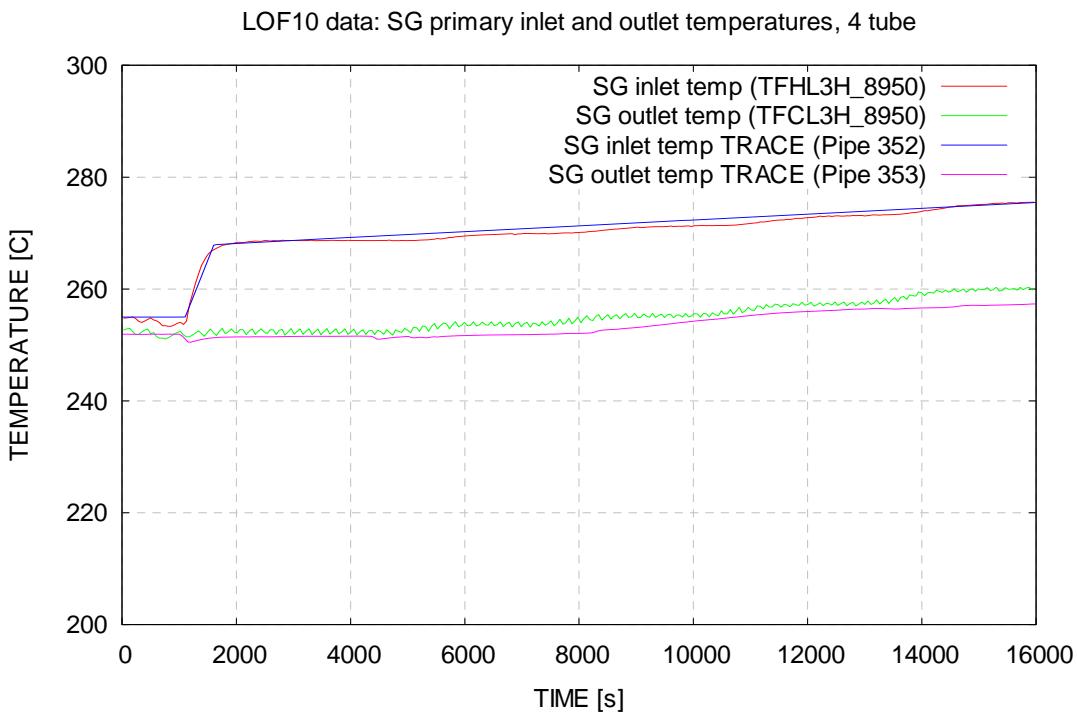


Figure 14. Primary inlet and outlet temperatures in experiment and in 4 pipe layer model.

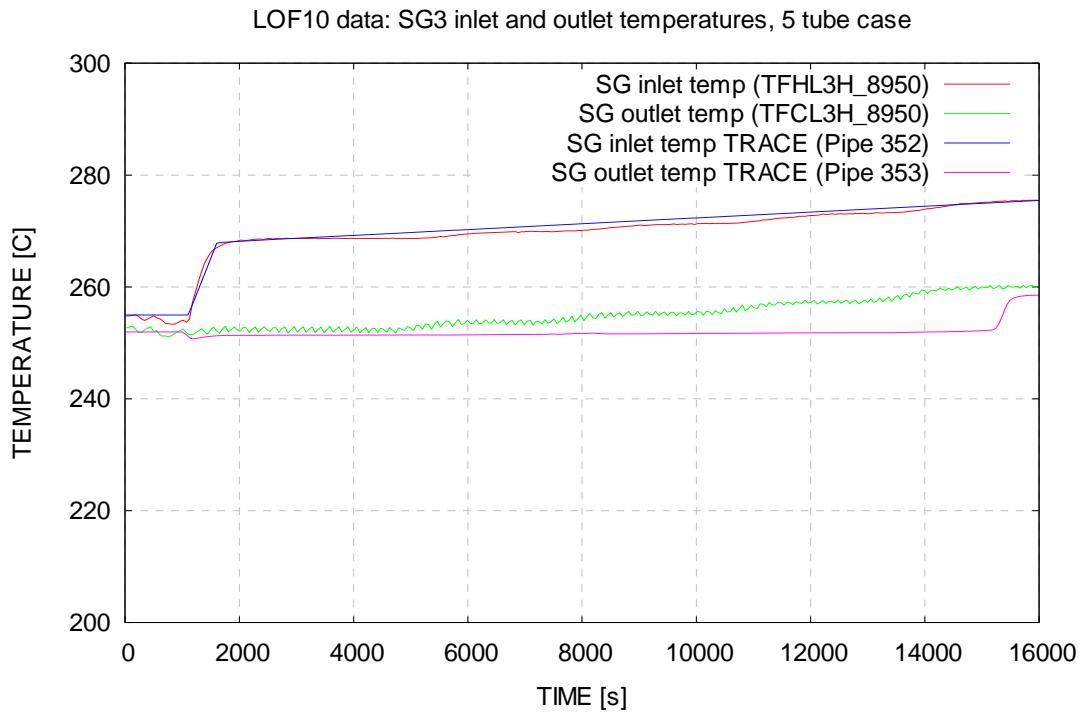


Figure 15. Primary inlet and outlet temperatures in experiment and in 5 pipe layer model.

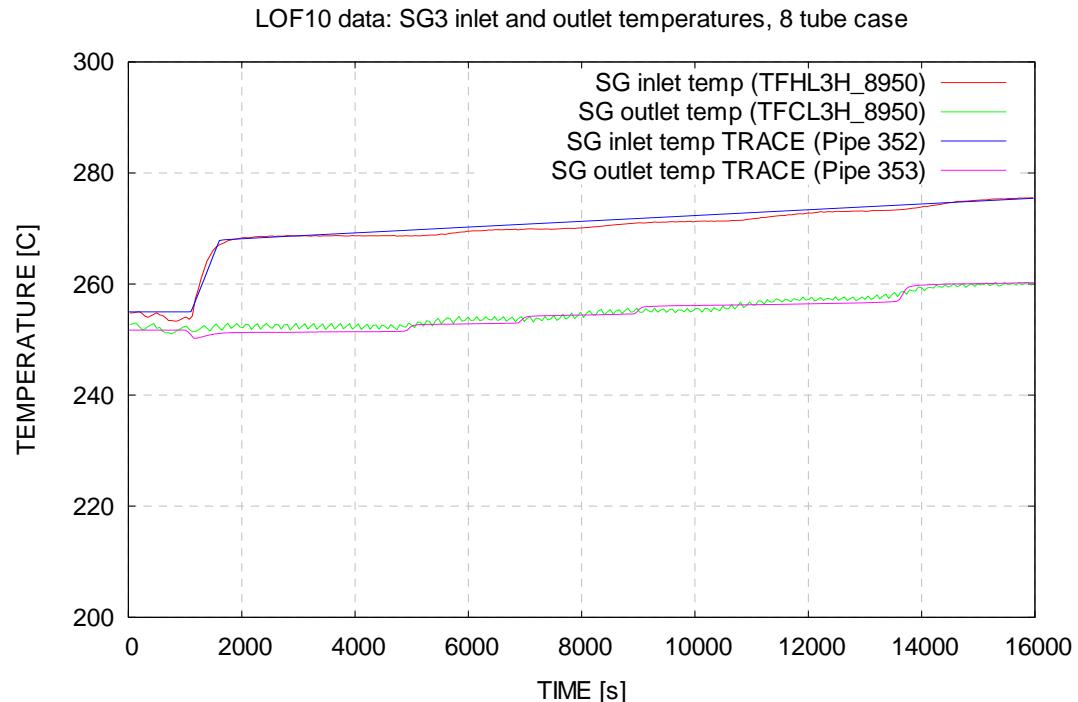


Figure 16. Primary inlet and outlet temperatures in experiment and in 8 pipe layer model.

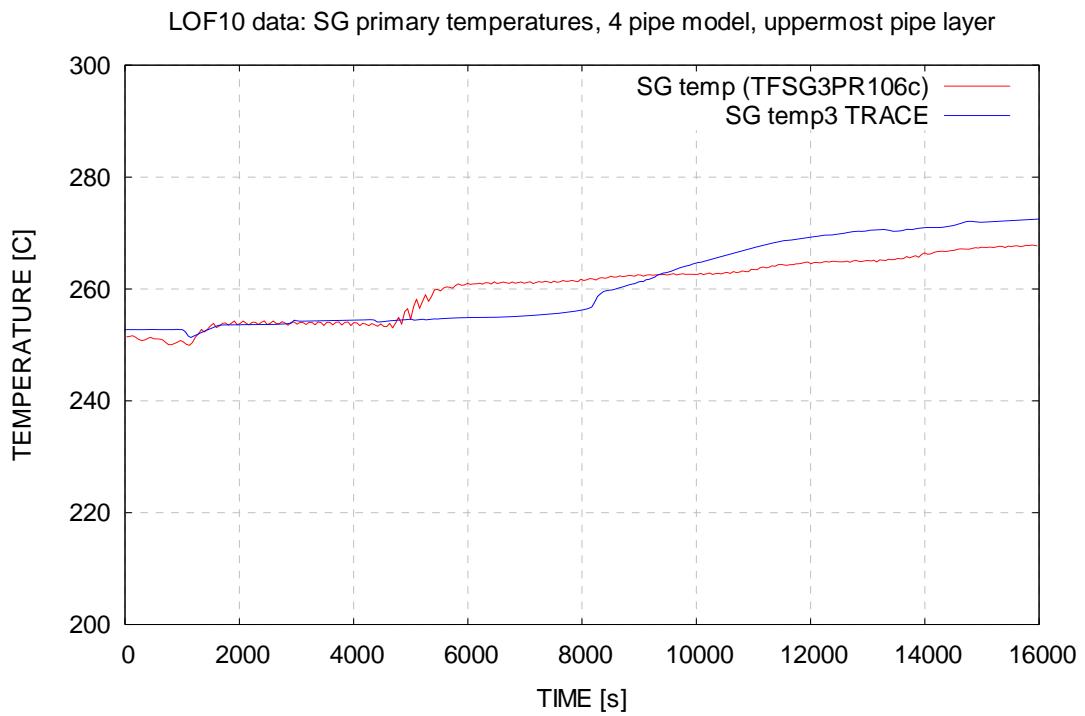


Figure 17. Primary temperatures, uppermost pipe layer, experiment vs. 4 pipe model.

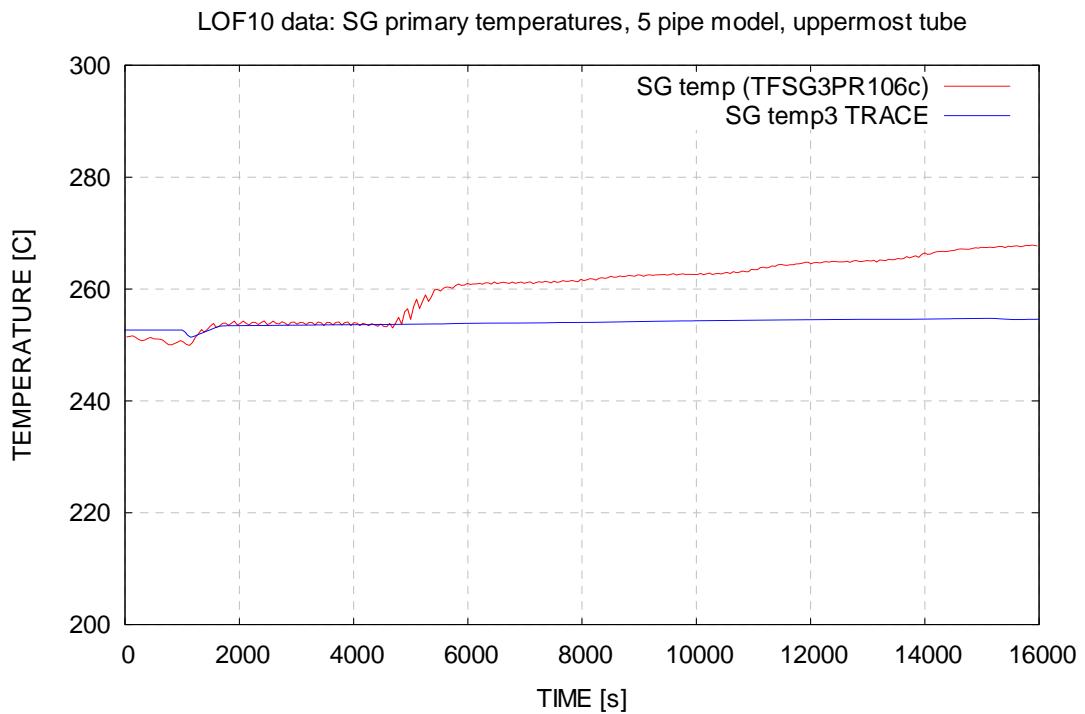


Figure 18. Primary temperatures, uppermost pipe layer, experiment vs. 5 pipe model.

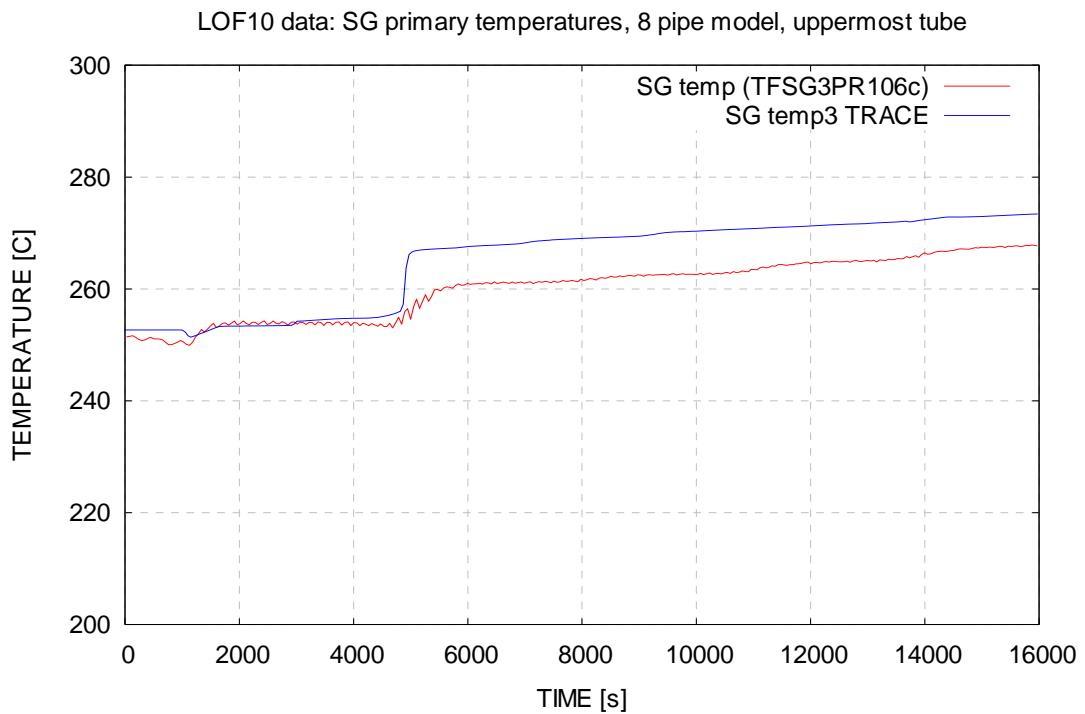


Figure 19. Primary temperatures, uppermost pipe layer, experiment vs. 8 pipe model.

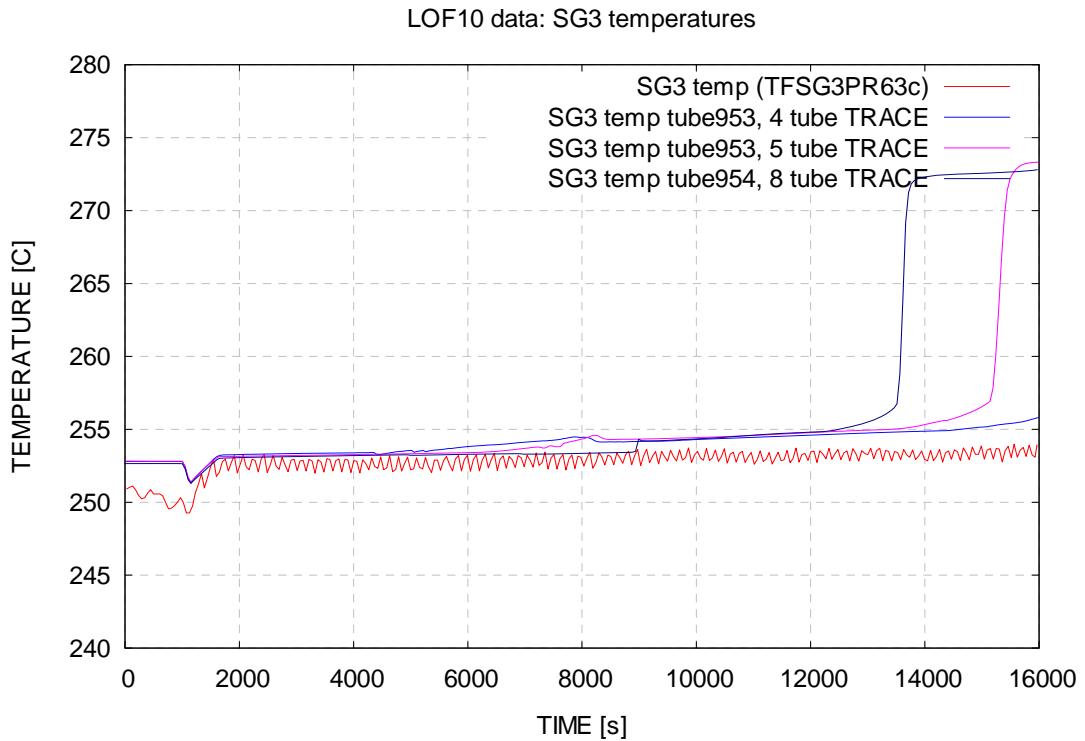


Figure 20. Primary tube temperatures in the experiment and in calculations at the middle of the tubebank.

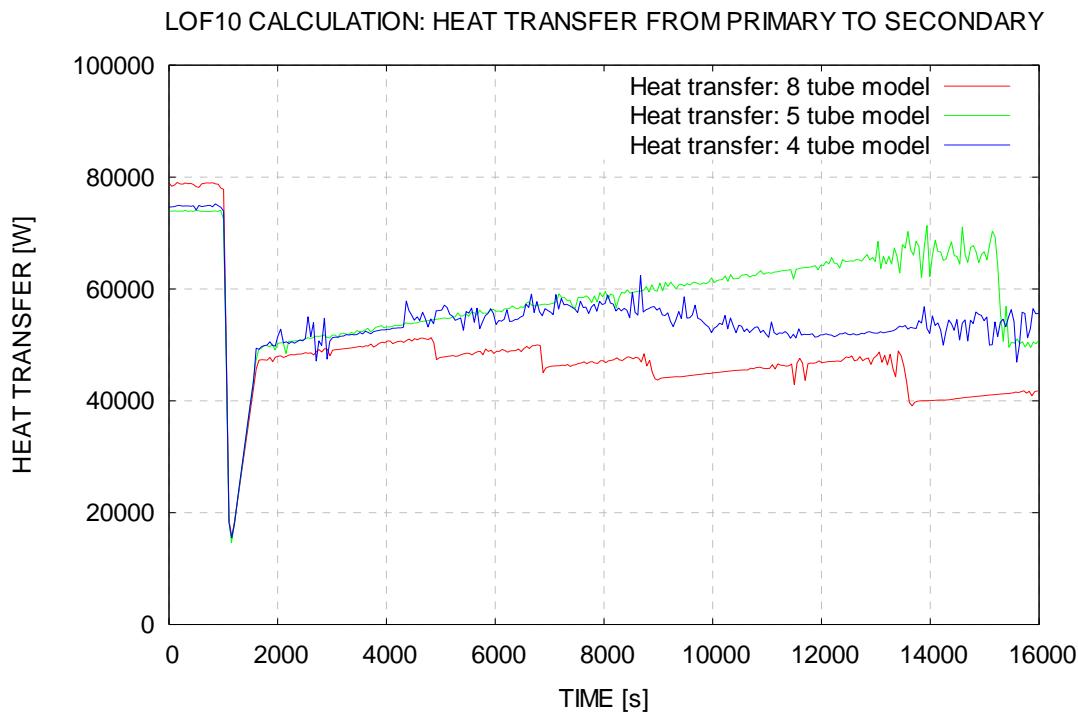


Figure 21. Calculated heat transfer from primary to secondary side in 4 and five pipe models.

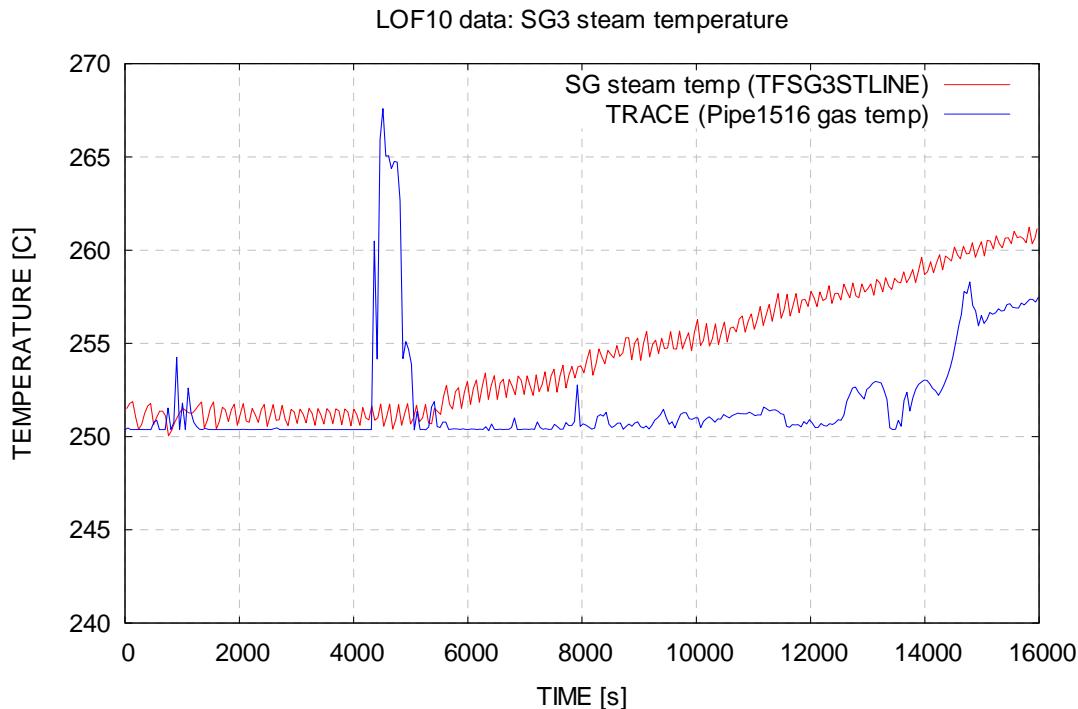


Figure 22. Steam outlet temperature, 4 pipe layer model.

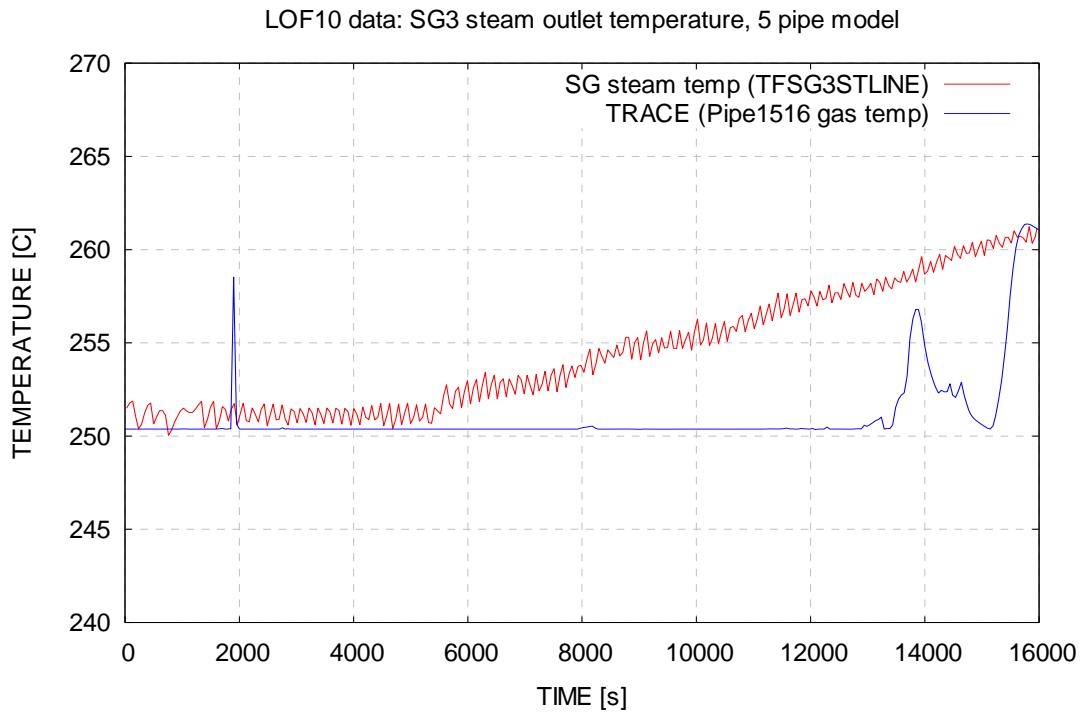


Figure 23. Steam outlet temperature, 5 pipe layer model.

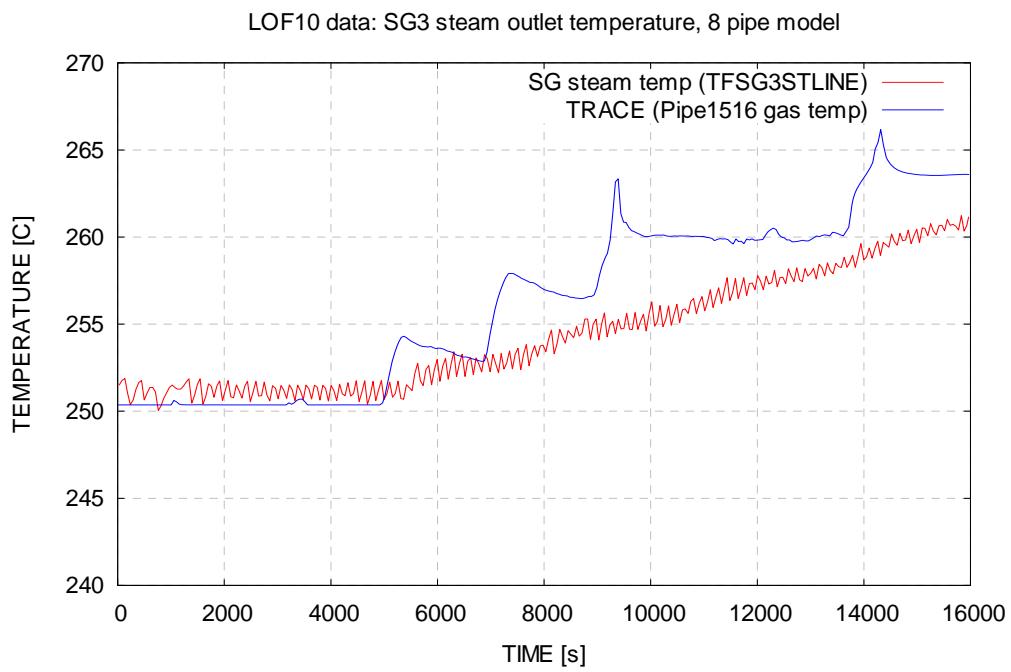


Figure 24. Steam outlet temperature, 8 pipe layer model.

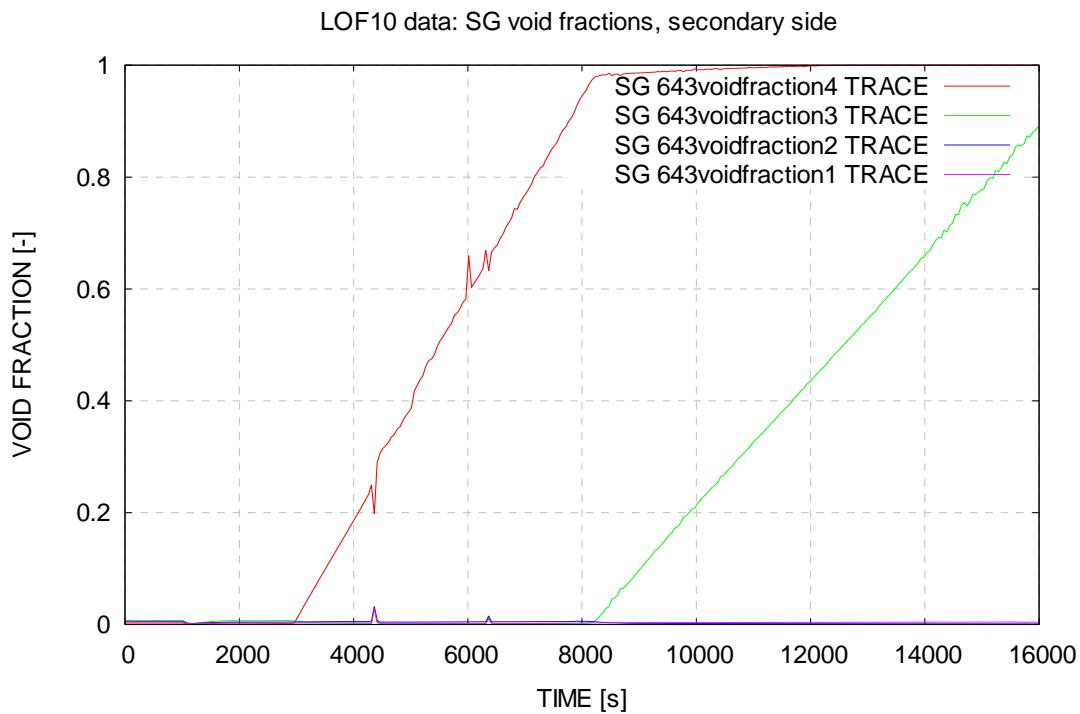


Figure 25. Calculated void fractions in secondary side in 4 pipe layer model.

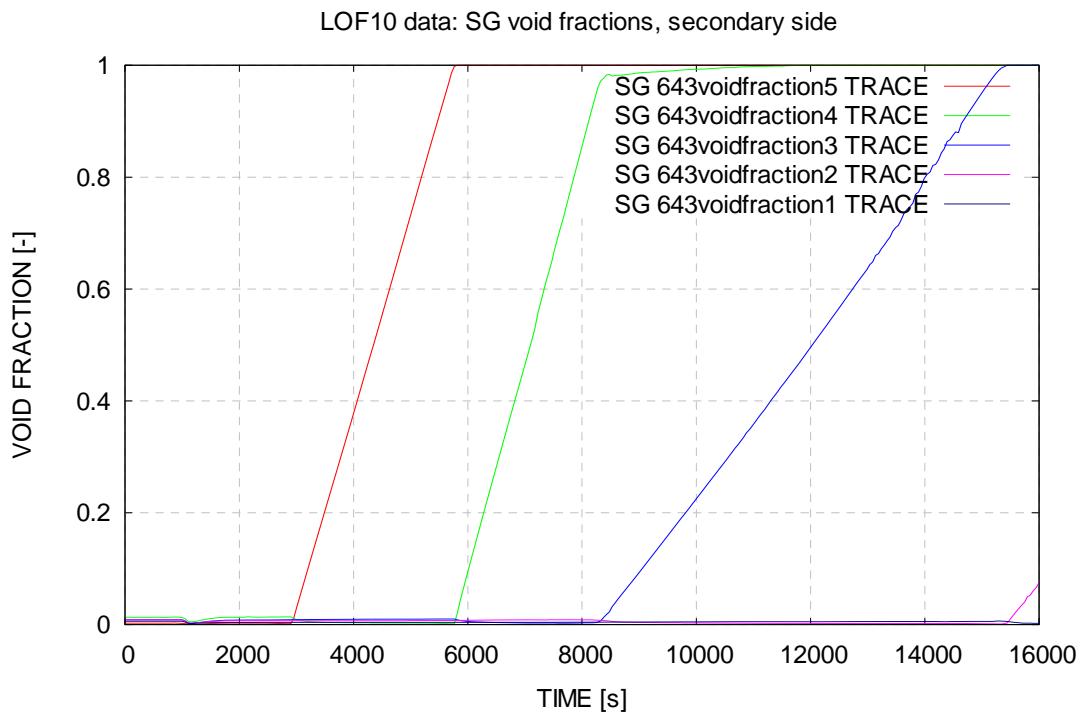


Figure 26. Calculated void fractions in secondary side in 5 pipe layer model.

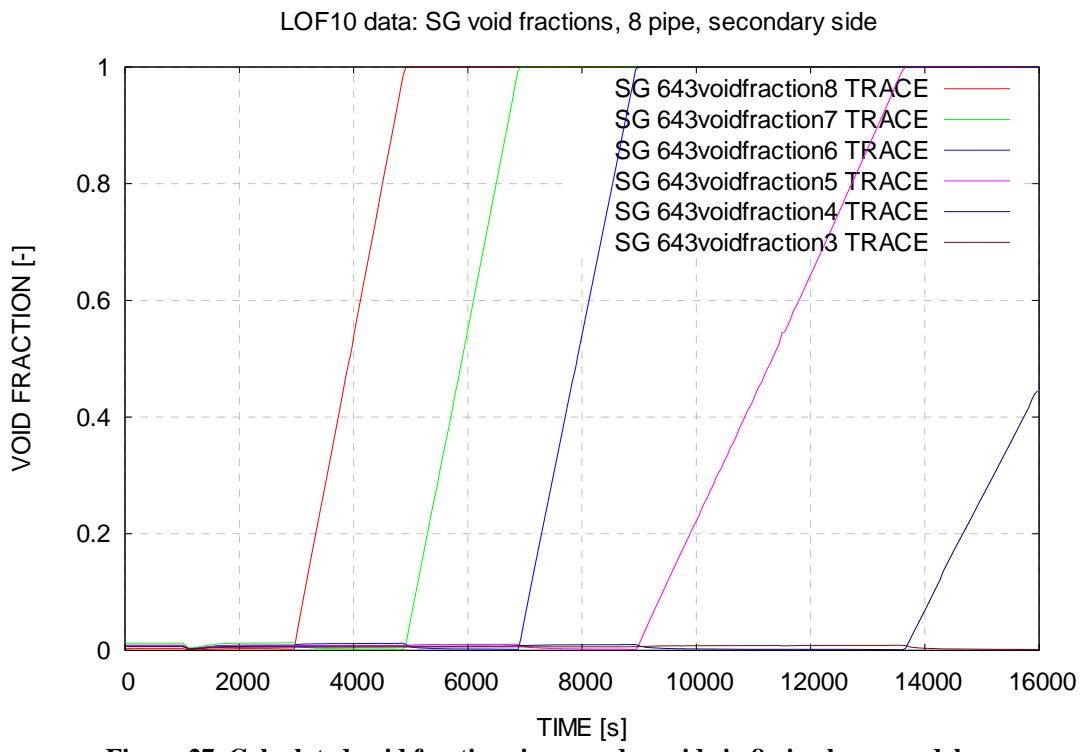


Figure 27. Calculated void fractions in secondary side in 8 pipe layer model.

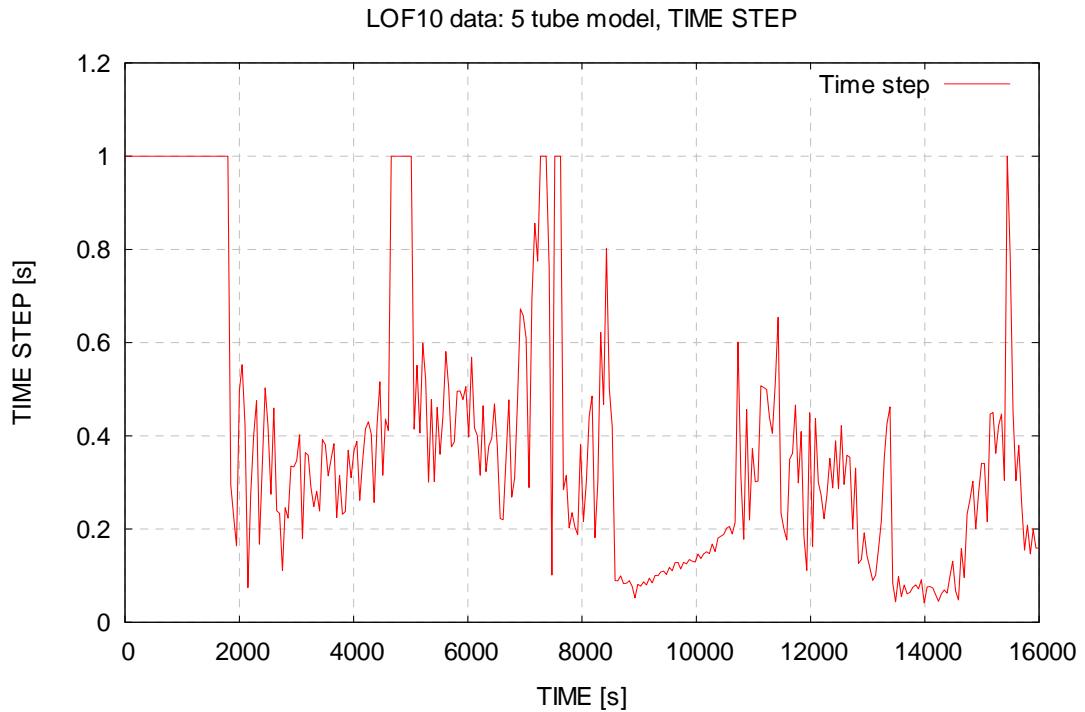


Figure 28. Transient calculation, time step in 5 pipe layer model.

5 CONCLUSIONS

The TRACE thermal hydraulic code with the SNAP model editor was used for preparing simulation model for the PACTEL horizontal steam generator. The calculation results showed that TRACE code is capable of modeling the behavior of the horizontal steam generator in steady state operation and in some transitory situations also. In the simulation of PACTEL loss of feedwater experiment LOF-10 the main parameters of the calculations followed the experiment with rather good accuracy. Three different models with nodalizations of 4, 5 and 8 pipe layers were implemented to describe the heat exchange tube rows of the PACTEL facility.

From the results of different tube layer models can be concluded that 5 tube layer model did not bring any significant approach towards experiment compared to the 4 tube layer model. On the contrary the results were not as good as with the four pipe model. It seemed that the overall behavior was satisfying already with 4 tube layers. However, to improve the modeling more detailed representation was introduced. The renodalized model with eight pipe layers modeling the heat exchange tubes. All three upper tube rows of heat exchange tubes were modeled separately resulting to more congruence with the experiment results.

The calculation results departed from experiment to some extent. At the final state the calculated secondary side collapsed level differed from the experiment less than 5 cm at the best case and 10 cm at the worst case. The heat transfer from primary to the secondary side degraded gradually during the uncovering of the heat exchange tubes. The calculations with four and five pipe layers overestimated this heat transfer. In the experiment the steam started to superheat almost immediately, when the uppermost tube layer had uncovered. The steam superheating in the calculations was possible only after the uppermost cell on the secondary side had voided thoroughly. Because of the use of lumped pipe representation of the heat exchange pipes in the calculations the timing of the superheating initiation was much later than in the experiment. Remarkable improvement with timing of the events was achieved, when the model was renodalized in more detail.

The next step in TRACE/SNAP implementation at LUT is to build up a model containing whole PACTEL facility.

6 REFERENCES

Kouhia, J., Puustinen, M., 1998, Experimental Data Report on LOF-10, VTT Energy, Technical Report TEKOJA 7/98, 11.12.1998.

Riikonen, V., 1994, RELAP5/MOD3.1 Analysis of the PACTEL Loss of Secondary Side Feed Water Experiment, VTT Energy Technical Report, PROPA 8/94, 25.10.1994.

Tuunanen, J., Kouhia, J., Purhonen, H., Riikonen, V., Puustinen, M., Semken, R.S., Partanen, H., Saure, I., Pylkkö, H. 1998. General description of the PACTEL test facility. Espoo, VTT Tiedote – Research Note No. 1929. 35 p. ISBN 951-38-5338-1.

TRACE V4.160 User's Manual. Volume 1: Input Specification. 2005. USNRC, Division of System Analysis and Regulatory Effectiveness. Washington DC. 600 p.

APPENDIX A

**TRACE steady state input of four layer pipe model for LOF-10
experiment**

```

free format
*****
* main data *
*****
*
*      numtcr      ieos      inopt      nmat      id2o
*      1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=-1.0,
nfrcl=2,
usesjc=3,
nhtstr=15
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
*      0          0.0
*      stdyst      transi      ncomp      njun      ipak
*      0          1          35          25          0
*      epso      epss
*      1.0E-4      1.0E-4
*      oitmax      sitmax      isolut      ncontr      nccfl
*      10          10          0          0          0
*      ntsv      ntcb      ntcf      ntrp      ntcp
*      25          9          34          0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type --- num ----- name ----- + jun1 jun2 jun3
* PIPE   * 1 s *           +   1  121
* PIPE   * 122 s * SG3-coldcol    +   52   0
* PIPE   * 241 s * SG3-hotcol    +   51   0
* PIPE   * 292 s *           +   0  150
* PIPE   * 312 s *           +  142   85
* PIPE   * 322 s *           +  141   86
* PIPE   * 332 s *           +  140   87
* PIPE   * 342 s *           +  139   88
* PIPE   * 352 s * SG3-inlet    +  128   51
* PIPE   * 353 s *           +  129   52
* FILL   * 463 s *           +  151
* PIPE   * 643 s *           +   0  148
* BREAK  * 873 s *           +  146
* PIPE   * 953 s *           +  122  123
* PIPE   * 963 s *           +  124  125

```

```

* PIPE   *  973 s *          +  126  127
* HTSTR  * 1375 s * HL1-col-bot      +
* HTSTR  * 1380 s * CL1-col-bot      +
* HTSTR  * 1411 s * SG1-pool-wall1    +
* HTSTR  * 1412 s * SG1-pool-wall2    +
* HTSTR  * 1413 s * SG1-pool-wall3    +
* HTSTR  * 1414 s * SG1-pool-wall4    +
* FILL   * 1420 s *          +  128
* HTSTR  * 1421 s * SG1-wallend1     +
* HTSTR  * 1422 s * SG1-wallend2     +
* HTSTR  * 1423 s * SG1-wallend3     +
* HTSTR  * 1424 s * SG1-wallend4     +
* BREAK  * 1430 s *          +  129
* HTSTR  * 1506 s * Downcomer wall    +
* PIPE   * 1516 s *          +  149  146
* HTSTR  * 1531 s * Steamdomewall1     +
* HTSTR  * 1532 s * Steamdomewall2     +
* HTSTR  * 1541 s * Steamdomewallend1   +
* HTSTR  * 1542 s * Steamdomewallend2   +
* SEPD   * 1546 e *          +  148  149  150
*
*****material properties *****
* material properties *
*****
* matb*      50e
* ptbln*     3e
* User Defined Material : 50
*
*n: Mineral wool
*
* prptb      temp      rho      cp      cond      emis
* prptb*    283.0    120.0    800.0    0.099    0.76s
* prptb*    373.0    120.0    800.0    0.12     0.76s
* prptb*    573.0    120.0    800.0    0.213    0.76e
*****
* Starting Signal Variable Section of Model   *
*****
*      idsv      isvn      ilcn      icn1      icn2
*      1         20       643        1         4
*
*      idsv      isvn      ilcn      icn1      icn2
*      2         20       1546       1         2
*
*      idsv      isvn      ilcn      icn1      icn2
*      105      103       1506       0         0
*n: PriHotcolbot
*
*      idsv      isvn      ilcn      icn1      icn2
*      107      103       1375       0         0
*n: PriColdcolbot
*
*      idsv      isvn      ilcn      icn1      icn2
*      108      103       1380       0         0
*
*      idsv      isvn      ilcn      icn1      icn2

```

	109	103	1411	0	0
*n: FWmassflow					
*					
*	idsv 110	isvn 31	ilcn 463	icn1 1	icn2 0
*					
*	idsv 111	isvn 0	ilcn 0	icn1 0	icn2 0
*					
*	idsv 112	isvn 103	ilcn 1412	icn1 0	icn2 0
*					
*	idsv 113	isvn 103	ilcn 1413	icn1 0	icn2 0
*					
*	idsv 114	isvn 103	ilcn 1414	icn1 0	icn2 0
*					
*	idsv 115	isvn 103	ilcn 1421	icn1 0	icn2 0
*					
*	idsv 116	isvn 103	ilcn 1422	icn1 0	icn2 0
*					
*	idsv 117	isvn 103	ilcn 1423	icn1 0	icn2 0
*					
*	idsv 118	isvn 103	ilcn 1424	icn1 0	icn2 0
*n: tubelayer 1					
*					
*	idsv 120	isvn 103	ilcn 1	icn1 0	icn2 0
*					
*	idsv 121	isvn 103	ilcn 953	icn1 0	icn2 0
*					
*	idsv 122	isvn 103	ilcn 963	icn1 0	icn2 0
*					
*	idsv 123	isvn 103	ilcn 973	icn1 0	icn2 0
*					
*	idsv 124	isvn 103	ilcn 241	icn1 0	icn2 0
*					
*	idsv 125	isvn 103	ilcn 122	icn1 0	icn2 0
*					
*	idsv 131	isvn 103	ilcn 1531	icn1 0	icn2 0
*					
*	idsv 132	isvn 103	ilcn 1532	icn1 0	icn2 0
*					
*	idsv	isvn	ilcn	icn1	icn2

```

        141      103      1541      0      0
*
*    idsv      isvn      ilcn      icn1      icn2
  142      103      1542      0      0
*****
* Finished Signal Variable Section of Model   *
*****
*
***** Starting Control System Section of Model  *
*****
***** Control Blocks *****
*
*    idcb      icbn      icb1      icb2      icb3
  -1       3       1       2       0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  1.0     -1.0E20    1.0E20    0.0      0.0
*
*
*    idcb      icbn      icb1      icb2      icb3
  -2      200      -1      -40      0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  160.0     0.0      0.6      0.712    0.0
*    cbdt      cbtau
  100.0     0.05
*
*n: Secheatlosses
*
*    idcb      icbn      icb1      icb2      icb3
  -3      103      13       0       0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  1.0     -1.0E20    1.0E20    0.0      0.0
* ids *    109      115      117      105s
* ids *    118      112      113      114s
* ids *    116      131      132      141s
* ids *    142e
*
*
*    idcb      icbn      icb1      icb2      icb3
  -4       9       0       0       0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  1.0     -1.0E20    1.0E20    60.0     0.0
*
*
*    idcb      icbn      icb1      icb2      icb3
  -5      39      110      -4       0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  1.0     -1.0E20    1.0E20    0.0      0.0
*
*n: tubelayers
*
*    idcb      icbn      icb1      icb2      icb3
  -6      103       4       0       0
*    cbgain    cbxmin    cbmax    cbcon1    cbcon2
  1.0     -1.0E20    1.0E20    0.0      0.0
* ids *    120      121      122      123e
*
```

```

*n: collectors
*
*      idcb      icbn      icb1      icb2      icb3
*      -7        3       124      125        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0     -1.0E20    1.0E20      0.0      0.0
*
*n: tubesandcoll
*
*      idcb      icbn      icb1      icb2      icb3
*      -8        3       -6      -7        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0     -1.0E20    1.0E20      0.0      0.0
*
*
*      idcb      icbn      icb1      icb2      icb3
*      -40       9        0        0        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0    -1000.0   1000.0      0.712      0.0
*
*****
* Finished Control System Section of Model *
*****
***** type      num      userid      component name
pipe          1        1      unnamed
*      ncells    nodes    jun1    jun2      epsw
*      5          4        1      121      2.0E-6
*      nsides      0
*      ichf      iconc    pipetype    ipow      npipes
*      1          0        0        0      27
*      iqptr     iqpsv    nqptb    nqpsv      nqprf
*      0          0        0        0        0
*      radin      th      houtl    houtv      toutl
*      6.5E-3    1.5E-3    0.0      0.0      300.0
*      toutv      pwin    pwoff    rpwmx      pwscl
*      300.0      0.0      0.0    1.0E20      1.0
*      qpin      qpoff    rqpmx    qpsc1      nhcom
*      0.0      0.0      0.0      1.0      643
* dx *      0.558    0.558    0.558    0.558s
* dx *      0.558e
* vol * 7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol * 7.40646E-5e
* fa  * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa  * 1.32732E-4 1.32732E-4e
* fric *      0.5      0.0      0.0      0.35s
* fric *      0.0      0.998e
* fricr *      0.0      0.0      0.0      0.0s
* fricr *      0.0      0.0e
* grav *      0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3      0.0e
* hd  *      0.013    0.013    0.013    0.013s
* hd  *      0.013    0.013e
* nff *      -100     -100     -100     -100s
* nff *      -100     -100e
* alp *      0.0      0.0      0.0      0.0s

```

```

* alp * 0.0e
* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e
* vv * 0.7 0.7 0.7 0.7s
* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 4 4 4 4 4e
*
***** type num userid component name
pipe 122 1 SG3-colcol
* ncells nodes jun1 jun2 epsw
* 4 3 52 0 2.0E-6
* nsides 4
* nclk junlk ncmpto nclkto nlevto
* 4 121 0 0 0
* theta ientrn
* 90.0 0
* nclk junlk ncmpto nclkto nlevto
* 3 123 0 0 0
* theta ientrn
* 90.0 0
* nclk junlk ncmpto nclkto nlevto
* 2 125 0 0 0
* theta ientrn
* 90.0 0
* nclk junlk ncmpto nclkto nlevto
* 1 127 0 0 0
* theta ientrn
* 90.0 0
* ichf iconc pipetype ipow npipes
* 1 0 0 0 1
* iqptr iqpsv nqptb nqpsv nqprf
* 0 0 0 0 0
* radin th houtl houtv toutl
* 0.07 0.02 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
* 300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpscl nhcom

```

```

      0.0      0.0      0.0      1.0      643
* dx   *    0.163    0.192    0.192    0.135e
* vol  *    2.5E-3   2.95E-3   2.95E-3   2.0E-3e
* fa   *  0.015393804  0.015394  0.015394  0.015394s
* fa   *  0.015394e
* fric  *     0.0     0.0     0.0     0.0s
* fric  *     0.0e
* fricr *     0.0     0.0     0.0     0.0s
* fricr *     0.0e
* grav  *     1.0     1.0     1.0     1.0s
* grav  *     1.0e
* hd   *     0.14    0.14    0.14    0.14s
* hd   *     0.14e
* nff  *    -100    -100    -100    -100s
* nff  *    -100e
* alp  *     0.0     0.0     0.0     0.0e
* vl   *    0.195    0.164    0.105    0.047s
* vl   *     0.0e
* vv   *    0.195    0.164    0.105    0.047s
* vv   *     0.0e
* tl   *    528.0   528.0   528.0   528.0e
* tv   *    528.0   528.0   528.0   528.0e
* p    *    7.3E6   7.3E6   7.3E6   7.3E6e
* pa   *     0.0     0.0     0.0     0.0e
* qpp  *     1.0     1.0     1.0     1.0     1.0s
* qpp  *     1.0     1.0     1.0     1.0     1.0s
* qpp  *     1.0     1.0e
* matr * f 6e
* tw   *    526.0   526.0   526.0   526.0   526.0s
* tw   *    526.0   526.0   526.0   526.0   526.0s
* tw   *    526.0   526.0e
* idrod *     0e
* nhcel *     1      2      3      4e
*
***** type      num      userid      component name
pipe          241          1           SG3-hotcol
* ncells      nodes      jun1      jun2      epsw
        4            3            51            0       2.0E-6
* nsides      4
* nclk       junlk      ncmpto      nclkto      nlevto
        4            1            0            0            0
* theta      ientrn
        90.0          0
* nclk       junlk      ncmpto      nclkto      nlevto
        3            122           0            0            0
* theta      ientrn
        90.0          0
* nclk       junlk      ncmpto      nclkto      nlevto
        2            124           0            0            0
* theta      ientrn
        90.0          0
* nclk       junlk      ncmpto      nclkto      nlevto
        1            126           0            0            0
* theta      ientrn
        90.0          0

```

```

*      ichf      iconc      pipetype      ipow      npipes
*      1          0          0          0          1
*      iqptr     iqpsv      nqptb      nqpsv      nqprf
*      0          0          0          0          0
*      radin      th        houtl      houtv      toutl
*      0.07      0.02      0.0        0.0        300.0
*      toutv      pwin      pwoff      rpwmx      pwscl
*      300.0      0.0        0.0        1.0E20      1.0
*      qpin      qpoff      rqpmx      qpscl      nhcom
*      0.0        0.0        0.0        1.0        643
* dx *      0.163      0.192      0.192      0.135e
* vol *      2.5E-3    2.95E-3   2.95E-3   2.0E-3e
* fa *      0.015394  0.015394  0.015394  0.015394s
* fa *      0.015394e
* fric *      0.0        0.0        0.0        0.0s
* fric *      0.0e
* fricr *      0.0        0.0        0.0        0.0s
* fricr *      0.0e
* grav *      1.0        1.0        1.0        1.0s
* grav *      1.0e
* hd *       0.14       0.14       0.14       0.14s
* hd *       0.14e
* nff *      -100      -100      -100      -100s
* nff *      -100e
* alp *       0.0        0.0        0.0        0.0e
* vl *       0.195      0.164      0.105      0.047s
* vl *       0.0e
* vv *       0.195      0.164      0.105      0.047s
* vv *       0.0e
* tl *       528.0     528.0     528.0     528.0e
* tv *       528.0     528.0     528.0     528.0e
* p *        7.3E6     7.3E6     7.3E6     7.3E6e
* pa *       0.0        0.0        0.0        0.0e
* qpp *       1.0        1.0        1.0        1.0      1.0s
* qpp *       1.0        1.0        1.0        1.0      1.0s
* qpp *       1.0        1.0e
* matr * f 6e
* tw *       528.0     528.0     526.0     528.0     528.0s
* tw *       526.0     528.0     528.0     526.0     528.0s
* tw *       528.0     526.0e
* idrod *     0e
* nhcel *     1          2          3          4e
*
***** type      num      userid      component name
pipe           292          1      unnamed
*      ncells      nodes      jun1      jun2      epsw
*      6            0          0        150      2.0E-6
*      nsides      5
*      nclk      junlk      ncmpto      nclkto      nlevto
*      1          139          0          0          0
*      theta      ientrn
*      90.0        0
*      nclk      junlk      ncmpto      nclkto      nlevto
*      3          140          0          0          0
*      theta      ientrn

```

```

    90.0      0
* nclk   junlk   ncmpto   nclkto   nlevto
    5       141      0        0        0
* theta  ientrn
90.0      0
* nclk   junlk   ncmpto   nclkto   nlevto
    6       142      0        0        0
* theta  ientrn
90.0      0
* nclk   junlk   ncmpto   nclkto   nlevto
    4       151      0        0        0
* theta  ientrn
90.0      0
* ichf   iconc   pipetype  ipow     npipes
    1       0        0        0        1
* radin  th       houtl    houtv    toutl
    0.0     0.0      0.0      0.0      0.0
* toutv   pwin    pwoff    rpwmx    pwscl
    0.0     0.0      0.0      0.0      0.0
* dx    *  0.0815  0.096   0.096   0.096s
* dx    *  0.096   0.135e
* vol   *  5.3975E-3 6.3E-3  6.3E-3  6.3E-3s
* vol   *  6.3E-3  8.8E-3e
* fa    *  0.065   0.0656  0.0656  0.0656s
* fa    *  0.0656  0.0652  0.065185e
* fric  *  0.0     0.0     0.0     0.0s
* fric  *  0.0     0.0     10.0e
* fricr *  0.0     0.0     0.0     0.0s
* fricr *  0.0     0.0     0.0e
* grav  *  1.0     1.0     1.0     1.0s
* grav  *  1.0     1.0     1.0e
* hd    *  0.288   0.289   0.289   0.289s
* hd    *  0.289   0.28809047 0.28809047e
* nff   *  -100    -100    -100    -100s
* nff   *  -100    -100    -1e
* alp   *  0.0     0.0     0.0     0.0s
* alp   *  0.0     0.0e
* vl    *  0.0     0.0     0.0     0.0s
* vl    *  0.0     0.0     0.0e
* vv    *  0.0     0.0     0.0     0.0s
* vv    *  0.0     0.0     0.0e
* tl    *  523.504 523.504  523.504  523.504s
* tl    *  523.504 523.504e
* tv    *  523.504 523.504  523.504  523.504s
* tv    *  523.504 523.504e
* p     *  4.0E6   4.0E6   4.0E6   4.0E6s
* p     *  4.0E6   4.0E6e
* pa   *  0.0     0.0     0.0     0.0s
* pa   *  0.0     0.0e
*
***** type      num      userid      component name
* single junction
pipe      312      1          unnamed
* ncells  nodes    jun1      jun2      epsw
    0       0        142      85       2.0E-6
* ichf   iconc   pipetype  ipow     npipes

```

```

      1      0      0      0      1
* radin    th    houtl   houtv   toutl
      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx   pwscl
      0.0     0.0     0.0     0.0     0.0
* dx      * f 0.0000e+00e
* vol     * f 0.0000e+00e
* fa      * f  0.3105e
* fric    * f   2.5e
* fricr   * f   10.0e
* grav    * f   0.0e
* hd      * f  0.44460144e
* nff     * f   -1e
* alp     * f 0.0000e+00e
* vl      * f   0.0e
* vv      * f   0.0e
* tl      * f 0.0000e+00e
* tv      * f 0.0000e+00e
* p       * f 0.0000e+00e
* pa      * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      322      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0        0     141     86    2.0E-6
* ichf     iconc    pipetype    ipow    npipes
      1        0        0        0        1
* radin    th    houtl   houtv   toutl
      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx   pwscl
      0.0     0.0     0.0     0.0     0.0
* dx      * f 0.0000e+00e
* vol     * f 0.0000e+00e
* fa      * f  0.4416e
* fric    * f   2.6e
* fricr   * f   10.0e
* grav    * f   0.0e
* hd      * f  0.7498e
* nff     * f   -1e
* alp     * f 0.0000e+00e
* vl      * f   0.0e
* vv      * f   0.0e
* tl      * f 0.0000e+00e
* tv      * f 0.0000e+00e
* p       * f 0.0000e+00e
* pa      * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      332      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0        0     140     87    2.0E-6
* ichf     iconc    pipetype    ipow    npipes

```

```

      1      0      0      0      1
* radin    th    houtl   houtv   toutl
      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx   pwscl
      0.0     0.0     0.0     0.0     0.0
* dx   * f 0.0000e+00e
* vol  * f 0.0000e+00e
* fa   * f  0.4416e
* fric * f  2.6e
* fricr * f 10.0e
* grav * f  0.0e
* hd   * f  0.7498e
* nff  * f -1e
* alp  * f 0.0000e+00e
* vl   * f  0.0e
* vv   * f  0.0e
* tl   * f 0.0000e+00e
* tv   * f 0.0000e+00e
* p    * f 0.0000e+00e
* pa   * f 0.0000e+00e
*
***** type      num      userid      component name
* single junction
pipe      342      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0        0      139      88    2.0E-6
* ichf     iconc    pipetype    ipow    npipes
      1        0        0        0        1
* radin    th    houtl   houtv   toutl
      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx   pwscl
      0.0     0.0     0.0     0.0     0.0
* dx   * f 0.0000e+00e
* vol  * f 0.0000e+00e
* fa   * f  0.3726e
* fric * f  2.4e
* fricr * f 10.0e
* grav * f  0.0e
* hd   * f  0.6688e
* nff  * f -1e
* alp  * f 0.0000e+00e
* vl   * f  0.0e
* vv   * f  0.0e
* tl   * f 0.0000e+00e
* tv   * f 0.0000e+00e
* p    * f 0.0000e+00e
* pa   * f 0.0000e+00e
*
*
***** type      num      userid      component name
pipe      352      1      SG3-inlet
* ncells    nodes    jun1    jun2    epsw
      1        0      128      51    2.0E-6
* nsides
      0
* ichf     iconc    pipetype    ipow    npipes

```

```

*      1      0      0      0      1
* radin    th    houtl   houtv    toutl
*      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx    pwscl
*      0.0     0.0     0.0     0.0     0.0
* dx      0.255e
* vol   * 3.92542E-3e
* fa    * 0.015394 0.015394e
* fric  *     0.0     0.0e
* fricr *     0.0     0.0e
* grav  *     1.0     1.0e
* hd    *     0.14    0.14e
* nff   *    -100    -100e
* alp   *     0.0e
* vl    *     0.195   0.195e
* vv    *     0.195   0.195e
* tl    *    528.0e
* tv    *    528.0e
* p     *    7.3E6e
* pa    *     0.0e
*
*
***** type      num      userid      component name
pipe      353      1      unnamed
* ncells      nodes      jun1      jun2      epsw
*      1        0       129       52      2.0E-6
* nsides      0
* ichf      iconc      pipetype      ipow      npipes
*      1        0        0        0        1
* radin    th    houtl   houtv    toutl
*      0.0     0.0     0.0     0.0     0.0
* toutv    pwin   pwoff   rpwmx    pwscl
*      0.0     0.0     0.0     0.0     0.0
* dx      0.255e
* vol   * 3.92542E-3e
* fa    * 0.015393804 0.015393804e
* fric  *     0.448   0.0e
* fricr *     0.0     0.0e
* grav  *     1.0     1.0e
* hd    *     0.14    0.14e
* nff   *    -100    -100e
* alp   *     0.0e
* vl    *     0.0     0.195e
* vv    *     0.0     0.195e
* tl    *    528.0e
* tv    *    528.0e
* p     *    7.3E6e
* pa    *     0.0e
*
*
***** type      num      userid      component name
fill      463      1      unnamed
* jun1      ifty      ioff
*      151        5        0
* iftr      ifsv      nftb      nfsv      nfrf

```

*	0	-2	0	0	0
*	twtold	rfmx	concin	felv	
	0.0	1.0E20	0.0	0.0	
*	dxin	volin	alpin	vlin	tlin
	0.192	0.0126	0.0	0.0	298.0
*	pin	pain	flowin	vvin	tvin
	4.0E6	0.0	0.3	0.0	298.0
*					
*					
*****	type	num	userid	component name	
pipe		643	1	unnamed	
*	ncells	nodes	jun1	jun2	epsw
	4	0	0	148	2.0E-6
*	nsides				
	4				
*	nclk	junlk	ncmpto	nclkto	nlevto
	4	85	0	0	0
*	theta	ientrn			
	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
	3	86	0	0	0
*	theta	ientrn			
	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
	2	87	0	0	0
*	theta	ientrn			
	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
	1	88	0	0	0
*	theta	ientrn			
	90.0	0			
*	ichf	iconc	pipetype	ipow	npipes
	1	0	0	0	1
*	radin	th	houtl	houtv	toutl
	0.0	0.0	0.0	0.0	0.0
*	toutv	pwin	pwoff	rpwmx	pwscl
	0.0	0.0	0.0	0.0	0.0
*	dx	* 0.163	0.192	0.192	0.135e
*	vol	* 0.1362	0.2748	0.3163	0.2114e
*	fa	* 1.29195	1.29195	1.707	1.74759s
*	fa	* 1.4477071e			
*	fric	* 0.0	0.0	0.0	0.0s
*	fric	* 0.0e			
*	fricr	* 0.0	0.0	0.0	0.0s
*	fricr	* 5.0e			
*	grav	* 1.0	1.0	1.0	1.0s
*	grav	* 1.0e			
*	hd	* 1.314779	1.314779	1.314779	1.314779s
*	hd	* 1.3576737e			
*	nff	* -100	-100	-100	-100s
*	nff	* -1e			
*	alp	* 0.0	0.0	0.0	0.0e
*	vl	* 0.0	0.0	0.0	0.0s
*	vl	* 0.0e			
*	vv	* 0.0	0.0	0.0	0.0s
*	vv	* 0.0e			

```

* tl  *    523.0    523.0    523.0    523.0e
* tv  *    523.0    523.0    523.0    523.0e
* p   *    4.0E6    4.0E6    4.0E6    4.0E6e
* pa  *     0.0     0.0     0.0     0.0e
*
*
***** type      num      userid      component name
break          873       1           unnamed
*   jun1      ibty      isat      ioff      adjpress
  146          0         0         0         0
*   dxin      volin     alpin     tin       pin
  2.127995    0.027     1.0      523.0    4.0E6
*   pain      concin    rbmx      poff      belv
  0.0         0.0      1.0E20    0.0      0.0
*
*
***** type      num      userid      component name
pipe          953       1           unnamed
*   ncells    nodes     jun1      jun2      epsw
  5            4        122      123      1.0E-6
*   nsides
  0
*   ichf      iconc     pipetype    ipow      npipes
  1            0         0         0         36
*   iqptr     iqpsv     nqptb     nqpsv     nqprf
  0            0         0         0         0
*   radin     th        houtl     houtv     toutl
  6.5E-3     1.5E-3    0.0       0.0      300.0
*   toutv     pwin     pwoff     rpwmx     pwscl
  300.0      0.0       0.0      1.0E20    1.0
*   qpin      qpoff    rqpmx     qpscl     nhcom
  0.0         0.0       0.0      1.0      643
* dx  *     0.558     0.558     0.558     0.558s
* dx  *     0.558e
* vol *    7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *    7.40646E-5e
* fa  *    1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa  *    1.32732E-4 1.32732E-4e
* fric *    0.5       0.0       0.0      0.35s
* fric *    0.0       0.998e
* fricr *   0.0       0.0       0.0      0.0s
* fricr *   0.0       0.0e
* grav *   0.0      7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3     0.0e
* hd  *    0.013     0.013     0.013     0.013s
* hd  *    0.013     0.013e
* nff *    1         1         1       1s
* nff *    1         1e
* alp *   0.0       0.0       0.0      0.0s
* alp *   0.0e
* vl  *    0.7       0.7       0.7      0.7s
* vl  *    0.7       0.7e
* vv  *    0.7       0.7       0.7      0.7s
* vv  *    0.7       0.7e
* tl  *    528.0    528.0    528.0    528.0s
* tl  *    528.0e

```

```

* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 3 3 3 3 3e
*
*
***** type num userid component name
pipe 963 1 unnamed
* ncells nodes jun1 jun2 epsw
5 4 124 125 1.0E-6
* nsides 0
* ichf iconc pipetype ipow npipes
1 0 0 0 36
* iqptr iqpsv nqptb nqpsv nqprf
0 0 0 0 0
* radin th houtl houtv toutl
6.5E-3 1.5E-3 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpscl nhcom
0.0 0.0 0.0 1.0 643
* dx * 0.558 0.558 0.558 0.558s
* dx * 0.558e
* vol * 7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol * 7.40646E-5e
* fa * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa * 1.32732E-4 1.32732E-4e
* fric * 0.5 0.0 0.0 0.35s
* fric * 0.0 0.998e
* fricr * 0.0 0.0 0.0 0.0s
* fricr * 0.0 0.0e
* grav * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3 0.0e
* hd * 0.013 0.013 0.013 0.013s
* hd * 0.013 0.013e
* nff * 1 1 1 1s
* nff * 1 1e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0e
* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e
* vv * 0.7 0.7 0.7 0.7s

```

```

* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 2 2 2 2 2e
*
*
***** type num userid component name
pipe 973 1 unnamed
* ncells nodes jun1 jun2 epsw
5 4 126 127 1.0E-6
* nsides 0
* ichf iconc pipetype ipow npipes
1 0 0 0 19
* iqptr iqpsv nqptb nqpsv nqprf
0 0 0 0 0
* radin th houtl houtv toutl
6.5E-3 1.5E-3 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpsc1 nhcom
0.0 0.0 0.0 1.0 643
* dx * 0.542 0.542 0.542 0.542s
* dx * 0.542e
* vol * 7.19409E-5 7.19409E-5 7.19409E-5 7.19409E-5s
* vol * 7.19409E-5e
* fa * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa * 1.32732E-4 1.32732E-4e
* fric * 0.5 0.0 0.0 0.35s
* fric * 0.0 0.998e
* fricr * 0.0 0.0 0.0 0.0s
* fricr * 0.0 0.0e
* grav * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3 0.0e
* hd * 0.013 0.013 0.013 0.013s
* hd * 0.013 0.013e
* nff * -100 -100 -100 -100s
* nff * -100 -100e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0e

```

```

* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e
* vv * 0.7 0.7 0.7 0.7s
* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 1 1 1 1 1e
*
*
***** type num userid component name
fill 1420 1 unnamed
* jun1 ifty ioff
128 5 0
* iftr ifsv nftb nfsv nfrf
0 111 2 0 0
* twtold rfmx concin felv
0.0 1.0E20 0.0 0.0
* dxin violin alpin vlin tlin
1.0 0.015394 0.0 0.0 528.0
* pin pain flowin vvin tvin
7.3E6 0.0 5.0 0.0 528.0
* vmscl vvscl
1.0 1.0
*
* vmtbv * 0.0 5.0s
* vmtbv * 1.0E4 5.0e
*
*
***** type num userid component name
break 1430 1 unnamed
* jun1 ibty isat ioff adjpress
129 0 0 0 0
* dxin violin alpin tin pin
1.0 0.015394 0.0 528.0 7.3E6
* pain concin rbmx poff belv
0.0 0.0 1.0E20 0.0 0.0
*
*
***** type num userid component name
pipe 1516 1 unnamed

```

```

* ncells      nodes      jun1      jun2      epsw
*      3          0        149       146     2.0E-6
* nsides      0
* ichf       iconc      pipetype      ipow      npipes
*      1          0          0          0          1
* radin       th        houtl      houtv      toutl
*      0.0        0.0        0.0        0.0        0.0
* toutv       pwin      pwoff      rpwmx      pwscl
*      0.0        0.0        0.0        0.0        0.0
* dx * 0.70933333 0.70933333 0.7093333e
* vol * 8.99977E-3 8.99977E-3 8.99977E-3e
* fa * 0.91399 0.012687644 0.012687644 0.012687644e
* fric * 3.0        0.0        0.0        3.0e
* fricr * 0.0        0.0        0.0        0.0e
* grav * 1.0        1.0        1.0        1.0e
* hd * 1.2632607 0.1271      0.1271      0.1271e
* nff * -1         1         1         1e
* alp * 1.0        1.0        1.0e
* vl * 0.0        0.0        0.0        0.0e
* vv * 0.0        0.0        0.0        0.0e
* tl * 523.0      523.0      523.0e
* tv * 523.0      523.0      523.0e
* p * 4.0E6       4.0E6       4.0E6e
* pa * 0.0        0.0        0.0e
*
*
* type      num      id      ctitle
sepd      1546      0      unnamed
* jcell      nodes      ichf      cost      epsw
*      2          0          1        -1.0        0.0
* nseps      ndryr      istage      xco       xcu
*      1          0          0        0.0        1.0
* alpsmn      alpsmx
*      0.0        1.0
* iconc1      ncell1      jun1      jun2      ipow1
*      0          2        148       149        0
* radin       th        houtl      houtv      toutl
*      0.0        0.0        0.0        0.0        0.0
* toutv       pwin      pwoff      rpwmx      pwscl
*      0.0        0.0        0.0        0.0        0.0
* iconc2      ncell2      jun3      ipow2
*      0          1        150        0
* radin2      th2        houtl2     houtv2     toutl2
*      0.0        0.0        0.0        0.0        0.0
* toutv2      pwin2      pwoff2     rpwmx2     pwscl2
*      0.0        0.0        0.0        0.0        0.0
* dx1 * 0.134      0.134e
* vol1 * 0.211153 0.1247487e
* fa1 * 1.4477071 1.25336 0.91399e
* fric1 * 0.0        0.0        3.0e
* fricr1 * 5.0        0.0        0.0e
* grav1 * 1.0        1.0        1.0e
* hd1 * 1.3576737 1.2632607 1.2632607e
* nff1 * -1         -1        -1e
* alp1 * 0.687      1.0e

```

```

* v11 *      0.0      0.0      0.0e
* vv1 *      0.0      0.0      0.0e
* tl1 *     523.0    523.0e
* tv1 *     523.0    523.0e
* p1 *     4.0E6    4.0E6e
* pa1 *      0.0      0.0e
* dx2 *     0.067e
* vol2 *   3.25925E-3e
* fa2 *   0.065185  0.065185e
* fric2 *     0.0      0.0e
* fricr2 *    0.0     10.0e
* grav2 *    -1.0     -1.0e
* hd2 *   0.28809047 0.28809047e
* nff2 *     -1      -1e
* alp2 *     1.0e
* v12 *      0.0      0.0e
* vv2 *      0.0      0.0e
* tl2 *     523.0e
* tv2 *     523.0e
* p2 *     4.0E6e
* pa2 *      0.0e
*
***** Starting Heat Structure Section of Model *****
***** Starting Heat Structure Section of Model *****
*
***** type      num      userid      component name
htstr      1375      0          HL1-col-bot
*   nzhstr     ittc     hscyl     ichf
    1        0        1        1
*  nofuelrod   plane    liqlev    iaxcnd
    1        3        0        0
*   nmwrx      nfc1     nfcil     hdri      hdro
    0        0        0        0.0      0.0
*   nhot       nodes    fmno      nzmax      reflood
    0        8        0       100        0
*   dtxht(1)  dtxht(2)  dznht    hgapo
    2.0     10.0    1.0E-3    6300.0
*
*   idbcin *    2e
*   idbcon *    1e
*   hcomon1 *   352      1        0        0e
*   htc2 *     3.44    298.0e
*   dhtstrz *  0.255e
*   rdx *     1.0e
*   radrd *   0.07  0.076666667 0.083333333    0.09    0.105s
*   radrd *   0.12    0.135    0.15e
*   matrd *    6        6        6      50s
*   matrd *   50      50      50e
*   nfax *     1e
*   rftn *    528.0    528.0    500.0    400.0s
*   rftn *   350.0    330.0    310.0    300.0e
*
***** type      num      userid      component name
htstr      1380      0          CL1-col-bot
*   nzhstr     ittc     hscyl     ichf

```

```

      1      0      1      1
*  nofuelrod    plane    liqlev    iaxcnd
      1      3      0      0
*  nmwrx       nfcii    nfcil     hdri      hdro
      0      0      0      0.0     0.0
*  nhot        nodes    fmno      nzmax     reflood
      0      8      0      100      0
*  dtxht(1)   dtxht(2)  dznht     hgapo
      2.0     10.0    1.0E-3   6300.0
*
*  idbcin *      2e
*  idbcon *      1e
*  hcomon1 *    353      1      0      0e
*  htc2 *       3.44    298.0e
*  dhtstrz *    0.255e
*  rdx *        1.0e
*  radrd *     0.07 0.076666667 0.083333333     0.09     0.105s
*  radrd *     0.12    0.135    0.15e
*  matrd *      6       6       6      50s
*  matrd *     50      50      50e
*  nfax *        1e
*  rftn *      520.0    520.0    500.0    400.0s
*  rftn *      350.0    330.0    310.0    300.0e
*
***** type      num      userid      component name
htstr      1411      0          SG1-pool-wall1
*  nzhstr     ittc     hscyl     ichf
      1      0      1      1
*  nofuelrod    plane    liqlev    iaxcnd
      1      3      0      0
*  nmwrx       nfcii    nfcil     hdri      hdro
      0      0      0      0.0     0.0
*  nhot        nodes    fmno      nzmax     reflood
      0      8      0      100      0
*  dtxht(1)   dtxht(2)  dznht     hgapo
      2.0     10.0    1.0E-3   6300.0
*
*  idbcin *      2e
*  idbcon *      1e
*  hcomon1 *    643      1      0      0e
*  htc2 *       7.0     298.0e
*  dhtstrz *    0.163e
*  rdx *        1.29996e
*  radrd *     0.475 0.48333333 0.49166667     0.5     0.525s
*  radrd *     0.55    0.575    0.6e
*  matrd *      6       6       6      50s
*  matrd *     50      50      50e
*  nfax *        1e
*  rftn *      523.0    521.0    510.0    470.0s
*  rftn *      450.0    400.0    350.0    300.0e
*
***** type      num      userid      component name
htstr      1412      0          SG1-pool-wall2
*  nzhstr     ittc     hscyl     ichf
      1      0      1      1
*  nofuelrod    plane    liqlev    iaxcnd

```

```

      1      3      0      0
* nmwrx    nfcii   nfcil   hdri     hdro
      0      0      0      0.0     0.0
* nhot     nodes    fmno    nzmax   reflood
      0      8      0      100     0
* dtxht(1) dtxht(2)  dznht   hgapo
      2.0    10.0    1.0E-3  6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643     2      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *     0.75802e
* radrd *   0.475  0.48333333 0.49166667    0.5    0.525s
* radrd *   0.55   0.575     0.6
* matrd *    6      6      6      50s
* matrd *   50     50     50e
* nfax *     1e
* rftn *    523.0   521.0   510.0   470.0s
* rftn *   450.0   400.0   350.0   300.0e
*
***** type      num      userid      component name
htstr      1413      0          SG1-pool-wall3
* nzhstr    ittc     hscyl     ichf
      1      0      1      1
*nofuelrod plane    liqlev    iaxcnd
      1      3      0      0
* nmwrx    nfcii   nfcil   hdri     hdro
      0      0      0      0.0     0.0
* nhot     nodes    fmno    nzmax   reflood
      0      8      0      100     0
* dtxht(1) dtxht(2)  dznht   hgapo
      2.0    10.0    1.0E-3  6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643     3      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *     0.66983e
* radrd *   0.475  0.48333333 0.49166667    0.5    0.525s
* radrd *   0.55   0.575     0.6
* matrd *    6      6      6      50s
* matrd *   50     50     50e
* nfax *     1e
* rftn *    523.0   521.0   510.0   470.0s
* rftn *   450.0   400.0   350.0   300.0e
*
***** type      num      userid      component name
htstr      1414      0          SG1-pool-wall4
* nzhstr    ittc     hscyl     ichf
      1      0      1      1
*nofuelrod plane    liqlev    iaxcnd
      1      3      0      0
* nmwrx    nfcii   nfcil   hdri     hdro

```

```

          0      0      0      0.0      0.0
*   nhot    nodes    fmno    nzmax    reflood
          0      8      0     100      0
*   dtxht(1)  dtxht(2)  dznht    hgapo
          2.0    10.0   1.0E-3   6300.0
*
*   idbcin *      2e
*   idbcon *      1e
*   hcomon1 *    643      4      0      0e
*   htc2 *       7.0   298.0e
*   dhtstrz *   0.163e
*   rdx *      0.4905e
*   radrd *    0.475  0.48333333 0.49166667      0.5      0.525s
*   radrd *    0.55   0.575      0.6e
*   matrd *      6      6      6      50s
*   matrd *     50      50      50e
*   nfax *      1e
*   rftn *     523.0    521.0    510.0    470.0s
*   rftn *     450.0    400.0    350.0    300.0e
*
***** type      num      userid      component name
htstr      1421      0      SG1-wallend1
*   nzhstr    ittc    hscyl    ichf
          1      0      1      1
*   nofuelrod  plane    liqlev    iaxcnd
          1      3      0      0
*   nmwrx     nfcii   nfcil    hdri      hdro
          0      0      0      0.0      0.0
*   nhot    nodes    fmno    nzmax    reflood
          0      8      0     100      0
*   dtxht(1)  dtxht(2)  dznht    hgapo
          2.0    10.0   1.0E-3   6300.0
*
*   idbcin *      2e
*   idbcon *      1e
*   hcomon1 *    643      1      0      0e
*   htc2 *       7.0   298.0e
*   dhtstrz *   0.163e
*   rdx *      0.09176e
*   radrd *    0.8   0.80766667 0.81533333      0.823      0.848s
*   radrd *    0.873   0.898   0.923e
*   matrd *      6      6      6      50s
*   matrd *     50      50      50e
*   nfax *      1e
*   rftn *     523.0    520.0    500.0    420.0s
*   rftn *     400.0    350.0    330.0    300.0e
*
***** type      num      userid      component name
htstr      1422      0      SG1-wallend2
*   nzhstr    ittc    hscyl    ichf
          1      0      1      1
*   nofuelrod  plane    liqlev    iaxcnd
          1      3      0      0
*   nmwrx     nfcii   nfcil    hdri      hdro
          0      0      0      0.0      0.0
*   nhot    nodes    fmno    nzmax    reflood

```

```

          0      8      0     100      0
* dtxht(1)  dtxht(2)  dznht    hgapo
          2.0     10.0   1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643      2      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *    0.04955e
* radrd *   0.8  0.80766667 0.81533333  0.823  0.848s
* radrd *   0.873  0.898  0.923e
* matrd *    6      6      6     50s
* matrd *   50      50    50e
* nfax *    1e
* rftn *   523.0   520.0   500.0   420.0s
* rftn *   400.0   350.0   330.0   300.0e
*
***** type    num    userid    component name
htstr     1423      0           SG1-wallend3
* nzhstr   ittc   hscyl    ichf
          1      0      1      1
*nofuelrod plane   liqlev   iaxcnd
          1      3      0      0
* nmwrx    nfcii  nfcil    hdri    hdro
          0      0      0      0.0     0.0
* nhot     nodes   fmno    nzmax   reflood
          0      8      0     100      0
* dtxht(1)  dtxht(2)  dznht    hgapo
          2.0     10.0   1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643      3      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *    0.04378e
* radrd *   0.8  0.80766667 0.81533333  0.823  0.848s
* radrd *   0.873  0.898  0.923e
* matrd *    6      6      6     50s
* matrd *   50      50    50e
* nfax *    1e
* rftn *   523.0   520.0   500.0   420.0s
* rftn *   400.0   350.0   330.0   300.0e
*
***** type    num    userid    component name
htstr     1424      0           SG1-wallend4
* nzhstr   ittc   hscyl    ichf
          1      0      1      1
*nofuelrod plane   liqlev   iaxcnd
          1      3      0      0
* nmwrx    nfcii  nfcil    hdri    hdro
          0      0      0      0.0     0.0
* nhot     nodes   fmno    nzmax   reflood
          0      8      0     100      0
* dtxht(1)  dtxht(2)  dznht    hgapo

```

```

      2.0      10.0     1.0E-3    6300.0
*
* idbcin *      2e
* idbcon *      1e
* hcomon1 *    643      4      0      0e
* htc2 *       7.0    298.0e
* dhtstrz *   0.163e
* rdx *      0.03206e
* radrd *     0.8  0.80766667  0.81533333    0.823    0.848s
* radrd *     0.873    0.898    0.923e
* matrd *      6      6      6      50s
* matrd *     50      50      50e
* nfax *      1e
* rftn *      523.0    520.0    500.0    420.0s
* rftn *     400.0    350.0    330.0    300.0e
*
***** type      num      userid      component name
htstr        1506      0          Downcomer wall
* nzhstr      ittc      hscyl      ichf
      2      0      1      1
*nofuelrod    plane      liqlev      iaxend
      1      3      0      0
*nmwrx       nfc1      nfcil      hdri      hdro
      0      0      0      0.0      0.0
*nhot        nodes      fmno      nzmax      reflood
      0      8      0      100      0
*dtxht(1)    dtxht(2)    dznhrt      hgapo
      2.0     10.0     1.0E-3    6300.0
*
* idbcin *      2      2e
* idbcon *      1      1e
* hcomon1 *    292      1      0      0e
* hcomon1 *    292      2      0      0e
* htc2 *       7.0    298.0e
* htc2 *       7.0    298.0e
* dhtstrz *   0.163    0.096e
* rdx *      0.10387e
* radrd *     0.475  0.48279133  0.49058266    0.5  0.52378049s
* radrd *  0.54918699  0.5745935    0.6e
* matrd *      6      6      6      50s
* matrd *     50      50      50e
* nfax *      1      1e
* rftn *      523.0    500.0    450.0    400.0s
* rftn *      380.0    350.0    320.0    300.0s
* rftn *      523.0    500.0    450.0    400.0s
* rftn *      380.0    350.0    320.0    300.0e
*
*d: Top of steam generator Separator wall node 1 (cylinder part)
***** type      num      userid      component name
htstr        1531      0          Steamdomewall1
* nzhstr      ittc      hscyl      ichf
      1      0      1      1
*nofuelrod    plane      liqlev      iaxend
      1      3      0      0
*nmwrx       nfc1      nfcil      hdri      hdro
      0      0      0      0.0      0.0

```

```

*      nhot      nodes      fmno      nzmax      reflood
      0          9          0         108          0
*      dtxht(1)  dtxht(2)  dznht      hgapo
      2.0        10.0      1.0E-3     6300.0
*
*      idbcin *      2e
*      idbcon *      1e
*      hcomon1 *    1546      1          0          0e
*      htc2 *      7.0      298.0e
*      dhtstrz *    0.134e
*      rdx *      0.552462e
*      radrd *    0.475  0.48279133 0.49058266      0.5 0.51869919s
*      radrd *  0.53902439 0.55934959 0.5796748      0.6e
*      matrd *      6          6          6          50s
*      matrd *      50         50         50         50e
*      nfax *      1e
*      rftn *      523.0     523.0      520.0      500.0s
*      rftn *      500.0     400.0      350.0      330.0s
*      rftn *      310.0e
*

```

*d: Top of steam generator Separator wall node 2 (cylinder part)

```

***** type      num      userid      component name
htstr      1532      0      Steamdomewall2
*      nzhstr      ittc      hscyl      ichf
      1          0          1          1
*     nofuelrod      plane      liqlev      iaxcnd
      1          3          0          0
*      nmwrx      nfc1      nfcil      hdri      hdro
      0          0          0          0.0        0.0
*      nhot      nodes      fmno      nzmax      reflood
      0          9          0         108          0
*      dtxht(1)  dtxht(2)  dznht      hgapo
      2.0        10.0      1.0E-3     6300.0
*
*      idbcin *      2e
*      idbcon *      1e
*      hcomon1 *    1546      2          0          0e
*      htc2 *      7.0      298.0e
*      dhtstrz *    0.134e
*      rdx *      1.289078e
*      radrd *    0.475  0.48279133 0.49058266      0.5 0.51869919s
*      radrd *  0.53902439 0.55934959 0.5796748      0.6e
*      matrd *      6          6          6          50s
*      matrd *      50         50         50         50e
*      nfax *      1e
*      rftn *      523.0     523.0      520.0      500.0s
*      rftn *      500.0     400.0      350.0      330.0s
*      rftn *      310.0e
*
```

*d: Top of steam generator Separator wall node 1 (end part)

```

***** type      num      userid      component name
htstr      1541      0      Steamdomewallend1
*      nzhstr      ittc      hscyl      ichf
      1          0          1          1
*     nofuelrod      plane      liqlev      iaxcnd
      1          3          0          0

```

```

*      nmwrx      nfcii      nfcil      hdri      hdro
*      0          0          0          0.0       0.0
*      nhot      nodes      fmno      nzmax      reflood
*      0          9          0         108       0
*      dtxht(1)  dtxht(2)  dznhht      hgapo
*      2.0        10.0      1.0E-3     6300.0
*
*      idbcin *    2e
*      idbcon *    1e
*      hcomon1 *   1546      1          0          0e
*      htc2 *      7.0       298.0e
*      dhtstrz *   0.134e
*      rdx *      0.036114e
*      radrd *    0.8       0.80766667  0.81533333  0.823    0.843s
*      radrd *    0.863    0.883    0.903    0.923e
*      matrd *    6          6          6          50s
*      matrd *    50         50         50         50e
*      nfax *     1e
*      rftn *     523.0    523.0    520.0    500.0s
*      rftn *     500.0    400.0    350.0    330.0s
*      rftn *     310.0e
*
*      *d: Top of steam generator Separator wall node 2 (end part)
***** type      num      userid      component name
htstr      1542      0      Steamdomewallend2
*      nzhstr      ittc      hscyl      ichf
*      1          0          1          1
*      nofuelrod    plane      liqlev      iaxcnd
*      1          3          0          0
*      nmwrx      nfcii      nfcil      hdri      hdro
*      0          0          0          0.0       0.0
*      nhot      nodes      fmno      nzmax      reflood
*      0          9          0         108       0
*      dtxht(1)  dtxht(2)  dznhht      hgapo
*      2.0        10.0      1.0E-3     6300.0
*
*      idbcin *    2e
*      idbcon *    1e
*      hcomon1 *   1546      2          0          0e
*      htc2 *      7.0       298.0e
*      dhtstrz *   0.134e
*      rdx *      0.084266e
*      radrd *    0.8       0.80766667  0.81533333  0.823    0.843s
*      radrd *    0.863    0.883    0.903    0.923e
*      matrd *    6          6          6          50s
*      matrd *    50         50         50         50e
*      nfax *     1e
*      rftn *     523.0    523.0    520.0    500.0s
*      rftn *     500.0    400.0    350.0    330.0s
*      rftn *     310.0e
*****
* Finished Heat Structure Section of Model *
*****
*
end
*

```

```
*****
* Timestep Data *
*****
*      dtmin      dtmax      tend      rtwfp
*      1.0E-6      1.0       1.0E4      10.0
*      edint      gfint      dmpint      sedint
*      100.0       50.0       500.0      10.0
*
*      endflag
*      -1.0
```

APPENDIX B

TRACE transient input of four layer pipe model for LOF-10 experiment

```

free format
*
*****
* main data *
*****
*      numtcr      ieos      inopt      nmat      id2o
*          1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=1.0,
nfrc1=2,
usesjc=3,
nhtstr=15
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
*      31483      0.0
*      stdyst      transi      ncomp      njun      ipak
*          0          1          35          25          0
*      epso      epss
*      1.0E-4      1.0E-4
*      oitmax      sitmax      isolut      ncontr      nccfl
*          10          10          0          0          0
*      ntsv      ntcb      ntcf      ntrp      ntcp
*          25          9          34          0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type ---- num ----- name ----- + jun1 jun2 jun3
* PIPE   *  1 s *           +    1   121
* PIPE   *  122 s * SG3-coldcol +    52   0
* PIPE   *  241 s * SG3-hotcol +    51   0
* PIPE   *  292 s *           +    0   150
* PIPE   *  312 s *           +   142   85
* PIPE   *  322 s *           +   141   86
* PIPE   *  332 s *           +   140   87
* PIPE   *  342 s *           +   139   88
* PIPE   *  352 s * SG3-inlet +   128   51
* PIPE   *  353 s *           +   129   52
* FILL   *  463 s *           +   151
* PIPE   *  643 s *           +    0   148
* BREAK  *  873 s *           +   146
* PIPE   *  953 s *           +   122   123
* PIPE   *  963 s *           +   124   125
* PIPE   *  973 s *           +   126   127

```

```

* HTSTR * 1375 s * HL1-col-bot      +
* HTSTR * 1380 s * CL1-col-bot      +
* HTSTR * 1411 s * SG1-pool-wall1   +
* HTSTR * 1412 s * SG1-pool-wall2   +
* HTSTR * 1413 s * SG1-pool-wall3   +
* HTSTR * 1414 s * SG1-pool-wall4   +
* FILL * 1420 s *                  + 128
* HTSTR * 1421 s * SG1-wallend1    +
* HTSTR * 1422 s * SG1-wallend2    +
* HTSTR * 1423 s * SG1-wallend3    +
* HTSTR * 1424 s * SG1-wallend4    +
* BREAK * 1430 s *                  + 129
* HTSTR * 1506 s * Downcomer wall  +
* PIPE * 1516 s *                  + 149 146
* HTSTR * 1531 s * Steamdomewall1   +
* HTSTR * 1532 s * Steamdomewall2   +
* HTSTR * 1541 s * Steamdomewallend1 +
* HTSTR * 1542 s * Steamdomewallend2 +
* SEPD * 1546 e *                  + 148 149 150
*
*****material properties *****
* material properties *
*****material properties *****
*
* matb*      50e
* ptbln*     3e
* User Defined Material : 50
*
*n: Mineral wool
*
* prptb      temp      rho      cp      cond      emis
* prptb*    283.0    120.0    800.0    0.099    0.76s
* prptb*    373.0    120.0    800.0    0.12     0.76s
* prptb*    573.0    120.0    800.0    0.213    0.76e
*
*****Starting Signal Variable Section of Model *****
* Starting Signal Variable Section of Model *
*****Starting Signal Variable Section of Model *****
**
*      idsv      isvn      ilcn      icn1      icn2
*          1        20       643        1        4
*
*      idsv      isvn      ilcn      icn1      icn2
*          2        20      1546        1        2
*
*      idsv      isvn      ilcn      icn1      icn2
*      105      103      1506        0        0
*n: PriHotcolbot
*
*      idsv      isvn      ilcn      icn1      icn2
*      107      103      1375        0        0
*n: PriColdcolbot
*
*      idsv      isvn      ilcn      icn1      icn2
*      108      103      1380        0        0

```

*	idsv	isvn	ilcn	icn1	icn2
*	109	103	1411	0	0
*n: FWmassflow					
*	idsv	isvn	ilcn	icn1	icn2
*	110	31	463	1	0
*	idsv	isvn	ilcn	icn1	icn2
*	111	0	0	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	112	103	1412	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	113	103	1413	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	114	103	1414	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	115	103	1421	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	116	103	1422	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	117	103	1423	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	118	103	1424	0	0
*n: tubelayer 1					
*	idsv	isvn	ilcn	icn1	icn2
*	120	103	1	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	121	103	953	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	122	103	963	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	123	103	973	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	124	103	241	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	125	103	122	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	131	103	1531	0	0
*	idsv	isvn	ilcn	icn1	icn2
*	132	103	1532	0	0

```

*      idsv      isvn      ilcn      icn1      icn2
        141       103      1541        0        0
*
*      idsv      isvn      ilcn      icn1      icn2
        142       103      1542        0        0
*****
* Finished Signal Variable Section of Model   *
*****
* Starting Control System Section of Model  *
*****
* **** Control Blocks ****
*
*      idcb      icbn      icb1      icb2      icb3
        -1         3        1        2        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        1.0     -1.0E20    1.0E20      0.0      0.0
*
*
*      idcb      icbn      icb1      icb2      icb3
        -2        200      -1      -40        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        160.0      0.0      0.6      0.712      0.0
*      cbdt      cbtau
        100.0      0.05
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
        -3       103       13        0        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        1.0     -1.0E20    1.0E20      0.0      0.0
* ids *      109       115       117      105s
* ids *      118       112       113      114s
* ids *      116       131       132      141s
* ids *      142e
*
*      idcb      icbn      icb1      icb2      icb3
        -4         9        0        0        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        1.0     -1.0E20    1.0E20      60.0      0.0
*
*      idcb      icbn      icb1      icb2      icb3
        -5        39       110      -4        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        1.0     -1.0E20    1.0E20      0.0      0.0
*
*n: tubelayers
*
*      idcb      icbn      icb1      icb2      icb3
        -6       103        4        0        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
        1.0     -1.0E20    1.0E20      0.0      0.0
* ids *      120       121       122     123e

```

```

*
*n: collectors
*
*      idcb      icbn      icb1      icb2      icb3
*      -7        3       124      125        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0     -1.0E20    1.0E20      0.0      0.0
*
*n: tubesandcoll
*
*      idcb      icbn      icb1      icb2      icb3
*      -8        3       -6      -7        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0     -1.0E20    1.0E20      0.0      0.0
*
*      idcb      icbn      icb1      icb2      icb3
*      -40      101      111        4        0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
*      1.0     -1.0E20    1.0E20      0.0      0.0
*      cbtbl *    0.0     0.712s
*      cbtbl *  1000.0     0.712s
*      cbtbl *  1001.0     0.000s
*      cbtbl *  2.0E4     0.000e
*
*****
* Finished Control System Section of Model *
*****
*
***** type      num      userid      component name
fill      1420      1      unnamed
*      jun1      ifty      ioff
*      128       6        0
*      iftr      ifsv      nftb      nfsv      nfrf
*      0        111       5        0        0
*      twtold    rfmx      concin    felv
*      0.0     1.0E20      0.0      0.0
*      dxin      volin    alpin      vlin      tlin
*      1.0     0.015394      0.0      0.0     528.0
*      pin       pain      flowin    vvin      tvin
*      7.3E6      0.0      0.0      0.0     528.0
*      vmscl    vvscl
*      1.0       1.0
*      tlscl    tvscl      pscl      pascl    conscl
*      1.0       1.0      1.0      1.0      1.0
*
*      vmtbl *    0.0     0.40607s
*      vmtbl *  1000.0     0.40607s
*      vmtbl *  1100.0     0.05075875s
*      vmtbl *  1600.0     0.05075875s
*      vmtbl *  16000.0    0.05075875e
*
*      vvtb *    0.0     0.40607s
*      vvtb *  1000.0     0.40607s
*      vvtb *  1100.0     0.05075875s
*      vvtb *  1600.0     0.05075875s
*      vvtb *  16000.0    0.05075875e

```

```

*
* tltb *    0.0  528.0s
* tltb *  1000.0  528.0s
* tltb *  1100.0  528.0s
* tltb *  1600.0  541.0s
* tltb * 16000.0  548.5e
*
* tvtb *    0.0  528.0s
* tvtb *  1000.0  528.0s
* tvtb *  1100.0  528.0s
* tvtb *  1600.0  541.0s
* tvtb * 16000.0  548.5e
*
* alptb *    0.0  0.0s
* alptb *  1000.0  0.0s
* alptb *  1100.0  0.0s
* alptb *  1600.0  0.0s
* alptb * 16000.0  0.0e
*
* ptb *     0.0  7.3E6s
* ptb *  1000.0  7.3E6s
* ptb *  1100.0  7.3E6s
* ptb *  1600.0  7.3E6s
* ptb * 16000.0  7.3E6e
*
* patb *    0.0  0.0s
* patb *  1000.0  0.0s
* patb *  1100.0  0.0s
* patb *  1600.0  0.0s
* patb * 16000.0  0.0e
*
end
*
*****
* Timestep Data *
*****
*      dtmin      dtmax      tend      rtwfp
*      1.0E-6       1.0       1.6E4      10.0
*      edint      gfint      dmpint      sedint
*      100.0       50.0       500.0      10.0
*
*      endflag
*      -1.0

```


APPENDIX C

TRACE steady state input of five layer pipe model for LOF-10 experiment

```

free format
*
*****
* main data *
*****
*      numtcr      ieos      inopt      nmat      id2o
      1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=-1.0,
nfrcl=2,
usesjc=3,
nhtstr=17
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
      0          0.0
*      stdyst      transi      ncomp      njun      ipak
      0          1          38         27          0
*      epso      epss
      1.0E-4     1.0E-4
*      oitmax      sitmax      isolut      ncontr      nccfl
      10         10          0          0          0
*      ntsv      ntcb      ntcf      ntrp      ntcp
      28         12          46          0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type ---- num ----- name ----- + jun1 jun2 jun3
* PIPE   * 1 s *           +    1  153
* PIPE   * 2 s *           +   152  154
* PIPE   * 122 s * SG3-coldcol      +    52   0
* PIPE   * 241 s * SG3-hotcol      +    51   0
* PIPE   * 292 s *           +    0  150
* PIPE   * 312 s *           +   155  85
* PIPE   * 322 s *           +   141  86
* PIPE   * 332 s *           +   140  87
* PIPE   * 342 s *           +   139  88
* PIPE   * 352 s * SG3-inlet      +   128  51
* PIPE   * 353 s *           +   129  52
* FILL   * 463 s *           +   156
* PIPE   * 643 s *           +    0  148
* BREAK  * 873 s *           +   146
* PIPE   * 953 s *           +   122  123
* PIPE   * 963 s *           +   124  125

```

```

* PIPE   *  973 s *          +  126  127
* HTSTR  * 1375 s * HL1-col-bot      +
* HTSTR  * 1380 s * CL1-col-bot      +
* HTSTR  * 1411 s * SG1-pool-wall1    +
* HTSTR  * 1412 s * SG1-pool-wall2    +
* HTSTR  * 1413 s * SG1-pool-wall3    +
* HTSTR  * 1414 s * SG1-pool-wall4    +
* HTSTR  * 1415 s * SG1-pool-wall5    +
* FILL   * 1420 s *          +  128
* HTSTR  * 1421 s * SG1-wallend1     +
* HTSTR  * 1422 s * SG1-wallend2     +
* HTSTR  * 1423 s * SG1-wallend3     +
* HTSTR  * 1424 s * SG1-wallend4     +
* HTSTR  * 1425 s * SG1-wallend5     +
* BREAK   * 1430 s *          +  129
* HTSTR  * 1506 s * Downcomer wall    +
* PIPE   * 1516 s *          +  149  146
* HTSTR  * 1531 s * Steamdomewall1    +
* HTSTR  * 1532 s * Steamdomewall2    +
* HTSTR  * 1541 s * Steamdomewallend1  +
* HTSTR  * 1542 s * Steamdomewallend2  +
* SEPD   * 1546 e *          +  148  149  150
*
*****material properties *****
* material properties *
*****
*
* matb*      50e
* ptbln*      3e
* User Defined Material : 50
*
*n: Mineral wool
*
* prptb      temp      rho      cp      cond      emis
* prptb*    283.0    120.0    800.0    0.099    0.76s
* prptb*    373.0    120.0    800.0    0.12     0.76s
* prptb*    573.0    120.0    800.0    0.213    0.76e
*
*
*
*****Starting Signal Variable Section of Model *****
* Starting Signal Variable Section of Model *
*****
*
*      idsv      isvn      ilcn      icn1      icn2
*          1        20       643        1        5
*
*      idsv      isvn      ilcn      icn1      icn2
*          2        20      1546        1        2
*
*n: FWmassflow
*
*      idsv      isvn      ilcn      icn1      icn2
*      110       31       463        1        0
*
*      idsv      isvn      ilcn      icn1      icn2
*      111        0         0        0        0

```

*n: tubelayer1					
*					
*	idsv 119	isvn 103	ilcn 1	icn1 0	icn2 0
*n: tubelayer2					
*					
*	idsv 120	isvn 103	ilcn 2	icn1 0	icn2 0
*					
*	idsv 121	isvn 103	ilcn 953	icn1 0	icn2 0
*					
*	idsv 122	isvn 103	ilcn 963	icn1 0	icn2 0
*					
*	idsv 123	isvn 103	ilcn 973	icn1 0	icn2 0
*					
*	idsv 124	isvn 103	ilcn 241	icn1 0	icn2 0
*					
*	idsv 125	isvn 103	ilcn 122	icn1 0	icn2 0
*					
*	idsv 375	isvn 103	ilcn 1375	icn1 0	icn2 0
*					
*	idsv 380	isvn 103	ilcn 1380	icn1 0	icn2 0
*					
*	idsv 411	isvn 103	ilcn 1411	icn1 0	icn2 0
*					
*	idsv 412	isvn 103	ilcn 1412	icn1 0	icn2 0
*					
*	idsv 413	isvn 103	ilcn 1413	icn1 0	icn2 0
*					
*	idsv 414	isvn 103	ilcn 1414	icn1 0	icn2 0
*					
*	idsv 415	isvn 103	ilcn 1415	icn1 0	icn2 0
*					
*	idsv 421	isvn 103	ilcn 1421	icn1 0	icn2 0
*					
*	idsv 422	isvn 103	ilcn 1422	icn1 0	icn2 0
*					
*	idsv 423	isvn 103	ilcn 1423	icn1 0	icn2 0
*					
*	idsv 424	isvn 103	ilcn 1424	icn1 0	icn2 0

```

*
*    idsv     isvn     ilcn     icn1     icn2
*      425     103     1425      0       0
*
*    idsv     isvn     ilcn     icn1     icn2
*      506     103     1506      0       0
*
*    idsv     isvn     ilcn     icn1     icn2
*      531     103     1531      0       0
*
*    idsv     isvn     ilcn     icn1     icn2
*      532     103     1532      0       0
*
*    idsv     isvn     ilcn     icn1     icn2
*      541     103     1541      0       0
*
*    idsv     isvn     ilcn     icn1     icn2
*      542     103     1542      0       0
*****
* Finished Signal Variable Section of Model   *
*****  

* Starting Control System Section of Model   *
*****  

*  

***** Control Blocks *****  

*  

*    idcb     icbn     icb1     icb2     icb3
*      -1      3       1       2       0
*    cbgain   cbxmin   cbmax   cbcon1   cbcon2
*      1.0    -1.0E20   1.0E20   0.0     0.0
*
*  

*    idcb     icbn     icb1     icb2     icb3
*      -2     200      -1      -40      0
*    cbgain   cbxmin   cbmax   cbcon1   cbcon2
*     160.0     0.0      0.6     0.712    0.0
*    cbdt     cbtau    100.0    0.05
*
*  

*n: Secheatlosses
*  

*    idcb     icbn     icb1     icb2     icb3
*      -3     103      4       0       0
*    cbgain   cbxmin   cbmax   cbcon1   cbcon2
*      1.0    -1.0E20   1.0E20   0.0     0.0
*  ids *    531     532     541     542e
*
*  

*    idcb     icbn     icb1     icb2     icb3
*      -4      9       0       0       0
*    cbgain   cbxmin   cbmax   cbcon1   cbcon2
*      1.0    -1.0E20   1.0E20   60.0    0.0
*
*
```

```

*      idcb      icbn      icb1      icb2      icb3
*      -5        39       110       -4        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*
*n: tubelayers
*
*      idcb      icbn      icb1      icb2      icb3
*      -6        103       5         0        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*      ids *    120      121      122      123s
*      ids *    119e
*
*n: collectors
*
*      idcb      icbn      icb1      icb2      icb3
*      -7        3        124      125       0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*
*n: tubesandcoll
*
*      idcb      icbn      icb1      icb2      icb3
*      -8        3        -6       -7        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
*      -9        103       5         0        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*      ids *    411      412      413      414s
*      ids *    415e
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
*      -10       103       5         0        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*      ids *    421      422      423      424s
*      ids *    425e
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
*      -11       103       4         0        0
*      cbgain    cbxmin    cbmax     cbcon1    cbcon2
*      1.0      -1.0E20    1.0E20     0.0      0.0
*      ids *    -3       -10      -9       506e
*
*
*      idcb      icbn      icb1      icb2      icb3

```

```

      -40      9      0      0      0
*   cbgain    cbxmin    cbmax    cbcon1    cbcon2
      1.0    -1000.0    1000.0     0.712     0.0
*
*****
* Finished Control System Section of Model *
*****
*
***** type      num      userid      component name
pipe          1        1      unnamed
*   ncells      nodes      jun1      jun2      epsw
      5          4        1      153      2.0E-6
*   nsides      0
*   ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          9
*   iqptr      iqpsv      nqptb      nqpsv      nqprf
      0          0          0          0          0
*   radin      th      houtl      houtv      toutl
      6.5E-3    1.5E-3    0.0        0.0      300.0
*   toutv      pwin      pwoff      rpwmx      pwscl
      300.0      0.0        0.0      1.0E20      1.0
*   qpin      qpoff      rqpmx      qpscl      nhcom
      0.0        0.0        0.0        1.0      643
* dx *      0.558      0.558      0.558      0.558s
* dx *      0.558e
* vol *    7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *    7.40646E-5e
* fa *    1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa *    1.32732E-4 1.32732E-4e
* fric *    0.5        0.0        0.0      0.35s
* fric *    0.0        0.998e
* fricr *   0.0        0.0        0.0      0.0s
* fricr *   0.0        0.0e
* grav *    0.0    7.37993E-3 7.37993E-3 -7.37993E-3s
* grav *  -7.37993E-3      0.0e
* hd *    0.013      0.013      0.013      0.013s
* hd *    0.013      0.013e
* nff *   -100      -100      -100      -100s
* nff *   -100      -100e
* alp *    0.0        0.0        0.0      0.0s
* alp *    0.0e
* vl *    0.7        0.7        0.7      0.7s
* vl *    0.7        0.7e
* vv *    0.7        0.7        0.7      0.7s
* vv *    0.7        0.7e
* tl *    528.0      528.0      528.0      528.0s
* tl *    528.0e
* tv *    528.0      528.0      528.0      528.0s
* tv *    528.0e
* p *    7.3E6      7.3E6      7.3E6      7.3E6s
* p *    7.3E6e
* pa *    0.0        0.0        0.0      0.0s
* pa *    0.0e
* qpp *   1.0        1.0        1.0        1.0      1.0s
* qpp *   1.0        1.0        1.0        1.0      1.0s

```

```

* qpp *      1.0      1.0      1.0      1.0      1.0s
* qpp *      1.0      1.0      1.0      1.0      1.0e
* matr * f 6e
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0e
* idrod *    0e
* nhcel *    1        1        1        1        1e
*
*
***** type      num      userid      component name
pipe          2        1        unnamed
* ncells      nodes     jun1      jun2      epsw
      5        4        152       154      2.0E-6
* nsides      0
* ichf        iconc     pipetype   ipow      npipes
      1        0        0          0        18
* iqptr        iqpsv     nqptb     nqpsv     nqprf
      0        0        0          0        0
* radin        th        houtl     houtv     toutl
      6.5E-3   1.5E-3   0.0        0.0      300.0
* toutv        pwin     pwoff     rpwmx     pwscl
      300.0    0.0        0.0      1.0E20    1.0
* qpin        qpoff     rqpmx     qpsc1     nhcom
      0.0      0.0        0.0      1.0      643
* dx *      0.558    0.558    0.558    0.558s
* dx *      0.558e
* vol *      7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *      7.40646E-5e
* fa *      1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa *      1.32732E-4 1.32732E-4e
* fric *     0.5        0.0        0.0      0.35s
* fric *     0.0        0.998e
* fricr *    0.0        0.0        0.0      0.0s
* fricr *    0.0        0.0e
* grav *     0.0      7.37993E-3 7.37993E-3 -7.37993E-3s
* grav *    -7.37993E-3 0.0e
* hd *      0.013    0.013    0.013    0.013s
* hd *      0.013    0.013e
* nff *     -100     -100     -100     -100s
* nff *     -100     -100e
* alp *     0.0        0.0        0.0      0.0s
* alp *     0.0e
* vl *      0.7        0.7        0.7      0.7s
* vl *      0.7        0.7e
* vv *      0.7        0.7        0.7      0.7s
* vv *      0.7        0.7e
* tl *      528.0    528.0    528.0    528.0s
* tl *      528.0e
* tv *      528.0    528.0    528.0    528.0s
* tv *      528.0e
* p *       7.3E6    7.3E6    7.3E6    7.3E6s
* p *       7.3E6e
* pa *     0.0        0.0        0.0      0.0s

```

```

* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 2 2 2 2 2e
*
***** type num userid component name
pipe 122 1 SG3-coldcol
* ncells nodes jun1 jun2 epsw
5 3 52 0 2.0E-6
* nsides
5
* nclk junlk ncmpto nclkto nlevto
3 123 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
2 125 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
1 127 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
5 153 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
4 154 0 0 0
* theta ientrn
90.0 0
* ichf iconc pipetype ipow npipes
1 0 0 0 1
* iqptr iqpsv nqptb nqpsv nqprf
0 0 0 0 0
* radin th houtl houtv toutl
0.07 0.02 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmpx qpsc1 nhcom
0.0 0.0 0.0 1.0 643
* dx * 0.163 0.192 0.192 0.0675s
* dx * 0.0675e
* vol * 2.5E-3 2.95E-3 2.95E-3 1.0E-3s
* vol * 1.0E-3e
* fa * 0.015393804 0.015394 0.015394 0.015394s
* fa * 0.015394 0.015394e
* fric * 0.0 0.0 0.0 0.0s

```

```

* fric *    0.0    0.0e
* fricr *   0.0    0.0    0.0    0.0s
* fricr *   0.0    0.0e
* grav *    1.0    1.0    1.0    1.0s
* grav *    1.0    1.0e
* hd *      0.14   0.14   0.14   0.14s
* hd *      0.14   0.14e
* nff *     -100   -100   -100   -100s
* nff *     -100   -100e
* alp *     0.0    0.0    0.0    0.0s
* alp *     0.0e
* vl *      0.195  0.164  0.105  0.047s
* vl *      0.047  0.0e
* vv *      0.195  0.164  0.105  0.047s
* vv *      0.047  0.0e
* tl *      528.0  528.0  528.0  528.0s
* tl *      528.0e
* tv *      528.0  528.0  528.0  528.0s
* tv *      528.0e
* p *       7.3E6  7.3E6  7.3E6  7.3E6s
* p *       7.3E6e
* pa *     0.0    0.0    0.0    0.0s
* pa *     0.0e
* qpp *     1.0    1.0    1.0    1.0    1.0s
* qpp *     1.0    1.0    1.0    1.0    1.0s
* qpp *     1.0    1.0    1.0    1.0    1.0e
* matr*f 6e
* tw *      526.0  526.0  526.0  526.0  526.0s
* tw *      526.0  526.0  526.0  526.0  526.0s
* tw *      526.0  526.0  526.0  526.0  526.0e
* idrod *   0e
* nhcel *   1      2      3      4      5e
*
*
***** type      num      userid      component name
pipe        241      1          SG3-hotcol
*  ncells    nodes      jun1      jun2      epsw
*      5          3          51          0      2.0E-6
*  nsides    5
*  nclk      junlk      ncmpto      nclkto      nlevto
*      5          1          0          0          0
*  theta     ientrn      90.0       0
*  nclk      junlk      ncmpto      nclkto      nlevto
*      3          122         0          0          0
*  theta     ientrn      90.0       0
*  nclk      junlk      ncmpto      nclkto      nlevto
*      2          124         0          0          0
*  theta     ientrn      90.0       0
*  nclk      junlk      ncmpto      nclkto      nlevto
*      1          126         0          0          0
*  theta     ientrn      90.0       0

```

*	nclk	junklk	ncmpto	nclkto	nlevto
*	4	152	0	0	0
*	theta	ientrn			
	90.0	0			
*	ichf	iconc	pipetype	ipow	npipes
	1	0	0	0	1
*	iqptr	iqpsv	nqptb	nqpsv	nqprf
	0	0	0	0	0
*	radin	th	houtl	houtv	toutl
	0.07	0.02	0.0	0.0	300.0
*	toutv	pwin	pwoff	rpwmx	pwscl
	300.0	0.0	0.0	1.0E20	1.0
*	qpin	qpoff	rqpmx	qpscl	nhcom
	0.0	0.0	0.0	1.0	643
* dx	*	0.163	0.192	0.192	0.0675s
* dx	*	0.0675e			
* vol	*	2.5E-3	2.95E-3	2.95E-3	1.0E-3s
* vol	*	1.0E-3e			
* fa	*	0.015394	0.015394	0.015394	0.015394s
* fa	*	0.015394	0.015394e		
* fric	*	0.0	0.0	0.0	0.0s
* fric	*	0.0	0.0e		
* fricr	*	0.0	0.0	0.0	0.0s
* fricr	*	0.0	0.0e		
* grav	*	1.0	1.0	1.0	1.0s
* grav	*	1.0	1.0e		
* hd	*	0.14	0.14	0.14	0.14s
* hd	*	0.14	0.14e		
* nff	*	-100	-100	-100	-100s
* nff	*	-100	-100e		
* alp	*	0.0	0.0	0.0	0.0s
* alp	*	0.0e			
* vl	*	0.195	0.164	0.105	0.047s
* vl	*	0.047	0.0e		
* vv	*	0.195	0.164	0.105	0.047s
* vv	*	0.047	0.0e		
* tl	*	528.0	528.0	528.0	528.0s
* tl	*	528.0e			
* tv	*	528.0	528.0	528.0	528.0s
* tv	*	528.0e			
* p	*	7.3E6	7.3E6	7.3E6	7.3E6s
* p	*	7.3E6e			
* pa	*	0.0	0.0	0.0	0.0s
* pa	*	0.0e			
* qpp	*	1.0	1.0	1.0	1.0s
* qpp	*	1.0	1.0	1.0	1.0s
* qpp	*	1.0	1.0	1.0	1.0e
* matr	*	f 6e			
* tw	*	528.0	528.0	526.0	528.0
* tw	*	526.0	528.0	528.0	526.0
* tw	*	528.0	526.0	528.0	528.0
* idrod	*	0e			
* nhcel	*	1	2	3	4
*					5e
*****	type	num	userid	component name	

pipe	292	1	unnamed		
*	ncells	nodes	jun1	jun2	epsw
*	7	0	0	150	2.0E-6
*	nsides	5			
*	nclk	junlk	ncmpto	nclkto	nlevto
*	1	139	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
*	3	140	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
*	5	141	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
*	6	155	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junlk	ncmpto	nclkto	nlevto
*	4	156	0	0	0
*	theta	ientrn			
*	90.0	0			
*	ichf	iconc	pipetype	ipow	npipes
*	1	0	0	0	1
*	radin	th	houtl	houtv	toutl
*	0.0	0.0	0.0	0.0	0.0
*	toutv	pwin	pwoff	rpwmx	pwscl
*	0.0	0.0	0.0	0.0	0.0
* dx *	0.0815	0.096	0.096	0.096s	
* dx *	0.096	0.0675	0.0675e		
* vol *	5.3975E-3	6.3E-3	6.3E-3	6.3E-3s	
* vol *	6.3E-3	4.4E-3	4.4E-3e		
* fa *	0.065	0.0656	0.0656	0.0656s	
* fa *	0.0656	0.0652	0.0652	0.065185e	
* fric *	0.0	0.0	0.0	0.0s	
* fric *	0.0	0.0	0.0	10.0e	
* fricr *	0.0	0.0	0.0	0.0s	
* fricr *	0.0	0.0	0.0	0.0e	
* grav *	1.0	1.0	1.0	1.0s	
* grav *	1.0	1.0	1.0	1.0e	
* hd *	0.288	0.289	0.289	0.289s	
* hd *	0.289	0.28809047	0.28809047	0.28809047e	
* nff *	-100	-100	-100	-100s	
* nff *	-100	-100	-100	-1e	
* alp *	0.0	0.0	0.0	0.0s	
* alp *	0.0	0.0	0.0e		
* vl *	0.0	0.0	0.0	0.0s	
* vl *	0.0	0.0	0.0	0.0e	
* vv *	0.0	0.0	0.0	0.0s	
* vv *	0.0	0.0	0.0	0.0e	
* tl *	523.504	523.504	523.504	523.504s	
* tl *	523.504	523.504	523.504e		
* tv *	523.504	523.504	523.504	523.504s	

```

* tv  *  523.504  523.504  523.504e
* p  *  4.0E6    4.0E6    4.0E6    4.0E6s
* p  *  4.0E6    4.0E6    4.0E6e
* pa *   0.0     0.0     0.0     0.0s
* pa *   0.0     0.0     0.0e
*
*
***** type      num      userid      component name
* single junction
pipe      312      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0       0     155     85    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
      1       0       0       0       1
* radin     th      houtl    houtv    toutl
      0.0     0.0     0.0     0.0     0.0
* toutv     pwin    pwoff    rpwmx    pwscl
      0.0     0.0     0.0     0.0     0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.3105e
* fric * f  2.5e
* fricr * f 10.0e
* grav * f  0.0e
* hd  * f  0.44460144e
* nff * f  -1e
* alp * f 0.0000e+00e
* vl  * f  0.0e
* vv  * f  0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      322      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0       0     141     86    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
      1       0       0       0       1
* radin     th      houtl    houtv    toutl
      0.0     0.0     0.0     0.0     0.0
* toutv     pwin    pwoff    rpwmx    pwscl
      0.0     0.0     0.0     0.0     0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.4416e
* fric * f  2.6e
* fricr * f 10.0e
* grav * f  0.0e
* hd  * f  0.7498e
* nff * f  -1e
* alp * f 0.0000e+00e
* vl  * f  0.0e

```

```

* vv  * f      0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      332      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0        0     140     87    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
      1        0        0        0        1
* radin     th      houtl    houtv    toutl
      0.0      0.0      0.0      0.0      0.0
* toutv     pwin    pwoff    rpwmx    pwscl
      0.0      0.0      0.0      0.0      0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.4416e
* fric * f  2.6e
* fricr * f 10.0e
* grav * f  0.0e
* hd  * f  0.7498e
* nff * f  -1e
* alp * f 0.0000e+00e
* vl  * f  0.0e
* vv  * f  0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      342      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      0        0     139     88    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
      1        0        0        0        1
* radin     th      houtl    houtv    toutl
      0.0      0.0      0.0      0.0      0.0
* toutv     pwin    pwoff    rpwmx    pwscl
      0.0      0.0      0.0      0.0      0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.3726e
* fric * f  2.4e
* fricr * f 10.0e
* grav * f  0.0e
* hd  * f  0.6688e
* nff * f  -1e
* alp * f 0.0000e+00e
* vl  * f  0.0e

```

```

* vv  * f      0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type    num    userid      component name
pipe      352      1      SG3-inlet
* ncells    nodes    jun1    jun2    epsw
      1      0     128      51    2.0E-6
* nsides
      0
* ichf    iconc    pipetype    ipow    npipes
      1      0      0      0      1
* radin    th      houtl    houtv    toutl
      0.0    0.0      0.0      0.0      0.0
* toutv    pwin    pwoff    rpwmx    pwscl
      0.0    0.0      0.0      0.0      0.0
* dx  * 0.255e
* vol * 3.92542E-3e
* fa  * 0.015394 0.015394e
* fric * 0.0    0.0e
* fricr * 0.0    0.0e
* grav * 1.0    1.0e
* hd   * 0.14   0.14e
* nff  * -100   -100e
* alp * 0.0e
* vl   * 0.195  0.195e
* vv  * 0.195  0.195e
* tl  * 528.0e
* tv   * 528.0e
* p   * 7.3E6e
* pa  * 0.0e
*
*
***** type    num    userid      component name
pipe      353      1      unnamed
* ncells    nodes    jun1    jun2    epsw
      1      0     129      52    2.0E-6
* nsides
      0
* ichf    iconc    pipetype    ipow    npipes
      1      0      0      0      1
* radin    th      houtl    houtv    toutl
      0.0    0.0      0.0      0.0      0.0
* toutv    pwin    pwoff    rpwmx    pwscl
      0.0    0.0      0.0      0.0      0.0
* dx  * 0.255e
* vol * 3.92542E-3e
* fa  * 0.015393804 0.015393804e
* fric * 0.448  0.0e
* fricr * 0.0    0.0e
* grav * 1.0    1.0e
* hd   * 0.14   0.14e
* nff  * -100   -100e

```

```

* alp *      0.0e
* vl *      0.0    0.195e
* vv *      0.0    0.195e
* tl *      528.0e
* tv *      528.0e
* p *      7.3E6e
* pa *      0.0e
*
*
***** type      num      userid      component name
fill      463      1      unnamed
*   jun1      ifty      ioff
*   156      5      0
*   iftr      ifsv      nftb      nfsv      nfrf
*   0      -2      0      0      0
*   twtold      rfmx      concin      felv
*   0.0      1.0E20      0.0      0.0
*   dxin      volin      alpin      vlin      tlin
*   0.192      0.0126      0.0      0.0      298.0
*   pin      pain      flowin      vvin      tvin
*   4.0E6      0.0      0.3      0.0      298.0
*
***** type      num      userid      component name
pipe      643      1      unnamed
*   ncells      nodes      jun1      jun2      epsw
*   5      0      0      148      2.0E-6
*   nsides      4
*   nclk      junlk      ncmpto      nclkto      nlevto
*   4      85      0      0      0
*   theta      ientrn
*   90.0      0
*   nclk      junlk      ncmpto      nclkto      nlevto
*   3      86      0      0      0
*   theta      ientrn
*   90.0      0
*   nclk      junlk      ncmpto      nclkto      nlevto
*   2      87      0      0      0
*   theta      ientrn
*   90.0      0
*   nclk      junlk      ncmpto      nclkto      nlevto
*   1      88      0      0      0
*   theta      ientrn
*   90.0      0
*   ichf      iconc      pipetype      ipow      npipes
*   1      0      0      0      1
*   radin      th      houtl      houtv      toutl
*   0.0      0.0      0.0      0.0      0.0
*   toutv      pwin      pwoff      rpwmx      pwscl
*   0.0      0.0      0.0      0.0      0.0
* dx  *      0.163      0.192      0.192      0.0675s
* dx  *      0.0675e
* vol *      0.1362      0.2748      0.3163      0.1057s
* vol *      0.1057e
* fa  *      1.29195      1.29195      1.707      1.74759s
* fa  *      1.5941227      1.4477071e

```

```

* fric *      0.0      0.0      0.0      0.0s
* fric *      0.0      0.0e
* fricr *     0.0      0.0      0.0      0.0s
* fricr *     0.0      5.0e
* grav *      1.0      1.0      1.0      1.0s
* grav *      1.0      1.0e
* hd  *  1.314779  1.314779  1.314779  1.314779s
* hd  *  1.3362264  1.3576737e
* nff *      -100     -100     -100     -100s
* nff *      -100     -1e
* alp *       0.0      0.0      0.0      0.0s
* alp *       0.0e
* vl  *       0.0      0.0      0.0      0.0s
* vl  *       0.0      0.0e
* vv  *       0.0      0.0      0.0      0.0s
* vv  *       0.0      0.0e
* tl  *      523.0    523.0    523.0    523.0s
* tl  *      523.0e
* tv  *      523.0    523.0    523.0    523.0s
* tv  *      523.0e
* p   *      4.0E6    4.0E6    4.0E6    4.0E6s
* p   *      4.0E6e
* pa  *       0.0      0.0      0.0      0.0s
* pa  *       0.0e
*
***** type      num      userid      component name
break          873        1      unnamed
*   jun1      ibty      isat      ioff      adjpress
*   146        0          0          0          0
*   dxin      violin     alpin     tin       pin
*   2.127995  0.027     1.0      523.0    4.0E6
*   pain      concin     rbmx      poff      belv
*   0.0        0.0      1.0E20    0.0        0.0
*
*
***** type      num      userid      component name
pipe           953        1      unnamed
*   ncells     nodes     jun1     jun2      epsw
*   5            4        122      123      1.0E-6
*   nsides      0
*   ichf       iconc     pipetype    ipow      npipes
*   1            0          0          0          36
*   iqptr      iqpsv     nqptb     nqpsv     nqprf
*   0            0          0          0          0
*   radin      th        houtl     houtv     toutl
*   6.5E-3    1.5E-3    0.0        0.0      300.0
*   toutv      pwin      pwoff     rpwmx     pwscl
*   300.0      0.0        0.0      1.0E20    1.0
*   qpin       qpoff     rqpmx     qpsc1     nhcom
*   0.0        0.0        0.0      1.0      643
* dx  *      0.558     0.558     0.558     0.558s
* dx  *      0.558e
* vol *  7.40646E-5  7.40646E-5  7.40646E-5  7.40646E-5s
* vol *  7.40646E-5e
* fa  *  1.32732E-4  1.32732E-4  1.32732E-4  1.32732E-4s

```

```

* fa  *  1.32732E-4 1.32732E-4e
* fric *    0.5    0.0    0.0    0.35s
* fric *    0.0    0.998e
* fricr *   0.0    0.0    0.0    0.0s
* fricr *   0.0    0.0e
* grav *    0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3    0.0e
* hd  *    0.013   0.013   0.013   0.013s
* hd  *    0.013   0.013e
* nff *     1      1      1      1s
* nff *     1      1e
* alp *    0.0    0.0    0.0    0.0s
* alp *    0.0e
* vl  *    0.7    0.7    0.7    0.7s
* vl  *    0.7    0.7e
* vv  *    0.7    0.7    0.7    0.7s
* vv  *    0.7    0.7e
* tl  *    528.0   528.0   528.0   528.0s
* tl  *    528.0e
* tv  *    528.0   528.0   528.0   528.0s
* tv  *    528.0e
* p   *    7.3E6   7.3E6   7.3E6   7.3E6s
* p   *    7.3E6e
* pa  *    0.0    0.0    0.0    0.0s
* pa  *    0.0e
* qpp *    1.0    1.0    1.0    1.0    1.0s
* qpp *    1.0    1.0    1.0    1.0    1.0s
* qpp *    1.0    1.0    1.0    1.0    1.0s
* qpp *    1.0    1.0    1.0    1.0    1.0e
* matr * f 6e
* tw  *    528.0   528.0   528.0   528.0   528.0s
* tw  *    528.0   528.0   528.0   528.0   528.0s
* tw  *    528.0   528.0   528.0   528.0   528.0s
* tw  *    528.0   528.0   528.0   528.0   528.0e
* idrod *    0e
* nhcel *    3      3      3      3      3e
*
***** type      num      userid      component name
pipe        963       1          unnamed
*   ncells      nodes      jun1      jun2      epsw
*           5         4        124       125     1.0E-6
*   nsides      0
*   ichf      iconc      pipetype      ipow      npipes
*           1         0          0          0        36
*   iqptr      iqpsv      nqptb      nqpsv      nqprf
*           0         0          0          0          0
*   radin      th        houtl      houtv      toutl
*  6.5E-3     1.5E-3      0.0        0.0      300.0
*   toutv      pwin      pwoff      rpwmx      pwscl
*  300.0       0.0        0.0      1.0E20      1.0
*   qpin      qpoff      rqpmpx      qpsc1      nhcom
*           0.0        0.0        0.0        1.0       643
* dx  *    0.558     0.558     0.558     0.558s
* dx  *    0.558e
* vol * 7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s

```

```

* vol * 7.40646E-5e
* fa * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa * 1.32732E-4 1.32732E-4e
* fric * 0.5 0.0 0.0 0.35s
* fric * 0.0 0.998e
* fricr * 0.0 0.0 0.0 0.0s
* fricr * 0.0 0.0e
* grav * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3 0.0e
* hd * 0.013 0.013 0.013 0.013s
* hd * 0.013 0.013e
* nff * 1 1 1 1s
* nff * 1 1e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0e
* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e
* vv * 0.7 0.7 0.7 0.7s
* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 2 2 2 2 2e
*
***** type num userid component name
pipe 973 1 unnamed
* ncells nodes jun1 jun2 epsw
* 5 4 126 127 1.0E-6
* nsides 0
* ichf iconc pipetype ipow npipes
* 1 0 0 0 19
* iqptr iqpsv nqptb nqpsv nqprf
* 0 0 0 0 0
* radin th houtl houtv toutl
* 6.5E-3 1.5E-3 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
* 300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpsc1 nhcom
* 0.0 0.0 0.0 1.0 643
* dx * 0.542 0.542 0.542 0.542s

```

```

* dx   *    0.542e
* vol  *  7.19409E-5 7.19409E-5 7.19409E-5 7.19409E-5s
* vol  *  7.19409E-5e
* fa   *  1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa   *  1.32732E-4 1.32732E-4e
* fric *    0.5    0.0    0.0    0.35s
* fric *    0.0    0.998e
* fricr *   0.0    0.0    0.0    0.0s
* fricr *   0.0    0.0e
* grav *    0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3    0.0e
* hd   *    0.013   0.013   0.013   0.013s
* hd   *    0.013   0.013e
* nff  *   -100   -100   -100   -100s
* nff  *   -100   -100e
* alp  *    0.0    0.0    0.0    0.0s
* alp  *    0.0e
* vl   *    0.7    0.7    0.7    0.7s
* vl   *    0.7    0.7e
* vv   *    0.7    0.7    0.7    0.7s
* vv   *    0.7    0.7e
* tl   *    528.0   528.0   528.0   528.0s
* tl   *    528.0e
* tv   *    528.0   528.0   528.0   528.0s
* tv   *    528.0e
* p    *    7.3E6   7.3E6   7.3E6   7.3E6s
* p    *    7.3E6e
* pa   *    0.0    0.0    0.0    0.0s
* pa   *    0.0e
* qpp  *    1.0    1.0    1.0    1.0    1.0s
* qpp  *    1.0    1.0    1.0    1.0    1.0s
* qpp  *    1.0    1.0    1.0    1.0    1.0s
* qpp  *    1.0    1.0    1.0    1.0    1.0e
* matr * f 6e
* tw   *    528.0   528.0   528.0   528.0   528.0s
* tw   *    528.0   528.0   528.0   528.0   528.0s
* tw   *    528.0   528.0   528.0   528.0   528.0s
* tw   *    528.0   528.0   528.0   528.0   528.0e
* idrod *    0e
* nhcel *    1      1      1      1      1e
*
***** type      num      userid      component name
fill     1420      1          unnamed
* jun1 ifty      ioff
* 128   5         0
* iftr  ifsv      nftb      nfsv      nfrf
* 0     111       2         0         0
* twtold rfmx      concin    felv
* 0.0   1.0E20    0.0       0.0
* dxin  violin    alpin     vlin      tlin
* 1.0   0.015394  0.0       0.0       528.0
* pin   pain      flowin    vvin      tvin
* 7.3E6 0.0        5.0       0.0       528.0
* vmscl vvscl
* 1.0   1.0
*
```

```

* vmtbv *      0.0      5.0s
* vmtbv *    1.0E4      5.0e
*
***** type      num      userid      component name
break      1430      1      unnamed
*   jun1      ibty      isat      ioff      adjpress
  129      0      0      0      0
*   dxin      violin      alpin      tin      pin
  1.0    0.015394      0.0    528.0    7.3E6
*   pain      concin      rbmx      poff      belv
  0.0      0.0    1.0E20      0.0      0.0
*
***** type      num      userid      component name
pipe      1516      1      unnamed
*   ncells      nodes      jun1      jun2      epsw
  3      0    149    146    2.0E-6
*   nsides      0
*   ichf      iconc      pipetype      ipow      npipes
  1      0      0      0      1
*   radin      th      houtl      houtv      toutl
  0.0      0.0      0.0      0.0      0.0
*   toutv      pwin      pwoff      rpwmx      pwscl
  0.0      0.0      0.0      0.0      0.0
* dx  *  0.70933333 0.70933333 0.7093333e
* vol *  8.99977E-3 8.99977E-3 8.99977E-3e
* fa  *  0.91399 0.012687644 0.012687644 0.012687644e
* fric *  3.0      0.0      0.0      3.0e
* fricr *  0.0      0.0      0.0      0.0e
* grav *  1.0      1.0      1.0      1.0e
* hd  *  1.2632607 0.1271 0.1271 0.1271e
* nff *  -1      1      1      1e
* alp *  1.0      1.0      1.0e
* vl  *  0.0      0.0      0.0      0.0e
* vv *  0.0      0.0      0.0      0.0e
* tl *  523.0 523.0 523.0e
* tv *  523.0 523.0 523.0e
* p  *  4.0E6 4.0E6 4.0E6e
* pa *  0.0      0.0      0.0e
*
*
* type      num      id      ctitle
sepd      1546      0      unnamed
*   jcell      nodes      ichf      cost      epsw
  2      0      1    -1.0      0.0
*   nseps      ndryr      istage      xco      xcu
  1      0      0      0.0      1.0
*   alpsmn      alpsmx
  0.0      1.0
*   iconc1      ncell1      jun1      jun2      ipow1
  0      2    148    149      0
*   radin      th      houtl      houtv      toutl
  0.0      0.0      0.0      0.0      0.0
*   toutv      pwin      pwoff      rpwmx      pwscl
  0.0      0.0      0.0      0.0      0.0
*   iconc2      ncell2      jun3      ipow2

```

```

          0      1     150      0
* radin2      th2     houtl2    houtv2    toutl2
          0.0     0.0     0.0     0.0     0.0
* toutv2     pwin2    pwoff2   rpwmx2    pwscl2
          0.0     0.0     0.0     0.0     0.0
* dx1 *     0.134    0.134e
* voll *   0.211153 0.1247487e
* fal *   1.4477071 1.25336  0.91399e
* fric1 *   0.0     0.0     3.0e
* fricr1*   5.0     0.0     0.0e
* grav1 *   1.0     1.0     1.0e
* hd1 *   1.3576737 1.2632607 1.2632607e
* nff1 *   -1     -1     -1e
* alp1 *   0.687    1.0e
* v11 *    0.0     0.0     0.0e
* vv1 *    0.0     0.0     0.0e
* tl1 *   523.0   523.0e
* tv1 *   523.0   523.0e
* p1 *    4.0E6   4.0E6e
* pa1 *    0.0     0.0e
* dx2 *    0.067e
* vol2 *  3.25925E-3
* fa2 *   0.065185 0.065185e
* fric2 *   0.0     0.0e
* fricr2*   0.0     10.0e
* grav2 *  -1.0    -1.0e
* hd2 *   0.28809047 0.28809047e
* nff2 *   -1     -1e
* alp2 *   1.0e
* v12 *    0.0     0.0e
* vv2 *    0.0     0.0e
* tl2 *   523.0e
* tv2 *   523.0e
* p2 *    4.0E6e
* pa2 *    0.0e
*
*****
```

* Starting Heat Structure Section of Model *

	type	num	userid	component name
htstr	1375	0		HL1-col-bot
* nzhstr	ittc	hscyl	ichf	
	1	0	1	1
*nofuelrod	plane	liqlev	iaxend	
	1	3	0	0
*nmwrx	nfc1	nfcil	hdri	hdro
	0	0	0.0	0.0
*nhot	nodes	fmno	nzmax	reflood
	0	8	100	0
*dtxht(1)	dtxht(2)	dznht	hgapo	
	2.0	10.0	1.0E-3	6300.0
*				
* idbcin *	2e			
* idbcon *	1e			
* hcomon1 *	352	1	0	0e
* htc2 *	3.44	298.0e		

```

* dhtstrz * 0.255e
* rdx * 1.0e
* radrd * 0.07 0.076666667 0.083333333 0.09 0.105s
* radrd * 0.12 0.135 0.15e
* matrd * 6 6 6 50s
* matrd * 50 50 50e
* nfax * 1e
* rftn * 528.0 528.0 500.0 400.0s
* rftn * 350.0 330.0 310.0 300.0e
*
***** type num userid component name
htstr 1380 0 CL1-col-bot
* nzhstr ittc hscyl ichf
1 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfc1 nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood
0 8 0 100 0
*dtxht(1) dtxht(2) dznht hgapo
2.0 10.0 1.0E-3 6300.0
*
* idbcin * 2e
* idbcon * 1e
*hcomon1 * 353 1 0 0e
* htc2 * 3.44 298.0e
*dhtstrz * 0.255e
* rdx * 1.0e
* radrd * 0.07 0.076666667 0.083333333 0.09 0.105s
* radrd * 0.12 0.135 0.15e
* matrd * 6 6 6 50s
* matrd * 50 50 50e
* nfax * 1e
* rftn * 520.0 520.0 500.0 400.0s
* rftn * 350.0 330.0 310.0 300.0e
*
***** type num userid component name
htstr 1411 0 SG1-pool-wall1
* nzhstr ittc hscyl ichf
1 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfc1 nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood
0 8 0 100 0
*dtxht(1) dtxht(2) dznht hgapo
2.0 10.0 1.0E-3 6300.0
*
* idbcin * 2e
* idbcon * 1e
*hcomon1 * 643 1 0 0e
* htc2 * 7.0 298.0e
*dhtstrz * 0.163e
* rdx * 1.29996e

```

```

* radrd *    0.475 0.48333333 0.49166667    0.5    0.525s
* radrd *    0.55    0.575    0.6e
* matrd *    6      6      6      50s
* matrd *    50     50     50e
* nfax *    1e
* rftn *    523.0   521.0   510.0   470.0s
* rftn *    450.0   400.0   350.0   300.0e
*
***** type      num      userid      component name
htstr      1412      0          SG1-pool-wall2
* nzhstr    ittc    hscyl    ichf
    1      0      1      1
*nofuelrod plane    liqlev    iaxcnd
    1      3      0      0
*nmwrx     nfc1    nfcil    hdri     hdro
    0      0      0      0.0     0.0
*nhot       nodes   fmno     nzmax    reflood
    0      8      0      100     0
*dtxht(1)  dtxht(2)  dznht    hgapo
    2.0    10.0   1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643      2      0      0e
* htc2 *    7.0    298.0e
*dhtstrz *  0.163e
* rdx *    0.75802e
* radrd *    0.475 0.48333333 0.49166667    0.5    0.525s
* radrd *    0.55    0.575    0.6e
* matrd *    6      6      6      50s
* matrd *    50     50     50e
* nfax *    1e
* rftn *    523.0   521.0   510.0   470.0s
* rftn *    450.0   400.0   350.0   300.0e
*
***** type      num      userid      component name
htstr      1413      0          SG1-pool-wall3
* nzhstr    ittc    hscyl    ichf
    1      0      1      1
*nofuelrod plane    liqlev    iaxcnd
    1      3      0      0
*nmwrx     nfc1    nfcil    hdri     hdro
    0      0      0      0.0     0.0
*nhot       nodes   fmno     nzmax    reflood
    0      8      0      100     0
*dtxht(1)  dtxht(2)  dznht    hgapo
    2.0    10.0   1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643      3      0      0e
* htc2 *    7.0    298.0e
*dhtstrz *  0.163e
* rdx *    0.66983e
* radrd *    0.475 0.48333333 0.49166667    0.5    0.525s
* radrd *    0.55    0.575    0.6e

```

```

* matrd *      6      6      6      50s
* matrd *     50      50     50e
* nfax *      1e
* rftn *    523.0    521.0    510.0    470.0s
* rftn *    450.0    400.0    350.0    300.0e
*
***** type    num    userid    component name
htstr      1414      0          SG1-pool-wall4
* nzhstr    ittc    hscyl    ichf
   1        0        1        1
*nofuelrod plane    liqlev    iaxcnd
   1        3        0        0
*nmwrx     nfcii   nfcil    hdri     hdro
   0        0        0        0.0      0.0
*nhot      nodes    fmno     nzmax    reflood
   0        8        0        100      0
*dtxht(1) dtxht(2)  dznht    hgapo
   2.0      10.0    1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643      4        0        0e
* htc2 *     7.0    298.0e
*dhtstrz *  0.163e
* rdx *      0.1e
* radrd *   0.475  0.48333333 0.49166667    0.5    0.525s
* radrd *   0.55   0.575     0.6e
* matrd *     6      6      6      50s
* matrd *     50     50     50e
* nfax *      1e
* rftn *    523.0    521.0    510.0    470.0s
* rftn *    450.0    400.0    350.0    300.0e
*
***** type    num    userid    component name
htstr      1415      0          SG1-pool-wall5
* nzhstr    ittc    hscyl    ichf
   1        0        1        1
*nofuelrod plane    liqlev    iaxcnd
   1        3        0        0
*nmwrx     nfcii   nfcil    hdri     hdro
   0        0        0        0.0      0.0
*nhot      nodes    fmno     nzmax    reflood
   0        8        0        100      0
*dtxht(1) dtxht(2)  dznht    hgapo
   2.0      10.0    1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643      5        0        0e
* htc2 *     7.0    298.0e
*dhtstrz *  0.163e
* rdx *      0.3905e
* radrd *   0.475  0.48333333 0.49166667    0.5    0.525s
* radrd *   0.55   0.575     0.6e
* matrd *     6      6      6      50s
* matrd *     50     50     50e

```

```

* nfax *      1e
* rftn *    523.0    521.0    510.0    470.0s
* rftn *    450.0    400.0    350.0    300.0e
*
***** type      num      userid      component name
htstr      1421      0          SG1-wallend1
* nzhstr     ittc     hscyl     ichf
    1      0      1      1
* nofuelrod   plane    liqlev    iaxcnd
    1      3      0      0
* nmwrx      nfcil    nfcil     hdri      hdro
    0      0      0      0.0      0.0
* nhot       nodes    fmno      nzmax      reflood
    0      8      0      100      0
* dtxht(1)   dtxht(2)  dznhht   hgapo
    2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643      1      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *    0.09176e
* radrd *    0.8    0.80766667  0.81533333  0.823    0.848s
* radrd *   0.873    0.898    0.923e
* matrd *    6      6      6      50s
* matrd *   50      50      50e
* nfax *      1e
* rftn *    523.0    520.0    500.0    420.0s
* rftn *    400.0    350.0    330.0    300.0e
*
***** type      num      userid      component name
htstr      1422      0          SG1-wallend2
* nzhstr     ittc     hscyl     ichf
    1      0      1      1
* nofuelrod   plane    liqlev    iaxcnd
    1      3      0      0
* nmwrx      nfcil    nfcil     hdri      hdro
    0      0      0      0.0      0.0
* nhot       nodes    fmno      nzmax      reflood
    0      8      0      100      0
* dtxht(1)   dtxht(2)  dznhht   hgapo
    2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   643      2      0      0e
* htc2 *     7.0    298.0e
* dhtstrz *  0.163e
* rdx *    0.04955e
* radrd *    0.8    0.80766667  0.81533333  0.823    0.848s
* radrd *   0.873    0.898    0.923e
* matrd *    6      6      6      50s
* matrd *   50      50      50e
* nfax *      1e
* rftn *    523.0    520.0    500.0    420.0s

```

```

* rftn *    400.0    350.0    330.0    300.0e
*
***** type      num      userid      component name
htstr      1423      0          SG1-wallend3
* nzhstr     ittc      hscyl      ichf
   1        0        1        1
*nofuelrod   plane     liqlev     iaxcnd
   1        3        0        0
*nmwrx       nfc1      nfcil      hdri      hdro
   0        0        0        0.0      0.0
*nhot        nodes     fmno      nzmax      reflood
   0        8        0        100      0
*dtxht(1)   dtxht(2)  dznht     hgapo
   2.0      10.0     1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643       3        0        0e
*htc2 *     7.0      298.0e
*dhtstrz *  0.163e
*rdx *     0.04378e
*radrd *    0.8      0.80766667  0.81533333  0.823    0.848s
*radrd *   0.873     0.898     0.923e
*matrd *    6         6         6        50s
*matrd *   50        50        50e
*nfax *     1e
*rftn *    523.0     520.0     500.0     420.0s
*rftn *    400.0     350.0     330.0     300.0e
*
***** type      num      userid      component name
htstr      1424      0          SG1-wallend4
* nzhstr     ittc      hscyl      ichf
   1        0        1        1
*nofuelrod   plane     liqlev     iaxcnd
   1        3        0        0
*nmwrx       nfc1      nfcil      hdri      hdro
   0        0        0        0.0      0.0
*nhot        nodes     fmno      nzmax      reflood
   0        8        0        100      0
*dtxht(1)   dtxht(2)  dznht     hgapo
   2.0      10.0     1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *   643       4        0        0e
*htc2 *     7.0      298.0e
*dhtstrz *  0.163e
*rdx *     0.01e
*radrd *    0.8      0.80766667  0.81533333  0.823    0.848s
*radrd *   0.873     0.898     0.923e
*matrd *    6         6         6        50s
*matrd *   50        50        50e
*nfax *     1e
*rftn *    523.0     520.0     500.0     420.0s
*rftn *    400.0     350.0     330.0     300.0e
*
```

```

***** type      num      userid      component name
htstr        1425      0          SG1-wallend5
* nzhstr     ittc      hscyl      ichf
    1      0      1      1
*nofuelrod   plane     liqlev     iaxcnd
    1      3      0      0
*nmwrx       nfci      nfcil      hdri      hdro
    0      0      0      0.0      0.0
*nhot        nodes     fmno      nzmax      reflood
    0      8      0      100      0
* dtxht(1)   dtxht(2)  dznht      hgapo
    2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
*hcomon1 *    643      5      0      0e
* htc2 *      7.0    298.0e
*dhtstrz *    0.163e
* rdx *      0.02206e
* radrd *    0.8    0.80766667  0.81533333  0.823    0.848s
* radrd *    0.873    0.898    0.923e
* matrd *     6      6      6      50s
* matrd *    50      50      50e
* nfax *      1e
* rftn *     523.0    520.0    500.0    420.0s
* rftn *    400.0    350.0    330.0    300.0e
*
***** type      num      userid      component name
htstr        1506      0          Downcomer wall
* nzhstr     ittc      hscyl      ichf
    2      0      1      1
*nofuelrod   plane     liqlev     iaxcnd
    1      3      0      0
*nmwrx       nfci      nfcil      hdri      hdro
    0      0      0      0.0      0.0
*nhot        nodes     fmno      nzmax      reflood
    0      8      0      100      0
* dtxht(1)   dtxht(2)  dznht      hgapo
    2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2      2e
* idbcon *    1      1e
*hcomon1 *    292      1      0      0e
*hcomon1 *    292      2      0      0e
* htc2 *      7.0    298.0e
* htc2 *      7.0    298.0e
*dhtstrz *    0.163    0.096e
* rdx *      0.10387e
* radrd *    0.475    0.48279133  0.49058266  0.5    0.52378049s
* radrd *  0.54918699  0.5745935    0.6e
* matrd *     6      6      6      50s
* matrd *    50      50      50e
* nfax *      1      1e
* rftn *     523.0    500.0    450.0    400.0s
* rftn *    380.0    350.0    320.0    300.0s
* rftn *    523.0    500.0    450.0    400.0s

```

```

* rftn *    380.0    350.0    320.0    300.0e
*
*d: Top of steam generator Separator wall node 1 (cylinder part)
***** type      num      userid      component name
htstr      1531      0      Steamdomewall1
* nzhstr     ittc      hscyl      ichf
   1      0      1      1
* nofuelrod   plane     liqlev     iaxcnd
   1      3      0      0
* nmwrx      nfcii     nfcil      hdri      hdro
   0      0      0      0.0      0.0
* nhot       nodes     fmno      nzmax      reflood
   0      9      0      108      0
* dtxht(1)   dtxht(2)   dznht      hgapo
   2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   1546      1      0      0e
* htc2 *     7.0     298.0e
* dhtstrz *  0.134e
* rdx *    0.552462e
* radrd *  0.475  0.48279133  0.49058266    0.5  0.51869919s
* radrd * 0.53902439 0.55934959  0.5796748    0.6e
* matrd *    6      6      6      50s
* matrd *   50      50      50      50e
* nfax *     1e
* rftn *    523.0    523.0    520.0    500.0s
* rftn *    500.0    400.0    350.0    330.0s
* rftn *    310.0e
*
*d: Top of steam generator Separator wall node 2 (cylinder part)
***** type      num      userid      component name
htstr      1532      0      Steamdomewall2
* nzhstr     ittc      hscyl      ichf
   1      0      1      1
* nofuelrod   plane     liqlev     iaxcnd
   1      3      0      0
* nmwrx      nfcii     nfcil      hdri      hdro
   0      0      0      0.0      0.0
* nhot       nodes     fmno      nzmax      reflood
   0      9      0      108      0
* dtxht(1)   dtxht(2)   dznht      hgapo
   2.0     10.0    1.0E-3    6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *   1546      2      0      0e
* htc2 *     7.0     298.0e
* dhtstrz *  0.134e
* rdx *    1.289078e
* radrd *  0.475  0.48279133  0.49058266    0.5  0.51869919s
* radrd * 0.53902439 0.55934959  0.5796748    0.6e
* matrd *    6      6      6      50s
* matrd *   50      50      50      50e
* nfax *     1e

```

```

* rftn * 523.0 523.0 520.0 500.0s
* rftn * 500.0 400.0 350.0 330.0s
* rftn * 310.0e
*
*d: Top of steam generator Separator wall node 1 (end part)
***** type num userid component name
htstr 1541 0 Steamdomewallend1
* nzhstr ittc hscyl ichf
1 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood
0 9 0 108 0
*dtxht(1) dtxht(2) dznht hgapo
2.0 10.0 1.0E-3 6300.0
*
* idbcin * 2e
* idbcon * 1e
*hcomon1 * 1546 1 0 0e
*htc2 * 7.0 298.0e
*dhtstrz * 0.134e
*rdx * 0.036114e
*radrd * 0.8 0.80766667 0.81533333 0.823 0.843s
*radrd * 0.863 0.883 0.903 0.923e
*matrd * 6 6 6 50s
*matrd * 50 50 50 50e
*nfax * 1e
*rftn * 523.0 523.0 520.0 500.0s
*rftn * 500.0 400.0 350.0 330.0s
*rftn * 310.0e
*
*d: Top of steam generator Separator wall node 2 (end part)
***** type num userid component name
htstr 1542 0 Steamdomewallend2
* nzhstr ittc hscyl ichf
1 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood
0 9 0 108 0
*dtxht(1) dtxht(2) dznht hgapo
2.0 10.0 1.0E-3 6300.0
*
* idbcin * 2e
* idbcon * 1e
*hcomon1 * 1546 2 0 0e
*htc2 * 7.0 298.0e
*dhtstrz * 0.134e
*rdx * 0.084266e
*radrd * 0.8 0.80766667 0.81533333 0.823 0.843s
*radrd * 0.863 0.883 0.903 0.923e
*matrd * 6 6 6 50s

```

```

* matrd *      50      50      50      50e
* nfax *       1e
* rftn *      523.0    523.0    520.0    500.0s
* rftn *      500.0    400.0    350.0    330.0s
* rftn *      310.0e
*****
* Finished Heat Structure Section of Model *
*****
*
end
*
*****
* Timestep Data *
*****
*      dtmin      dtmax      tend      rtwfp
*      1.0E-6     1.0        1.0E4     10.0
*      edint      gfint      dmpint    sedint
*      100.0      50.0      500.0    10.0
*
*      endflag
*      -1.0

```


APPENDIX D

TRACE transient input of five layer pipe model for LOF-10 experiment

```

free format
*****
* main data *
*****
*
*      numtcr      ieos      inopt      nmat      id2o
      1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=1.0,
nfrcl=2,
usesjc=3,
nhtstr=17
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
  10264      0.0
*      stdyst      transi      ncomp      njun      ipak
      0          1          38          27          0
*      epso      epss
      1.0E-4      1.0E-4
*      oitmax      sitmax      isolut      ncontr      nccl
      10          10          0          0          0
*      ntsv      ntcb      ntcf      ntrp      ntcp
      28          12          46          0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type ---- num ----- name ----- + jun1 jun2 jun3
* PIPE   * 1 s *           +   1  153
* PIPE   * 2 s *           +  152  154
* PIPE   * 122 s * SG3-coldcol    +   52   0
* PIPE   * 241 s * SG3-hotcol    +   51   0
* PIPE   * 292 s *           +   0  150
* PIPE   * 312 s *           +  155  85
* PIPE   * 322 s *           +  141  86
* PIPE   * 332 s *           +  140  87
* PIPE   * 342 s *           +  139  88
* PIPE   * 352 s * SG3-inlet    +  128  51
* PIPE   * 353 s *           +  129  52
* FILL   * 463 s *           +  156
* PIPE   * 643 s *           +   0  148
* BREAK  * 873 s *           +  146
* PIPE   * 953 s *           +  122  123
* PIPE   * 963 s *           +  124  125

```

```

* PIPE   *  973 s *           +  126  127
* HTSTR * 1375 s * HL1-col-bot    +
* HTSTR * 1380 s * CL1-col-bot    +
* HTSTR * 1411 s * SG1-pool-wall1  +
* HTSTR * 1412 s * SG1-pool-wall2  +
* HTSTR * 1413 s * SG1-pool-wall3  +
* HTSTR * 1414 s * SG1-pool-wall4  +
* HTSTR * 1415 s * SG1-pool-wall5  +
* FILL   * 1420 s *           +  128
* HTSTR * 1421 s * SG1-wallend1    +
* HTSTR * 1422 s * SG1-wallend2    +
* HTSTR * 1423 s * SG1-wallend3    +
* HTSTR * 1424 s * SG1-wallend4    +
* HTSTR * 1425 s * SG1-wallend5    +
* BREAK  * 1430 s *           +  129
* HTSTR * 1506 s * Downcomer wall  +
* PIPE   * 1516 s *           +  149  146
* HTSTR * 1531 s * Steamdomewall1  +
* HTSTR * 1532 s * Steamdomewall2  +
* HTSTR * 1541 s * Steamdomewallend1 +
* HTSTR * 1542 s * Steamdomewallend2 +
* SEPD   * 1546 e *           +  148  149  150
*
*****
```

* material properties *

* matb* 50e

* ptbln* 3e

* User Defined Material : 50

*

*n: Mineral wool

*

prptb	temp	rho	cp	cond	emis
prptb*	283.0	120.0	800.0	0.099	0.76s
prptb*	373.0	120.0	800.0	0.12	0.76s
prptb*	573.0	120.0	800.0	0.213	0.76e

* Starting Signal Variable Section of Model *

idsv	isvn	ilcn	icn1	icn2
1	20	643	1	5

*

idsv	isvn	ilcn	icn1	icn2
2	20	1546	1	2

*n: FWmassflow

*

idsv	isvn	ilcn	icn1	icn2
110	31	463	1	0

*

idsv	isvn	ilcn	icn1	icn2
111	0	0	0	0

*n: tubelayer1

*

idsv	isvn	ilcn	icn1	icn2
119	103	1	0	0

*n: tubelayer2

*					
*	idsv	isvn	ilcn	icn1	icn2
*	120	103	2	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	121	103	953	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	122	103	963	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	123	103	973	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	124	103	241	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	125	103	122	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	375	103	1375	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	380	103	1380	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	411	103	1411	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	412	103	1412	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	413	103	1413	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	414	103	1414	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	415	103	1415	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	421	103	1421	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	422	103	1422	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	423	103	1423	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	424	103	1424	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2
*	425	103	1425	0	0
*					
*	idsv	isvn	ilcn	icn1	icn2

```

      506     103    1506      0      0
*
*   idsv    isvn    ilcn    icn1    icn2
*   531     103    1531      0      0
*
*   idsv    isvn    ilcn    icn1    icn2
*   532     103    1532      0      0
*
*   idsv    isvn    ilcn    icn1    icn2
*   541     103    1541      0      0
*
*   idsv    isvn    ilcn    icn1    icn2
*   542     103    1542      0      0
*****
* Finished Signal Variable Section of Model *
*****
* Starting Control System Section of Model *
*****
***** Control Blocks *****
*
*   idcb    icbn    icb1    icb2    icb3
*   -1      3       1       2       0
*   cbgain  cbxmin  cbmax   cbcon1  cbcon2
*   1.0     -1.0E20  1.0E20  0.0     0.0
*
*   idcb    icbn    icb1    icb2    icb3
*   -2      200     -1      -40     0
*   cbgain  cbxmin  cbmax   cbcon1  cbcon2
*   160.0   0.0     0.6     0.712   0.0
*   cbdt    cbtau   100.0   0.05
*
*n: Secheatlosses
*
*   idcb    icbn    icb1    icb2    icb3
*   -3      103     4       0       0
*   cbgain  cbxmin  cbmax   cbcon1  cbcon2
*   1.0     -1.0E20  1.0E20  0.0     0.0
*   ids    * 531     532     541     542e
*
*   idcb    icbn    icb1    icb2    icb3
*   -4      9       0       0       0
*   cbgain  cbxmin  cbmax   cbcon1  cbcon2
*   1.0     -1.0E20  1.0E20  60.0    0.0
*
*   idcb    icbn    icb1    icb2    icb3
*   -5      39      110     -4      0
*   cbgain  cbxmin  cbmax   cbcon1  cbcon2
*   1.0     -1.0E20  1.0E20  0.0     0.0
*
*n: tubelayers
*
*   idcb    icbn    icb1    icb2    icb3
*   -6      103     5       0       0

```

```

*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids  *      120      121      122      123s
*  ids  *      119e
*
*n: collectors
*
*      idcb      icbn      icb1      icb2      icb3
      -7          3      124      125          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*
*n: tubesandcoll
*
*      idcb      icbn      icb1      icb2      icb3
      -8          3      -6      -7          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
      -9      103          5          0          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids  *      411      412      413      414s
*  ids  *      415e
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
      -10      103          5          0          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids  *      421      422      423      424s
*  ids  *      425e
*
*n: Secheatlosses
*
*      idcb      icbn      icb1      icb2      icb3
      -11      103          4          0          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids  *      -3      -10         -9      506e
*
*      idcb      icbn      icb1      icb2      icb3
      -40      101      111          4          0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  cbtbl  *      0.0      0.712s
*  cbtbl  *      1000.0      0.712s
*  cbtbl  *      1001.0      0.000s
*  cbtbl  *      2.0E4      0.000e
*
*****
* Finished Control System Section of Model  *

```

```
*****
***** type      num      userid      component name
fill          1420        1           unnamed
*   jun1      ifty      ioff
*   128         6         0
*   iftr      ifsv      nftb      nfsv      nfrf
*   0         111        5         0         0
*   twtold     rfmx      concin     felv
*   0.0       1.0E20     0.0       0.0
*   dxin      violin    alpin     vlin      tlin
*   1.0      0.015394     0.0       0.0      528.0
*   pin       pain      flowin    vvin      tvin
*   7.3E6      0.0       0.0       0.0      528.0
*   vmscl     vvscl
*   1.0       1.0
*   tlscl     tvscl     pscl      pascl     conscl
*   1.0       1.0       1.0       1.0       1.0
*
* vmtbl *   0.0  0.40607s
* vmtbl * 1000.0  0.40607s
* vmtbl * 1100.0  0.05075875s
* vmtbl * 1600.0  0.05075875s
* vmtbl * 16000.0 0.05075875e
*
* vvtb *   0.0  0.40607s
* vvtb * 1000.0  0.40607s
* vvtb * 1100.0  0.05075875s
* vvtb * 1600.0  0.05075875s
* vvtb * 16000.0 0.05075875e
*
* tltb *   0.0  528.0s
* tltb * 1000.0  528.0s
* tltb * 1100.0  528.0s
* tltb * 1600.0  541.0s
* tltb * 16000.0 548.5e
*
* tvtb *   0.0  528.0s
* tvtb * 1000.0  528.0s
* tvtb * 1100.0  528.0s
* tvtb * 1600.0  541.0s
* tvtb * 16000.0 548.5e
*
* alptb *   0.0  0.0s
* alptb * 1000.0  0.0s
* alptb * 1100.0  0.0s
* alptb * 1600.0  0.0s
* alptb * 16000.0 0.0e
*
* ptb  *   0.0  7.3E6s
* ptb  * 1000.0  7.3E6s
* ptb  * 1100.0  7.3E6s
* ptb  * 1600.0  7.3E6s
* ptb  * 16000.0 7.3E6e
*
* patb *   0.0  0.0s
* patb * 1000.0  0.0s
```

```
* patb * 1100.0 0.0s
* patb * 1600.0 0.0s
* patb * 16000.0 0.0e
*
end
*
*****
* Timestep Data *
*****
*      dtmin      dtmax      tend      rtwfp
*      1.0E-6      1.0       1.6E4     10.0
*      edint      gfint      dmpint    sedint
*      100.0       50.0      500.0    10.0
*
*      endflag
*      -1.0
```

APPENDIX E

**TRACE steady state input of eight layer pipe model for
LOF-10 experiment**

```

free format
*
*****
* main data *
*****
*
*      numtcr      ieos      inopt      nmat      id2o
*      1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=0.1,
nfrcl=2,
usesjc=3,
nhtstr=15,
fluids='H2O'
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
*      0          0.0
*      stdyst     transi      ncomp      njun      ipak
*      0          1          43          41          0
*      epso       epss
*      1.0E-4    1.0E-4
*      oitmax     sitmax     isolut     ncontr     nccl
*      10         10         0          0          0
*      ntsv       ntcb       ntcf       ntrp       ntcp
*      24         7          40         0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type ---- num ----- name ----- + jun1 jun2 jun3
* PIPE   * 1 s *           +  21  22
* PIPE   * 2 s *           +  23  24
* PIPE   * 3 s *           +  25  26
* PIPE   * 122 s * SG3-coldcol +  38  0
* PIPE   * 241 s * SG3-hotcol +  37  0
* PIPE   * 292 s *          +  0   2
* PIPE   * 312 s *          +  3   4
* PIPE   * 313 s *          +  8   7
* PIPE   * 314 s *          + 10   9
* PIPE   * 322 s *          + 12  11
* PIPE   * 323 s *          + 14  13
* PIPE   * 332 s *          + 16  15
* PIPE   * 333 s *          + 18  17
* PIPE   * 342 s *          + 20  19

```

```

* PIPE * 352 s * SG3-inlet      + 39 37
* PIPE * 353 s *               + 40 38
* FILL * 463 s *               + 41
* PIPE * 643 s *               + 0 1
* BREAK * 873 s *              + 6
* PIPE * 953 s *               + 27 28
* PIPE * 954 s *               + 29 30
* PIPE * 963 s *               + 31 32
* PIPE * 964 s *               + 33 34
* PIPE * 973 s *               + 35 36
* HTSTR * 1375 s * HL1-col-bot +
* HTSTR * 1380 s * CL1-col-bot +
* HTSTR * 1411 s * SG1-pool-wall1 +
* HTSTR * 1412 s * SG1-pool-wall2 +
* HTSTR * 1413 s * SG1-pool-wall3 +
* HTSTR * 1414 s * SG1-pool-wall4 +
* FILL * 1420 s *              + 39
* HTSTR * 1421 s * SG1-wallend1 +
* HTSTR * 1422 s * SG1-wallend2 +
* HTSTR * 1423 s * SG1-wallend3 +
* HTSTR * 1424 s * SG1-wallend4 +
* BREAK * 1430 s *              + 40
* HTSTR * 1506 s * Downcomer wall +
* PIPE * 1516 s *               + 5 6
* HTSTR * 1531 s * Steamdomewall1 +
* HTSTR * 1532 s * Steamdomewall2 +
* HTSTR * 1541 s * Steamdomewallend1 +
* HTSTR * 1542 s * Steamdomewallend2 +
* SEPD * 1546 e *               + 1 5 2
*
*****
```

* material properties *

*

* matb* 50e

* ptbln* 3e

* User Defined Material : 50

*

*n: Mineral wool

*

prptb	temp	rho	cp	cond	emis
prptb*	283.0	120.0	800.0	0.099	0.76s
prptb*	373.0	120.0	800.0	0.12	0.76s
prptb*	573.0	120.0	800.0	0.213	0.76e

*

*

*

* Starting Signal Variable Section of Model *

*

idsv	isvn	ilcn	icn1	icn2
1	0	0	0	0

*

idsv	isvn	ilcn	icn1	icn2
2	20	1546	1	2

*					
*	idsv	isvn	ilcn	icn1	icn2
	3	20	643	1	8
*n:	HTRPipe1				
*					
*	idsv	isvn	ilcn	icn1	icn2
	11	103	1	0	0
*n:	HTRPipe2				
*					
*	idsv	isvn	ilcn	icn1	icn2
	12	103	2	0	0
*n:	HTRPipe3				
*					
*	idsv	isvn	ilcn	icn1	icn2
	13	103	3	0	0
*n:	HTRPipe4				
*					
*	idsv	isvn	ilcn	icn1	icn2
	14	103	953	0	0
*n:	HTRPipe5				
*					
*	idsv	isvn	ilcn	icn1	icn2
	15	103	954	0	0
*n:	HTRPipe6				
*					
*	idsv	isvn	ilcn	icn1	icn2
	16	103	963	0	0
*n:	HTRPipe7				
*					
*	idsv	isvn	ilcn	icn1	icn2
	17	103	964	0	0
*n:	HTRPipe8				
*					
*	idsv	isvn	ilcn	icn1	icn2
	18	103	973	0	0
*n:	HLSEPD1				
*					
*	idsv	isvn	ilcn	icn1	icn2
	21	103	1531	0	0
*n:	HLSEPD2				
*					
*	idsv	isvn	ilcn	icn1	icn2
	22	103	1532	0	0
*n:	HLSEPD3				
*					
*	idsv	isvn	ilcn	icn1	icn2
	23	103	1541	0	0
*n:	HLSEPD4				
*					
*	idsv	isvn	ilcn	icn1	icn2
	24	103	1542	0	0
*n:	HLPOOL1				
*					
*	idsv	isvn	ilcn	icn1	icn2
	31	103	1411	0	0
*n:	HLPOOL2				

```

*
*      idsv     isvn     ilcn     icn1     icn2
*      32       103      1412      0        0
*n: HLPOOL3
*
*      idsv     isvn     ilcn     icn1     icn2
*      33       103      1413      0        0
*n: HLPOOL4
*
*      idsv     isvn     ilcn     icn1     icn2
*      34       103      1414      0        0
*n: HLPOOL5
*
*      idsv     isvn     ilcn     icn1     icn2
*      35       103      1421      0        0
*n: HLPOOL6
*
*      idsv     isvn     ilcn     icn1     icn2
*      36       103      1422      0        0
*n: HLPOOL7
*
*      idsv     isvn     ilcn     icn1     icn2
*      37       103      1423      0        0
*n: HLPOOL8
*
*      idsv     isvn     ilcn     icn1     icn2
*      38       103      1424      0        0
*n: HLPOOL8
*
*      idsv     isvn     ilcn     icn1     icn2
*      39       103      1506      0        0
*****
* Finished Signal Variable Section of Model   *
*****
```

*

*

*

*

* Starting Control System Section of Model *

*

***** Control Blocks *****

*

```

*      idcb     icbn     icb1     icb2     icb3
*      -1       3        2        3        0
*      cbgain   cbxmin  cbmax   cbcon1  cbcon2
*      1.0      -1.0E20  1.0E20  0.0      0.0
*
*
*      idcb     icbn     icb1     icb2     icb3
*      -2       200      -1       -40      0
*      cbgain   cbxmin  cbmax   cbcon1  cbcon2
*      160.0    0.0      0.6      0.712    0.0
*      cbdt    cbtau   100.0   0.05
```

```

*
*n: HTRPRtoSEC
*
*      idcb      icbn      icb1      icb2      icb3
*      -3        103       8        0        0
*      cbgain    cbxmin   cbmax    cbcon1   cbcon2
*      1.0     -1.0E20   1.0E20    0.0      0.0
*  ids *      11        12       13      14s
*  ids *      15        16       17      18e
*
*
*      idcb      icbn      icb1      icb2      icb3
*      -4        103       4        0        0
*      cbgain    cbxmin   cbmax    cbcon1   cbcon2
*      1.0     -1.0E20   1.0E20    0.0      0.0
*  ids *      21        22       23      24e
*
*
*      idcb      icbn      icb1      icb2      icb3
*      -5        103       8        0        0
*      cbgain    cbxmin   cbmax    cbcon1   cbcon2
*      1.0     -1.0E20   1.0E20    0.0      0.0
*  ids *      31        32       33      34s
*  ids *      35        36       37      38e
*
*n: HLSEC
*
*      idcb      icbn      icb1      icb2      icb3
*      -6        57        -4       -5       39
*      cbgain    cbxmin   cbmax    cbcon1   cbcon2
*      1.0     -1.0E20   1.0E20    0.0      0.0
*
*
*      idcb      icbn      icb1      icb2      icb3
*      -40       9         0        0        0
*      cbgain    cbxmin   cbmax    cbcon1   cbcon2
*      1.0    -1000.0  1000.0    0.712    0.0
*
*****
* Finished Control System Section of Model *
*****
*
*
*
*****
***** type      num      userid      component name
pipe          1        1           unnamed
*  ncells     nodes     jun1     jun2      epsw
*      5        4        21        22     2.0E-6
*  nsides      0
*  ichf      iconc     pipetype    ipow     npipes
*      1        0        0        0        9
*  iqptr     iqpsv     nqptb     nqpsv    nqprf
*      0        0        0        0        0
*  radin      th       houtl     houtv    toutl

```

```

      6.5E-3    1.5E-3      0.0      0.0    300.0
* toutv      pwin      pwoff     rpwmx     pwscl
      300.0      0.0      0.0    1.0E20      1.0
* qpin      qpoff     rqpmx     qpscl     nhcom
      0.0      0.0      0.0      1.0      643
* dx *      0.558     0.558     0.558     0.558s
* dx *      0.558e
* vol *    7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *    7.40646E-5e
* fa *   1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa *   1.32732E-4 1.32732E-4e
* fric *     0.5      0.0      0.0     0.35s
* fric *     0.0      0.998e
* fricr *    0.0      0.0      0.0     0.0s
* fricr *    0.0      0.0e
* grav *     0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3      0.0e
* hd *     0.013     0.013     0.013     0.013s
* hd *     0.013     0.013e
* nff *     -100     -100     -100     -100s
* nff *     -100     -100e
* alp *     0.0      0.0      0.0     0.0s
* alp *     0.0e
* vl *      0.7      0.7      0.7     0.7s
* vl *      0.7      0.7e
* vv *      0.7      0.7      0.7     0.7s
* vv *      0.7      0.7e
* tl *     528.0     528.0     528.0     528.0s
* tl *     528.0e
* tv *     528.0     528.0     528.0     528.0s
* tv *     528.0e
* p *      7.3E6     7.3E6     7.3E6     7.3E6s
* p *     7.3E6e
* pa *     0.0      0.0      0.0     0.0s
* pa *     0.0e
* qpp *     1.0      1.0      1.0      1.0     1.0s
* qpp *     1.0      1.0      1.0      1.0     1.0s
* qpp *     1.0      1.0      1.0      1.0     1.0s
* qpp *     1.0      1.0      1.0      1.0     1.0e
* matr * f 6e
* tw *     528.0     528.0     528.0     528.0     528.0s
* tw *     528.0     528.0     528.0     528.0     528.0s
* tw *     528.0     528.0     528.0     528.0     528.0s
* tw *     528.0     528.0     528.0     528.0     528.0e
* idrod *     0e
* nhcel *     8       8       8       8       8e
*
*
***** type      num      userid          component name
pipe           2       1           unnamed
* ncells      nodes     jun1     jun2      epsw
      5         4       23       24     2.0E-6
* nsides      0
* ichf      iconc     pipetype     ipow      npipes
      1         0         0         0         9

```

```

* iqptr iqpsv nqptb nqpsv nqprf
* 0 0 0 0 0
* radin th houtl houtv toutl
6.5E-3 1.5E-3 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpsc1 nhcom
0.0 0.0 0.0 1.0 643
* dx * 0.558 0.558 0.558 0.558s
* dx * 0.558e
* vol * 7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol * 7.40646E-5e
* fa * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa * 1.32732E-4 1.32732E-4e
* fric * 0.5 0.0 0.0 0.35s
* fric * 0.0 0.998e
* fricr * 0.0 0.0 0.0 0.0s
* fricr * 0.0 0.0e
* grav * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3 0.0e
* hd * 0.013 0.013 0.013 0.013s
* hd * 0.013 0.013e
* nff * -100 -100 -100 -100s
* nff * -100 -100e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0e
* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e
* vv * 0.7 0.7 0.7 0.7s
* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 7 7 7 7 7e
*
*
***** type num userid component name
pipe 3 1 unnamed
* ncells nodes jun1 jun2 epsw
5 4 25 26 2.0E-6
* nsides

```

```

          0
* ichf    iconc    pipetype    ipow    npipes
          1          0          0          0         9
* iqptr   iqpsv    nqptb    nqpsv    nqprf
          0          0          0          0         0
* radin   th       houtl    houtv    toutl
          6.5E-3   1.5E-3   0.0       0.0     300.0
* toutv   pwin    pwoff    rpwmx    pwscl
          300.0    0.0       0.0     1.0E20    1.0
* qpin    qpoff   rqpmx    qpscl    nhcom
          0.0       0.0       0.0      1.0      643
* dx     * 0.558    0.558    0.558    0.558s
* dx     * 0.558e
* vol   * 7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol   * 7.40646E-5e
* fa    * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa    * 1.32732E-4 1.32732E-4e
* fric  * 0.5       0.0       0.0      0.35s
* fric  * 0.0       0.998e
* fricr * 0.0       0.0       0.0      0.0s
* fricr * 0.0       0.0e
* grav  * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav  * -7.37993E-3 0.0e
* hd    * 0.013    0.013    0.013    0.013s
* hd    * 0.013    0.013e
* nff   * -100     -100     -100     -100s
* nff   * -100     -100e
* alp   * 0.0       0.0       0.0      0.0s
* alp   * 0.0e
* vl    * 0.7       0.7       0.7      0.7s
* vl    * 0.7       0.7e
* vv    * 0.7       0.7       0.7      0.7s
* vv    * 0.7       0.7e
* tl    * 528.0    528.0    528.0    528.0s
* tl    * 528.0e
* tv    * 528.0    528.0    528.0    528.0s
* tv    * 528.0e
* p     * 7.3E6    7.3E6    7.3E6    7.3E6s
* p     * 7.3E6e
* pa    * 0.0       0.0       0.0      0.0s
* pa    * 0.0e
* qpp   * 1.0       1.0       1.0      1.0      1.0s
* qpp   * 1.0       1.0       1.0      1.0      1.0s
* qpp   * 1.0       1.0       1.0      1.0      1.0s
* qpp   * 1.0       1.0       1.0      1.0      1.0e
* matr * f 6e
* tw    * 528.0    528.0    528.0    528.0    528.0s
* tw    * 528.0    528.0    528.0    528.0    528.0s
* tw    * 528.0    528.0    528.0    528.0    528.0s
* tw    * 528.0    528.0    528.0    528.0    528.0e
* idrod * 0e
* nhcel * 6        6        6        6        6e
*
*****
type      num      userid      component name
pipe      122       1           SG3-coldcol

```

```

* ncells      nodes      jun1      jun2      epsw
*     8          3          38         0        2.0E-6
* nsides      nsides      junlk      ncmpto      nclkto      nlevto
*     8          8          22         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     8          7          24         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     6          6          26         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     5          5          28         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     4          4          30         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     3          3          32         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     2          2          34         0         0         0
* theta       theta       ientrn      90.0       0
* nclk       nclk       junlk      ncmpto      nclkto      nlevto
*     1          1          36         0         0         0
* theta       theta       ientrn      90.0       0
* ichf        iconc      pipetype      ipow      npipes
*     1          0          0          0          1
* iqptr      iqpsv      nqptb      nqpsv      nqprf
*     0          0          0          0          0
* radin       th         houtl      houtv      toutl
*     0.07      0.02      0.0        0.0        300.0
* toutv       pwin      pwoff      rpwmx      pwscl
*     300.0     0.0       0.0        1.0E20     1.0
* qpin        qpoff      rqpmx      qpscl      nhcom
*     0.0       0.0       0.0        1.0        643
* dx          *          0.163     0.096     0.096     0.096s
* dx          *          0.096     0.045     0.045     0.045e
* vol         *          2.5E-3   1.475E-3  1.475E-3  1.475E-3s
* vol         *          1.475E-3 6.66667E-4 6.66667E-4 6.66667E-4e
* fa          *          0.015393804 0.015393804 0.015393804 0.015393804s
* fa          *          0.015393804 0.015393804 0.015393804 0.015393804s
* fa          *          0.015393804e
* fric       *          0.0       0.0       0.0       0.0s
* fric       *          0.0       0.0       0.0       0.0s
* fric       *          0.0e

```

```

* fricr *    0.0    0.0    0.0    0.0s
* fricr *    0.0    0.0    0.0    0.0s
* fricr *    0.0e
* grav *     1.0    1.0    1.0    1.0s
* grav *     1.0    1.0    1.0    1.0s
* grav *     1.0e
* hd  *      0.14   0.14   0.14   0.14s
* hd  *      0.14   0.14   0.14   0.14s
* hd  *      0.14e
* nff *     -100   -100   -100   -100s
* nff *     -100   -100   -100   -100s
* nff *     -100e
* alp *      0.0    0.0    0.0    0.0s
* alp *      0.0    0.0    0.0    0.0e
* vl  *      0.195   0.164   0.164   0.105s
* vl  *      0.105   0.047   0.047   0.047s
* vl  *      0.0e
* vv  *      0.195   0.164   0.164   0.105s
* vv  *      0.105   0.047   0.047   0.047s
* vv  *      0.0e
* tl  *      528.0   528.0   528.0   528.0s
* tl  *      528.0   528.0   528.0   528.0e
* tv  *      528.0   528.0   528.0   528.0s
* tv  *      528.0   528.0   528.0   528.0e
* p   *      7.3E6   7.3E6   7.3E6   7.3E6s
* p   *      7.3E6   7.3E6   7.3E6   7.3E6e
* pa  *      0.0    0.0    0.0    0.0s
* pa  *      0.0    0.0    0.0    0.0e
* qpp *      1.0    1.0    1.0    1.0    1.0s
* qpp *      1.0    1.0    1.0    1.0e
* matr * f 6e
* tw  *      526.0   526.0   526.0   526.0   526.0s
* tw  *      526.0   526.0   526.0   526.0e
* idrod *    0e
* nhcel *    1      2      3      4      5s
* nhcel *    6      7      8e
*
*
***** type      num      userid      component name
pipe          241        1           SG3-hotcol
*   ncells    nodes      jun1      jun2      epsw
*       8         3        37         0     2.0E-6
*   nsides     8
*   nclk      junlk     ncmpto    nclkto    nlevto
*       8         21         0         0         0
*   theta     ientrn
*       90.0        0
*   nclk      junlk     ncmpto    nclkto    nlevto
*       7         23         0         0         0

```

```

* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   6     25    0      0      0
* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   5     27    0      0      0
* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   4     29    0      0      0
* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   3     31    0      0      0
* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   2     33    0      0      0
* theta ientrn
  90.0      0
* nclk junlk ncmpto nclkto nlevto
   1     35    0      0      0
* theta ientrn
  90.0      0
* ichf iconc pipetype ipow npipes
   1      0      0      0      1
* iqptr iqpsv nqptb nqpsv nqprf
   0      0      0      0      0
* radin th houtl houtv toutl
  0.07   0.02   0.0    0.0   300.0
* toutv pwin pwoff rpwmx pwscl
 300.0    0.0    0.0   1.0E20   1.0
* qpin qpoff rqpmpx qpsc1 nhcom
  0.0    0.0    0.0    1.0    643
* dx *  0.163  0.096  0.096  0.096s
* dx *  0.096  0.045  0.045  0.045e
* vol *  2.5E-3  1.475E-3  1.475E-3  1.475E-3s
* vol *  1.475E-3  6.66667E-4  6.66667E-4  6.66667E-4e
* fa  *  0.015393804 0.015393804 0.015393804 0.015393804s
* fa  *  0.015393804 0.015393804 0.015393804 0.015393804s
* fa  *  0.015393804e
* fric *  0.0    0.0    0.0    0.0s
* fric *  0.0    0.0    0.0    0.0s
* fric *  0.0e
* fricr *  0.0    0.0    0.0    0.0s
* fricr *  0.0    0.0    0.0    0.0s
* fricr *  0.0e
* grav *  1.0    1.0    1.0    1.0s
* grav *  1.0    1.0    1.0    1.0s
* grav *  1.0e
* hd  *  0.14   0.14   0.14   0.14s
* hd  *  0.14   0.14   0.14   0.14s
* hd  *  0.14e
* nff *  1     -100   -100  -100s

```

```

* nff * -100 -100 -100 -100s
* nff * -100e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0 0.0 0.0 0.0e
* vl * 0.0 0.164 0.164 0.105s
* vl * 0.105 0.047 0.047 0.047s
* vl * 0.0e
* vv * 0.0 0.164 0.164 0.105s
* vv * 0.105 0.047 0.047 0.047s
* vv * 0.0e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0 528.0 528.0 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0 528.0 528.0 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6 7.3E6 7.3E6 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0 0.0 0.0 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 526.0 528.0 528.0s
* tw * 526.0 528.0 528.0 526.0 528.0s
* tw * 528.0 526.0 528.0 528.0 526.0s
* tw * 528.0 528.0 526.0 528.0 528.0s
* tw * 526.0 528.0 528.0 526.0e
* idrod * 0e
* nhcel * 1 2 3 4 5s
* nhcel * 6 7 8e
*
*
***** type num userid component name
pipe 292 1 unnamed
* ncells nodes jun1 jun2 epsw
8 0 0 2 2.0E-6
* nsides 9
* nclk junlk ncmpto nclkto nlevto
8 3 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
7 8 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
6 10 0 0 0
* theta ientrn
90.0 0
* nclk junlk ncmpto nclkto nlevto
5 12 0 0 0
* theta ientrn
90.0 0

```

*	nclk	junkl	ncmpto	nclkto	nlevto
*	4	14	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junkl	ncmpto	nclkto	nlevto
*	3	16	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junkl	ncmpto	nclkto	nlevto
*	2	18	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junkl	ncmpto	nclkto	nlevto
*	1	20	0	0	0
*	theta	ientrn			
*	90.0	0			
*	nclk	junkl	ncmpto	nclkto	nlevto
*	4	41	0	0	0
*	theta	ientrn			
*	90.0	0			
*	ichf	iconc	pipetype	ipow	npipes
*	1	0	0	0	1
*	radin	th	houtl	houtv	toutl
*	0.0	0.0	0.0	0.0	0.0
*	toutv	pwin	pwoff	rpwmx	pwscl
*	0.0	0.0	0.0	0.0	0.0
* dx	*	0.144	0.096	0.096	0.096s
* dx	*	0.096	0.045	0.045	0.045e
* vol	*	9.38074E-3	6.25383E-3	6.25383E-3	6.25383E-3s
* vol	*	6.25383E-3	2.93148E-3	2.93148E-3	2.93148E-3e
* fa	*	0.065144065	0.065144065	0.065144065	0.065144065s
* fa	*	0.065144065	0.065144065	0.065144065	0.065144065s
* fa	*	0.065185e			
* fric	*	0.0	0.0	0.0	0.0s
* fric	*	0.0	0.0	0.0	0.0s
* fric	*	10.0e			
* fricr	*	0.0	0.0	0.0	0.0s
* fricr	*	0.0	0.0	0.0	0.0s
* fricr	*	0.0e			
* grav	*	1.0	1.0	1.0	1.0s
* grav	*	1.0	1.0	1.0	1.0s
* grav	*	1.0e			
* hd	*	0.288	0.288	0.288	0.288s
* hd	*	0.288	0.288	0.288	0.288s
* hd	*	0.28809047e			
* nff	*	-100	-100	-100	-100s
* nff	*	-100	-100	-100	-100s
* nff	*	-1e			
* alp	*	0.0	0.0	0.0	0.0s
* alp	*	0.0	0.0	0.0	0.0e
* vl	*	0.0	0.0	0.0	0.0s
* vl	*	0.0	0.0	0.0	0.0s
* vl	*	0.0e			
* vv	*	0.0	0.0	0.0	0.0s
* vv	*	0.0	0.0	0.0	0.0s
* vv	*	0.0e			

```

* tl  *  523.504  523.504  523.504  523.504s
* tl  *  523.504  523.504  523.504  523.504e
* tv  *  523.504  523.504  523.504  523.504s
* tv  *  523.504  523.504  523.504  523.504e
* p  *   4.0E6   4.0E6   4.0E6   4.0E6s
* p  *   4.0E6   4.0E6   4.0E6   4.0E6e
* pa *    0.0     0.0     0.0     0.0s
* pa *    0.0     0.0     0.0     0.0e
*
*
***** type      num      userid      component name
* single junction
pipe      312      1      unnamed
* ncells    nodes    jun1    jun2    epsw
    0        0        3        4    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
    1        0        0        0        1
* radin     th       houtl    houtv    toutl
    0.0      0.0      0.0      0.0      0.0
* toutv     pwin     pwoff    rpwmx    pwscl
    0.0      0.0      0.0      0.0      0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f 0.010177e
* fric * f 2.5e
* fricr * f 10.0e
* grav * f 0.0e
* hd  * f 0.11383215e
* nff * f -1e
* alp * f 0.0000e+00e
* vl  * f 0.0e
* vv  * f 0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      313      1      unnamed
* ncells    nodes    jun1    jun2    epsw
    0        0        8        7    2.0E-6
* ichf      iconc    pipetype    ipow    npipes
    1        0        0        0        1
* radin     th       houtl    houtv    toutl
    0.0      0.0      0.0      0.0      0.0
* toutv     pwin     pwoff    rpwmx    pwscl
    0.0      0.0      0.0      0.0      0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f 0.010177e
* fric * f 2.5e
* fricr * f 10.0e
* grav * f 0.0e
* hd  * f 0.11383215e

```

```

* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f     0.0e
* vv  * f     0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      314      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        10        9      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f 0.010177e
* fric * f 2.5e
* fricr * f 10.0e
* grav * f 0.0e
* hd  * f 0.11383215e
* nff * f -1e
* alp * f 0.0000e+00e
* vl  * f 0.0e
* vv  * f 0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      322      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        12        11      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f 0.021715e
* fric * f 2.6e
* fricr * f 10.0e
* grav * f 0.0e
* hd  * f 0.16627807e

```

```

* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f     0.0e
* vv  * f     0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      323      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        14       13      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.021715e
* fric * f    2.6e
* fricr * f   10.0e
* grav * f    0.0e
* hd   * f  0.16627807e
* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f     0.0e
* vv  * f     0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      332      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        16       15      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.021715e
* fric * f    2.6e
* fricr * f   10.0e
* grav * f    0.0e
* hd   * f  0.16627807e

```

```

* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f     0.0e
* vv  * f     0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      333      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        18        17      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.021715e
* fric * f    2.6e
* fricr * f   10.0e
* grav * f    0.0e
* hd   * f  0.16627807e
* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f     0.0e
* vv  * f     0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type      num      userid      component name
* single junction
pipe      342      1      unnamed
*    ncells      nodes      jun1      jun2      epsw
      0          0        20        19      2.0E-6
*    ichf      iconc      pipetype      ipow      npipes
      1          0          0          0          1
*    radin      th      houtl      houtv      toutl
      0.0        0.0        0.0        0.0        0.0
*    toutv      pwin      pwoff      rpwmx      pwscl
      0.0        0.0        0.0        0.0        0.0
* dx  * f 0.0000e+00e
* vol * f 0.0000e+00e
* fa  * f  0.03687e
* fric * f    2.4e
* fricr * f   10.0e
* grav * f    0.0e
* hd   * f  0.21666643e

```

```

* nff * f      -1e
* alp * f 0.0000e+00e
* vl  * f    0.0e
* vv  * f    0.0e
* tl  * f 0.0000e+00e
* tv  * f 0.0000e+00e
* p   * f 0.0000e+00e
* pa  * f 0.0000e+00e
*
*
***** type    num    userid      component name
pipe      352      1      SG3-inlet
* ncells  nodes   jun1   jun2      epsw
*       1      0      39      37      2.0E-6
* nsides
*       0
* ichf    iconc   pipetype   ipow   npipes
*       1      0      0      0      1
* radin    th     houtl     houtv     toutl
*       0.0    0.0     0.0     0.0     0.0
* toutv    pwin   pwoff    rpwmx    pwscl
*       0.0    0.0     0.0     0.0     0.0
* dx      * 0.255e
* vol    * 3.92542E-3e
* fa     * 0.015393804 0.015393804e
* fric   * 0.0    0.0e
* fricr  * 0.0    0.0e
* grav   * 1.0    1.0e
* hd     * 0.14   0.14e
* nff    * -100   1e
* alp    * 0.0e
* vl     * 0.195  0.0e
* vv     * 0.195  0.0e
* tl     * 528.0e
* tv     * 528.0e
* p      * 7.3E6e
* pa     * 0.0e
*
*
***** type    num    userid      component name
pipe      353      1      unnamed
* ncells  nodes   jun1   jun2      epsw
*       1      0      40      38      2.0E-6
* nsides
*       0
* ichf    iconc   pipetype   ipow   npipes
*       1      0      0      0      1
* radin    th     houtl     houtv     toutl
*       0.0    0.0     0.0     0.0     0.0
* toutv    pwin   pwoff    rpwmx    pwscl
*       0.0    0.0     0.0     0.0     0.0
* dx      * 0.255e
* vol    * 3.92542E-3e
* fa     * 0.015393804 0.015393804e
* fric   * 0.448  0.0e
* fricr  * 0.0    0.0e

```

```

* grav *      1.0      1.0e
* hd  *      0.14     0.14e
* nff *     -100     -100e
* alp *      0.0e
* vl  *      0.0     0.195e
* vv  *      0.0     0.195e
* tl  *    528.0e
* tv  *    528.0e
* p   *    7.3E6e
* pa  *      0.0e
*
*
***** type      num      userid      component name
fill      463      1      unnamed
* jun1 ifty ioff
  41   5   0
* iftr ifsv nftb nfsv nfrf
  0   -2   0   0   0
* twtold rfmx concin felv
  0.0  1.0E20  0.0  0.0
* dxin  violin alpin vlin tlin
  0.192 0.0126  0.0  0.0  298.0
* pin   pain flowin vvin tvin
  4.0E6  0.0   0.027  0.0  298.0
*
*
***** type      num      userid      component name
pipe     643      1      unnamed
* ncells nodes jun1 jun2 epsw
  8     0     0     1  2.0E-6
* nsides 8
* nclk  junlk ncmpto nclkto nlevto
  8     4     0     0     0
* theta ientrn
  90.0   0
* nclk  junlk ncmpto nclkto nlevto
  7     7     0     0     0
* theta ientrn
  90.0   0
* nclk  junlk ncmpto nclkto nlevto
  6     9     0     0     0
* theta ientrn
  90.0   0
* nclk  junlk ncmpto nclkto nlevto
  5     11    0     0     0
* theta ientrn
  90.0   0
* nclk  junlk ncmpto nclkto nlevto
  4     13    0     0     0
* theta ientrn
  90.0   0
* nclk  junlk ncmpto nclkto nlevto
  3     15    0     0     0
* theta ientrn
  90.0   0

```

```

*      nclk      junlk      ncmpto      nclkto      nlevto
*      2          17          0          0          0
*      theta     ientrn
*      90.0        0
*      nclk      junlk      ncmpto      nclkto      nlevto
*      1          19          0          0          0
*      theta     ientrn
*      90.0        0
*      ichf     iconc     pipetype      ipow      npipes
*      1          0          0          0          1
*      radin      th      houtl      houtv      toutl
*      0.0        0.0        0.0        0.0        0.0
*      toutv      pwin      pwoff      rpwmx      pwscl
*      0.0        0.0        0.0        0.0        0.0
* dx *    0.163    0.096    0.096    0.096s
* dx *    0.096    0.045    0.045    0.045e
* vol *   0.1362   0.1374   0.1374   0.15815s
* vol *   0.15815  0.070466667 0.070466667 0.070466667e
* fa *   1.29195  1.29195  1.49226  1.707s
* fa *   1.7272354 1.74759  1.6444949 1.544534s
* fa *   1.25336e
* fric *   0.0      0.0      0.0      0.0s
* fric *   0.0      0.0      0.0      0.0s
* fric *   0.0e
* fricr *   0.0      0.0      0.0      0.0s
* fricr *   0.0      0.0      0.0      0.0s
* fricr *   0.0e
* grav *   1.0      1.0      1.0      1.0s
* grav *   1.0      1.0      1.0      1.0s
* grav *   1.0e
* hd *    1.314779  1.314779  1.314779  1.314779s
* hd *    1.314779  1.314779  1.3290772 1.3433755s
* hd *   1.2632607e
* nff *   -100     -100     -100     -100s
* nff *   -100     -100     -100     -100s
* nff *   1e
* alp *   0.0      0.0      0.0      0.0s
* alp *   0.0      0.0      0.0      0.0e
* vl *    0.0      0.0      0.0      0.0s
* vl *    0.0      0.0      0.0      0.0s
* vl *    0.0e
* vv *    0.0      0.0      0.0      0.0s
* vv *    0.0      0.0      0.0      0.0s
* vv *    0.0e
* tl *    523.0    523.0    523.0    523.0s
* tl *    523.0    523.0    523.0    523.0e
* tv *    523.0    523.0    523.0    523.0s
* tv *    523.0    523.0    523.0    523.0e
* p *     4.0E6    4.0E6    4.0E6    4.0E6s
* p *     4.0E6    4.0E6    4.0E6    4.0E6e
* pa *    0.0      0.0      0.0      0.0s
* pa *    0.0      0.0      0.0      0.0e
*
*****
      type      num      userid      component name
break      873       1      unnamed

```

```

*     jun1      ibty      isat      ioff      adjpress
*       6        0        0        0        0
*   dxin      violin     alpin      tin      pin
* 2.127995     0.027     1.0     523.0    4.0E6
*   pain     concin     rbmx      poff      belv
*     0.0      0.0     1.0E20      0.0      0.0
*
*
***** type      num      userid      component name
pipe      953        1      unnamed
*   ncells      nodes      jun1      jun2      epsw
*     5          4        27        28     1.0E-6
*   nsides      0
*   ichf      iconc      pipetype      ipow      npipes
*     1          0          0          0        18
*   iqptr      iqpsv      nqptb      nqpsv      nqprf
*     0          0          0          0          0
*   radin      th      houtl      houtv      toutl
* 6.5E-3     1.5E-3      0.0      0.0     300.0
*   toutv      pwin      pwoff      rpwmx      pwscl
* 300.0      0.0      0.0     1.0E20      1.0
*   qpin      qpoff      rqpmx      qpscl      nhcom
*     0.0      0.0      0.0        1.0      643
* dx *      0.558      0.558      0.558      0.558s
* dx *      0.558e
* vol *    7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *    7.40646E-5e
* fa *    1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa *    1.32732E-4 1.32732E-4e
* fric *      0.5      0.0      0.0      0.35s
* fric *      0.0      0.998e
* fricr *      0.0      0.0      0.0      0.0s
* fricr *      0.0      0.0e
* grav *      0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3      0.0e
* hd *      0.013      0.013      0.013      0.013s
* hd *      0.013      0.013e
* nff *      1        1        1      1s
* nff *      1        1e
* alp *      0.0      0.0      0.0      0.0s
* alp *      0.0e
* vl *      0.7      0.7      0.7      0.7s
* vl *      0.7      0.7e
* vv *      0.7      0.7      0.7      0.7s
* vv *      0.7      0.7e
* tl *      528.0      528.0      528.0      528.0s
* tl *      528.0e
* tv *      528.0      528.0      528.0      528.0s
* tv *      528.0e
* p *      7.3E6      7.3E6      7.3E6      7.3E6s
* p *      7.3E6e
* pa *      0.0      0.0      0.0      0.0s
* pa *      0.0e
* qpp *      1.0      1.0      1.0      1.0      1.0s
* qpp *      1.0      1.0      1.0      1.0      1.0s

```

```

* qpp *      1.0      1.0      1.0      1.0      1.0s
* qpp *      1.0      1.0      1.0      1.0      1.0e
* matr * f 6e
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0s
* tw *      528.0    528.0    528.0    528.0    528.0e
* idrod *    0e
* nhcel *    5       5       5       5       5e
*
*
***** type      num      userid      component name
pipe      954      1      unnamed
* ncells      nodes      jun1      jun2      epsw
      5       4       29       30      1.0E-6
* nsides      0
* ichf      iconc      pipetype      ipow      npipes
      1       0       0       0       18
* iqptr      iqpsv      nqptb      nqpsv      nqprf
      0       0       0       0       0
* radin      th      houtl      houtv      toutl
      6.5E-3   1.5E-3   0.0       0.0     300.0
* toutv      pwin      pwoff      rpwmx      pwscl
      300.0    0.0       0.0     1.0E20     1.0
* qpin      qpoff      rqpmx      qpsc1      nhcom
      0.0      0.0       0.0      1.0      643
* dx *      0.558    0.558    0.558    0.558s
* dx *      0.558e
* vol *    7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol *    7.40646E-5e
* fa *    1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa *    1.32732E-4 1.32732E-4e
* fric *    0.5      0.0      0.0      0.35s
* fric *    0.0      0.998e
* fricr *   0.0      0.0      0.0      0.0s
* fricr *   0.0      0.0e
* grav *    0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3      0.0e
* hd *    0.013    0.013    0.013    0.013s
* hd *    0.013    0.013e
* nff *    1       1       1       1s
* nff *    1       1e
* alp *    0.0      0.0      0.0      0.0s
* alp *    0.0e
* vl *     0.7      0.7      0.7      0.7s
* vl *     0.7      0.7e
* vv *     0.7      0.7      0.7      0.7s
* vv *     0.7      0.7e
* tl *     528.0    528.0    528.0    528.0s
* tl *    528.0e
* tv *     528.0    528.0    528.0    528.0s
* tv *    528.0e
* p *     7.3E6    7.3E6    7.3E6    7.3E6s
* p *    7.3E6e
* pa *    0.0      0.0      0.0      0.0s

```

```

* pa   *      0.0e
* qpp  *      1.0    1.0    1.0    1.0    1.0s
* qpp  *      1.0    1.0    1.0    1.0    1.0s
* qpp  *      1.0    1.0    1.0    1.0    1.0s
* qpp  *      1.0    1.0    1.0    1.0    1.0e
* matr * f 6e
* tw   *      528.0   528.0   528.0   528.0   528.0s
* tw   *      528.0   528.0   528.0   528.0   528.0s
* tw   *      528.0   528.0   528.0   528.0   528.0s
* tw   *      528.0   528.0   528.0   528.0   528.0e
* idrod *      0e
* nhcel *      4      4      4      4      4e
*
*
***** type      num      userid      component name
pipe          963        1      unnamed
* ncells      nodes     jun1     jun2      epsw
      5          4       31       32      1.0E-6
* nsides      0
* ichf        iconc    pipetype    ipow      npipes
      1          0          0          0        18
* iqptr       iqpsv     nqptb     nqpsv      nqprf
      0          0          0          0          0
* radin       th        houtl     houtv      toutl
      6.5E-3    1.5E-3    0.0        0.0      300.0
* toutv       pwin     pwoff     rpwmx      pwscl
      300.0     0.0        0.0      1.0E20     1.0
* qpin        qpoff    rqpmx     qpscl      nhcom
      0.0        0.0        0.0        1.0      643
* dx   *      0.558    0.558    0.558    0.558s
* dx   *      0.558e
* vol  *      7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol  *      7.40646E-5e
* fa   *      1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa   *      1.32732E-4 1.32732E-4e
* fric *      0.5      0.0      0.0      0.35s
* fric *      0.0      0.998e
* fricr *     0.0      0.0      0.0      0.0s
* fricr *     0.0      0.0e
* grav *      0.0      7.37993E-3 7.37993E-3 -7.37993E-3s
* grav *     -7.37993E-3      0.0e
* hd   *      0.013    0.013    0.013    0.013s
* hd   *      0.013    0.013e
* nff  *      1      1      1      1s
* nff  *      1      1e
* alp  *      0.0      0.0      0.0      0.0s
* alp  *      0.0e
* vl   *      0.7      0.7      0.7      0.7s
* vl   *      0.7      0.7e
* vv   *      0.7      0.7      0.7      0.7s
* vv   *      0.7      0.7e
* tl   *      528.0   528.0   528.0   528.0s
* tl   *      528.0e
* tv   *      528.0   528.0   528.0   528.0s
* tv   *      528.0e

```

```

* p   *    7.3E6    7.3E6    7.3E6    7.3E6s
* p   *    7.3E6e
* pa  *     0.0     0.0     0.0     0.0s
* pa  *     0.0e
* qpp *     1.0     1.0     1.0     1.0     1.0s
* qpp *     1.0     1.0     1.0     1.0     1.0s
* qpp *     1.0     1.0     1.0     1.0     1.0s
* qpp *     1.0     1.0     1.0     1.0     1.0e
* matr * f 6e
* tw  *    528.0    528.0    528.0    528.0    528.0s
* tw  *    528.0    528.0    528.0    528.0    528.0s
* tw  *    528.0    528.0    528.0    528.0    528.0s
* tw  *    528.0    528.0    528.0    528.0    528.0e
* idrod *     0e
* nhcel *     3       3       3       3       3e
*
*****
***** type      num      userid      component name
pipe      964       1      unnamed
* ncells  nodes     jun1     jun2      epsw
      5        4       33       34     1.0E-6
* nsides  0
* ichf    iconc    pipetype    ipow      npipes
      1        0        0        0       18
* iqptr   iqpsv    nqptb     nqpsv     nqprf
      0        0        0        0        0
* radin   th       houtl     houtv     toutl
  6.5E-3   1.5E-3     0.0      0.0     300.0
* toutv   pwin     pwoff     rpwmx     pwscl
  300.0     0.0      0.0     1.0E20     1.0
* qpin    qpoff    rqpmx     qpscl     nhcom
      0.0      0.0      0.0      1.0      643
* dx    *    0.558    0.558    0.558    0.558s
* dx    *    0.558e
* vol   *  7.40646E-5 7.40646E-5 7.40646E-5 7.40646E-5s
* vol   *  7.40646E-5e
* fa    *  1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa    *  1.32732E-4 1.32732E-4e
* fric   *     0.5     0.0     0.0     0.35s
* fric   *     0.0     0.998e
* fricr  *     0.0     0.0     0.0     0.0s
* fricr  *     0.0     0.0e
* grav   *     0.0  7.37993E-3 7.37993E-3 -7.37993E-3s
* grav   * -7.37993E-3     0.0e
* hd    *    0.013    0.013    0.013    0.013s
* hd    *    0.013    0.013e
* nff   *     1       1       1       1s
* nff   *     1       1e
* alp   *     0.0     0.0     0.0     0.0s
* alp   *     0.0e
* vl    *     0.7     0.7     0.7     0.7s
* vl    *     0.7     0.7e
* vv    *     0.7     0.7     0.7     0.7s
* vv    *     0.7     0.7e
* tl    *    528.0    528.0    528.0    528.0s

```

```

* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 2 2 2 2 2e
*
*
***** type num userid component name
pipe 973 1 unnamed
* ncells nodes jun1 jun2 epsw
5 4 35 36 1.0E-6
* nsides 0
* ichf iconc pipetype ipow npipes
1 0 0 0 19
* iqptr iqpsv nqptb nqpsv nqprf
0 0 0 0 0
* radin th houtl houtv toutl
6.5E-3 1.5E-3 0.0 0.0 300.0
* toutv pwin pwoff rpwmx pwscl
300.0 0.0 0.0 1.0E20 1.0
* qpin qpoff rqpmx qpscl nhcom
0.0 0.0 0.0 1.0 643
* dx * 0.542 0.542 0.542 0.542s
* dx * 0.542e
* vol * 7.19409E-5 7.19409E-5 7.19409E-5 7.19409E-5s
* vol * 7.19409E-5e
* fa * 1.32732E-4 1.32732E-4 1.32732E-4 1.32732E-4s
* fa * 1.32732E-4 1.32732E-4e
* fric * 0.5 0.0 0.0 0.35s
* fric * 0.0 0.998e
* fricr * 0.0 0.0 0.0 0.0s
* fricr * 0.0 0.0e
* grav * 0.0 7.37993E-3 7.37993E-3 -7.37993E-3s
* grav * -7.37993E-3 0.0e
* hd * 0.013 0.013 0.013 0.013s
* hd * 0.013 0.013e
* nff * -100 -100 -100 -100s
* nff * -100 -100e
* alp * 0.0 0.0 0.0 0.0s
* alp * 0.0e
* vl * 0.7 0.7 0.7 0.7s
* vl * 0.7 0.7e

```

```

* vv * 0.7 0.7 0.7 0.7s
* vv * 0.7 0.7e
* tl * 528.0 528.0 528.0 528.0s
* tl * 528.0e
* tv * 528.0 528.0 528.0 528.0s
* tv * 528.0e
* p * 7.3E6 7.3E6 7.3E6 7.3E6s
* p * 7.3E6e
* pa * 0.0 0.0 0.0 0.0s
* pa * 0.0e
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0s
* qpp * 1.0 1.0 1.0 1.0 1.0e
* matr * f 6e
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0s
* tw * 528.0 528.0 528.0 528.0 528.0e
* idrod * 0e
* nhcel * 1 1 1 1 1e
*
*
***** type num userid component name
fill 1420 1 unnamed
* jun1 ifty ioff
 39 5 0
* iftr ifsv nftb nfsv nfrf
 0 1 2 0 0
* twtold rfmx concin felv
 0.0 1.0E20 0.0 0.0
* dxin violin alpin vlin tlin
 1.0 0.015394 0.0 0.0 528.0
* pin pain flowin vvin tvin
 7.3E6 0.0 5.0 0.0 528.0
* vmscl vvscl
 1.0 1.0
*
* vmtbv * 0.0 5.0s
* vmtbv * 1.0E4 5.0e
*
*
***** type num userid component name
break 1430 1 unnamed
* jun1 ibty isat ioff adjpress
 40 0 0 0 0
* dxin violin alpin tin pin
 1.0 0.015394 0.0 528.0 7.3E6
* pain concin rbmx poff belv
 0.0 0.0 1.0E20 0.0 0.0
*
*
***** type num userid component name
pipe 1516 1 unnamed
* ncells nodes jun1 jun2 epsw
 3 0 5 6 2.0E-6

```

```

* nsides
  0
* ichf  iconc  pipetype   ipow  npipes
  1      0       0          0      1
* radin th     houtl     houtv  toutl
  0.0    0.0     0.0       0.0     0.0
* toutv pwin   pwoff   rpwmx  pwscl
  0.0    0.0     0.0       0.0     0.0
* dx   * 0.70933333 0.70933333 0.7093333e
* vol  * 8.99977E-3 8.99977E-3 8.99977E-3e
* fa   * 0.91399 0.012687644 0.012687644 0.012687644e
* fric * 3.0     0.0       0.0     3.0e
* fricr* 0.0     0.0       0.0     0.0e
* grav * 1.0     0.0       0.0     0.0e
* hd   * 1.2632607 0.1271    0.1271  0.1271e
* nff  * -1      1       1     1e
* alp  * 1.0     1.0       1.0e
* vl   * 0.0     0.0       0.0     0.0e
* vv   * 0.0     0.0       0.0     0.0e
* tl   * 523.0   523.0    523.0e
* tv   * 523.0   523.0    523.0e
* p    * 4.0E6   4.0E6    4.0E6e
* pa   * 0.0     0.0       0.0e
*
*
* type      num      id      ctitle
sepd      1546    0        unnamed
* jcell    nodes   ichf     cost    epsw
  2      0       1     -1.0     0.0
* nseps   ndryr  istage   xco     xcu
  1      0       0     0.0      1.0
* alpsmn  alpsmx
  0.0    1.0
* iconc1  ncell1 jun1    jun2    ipow1
  0      2       1     5       0
* radin   th     houtl   houtv  toutl
  0.0    0.0     0.0     0.0     0.0
* toutv   pwin   pwoff   rpwmx  pwscl
  0.0    0.0     0.0     0.0     0.0
* iconc2  ncell2 jun3    ipow2
  0      1       2       0
* radin2  th2    houtl2  houtv2 toutl2
  0.0    0.0     0.0     0.0     0.0
* toutv2  pwin2  pwoff2 rpwmx2 pwscl2
  0.0    0.0     0.0     0.0     0.0
* dx1   * 0.134   0.134e
* voll  * 0.211153 0.1247487e
* fal   * 1.25336 1.25336 0.91399e
* fric1 * 0.0     0.0     3.0e
* fricr1* 0.0     0.0     0.0e
* grav1 * 1.0     1.0     1.0e
* hd1   * 1.2632607 1.2632607 1.2632607e
* nff1  * 1       -1     -1e
* alp1  * 0.67   1.0e
* vl1   * 0.0     0.0     0.0e
* vv1   * 0.0     0.0     0.0e

```

```

* t1   *    523.0    523.0e
* tv1  *    523.0    523.0e
* p1   *    4.0E6    4.0E6e
* pa1  *     0.0     0.0e
* dx2  *    0.067e
* vol2 * 3.25925E-3e
* fa2  *  0.065185  0.065185e
* fric2 *     0.0     0.0e
* fricr2*    0.0     10.0e
* grav2 *    -1.0    -1.0e
* hd2   * 0.28809047 0.28809047e
* nff2  *     -1     -1e
* alp2  *     1.0e
* vl2   *     0.0     0.0e
* vv2   *     0.0     0.0e
* t2   *    523.0e
* tv2  *    523.0e
* p2   *    4.0E6e
* pa2  *     0.0e
*
*
***** Starting Heat Structure Section of Model *****
***** Starting Heat Structure Section of Model *****
*
***** type      num      userid      component name
htstr       1375      0          HL1-col-bot
*   nzhstr     ittc      hscyl      ichf
    1         0         1         1
*   nofuelrod   plane    liqlev    iaxcnd
    1         3         0         0
*   nmwrx      nfc1      nfcil      hdri      hdro
    0         0         0         0.0       0.0
*   nhot       nodes     fmno      nzmax      reflood
    0         8         0        100         0
*   dtxht(1)   dtxht(2)  dznht     hgapo
    2.0       10.0     1.0E-3     6300.0
*
*   idbcin *     2e
*   idbcon *     1e
*   hcomon1 *    352       1       0       0e
*   htc2   *    7.0     298.0e
*   dhtstrz *  0.255e
*   rdx   *    1.0e
*   radrd *  0.07 0.076666667 0.083333333  0.09   0.105s
*   radrd *  0.12   0.135    0.15e
*   matrd *    6       6       6      50s
*   matrd *   50      50      50e
*   nfax *     1e
*   rftn *   528.0   528.0   500.0   400.0s
*   rftn *   350.0   330.0   310.0   300.0e
*
***** type      num      userid      component name
htstr       1380      0          CL1-col-bot
*   nzhstr     ittc      hscyl      ichf
    1         0         1         1

```

```

* nofuelrod    plane    liqlev    iaxcnd
   1          3          0          0
*  nmwrx      nfcii    nfcil     hdri      hdro
   0          0          0         0.0        0.0
*  nhot       nodes     fmno      nzmax     reflood
   0          8          0         100        0
*  dtxht(1)   dtxht(2)  dznht     hgapo
   2.0        10.0      1.0E-3    6300.0
*
*  idbcin *    2e
*  idbcon *    1e
*  hcomon1 *   353       1          0          0e
*  htc2 *      7.0      298.0e
*  dhtstrz *   0.255e
*  rdx *       1.0e
*  radrd *    0.07 0.076666667 0.083333333    0.09    0.105s
*  radrd *    0.12   0.135     0.15e
*  matrd *     6          6          6          50s
*  matrd *    50          50        50e
*  nfax *      1e
*  rftn *     520.0    520.0    500.0    400.0s
*  rftn *     350.0    330.0    310.0    300.0e
*
***** type    num    userid    component name
htstr      1411      0           SG1-pool-wall1
*  nzhstr    ittc      hscyl     ichf
   1          0          1          1
*  nofuelrod  plane    liqlev    iaxcnd
   1          3          0          0
*  nmwrx      nfcii    nfcil     hdri      hdro
   0          0          0         0.0        0.0
*  nhot       nodes     fmno      nzmax     reflood
   0          8          0         100        0
*  dtxht(1)   dtxht(2)  dznht     hgapo
   2.0        10.0      1.0E-3    6300.0
*
*  idbcin *    2e
*  idbcon *    1e
*  hcomon1 *   643       1          0          0e
*  htc2 *      7.0      298.0e
*  dhtstrz *   0.163e
*  rdx *       1.29996e
*  radrd *    0.475 0.48333333 0.49166667    0.5    0.525s
*  radrd *    0.55   0.575     0.6e
*  matrd *     6          6          6          50s
*  matrd *    50          50        50e
*  nfax *      1e
*  rftn *     523.0    521.0    510.0    470.0s
*  rftn *     450.0    400.0    350.0    300.0e
*
***** type    num    userid    component name
htstr      1412      0           SG1-pool-wall2
*  nzhstr    ittc      hscyl     ichf
   2          0          1          1
*  nofuelrod  plane    liqlev    iaxcnd
   1          3          0          0

```

```

*      nmwrx      nfcii      nfcil      hdri      hdro
*      0          0          0          0.0       0.0
*      nhot      nodes      fmno      nzmax      reflood
*      0          8          0         100       0
*      dtxht(1)  dtxht(2)  dznht      hgapo
*      2.0        10.0      1.0E-3    6300.0
*
*      idbcin *    2          2e
*      idbcon *    1          1e
*      hcomon1 *   643        2          0          0e
*      hcomon1 *   643        3          0          0e
*      htc2 *      7.0        298.0e
*      htc2 *      7.0        298.0e
*      dhtstrz *  0.163      0.163e
*      rdx *      0.75802e
*      radrd *    0.475      0.48333333 0.49166667    0.5      0.525s
*      radrd *    0.55       0.575      0.6e
*      matrd *    6          6          6          50s
*      matrd *    50         50         50e
*      nfax *     1          1e
*      rftn *     523.0     521.0     510.0     470.0s
*      rftn *     450.0     400.0     350.0     300.0s
*      rftn *     523.0     521.0     510.0     470.0s
*      rftn *     450.0     400.0     350.0     300.0e
*
***** type      num      userid      component name
htstr      1413      0      SG1-pool-wall3
*      nzhstr      ittc      hsycl      ichf
*      2          0          1          1
*      nofuelrod   plane      liqlev      iaxcnd
*      1          3          0          0
*      nmwrx      nfcii      nfcil      hdri      hdro
*      0          0          0          0.0       0.0
*      nhot      nodes      fmno      nzmax      reflood
*      0          8          0         107       0
*      dtxht(1)  dtxht(2)  dznht      hgapo
*      2.0        10.0      1.0E-3    6300.0
*
*      idbcin *    2          2e
*      idbcon *    1          1e
*      hcomon1 *   643        4          0          0e
*      hcomon1 *   643        5          0          0e
*      htc2 *      7.0        298.0e
*      htc2 *      7.0        298.0e
*      dhtstrz *  0.096      0.067e
*      rdx *      0.66983e
*      radrd *    0.475      0.48333333 0.49166667    0.5      0.525s
*      radrd *    0.55       0.575      0.6e
*      matrd *    6          6          6          50s
*      matrd *    50         50         50e
*      nfax *     1          1e
*      rftn *     523.0     521.0     510.0     470.0s
*      rftn *     450.0     400.0     350.0     300.0s
*      rftn *     523.0     521.0     510.0     470.0s
*      rftn *     450.0     400.0     350.0     300.0e
*
```

```

***** type      num      userid      component name
htstr          1414      0          SG1-pool-wall4
*   nzhstr     ittc      hscyl      ichf
    3          0          1          1
*   nofuelrod   plane    liqlev    iaxcnd
    1          3          0          0
*   nmwrx      nfci      nfcil      hdri      hdro
    0          0          0          0.0        0.0
*   nhot       nodes    fmno      nzmax      reflood
    0          8          0          114        0
*   dtxht(1)   dtxht(2)  dznht      hgapo
    2.0        10.0      1.0E-3    6300.0
*
*   idbcin *    2         2         2e
*   idbcon *    1         1         1e
*   hcomon1 *   643       6         0         0e
*   hcomon1 *   643       7         0         0e
*   hcomon1 *   643       8         0         0e
*   htc2 *     7.0      298.0e
*   htc2 *     7.0      298.0e
*   htc2 *     7.0      298.0e
*dhtstrz * 0.054333333 0.054333333 0.054333333e
*   rdx *     0.4905e
*   radrd *   0.475     0.48333333 0.49166667    0.5      0.525s
*   radrd *   0.55      0.575      0.6e
*   matrd *    6         6         6         50s
*   matrd *   50        50        50e
*   nfax *     1         1         1e
*   rftn *    523.0     521.0     510.0     470.0s
*   rftn *    450.0     400.0     350.0     300.0s
*   rftn *    523.0     521.0     510.0     470.0s
*   rftn *    450.0     400.0     350.0     300.0s
*   rftn *    523.0     521.0     510.0     470.0s
*   rftn *    450.0     400.0     350.0     300.0e
*
***** type      num      userid      component name
htstr          1421      0          SG1-wallend1
*   nzhstr     ittc      hscyl      ichf
    1          0          1          1
*   nofuelrod   plane    liqlev    iaxcnd
    1          3          0          0
*   nmwrx      nfci      nfcil      hdri      hdro
    0          0          0          0.0        0.0
*   nhot       nodes    fmno      nzmax      reflood
    0          8          0          100        0
*   dtxht(1)   dtxht(2)  dznht      hgapo
    2.0        10.0      1.0E-3    6300.0
*
*   idbcin *    2e
*   idbcon *    1e
*   hcomon1 *   643       1         0         0e
*   htc2 *     7.0      298.0e
*dhtstrz * 0.163e
*   rdx *     0.09176e
*   radrd *   0.8      0.80766667 0.81533333 0.823      0.848s
*   radrd *   0.873     0.898      0.923e

```

```

* matrd *      6      6      6      50s
* matrd *     50      50     50e
* nfax *      1e
* rftn *    523.0    520.0    500.0    420.0s
* rftn *    400.0    350.0    330.0    300.0e
*
***** type    num    userid    component name
htstr      1422      0          SG1-wallend2
* nzhstr    ittc    hscyl    ichf
   2        0        1        1
*nofuelrod plane    liqlev    iaxcnd
   1        3        0        0
*nmwrx     nfcii   nfcil    hdri     hdro
   0        0        0        0.0      0.0
*nhot      nodes    fmno     nzmax    reflood
   0        8        0        100      0
*dtxht(1) dtxht(2)   dznht    hgapo
   2.0      10.0    1.0E-3    6300.0
*
* idbcin *    2      2e
* idbcon *    1      1e
*hcomon1 *   643      2        0        0e
*hcomon1 *   643      3        0        0e
*htc2 *     7.0    298.0e
*htc2 *     7.0    298.0e
*dhtstrz *  0.163    0.163e
*rdx *     0.04955e
*radrd *    0.8    0.80766667  0.81533333  0.823    0.848s
*radrd *   0.873    0.898    0.923e
*matrd *    6      6      6      50s
*matrd *   50      50     50e
* nfax *      1      1e
* rftn *    523.0    520.0    500.0    420.0s
* rftn *    400.0    350.0    330.0    300.0s
* rftn *    523.0    520.0    500.0    420.0s
* rftn *    400.0    350.0    330.0    300.0e
*
***** type    num    userid    component name
htstr      1423      0          SG1-wallend3
* nzhstr    ittc    hscyl    ichf
   2        0        1        1
*nofuelrod plane    liqlev    iaxcnd
   1        3        0        0
*nmwrx     nfcii   nfcil    hdri     hdro
   0        0        0        0.0      0.0
*nhot      nodes    fmno     nzmax    reflood
   0        8        0        107      0
*dtxht(1) dtxht(2)   dznht    hgapo
   2.0      10.0    1.0E-3    6300.0
*
* idbcin *    2      2e
* idbcon *    1      1e
*hcomon1 *   643      4        0        0e
*hcomon1 *   643      5        0        0e
*htc2 *     7.0    298.0e
*htc2 *     7.0    298.0e

```

```

* dhtstrz * 0.096 0.067e
* rdx * 0.04378e
* radrd * 0.8 0.80766667 0.81533333 0.823 0.848s
* radrd * 0.873 0.898 0.923e
* matrd * 6 6 6 50s
* matrd * 50 50 50e
* nfax * 1 1e
* rftn * 523.0 520.0 500.0 420.0s
* rftn * 400.0 350.0 330.0 300.0s
* rftn * 523.0 520.0 500.0 420.0s
* rftn * 400.0 350.0 330.0 300.0e
*
***** type num userid component name
htstr 1424 0 SG1-wallend4
* nzhstr ittc hscyl ichf
3 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfc1 nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood
0 8 0 114 0
* dtxht(1) dtxht(2) dznht hgapo
2.0 10.0 1.0E-3 6300.0
*
* idbcin * 2 2 2e
* idbcon * 1 1 1e
*hcomon1 * 643 6 0 0e
*hcomon1 * 643 7 0 0e
*hcomon1 * 643 8 0 0e
* htc2 * 7.0 298.0e
* htc2 * 7.0 298.0e
* htc2 * 7.0 298.0e
*dhtstrz * 0.054333333 0.054333333 0.054333333e
* rdx * 0.03206e
* radrd * 0.8 0.80766667 0.81533333 0.823 0.848s
* radrd * 0.873 0.898 0.923e
* matrd * 6 6 6 50s
* matrd * 50 50 50e
* nfax * 1 1 1e
* rftn * 523.0 520.0 500.0 420.0s
* rftn * 400.0 350.0 330.0 300.0s
* rftn * 523.0 520.0 500.0 420.0s
* rftn * 400.0 350.0 330.0 300.0s
* rftn * 523.0 520.0 500.0 420.0s
* rftn * 400.0 350.0 330.0 300.0e
*
***** type num userid component name
htstr 1506 0 Downcomer wall
* nzhstr ittc hscyl ichf
3 0 1 1
*nofuelrod plane liqlev iaxcnd
1 3 0 0
*nmwrx nfc1 nfcil hdri hdro
0 0 0 0.0 0.0
*nhot nodes fmno nzmax reflood

```

```

      0     8     0    100      0
* dtxht(1)  dtxht(2)  dznht   hgapo
      2.0     10.0    1.0E-3   6300.0
*
* idbcin *    2     2     2e
* idbcon *    1     1     1e
* hcomon1 *   292     1     0     0e
* hcomon1 *   292     2     0     0e
* hcomon1 *   292     3     0     0e
* htc2 *     7.0   298.0e
* htc2 *     7.0   298.0e
* htc2 *     7.0   298.0e
* dhtstrz *  0.163   0.096   0.096e
* rdx *   0.10387e
* radrd *  0.475  0.48279133 0.49058266      0.5 0.52378049s
* radrd * 0.54918699  0.5745935   0.6e
* matrd *   6     6     6     50s
* matrd *   50    50    50e
* nfax *    1     1     1e
* rftn *   523.0   500.0   450.0   400.0s
* rftn *   380.0   350.0   320.0   300.0s
* rftn *   523.0   500.0   450.0   400.0s
* rftn *   380.0   350.0   320.0   300.0s
* rftn *   523.0   500.0   450.0   400.0s
* rftn *   380.0   350.0   320.0   300.0e
*

```

*d: Top of steam generator Separator wall node 1 (cylinder part)

```

***** type      num      userid      component name
htstr       1531      0      Steamdomewall1
* nzhstr     ittc      hscyl      ichf
      1      0      1      1
*nofuelrod   plane     liqlev     iaxcnd
      1      3      0      0
* nmwrx      nfcil     nfcil      hdri      hdro
      0      0      0      0.0     0.0
* nhot       nodes     fmno      nzmax     reflood
      0      9      0      108     0
* dtxht(1)  dtxht(2)  dznht   hgapo
      2.0     10.0    1.0E-3   6300.0
*
* idbcin *    2e
* idbcon *    1e
* hcomon1 *  1546     1     0     0e
* htc2 *     7.0   298.0e
* dhtstrz *  0.134e
* rdx *   0.552462e
* radrd *  0.475  0.48279133 0.49058266      0.5 0.51869919s
* radrd * 0.53902439  0.55934959  0.5796748   0.6e
* matrd *   6     6     6     50s
* matrd *   50    50    50e
* nfax *    1e
* rftn *   523.0   523.0   520.0   500.0s
* rftn *   500.0   400.0   350.0   330.0s
* rftn *   310.0e
*
```

*d: Top of steam generator Separator wall node 2 (cylinder part)

```

***** type      num      userid      component name
htstr        1532       0          Steamdomewall2
*   nzhstr     ittc      hscyl      ichf
    1         0         1         1
*   nofuelrod   plane    liqlev    iaxcnd
    1         3         0         0
*   nmwrx      nfcii    nfcil      hdri      hdro
    0         0         0         0.0       0.0
*   nhot       nodes    fmno      nzmax      reflood
    0         9         0        108         0
*   dtxht(1)   dtxht(2)  dznht      hgapo
    2.0       10.0     1.0E-3     6300.0
*
*   idbcin *    2e
*   idbcon *    1e
*   hcomon1 *   1546       2         0         0e
*   htc2 *     7.0      298.0e
*   dhtstrz *  0.134e
*   rdx *     1.289078e
*   radrd *   0.475    0.48279133  0.49058266    0.5  0.51869919s
*   radrd *  0.53902439  0.55934959  0.5796748    0.6e
*   matrd *    6         6         6        50s
*   matrd *   50        50        50        50e
*   nfax *     1e
*   rftn *    523.0    523.0     520.0     500.0s
*   rftn *   500.0    400.0     350.0     330.0s
*   rftn *   310.0e
*
*d: Top of steam generator Separator wall node 1 (end part)
***** type      num      userid      component name
htstr        1541       0          Steamdomewallend1
*   nzhstr     ittc      hscyl      ichf
    1         0         1         1
*   nofuelrod   plane    liqlev    iaxcnd
    1         3         0         0
*   nmwrx      nfcii    nfcil      hdri      hdro
    0         0         0         0.0       0.0
*   nhot       nodes    fmno      nzmax      reflood
    0         9         0        108         0
*   dtxht(1)   dtxht(2)  dznht      hgapo
    2.0       10.0     1.0E-3     6300.0
*
*   idbcin *    2e
*   idbcon *    1e
*   hcomon1 *   1546       1         0         0e
*   htc2 *     7.0      298.0e
*   dhtstrz *  0.134e
*   rdx *    0.036114e
*   radrd *   0.8    0.80766667  0.81533333    0.823    0.843s
*   radrd *  0.863    0.883     0.903     0.923e
*   matrd *    6         6         6        50s
*   matrd *   50        50        50        50e
*   nfax *     1e
*   rftn *    523.0    523.0     520.0     500.0s
*   rftn *   500.0    400.0     350.0     330.0s
*   rftn *   310.0e

```

```

*
*d: Top of steam generator Separator wall node 2 (end part)
***** type      num      userid      component name
htstr      1542      0      Steamdomewallend2
*   nzhstr     ittc     hscyl     ichf
    1      0      1      1
*   nofuelrod   plane    liqlev    iaxcnd
    1      3      0      0
*   nmwrx      nfc1     nfcil     hdri      hdro
    0      0      0      0.0      0.0
*   nhot       nodes    fmno      nzmax      reflood
    0      9      0      108      0
*   dtxht(1)   dtxht(2)  dznht    hgapo
    2.0     10.0    1.0E-3    6300.0
*
*   idbcin *    2e
*   idbcon *    1e
*   hcomon1 *   1546      2      0      0e
*   htc2 *     7.0     298.0e
*   dhtstrz *   0.134e
*   rdx *     0.084266e
*   radrd *    0.8     0.80766667  0.81533333  0.823    0.843s
*   radrd *    0.863    0.883     0.903     0.923e
*   matrd *     6       6       6      50s
*   matrd *    50      50      50     50e
*   nfax *     1e
*   rftn *    523.0    523.0    520.0    500.0s
*   rftn *    500.0    400.0    350.0    330.0s
*   rftn *    310.0e
*****
* Finished Heat Structure Section of Model *
*****
*
*
*
end
*****
* Timestep Data *
*****
*   dtmin      dtmax      tend      rtwfp
    1.0E-6      1.0      1.0E4      10.0
*   edint      gfint      dmpint    sedint
    100.0      50.0      500.0     10.0
*
*   endflag
    -1.0

```


APPENDIX F

TRACE transient input of eight layer pipe model for LOF-10 experiment

```

free format
*
*****
* main data *
*****
*
*      numtcr      ieos      inopt      nmat      id2o
*          1          0          1          1          0
*
*****
* namelist data *
*****
*
&inopts
dtstrt=-1.0,
nfrcl=2,
usesjc=3,
nhtstr=15,
fluids='H2O'
&end
*
*****
* Model Flags *
*****
*
*      dstep      timet
*      28294      0.0
*      stdyst      transi      ncomp      njun      ipak
*          0          1          43          41          0
*      epso      epss
*      1.0E-4      1.0E-4
*      oitmax      sitmax      isolut      ncontr      nccl
*          10          10          0          0          0
*      ntsv      ntcb      ntcf      ntrp      ntcp
*          24          7          48          0          0
*
*****
* component-number data *
*****
*
* Component input order (IORDER)
*-- type ---- num ----- name ----- + jun1 jun2 jun3
* PIPE   * 1 s *           +  21  22
* PIPE   * 2 s *           +  23  24
* PIPE   * 3 s *           +  25  26
* PIPE   * 122 s * SG3-coldcol +  38  0
* PIPE   * 241 s * SG3-hotcol +  37  0
* PIPE   * 292 s *          +  0  2
* PIPE   * 312 s *          +  3  4
* PIPE   * 313 s *          +  8  7
* PIPE   * 314 s *          + 10  9
* PIPE   * 322 s *          + 12 11
* PIPE   * 323 s *          + 14 13
* PIPE   * 332 s *          + 16 15
* PIPE   * 333 s *          + 18 17
* PIPE   * 342 s *          + 20 19

```

```

* PIPE * 352 s * SG3-inlet      + 39 37
* PIPE * 353 s *               + 40 38
* FILL * 463 s *               + 41
* PIPE * 643 s *               + 0 1
* BREAK * 873 s *               + 6
* PIPE * 953 s *               + 27 28
* PIPE * 954 s *               + 29 30
* PIPE * 963 s *               + 31 32
* PIPE * 964 s *               + 33 34
* PIPE * 973 s *               + 35 36
* HTSTR * 1375 s * HL1-col-bot +
* HTSTR * 1380 s * CL1-col-bot +
* HTSTR * 1411 s * SG1-pool-wall1 +
* HTSTR * 1412 s * SG1-pool-wall2 +
* HTSTR * 1413 s * SG1-pool-wall3 +
* HTSTR * 1414 s * SG1-pool-wall4 +
* FILL * 1420 s *               + 39
* HTSTR * 1421 s * SG1-wallend1 +
* HTSTR * 1422 s * SG1-wallend2 +
* HTSTR * 1423 s * SG1-wallend3 +
* HTSTR * 1424 s * SG1-wallend4 +
* BREAK * 1430 s *               + 40
* HTSTR * 1506 s * Downcomer wall +
* PIPE * 1516 s *               + 5 6
* HTSTR * 1531 s * Steamdomewall1 +
* HTSTR * 1532 s * Steamdomewall2 +
* HTSTR * 1541 s * Steamdomewallend1 +
* HTSTR * 1542 s * Steamdomewallend2 +
* SEPD * 1546 e *               + 1 5 2
*
*****
```

* material properties *

*

* matb* 50e

* ptbln* 3e

* User Defined Material : 50

*

*n: Mineral wool

*

prptb	temp	rho	cp	cond	emis
prptb*	283.0	120.0	800.0	0.099	0.76s
prptb*	373.0	120.0	800.0	0.12	0.76s
prptb*	573.0	120.0	800.0	0.213	0.76e

*

* Starting Signal Variable Section of Model *

*

idsv	isvn	ilcn	icn1	icn2
1	0	0	0	0

*

idsv	isvn	ilcn	icn1	icn2
2	20	1546	1	2

*

idsv	isvn	ilcn	icn1	icn2
------	------	------	------	------

	3	20	643	1	8
*n: HTRPipe1					
*					
*	idsv	isvn	ilcn	icn1	icn2
	11	103	1	0	0
*n: HTRPipe2					
*					
*	idsv	isvn	ilcn	icn1	icn2
	12	103	2	0	0
*n: HTRPipe3					
*					
*	idsv	isvn	ilcn	icn1	icn2
	13	103	3	0	0
*n: HTRPipe4					
*					
*	idsv	isvn	ilcn	icn1	icn2
	14	103	953	0	0
*n: HTRPipe5					
*					
*	idsv	isvn	ilcn	icn1	icn2
	15	103	954	0	0
*n: HTRPipe6					
*					
*	idsv	isvn	ilcn	icn1	icn2
	16	103	963	0	0
*n: HTRPipe7					
*					
*	idsv	isvn	ilcn	icn1	icn2
	17	103	964	0	0
*n: HTRPipe8					
*					
*	idsv	isvn	ilcn	icn1	icn2
	18	103	973	0	0
*n: HLSEPD1					
*					
*	idsv	isvn	ilcn	icn1	icn2
	21	103	1531	0	0
*n: HLSEPD2					
*					
*	idsv	isvn	ilcn	icn1	icn2
	22	103	1532	0	0
*n: HLSEPD3					
*					
*	idsv	isvn	ilcn	icn1	icn2
	23	103	1541	0	0
*n: HLSEPD4					
*					
*	idsv	isvn	ilcn	icn1	icn2
	24	103	1542	0	0
*n: HLPOOL1					
*					
*	idsv	isvn	ilcn	icn1	icn2
	31	103	1411	0	0
*n: HLPOOL2					
*					
*	idsv	isvn	ilcn	icn1	icn2

```

      32      103      1412      0      0
*n: HLPOOL3
*
*      idsv      isvn      ilcn      icn1      icn2
      33      103      1413      0      0
*n: HLPOOL4
*
*      idsv      isvn      ilcn      icn1      icn2
      34      103      1414      0      0
*n: HLPOOL5
*
*      idsv      isvn      ilcn      icn1      icn2
      35      103      1421      0      0
*n: HLPOOL6
*
*      idsv      isvn      ilcn      icn1      icn2
      36      103      1422      0      0
*n: HLPOOL7
*
*      idsv      isvn      ilcn      icn1      icn2
      37      103      1423      0      0
*n: HLPOOL8
*
*      idsv      isvn      ilcn      icn1      icn2
      38      103      1424      0      0
*n: HLPOOL8
*
*      idsv      isvn      ilcn      icn1      icn2
      39      103      1506      0      0
*****
* Finished Signal Variable Section of Model  *
*****
*
*****
* Starting Control System Section of Model *
*****
*
*****
Control Blocks *****
*
*      idcb      icbn      icb1      icb2      icb3
      -1          3          2          3          0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
      1.0     -1.0E20    1.0E20      0.0      0.0
*
*
*      idcb      icbn      icb1      icb2      icb3
      -2         200        -1       -40          0
*      cbgain    cbxmin    cbmax    cbcon1    cbcon2
      160.0      0.0        0.6      0.712      0.0
*      cbdt      cbtau
      100.0      0.05
*
*n: HTRPRtoSEC
*
*      idcb      icbn      icb1      icb2      icb3
      -3         103         8          0          0

```

```

*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids *      11      12      13      14s
*  ids *      15      16      17      18e
*
*      idcb      icbn      icb1      icb2      icb3
      -4      103      4      0      0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids *      21      22      23      24e
*
*
*      idcb      icbn      icb1      icb2      icb3
      -5      103      8      0      0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*  ids *      31      32      33      34s
*  ids *      35      36      37      38e
*
*n: HLSEC
*
*      idcb      icbn      icb1      icb2      icb3
      -6      57      -4      -5      39
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1.0E20      1.0E20      0.0      0.0
*
*      idcb      icbn      icb1      icb2      icb3
      -40      101      1      4      0
*      cbgain      cbxmin      cbmax      cbcon1      cbcon2
      1.0      -1000.0      1000.0      0.0      0.0
*  cbtbl *      0.0      0.712s
*  cbtbl *      1000.0      0.712s
*  cbtbl *      1001.0      0.0s
*  cbtbl *      2.0E4      0.0e
*
*****
* Finished Control System Section of Model *
*****
*
***** type      num      userid      component name
fill      1420      1      unnamed
*  jun1      ifty      ioff
      39      6      0
*  iftr      ifsv      nftb      nfsv      nfrf
      0      1      5      0      0
*  twtold      rfmx      concin      felv
      0.0      1.0E20      0.0      0.0
*  dxin      violin      alpin      vlin      tlin
      1.0      0.015394      0.0      0.0      528.0
*  pin      pain      flowin      vvin      tvin
      7.3E6      0.0      0.0      0.0      528.0
*  vmscl      vvscl
      1.0      1.0
*  tlscl      tvscl      pscl      pascl      conscl
      1.0      1.0      1.0      1.0      1.0
*
```

```

* vmtbm *      0.0   0.40607s
* vmtbm *    1000.0   0.40607s
* vmtbm *    1100.0  0.05075875s
* vmtbm *    1600.0  0.05075875s
* vmtbm *    1.6E4  0.05075875e
*
* vvtb *      0.0   0.40607s
* vvtb *    1000.0   0.40607s
* vvtb *    1100.0  0.05075875s
* vvtb *    1600.0  0.05075875s
* vvtb *    1.6E4  0.05075875e
*
* tlbt *      0.0   528.0s
* tlbt *    1000.0   528.0s
* tlbt *    1100.0   528.0s
* tlbt *    1600.0   541.0s
* tlbt *    1.6E4   548.5e
*
* tvtb *      0.0   528.0s
* tvtb *    1000.0   528.0s
* tvtb *    1100.0   528.0s
* tvtb *    1600.0   541.0s
* tvtb *    1.6E4   548.5e
*
* alptb *     0.0   0.0s
* alptb *   1000.0   0.0s
* alptb *   1100.0   0.0s
* alptb *   1600.0   0.0s
* alptb *   1.6E4   0.0e
*
* ptb *       0.0   7.3E6s
* ptb *   1000.0   7.3E6s
* ptb *   1100.0   7.3E6s
* ptb *   1600.0   7.3E6s
* ptb *   1.6E4   7.3E6e
*
* patb *     0.0   0.0s
* patb *   1000.0   0.0s
* patb *   1100.0   0.0s
* patb *   1600.0   0.0s
* patb *   1.6E4   0.0e
*
*****
* Starting Heat Structure Section of Model *
*****
* Finished Heat Structure Section of Model *
*****
*
end
*
*****
* Timestep Data *
*****
*      dtmin      dtmax      tend      rtwfp
*      1.0E-6      1.0       1.6E4      10.0
*      edint      gfint      dmpint      sedint

```

* 100.0 50.0 500.0 10.0
* endflag
-1.0