

RELAP/MOD3.2 Assessment Using an 11% Upper Plenum Break Experiment in the PSB Facility

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ABSTRACT

The RELAP/MOD3.2 computer code has been assessed using an 11% upper plenum break experiment in the PSB test facility at the Electrogorsk Research and Engineering Center. This work was performed as part of the U.S. Department of Energy's International Nuclear Safety Program, and is part of the effort addressing the capability of the RELAP5/MOD3.2 code to model transients in Soviet-designed reactors.

Designated VVER Standard Problem PSBV1, the test addressed several important phenomena related to VVER behavior that the code needs to simulate well. The code was judged to reasonably model the phenomena of two-phase flow natural circulation in the primary coolant system, asymmetric loop behavior, leak flow, loop seal clearance in the cold legs, heat transfer in a covered core, heat transfer in a partially covered core, pressurizer thermal-hydraulics, and integral system effects. The code was judged to be in minimal agreement with the experiment data for the mixture level and entrainment in the core, leading to a user recommendation to assess the sensitivity of transient calculations to the interphase drag modeling in the core. No judgments were made for the phenomena of phase separation without mixture level formation, mixture level and entrainment in the steam generators, pool formation in the upper plenum, or flow stratification in horizontal pipes because either the phenomenon did not occur in the test or there were insufficient measurements to characterize the behavior.

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ACRONYMS

ACC	accumulator
CCFL	countercurrent flow limitation
ECC	emergency core coolant
ECCS	emergency core cooling system
EREC	Electrogorsk Research and Engineering Center on Nuclear Plants Safety
HPI	high pressure injection
INEEL	Idaho National Engineering and Environmental Laboratory
INSP	International Nuclear Safety Program
RBMK	boiling water-cooled, graphite-moderated reactor
SG	steam generator
VVER	water-cooled, water-moderated energy reactor

RELAP5/MOD3.2 Assessment Using an 11% Upper Plenum Break Experiment in the PSB Facility

1. INTRODUCTION

The RELAP5/MOD3.2 computer code is being investigated to determine its applicability for modeling transients in Soviet-designed reactors. Part of that investigation includes assessment of the code using experiment data. Such an assessment has been performed using data from the PSB facility at the Electrogorsk Research and Engineering Center for Nuclear Plants Safety (EREC).

This work has been undertaken as part of Joint Project #6, "Verification of Software with Respect to VVER and RBMK Reactors," of the U.S. Department of Energy's International Nuclear Safety Program (INSP). Russian experts and scientists from the United States are collaborating in the code assessment process. The specific experiment being used for this study was an 11% break in the upper plenum, which is a counterpart to an earlier experiment performed in the ISB facility. That earlier experiment was analyzed as VVER Standard Problem #5 in the INSP code validation effort; the current test is designated as Standard Problem PSBV1.

1.1 Important Phenomena

Reference 1 identifies the transient phenomena that are important for any code to be able to model well in order to provide confidence in the simulation of VVER transient behavior. The standard problem definition report² identifies the following phenomena as being addressed by this experiment:

- Two-phase flow natural circulation in the primary coolant system
- Asymmetric loop behavior
- Leak flow
- Separation of phases without mixture level formation
- Mixture level and entrainment in the steam generators
- Mixture level and entrainment in the core
- Flow stratification in horizontal pipes
- Loop seal clearance in the cold legs
- Pool formation in the upper plenum
- Heat transfer in a covered core
- Heat transfer in a partially uncovered core
- Pressurizer thermal-hydraulics

- Integral system effects.

1.2 Code Capability Determination

Judgments regarding code fidelity were made based on the code/data comparisons presented in this report. These judgments were based on the application of a standardized, consistent, and qualitative set of criteria. The terminology of these criteria is defined below.

"Excellent agreement" applies when the code exhibits no deficiencies in modeling a given behavior. Major and minor phenomena and trends are correctly predicted. The calculated results are judged to agree closely with the data. The calculation will, with few exceptions, lie within the uncertainty bands of the data. The code may be used with confidence in similar applications. (The term "major phenomena" refers to the phenomena that influence key parameters such as fuel rod cladding temperature, pressure, differential pressure, mass flow rate, and mass distribution. Predicting major trends means that the prediction shows the significant features of the data. Significant features include the magnitude of a given parameter through the transient, slopes, and inflection points that mark significant changes in the parameter.)

"Reasonable agreement" applies when the code exhibits minor deficiencies. Overall, the code provides an acceptable prediction. All major trends and phenomena are correctly predicted. Differences between calculation and data are greater than deemed necessary for excellent agreement. The calculation will occasionally lie outside the uncertainty bands of the data. However, the correct conclusions about trends and phenomena would be reached if the code were used in similar applications. The code models and/or facility model nodding should be reviewed to see if improvements can be made.

"Minimal agreement" applies when the code exhibits significant deficiencies. Overall, the code provides a prediction that is only conditionally acceptable. Some major trends or phenomena are not predicted correctly, and some calculated values lie considerably outside the uncertainty bands of the data. Incorrect conclusions about trends and phenomena may be reached if the code were used in similar applications, and an appropriate warning needs to be issued to users. Selected code models and/or facility model nodding need to be reviewed, modified, and assessed before the code can be used with confidence in similar applications.

"Insufficient agreement" applies when the code exhibits major deficiencies. The code provides an unacceptable prediction of the test. Major trends are not predicted correctly. Most calculated values lie outside the uncertainty bands of the data. Incorrect conclusions about trends and phenomena are probable if the code is used in similar applications, and an appropriate warning needs to be issued to users. Selected code models and/or facility model nodding need to be reviewed, modified, and assessed before the code can be used with confidence in similar applications.

Assessment findings of "excellent" or "reasonable" indicate that the code can model those phenomena acceptably.

Subsequent sections of the report present a description of the test facility and experiment, the RELAP5 code and test facility input model, the assessment results, the conclusions reached in the assessment study, and references.

2. FACILITY AND TEST DESCRIPTION

Standard Problem PSBV1 is based on an 11% upper plenum break in the PSB-VVER test facility. The facility and the specific test are described in the following subsections.

2.1 Experiment Facility

The PSB-VVER facility (see Figure 1) is a full-height scale model of a VVER-1000 reactor that is approximately 1/300 scale in volume and power. The facility has four coolant loops. The pressurizer surge line is connected to two of the hot legs, with only one flow path being used in a given experiment. Emergency core coolant (ECC) injection is provided by four accumulators and by an active pump simulating the high- and low-pressure injection system pumps. All system components are insulated from the environment with glass wool insulation, but during initial steady state operation about 3.4% of the input heat is lost to the environment.

The internals of the VVER vessel are represented in the facility by separate pipes for the downcomer, the core and upper plenum, and the core bypass. A horizontal pipe connects the lower portion of the downcomer to the core and core bypass pipes. There is also a small pipe connecting the top of the downcomer to the upper plenum. The core contains 168 full height hollow fuel rod simulators (hereinafter, heater rods) with a uniform power profile and a center unheated rod. About 3% of the downcomer flow is diverted through the core bypass instead of going through the core. Special flow restrictors, each consisting of a plate with 2 holes of 7 mm diameter, were inserted at either end of the core bypass section. The bypass section is heated over the same elevation range as the core but only receives about 1% of the core power.

Each coolant loop includes a hot leg, steam generator, pump suction piping, pump, and cold leg. The primary side of each steam generator contains hot and cold collectors, and 27 steam generator tubes. Each tube is a coil with ten complete turns, inclined slightly downward from the hot collector to the cold collector. The secondary side has a feedwater ring in the plenum above the steam generator tubes, and no separate downcomer region. The four steam generators are connected to a common steam header. Feedwater flow to the steam generators is not continuous. Flow is provided when needed to keep the water level within the desired operating band.

The break was located in a special pipe connected to the upper plenum. An insert with an inner diameter of 16 mm and a length-to-diameter ratio of 10 was installed in the 45-mm diameter break piping. A valve downstream of the insert was opened to initiate the transient.

Cylinders in the downcomer and upper plenum are used to separate the ECC flows from the break and the hot and cold leg nozzles. The break piping and hot and cold legs are connected to the outer walls of the upper plenum and downcomer. The ECC is connected to the inside of these cylinders, providing a barrier to immediate bypass of the ECC flow into the loop piping or out the break.

2.2 Test Procedure

The 11% upper plenum break represented a rupture of an emergency core cooling system (ECCS) injection line. The ECCS equipment available for this experiment was high pressure injection (HPI) to the loop 4 hot leg and all four accumulators.

The experiment was initiated from steady state conditions by opening the break. The electrical power supplied to the heater rods and the core bypass heaters was reduced to simulate reactor scram. Following

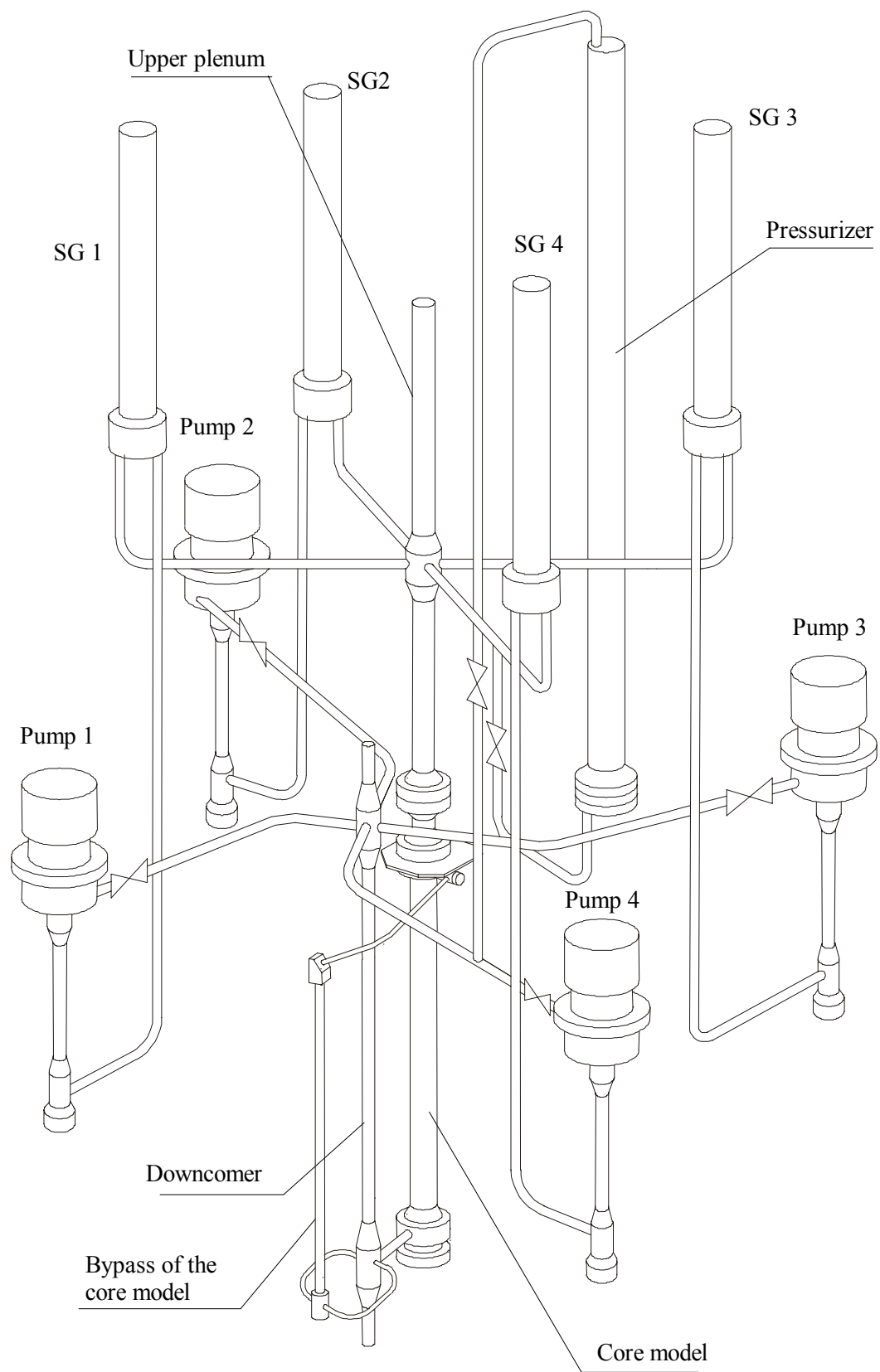


Figure 1. General view of the PSB facility.

the simulated scram, feedwater flow to the steam generators was stopped, and the steam line isolation valves were closed. The main circulation pumps were tripped near 10 s. High pressure injection flow was initiated at an upper plenum pressure of 10.5 MPa, providing coolant flow to the loop 4 hot leg. The transient was then allowed to progress until elevated temperatures were measured in the core and core bypass structures. When the core bypass structure temperature reached 673 K, the bypass heaters were de-energized. Power to the core was turned off at 1037 s, terminating the test, when the peak measured heater rod temperature was near 1100 K.

3. CODE AND INPUT MODEL DESCRIPTION

The RELAP5/MOD3.2 code and input model used for the assessment calculations are described below. Also addressed are the initial and boundary conditions used for the transient calculations.

3.1 RELAP5/MOD3.2

The RELAP5/MOD3.2 computer code³ was developed at the Idaho National Engineering and Environmental Laboratory (INEEL) for use in analyzing transients in light water reactors. It can be used for simulating a wide variety of system transients of interest in reactor safety. The core, primary system, secondary system, feedwater train, and system controls can be simulated.

RELAP5/MOD3.2 uses a one-dimensional, two fluid, nonequilibrium, six equation hydrodynamic model with a simplified capability to treat multi-dimensional flows. This model provides continuity, momentum, and energy equations for both the liquid and the vapor phases within a control volume. The energy equation contains source terms which couple the hydrodynamic model to the heat structure conduction model by a convective heat transfer formulation. The code contains special process models for critical flow, abrupt area changes, branching, crossflow junctions, pumps, accumulators, valves, core neutronics, and control systems. A countercurrent flow limitation model can also be applied at vertical junctions. The reflood model does not work properly in this version of the code.

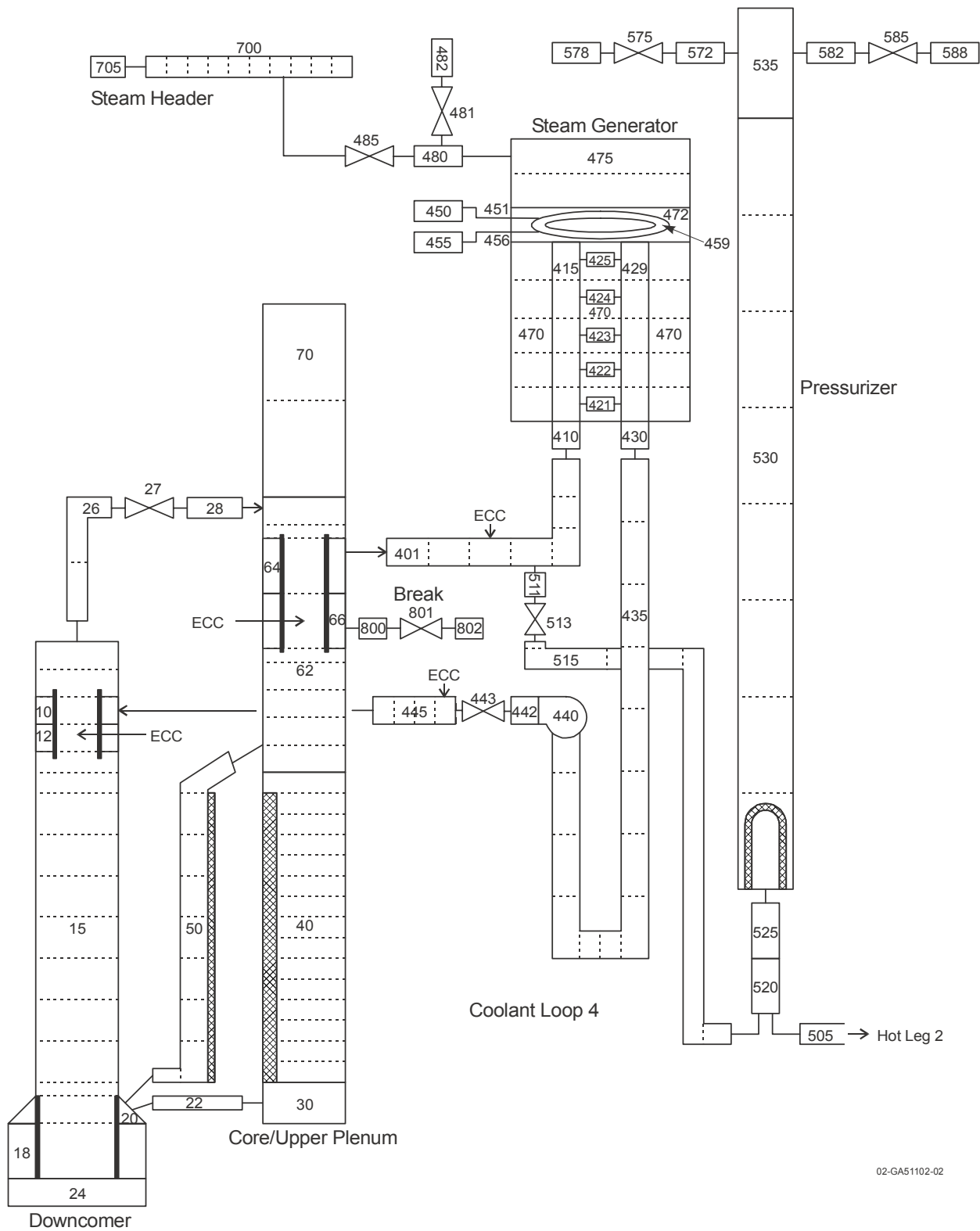
The code has been developed to run on a variety of computing platforms, from mainframes to personal computers. Configuration control is maintained on all versions of the code developed at the INEEL.

3.2 RELAP5 Input Model

All of the major features of the experiment facility were included in the RELAP5 input model. Each of the four coolant loops included a hot leg, steam generator, pump suction loop seal piping, main coolant pump, and a cold leg. The downcomer, core, core bypass, upper plenum, and bypass piping between the downcomer and upper plenum were also included in the model. The pressurizer was modeled, with surge lines connecting to two of the hot legs. The secondary side of the steam generators included main and auxiliary feedwater, individual steam lines and the common steam header. High pressure injection flow was provided to the loop 4 hot leg, and four accumulators provided flow to the downcomer and upper plenum (two to each location). Relief valves were included on the pressurizer and each of the steam lines. Figure 2 provides a nodalization diagram for the model, showing the reactor vessel components and one coolant loop with the pressurizer; the other three loops have identical nodalizations, except that two loops are not connected to the pressurizer. The model contains 534 volumes, 557 junctions, and 521 heat structures with 5549 mesh points. Standard modeling guidelines were followed in developing the nodalization of the system. The nodalization approach was peer reviewed. Appendix A provides a listing of the input model.

The steam generator secondary side is modeled with a single stack of volumes in the tube bundle region. There is no physical barrier between the tube bundle and the outer shell of the steam generator, and attempts to model a downcomer region separate from the riser, with crossflow junctions between them, resulted in unphysical flow rates.

The heat transfer coefficient on the inside of the steam generator tubes was increased by 20% by using a fouling factor of 1.2. This was done to estimate the convective heat transfer enhancement caused



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Figure 2. Nodalization of the PSB reactor vessel, pressurizer, and one coolant loop.

by the coiled tubes,⁴ because the wall heat transfer model available in RELAP5 was developed for straight tubes.

No data were available on the pump performance, so built-in data for Westinghouse pumps were used. No two-phase degradation was modeled because no appropriate data were available; this is not expected to affect the transient behavior because the pumps coast down very quickly (~4 s) after being tripped.

There was no measurement of the flow through the core bypass. The loss coefficients through the bypass flow path were adjusted during the steady state calculation so that the calculated coolant temperature at the top of the core bypass matched the measured value of 570 K (measurement YC01T03).

Choking was turned off at most of the junctions, as recommended in the code user guidelines. Exceptions were the break, at valves, at the pressurizer connection to the surge line and the surge line connections to the hot leg, and at the core outlet. The break piping was attached to the upper plenum one volume below the hot leg connections. The break was modeled as an abrupt area change with user-input loss coefficients of 1.465 (calculated for the break geometry). No characterization data were available for the break geometry. Based on previous experience, a subcooled discharge coefficient of 0.80 was used; the saturated and superheated discharge coefficients were left at the default value of 1.0.

The RELAP5/MOD3.2 countercurrent flow limitation (CCFL) model was applied at five locations in the model: in the downcomer below the accumulator injection nozzles, at the core outlet, in the upper plenum below the accumulator injection nozzles, at the plate between the upper plenum and the upper head, and at the outlet of the riser section on the secondary side of the steam generators. These junctions were selected because they were vertically oriented, represented places where the flow area changed, and modeled regions of the facility where CCFL might be expected to occur.

The heat loss from the primary and secondary was represented in the RELAP5/MOD3.2 model by entering the thickness of the insulation on the outside of all the pipes and other system components. Appropriate material properties were input for the insulation. A constant boundary temperature was applied. The heat transfer coefficient on the outer surface of the insulation was determined from model benchmarking calculations using heat loss data from the facility.⁵

3.3 Initial and Boundary Conditions

A steady state calculation was performed to establish the desired initial conditions in the PSB facility model for the transient calculation. Results from this calculation are compared to the values from the experiment in Table 1. Except for the steam generator pressures, all of the calculated initial conditions were in good agreement with the measured values. The steam generator pressures are lower than the measured values. In the steady state calculation, the steam header pressure was adjusted to achieve the desired reactor vessel inlet temperature; the resulting pressure required to remove the heat from the tubes was lower than in the experiment. This is likely the result of not having appropriate, specific heat transfer correlations for the coiled geometry of the steam generator tubes. The accumulator levels and pressures are also slightly different in some cases. The measured values in the table were taken from the experiment data report,⁶ while the RELAP5 input model initial values were adjusted to match the initial values from the electronic data file.

The initial conditions for the test were not all steady. For example, the feedwater flow to the steam generators was not continuous in the facility. Intermittent flow was used to keep the liquid level within a desired band. By contrast, a steady feedwater flow was maintained to keep the level constant at the

Table 1. Measured and calculated initial conditions for the PSB 11% upper plenum break experiment.

Parameter	Measured	Calculated
Upper plenum pressure (MPa)	16.9	16.9
Downcomer inlet temperature (K)	559.7	559.7
Upper plenum outlet temperature (K)	589.7	589.5
Core power (kW)	1520	1520
Core bypass power (kW)	17.4	17.4
Pressurizer level ^a (m)	6.99	6.99
Loop flow (kg/s)		
Loop 1	2.3	2.3
Loop 2	2.3	2.3
Loop 3	2.3	2.3
Loop 4	2.4	2.4
Liquid level (m)		
Steam generator 1	1.71	1.71
Steam generator 2	1.71	1.71
Steam generator 3	1.84	1.84
Steam generator 4	1.74	1.74
Pressure (MPa)		
Steam generator 1	7.43	7.17
Steam generator 2	7.47	7.17
Steam generator 3	7.33	7.17
Steam generator 4	7.43	7.17
Liquid level (m)		
Accumulator 1	4.84	4.83
Accumulator 2	4.84	4.84
Accumulator 3	4.86	4.86
Accumulator 4	4.85	4.84
Pressure (MPa)		
Accumulator 1	5.8	5.9
Accumulator 2	5.8	6.0
Accumulator 3	5.9	5.9
Accumulator 4	5.9	5.9

a. The specified pressurizer level is the reading from measurement YP01L02, whose lower tap is 1.885 m above the bottom of the pressurizer.

desired initial value in the RELAP5 calculation. The impact of the different approach in the calculation is that although the initial liquid level is at the desired value, the feedwater flow rate is different from the measured value in each of the steam generators. Since the steam generator secondary behavior is not significant in this transient, this anomaly is not expected to have a noticeable impact on the primary coolant system behavior.

The core power measured during the experiment was input as the power table in the RELAP5 calculation. The measured core bypass power was also input as a boundary condition, with the power being held constant at 11.6 kW until the maximum temperature in the core bypass piping reached 673 K; at that time, the power was turned off to protect the heater.

HPI flow and temperature were also input as boundary conditions for the calculation, based on the measured data; the HPI flow was a specified boundary condition for the test as well. HPI flow was started when the upper plenum pressure decreased to 10.5 MPa; in the calculation, a 0.7-s delay was included to account for signal processing time. The timing of the feedwater and steam valve closings in the input deck were also based on the measured data.

The transient calculations were terminated when the peak heater rod temperature reached 1073 K.

3.4 Calculation Information

The RELAP5 calculations were run on a DEC AlphaStation 600 computer. The semi-implicit solution scheme was used. The base case transient calculation ran 830 s of transient in 4112 s of cpu time. The calculated mass error in the primary coolant system was less than 0.5% of the total system coolant mass at the end of the calculation, indicating that the calculated response was not compromised by the accuracy of the numerical solution.

4. CODE ASSESSMENT

Once acceptable steady state conditions were established, transient calculations were undertaken. In addition to the base case calculation, several sensitivity calculations were performed to investigate certain aspects of the transient and code performance that were of particular interest.

Assessment judgments were made for the high-ranked phenomena believed to be addressed by this experiment. These phenomena were listed in Section 1, as were the assessment definitions and criteria.

4.1 Base Case

The behavior in the four loops was very similar. The discussions below will generally address only one loop, with the understanding that the same behavior was observed or calculated in the other three coolant loops. In those cases where different phenomena were observed, they will be presented.

Measured and calculated pressures in the upper plenum are presented in Figure 3. Table 2 provides the sequence of significant events for the experiment. A brief overview of the behavior observed in the experiment is provided here, then the comparisons between the data and calculations will be presented and discussed. Following the break opening, the system pressure decreased rapidly. The depressurization slowed near 50 s, as liquid began to boil in the core. As the pressure continued to decrease, accumulator injection began near 200 s. Condensation of some of the steam in the system by the cold ECC liquid caused the depressurization rate to increase. The ECC injection flow could not fully compensate for the break flow, allowing the core liquid level to drop low enough that the core began to heat up above the coolant saturation temperature. A cyclic behavior was then observed in the primary coolant system. The accumulator injection increased the depressurization rate because of steam condensing on the cold water

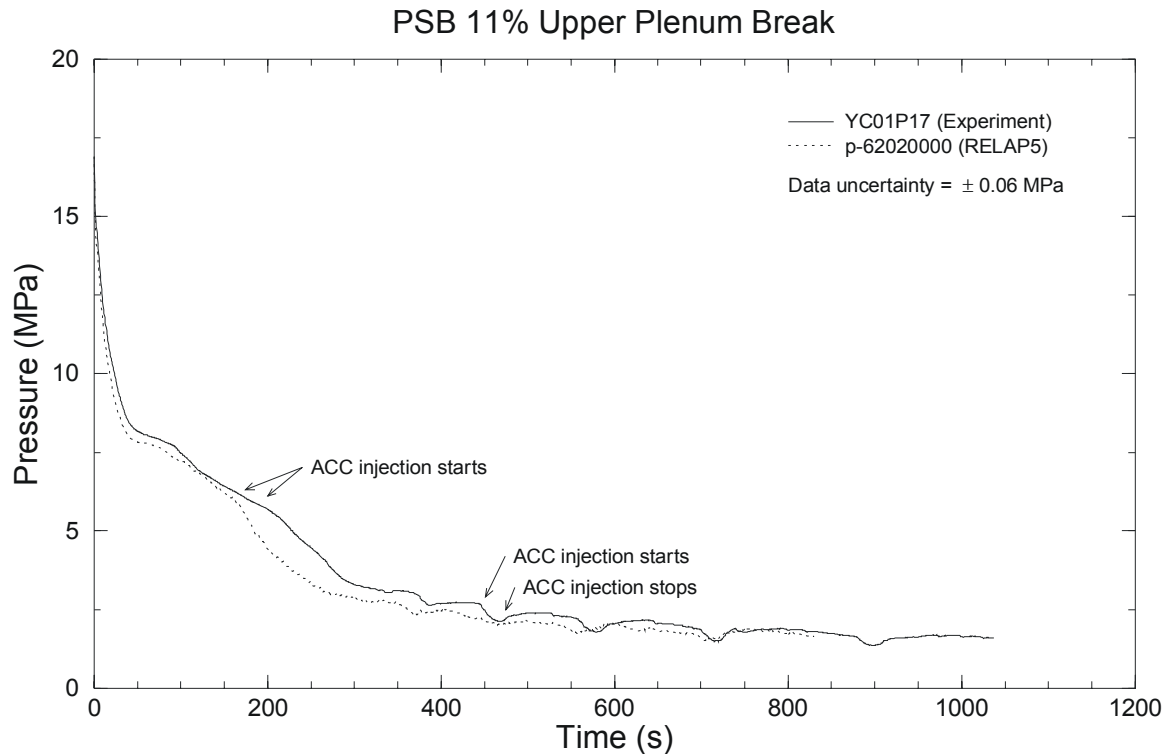


Figure 3. Upper plenum pressure for the base case.

Table 2. Sequence of events for the PSB 11% upper plenum break experiment.

Event	Time (s)	
	Data	Calculation
Break opens	0	0
Scram/power decrease	5	5 ^a
Pressurizer heaters turned off	6	5
Main coolant pumps tripped	10	10 ^a
Steam generator 4 feedwater flow ends	10	10 ^a
Steam generator 1 feedwater flow ends	13	13 ^a
Steam generator 3 feedwater flow ends	14	14 ^a
Steam generator 2 steam flow ends	17	17 ^a
Pressurizer above heaters empties (measurement YP01L02)	19	16
Steam generator 1 steam flow ends	20	20 ^a
HPI starts	21	18
Steam generator 4 steam flow ends	23	23 ^a
Steam generator 3 steam flow ends	24	24 ^a
Primary pressure drops below secondary pressure	86	83
Accumulator 4 injection starts	165	163
Accumulator 2 injection starts	175	157
Accumulator 3 injection starts	184	163
Accumulator 1 injection starts	194	163
Core heatup starts	222	170
Core bypass heater tripped	559	--
Experiment terminated	1037	830

a. Specified boundary condition in the calculation, based on the experiment data.

being injected. This further increased the accumulator flow, refilling parts of the downcomer and core. As the liquid level in the core increased, the heater rods were quenched, and the increased vapor generation caused the pressure to increase, stopping accumulator injection. Without the accumulator injection, the liquid level in the core decreased, and the heater rods began to heat up again. The vapor generation rate was reduced because less liquid was available to boil, so the pressure decreased, allowing the accumulators to inject liquid again. This cyclic accumulator injection continued through much of the experiment, although the injection became less effective in stopping the core heatup; after 700 s, the injection was unable to completely quench the core. The test was terminated shortly after 1000 s to protect the heater rods, when the maximum heater rod temperature was near 1100 K.

The calculated pressure decreased a little more rapidly than was measured immediately after the break was opened, and again when accumulator injection began. The calculation exhibited the same effects of the accumulator injection as the test, with the depressurization rate increasing as the injection began, then the pressure increasing to temporarily stop the injection as more liquid was boiled in the core, although the magnitude of the pressure changes was smaller than in the test.

Measured and code input core and core bypass powers are shown in Figures 4 and 5, respectively. The bypass heater was turned off when high heater temperatures were achieved, which occurred in the test but not in the calculation. Figure 6 shows the power to the pressurizer heaters. In the test, full power to the heaters was provided for about 5 s. In the calculation, the pressure decreased more rapidly, and full power to the heaters was provided for about 4 s. In both cases, power to the heaters was shut off when the pressure decreased to 13.73 MPa.

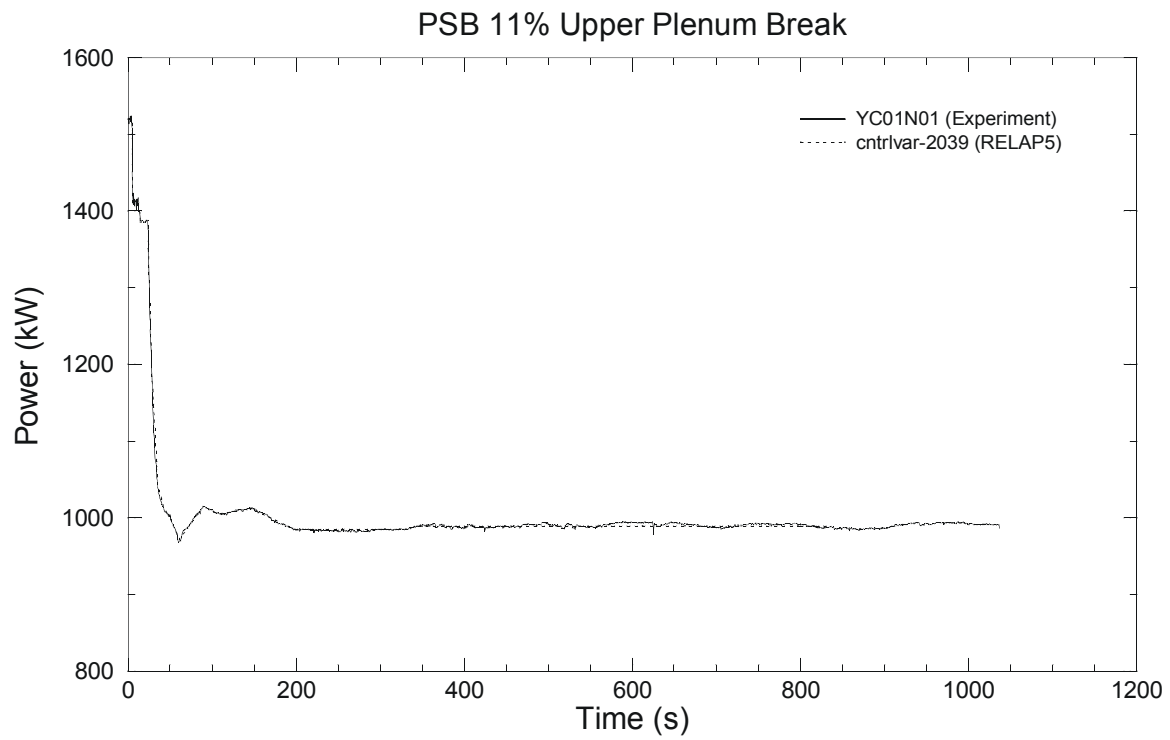


Figure 4. Core power.

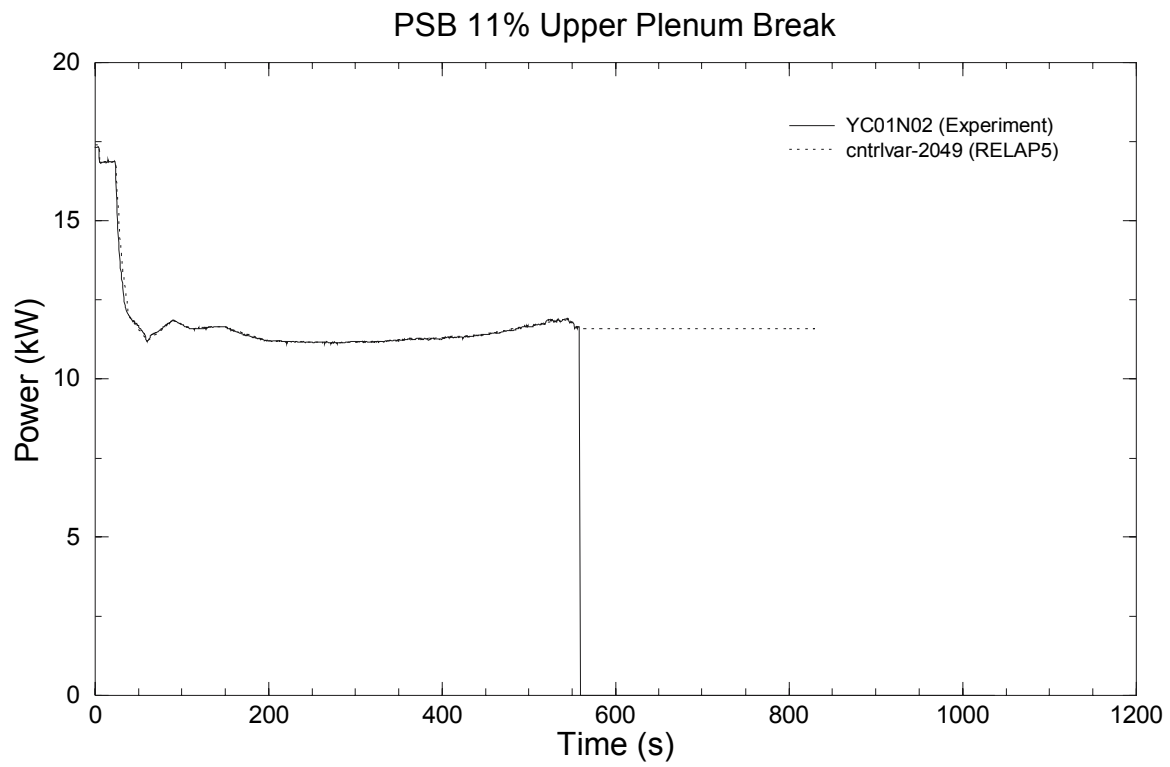


Figure 5. Core bypass power for the base case.

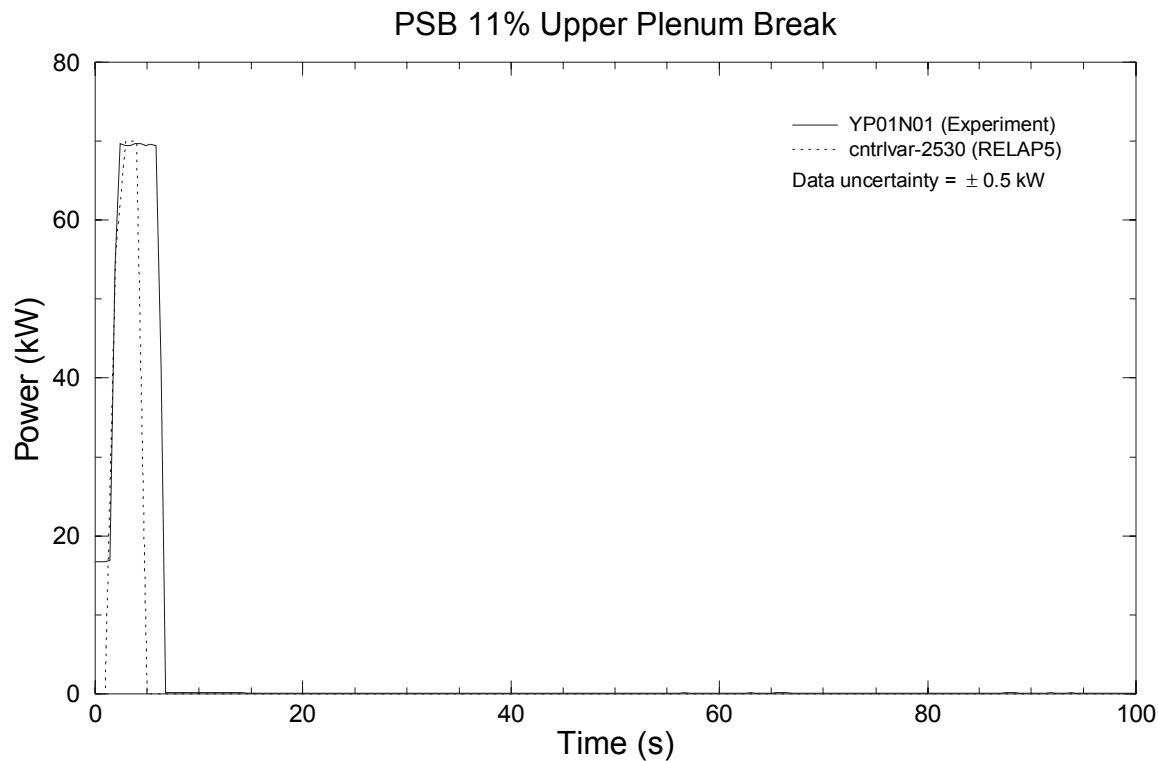


Figure 6. Pressurizer heater power for the base case.

Figure 7 shows the mass flow rate through the break. Despite the higher calculated peak flow rate, the calculation released about the same total mass through the break during the first 20 s. The calculated flow rate was then higher than the measured value for about 50 s, although the upstream fluid densities, shown in Figure 8, were the same; this is an indication that using a smaller discharge coefficient in the input model would provide a better match to the data. The calculated flow made the transition to a high quality mixture faster than the test, resulting in a lower flow rate from 100-300 s. The periodic accumulator injection had a more noticeable effect in the test than in the calculation, causing small increases in the mass flow rate as some of the liquid being injected into the upper plenum was entrained through the break. This is also seen in the fluid density figure. Both the measurement and the calculation show large variations in the fluid density upstream of the break through much of the transient. The measured density increase at the beginning of the transient is questionable. The measured temperature, shown in Figure 9, indicates that in the first 20 s both the temperature and density have increased from their initial values, while the pressure has decreased, which is not self-consistent. The measured temperature was very close to the saturation temperature throughout the test, with a few sharp decreases in temperature indicating colder liquid flowing to the break. This effect was more pronounced in the calculation, where the discrete nodalization allows the colder ECCS flow to be transported to the break piping with less heating than appears to be occurring in the test.

Figure 10 presents the measured and calculated pressurizer levels, for the instrument that spans the portion of the pressurizer from just above the heaters to the top of the tank. This portion of the pressurizer drained slightly faster in the calculation than in the test, emptying at 16 s compared to 19 s. Using a smaller break discharge coefficient, as mentioned above, would improve the draining comparison.

Liquid levels in accumulator 1, which are representative of all the accumulators, are shown in Figure 11. In both the data and the calculation, the periodic injection is reflected in the level response.

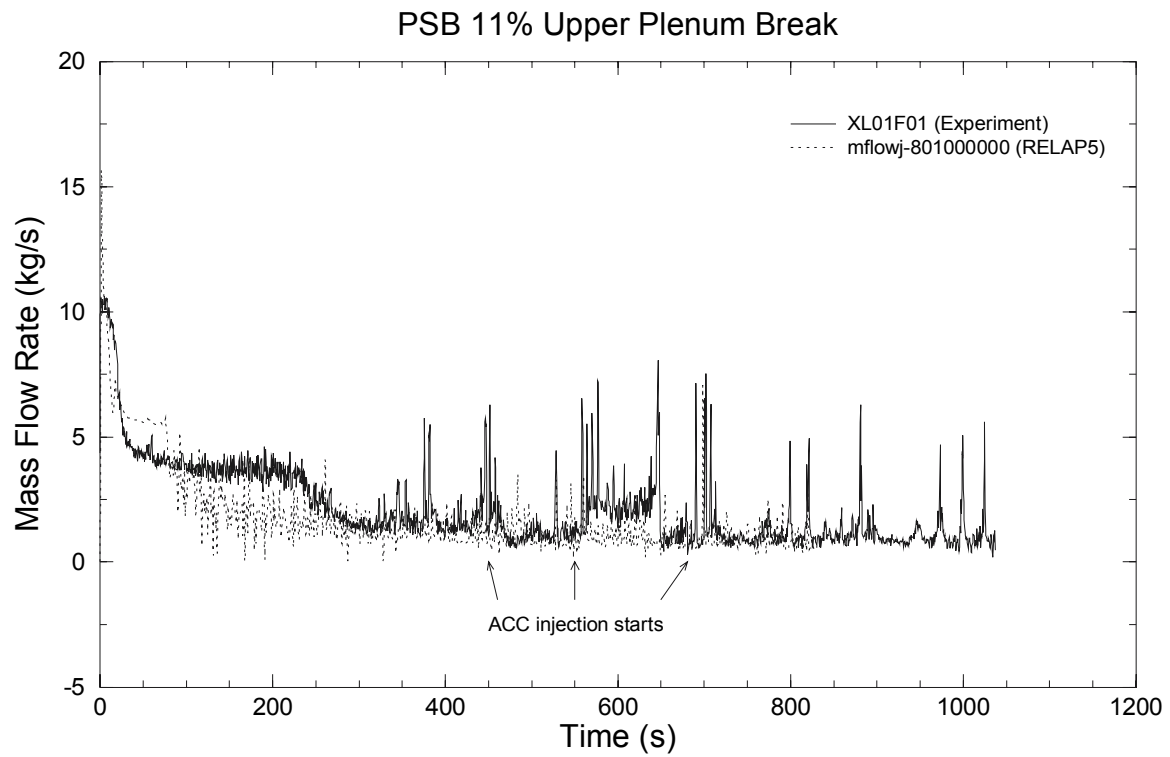


Figure 7. Break flow rate for the base case.

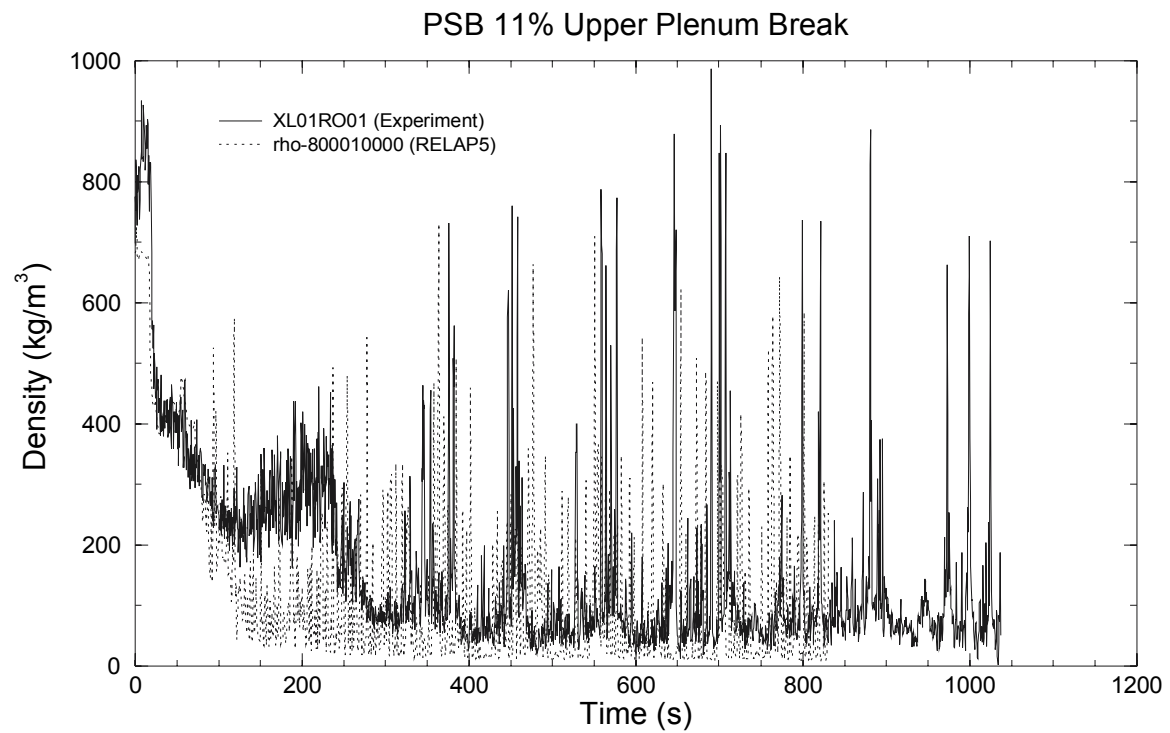


Figure 8. Fluid density in the break piping for the base case.

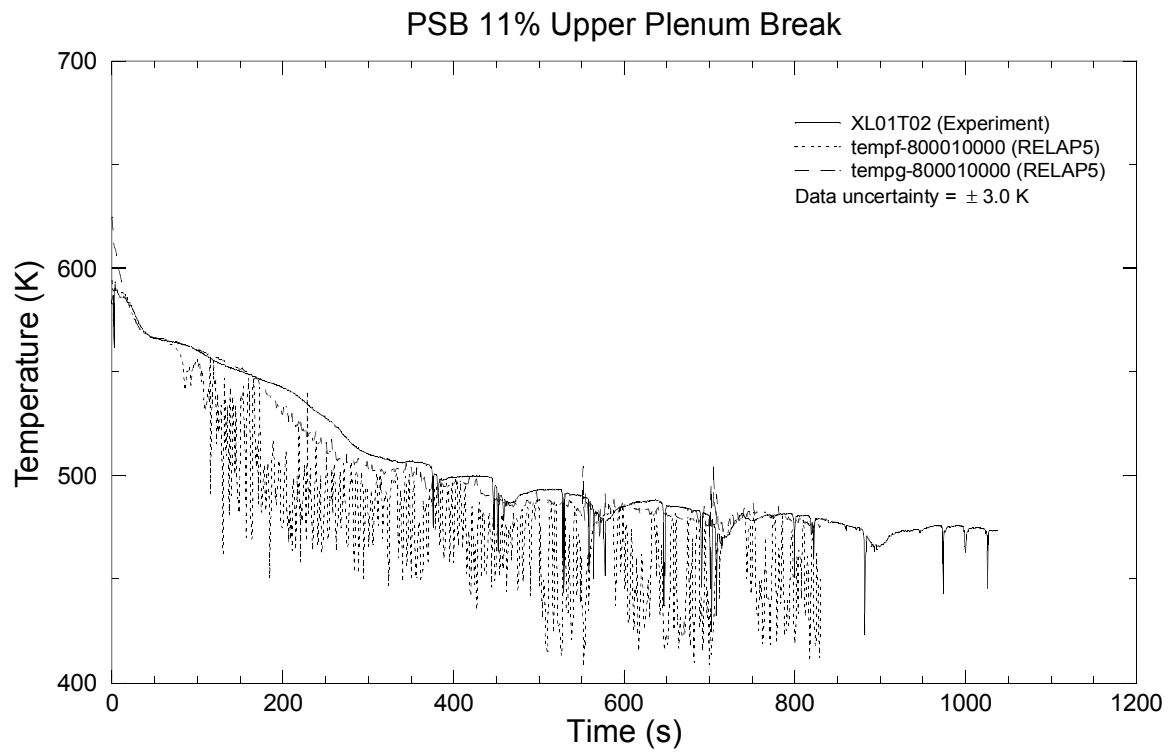


Figure 9. Fluid temperature in the break piping for the base case.

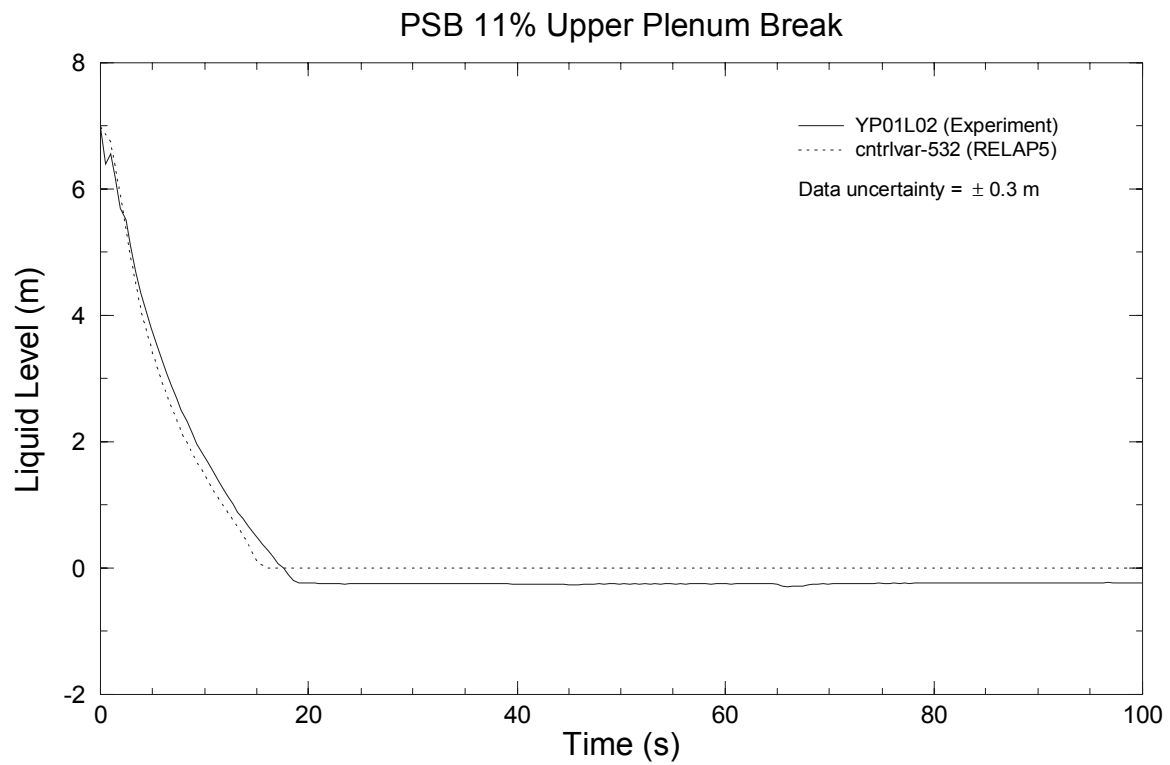


Figure 10. Pressurizer liquid level for the base case.

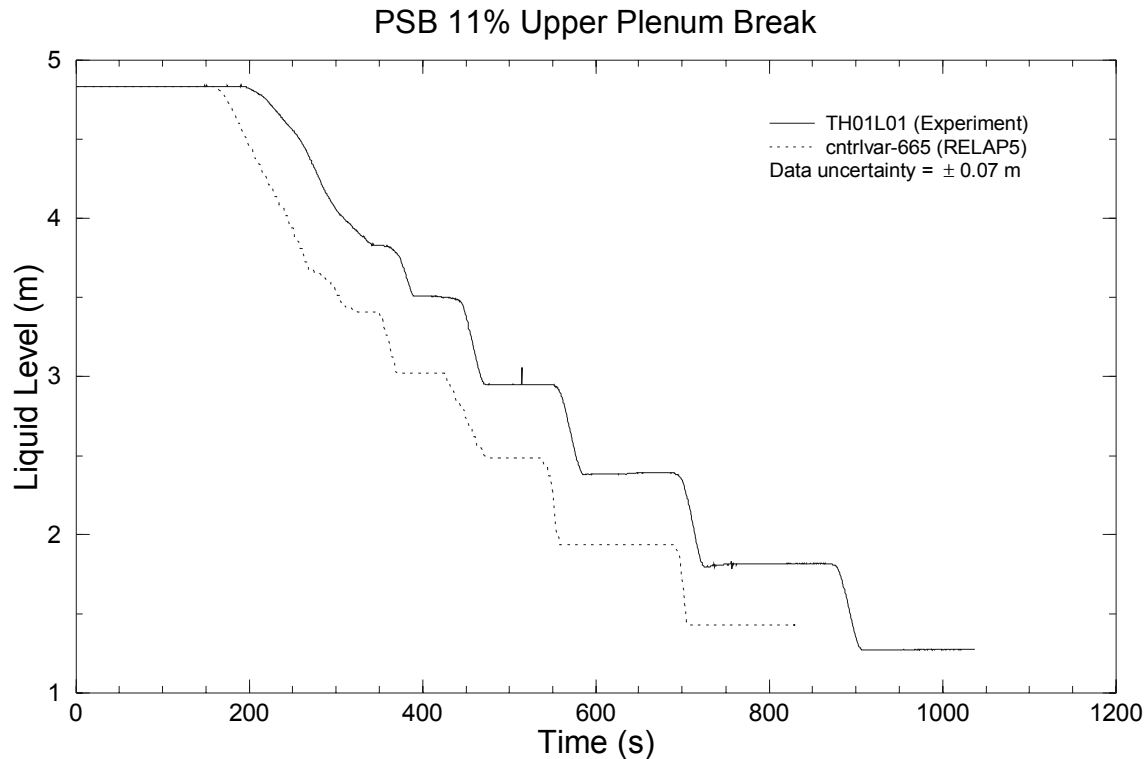


Figure 11. Accumulator 1 liquid level for the base case.

The level decreased more rapidly in the calculation than in the test because the calculated primary system pressure was lower than the measured value.

Accumulator 1 pressures are shown in Figure 12. As with the accumulator levels, the pressure reflects the periodic injection to the primary system, with the calculated pressure dropping earlier because of the lower calculated primary system pressure. The small increases in pressure between injections in the data were not captured in the calculation. The pressure increased because of heat transfer from the hotter walls to the vapor in the accumulator, an effect that was underpredicted by the code.

Mass flow rates through two of the coolant loops are shown in Figures 13 and 14. According to the experiment data report,⁶ the measurements are only reliable until 50 s. This time period includes the pump coastdown, starting at 10 s, and the transition to natural circulation flow. The calculations for both loops 1 and 4 are in excellent agreement with the data during this period. Once natural circulation was established in the loops, it did not last long. As steam continued to be generated in the system, it displaced liquid in the steam generators, causing a steady decline in the loop flow rate; by 200 s, there was essentially no flow through the coolant loops in the calculation.

With no forced flow through the system, the differential pressure measurements provide an indication of the collapsed liquid level, or average void fraction, between the pressure taps. The indicated differential pressure will move toward zero (the absolute value decreases) as the liquid between the pressure taps is replaced by steam (as the void fraction increases or the collapsed level decreases). These instruments can be used to determine how the liquid is distributed in the facility.

Differential pressures in different axial regions of the core are shown in Figures 15-17. The initial void formation in the core was reasonably simulated by the code. In the experiment, the upper portion of

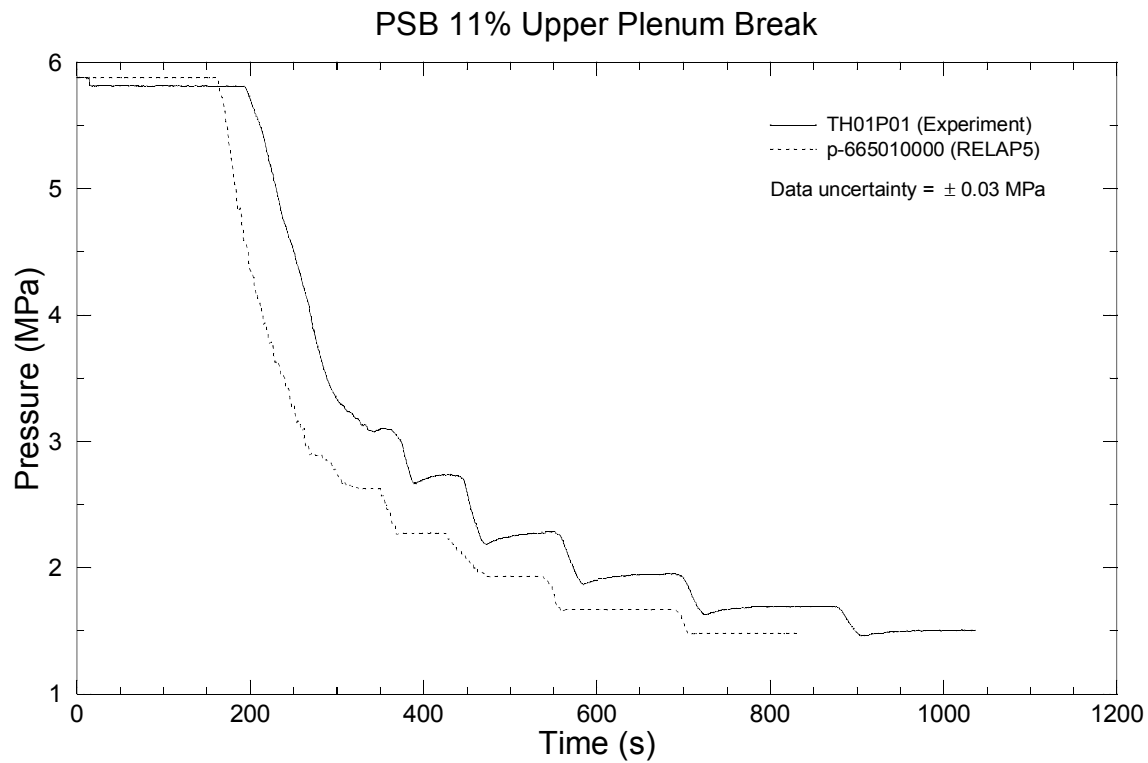


Figure 12. Accumulator 1 pressure for the base case.

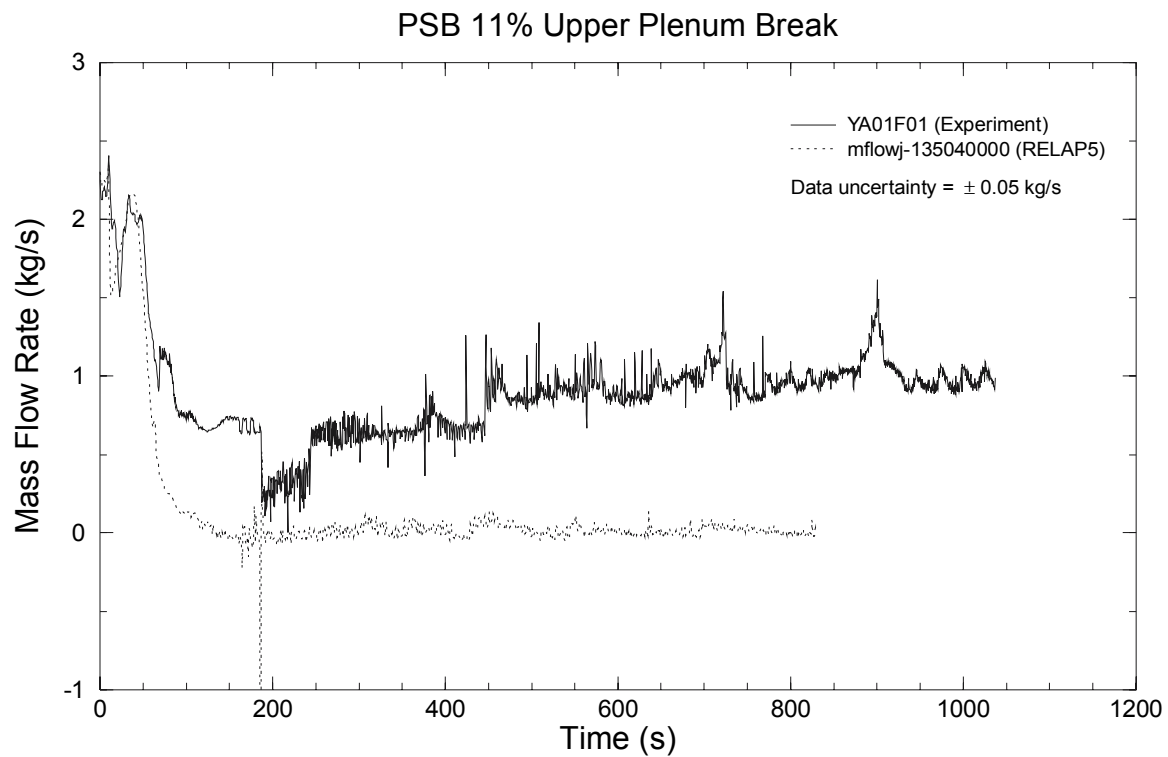


Figure 13. Loop 1 mass flow rate for the base case.

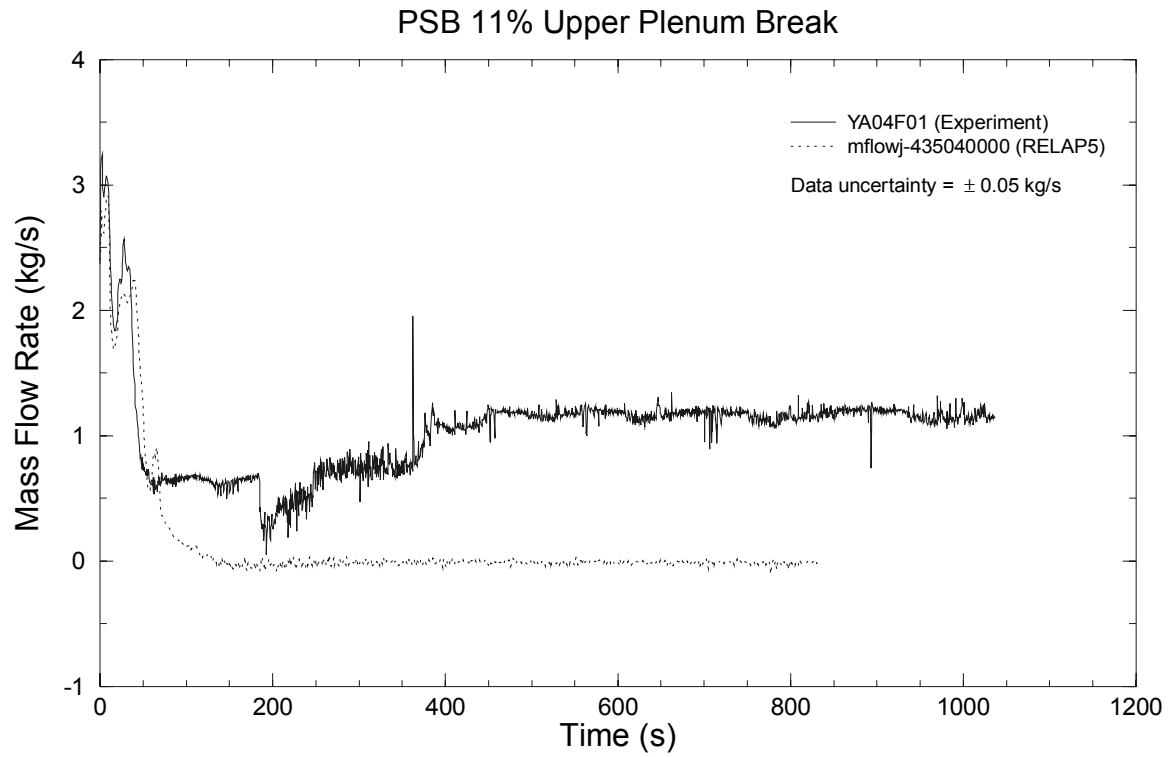


Figure 14. Loop 4 mass flow rate for the base case.

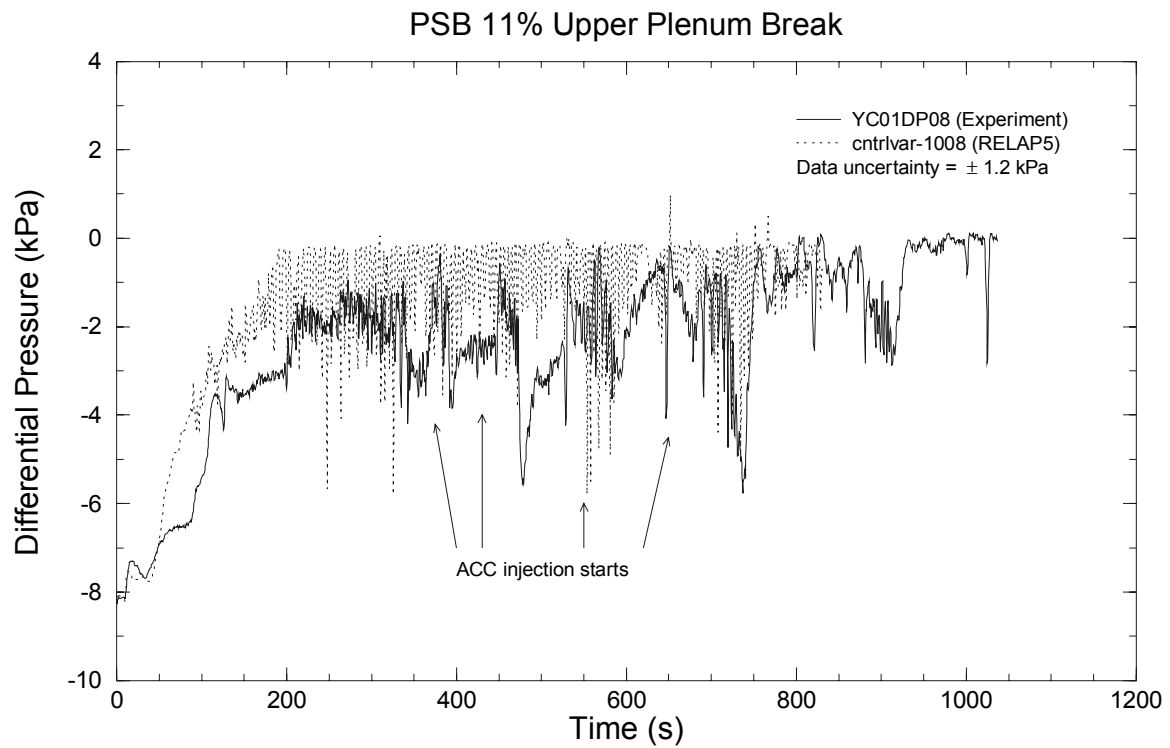


Figure 15. Differential pressure in the lower portion of the core simulator for the base case.

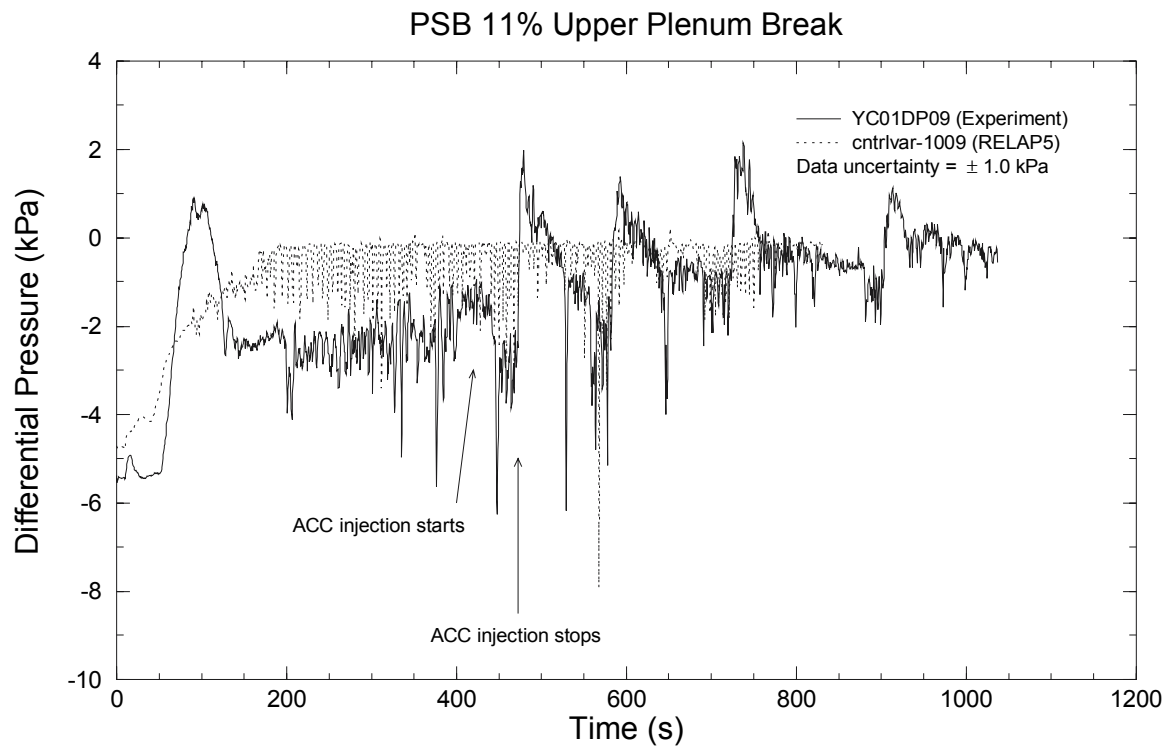


Figure 16. Differential pressure in the middle portion of the core simulator for the base case.

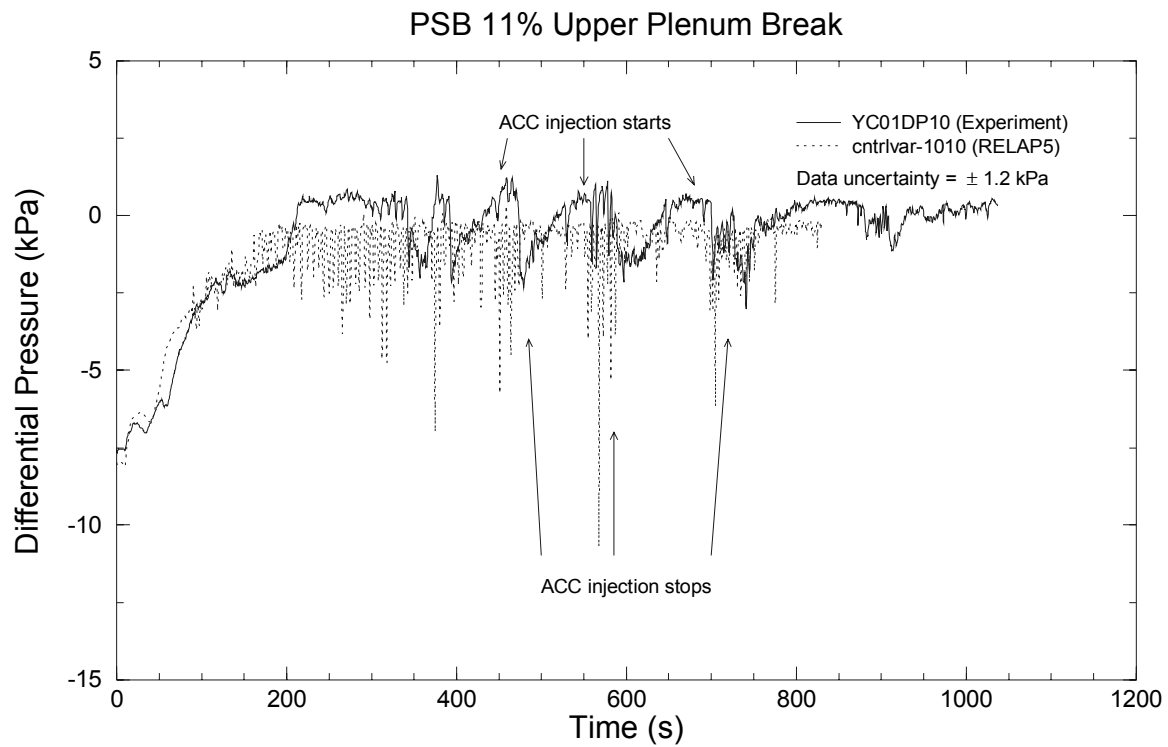


Figure 17. Differential pressure in the upper portion of the core simulator for the base case.

the core had less liquid than the lower portions, while in the calculation the axial void profile was fairly uniform. The effects of the accumulator injection were also different in the test and calculation. In the test, the beginning of the accumulator injection cycle resulted in decreases in the differential pressure after a short delay. After the injection stopped, the differential pressures in the upper and lower portions slowly moved toward their previous values, and the middle of the core saw a rapid increase to values above zero. Since the measurement should read slightly below zero when the region is steam filled, this may be an indication of a problem with the measurement. In the calculation, there was no noticeable effect of the accumulator injection on the differential pressures. This is further illustrated by the core collapsed level response, shown in Figure 18, where there is very little change in the core liquid content during most of the transient.

The differential pressure across the core bypass is shown in Figure 19. The calculation agrees well with the data before accumulator injection begins, then generally has less liquid than in the test. When accumulator injection starts before 200 s, the initial effect is a reduction in the liquid level in the core bypass. The reduced system pressure resulting from condensation on the injection liquid allows some of the remaining liquid to flash or boil. Subsequent injections of liquid from the accumulators resulted in level increases in both the data and calculation, which are reflected as decreases in the differential pressure. The impact of the injection is more pronounced in the test than in the calculation. Despite retaining less liquid, the core bypass wall temperatures were lower in the calculation than were measured. With lower temperatures, the bypass heater power remained on throughout the calculation, whereas in the test the power was reduced to protect the heaters when the peak temperature reached 673 K near 560 s.

Differential pressures in the upper plenum are shown in Figures 20 and 21. More liquid was retained in the calculation than in the experiment, particularly in the upper portion of the upper plenum. Possible reasons for the overprediction of the liquid inventory in the upper plenum are that CCFL at the core exit is preventing liquid from falling back into the core region in the calculation, that the interphase drag is overpredicted at the core exit, again preventing liquid from separating from the vapor flow and draining to lower portions of the reactor vessel, or that interphase drag is underpredicted at the connection to the break piping, not allowing enough liquid to be entrained from the upper plenum into the break piping.

Differential pressures in the upper head are shown in Figures 22 and 23. The early draining of the upper head region was well calculated by the code.

Differential pressures in the downcomer are shown in Figures 24 and 25. In the test, the upper portion of the downcomer drained completely before 200 s. Water injection from the accumulators temporarily restored liquid to this region, but it drained completely between injection cycles. The calculated level did not drop that far, retaining some liquid between injection cycles. Accordingly, the calculated differential pressure in the lower portion of the downcomer did not show as much of an effect of the accumulator injections, especially later in the transient. A major feature not captured in the calculation is the apparent complete draining of the downcomer near 200 s. This was the only time during the test that the level dropped nearly that far, and it is not clear what caused this response, as there is no corresponding change in other differential pressure measurements that indicate that liquid has flowed from the downcomer to some other location in the system; in fact, the core and core bypass differential pressures also show a reduction in liquid inventory at this time.

Figure 26 shows the differential pressure in the steam generator 1 hot collector, which is typical of the behavior seen in all four loops. The hot collector drains within about 70 s in the test, and a little earlier in the calculation, not long after boiling began in the core. The steam generator tubes then drained into the cold collector; in the calculation, all of the tubes were dry by about 180 s.

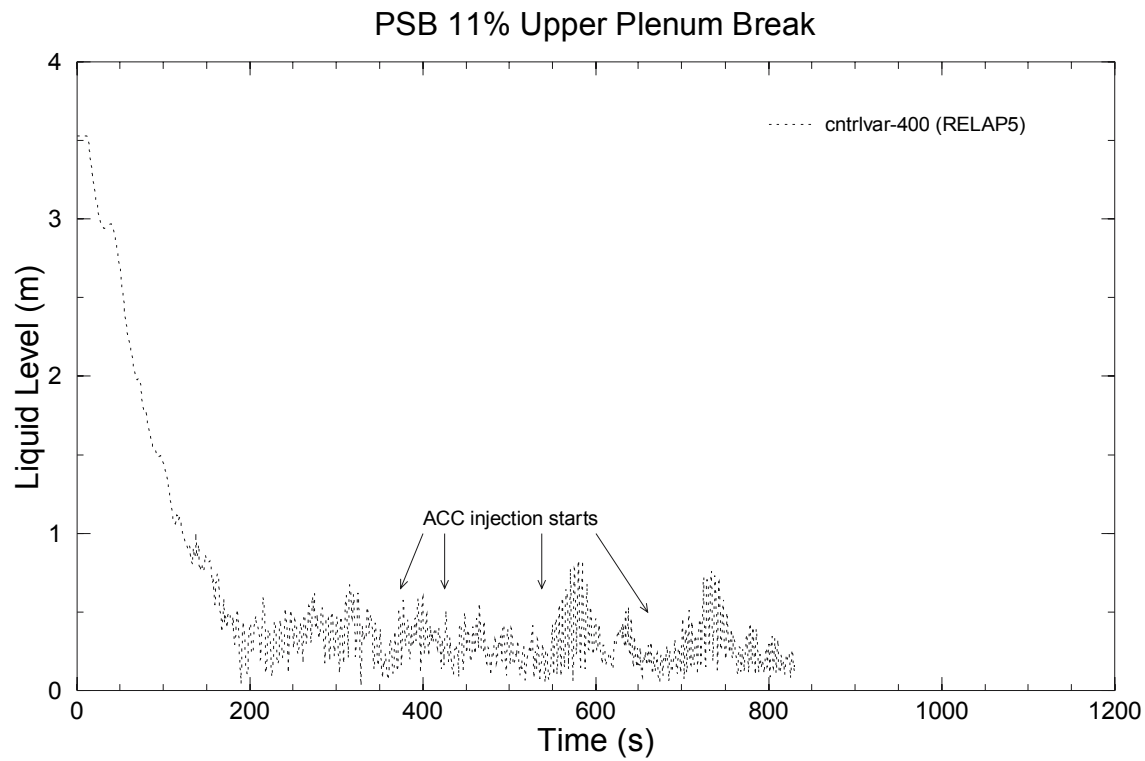


Figure 18. Core collapsed liquid level for the base case.

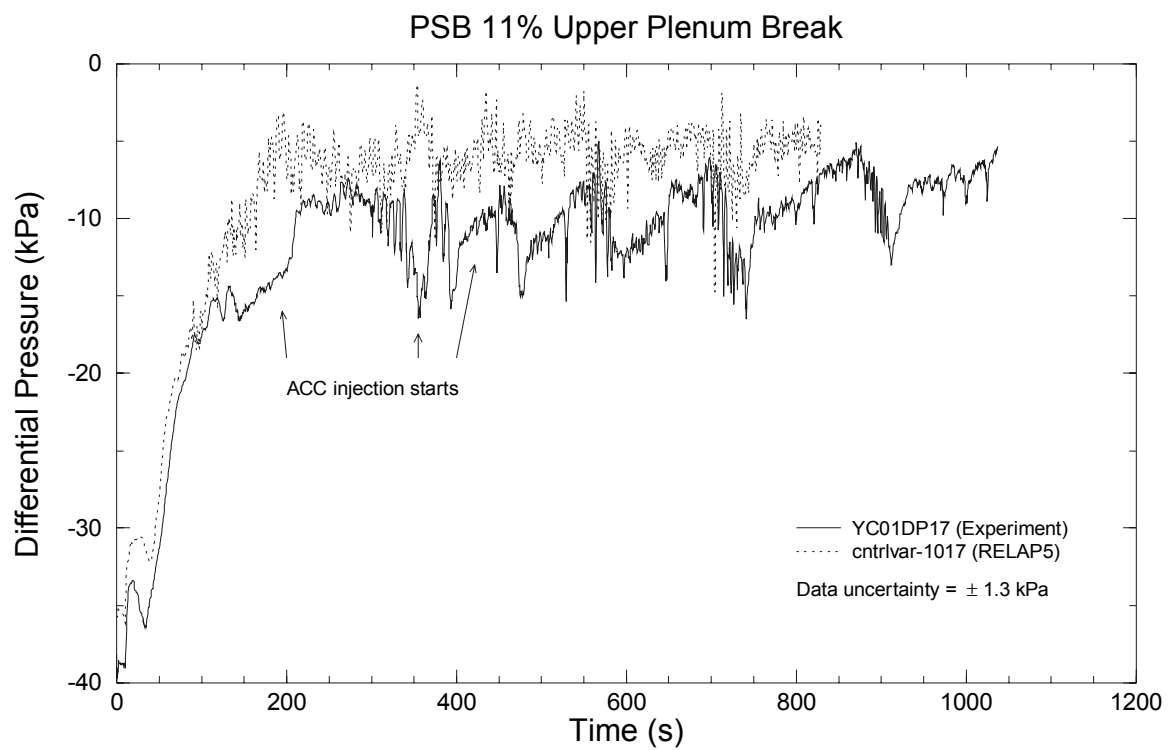


Figure 19. Core bypass differential pressure for the base case.

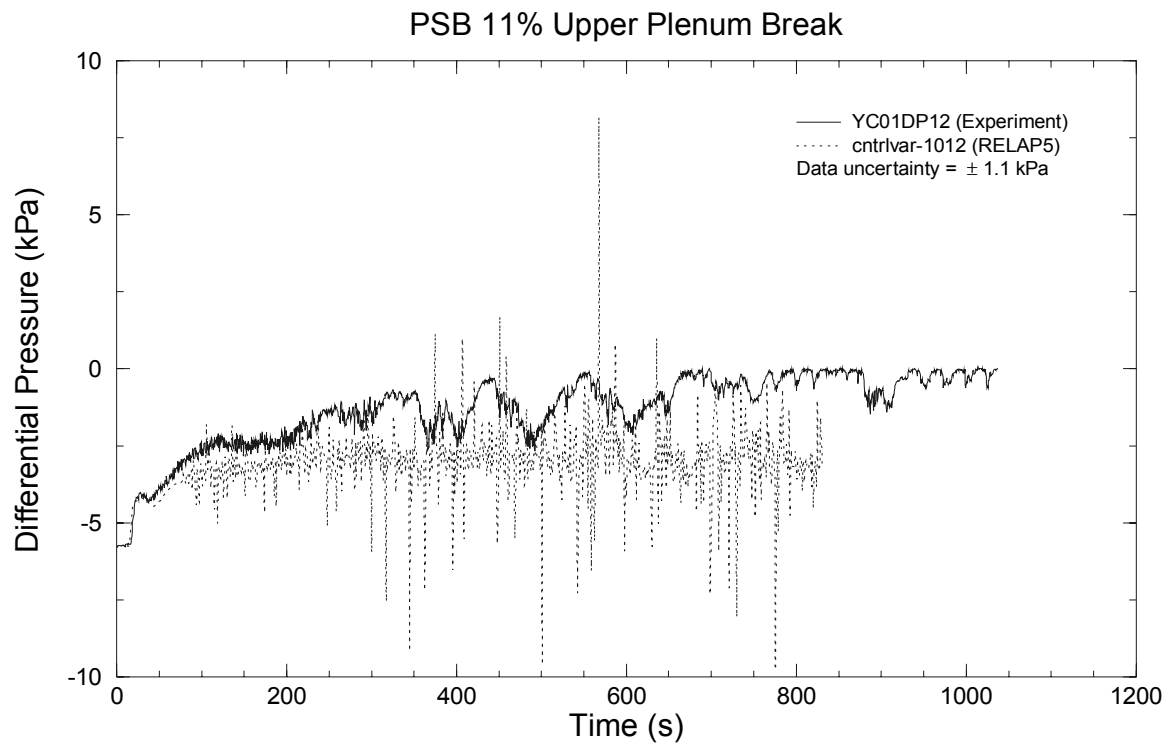


Figure 20. Differential pressure in the lower portion of the upper plenum for the base case.

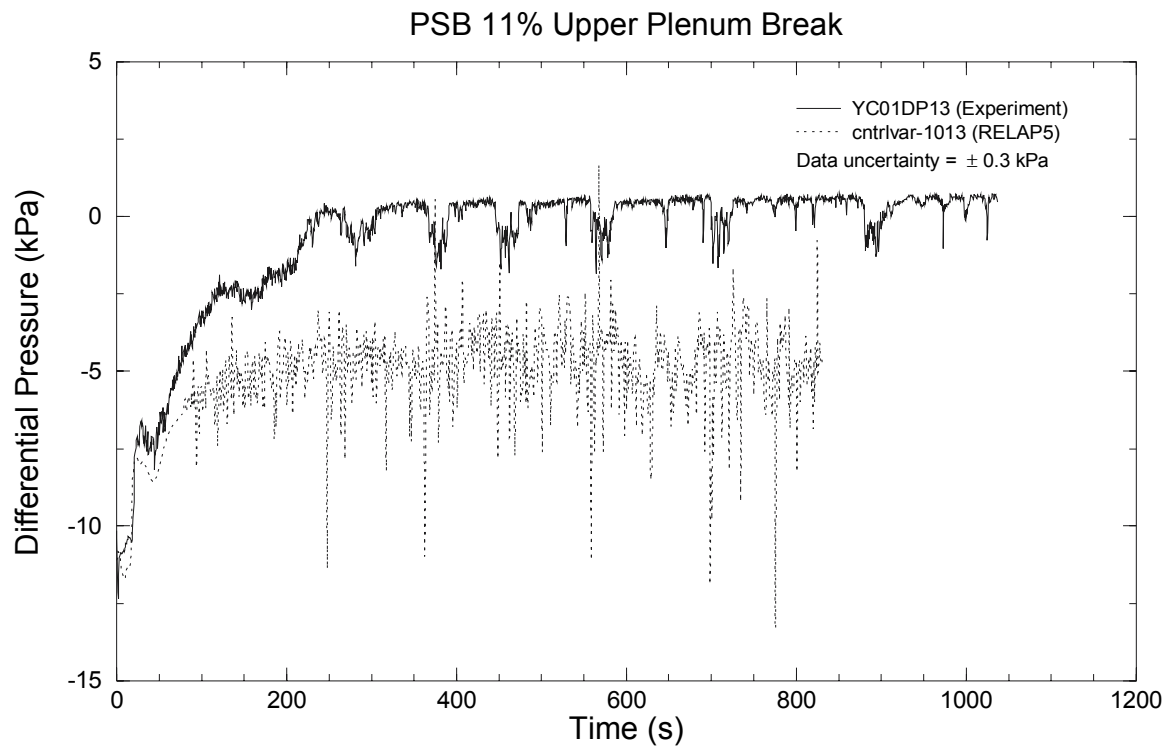


Figure 21. Differential pressure in the upper portion of the upper plenum for the base case.

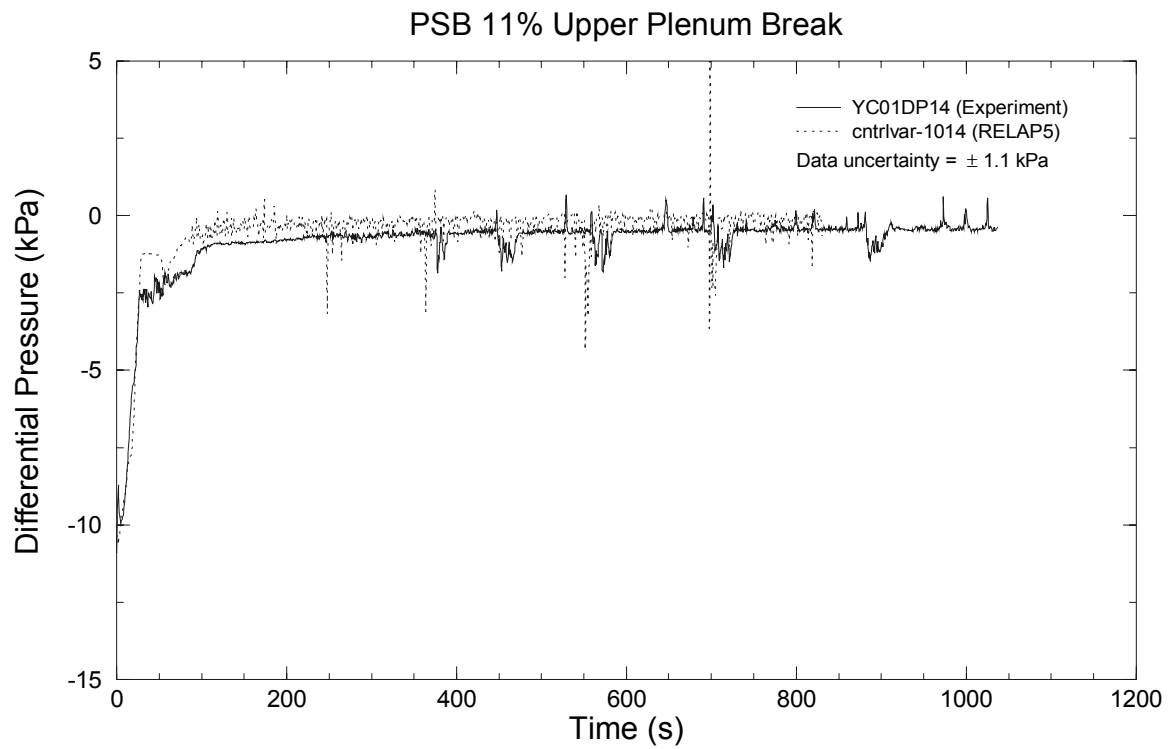


Figure 22. Differential pressure in the lower portion of the upper head for the base case.

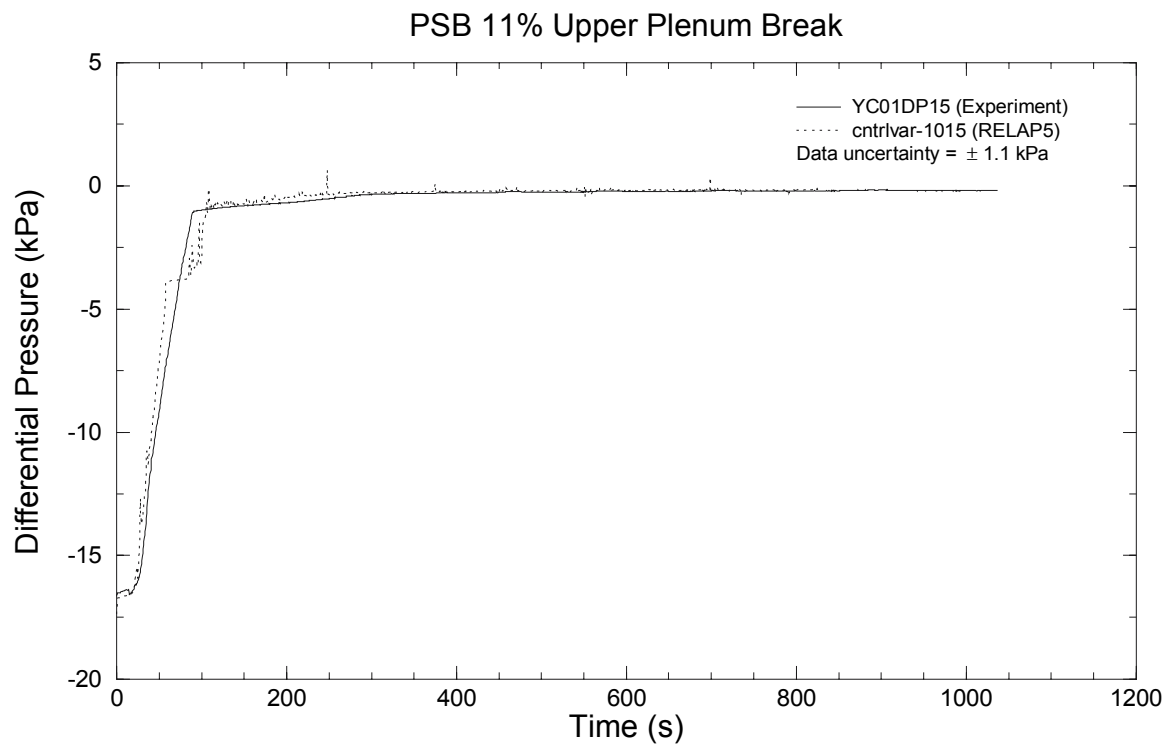


Figure 23. Differential pressure in the upper portion of the upper head for the base case.

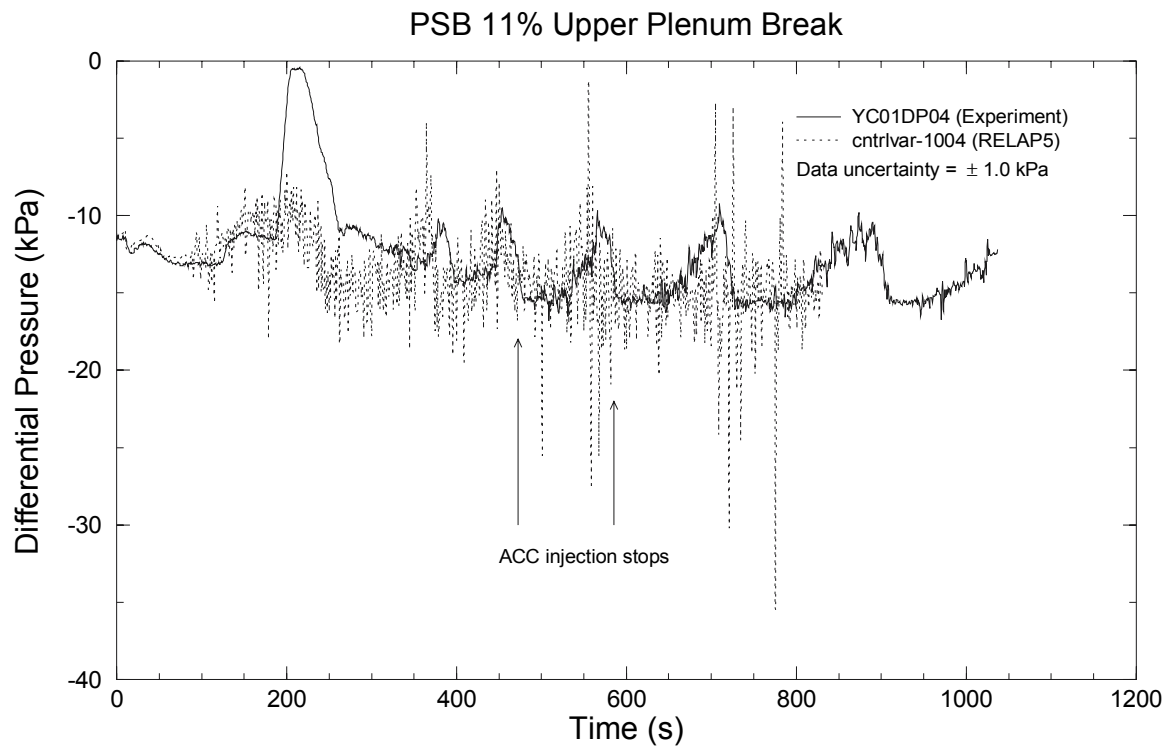


Figure 24. Differential pressure in the lower portion of the downcomer for the base case.

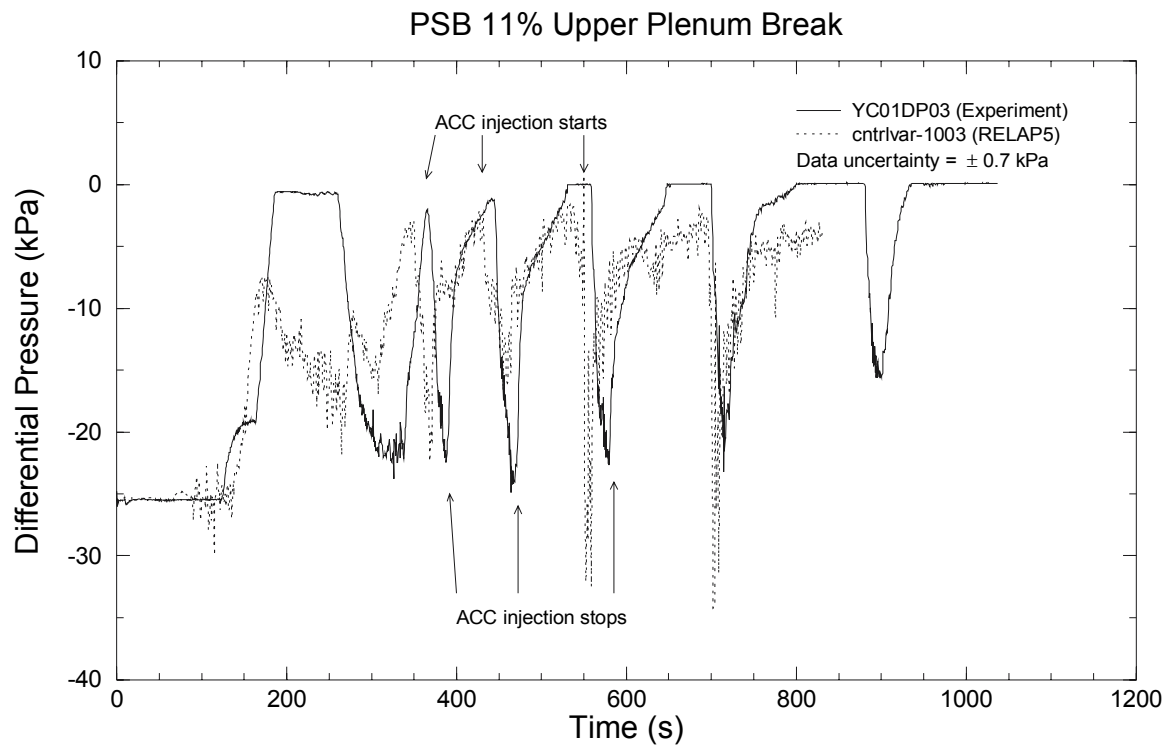


Figure 25. Differential pressure in the upper portion of the downcomer for the base case.

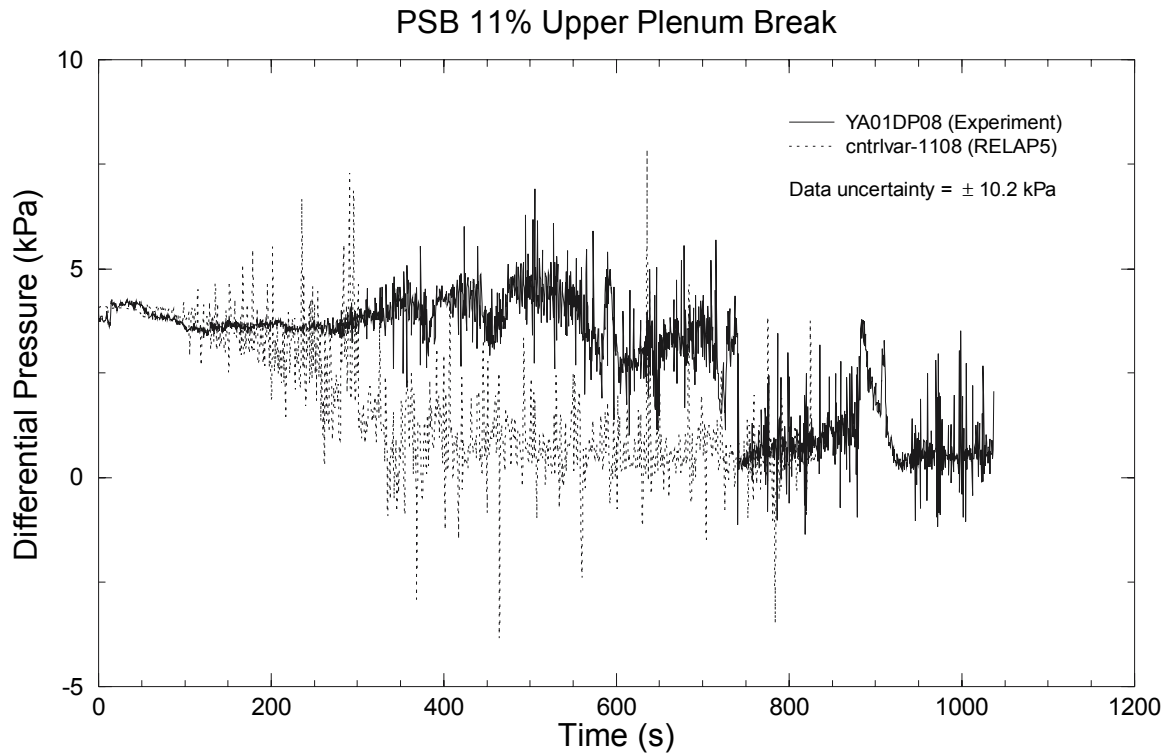


Figure 26. Differential pressure in the steam generator 1 hot collector for the base case.

The behavior of the loop seals is illustrated by the differential pressures in Figures 27-29. When the accumulators were injecting liquid, condensation in the vessel drew liquid from the steam generator side of the loop seals into the pump side; since the pump side was full during the first half of the transient, the evidence is in the pump differential pressure measurement. When the injection stopped, the liquid levels on the two sides of the loop seal equilibrated, moving liquid from the pump side to the steam generator side. However, some of the liquid flowed through the cold leg to the downcomer during the injection phase, so that the amount of liquid in the loop seals decreased with each injection cycle, leading to loop seal clearing near 750 s. In the calculation, the loop seals had cleared by about 400 s. As in the test, the pump differential pressure calculation (Figure 29) showed that liquid was being drawn from the loop seal into the pump when the accumulators were injecting.

Measured and calculated fuel simulator cladding surface temperatures are shown in Figures 30 and 31, respectively. The data show a series of top-down core heatups that were terminated by accumulator injection, returning the cladding to the coolant saturation temperature. As the transient progressed, the accumulator injection became less effective in terminating the heatup, as more of the length of the heater rods became involved in the heatup. By the end of the transient, the accumulator injection could only partially cool (not quench) the core, and the heatup continued until the power was reduced to protect the heater rods. In the calculation, the heatup started about 50 s earlier than in the test, because of the lower system pressure, and there were almost continuous small heatups of 20-30 K over the entire length of the core. While a greater portion of the core was involved than in the test, the heatups were not as extensive. Near 350 s, a more extensive heatup was calculated in the top portion of the core, which was subsequently quenched by accumulator injection. The next two periods of extended core heatup were only partially quenched by the accumulator injection, and the temperatures increased sufficiently that the calculation was terminated at 830 s.

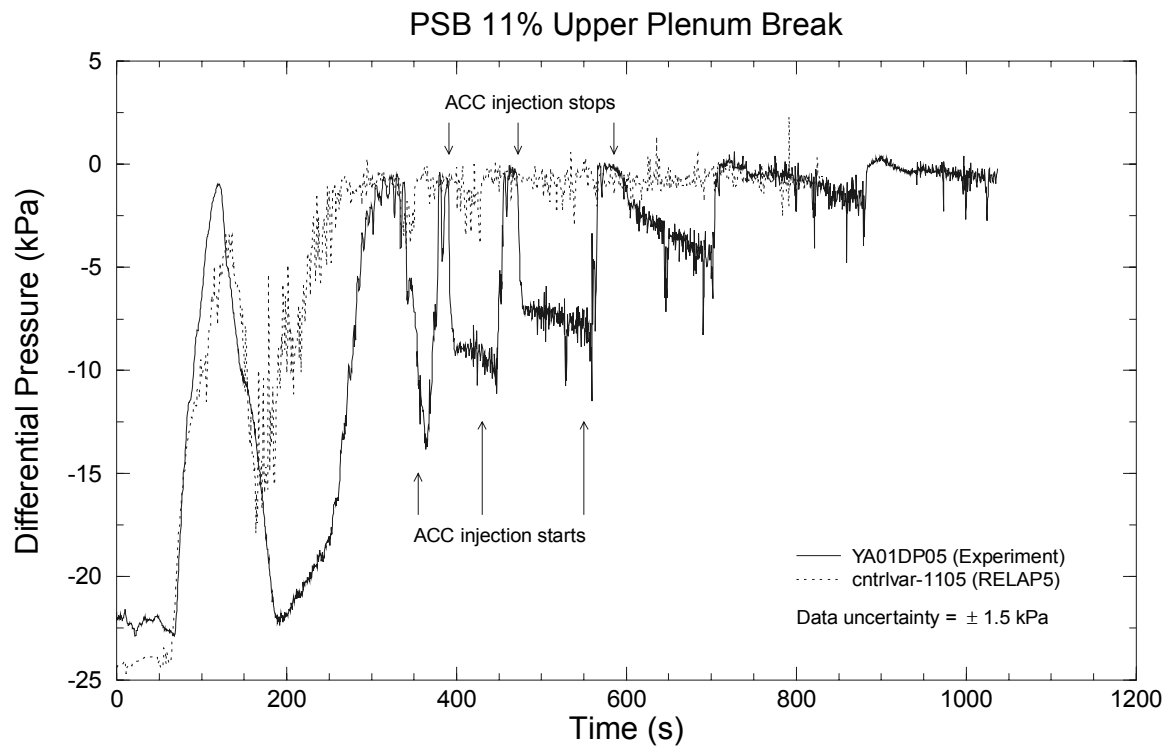


Figure 27. Differential pressure in the SG side of the loop 1 loop seal for the base case.

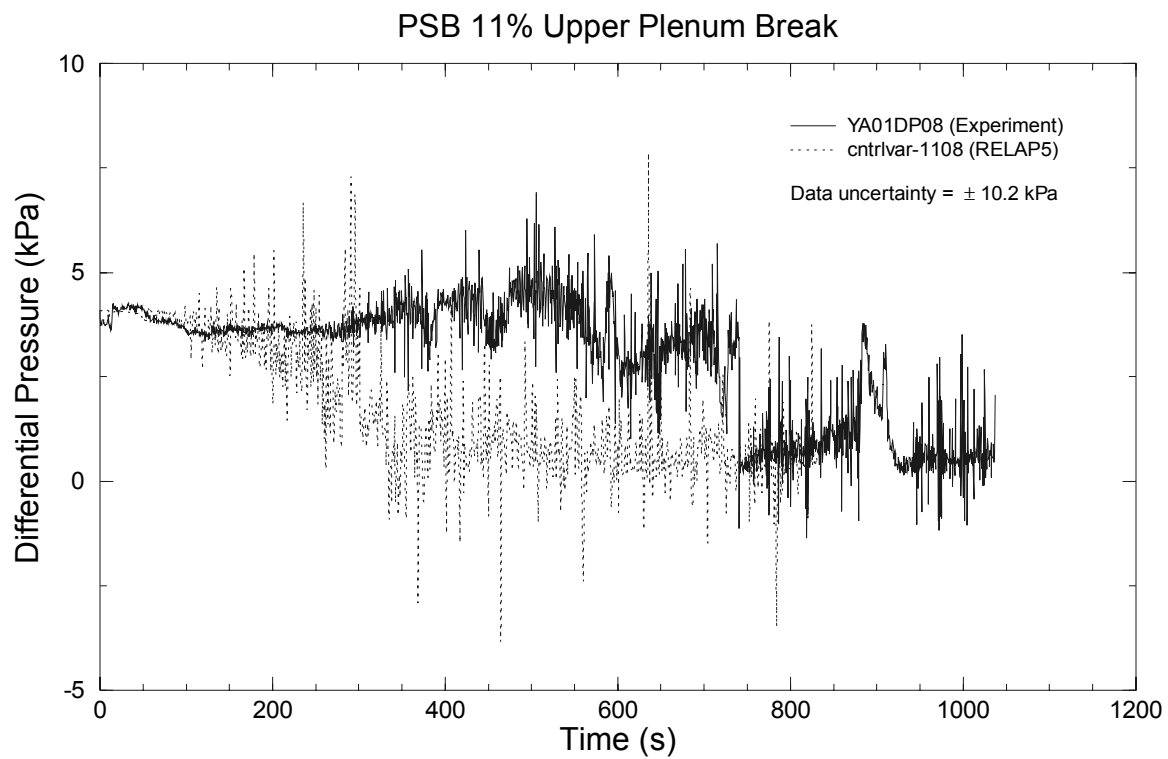


Figure 28. Differential pressure in the pump side of the loop 1 loop seal for the base case.

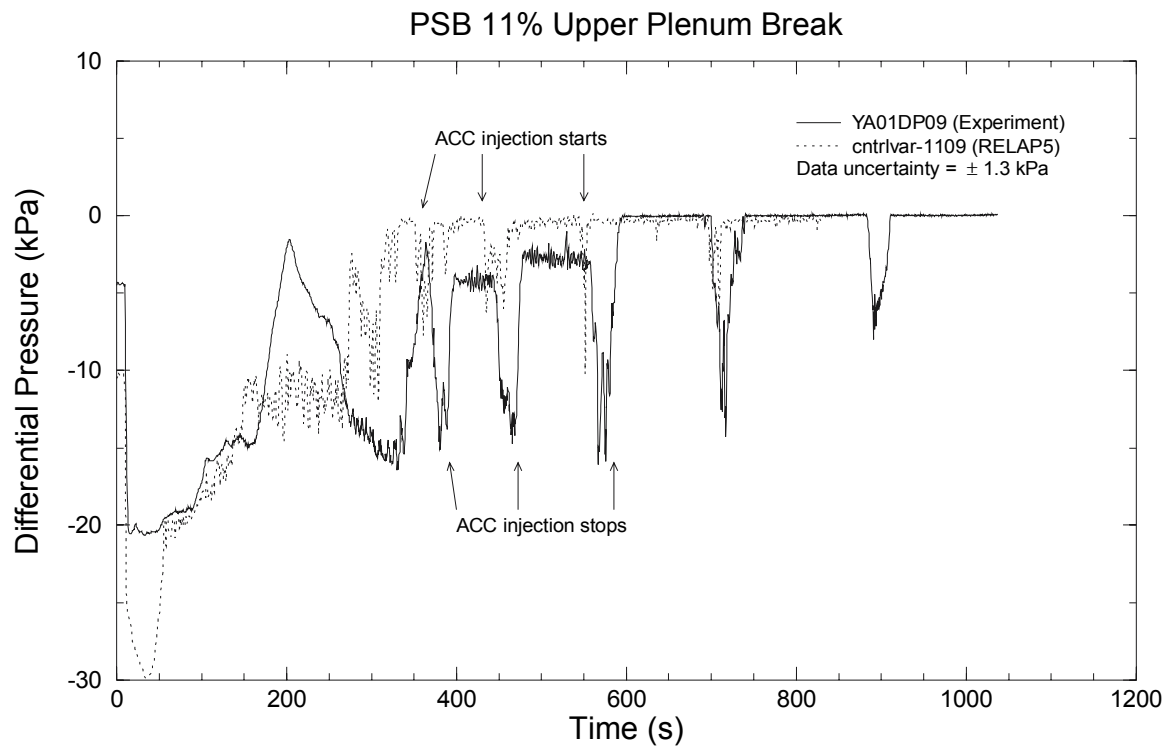


Figure 29. Differential pressure across the loop 1 pump for the base case.

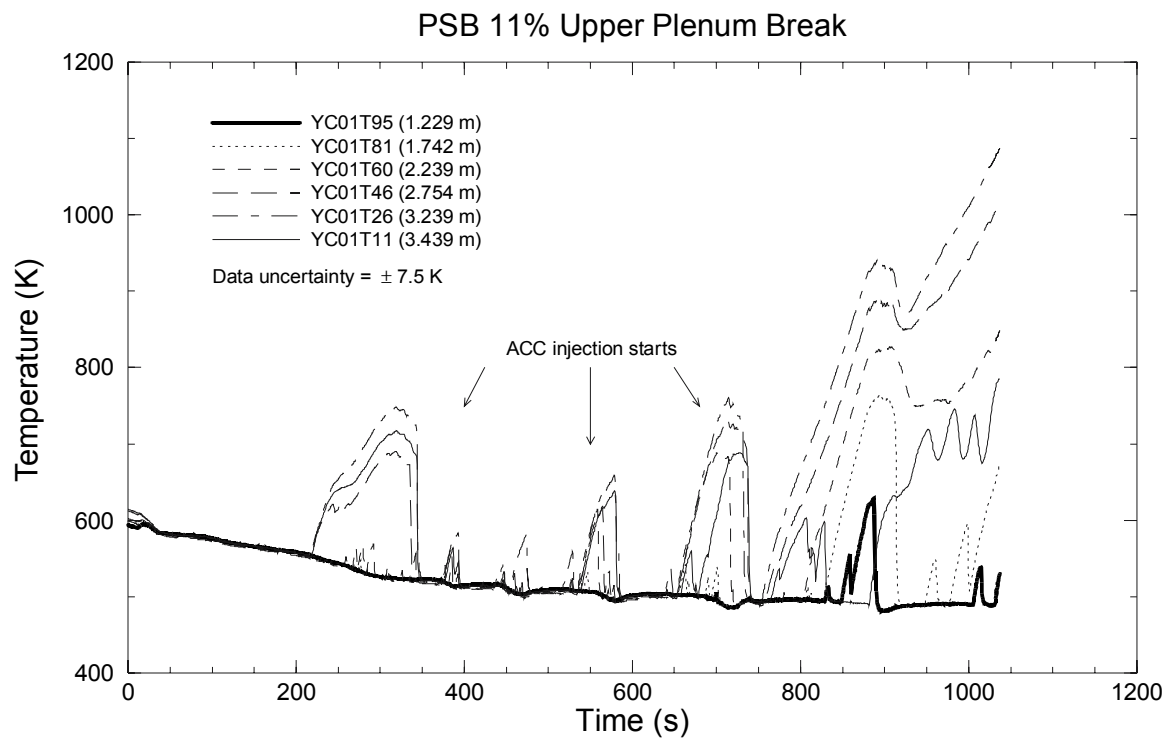


Figure 30. Measured heater rod surface temperatures.

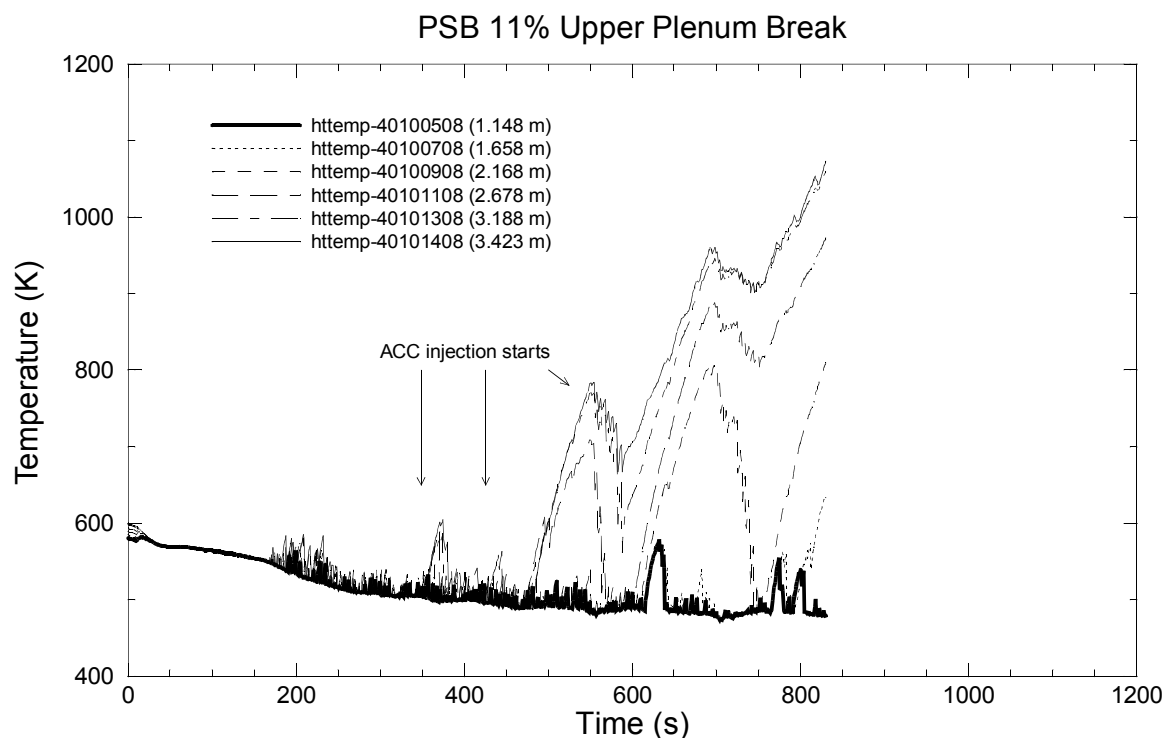


Figure 31. Calculated heater rod surface temperatures for the base case.

The response of the top-most measured temperature near the end of the test suggests that there may have been some liquid entering the core from the upper plenum to partially cool the upper end of the heater rods. This was not predicted in the calculation, where the CCFL model was invoked at the core outlet junction more than 70% of the time after the core heatup began, often preventing liquid in the upper plenum from flowing down into the core. Measured temperatures near the top of the core from several different heater rods are shown in Figure 32, where it is seen that there is some radial variation in the temperatures. There are likely some multi-dimensional effects in the experiment that allow some liquid penetration from the upper plenum into the core, but these cannot be captured with the one-dimensional nodalization used in the RELAP5 model.

Fluid temperatures in the top of the upper head are presented in Figure 33. In both the test and the calculation, this region is stagnant, and the vapor temperature remains superheated because of heat transfer from the hot vessel wall.

Coolant temperatures in the loop 4 hot leg are shown in Figure 34. The effect of the HPI flow is evident in both the data and the calculation. The highly subcooled liquid being injected flows toward the reactor vessel, sharply reducing the temperature being measured when it contacts the thermocouple. This effect is seen much earlier in the calculation than in the data.

Coolant temperatures in the loop 1 hot leg are presented in Figure 35. After natural circulation flow ends, the measured temperature begins to show superheating. This could be the result of actual superheating of the vapor, or the thermocouple could be reading a wall temperature rather than the fluid temperature. In either case, the superheated temperature is an indication that there is little to no flow through the loop. The temperature returns to the saturation temperature as the accumulators empty. The condensation caused by the accumulator injection moves fluid through the pipes, causing the temperature

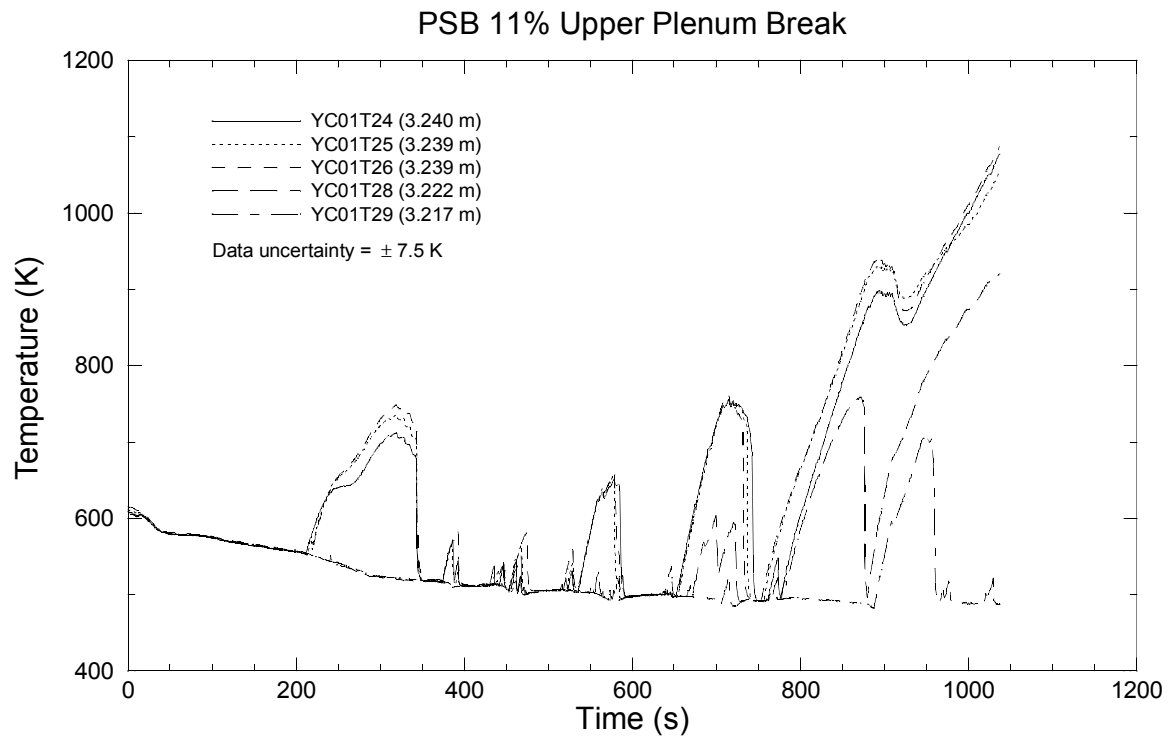


Figure 32. Measured heater rod surface temperatures near the top of the core.

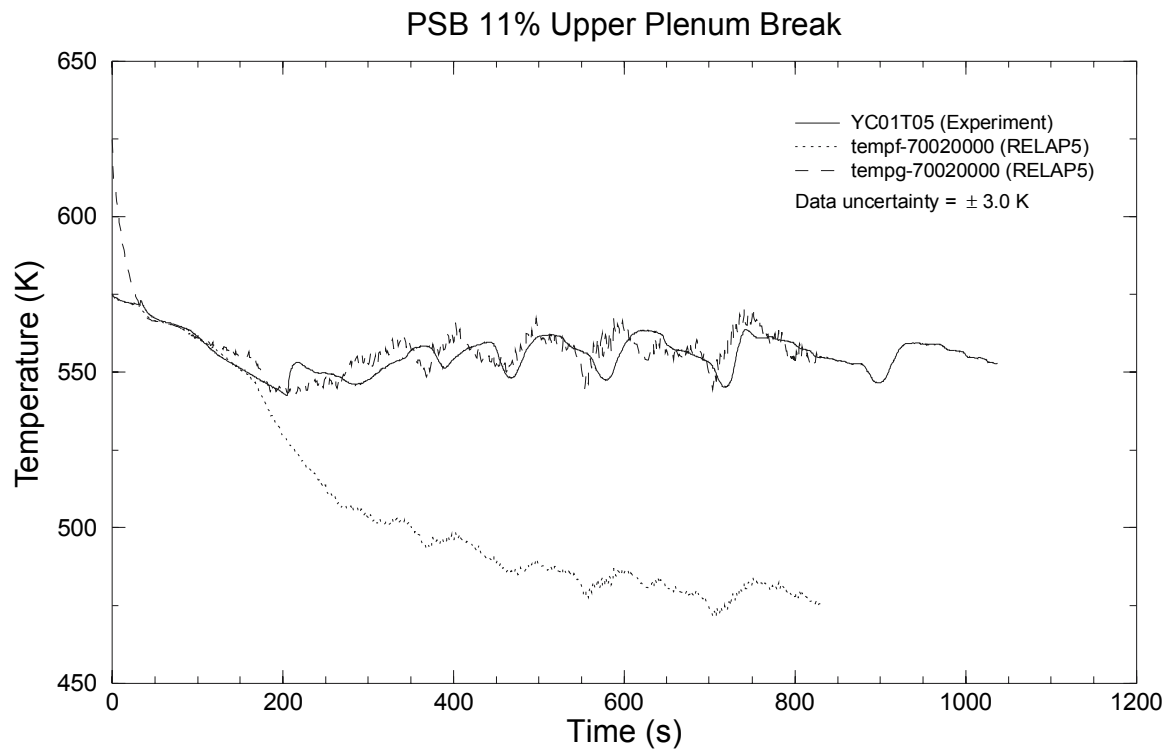


Figure 33. Fluid temperature at the top of the upper head for the base case.

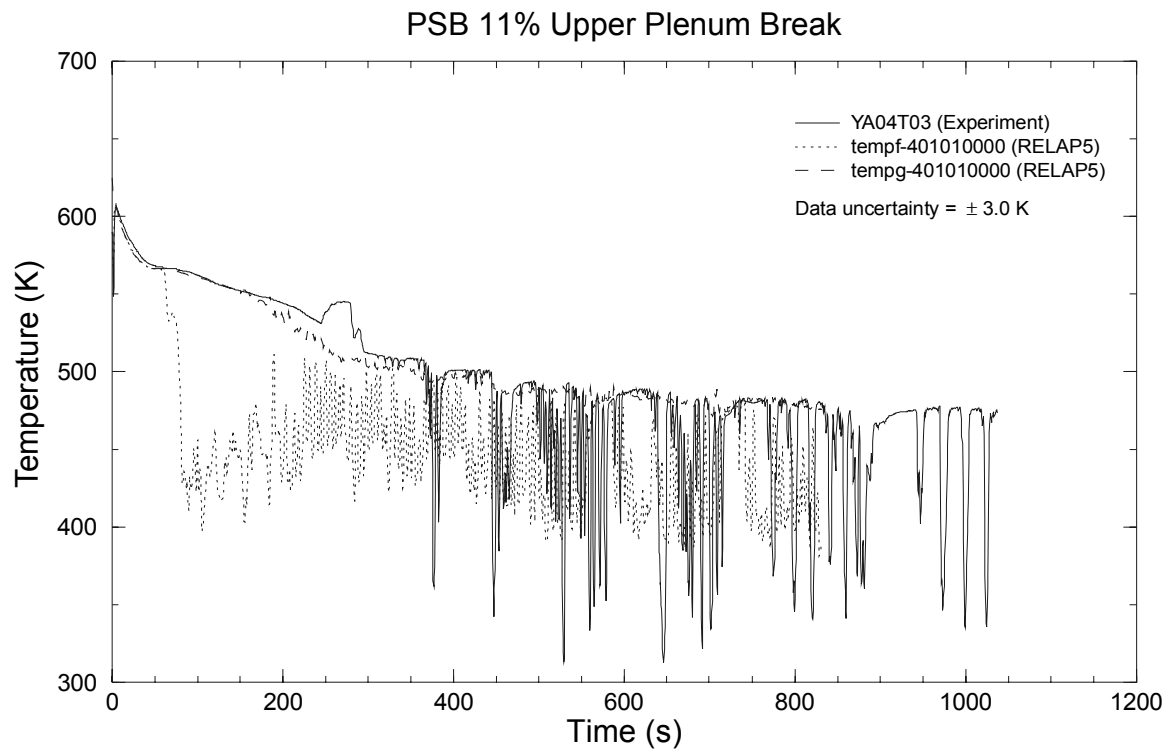


Figure 34. Loop 4 hot leg fluid temperature for the base case.

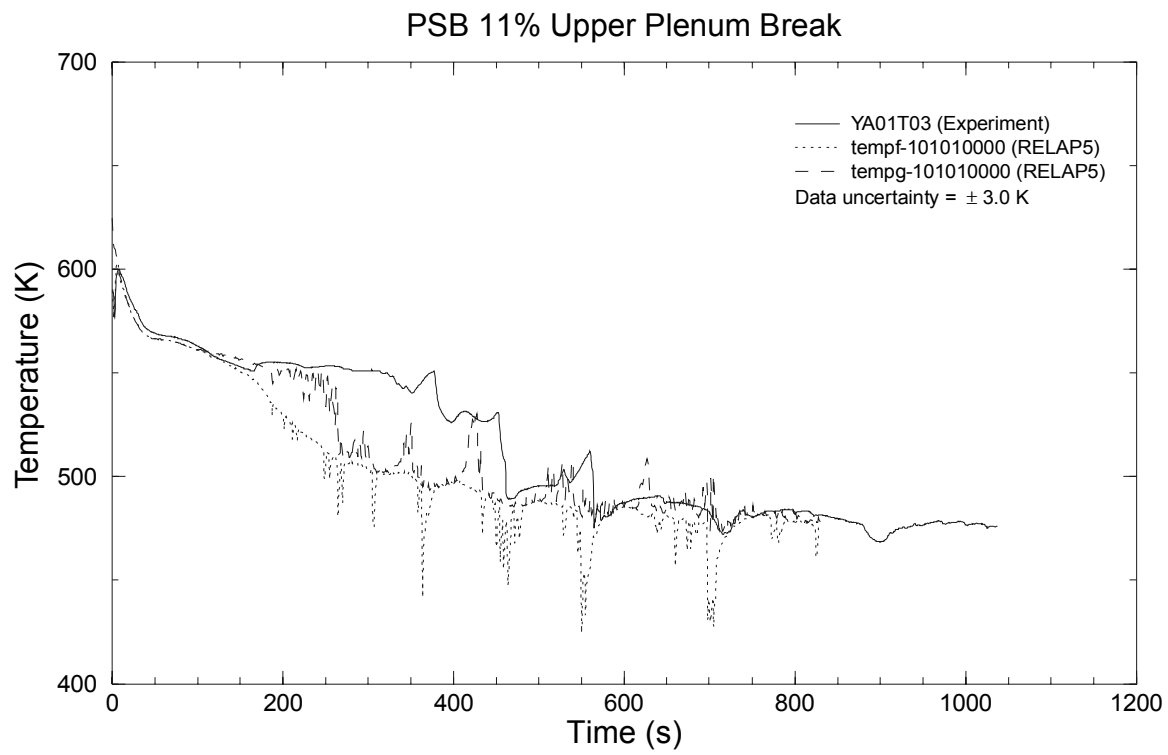


Figure 35. Loop 1 hot leg fluid temperature for the base case.

to drop. In the calculation, less superheat is observed, and there is some colder liquid appearing in the hot leg from either the HPI in the loop 4 hot leg or the accumulator injection to the upper plenum.

Coolant temperatures in the loop 4 cold leg are presented in Figure 36. In the RELAP5 calculation, the coolant became slightly superheated after the cold leg drained; the liquid phase was at the saturation temperature from about 150 s until the end of the transient. The periodic decreases in coolant temperature after 300 s in both the data and the calculation were caused by accumulator injection. The injection of cold water caused some of the steam in the system to condense, reducing the pressure and saturation temperature.

The pressure in steam generator 1 is presented in Figure 37. The measured pressure increased rapidly to a peak value of about 8.1 MPa when the steam line isolation valve was closed. Heat transfer back to the primary system and heat loss to the environment caused the pressure to decrease steadily for the rest of the transient. The calculated pressure mirrored the measured value, with a nearly constant offset over the course of the transient. The pressure response in steam generators 3 and 4 was very similar to that in steam generator 1, but steam generator 2 behaved a little differently in the test. Figure 38 shows reductions in pressure coincident with the periods of accumulator injection. The accumulator injections appeared to move some liquid into the loop 2 steam generator tubes, increasing the heat transfer back to the primary system and causing the pressure to drop further than in the other steam generators.

Figure 39 presents the secondary side liquid levels in steam generator 1. The level increased at the beginning of the transient because feedwater flow was still being provided, but the heat transfer from the primary system was reduced because the core power was decreasing, resulting in less liquid being boiled in the steam generator. It continued to increase in the calculation until about 50 s as liquid drained from the feedwater ring and liquid that had been entrained into the upper region of the steam generator fell back into the measurement range as the boiling in the steam generator subsided. The level slowly decreased until about 100 s, when the primary system pressure dropped below the secondary system pressure. The level then decreased more rapidly, as heat transfer to the primary coolant system cooled the liquid in the steam generators, causing it to contract. The level then steadily decreased until about 250 s in the test, and about 150 s in the calculation, when the rate of decrease slowed, reflecting a slower depressurization in the primary coolant system.

The liquid level in steam generator 2 is shown in Figure 40. Behavior generally similar to that in steam generator 1 was observed, except that the liquid level was decreasing at the beginning of the transient because there was no feedwater being supplied. The measured behavior was also a bit unusual after about 300 s. The abrupt changes in level seem to be coincident with the accumulator injection cycles. Decreases in level might occur if the accumulator injection resulted in some liquid reaching the steam generator tubes, enhancing the heat transfer back to the primary system, thereby cooling the secondary side liquid (and hence reducing the specific volume and liquid level). There is no apparent explanation for the level increases, since the primary system pressure is well below that of the secondary system (precluding coolant expansion from causing the increase in measured level).

4.2 Sensitivity Cases

Sensitivity calculations were performed to investigate the impact of various parameters or code options on the predicted transient response. The major area of concern was the amount of liquid present in the upper plenum and core. A second concern was the heater rod temperature response.

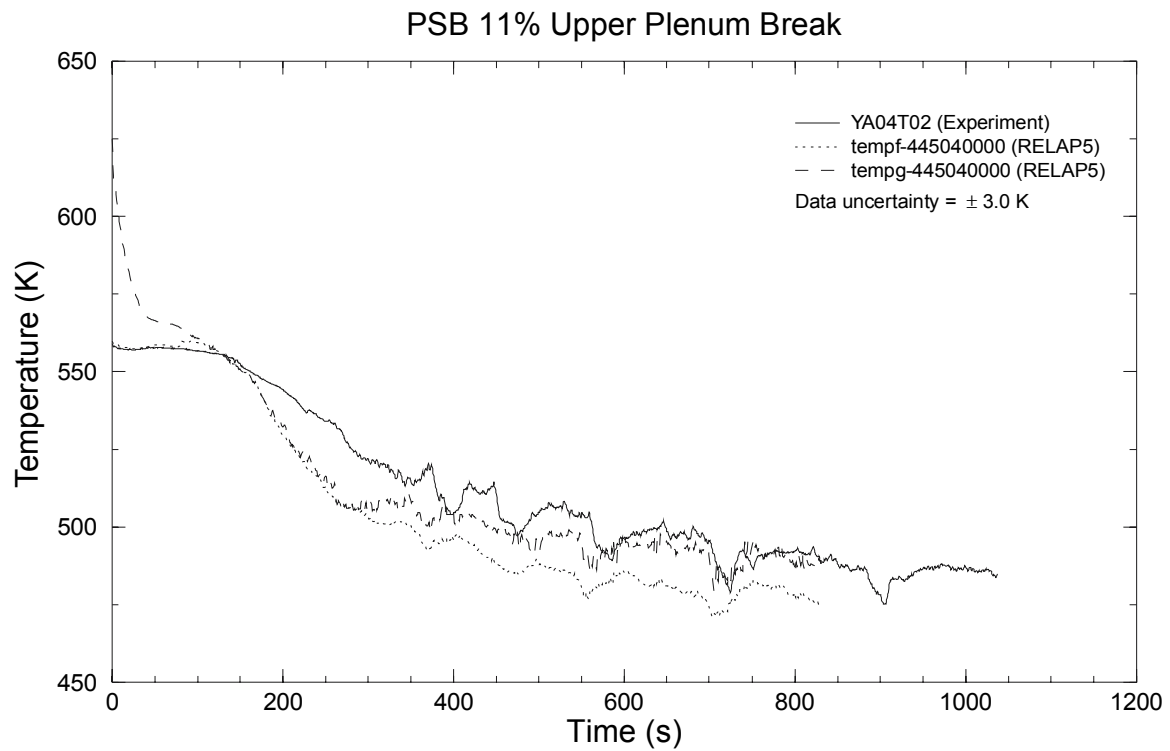


Figure 36. Loop 4 cold leg fluid temperature for the base case.

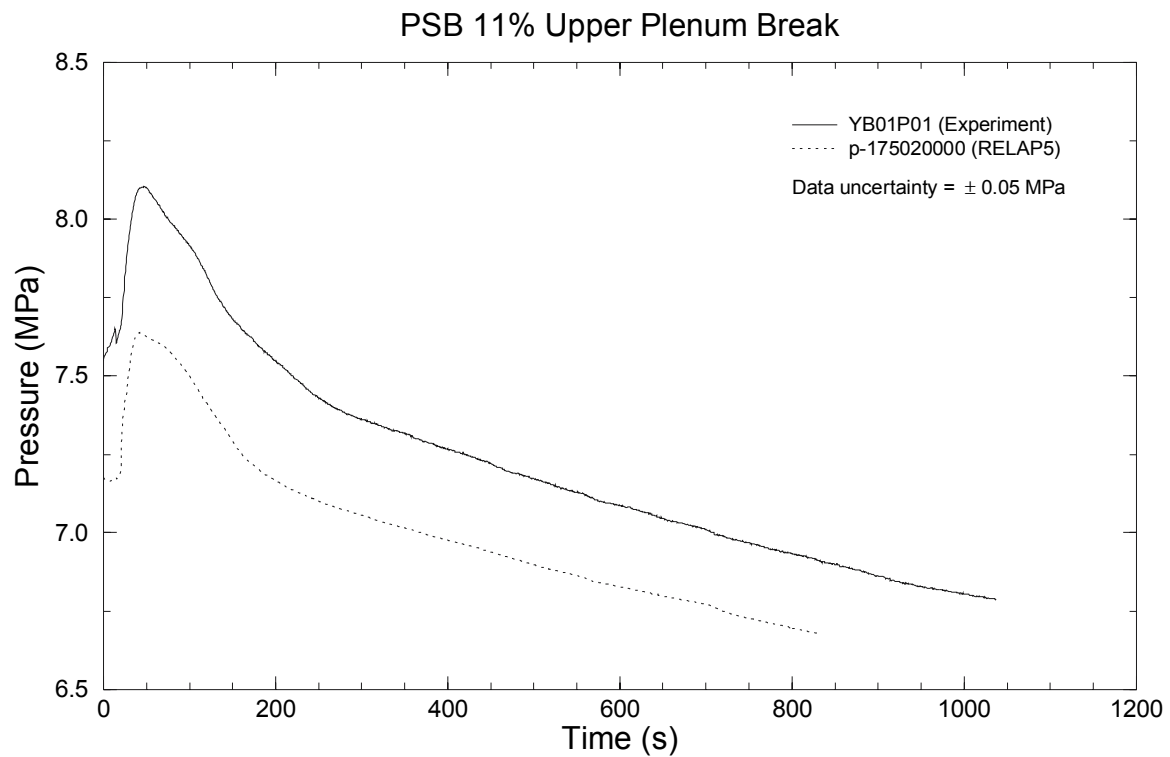


Figure 37. Loop 1 steam generator pressure for the base case.

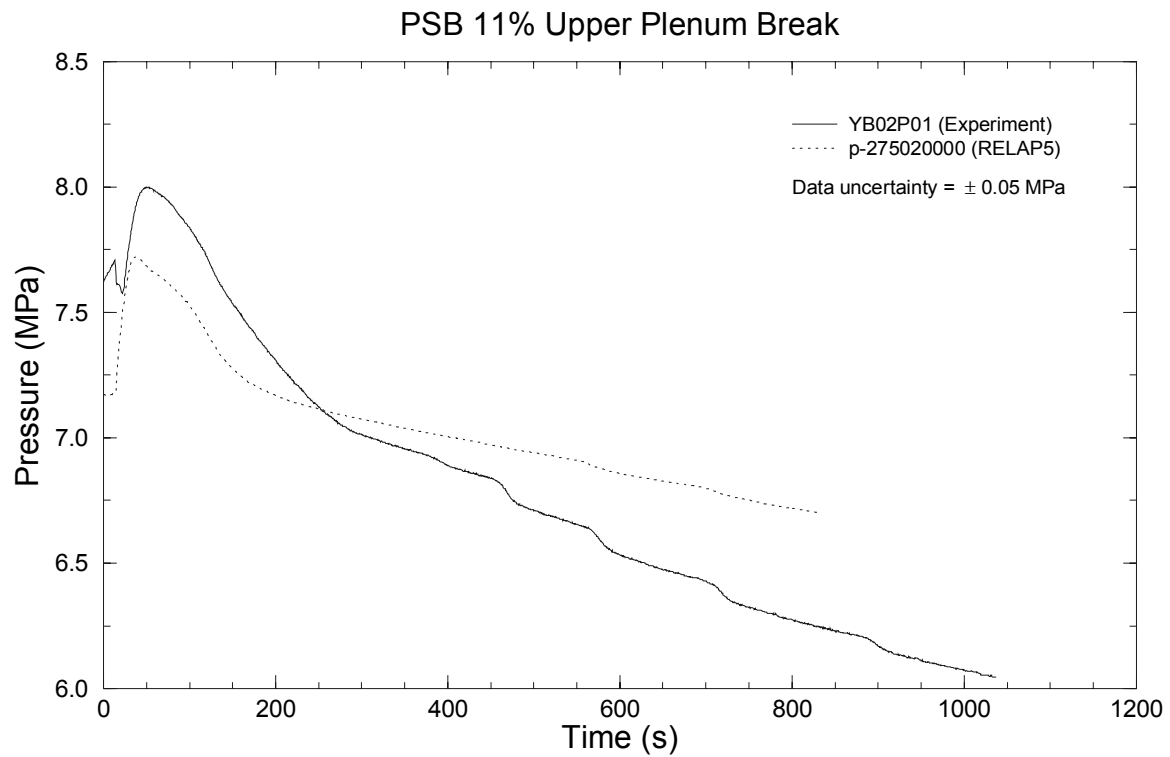


Figure 38. Loop 2 steam generator pressure for the base case.

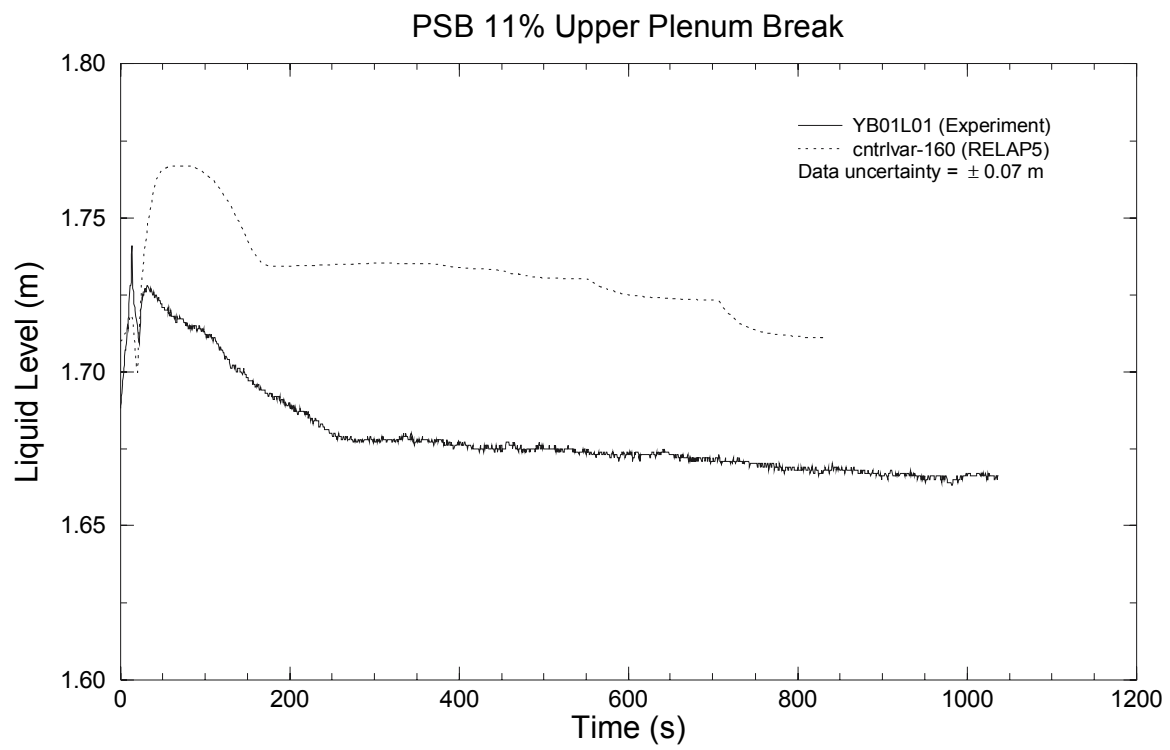


Figure 39. Loop 1 steam generator collapsed liquid level for the base case.

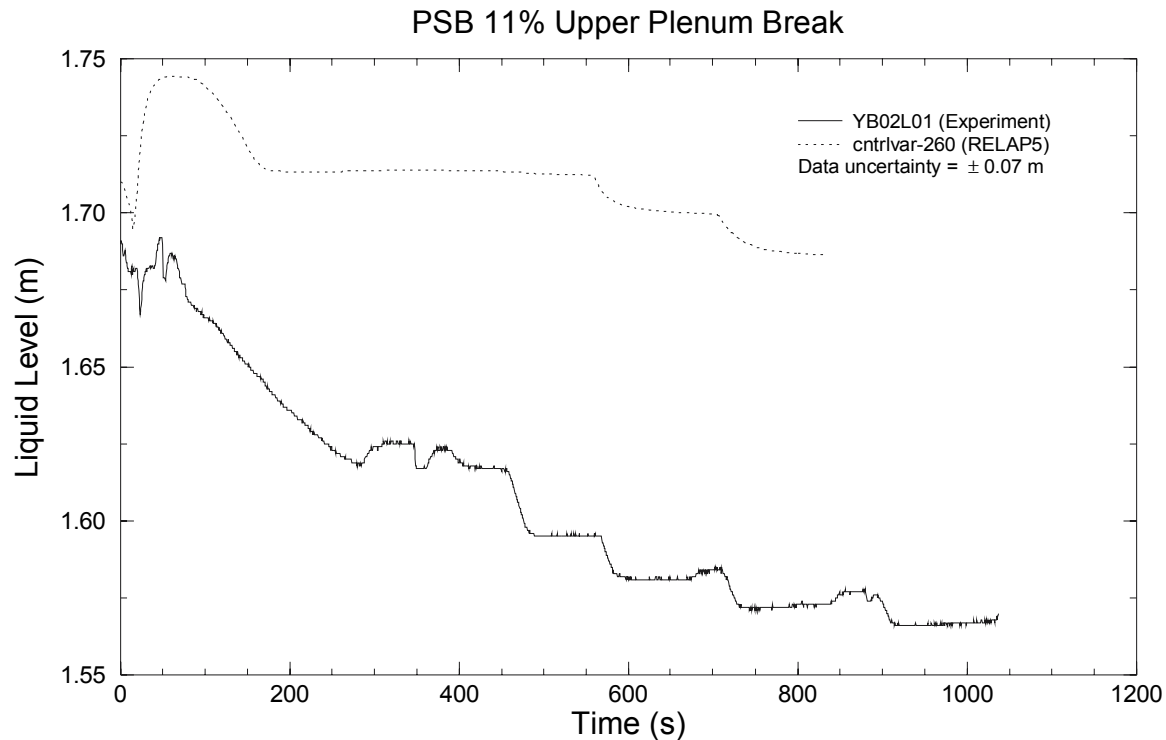


Figure 40. Loop 2 steam generator collapsed liquid level for the base case.

4.2.1 CCFL Off at Core Outlet

A sensitivity calculation was performed in which the CCFL model was turned off at the core exit (junction flag f set to 0 instead of 1). This provides a lower bound on the effects of the CCFL model by allowing the maximum amount of liquid to flow from the upper plenum back into the core. The objective of this run was to try to reduce the amount of liquid in the upper plenum.

The result showed little difference in any of the system parameters, except that the core heatup was significantly delayed because water penetration into the core from the upper accumulator injection helped cool the heater rods. Liquid inventories in the upper plenum, core, and downcomer were nearly the same as in the base case calculation. The heatup was also different in that the top portion of the heater rod remained cooled, with the maximum temperature occurring lower in the core, as illustrated in Figure 41.

4.2.2 Single Velocity Option at Core Outlet

In this calculation, the single velocity option was used at the core outlet junction (junction flag h set to 2 instead of 0). This prevented liquid from flowing from the upper plenum back down into the core by forcing the liquid to flow with the vapor. This calculation thus provided an upper bound on the possible CCFL effects.

Figure 42 shows that there was little material change in the amount of liquid in the core, compared to the base case calculation. With no liquid entering the top of the core, however, the core heatup was accelerated, as illustrated by the heater rod temperatures near the top of the core in Figure 43. As in the core, there was no noticeable change in the liquid inventory in the upper plenum, either.

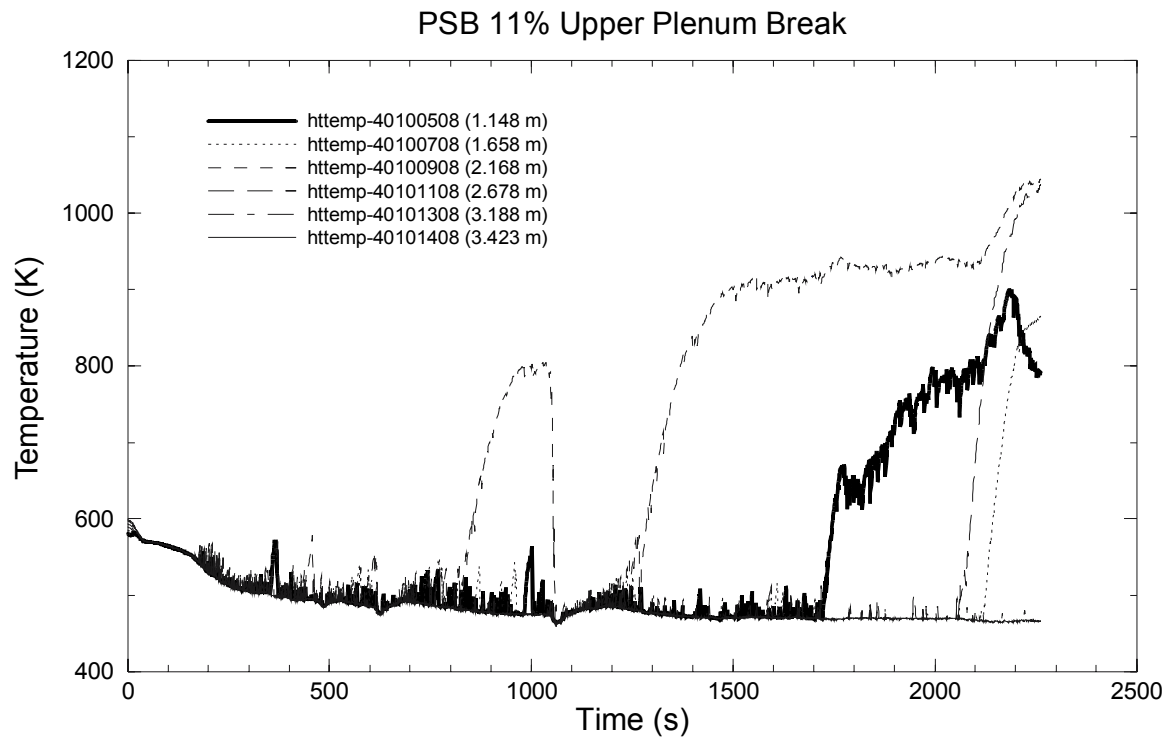


Figure 41. Calculated heater rod surface temperatures for the CCFL sensitivity case.

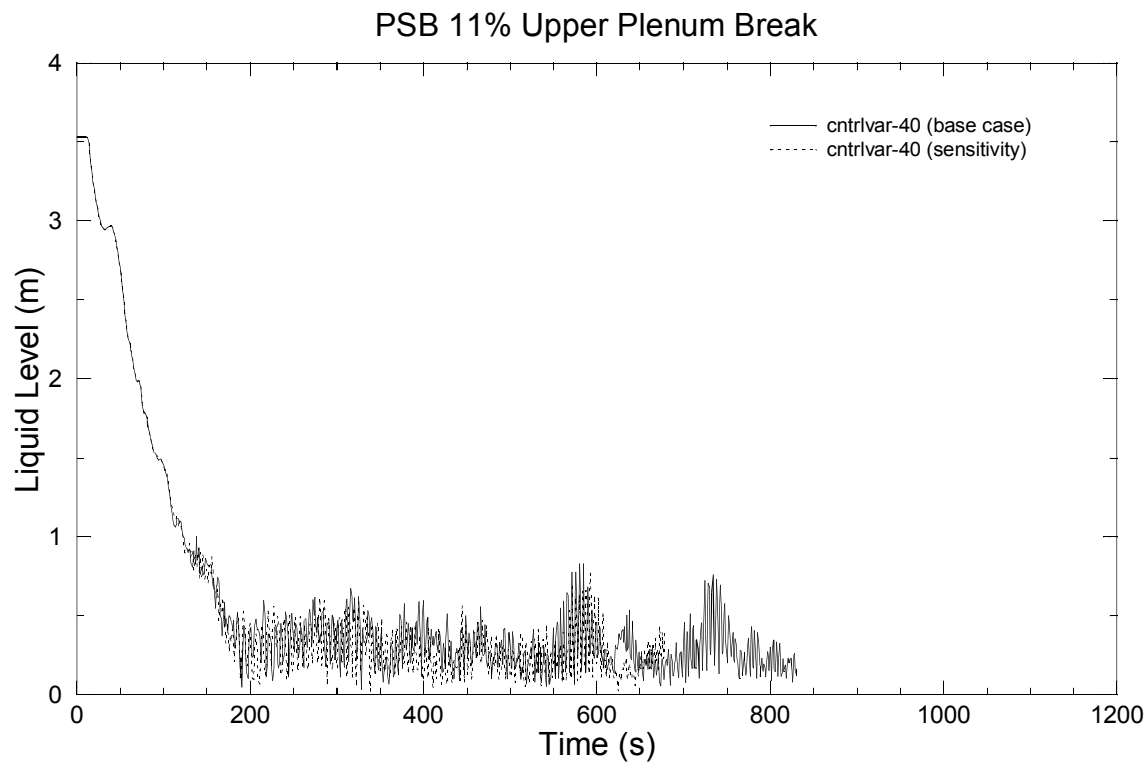


Figure 42. Core collapsed liquid level for the base and single velocity sensitivity cases.

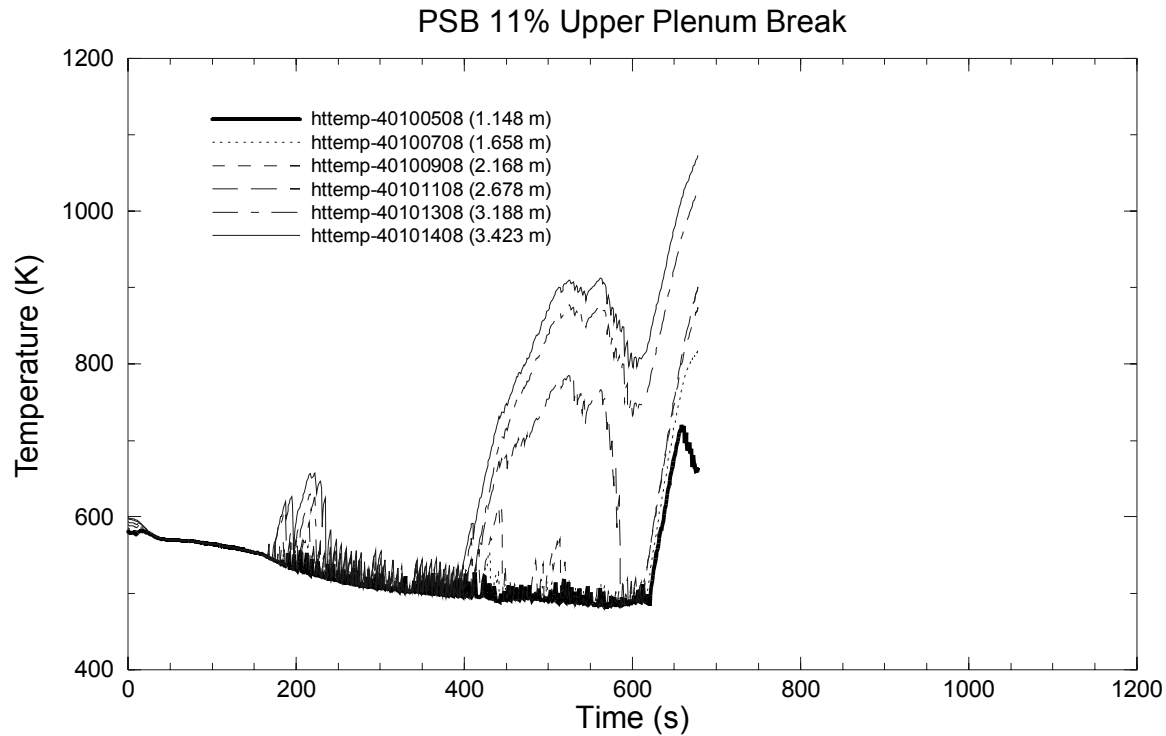


Figure 43. Calculated heater rod surface temperatures for the single velocity sensitivity case.

4.2.3 Reduced Drag in Upper Plenum

A sensitivity calculation was performed in which the bundle interphase drag model was turned on in the upper plenum region (volume flag b set to 1 instead of 0); this will tend to reduce the calculated drag. The objective was to reduce the amount of liquid in the upper plenum.

Figures 44 and 45 show that the amount of liquid in the upper plenum was reduced in the sensitivity calculation, resulting in better agreement with the measured data. The core liquid inventory was increased somewhat after 400 s. The effect on the heater rod temperatures is shown in Figure 46. The early, smaller heatups are more pronounced than in the base calculation (see Figure 31), and the heatup near 500 s is completely quenched in the sensitivity calculation (it was not in the base calculation) because of the additional water in the core. However, the calculation was terminated on high temperatures about 90 s earlier than in the base case.

4.2.4 Increased Drag in Core

A sensitivity calculation was performed in which the bundle interphase drag model was turned off in the core region (volume flag b set to 0 instead of 1); this will tend to increase the calculated drag.

In this calculation, more liquid was retained in both the core (see Figure 47) and the downcomer, while the liquid inventory in the upper plenum was essentially unchanged from the base case. The core liquid level also showed changes corresponding to the accumulator injection cycles that were much more obvious than in the base case calculation. The void profile in the core was also different, with the void fraction increasing with elevation in the core, whereas in the base case the void fraction was nearly constant along the core height.

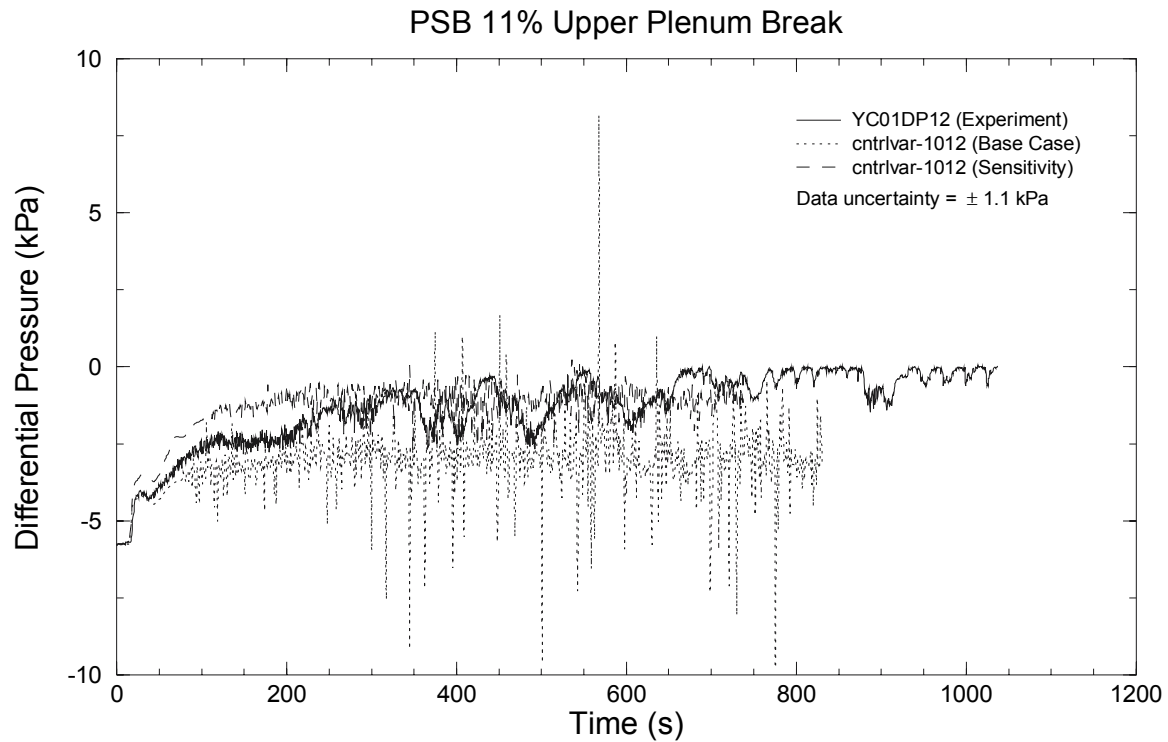


Figure 44. Differential pressure in the lower portion of the upper plenum for the base and upper plenum drag sensitivity cases.

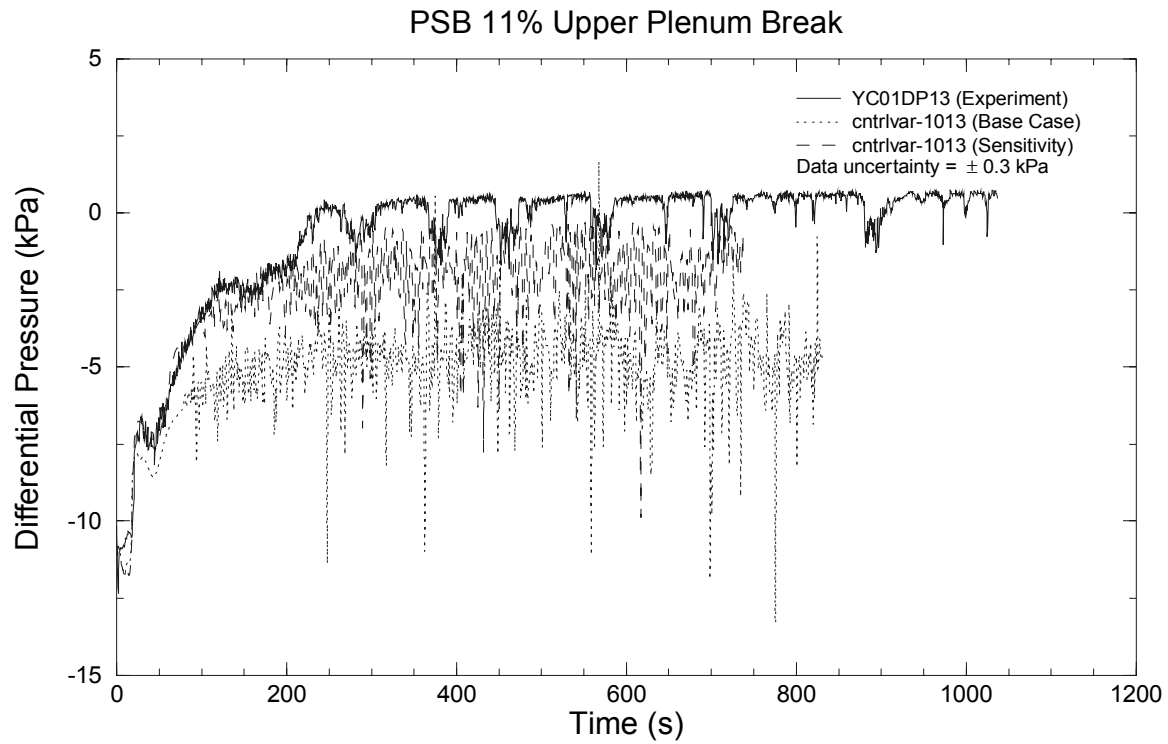


Figure 45. Differential pressure in the upper portion of the upper plenum for the base and upper plenum drag sensitivity cases.

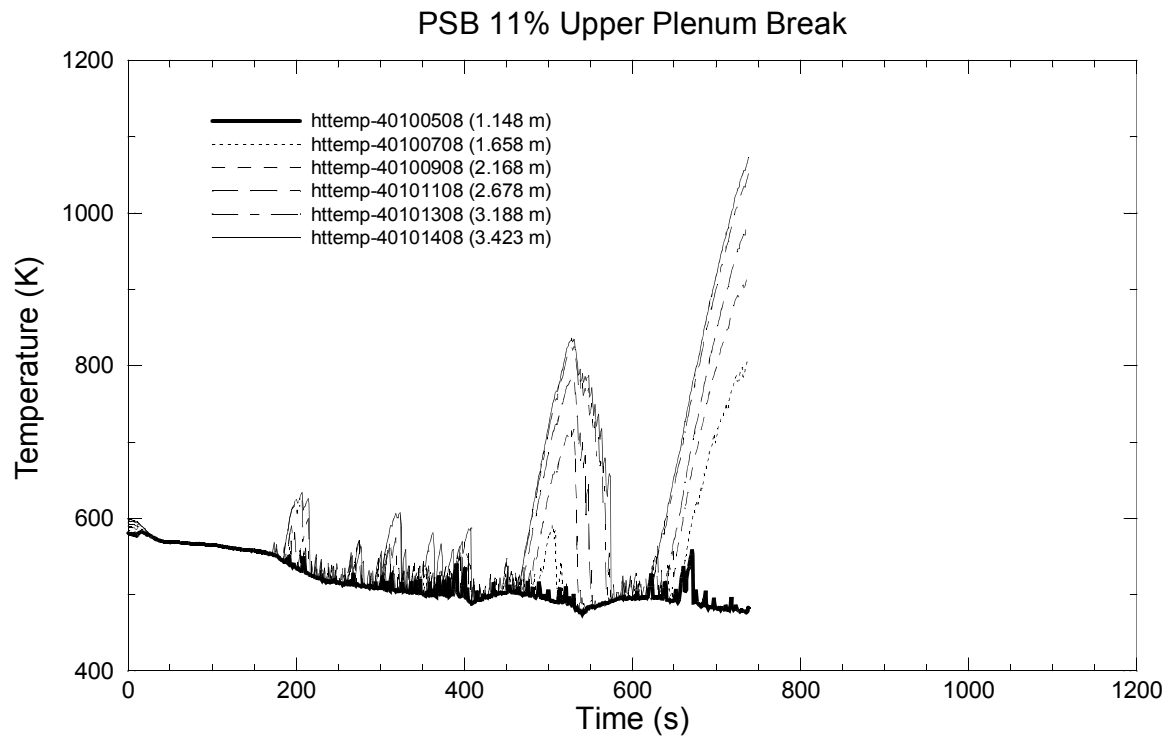


Figure 46. Calculated heater rod surface temperatures for the upper plenum drag sensitivity case.

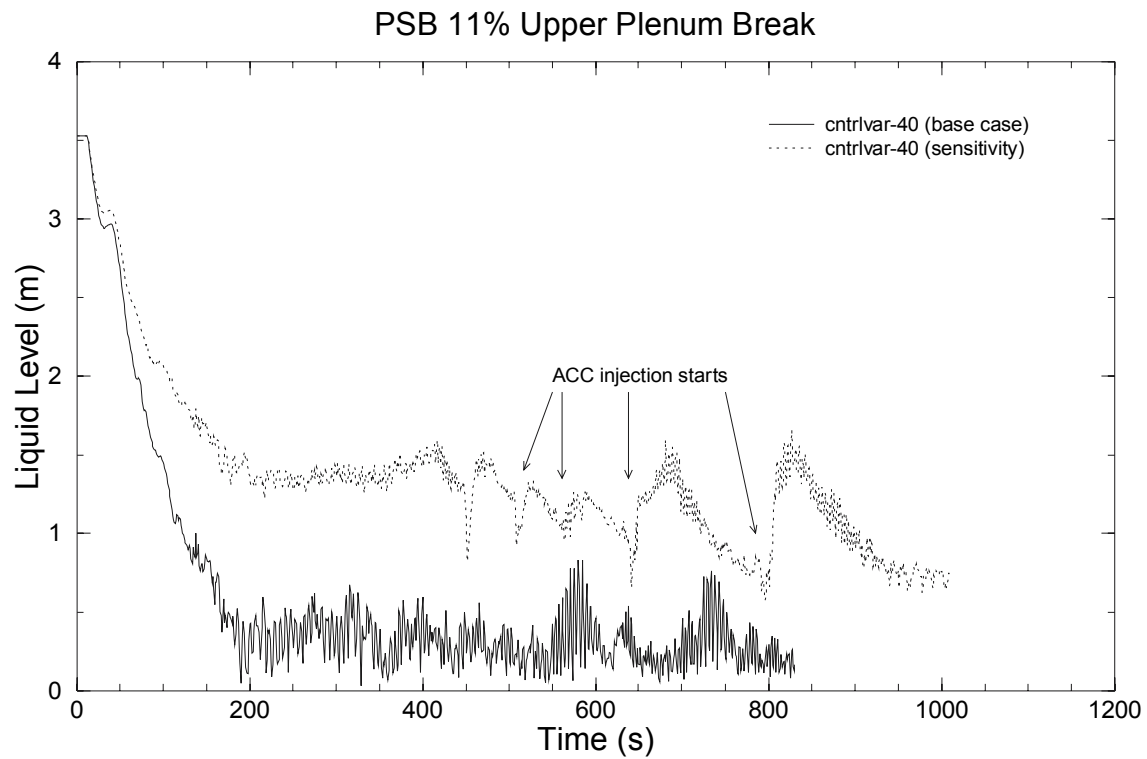


Figure 47. Core collapsed liquid level for the base and core drag sensitivity cases.

Figure 48 shows the resulting heater rod temperatures in the core. The numerous small heatups that were present in the base case calculation have been eliminated. The heatup behavior is more like that in the experiment, although the top of the core did not quench as often as in the test. The heatup is also delayed compared to the base case, resulting in the calculation being terminated on high temperatures at nearly the same time as the test.

4.3 Assessment Results

The assessment findings for the important phenomena expected to be addressed by the experiment are presented below.

Primary system two-phase natural circulation is judged to have been reasonably simulated by the code. Natural circulation flow only existed for a relatively short period in the test, with the hot collectors in the steam generators draining by 70 s and the primary coolant system pressure dropping below the secondary system pressure by 90 s. The loop flow rates were well predicted in making the transition from forced to natural convection, and the calculation was in excellent agreement with the measured data during the time the measurement was valid.

Asymmetric loop behavior is judged to be reasonably simulated, although it was not very important in either the test or the calculation. The only notable difference between the loops was the high pressure injection to the loop 4 hot leg. The effects of this injection, indications of much colder water in that hot leg, were seen in both the data and the calculation. The input model, which included all four loops in the facility explicitly, would allow differences in loop behavior in other transients to be simulated.

Leak flow is judged to be reasonably simulated. The fluid conditions upstream of the break were calculated well, reflecting both the transient liquid flow and the occasional liquid subcooling. With no

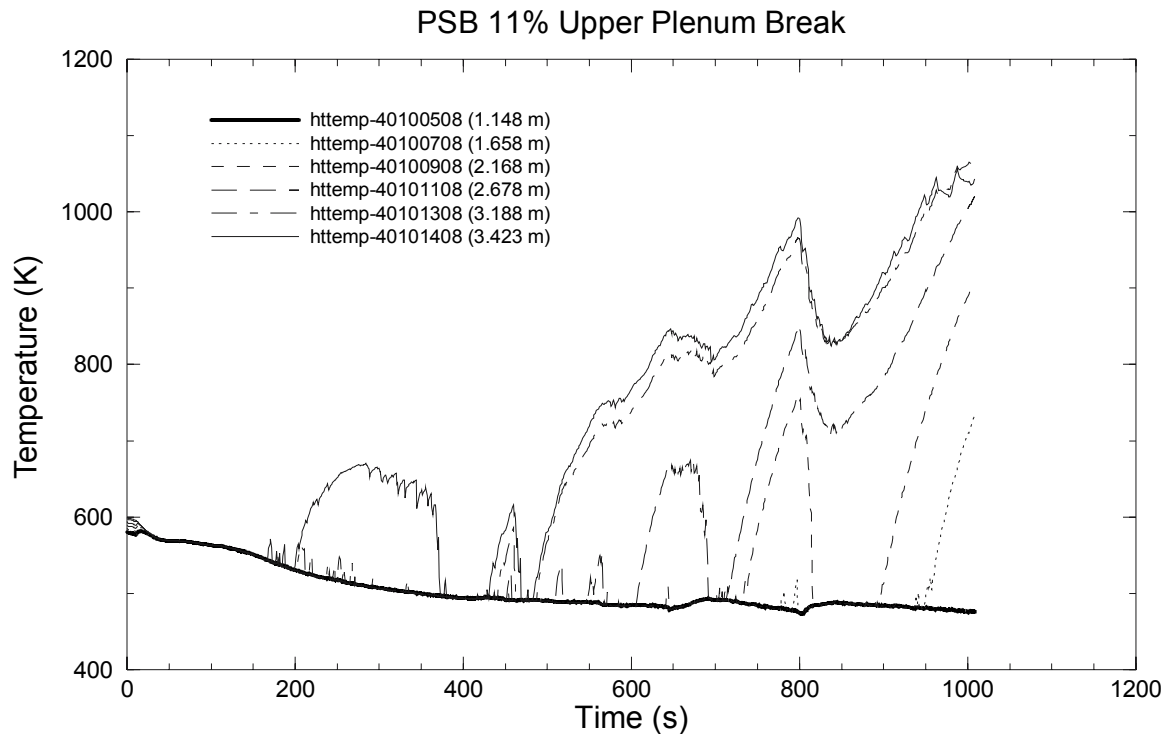


Figure 48. Calculated heater rod surface temperatures for the core drag sensitivity case.

break characterization data, an assumed set of discharge coefficients was used in the input model. Additional sensitivity calculations could be performed to find a set of discharge coefficients that would result in a close match to the data. There were no indications of problems with the RELAP5 critical flow model.

No judgment is made for the phenomenon of phase separation without mixture level formation. There were not detailed enough measurements to indicate if this occurred in any location in the system other than the core, where there were sufficient instruments but a mixture level existed.

The differential pressure measurements in the steam generators provide information on the collapsed liquid level, but by themselves do not provide sufficient information to make a judgment on mixture level and entrainment in the steam generator. There are no measurements in the steam generator to determine where the mixture level is, or how much liquid is being entrained either out of the tube bundle region or into the steam lines during the short period when the steam valves are open. The trend of the steam generator levels during the first 50 s indicates that the code may be overpredicting the amount of liquid being held above the measurement location, as more liquid appears to be falling back in the calculations than in the test. However, the steam generator feedwater is not at a steady state in the test, while it is in the calculation. Also, the steam generator geometry is not prototypic, and conclusions drawn from the experiment behavior would not necessarily apply to the horizontal steam generators in the power plants.

The code modeling of mixture level and entrainment in the core is judged to be minimal in the base case calculation. While the code correctly predicted the top-down uncovering and heatup, the void distribution in the core was much different from that in the test. The heater rods were heating up above the coolant saturation temperature over most of their length in the calculation, but not in the test. The impact of the accumulator injection on the core differential pressures observed in the test was not reproduced well by the code. The behavior was improved, however, in the sensitivity calculation with the bundle interphase drag model turned off in the core.

There were insufficient experiment data to address the phenomenon of flow stratification in horizontal pipes. No measurements were available to determine the flow regimes in the piping, so no judgment of the code's capability to model the phenomenon is made.

Loop seal clearance in the cold legs is judged to be reasonably simulated. While the calculated loop seal clearing occurred earlier than was measured, it did occur in both the test and calculation through the same mechanism. Condensation in the vessel associated with accumulator injection drew liquid from the loop seal toward the cold legs, where some of it flowed to the vessel. When the accumulator injection stopped, the liquid levels in the two sides of the loop seal equilibrated, but at successively lower levels with each accumulator injection cycle until the loop seal cleared.

No judgment is made on the code capability to model pool formation in the upper plenum because a pool did not form in either the test or the calculation. Based on the differential pressure measurements, the calculation retained more liquid in the upper plenum than was measured in the test. However, that liquid did not separate into a pool, remaining a fairly uniform two-phase mixture below the nozzle elevations.

Heat transfer in a covered core is judged to be reasonably simulated. The heat fluxes were low enough that the core remained in nucleate boiling until it began to uncover, and no early heatup was observed in the test or predicted by the code.

The code capability to model heat transfer in a partially uncovered core is judged to be reasonable. When the core was heating up, the heatup rate matched that in the test. In addition, the heatup rates

differed axially in the core, with regions toward the center of the core heating up faster than did those toward the ends in both the calculation and the data.

The code is judged to reasonably simulate pressurizer thermal hydraulics in this test. The pressurizer behavior was relatively simple, with the liquid initially in the pressurizer either rapidly draining or flashing in response to the upper plenum break. The code adequately modeled the draining/flashing behavior, based on the good agreement in both the system pressure (affected by the flashing) and liquid level during the first 20 s of the transient.

The code's capability to model the integral system effects is judged to be reasonable. The shape of the measured pressure curve was similar to that of the test, indicating that all of the significant events that occurred in the test were present in the calculation. There were no phenomena in the test that were not present in the calculation, nor were there calculated behaviors that were not observed in the test.

5. SUMMARY/CONCLUSIONS

RELAP5/MOD3.2 calculations of an 11% upper plenum break in the PSB facility reasonably simulated the basic transient behavior. The experiment progression and controlling phenomena were well reproduced by the code. The code assessment findings for the high-ranked phenomena are summarized in Table 3.

Most of the phenomena that were present in the test were reasonably simulated by the code. The major difference between the test and the calculation was the timing of the core heatup, and the thermal response to the accumulator injection cycles. The calculation had a more extensive axial heatup, with most of the core experiencing small heatups. The accumulator injection was more effective in quenching the core in the test than in the calculation. This difference is attributed to the liquid distribution in the core, rather than to the heat transfer models in the code. The code calculation had a more uniform axial distribution of the liquid in the core, and the accumulator injection did not have much impact on the core liquid inventory. Based on this, the code simulation of the mixture level and entrainment in the core was judged to be minimal.

An improved simulation of the core behavior was achieved in the sensitivity calculation in which the interphase drag in the core was increased by turning off the bundle volume flag. The current user recommendation is to use the bundle flag in vertical rod bundles. These results suggest that that may not be appropriate for the VVER bundle geometry. However, this was only a single bundle, and the results may differ at full scale. Users should at least investigate the sensitivity of their results to the interphase drag modeling in the core.

Assessment judgments were not made for several phenomena, either because they did not occur in the test or because there were insufficient measurements to characterize them.

Table 3. Assessment results for high-ranked phenomena.

Phenomenon	Judgment
Primary system two-phase natural circulation	Reasonable
Asymmetric loop behavior	Reasonable
Leak flow	Reasonable
Phase separation without mixture level formation	None made
Mixture level and entrainment in the steam generator	None made
Mixture level and entrainment in the core	Minimal
Flow stratification in horizontal pipes	None made
Loop seal clearance in the cold legs	Reasonable
Pool formation in the upper plenum	None made
Heat transfer in a covered core	Reasonable
Heat transfer in a partially uncovered core	Reasonable
Pressurizer thermal-hydraulics	Reasonable
Integral system effects	Reasonable

6. REFERENCES

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2. V. N. Blinkov and A. G. Kraev, *Computer Code Validation for Transient Analysis of VVER and RBMK Reactors, Phase 4, Standard Problem Definition Report for INSCSP-PSBV1: 11% Upper Plenum Break*, International Nuclear Safety Center of Russian Minatom, 2002.
3. Idaho National Engineering Laboratory, *RELAP5/MOD3 Code Manual*, NUREG/CR-5535, INEL-95/0174, August 1995.
4. L. Guo, Z. Feng and X. Chen, "Transient convective heat transfer of steam-water two-phase flow in a helical tube under pressure drop type oscillations," *International Journal of Heat and Mass Transfer*, Vol. 45 (2002), pp. 533-542.
5. O. I. Melikhov, *PSB-VVER Heat Losses*, Electrogorsk 2002.
6. V. N. Blinkov and A. G. Kraev, *Computer Code Validation for Transient Analysis of VVER and RBMK Reactors, Phase 4, Experimental Data Report for INSCSP-PSBV1: 11% Upper Plenum Break Test*, International Nuclear Safety Center of Russian Minatom, 2002.

Appendix A
Input Listing for PSB RELAP5 Model

Appendix A

Input Listing for PSB RELAP5 Model

```

= psb model
*
* transient deck for SP-V1
*
* NOTE: Calculations can be run either for a steady-state or a
* transient. By default the deck is configured for transient
* calculations. To invoke the steady-state options, enter the
* following commands in "vi":
*
* $* :g/trancalc/s/^[0-9]/*%/
* $* :g/sscalc/s/^[0-9]/*%/
*
* To reinvoked the transient options, enter the following commands
* in "vi":
*
* $* :g/sscalc/s/^[0-9]/*%/
* $* :g/trancalc/s/^[0-9]/*%/
*
*=====
0000100 new transient *trancalc
*0000100 new *sscalc
*-----
0000101 run
*-----
0000102 si si
*-----
0000110 air nitrogen
0000115 1.0 0.0
0000120 024010000 1.340 h2o primary * vessel elevation reference
0000120 101010000 8.855 h2o primary * loop elevation reference
0000121 159010000 12.960 h2o scndary * feedwater ring
*-----
0000201 1500. 1.0e-8 0.050 0003 20 10000 200000 * trancalc
*0000201 3000. 1.0e-8 0.050 0019 40 20000 200000 * sscalc
*-----
*****
***** ADDITIONAL RSTPLT VARIABLES *****
***** $
20800001 dt 0
20800002 dtcrnt 0
*
*****
***** TRIPS *****
***** $
20600000 expanded
*
20600010 time 0 ge null 0 0.0 1 0.0 * always true
20600020 time 0 ge null 0 1.e6 1 -1.0 * always false
*
* bypass heater high temperature trip
20600500 ctrnlvar 50 le null 0 673. n 0.0 * heater on
*
* main circulation pump trips
20601400 time 0 le null 0 10.0 n 0.0 * MCF1 running

```

```

20602400 time 0 le null 0 10.0 n 0.0 * MCP2 running
20603400 time 0 le null 0 10.0 n 0.0 * MCP3 running
20604400 time 0 le null 0 10.0 n 0.0 * MCP4 running
20611400 -140 n -1.0
20612400 -240 n -1.0
20613400 -340 n -1.0
20614400 -440 n -1.0
*
* loop cold leg isolation valve trips
20601420 time 0 ge null 0 0.0 1 0.0 * open c11 vlv
20601430 time 0 ge null 0 1.e6 1 -1.0 * clos c11 vlv
*
20602420 time 0 ge null 0 0.0 1 0.0 * open c12 vlv
20602430 time 0 ge null 0 1.e6 1 -1.0 * clos c12 vlv
*
20603420 time 0 ge null 0 0.0 1 0.0 * open c13 vlv
20603430 time 0 ge null 0 1.e6 1 -1.0 * clos c13 vlv
*
20604420 time 0 ge null 0 0.0 1 0.0 * open c14 vlv
20604430 time 0 ge null 0 1.e6 1 -1.0 * clos c14 vlv
*
* feedwater time dependent junction trips
20601510 time 0 ge null 0 5.0 1 -1.0
20601560 time 0 ge null 0 0.0 1 0.0
*
20602510 time 0 ge null 0 5.0 1 -1.0
20602560 time 0 ge null 0 0.0 1 0.0
*
20603510 time 0 ge null 0 5.0 1 -1.0
20603560 time 0 ge null 0 0.0 1 0.0
*
20604510 time 0 ge null 0 5.0 1 -1.0
20604560 time 0 ge null 0 0.0 1 0.0
*
* steam generator safety valve trips
20601800 p 175020000 ge null 0 13.65e6 n -1.0 * reseal
20601810 p 175020000 ge null 0 14.30e6 n -1.0 * open
20611800 180 and 1181 n -1.0
20611810 181 or 1180 n -1.0 * valve control
*
20602800 p 275020000 ge null 0 13.65e6 n -1.0 * reseal
20602810 p 275020000 ge null 0 14.30e6 n -1.0 * open
20612800 280 and 1281 n -1.0
20612810 281 or 1280 n -1.0 * valve control
*
20603800 p 375020000 ge null 0 13.65e6 n -1.0 * reseal
20603810 p 375020000 ge null 0 14.30e6 n -1.0 * open
20613800 380 and 1381 n -1.0
20613810 381 or 1380 n -1.0 * valve control
*
20604800 p 475020000 ge null 0 13.65e6 n -1.0 * reseal
20604810 p 475020000 ge null 0 14.30e6 n -1.0 * open
20614800 480 and 1481 n -1.0
20614810 481 or 1480 n -1.0 * valve control
*
* steam line isolation valves

```

```

20601840 time 0 ge null 0 5.0 1 -1.0 * close
20601850 time 0 ge null 0 1.e6 1 -1.0 * open
*
20602840 time 0 ge null 0 5.0 1 -1.0 * close
20602850 time 0 ge null 0 1.e6 1 -1.0 * open
*
20603840 time 0 ge null 0 5.0 1 -1.0 * close
20603850 time 0 ge null 0 1.e6 1 -1.0 * open
*
20604840 time 0 ge null 0 5.0 1 -1.0 * close
20604850 time 0 ge null 0 1.e6 1 -1.0 * open
*
* surge line isolation valves
20605020 time 0 lt null 0 -1.0 1 -1.0 * open
20605030 time 0 lt null 0 -1.0 1 -1.0 * close
*
20605120 time 0 lt null 0 -1.0 1 -1.0 * open
20605130 time 0 lt null 0 -1.0 1 -1.0 * close
*
* pressurizer heater
20605300 p 062020000 le null 0 15.4e6 n -1.0 * low P
20605310 p 062020000 ge null 0 17.0e6 n -1.0 * high P
20605320 cntlrvr 530 ge null 0 2.0 n 0.0 * level check
20605330 p 062020000 le null 0 13.73e6 1 -1.0 * low-low P
20615300 530 or 1532 n -1.0 * P low or heaters on
20615310 1530 and -531 n -1.0 * heaters on, P not high
20615320 1531 and -532 n -1.0 * heaters on, level high enough
20615330 1532 and -533 n -1.0 * trip heaters on low-low P
*
* pressurizer safety relief valve
20605740 p 535010000 ge null 0 17.00e6 n -1.0 * opening
20605750 p 535010000 le null 0 16.50e6 n -1.0 * closing
20615720 1573 and -575 n -1.0 * opening, P>closing
20615730 1572 or 574 n -1.0 * open valve
20615740 1575 and -574 n -1.0 * closing, P<opening
20615750 1574 or 575 n -1.0 * close valve
*
* pressurizer PORV
20605840 p 535010000 ge null 0 17.00e6 n -1.0 * opening
20605850 p 535010000 le null 0 16.50e6 n -1.0 * closing
20615820 1583 and -585 n -1.0 * opening, P>closing
20615830 1582 or 584 n -1.0 * open valve
20615840 1585 and -584 n -1.0 * closing, P<opening
20615850 1584 or 585 n -1.0 * close valve
*
* isolate accumulator on low level
20606000 cntlrvr 600 gt null 0 0.0 n 0.0 * accum 4 lvl
20606050 cntlrvr 605 gt null 0 0.0 n 0.0 * accum 2 lvl
20606600 cntlrvr 660 gt null 0 0.0 n 0.0 * accum 3 lvl
20606650 cntlrvr 665 gt null 0 0.0 n 0.0 * accum 1 lvl
*
20606400 p 062020000 le null 0 10.5+6 1 -1.0 * hpsis initiation
20606410 time 0 ge timeof 640 0.7 1 -1.0 * hpsis delay
*
* break valve
20608010 time 0 ge null 0 0.0 1 -1.0 * break * trancalc
20608010 time 0 ge null 0 1.e6 1 -1.0 * break * sscalc
*
=====
0100000 dcann1 branch
*-----
* no. juns vel/flow
*
0100001 6 area length volume
0100101 0.009046 0.200 incl angle delta z
* 0100102 0.0 azim angle -90.0 -0.200
* 0100102 0.0 roughness hyd dia p/bfe
*
=====
0100103 4.57e-5 0.0357 00000
*
0100200 0 16910368. 1243288. 2411826. 0.
*
0101101 145010000 010010003 0.004536 1.10 0.280 001001
0102101 245010000 010010003 0.004536 1.10 0.280 001001
0103101 345010000 010010003 0.004536 1.10 0.280 001001
0104101 445010000 010010003 0.004536 1.10 0.280 001001
0105101 010010000 012000000 0.008171 0.0 0.0 001000
0106101 015020002 010000000 0.00669 0.321 0.295 001000
*
0101201 .671443 .671443 0. * 2.3
0102201 .67144 .67144 0. * 2.3
0103201 .671417 .671417 0. * 2.3
0104201 .700828 .700828 0. * 2.4
0105201 .915137 .915137 0. * 5.64652
0106201 -.723205 -.723205 0. * -3.65348
*
0101110 0.076 0.00 beta y-int slope
0102110 0.076 0.00 1.00 1.00
0103110 0.076 0.00 1.00 1.00
0104110 0.076 0.00 1.00 1.00
0105110 0.076 0.00 1.00 1.00
0106110 0.0357 0.00 1.00 1.00
*-----
0120000 dcann2 branch
*-----
* no. juns vel/flow
*
0120001 1
*
0120101 area length volume
* 0120101 0.009660 0.200 0.0
* 0120102 0.0 azim angle incl angle delta z
* 0120102 0.0 roughness hyd dia p/bfe
* 0120103 4.57e-5 0.040 0.000
*
0120200 0 16911554. 1243288. 2411795. 0.
*
0121101 012010000 015050001 0.01005 0.253 0.312 001000
*
0121201 .744037 .744037 0. * 5.64652
*
0121110 0.040 0.00 beta y-int slope
*-----
0150000 dc pipe
*-----
* hydro no. volumes
*
0150001 17
*
* hydro vol area vol
* 0150101 0.01022 1
* 0150102 0.01922 2
* 0150103 0.01057 4
* 0150105 0.01553 5
* 0150106 0.01112 14
* 0150107 0.01000 15
* 0150108 0.008171 16
* 0150109 0.008541 17
*
* hydro jun area jun
* 0150201 0.01112 1
* 0150202 0.01057 4
* 0150203 0.01112 14
* 0150204 0.008171 16
*
* hydro length vol
* 0150301 0.525 1
* 0150302 0.390 2

```



```

*          hyd dia      beta      y-int      slope
020110     0.100      0.00      1.00      1.00
020210     0.024      0.00      1.00      1.00
*
*=====
020000     lp3      branch
*
*          no. juns      vel/flow
0220001     1      0
*
*          area      length      volume
0220101     0.01797      0.284      0.0
*          azim angle      incl angle      delta z
0220102     270.0      90.0      0.284
*          roughness      hyd dia      pvbfe
0220103     4.57e-5      0.0409      00000
*          ebt
0220200     0      1.696+7      1218121.      2410371.      0.
*          from      to      area      Kf      Kr      fvcahs
0221101     022010000      0.009613      0.319      0.370      001000
*          velf      velg      ve11
0221201     -6.6416-10      -6.63999-10      0. * -4.82238-9
*          hyd dia      beta      y-int      slope
0221110     0.040      0.00      1.00      1.00
*=====
0240000     connect      branch
*
*          no. juns      vel/flow
0240001     1      0
*          area      length      volume
0240101     0.007854      0.586      0.0
*          azim angle      incl angle      delta z
0240102     270.0      0.0      0.0
*          roughness      hyd dia      pvbfe
0240103     4.57e-5      0.100      00000
*          ebt
0240200     0      16949096.      1242807.      2410694.      0.
*          from      to      area      Kf      Kr      fvcahs
0241101     024010000      0.007854      0.736      0.214      001001
*          velf      velg      ve11
0241201     1.47406      1.47406      0. * 8.7447
*          hyd dia      beta      y-int      slope
0241110     0.100      0.00      1.00      1.00
*
*=====
*          dc to bypass
*=====
0250000     dc-byp      sngl jun
*          from      to      area      f loss      r loss      fvcahs
0250101     015000000      026000000      0.0      0.922      0.480      001000
*          Dhyd      beta      c      m
0250110     0.0      0.0      1.0      1.0
*
0250201     0      1.416852      1.416852      0. * .272429
*
*=====
0260000     bypass      pipe
*
*          no. volumes
0260001     2
*
*          hyd vol area      vol
0260101     0.0002545      2
*
*          hyd jun area      jun
0260201     0.0      1
*
*          hyd length      vol

```

```

0260301     0.9525      1
0260302     1.534      2
*
*          hyd vol
0260401     0.0      2
*
*          hyd hor angle      vol
0260501     0.0      1
0260502     270.0      2
*
*          hyd vert angle      vol
0260601     90.0      1
0260602     60.0      2
*
*          hyd delta z      vol
0260701     0.9525      1
0260702     1.1985      2
*
*          hyd roughness      hyd diam      vol
0260801     4.57e-5      0.018      2
*
*          hyd Kfwd      Krev      jun
0260901     0.045      0.045      1
*
*          hyd fe      vol
0261001     00      2
*
*          hyd fvcahs      jun
0261101     001000      1
*
*          hyd ebt
0261201     0      16897228.      1241612.      2412163.      0.      0.      1
0261202     0      16887874.      1240613.      2412404.      0.      0.      2
*
0261301     1.41647      1.41647      0.      1 * .272429
*          diamj      beta      c      m      jun
0261401     0.0      0.0      1.0      1.0      1
*
*=====
*          bypass isolation valve
*=====
0270000     byp-iso      valve
*
*=====
*          hyd from      to      area      kf      kr      vcabs
0270101     026010000      028000000      0.0      0.508      0.508      01000
*
0270201     0      1.415814      1.415814      0. * .272429
*
0270300     trpvlv
0270301     1
*
*=====
0280000     bypass      branch
*
*          no. juns      vel/flow
0280001     1      0
*          area      length      volume
0280101     0.0002652      0.8617      0.0
*          azim angle      incl angle      delta z
0280102     270.0      0.0      0.0
*          roughness      hyd dia      pvbfe
0280103     4.57e-5      0.018      00000
*          ebt
0280200     0      16881842.      1240073.      2412559.      0.
*          from      to      area      Kf      Kr      fvcahs
0281101     028010000      062090002      0.002545      1.0      1.0      001001
*          velf      velg      veli

```

```

0281201 .1415462 .1415462 0. * .272429
* hyd dia beta y-int slope
0281110 0.018 0.00 1.00 1.00
*
*****
* Unheated inlet section
* =====
0300000 inlet pipe
* -----
0300001 2
*
* flow areas
0300101 0.0 2
*
* Jct Flow Areas
0300201 0.01344 1
* lengths
0300301 0.308 1
0300302 0.431 2
*
* volumes
0300401 9.44784-3 1
0300402 6.1524-3 2
*
* horiz #
0300501 0.0 2
*
* azimuth #
0300601 90.0 2
*
* deltaz
0300701 0.308 1
0300702 0.431 2
*
* rough dhyd
0300801 4.570e-5 0.0224 1
0300802 4.570e-5 9.9239-3 2
*
* laminar wall friction
*0302501 1.0 0.0 1.0 0.0 1.0 0.0 1
*0302502 1.0 0.0 1.0 0.0 1.0 0.0 2
*
* kfor krev #
0300901 1.482 1.384 1
*
* pvbfe #
0301001 00100 2
*
* fvcabs #
0301101 001000 1
*
* volume ic
0301201 0 16949270. 1242731. 2410689. 0. 0. 1
0301202 0 16945686. 1242677. 2410795. 0. 0. 2
*
* vel/flow
0301300 0
*
* jct ic
301301 .861372 .861372 0. 1 * 8.7447
*
*****
* core inlet
* =====
0300000 corein sngl jun
*hydro from to area f loss r loss fvcabs
030101 030020002 040010001 0.0 0. 0. 001000

```

```

0350102 1.
* Dhyd beta c m
0350110 9.9239-3 0.0 0.775 1.0
*
0350201 0 .861354 .861354 0. * 8.7447
*
*****
* Core simulator region
* =====
0400000 coresim pipe
* -----
0400001 15
*
* flow areas
0400101 0.01344 15
*
* Jct Flow Areas
0400201 0.01344 14
* lengths
0400301 0.255 13
0400302 0.215 14
0400303 0.275 15
*
* volumes
0400401 0.0 15
*
* horiz #
0400501 0.0 15
*
* azimuth #
0400601 90.0 15
*
* deltaz
0400701 0.255 13
0400702 0.215 14
0400703 0.275 15
*
* rough dhyd
0400801 4.570e-5 9.9239-3 15
*
* laminar wall friction
*402501 1.0 0.0 1.0 0.0 1.0 0.0 1
*
* note add junction form losses based on pressure drop data
* kfor krev #
0400901 0.0 0.0 14
*
* pvbfe #
0401001 00100 15
*
* fvcabs #
0401101 001000 14
*
* volume ic
0401201 0 16942838. 1255071. 2410879. 0. 0. 1
0401202 0 16940738. 1267462. 2410942. 0. 0. 2
0401203 0 16938648. 1279848. 2411003. 0. 0. 3
0401204 0 16936568. 1292229. 2411065. 0. 0. 4
0401205 0 16934498. 1304608. 2411126. 0. 0. 5
0401206 0 16932438. 1316984. 2411187. 0. 0. 6
0401207 0 16930390. 1329355. 2411248. 0. 0. 7
0401208 0 16928350. 1341720. 2411309. 0. 0. 8
0401209 0 16926322. 1354081. 2411369. 0. 0. 9
0401210 0 16924304. 1366442. 2411428. 0. 0. 10
0401211 0 16922296. 1378796. 2411488. 0. 0. 11
0401212 0 16920300. 1391143. 2411547. 0. 0. 12
0401213 0 16918316. 1403482. 2411606. 0. 0. 13
0401214 0 16916494. 1413884. 2411660. 0. 0. 14

```

```

0401215 0 16914602.1413841.2411716.0.0. 15
*
* vel/flow
0401300 0
*
* jet ic
0401301 .866379 0. 1 * 8.7447
0401302 .871533 0. 2 * 8.7447
0401303 .876855 0. 3 * 8.7447
0401304 .882355 0. 4 * 8.7447
0401305 .887902 0. 5 * 8.7447
0401306 .893559 0. 6 * 8.7447
0401307 .899416 0. 7 * 8.7447
0401308 .905488 0. 8 * 8.7447
0401309 .911705 0. 9 * 8.7447
0401310 .917928 0. 10 * 8.7447
0401311 .924391 0. 11 * 8.7447
0401312 .931116 0. 12 * 8.7447
0401313 .938124 0. 13 * 8.7447
0401314 .944094 0. 14 * 8.7447
*
***** JUNCTION 45 *****
* core tie plate
*****
0450000 tieplat sngljun to area f loss r loss fvcabs
0450101 040150002 062010001 7.84e-3 0.78 0.67 100000
0450102 1.
* dhjd beta c m
0450110 5.5e-3 0.0 0.775 1.0
*
0450201 0 1.61841 1.61841 0. * 8.7447
*
***** Core bypass region ***** VOLUME 50 *****
* Core bypass region
*****
0500000 bypass pipe
*****
0500001 10
*
* flow areas
0500101 0.0010 1
0500102 0.00132 9
0500103 0.00145 10
*
* Jct Flow Areas
0500201 0.0009048 1
0500202 7.70e-5 2
0500203 0.00132 8
0500204 7.70e-5 9
*
* lengths
0500301 1.0375 1
0500302 0.585 2
0500303 0.510 3
0500304 0.510 8
0500305 0.636 9
0500306 2.1475 10
*
* volumes
0500401 0.0 10
*
* horiz #
0500501 0.0 10
*
* azimuth #
0500601 0.0 1

```

```

0500602 90.0 9
0500603 15.78 10
*
* deltaz
0500701 0.0 1
0500702 0.585 2
0500703 0.510 3
0500704 0.510 8
0500705 0.636 9
0500706 0.584 10
*
* rough dhjd
0500801 4.570e-5 0.0256 1
0500802 4.570e-5 0.041 9
0500803 4.570e-5 0.043 10
*
* laminar wall friction
0402501 1.0 0.0 1.0 0.0 1.0 0.0 1
*
* note add junction form losses based on pressure drop data
* kfor krev #
$0500901 1.451 0.288 1
$0500902 1.613 1.613 2
0500903 0.0 0.0 8
$0500904 2.419 2.419 9
* loss coefficients reduced based on model flow testing
0500901 0.10 0.1 1
0500902 0.25 0.25 2
0500904 0.25 0.25 9
*
* pvbfe #
0501001 00000 10
*
* fvcabs #
0501101 001000 9
*
* volume ic
0501201 0 16950060. 1241742. 2410666. 0. 0. 1
0501202 0 16947874. 1241091. 2410730. 0. 0. 2
0501203 0 16941578. 1249155. 2410917. 0. 0. 3
0501204 0 16937810. 1257215. 2411028. 0. 0. 4
0501205 0 16934056. 1265269. 2411139. 0. 0. 5
0501206 0 16930316. 1273318. 2411250. 0. 0. 6
0501207 0 16926592. 1281361. 2411361. 0. 0. 7
0501208 0 16922882. 1289398. 2411471. 0. 0. 8
0501209 0 16918732. 1297283. 2411594. 0. 0. 9
0501210 0 1.6912+7 1294783. 2411783. 0. 0. 10
*
* vel/flow
0501300 0
*
* jct ic
0501301 .413684 .413684 0. 1 * .2828664
0501302 4.85957 4.85957 0. 2 * .2828664
0501303 .284553 .284553 0. 3 * .2828664
0501304 .285636 .285636 0. 4 * .2828664
0501305 .28674 .28674 0. 5 * .2828664
0501306 .287867 .287867 0. 6 * .2828664
0501307 .2890174 .2890174 0. 7 * .2828664
0501308 .290192 .290192 0. 8 * .2828664
0501309 4.99486 4.99486 0. 9 * .2828664
*
***** JUNCTION 55 *****
* bypass outlet junction
*****
0550000 bypout sngljun to area f loss r loss fvcabs
*hydro from

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```

0550101 050100002 062020001 1.4522-3 0.892 0.003 01000
0550102 1. Dhyd beta c m
* 0550110 0.043 0.0 0.775 1.0
*
0550201 0 .2645067 .2645067 0. * .2828664
*
=====
0620000 up-plen pipe
*-----
*
*hydro no. volumes
0620001 9
*
*hydro vol area vol
0620101 0.03034 1
0620102 0.03440 2
0620103 0.03351 3
0620104 0.02720 4
0620105 0.02570 5
0620106 0.01057 7
0620107 0.02426 8
0620108 0.02573 9
*
*hydro jun area jun
0620201 0.03379 1
0620202 0.03205 2
0620203 0.05309 3
0620204 0.02573 4
0620205 0.01057 7
0620206 0.02573 8
*
*hydro length vol
0620301 0.475 1
0620302 0.775 2
0620303 0.575 3
0620304 0.525 4
0620305 0.475 5
0620306 0.200 7
0620307 0.638 9
*
*hydro volume vol
0620401 0.0 9
*
*hydro vert angle vol
0620601 90.0 9
*
*hydro delta z vol
0620701 0.475 1
0620702 0.775 2
0620703 0.575 3
0620704 0.525 4
0620705 0.475 5
0620706 0.200 7
0620707 0.638 9
*
*hydro roughness hyd diam vol
0620801 4.57e-5 0.0634 1
0620802 4.57e-5 0.1346 2
0620803 4.57e-5 0.1975 3
0620804 4.57e-5 0.1069 4
0620805 4.57e-5 0.1809 5
0620806 4.57e-5 0.116 7
0620807 4.57e-5 0.1955 8
0620808 4.57e-5 0.181 9
*
*hydro Kfwd Krev jun
0620901 0.493 0.597 1

```

```

0620902 0.149 0.235 2
0620903 0.431 0.544 3
0620904 0.191 0.266 4
0620905 0.096 0.036 5
0620906 0.0 0.0 6
0620907 0.096 0.204 7
0620908 0.0001 0.0056 8
*
*hydro fe vol
0621001 00 9
*
*hydro fvcchs jun
0621101 001000 3
0621102 101000 4
0621103 001000 8
*
*hydro ebt
0621201 0 16911470. 1413773. 2411797. 0. 0. 1
0621202 0 16907218. 1409958. 2411907. 0. 0. 2
0621203 0 16902630. 1409895. 2412025. 0. 0. 3
0621204 0 16898864. 1409838. 2412121. 0. 0. 4
0621205 0 16895444. 1409780. 2412209. 0. 0. 5
0621206 0 16893152. 1409780. 2412268. 0. 0. 6
0621207 0 16891796. 1409770. 2412303. 0. 0. 7
0621208 0 1.6889+7 1397602. 2412375. 0. 0. 8
0621209 0 16884470. 1238540. 2412492. 0. 0. 9
*
0621301 .375492 0. .375492 0. 1 * 8.7447
0621302 .407746 0. .471646 0. 2 * 9.02757
0621303 .246146 0. .297333 0. 3 * 9.02757
0621304 .507871 0. .578216 0. 4 * 9.02757
0621305 .491729 0. .552395 0. 5 * 3.59079
0621306 .491731 0. .552404 0. 6 * 3.59079
0621307 .491729 0. .552406 0. 7 * 3.59079
0621308 -.01399055 -.01517127 0. 8 * -.272432
*
0621401 0.0482 0.0 1.0 1.0 1
0621402 0.202 0.0 1.0 1.0 2
0621403 0.260 0.0 1.0 1.0 3
0621404 0.181 0.0 1.0 1.0 4
0621405 0.0 0.0 1.0 1.0 7
0621406 0.181 0.0 1.0 1.0 8
*
=====
0640000 upannl branch
*-----
*
* 6 no. juns vel/flow
*
* 640001 6 area length volume
* 640101 0.009046 0.200 0.0
* 640102 0.0 90.0 0.200
* 640103 4.57e-5 0.0357 00000
* 640200 0 16891722. 1404707. 2412305. 0.
* 641101 064010004 101000000 0.004536 0.280 1.10 001002
0642101 064010004 201000000 0.004536 0.280 1.10 001002
0643101 064010004 301000000 0.004536 0.280 1.10 001002
0644101 064010004 401000000 0.004536 0.280 1.10 001002
0645101 066010000 064000000 0.008171 0.0 0.0 001000
0646101 064010000 062080001 0.00669 0.295 0.321 001000
*
0641201 .731678 .731678 0. * 2.3
0642201 .731678 .731678 0. * 2.3
0643201 .731678 .731678 0. * 2.3
0644201 .76349 .76349 0. * 2.4

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```

0645201 .963116 .963116 0. * 5.43678
0646201 -.829652 -.829652 0. * -3.863225
*
064110 0.076 0.00 beta y-int slope
064210 0.076 0.00 1.00 1.00
064310 0.076 0.00 1.00 1.00
064410 0.076 0.00 1.00 1.00
064510 0.076 0.00 1.00 1.00
064610 0.0357 0.00 1.00 1.00
*=====
0660000 upan2 branch
*=====
* no. juns vel/flow
*
0660001 1
*
0660101 area length volume
0660101 0.009660 0.200 0.0
* azim angle incl angle delta z
0660102 0.0 90.0 0.200
* roughness hyd dia pvbfe
0660103 4.57e-5 0.040 00000
* ebt
*
0660200 0 16892936. 1409780. 2412274. 0.
* from to area Kf Kr fvcabs
0661101 062050002 066000000 0.01005 0.312 0.253 001000
* velf velg veli
0661201 .783043 .783043 0. * 5.43678
* hyd dia beta y-int slope
0661110 0.040 0.00 1.00 1.00
*=====
* upper core support plate
*=====
0680000 ucsp sngl jun
*
0680101 062010000 070000000 area f loss r loss fvcabs
* Dhyd beta c m
0680110 0.020 0.30 2.0 1.0
*
0680201 0 -2.10201-6 -2.102034-6 0. * -3.00999-6
*=====
0700000 up-head pipe
*=====
*
*hydro no. volumes
0700001 2
*
*hydro vol area vol
0700101 0.02483 1
0700102 0.02542 2
*hydro jun area jun
0700201 0.02542 1
*
*hydro length vol
0700301 1.1975 2
*
*hydro volume vol
0700401 0.0 2
*
*hydro vert angle vol
0700601 90.0 2
*
*hydro delta z vol
0700701 1.1975 2
*
*hydro roughness hyd diam vol
0700801 4.57e-5 0.1702 1
0700802 4.57e-5 0.1610 2
*
*hydro Kfwd Krev jun

```

```

0700901 0.0 0.0 1
*
*hydro fe vol
0701001 00 2
*
*hydro fvcabs jun
0701101 001000 1
*
*hydro ebt
0701201 0 16877642. 1230474. 2412667. 0. 0. 1
* 0701202 0 16868720. 1230277. 2412897. 0. 0. 2
0701201 3 16877642. 575. 0. 0. 0. 1
0701202 3 16868720. 575. 0. 0. 0. 2
*
0701301 1.60402-9 1.604185-9 0. jun 1 * 3.097456-8
* diamj beta c m jun 1
0701401 0.0161 0.0 1.0 1.0 1
*
*=====
* LOOP 1
*=====
* PRIMARY COOLANT SYSTEM
*=====
*
* Loop 1 bot leg
*=====
1010000 hotleg1 pipe
*=====
*
*hydro no. volumes
1010001 7
*
*hydro vol area vol
1010101 0.004536 7
*
*hydro jun area jun
1010201 0.004536 6
*
*hydro length vol
1010301 0.6683 3
1010302 0.420 4
1010303 0.567 7
*
*hydro volume vol
1010401 0.0 7
*
*hydro horiz ang vol
1010501 45.0 7
*
*hydro vert angle vol
1010601 0.0 4
1010602 42.22 5
1010603 90.0 7
*
*hydro delta z vol
1010701 0.0 4
1010702 0.381 5
1010703 0.567 7
*
*hydro roughness hyd diam vol
1010801 5.00e-5 0.076 7
*
*hydro Kfwd Krev jun
1010901 0.0 0.0 3
1010902 0.25 0.25 4
1010903 0.0 0.0 6
*
*hydro fe vol

```

```

1011001 00 7
*
*hydro fvcabs jun
101101 001000 6
*
*hydro ebt
1011201 0 16891470. 1404572. 2412312. 0. 0. 1
1011202 0 16891440. 1404438. 2412312. 0. 0. 2
1011203 0 16891408. 1404304. 2412313. 0. 0. 3
1011204 0 16891384. 1404220. 2412314. 0. 0. 4
1011205 0 1689020. 1404107. 2412349. 0. 0. 5
1011206 0 16886770. 1403993. 2412433. 0. 0. 6
1011207 0 16882890. 1403880. 2412532. 0. 0. 7
*
1011301 .731617 .731617 0. 1 * 2.3
1011302 .731557 .731557 0. 2 * 2.3
1011303 .731496 .731496 0. 3 * 2.3
1011304 .731458 .731458 0. 4 * 2.3
1011305 .731408 .731408 0. 5 * 2.3
1011306 .731361 .731361 0. 6 * 2.3
*
* diamj beta c m jun
1011401 0.076 0.0 1.0 1.0 6
*
***** VOLUME 110 *****
* Steam generator 1 inlet transition region
*****
1100000 sglnel branch
*****
* no. juns vel/flow
1100001 2 0
*
* area length volume
1100101 0.0 0.210 0.00129
* azim angle incl angle delta z
1100102 0.0 90.0 0.210
* roughness hyd dia pvbfe
1100103 5.00e-5 0.0 00000
* ebt
1100200 0 16880318. 1403840. 2412599. 0.
* from to area Kf Kr fvcabs
1101101 101010000 110000000 0.004536 0.0 0.0 001000
1102101 110010000 115000000 0.004301 0.045 0.023 001000
* velj velg vell
1101201 .731315 .731315 0. * 2.3
1102201 .771258 .771258 0. * 2.3
* hyd dia beta y-int slope
1101110 0.076 0.00 1.00 1.00
1102110 0.074 0.00 1.00 1.00
*
***** VOLUME 115 *****
* Steam generator 1 hot collector
*****
1150000 sgihotc pipe
*****
*
*hydro no. volumes
1150001 5
*
*hydro vol area vol
1150101 0.0 1
1150102 0.003632 4
1150103 0.0 5
*
*hydro jun area jun
1150201 0.0 4
*
*hydro length vol
1150301 0.508 1

```

```

1150302 0.476 4
1150303 0.429 5
*
*hydro volume vol
1150401 0.001849 1
1150402 0.0 4
1150403 0.001588 5
*
*hydro horiz ang vol
1150501 0.0 5
*
*hydro vert angle vol
1150601 90.0 5
*
*hydro delta z vol
1150701 0.508 1
1150702 0.476 4
1150703 0.429 5
*
*hydro roughness hyd diam vol
1150801 5.00e-5 0.068 5
*
*hydro Kfwd Krev jun
1150901 0.0 0.0 4
*
*hydro fe vol
1151001 00 5
*
*hydro fvcabs jun
1151101 001000 4
*
*hydro ebt
1151201 0 16877684. 1402171. 2412666. 0. 0. 1
1151202 0 16874404. 1400506. 2412751. 0. 0. 2
1151203 0 16871222. 1398460. 2412833. 0. 0. 3
1151204 0 16868020. 1395801. 2412915. 0. 0. 4
1151205 0 16864946. 139216. 2412994. 0. 0. 5
*
1151301 .73562 .73562 0. 1 * 1.854402
1151302 .552481 .552481 0. 2 * 1.39415
1151303 .363967 .363967 0. 3 * .919592
1151304 .170144 .170144 0. 4 * .4305745
*
1151401 diamj beta c m jun
1151401 0.068 0.0 1.0 1.0 4
*
***** JUNCTION 116 *****
* junctions between the hot collector and the sg tubes
*****
1160000 hcjuns1 mtpljun
*****
1160001 5 0
*
* 0nm from to area kfor krev efvcabs sub 2ph
1160011 115050004 125000000 0.0007964 0.005 0.002 0001002 1.0 1.0 1.0
* inc-firm inc-to 0 limit
1160012 000000000 000000000 0 1
*
* lnmm velf velg #
1161011 .774178 .774178 1 * .4305745
*
* 2nm Dhyd b c m #
1162011 0.013 1.0 2.0 1.0 1
*
* 0nm from to area kfor krev efvcabs sub 2ph
1160021 115040004 124000000 0.0009291 0.005 0.002 0001002 1.0 1.0 1.0
* inc-firm inc-to 0 limit
1160022 -10000 -100000 0 5

```



```

1221209 0 16871078. 1253853. 2412836. 0. 0. 9
1221210 0 16870696. 1252605. 2412846. 0. 0. 10
*
1221301 .691236 .691236 0.
1221302 .678707 .678707 0.
1221303 .671274 .671274 0.
1221304 .666641 .666641 0.
1221305 .663745 .663745 0.
1221306 .661889 .661889 0.
1221307 .660673 .660673 0.
1221308 .659859 .659859 0.
1221309 .659303 .659303 0.
*
* diamj beta c m jun
1221401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 1 tubes row 3 (7 tubes)
*****
1230000 sgltub3
*****
*
*hydro no. volumes
1230001 10
*
*hydro vol area vol
1230101 0.0009291 10
*
*hydro jun area jun
1230201 0.0 9
*
*hydro length vol
1230301 1.0656 10
*
*hydro volume vol
1230401 0.0 10
*
*hydro horiz ang vol
1230501 0.0 10
*
*hydro vert angle vol
1230601 0.0 1
1230602 -0.343 9
1230603 0.0 10
*
*hydro delta z vol
1230701 0.0 1
1230702 -0.006375 9
1230703 0.0 10
*
*hydro roughness hyd diam vol
1230801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
1230901 0.047 0.047 9
*
*hydro fe vol
1231001 00 10
*
*hydro fvcabs jun
1231101 001000 9
*
*hydro ebt
1231201 0 16870800. 1345562. 2412844. 0. 0. 1
1231202 0 16870378. 1312030. 2412855. 0. 0. 2
1231203 0 1.687+7 1290606. 2412865. 0. 0. 3
1231204 0 16869594. 1276898. 2412875. 0. 0. 4
1231205 0 16869208. 1268016. 2412885. 0. 0. 5
*
*****
* Steam generator 1 tubes row 4 (7 tubes)
*****
1240000 sgltub4
*****
*
*hydro no. volumes
1240001 10
*
*hydro vol area vol
1240101 0.0009291 10
*
*hydro jun area jun
1240201 0.0 9
*
*hydro length vol
1240301 1.0656 10
*
*hydro volume vol
1240401 0.0 10
*
*hydro horiz ang vol
1240501 0.0 10
*
*hydro vert angle vol
1240601 0.0 1
1240602 -0.343 9
1240603 0.0 10
*
*hydro delta z vol
1240701 0.0 1
1240702 -0.006375 9
1240703 0.0 10
*
*hydro roughness hyd diam vol
1240801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
1240901 0.047 0.047 9
*
*hydro fe vol
1241001 00 10
*
*hydro fvcabs jun
1241101 001000 9
*
*hydro ebt
1241201 0 16867574. 1344358. 2412927. 0. 0. 1
1241202 0 16867124. 1311551. 2412938. 0. 0. 2
*
*****

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1241203 0 16866704. 1290469. 0. 0. 3
1241204 0 16866288. 1276903. 2412949. 0. 0. 4
1241205 0 16865874. 1268064. 2412970. 0. 0. 5
1241206 0 16865464. 1262228. 2412981. 0. 0. 6
1241207 0 16865052. 1258317. 2412992. 0. 0. 7
1241208 0 16864642. 1255654. 2.413+6 0. 0. 8
1241209 0 16864232. 1253811. 2413013. 0. 0. 9
1241210 0 16863800. 1252512. 2413024. 0. 0. 10
*
1241301 .733626 0. jun 1 * .489017
1241302 .720876 .73626 0. 2 * .489017
1241303 .713198 0. 3 * .489017
1241304 .708354 .708354 0. 4 * .489017
1241305 .705291 0. 5 * .489017
1241306 .703308 0. 6 * .489017
1241307 .701996 0. 7 * .489017
1241308 .70111 0. 8 * .489017
1241309 .7005 0. 9 * .489017
*
* diamj beta c m jun
1241401 0.013 0.0 1.0 1.0 9
*
***** VOLUME 125 *****
* Steam generator tubes 1 row 5 (6 tubes)
=====
1250000 sgltub5 pipe
-----*
*
*hydro no. volumes
1250001 10
*
*hydro vol area vol
1250101 0.0007964 10
*
*hydro jun area jun
1250201 0.0 9
*
*hydro length vol
1250301 1.0656 10
*
*hydro volume vol
1250401 0.0 10
*
*hydro horiz ang vol
1250501 0.0 10
*
*hydro vert angle vol
1250601 0.0 1
1250602 -0.343 9
1250603 0.0 10
*
*hydro delta z vol
1250701 0.0 1
1250702 -0.006375 9
1250703 0.0 10
*
*hydro roughness hyd diam vol
1250801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
1250901 0.047 0.047 9
*
*hydro fe vol
1251001 00 10
*
*hydro fvcchs jun
1251101 001000 9
*

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```

*hydro ebt 2413006. 0. 0. 1
1251201 0 16864478. 1342369. 2413019. 0. 0. 2
1251202 0 1.6864+7 1310535. 2413030. 0. 0. 3
1251203 0 16863558. 1289975. 2413042. 0. 0. 4
1251204 0 16863118. 1276672. 2413053. 0. 0. 5
1251205 0 16862680. 1267959. 2413064. 0. 0. 6
1251206 0 16862242. 1262175. 2413075. 0. 0. 7
1251207 0 16861808. 1258280. 2413086. 0. 0. 8
1251208 0 16861374. 1255616. 2413098. 0. 0. 9
1251209 0 16860938. 1253763. 2413109. 0. 0. 10
1251210 0 16860482. 1252451. jun
1251301 .752753 0. 1 * .4305745
1251302 .740101 0. 2 * .4305745
1251303 .732416 0. 3 * .4305745
1251304 .727541 0. 4 * .4305745
1251305 .724442 0. 5 * .4305745
1251306 .722423 0. 6 * .4305745
1251307 .721081 0. 7 * .4305745
1251308 .72017 0. 8 * .4305745
1251309 .719541 0. 9 * .4305745
*
* diamj beta c m jun
1251401 0.013 0.0 1.0 1.0 9
*
***** JUNCTION 128 *****
* junctions between the sg tubes and the cold collector
=====
1280000 cc junsl mtpl jun
-----
1280001 5 0
*
* 0nmm from to area kfor krev fvcchs sub 2ph
1280011 12501000 129050003 0.0007964 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
1280012 000000000 000000000 0 1
*
* lnnm velf velg #
1281011 .719097 1 * .4305745
* 2nmm Dhvd b c m #
1282011 0.013 1.0 2.0 1.0 1
*
* 0nmm from to area kfor krev fvcchs sub 2ph
1280021 124010000 129040003 0.0009291 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
1280022 -1000000 -10000 0 5
*
* lnnm velf velg #
1281021 .700072 2 * .489017
1281031 .679385 3 * .474558
1281041 .658916 4 * .460252
1281051 .637952 5 * .445598
*
* 2nmm Dhvd b c m #
1282021 0.013 1.0 2.0 1.0 5
*
***** VOLUME 129 *****
* Steam generator 1 cold collector
=====
1290000 sgicldc pipe
-----*
*
*hydro no. volumes
1290001 6
*
*hydro vol area vol
1290101 0.0 1

```

```

1290102 0.003632 5
1290103 0.0 6
*
*hydro jun area jun
1290201 0.0 5
*
*hydro length vol
1290301 0.508 1
1290302 0.476 4
1290303 0.429 5
1290304 0.051 6
*
*hydro volume vol
1290401 0.001883 1
1290402 0.0 5
1290403 0.0002164 6
*
*hydro horiz ang vol
1290501 0.0 6
*
*hydro vert angle vol
1290601 90.0 6
*
*hydro delta z vol
1290701 0.508 1
1290702 0.476 4
1290703 0.429 5
1290704 0.051 6
*
*hydro roughness hyd diam vol
1290801 5.00e-5 0.068 5
1290802 5.00e-5 0.074 6
*
*hydro Kfwd Krev jun
1290901 0.0 0.0 4
1290902 0.016 0.032 5
*
*hydro tlpvbf vol
1291001 0.000000 6
*
*hydro efvcchs jun
1291101 0.001000 5
*
*hydro ebt vol
1291201 0 16874190. 1252437. 2412756. 0. 0. 1
1291202 0 16870660. 1252420. 2412847. 0. 0. 2
1291203 0 16867224. 1252404. 2412936. 0. 0. 3
1291204 0 16863760. 1252389. 2413025. 0. 0. 4
1291205 0 16860440. 1252378. 2413111. 0. 0. 5
1291206 0 16858672. 1263399. 2413156. 0. 0. 6
*
1291301 -.679074 -.679074 0. 1 * -1.854402
1291302 -.51053 -.51053 0. 2 * -1.39415
1291303 -.336748 -.336748 0. 3 * -.919592
1291304 -.1576734 -.1576734 0. 4 * -.4305745
1291305 8.0974-11 8.11051-11 0. 5 * 2.21124-10
*
* diamj beta c m jun
1291401 0.068 0.0 1.0 1.0 5
*
*****
* Steam generator 1 inlet transition region
*****
1300000 sgoutlet1 branch
*-----*
* no. juns vel/flow
1300001 2 0 length volume
*

```

```

1300101 0.0 0.159 0.001069
* incl angle delta z
1300102 0.0 -90.0 -0.159
* roughness hyd dia pvcfe
1300103 5.00e-5 0.0 0.0000
* ebt
1300200 0 16876738. 1252436. 2412691. 0.
* from to area Kf Kr fvcchs
1301101 129000000 130000000 0.004301 0.023 0.045 001000
1302101 130010000 135000000 0.004536 0.0 0.0 001000
* velf velg veli
1301201 .711244 .711244 0. * 2.3
1302201 .674394 .674394 0. * 2.3
* hyd dia beta y-int slope
1301110 0.074 0.00 1.00 1.00
1302110 0.076 0.00 1.00 1.00
*
*****
* Loop 1 pump suction piping of cold leg
*****
1350000 pmpsect1 pipe
*-----*
*
*hydro no. volumes
1350001 14
*
*hydro vol area vol
1350101 0.004536 10
1350102 0.0 11
1350103 0.004536 14
*
*hydro jun area jun
1350201 0.004536 13
*
*hydro length vol
1350301 0.828 5
1350302 1.042 7
1350303 1.121 8
1350304 0.7495 10
1350305 0.74525 14
*
*hydro volume vol
1350401 0.0 10
1350402 0.006897 11
1350403 0.0 14
*
*hydro horiz ang vol
1350501 95.0 14
*
*hydro vert angle vol
1350601 -90.0 8
1350602 0.0 10
1350603 90.0 14
*
*hydro delta z vol
1350701 -0.828 5
1350702 -0.7425 7
1350703 -0.935 8
1350704 0.0 10
1350705 0.64925 11
1350706 0.74525 14
*
*hydro roughness hyd diam vol
1350801 5.00e-5 0.076 14
*
*hydro Kfwd Krev jun
1350901 0.0 0.0 4
1350902 0.13 0.13 5

```



```

1450302 0.741 4
*
*hydro volume vol 4
1450401 0.0 4
*
*hydro horiz ang vol
1450501 -100.0 3
1450502 -145.0 4
*
*hydro vert angle vol
1450601 0.0 4
*
*hydro delta z vol
1450701 0.0 4
*
*hydro roughness hyd diam vol
1450801 5.00e-5 0.076 4
*
*hydro Kfwd Krev jun
1450901 0.0 0.0 2
1450902 0.16 0.16 3
*
*hydro fe vol
1451001 00 4
*
*hydro fvcahs jun
1451101 001000 3
*
*hydro ebt vol
1451201 0 16910528. 1243568. 2411822. 0. 0. 1
1451202 0 16910496. 1243430. 2411822. 0. 0. 2
1451203 0 16910462. 1243291. 2411823. 0. 0. 3
1451204 0 16910402. 1243160. 2411825. 0. 0. 4
*
1451301 .671573 .671573 0. jun 1 * 2.3
1451302 .671529 .671529 0. 2 * 2.3
1451303 .671484 .671484 0. 3 * 2.3
*
* diamj beta c m jun
1451401 0.076 0.0 1.0 1.0 3
*
*##### LOOP 1 #####
* SECONDARY COOLANT SYSTEM $
*****
* Loop 1 Main Feedwater source *****
=====
1500000 mfwlsrc tndpvol *****
*#####
* area length volume
1500101 1.0 1.0 0.0
* azim angle incl angle delta z
1500102 0.0 0.0 0.0
* roughness hyd dia pvbfe
1500103 0.0000 0.0000 00010
* ebt trip search var
1500200 003 0
* indep var 10.0e6 443.15
1500201 0.00 10.0e6 443.15
*
***** JUNCTION 151 *****
* Loop 1 main feedwater flow *****
=====
1510000 mfw1 tndpvol
*
* From To Area
1510101 150010000 159000000 0.0009079

```

```

* Loop 1 sg downcomer
*=====
$1600000 dcl annulus
*-----*
*hydro no. volumes
$1600001 5
*
*hydro vol area vol
$1600101 0.0 5
*
*hydro jun area jun
$1600201 0.0 4
*
*hydro length vol
$1600301 0.374 1
$1600302 0.476 4
$1600303 0.563 5
*
*hydro volume vol
$1600401 0.00987 1
$1600402 0.01256 4
$1600403 0.01486 5
*
*hydro vert angle vol
$1600601 -90.0 5
*
*hydro delta z vol
$1600701 -0.374 1
$1600702 -0.476 4
$1600703 -0.563 5
*
*hydro roughness hyd diam vol
$1600801 1.0e-5 0.04 5
*
*hydro Kfwd Krev jun
$1600901 0.0 0.0 4
*
*hydro fe vol
$1601001 00 5
*
*hydro fvcchs jun
$1601101 001000 4
*
*hydro ebt
$1601201 2 7.40e6 0.0 0.0 0.0 5
*
$1601301 0.0 0.0 0.0 4
*
$1601401 0.04 0.0 1.0 1.0 4
*
*****
* Loop 1 sg downcomer-to-riser connection
*=====
$1650000 dcrisr1 mtlpljun
*-----
$1650001 5 0
*
* Onnm from to area kfor krev fvcchs sub 2ph
$1650011 160050003 170010004 0.3694 0.2 0.2 001003 1.0 1.0 1.0
* inc-fm inc-to 0 limit
$1650012 000000000 000000000 0 1
*
* innm velf velg #
$1651011 0.0 0.0 1
*
* 2nm Dhyd b c m #
$1652011 0.032 1.0 2.0 1.0 # 1
*
$1652011 0.032 1.0 2.0 1.0 # 1

```

```

*
* Onnm from to area kfor krev fvcchs sub 2ph
$1650021 160040003 170020004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-fm inc-to 0 limit
$1650022 000000000 000000000 0 2
*
* innm velf velg #
$1651021 0.0 0.0 2
*
* 2nm Dhyd b c m #
$1652021 0.032 1.0 2.0 1.0 # 2
*
* Onnm from to area kfor krev fvcchs sub 2ph
$1650031 160030003 170030004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-fm inc-to 0 limit
$1650032 000000000 000000000 0 3
*
* innm velf velg #
$1651031 0.0 0.0 3
*
* 2nm Dhyd b c m #
$1652031 0.032 1.0 2.0 1.0 # 3
*
* Onnm from to area kfor krev fvcchs sub 2ph
$1650041 160020003 170040004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-fm inc-to 0 limit
$1650042 000000000 000000000 0 4
*
* innm velf velg #
$1651041 0.0 0.0 4
*
* 2nm Dhyd b c m #
$1652041 0.032 1.0 2.0 1.0 # 4
*
* Onnm from to area kfor krev fvcchs sub 2ph
$1650051 160010003 170050004 0.2413 5.0 5.0 001003 1.0 1.0 1.0
* inc-fm inc-to 0 limit
$1650052 000000000 000000000 0 5
*
* innm velf velg #
$1651051 0.0 0.0 5
*
* 2nm Dhyd b c m #
$1652051 0.032 1.0 2.0 1.0 # 5
*
*****
* Loop 1 sg riser
*=====
$1700000 riser1 pipe
*-----*
*hydro no. volumes
$1700001 5
*
*hydro vol area vol
$1700101 0.0 5
*
*hydro jun area jun
$1700201 0.0 4
*
*hydro length vol
$1700301 0.563 1
$1700302 0.476 4
$1700303 0.374 5
*
*hydro volume vol
$1700401 0.04553 1
$1700402 0.03701 4

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```

$1700403 0.02909 5
*
*hydro vert angle vol
$1700601 90.0 5
*
*hydro delta z vol
$1700701 0.563 1
$1700702 0.476 4
$1700703 0.374 5
*
*hydro roughness hyd diam vol
$1700801 1.0e-5 0.0376 5
*
*hydro Kfwd Krev jun
$1700901 0.0 0.0 4
*
*hydro fe vol
$1701001 00 5
*
*hydro fvcchs jun
$1701101 001000 4
*
*hydro ebt
$1701201 2 7.40e6 0.0 0.0 0. 5
*
$1701301 0.0 0.0 0.0 0.0 4
*
$1701401 0.0376 0.0 1.0 1.0 4
*
*****
* Loop 1 sg lower steam dome *****
*****
$1720000 lwrdoml branch
*
* no. juns vel/flow
$1720001 3 0
*
$1720101 0.0 length volume
$1720101 0.0 0.630 0.09265
*
$1720102 0.0 azim angle delta z
$1720102 0.0 90.0 0.630
*
$1720103 5.0e-5 roughness hyd dia pvbfe
$1720103 5.0e-5 0.343 01000
*
$1720200 2 7.40e6 1.0 Kf Kr fvcchs
*
$1721101 170010000 172000000 0.07778 0.24 0.24 101000
$1722101 172010000 175000000 0.1521 0.0 0.0 001000
$1723101 172000000 160000000 0.02639 0.41 0.68 101000
*
$1721201 0.0 0.0 0.0 0.0
$1722201 0.0 0.0 0.0 0.0
$1723201 0.0 0.0 0.0 0.0
*
$1721110 0.0376 1.00 slope
$1722110 0.0 1.00 1.00
$1723110 0.04 0.00 1.00 1.00
*
*****
* End of superseded components *****
*****
*****
* Loop 1 sg riser *****
*****
1700000 riserl pipe
*
*****
*hydro no. volumes

```

```

1721101 170010000 172000000 0.10417 0.10 0.16 101000
1722101 172010000 175000000 0.1521 0.0 0.0 001000
* velf velfg velfi 0. * .001922815
1721201 -.00910946 .658514 0. * .1671202
1722201 -.706497 -.04342745 0. * .1671202
* hyd dia beta y-int slope
1721110 0.0376 1.00 1.00 1.00
1722110 0.0 0.00 1.00 1.00
*
***** VOLUME 175 *****
* Loop 1 sg upper portion of steam dome
=====
1750000 uprdm1 pipe
*-----*
*
*hydro no. volumes
1750001 2
*
*hydro vol area vol
1750101 0.1521 2
*
*hydro jun area jun
1750201 0.0 1
*
*hydro length vol
1750301 0.470 2
*
*hydro volume vol
1750401 0.0 2
*
*hydro vert angle vol
1750601 90.0 2
*
*hydro delta z vol
1750701 0.470 2
*
*hydro roughness hyd diam vol
1750801 1.0e-5 0.440 2
*
*hydro kfwd krev jun
1750901 0.0 0.0 1
*
*hydro fe vol
1751001 0 2
*
*hydro fvcchs jun
1751101 001000 1
*
*hydro ebt 7174418. 1266640. 2580099. .999978 0. 1
1751201 0 7174244. 1266631. 2580109. .999946 0. 2
* jun 1 * .1674956
1751301 -.1469628 .02947904 0. 1
* diamj beta c m jun 1
1751401 0.440 0.0 1.0 1.0 1
*
***** VOLUME 180 *****
* Steam line 1
=====
1800000 stm1n1 branch
*-----*
*
*no. juns vel/flow
1800001 1 0
*
*area length volume
1800101 0.0003142 4.74 0.0
* azim angle incl angle delta z
1800102 0.0 0.0 0.0
* roughness hyd dia pvbfe
*
***** VOLUME 181 *****
* Steam Line 1 Relief Valve
=====
1810000 reliefl valve
*-----*
*
*hydro from to area kf kr vchhs
1810101 180010003 182000000 0.0003142 0.0 0.0 00102
*
*hyd dia beta y-int slope
1810110 0.020 0.00 1.00 1.00
*
* ic velf velfg velfi 0. * 0.
1810201 0 0.
*
1810300 trpvlv
1810301 1181
*
***** VOLUME 182 *****
* Atmospheric boundary condition for steam relief
=====
1820000 atmos1 tmpdpvl
*-----*
*
*area length volume
1820101 1.0 1.0 0.0
* azim angle incl angle delta z
1820102 0.00 0.0 0.0
* roughness hyd dia pvbfe
1820103 0.00000 0.0000 00010
* ebt trip search var
1820200 003 0
* indep var 1.013e5 300.0
1820201 0.00 1.013e5 300.0
*
***** JUNCTION 185 *****
* Steam Line 1 Isolation Valve
=====
1850000 isolvl valve
*-----*
*
*hydro from to area kf kr vchhs
1850101 180010000 700010003 0.0003142 0.0 0.0 01101
*
*hyd dia beta y-int slope
1850110 0.020 0.00 1.00 1.00
*
* ic velf velfg velfi 14.24324 0. * .167748
1850201 0 .569663
* mtrvlv
1850300
*
*open close rate ic * 15 s closing time
1850301 185 184 0.066667 1.
*
***** LOOP 2 *****
* PRIMARY COOLANT SYSTEM $
*****

```

```

* ***** VOLUME 201 *****
* Loop 2 hot leg
* =====
2010000 hotleg2 pipe
* -----
*
*hydro no. volumes
2010001 7
*
*hydro vol area vol
2010101 0.004536 7
*
*hydro jun area jun
2010201 0.004536 6
*
*hydro length vol
2010301 0.6683 3
2010302 0.420 4
2010303 0.567 7
*
*hydro volume vol
2010401 0.0 7
*
*hydro horiz ang vol
2010501 -45.0 7
*
*hydro vert angle vol
2010601 0.0 4
2010602 42.22 5
2010603 90.0 7
*
*hydro delta z vol
2010701 0.0 4
2010702 0.361 5
2010703 0.567 7
*
*hydro roughness hyd diam vol
2010801 5.00e-5 0.076 7
*
*hydro kfwid jun
2010901 0.0 0.0 3
2010902 0.25 4
2010903 0.0 0.0 6
*
*hydro fe vol
2011001 00 7
*
*hydro fvcabs jun
2011101 001000 6
*
*hydro ebt
2011201 0 16891470. 1404572. 2412312. 0. 0. 1
2011202 0 16891440. 1404438. 2412312. 0. 0. 2
2011203 0 16891408. 1404304. 2412313. 0. 0. 3
2011204 0 16891384. 1404219. 2412314. 0. 0. 4
2011205 0 16890020. 1404105. 2412349. 0. 0. 5
2011206 0 16886770. 1403992. 2412433. 0. 0. 6
2011207 0 16882890. 1403878. 2412532. 0. 0. 7
*
2011301 .731617 .731617 0. jun 1 * 2.3
2011302 .731557 .731557 0. 2 * 2.3
2011303 .731496 .731496 0. 3 * 2.3
2011304 .731457 .731457 0. 4 * 2.3
2011305 .731408 .731408 0. 5 * 2.3
2011306 .73136 .73136 0. 6 * 2.3
*
* diamj beta c m jun

```

```

2011401 0.076 0.0 1.0 1.0 6
*
* ***** VOLUME 210 *****
* Steam generator 2 inlet transition region
* =====
2100000 sginlet2 branch
* -----
*
* no. juns vel/flow
2100001 2 0
*
* area length volume
2100101 0.0 0.210 0.00129
* incl angle delta z
2100102 0.0 90.0 0.210
* roughness hyd dia pvbfe
2100103 5.00e-5 0.0 00000
* ebt
2100200 0 16880318. 1403839. 2412599. 0.
* from to area Kf fvcabs
2101101 21010000 210000000 0.004536 0.0 0.0 001000
2102101 210010000 215000000 0.004301 0.045 0.023 001000
* velg velg veli
2101201 .731314 .731314 0. * 2.3
2102201 .771257 .771257 0. * 2.3
* hyd dia beta y-int slope
2101110 0.076 0.00 1.00 1.00
2102110 0.074 0.00 1.00 1.00
*
* ***** VOLUME 215 *****
* Steam generator 2 hot collector
* =====
2150000 sghotc pipe
* -----
*
*hydro no. volumes
2150001 5
*
*hydro vol area vol
2150101 0.0 1
2150102 0.003632 4
2150103 0.0 5
*
*hydro jun area jun
2150201 0.0 4
*
*hydro length vol
2150301 0.508 1
2150302 0.476 4
2150303 0.429 5
*
*hydro volume vol
2150401 0.001849 1
2150402 0.0 4
2150403 0.001588 5
*
*hydro horiz ang vol
2150501 0.0 5
*
*hydro vert angle vol
2150601 90.0 5
*
*hydro delta z vol
2150701 0.508 1
2150702 0.476 4
2150703 0.429 5
*
*hydro roughness hyd diam vol
2150801 5.00e-5 0.068 5
*

```



```

*hydro Kfwd jun Krev jun
2150901 0.0 4
*
*hydro fe vol
2151001 00 5
*
*hydro fveahs jun
2151101 001000 4
*
*hydro ebt
2151201 0 16877684. 1402170. 2412666. 0. 0. 1
2151202 0 16874404. 1400504. 2412751. 0. 0. 2
2151203 0 16871222. 1398459. 2412833. 0. 0. 3
2151204 0 16868020. 1395800. 2412915. 0. 0. 4
2151205 0 16864946. 1.392+6 2412994. 0. 0. 5
*
2151301 .73562 0. 1 * 1.854402
2151302 .55248 0. 2 * 1.39415
2151303 .363967 .363967 0. 3 * .919592
2151304 .170144 .170144 0. 4 * .4305744
*
* diamj beta c m jun
2151401 0.068 0.0 1.0 1.0 4
*
***** JUNCTION 216 *****
* junctions between the hot collector and the sg tubes
=====
2160000 hcjuns2 mtpljun
-----
2160001 5 0
*
* Onnm from to area kfor krev efvcchs sub 2ph
2160011 215050004 225000000 0.0007964 0.005 0.002 0001002 1.0 1.0 1.0
*
2160012 000000000 000000000 0 1
*
* Innm velf velg #
2161011 .774177 .774177 1 * .4305744
*
* 2nm Dbyd b c m #
2162011 0.013 1.0 2.0 1.0 1
*
* Onnm from to area kfor krev efvcchs sub 2ph
2160021 215040004 224000000 0.0009291 0.005 0.002 0001002 1.0 1.0 1.0
*
2160022 -10000 -100000 0 5
*
* Innm velf velg #
2161021 .755397 .755397 2 * .489017
2161031 .734242 .734242 3 * .474558
2161041 .712996 .712996 4 * .460253
2161051 .690996 .690996 5 * .445598
*
* 2nm Dbyd b c m #
2162021 0.013 1.0 2.0 1.0 5
*
***** JUNCTION 221 *****
* Steam generator 2 tubes row 1 (7 tubes)
=====
2210000 sg2tub1 pipe
-----
*
*hydro no. volumes
2210001 10
*
*hydro vol
2210101 0.0009291 10
*

```

```

*hydro jun area jun
2210201 0.0 9
*
*hydro length vol
2210301 1.0656 10
*
*hydro volume vol
2210401 0.0 10
*
*hydro horiz ang vol
2210501 0.0 10
*
*hydro vert angle vol
2210601 0.0 1
2210602 -0.343 9
2210603 0.0 10
*
*hydro delta z vol
2210701 0.0 1
2210702 -0.006375 9
2210703 0.0 10
*
*hydro roughness hyd diam vol
2210801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
2210901 0.047 0.047 9
*
*hydro fe vol
2211001 00 10
*
*hydro fvcchs jun
2211101 001000 9
*
*hydro ebt
2211201 0 16877310. 1346880. 2412676. 0. 0. 1
2211202 0 16876938. 1312264. 2412686. 0. 0. 2
2211203 0 16876596. 1290411. 2412694. 0. 0. 3
2211204 0 16876258. 1276592. 2412703. 0. 0. 4
2211205 0 16875920. 1267738. 2412712. 0. 0. 5
2211206 0 16875584. 1261983. 2412720. 0. 0. 6
2211207 0 16875250. 1258183. 2412729. 0. 0. 7
2211208 0 16874916. 1255630. 2412738. 0. 0. 8
2211209 0 16874582. 1253885. 2412746. 0. 0. 9
2211210 0 16874224. 1252668. 2412755. 0. 0. 10
*
2211301 .66942 .66942 0. 1 * .445598
2211302 .657102 .657102 0. 2 * .445598
2211303 .649846 .649846 0. 3 * .445598
2211304 .645352 .645352 0. 4 * .445598
2211305 .642559 .642559 0. 5 * .445598
2211306 .640779 .640779 0. 6 * .445598
2211307 .639617 .639617 0. 7 * .445598
2211308 .638844 .638844 0. 8 * .445598
2211309 .638317 .638317 0. 9 * .445598
*
* diamj beta c m jun
2211401 0.013 0.0 1.0 1.0 9
*
***** JUNCTION 222 *****
* Steam generator 2 tubes row 2 (7 tubes)
=====
2220000 sg2tub2 pipe
-----
*
*hydro no. volumes
2220001 10
*

```

```

*hydro vol area vol 1
2220101 0.0009291 10
*
*hydro jun area jun 9
2220201 0.0
*
*hydro length vol 1
2220301 1.0656 10
*
*hydro volume vol 1
2220401 0.0
*
*hydro horiz ang vol 1
2220501 0.0
*
*hydro vert angle vol 1
2220601 0.0
2220602 -0.343 9
2220603 0.0 10
*
*hydro delta z vol 1
2220701 0.0
2220702 -0.006375 9
2220703 0.0 10
*
*hydro roughness hyd diam vol
2220801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun 9
2220901 0.047
*
*hydro fe vol 10
2221001 00
*
*hydro fvcabs jun 9
2221101 001000
*
*hydro ebt vol 1
2221201 0 1.6874+7 1346355. 2412761. 0. 0. 1
2221202 0 1312239. 16873610. 2412771. 0. 0. 2
2221203 0 16873242. 1290567. 2412781. 0. 0. 3
2221204 0 16872878. 1276781. 2412790. 0. 0. 4
2221205 0 16872516. 1267897. 2412799. 0. 0. 5
2221206 0 16872156. 1262091. 2412809. 0. 0. 6
2221207 0 16871796. 1258238. 2412818. 0. 0. 7
2221208 0 16871438. 1255639. 2412827. 0. 0. 8
2221209 0 16871078. 1253853. 2412836. 0. 0. 9
2221210 0 16870696. 1252605. 2412846. 0. 0. 10
*
2221301 .691235 .691235 0. jun 1 * .460253
2221302 .678706 .678706 0. 2 * .460253
2221303 .671274 .671274 0. 3 * .460253
2221304 .666641 .666641 0. 4 * .460253
2221305 .663745 .663745 0. 5 * .460253
2221306 .661889 .661889 0. 6 * .460253
2221307 .660673 .660673 0. 7 * .460253
2221308 .659859 .659859 0. 8 * .460253
2221309 .659303 .659303 0. 9 * .4602525
*
* diamj beta c m jun
2221401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 2 tubes row 3 (7 tubes)
2230000 sg2tub3 pipe
*****

```

```

*hydro no. volumes
2230001 10
*
*hydro vol area vol
2230101 0.0009291 10
*
*hydro jun area jun 9
2230201 0.0
*
*hydro length vol 1
2230301 1.0656 10
*
*hydro volume vol 1
2230401 0.0
*
*hydro horiz ang vol 1
2230501 0.0
*
*hydro vert angle vol 1
2230601 0.0
2230602 -0.343 9
2230603 0.0 10
*
*hydro delta z vol 1
2230701 0.0
2230702 -0.006375 9
2230703 0.0 10
*
*hydro roughness hyd diam vol
2230801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun 9
2230901 0.047
*
*hydro fe vol 10
2231001 00
*
*hydro fvcabs jun 9
2231101 001000
*
*hydro ebt vol 1
2231201 0 16870800. 1345561. 2412844. 0. 0. 1
2231202 0 16870378. 1312030. 2412855. 0. 0. 2
2231203 0 1.687+7 1290605. 2412865. 0. 0. 3
2231204 0 16869594. 1276898. 2412875. 0. 0. 4
2231205 0 16869208. 1268016. 2412885. 0. 0. 5
2231206 0 16868822. 1262181. 2412895. 0. 0. 6
2231207 0 16868438. 1258291. 2412904. 0. 0. 7
2231208 0 16868054. 1255654. 2412914. 0. 0. 8
2231209 0 16867670. 1253836. 2412924. 0. 0. 9
2231210 0 16867262. 1252560. 2412935. 0. 0. 10
*
2231301 .712408 .712408 0. jun 1 * .474558
2231302 .69973 .69973 0. 2 * .474558
2231303 .692155 .692155 0. 3 * .474558
2231304 .687404 .687404 0. 4 * .474558
2231305 .684418 .684418 0. 5 * .474558
2231306 .682495 .682495 0. 6 * .474558
2231307 .681228 .681228 0. 7 * .474558
2231308 .680377 .680377 0. 8 * .474558
2231309 .679793 .679793 0. 9 * .474558
*
* diamj beta c m jun
2231401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 2 tubes row 4 (7 tubes)
*****

```

```

2240000          sg2tub4          pipe
*-----*
*hydro no. volumes
2240001 10
*
*hydro vol area vol
2240101 0.0009291 10
*
*hydro jun area jun
2240201 0.0 9
*
*hydro length vol
2240301 1.0656 10
*
*hydro volume vol
2240401 0.0 10
*
*hydro horiz ang vol
2240501 0.0 10
*
*hydro vert angle vol
2240601 0.0 1
2240601 0.0 1
2240602 -0.343 9
2240603 0.0 10
*
*hydro delta z vol
2240701 0.0 1
2240702 -0.006375 9
2240703 0.0 10
*
*hydro roughness hyd diam vol
2240801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
2240901 0.047 0.047 9
*
*hydro fe vol
2241001 00 10
*
*hydro fvcabs jun
2241101 001000 9
*
*hydro ebt vol
2241201 0 16867574. 1344357. 2412927. 0. 0. 1
2241202 0 16867124. 1311550. 2412938. 0. 0. 2
2241203 0 16866704. 1290468. 2412949. 0. 0. 3
2241204 0 16866288. 1276903. 2412960. 0. 0. 4
2241205 0 16865874. 1268064. 2412970. 0. 0. 5
2241206 0 16865464. 1262227. 2412981. 0. 0. 6
2241207 0 16865052. 1258316. 2412992. 0. 0. 7
2241208 0 16864642. 1255654. 2.413+6 0. 0. 8
2241209 0 16864232. 1253810. 2413013. 0. 0. 9
2241210 0 16863800. 1252512. 2413024. 0. 0. 10
*
2241301 .733625 .733625 0. jun 1 * .489017
2241302 .720875 .720875 0. 2 * .489017
2241303 .713197 .713197 0. 3 * .489017
2241304 .708353 .708353 0. 4 * .489017
2241305 .705291 .705291 0. 5 * .489017
2241306 .703308 .703308 0. 6 * .489017
2241307 .701995 .701995 0. 7 * .489017
2241308 .70111 .70111 0. 8 * .489017
2241309 .7005 .7005 0. 9 * .489017
*
diamj beta c m jun
2241401 0.013 0.0 1.0 1.0 9
*

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***** VOLUME 225 *****
* Steam generator tubes 2 row 5 (6 tubes)
*****
2250000          sg2tub5          pipe
*-----*
*hydro no. volumes
2250001 10
*
*hydro vol area vol
2250101 0.0007964 10
*
*hydro jun area jun
2250201 0.0 9
*
*hydro length vol
2250301 1.0656 10
*
*hydro volume vol
2250401 0.0 10
*
*hydro horiz ang vol
2250501 0.0 10
*
*hydro vert angle vol
2250601 0.0 1
2250602 -0.343 9
2250603 0.0 10
*
*hydro delta z vol
2250701 0.0 1
2250702 -0.006375 9
2250703 0.0 10
*
*hydro roughness hyd diam vol
2250801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
2250901 0.047 0.047 9
*
*hydro fe vol
2251001 00 10
*
*hydro fvcabs jun
2251101 001000 9
*
*hydro ebt vol
2251201 0 16864478. 1342368. 2413006. 0. 0. 1
2251202 0 1686407. 1310534. 2413019. 0. 0. 2
2251203 0 16863558. 1289975. 2413030. 0. 0. 3
2251204 0 16863118. 1276672. 2413042. 0. 0. 4
2251205 0 16862680. 1267959. 2413053. 0. 0. 5
2251206 0 16862242. 1262175. 2413064. 0. 0. 6
2251207 0 16861808. 1258280. 2413075. 0. 0. 7
2251208 0 16861372. 1255615. 2413086. 0. 0. 8
2251209 0 16860938. 1253761. 2413098. 0. 0. 9
2251210 0 16860482. 1252449. 2413109. 0. 0. 10
*
2251301 .752753 .752753 0. jun 1 * .4305744
2251302 .740101 .740101 0. 2 * .4305744
2251303 .732416 .732416 0. 3 * .4305744
2251304 .727541 .727541 0. 4 * .4305744
2251305 .724441 .724441 0. 5 * .4305744
2251306 .722423 .722423 0. 6 * .430574
2251307 .72108 .72108 0. 7 * .430574
2251308 .72017 .72017 0. 8 * .430574
2251309 .71954 .71954 0. 9 * .430574
*

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```

*          diamj      beta      c      m      jun
2251401  0.013      0.0      1.0      1.0      9
*
***** JUNCTION 228 *****
* junctions between the sg tubes and the cold collector
*****
2280000      ccjuns2      mtpljun
*****
2280001  5      0
*
* Onnm      from      to      area      kfor      krev      fvcchs      sub      2ph
2280011  22501000  229050003  0.0007964  0.005  0.002  001001  1.0  1.0  1.0
*      inc-frm      inc-to      limit
2280012  00000000  00000000  0      1
*
* Innm      velf      velg      #      .430574
2281011  .719096      .719096      1
*
* 2nm      Dhyd      b      c      m      #
2282011  0.013      1.0      2.0      1.0      1
*
* Onnm      from      to      area      kfor      krev      fvcchs      sub      2ph
2280021  22401000  229040003  0.0009291  0.005  0.002  001001  1.0  1.0  1.0
*      inc-frm      inc-to      limit
2280022  -1000000  -10000  0      5
*
* Innm      velf      velg      #
2281021  .700072      .700072      2 * .489017
2281031  .679385      .679385      3 * .474558
2281041  .658916      .658916      4 * .4602525
2281051  .637952      .637952      5 * .445598
*
* 2nm      Dhyd      b      c      m      #
2282021  0.013      1.0      2.0      1.0      5
*
***** VOLUME 229 *****
* Steam generator 2 cold collector
*****
2290000      sq2cldc      pipe
*****
*
*hydro      no. volumes
2290001  6
*
*hydro      vol      area      vol
2290101  0.0      0.0      1
2290102  0.003632      5
2290103  0.0      6
*
*hydro      jun      area      jun
2290201  0.0      5
*
*hydro      length      vol
2290301  0.508      1
2290302  0.476      4
2290303  0.429      5
2290304  0.051      6
*
*hydro      volume      vol
2290401  0.001883      1
2290402  0.0      5
2290403  0.0002164      6
*
*hydro      horiz      ang      vol
2290501  0.0      6
*
*hydro      vert      angle      vol
2290601  90.0      6

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*          delta z      vol
2290701  0.508      1
2290702  0.476      4
2290703  0.429      5
2290704  0.051      6
*
*hydro      roughness      hyd      diam      vol
2290801  5.00e-5      0.068      5
2290802  5.00e-5      0.074      6
*
*hydro      Kfwd      Krev      jun
2290901  0.0      0.0      4
2290902  0.016      0.032      5
*
*hydro      fe      vol
2291001  00      6
*
*hydro      fvcchs      jun
2291101  001000      5
*
*hydro      ebt
2291201  0      16874190.      1252436.      2412756.      0.      0.      1
2291202  0      16870660.      1252420.      2412847.      0.      0.      2
2291203  0      16867224.      1252403.      2412936.      0.      0.      3
2291204  0      16863760.      1252388.      2413025.      0.      0.      4
2291205  0      16860440.      1252376.      2413111.      0.      0.      5
2291206  0      16858672.      1252399.      2413156.      0.      0.      6
*
2291301  -.679074      -.679074      0.      1 * -1.854402
2291302  -.510529      -.510529      0.      2 * -1.39415
2291303  -.336748      -.336748      0.      3 * -.919592
2291304  -.157673      -.157673      0.      4 * -.430574
2291305  8.0974-11      8.11051-11      0.      5 * 2.21124-10
*
*          diamj      beta      c      m      jun
2291401  0.068      0.0      1.0      1.0      5
*
***** VOLUME 230 *****
* Steam generator 2 inlet transition region
*****
2300000      sgoutlt2      branch
*****
*          no.      juns      vel/flow
2300001  2
*          area      length      volume
2300101  0.0      0.159      0.001069
*          azim      angle      incl      angle      delta z
2300102  0.0      -90.0      -0.159
*          roughness      hyd      dia      pbvre
2300103  5.00e-5      0.0      00000
*          ebt
2300200  0      16876738.      1252436.      2412691.      0.
*          from      to      area      Kf      fvcchs
2301101  229000000  230000000  0.004301  0.023  0.045  001000
2302101  230010000  235000000  0.004536  0.0  0.0  001000
*          velf      velg      veli      0. * 2.3
2301201  .711244      .711244      0. * 2.3
2302201  .674394      .674394      0. * 2.3
*          hyd      dia      beta      y-int      slope
2301110  0.074      0.00      1.00      1.00
2302110  0.076      0.00      1.00      1.00
*
***** VOLUME 235 *****
* Loop 2 pump suction piping of cold leg
*****
2350000      pmpset2      pipe
*****

```



```

*-----$
*hydro area length volume
2420101 0.004536 0.880 0.0
*
*hydro horz angle vert angle delta z
2420102 170.0 0.0 0.0
*
*hydro roughness hyd diam fe
2420103 0.00005 0.076 00
*
*hydro ebt pressure tempe
2420200 0 16910562. 1243701. 2411821. 0.
*
***** JUNCTION 243 *****
* Cold leg isolation valve *****
2430000 c12v1v valve *****$
*-----$
*
*hydro from to area kf kr vcabs
2430101 242010000 245000000 0.004536 0.0 0.0 00100
*
2430201 0 .671615 .671615 0. * 2.3
2430300 mtr1v
*
* open close rate ic
2430301 242 243 0.1 1.
*
***** VOLUME 245 *****
* Loop 2 reactor vessel inlet section of cold leg *****
2450000 cidleg2 pipe *****$
*-----$
*
*hydro no. volumes
2450001 4
*
*hydro vol area vol
2450101 0.004536 4
*
*hydro jun area jun
2450201 0.004536 3
*
*hydro length vol
2450301 0.782 3
2450302 0.741 4
*
*hydro volume vol
2450401 0.0 4
*
*hydro horz ang vol
2450501 170.0 3
2450502 125.0 4
*
*hydro vert angle vol
2450601 0.0 4
*
*hydro delta z vol
2450701 0.0 4
*
*hydro roughness hyd diam vol
2450801 5.00e-5 0.076 4
*
*hydro Kfwd Krev jun
2450901 0.0 0.0 2
2450902 0.16 0.16 3
*

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```

*hydro fe vol
2451001 00 4
*
*hydro fvcabs jun
2451101 001000 3
*
*hydro ebt
2451201 0 16910528. 1243562. 2411822. 0. 0. 1
2451202 0 16910496. 1243424. 2411822. 0. 0. 2
2451203 0 16910462. 1243154. 2411823. 0. 0. 3
2451204 0 16910402. 1243154. 2411825. 0. 0. 4
*
2451301 .671571 .671571 0. jun 1 * 2.3
2451302 .671527 .671527 0. 2 * 2.3
2451303 .67144 0. 3 * 2.3
*
* diamj beta c m jun
2451401 0.076 0.0 1.0 1.0 3
*
***** LOOP 2 *****
* SECONDARY COOLANT SYSTEM *****$
* Loop 2 Main Feedwater source *****$
***** VOLUME 250 *****$
*****$
2500000 mfw2src tmdpvvol
*-----$
* area length volume
2500101 1.0 1.0 0.0
* azim angle incl angle delta z
2500102 0.00 0.0 0.0
* roughness hyd dia pvbfe
2500103 0.00000 0.0000 00010
* ebt trip search var
2500200 003 0
* indep var
2500201 0.00 10.0e6 443.15
*
***** JUNCTION 251 *****$
* Loop 2 main feedwater flow *****$
*****$
2510000 mfw2 tmdpvjun
*
* From To Area
2510101 250010000 259000000 0.0009079
*
* vel/Kg trip var req. # var req * trancalc
2510200 1 251
*
* Time kg/s kg/s m/s
* 2510201 0.0 0.1666 0. 0.
* 2510201 0.0 0.0 0. 0.
* 2510202 8.0 0.0 0. 0.
*
***** VOLUME 255 *****$
* Loop 2 Auxiliary Feedwater source *****$
*****$
2550000 afw2src tmdpvvol
*-----$
* area length volume
2550101 1.0 1.0 0.0
* azim angle incl angle delta z
2550102 0.00 0.0 0.0
* roughness hyd dia pvbfe
2550103 0.00000 0.0000 00010
* ebt trip search var
2550200 003 0
*

```

```

* indep var
2550201 0.00 16.0e6 443.15
*
***** JUNCTION 256 *****
* Loop 2 auxiliary feedwater flow
*****
2560000 afw2 tndpjun
*
* From To Area
2560101 255010000 259000000 0.0009079
*
* vel/kg trip var req. # var req
2560200 1 256
*
* Time kg/s kg/s m/s
2560201 -1. 0.0 0.
2560202 0.0 0.0 0.
*
***** VOLUME 259 *****
* Loop 2 Feedwater ring
*****
2590000 fwrng2 branch
*****
* no. juns vel/flow
2590001 1 0 length volume
* area 1.062 0.0
2590101 0.0009079 incl angle delta z
* azim angle 0.0 0.000
2590102 0.0 hyd dia p/bfe
* roughness 0.034 00000
2590103 5.0e-5 ebt
* 7175361. 1084606. 2580093. 463851
2590200 0 from to area Kf Kr fvcchs
* 259010000 272010003 0.009651 0.0 0.0 001000
2591101 velf velg
* 2591201 -.0484272 -.1360606 0. * .166634
* hyd dia beta y-int slope
2591110 0.008 0.00 1.00 1.00
*
***** These components have been superseded. They are being left in the
* input deck for possible future use.
*****
* Loop 2 sg downcomer
*****
2600000 dc2 annulus
*****
* hydro no. volumes
$2600001 5
*
*hydro vol area vol
$2600101 0.0 5
*
*hydro jun area jun
$2600201 0.0 4
*
*hydro length vol
$2600301 0.374 1
$2600302 0.476 4
$2600303 0.563 5
*
*hydro volume vol
$2600401 0.00987 1
$2600402 0.01256 4

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```

$2600403 0.01486 5
*
*hydro vert angle vol
$2600601 -90.0 5
*
*hydro delta z vol
$2600701 -0.374 1
$2600702 -0.476 4
$2600703 -0.563 5
*
*hydro roughness hyd diam vol
$2600801 1.0e-5 0.04 5
*
*hydro Kfwd Krev jun
$2600901 0.0 0.0 4
*
*hydro fe vol
$2601001 00 5
*
*hydro fvcchs jun
$2601101 001000 4
*
*hydro ebt
$2601201 2 7.40e6 0.0 0. jun 5
*
$2601301 0.0 0.0 0.0 4
* diamj beta c jun
$2601401 0.04 0.0 1.0 1.0 4
*
***** JUNCTION 265 *****
* Loop 2 sg downcomer-to-riser connection
*****
$2650000 dcorisr2 mtp1jun
*****
$2650001 5 0
*
* 0nm from to area kfor krev fvcchs sub 2ph
$2650011 260050003 270010004 0.3694 0.2 0.2 001003 1.0 1.0 1.0
* inc-firm inc-to 0 limit
$2650012 000000000 000000000 0 1
*
* 1nm velf velf #
$2651011 0.0 0.0 1
*
* 2nm Dhyd b c m #
$2652011 0.032 1.0 2.0 1.0 1
*
* 0nm from to area kfor krev fvcchs sub 2ph
$2650021 260040003 270020004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-firm inc-to 0 limit
$2650022 000000000 000000000 0 2
*
* 1nm velf velf #
$2651021 0.0 0.0 2
*
* 2nm Dhyd b c m #
$2652021 0.032 1.0 2.0 1.0 2
*
* 0nm from to area kfor krev fvcchs sub 2ph
$2650031 260030003 270030004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-firm inc-to 0 limit
$2650032 000000000 000000000 0 3
*
* 1nm velf velf #
$2651031 0.0 0.0 3
*
* 2nm Dhyd b c m #
$2652031 0.032 1.0 2.0 1.0 3

```

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2700701 0.563 1
2700702 0.476 4
2700703 0.374 5
*
*hydro roughness hyd diam vol
2700801 1.0e-5 0.0378 5
*
*hydro Kfwd Krev jun
2700901 0.0 0.0 4
*
*hydro fe vol
2701001 00 5
*
*hydro fvcchs jun
2701101 001000 4
*
*hydro ebt 2579955. .062518 0. 1
2701201 0 7189175. 1267214. 2579991. .1178208 0. 2
2701202 0 7185734. 1267115. 2580023. .162356 0. 3
2701203 0 7182752. 1266981. 2580052. .232651 0. 4
2701204 0 7179957. 1266852. 2580080. .0730707 0. 5
2701205 0 7177358. 1266189.
jun
2701301 -6.85585-4 .1899786 0. 1 * 1.543788-4
2701302 -.001454146 .2035578 0. 2 * 5.02938-4
2701303 -.00239415 .223328 0. 3 * .001018223
2701304 -.002647163 .2088886 0. 4 * .001880066
*
diamj beta c m jun
2701401 0.0376 0.0 1.0 1.0 4
*
***** VOLUME 272 *****
* Loop 2 sg lower steam dome *****
*=====
2720000 lwdom2 branch
*-----
* no. juns vel/flow
2720001 2
* area length volume
2720101 0.0 0.630 0.09265
* azim angle incl angle delta z
2720102 0. 90.0 0.630
* roughness hyd dia pvbfe
2720103 5.0e-5 0.343 01000
* ebt
2720200 0 7175301. 1242270. 2580074. .688236
* from to area Kf Kr fvcchs
2721101 270010000 272000000 0.10417 0.10 0.16 101000
2722101 272010000 275000000 0.1521 0.0 0.0 001000
* velf velg veli
2721201 -.00931371 .796213 0. * .00200009
2722201 -.710388 .0429469 0. * .1671204
* hyd dia beta y-int slope
2721110 0.376 1.00 1.00 1.00
2722110 0.0 0.00 1.00 1.00
*
***** VOLUME 275 *****
* Loop 2 sg upper portion of steam dome
*=====
2750000 uprdom2 pipe
*-----
*hydro no. volumes
2750001 2
*
*hydro vol area vol
2750101 0.1521 2
*
*hydro jun area jun

```

[illegible]

```

3102201 .771258 .771258 0. * 2.3
* hyd dia beta y-int slope
310110 0.076 0.00 1.00 1.00
310210 0.074 0.00 1.00 1.00
*
*****
* Steam generator 3 hot collector
*****
3150000 sgihotc pipe
=====
*
* hydro no. volumes
3150001 5
*
* hydro vol area vol
3150101 0.0 1
3150102 0.003632 4
3150103 0.0 5
*
* hydro jun area jun
3150201 0.0 4
*
* hydro length vol
3150301 0.508 1
3150302 0.476 4
3150303 0.429 5
*
* hydro volume vol
3150401 0.001849 1
3150402 0.0 4
3150403 0.001588 5
*
* hydro horiz ang vol
3150501 0.0 5
*
* hydro vert angle vol
3150601 90.0 5
*
* hydro delta z vol
3150701 0.508 1
3150702 0.476 4
3150703 0.429 5
*
* hydro roughness hyd diam vol
3150801 5.00e-5 0.068 5
*
* hydro Kfwd Krev jun
3150901 0.0 0.0 4
*
* hydro fe vol
3151001 00 5
*
* hydro fvcchs jun
3151101 001000 4
*
* hydro ebt vol
3151201 0 16877684. 1402170. 2412666. 0. 0. 1
3151202 0 16874404. 1400504. 2412751. 0. 0. 2
3151203 0 16871222. 1398458. 2412833. 0. 0. 3
3151204 0 16868020. 1395798. 2412915. 0. 0. 4
3151205 0 16864946. 1391995. 2412994. 0. 0. 5
*
3151301 .735625 1 * 1.854415
3151302 .552487 2 * 1.394168
3151303 .363973 3 * .919609
3151304 .1701476 4 * .430585
*
* diamj beta c m jun

```

```

3151401 0.068 0.0 1.0 1.0 4
*
*****
* junctions between the hot collector and the sg tubes
*****
3160000 hcjuns3 mtp1jun
=====
3160001 5 0
*
* 0nm from to area kfor krev fvcchs sub 2ph
3160011 315050004 325000000 0.0007964 0.005 0.002 0001002 1.0 1.0 1.0
* inc-firm inc-to 0 limit
3160012 000000000 000000000 0 1
*
* lnm velf velg #
3161011 .774193 .774193 1 * .430585
* 2nm Dhyd b c m #
3162011 0.013 1.0 2.0 1.0 1
*
* 0nm from to area kfor krev efvcchs sub 2ph
3160021 315040004 324000000 0.0009291 0.005 0.002 0001002 1.0 1.0 1.0
* inc-firm inc-to 0 limit
3160022 -10000 -1000000 0 5
*
* lnm velf velg #
3161021 .755407 .755407 2 * .489024
3161031 .734244 .734244 3 * .474559
3161041 .712987 .712987 4 * .460247
3161051 .690977 .690977 5 * .445585
*
* 2nm Dhyd b c m #
3162021 0.013 1.0 2.0 1.0 5
*
*****
* Steam generator 3 tubes row 1 (7 tubes)
*****
3210000 sg3tubl pipe
=====
*
* hydro no. volumes
3210001 10
*
* hydro vol area vol
3210101 0.0009291 10
*
* hydro jun area jun
3210201 0.0 9
*
* hydro length vol
3210301 1.0656 10
*
* hydro volume vol
3210401 0.0 10
*
* hydro horiz ang vol
3210501 0.0 10
*
* hydro vert angle vol
3210601 0.0 1
3210602 -0.343 9
3210603 0.0 10
*
* hydro delta z vol
3210701 0.0 1
3210702 -0.006375 9
3210703 0.0 10
*

```

```

*hydro roughness hyd diam vol
3210801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
3210901 0.047 0.047 9
*
*hydro fe vol
3211001 00 10
*
*hydro fvcchs jun
3211101 001000 9
*
*hydro ebt vol
3211201 0 16877310. 1346853. 2412676. 0. 0. 1
3211202 0 1312220. 1312220. 2412686. 0. 0. 2
3211203 0 16876940. 1290357. 2412694. 0. 0. 3
3211204 0 16876258. 1276532. 2412703. 0. 0. 4
3211205 0 16875920. 1267674. 2412712. 0. 0. 5
3211206 0 16875584. 1261917. 2412720. 0. 0. 6
3211207 0 16875250. 1258115. 2412729. 0. 0. 7
3211208 0 16874916. 1255561. 2412738. 0. 0. 8
3211209 0 16874582. 1253815. 2412746. 0. 0. 9
3211210 0 16874226. 1252598. 2412755. 0. 0. 10
*
3211301 .66939 0. 1 * .445585
3211302 .657068 .657068 0. 2 * .445585
3211303 .649809 .649809 0. 3 * .445585
3211304 .645314 .645314 0. 4 * .445585
3211305 .642521 .642521 0. 5 * .445585
3211306 .64074 .64074 0. 6 * .445585
3211307 .639578 .639578 0. 7 * .445585
3211308 .638804 .638804 0. 8 * .445585
3211309 .638278 .638278 0. 9 * .445585
*
* diamj beta c m jun
3211401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 3 tubes row 2 (7 tubes)
=====
3220000 sg3tub2 pipe
-----*
*
*hydro no. volumes
3220001 10
*
*hydro vol area vol
3220101 0.0009291 10
*
*hydro jun area jun
3220201 0.0 9
*
*hydro length vol
3220301 1.0656 10
*
*hydro volume vol
3220401 0.0 10
*
*hydro horiz ang vol
3220501 0.0 10
*
*hydro vert angle vol
3220601 0.0 1
3220602 -0.343 9
3220603 0.0 10
*
*hydro delta z vol
3220701 0.0 1

```

```

3220702 -0.006375 9
3220703 0.0 10
*
*hydro roughness hyd diam vol
3220801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
3220901 0.047 0.047 9
*
*hydro fe vol
3221001 00 10
*
*hydro fvcchs jun
3221101 001000 9
*
*hydro ebt vol
3221201 0 1.6874+7 1346338. 2412761. 0. 0. 1
3221202 0 16873610. 1312195. 2412771. 0. 0. 2
3221203 0 16873242. 1290513. 2412781. 0. 0. 3
3221204 0 16872878. 1276721. 2412790. 0. 0. 4
3221205 0 16872516. 1267833. 2412799. 0. 0. 5
3221206 0 16872156. 1262025. 2412809. 0. 0. 6
3221207 0 16871796. 1258170. 2412818. 0. 0. 7
3221208 0 16871438. 1255570. 2412827. 0. 0. 8
3221209 0 16871078. 1253784. 2412836. 0. 0. 9
3221210 0 16870698. 1252535. 2412846. 0. 0. 10
*
3221301 .691217 .691217 0. 1 * .460247
3221302 .678683 .678683 0. 2 * .460247
3221303 .671248 .671248 0. 3 * .460247
3221304 .666613 .666613 0. 4 * .460247
3221305 .663717 .663717 0. 5 * .460247
3221306 .66186 .66186 0. 6 * .460247
3221307 .660644 .660644 0. 7 * .460247
3221308 .65983 .65983 0. 8 * .460247
3221309 .659274 .659274 0. 9 * .460247
*
* diamj beta c m jun
3221401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 3 tubes row 3 (7 tubes)
=====
3230000 sg3tub3 pipe
-----*
*
*hydro no. volumes
3230001 10
*
*hydro vol area vol
3230101 0.0009291 10
*
*hydro jun area jun
3230201 0.0 9
*
*hydro length vol
3230301 1.0656 10
*
*hydro volume vol
3230401 0.0 10
*
*hydro horiz ang vol
3230501 0.0 10
*
*hydro vert angle vol
3230601 0.0 1
3230602 -0.343 9
3230603 0.0 10

```

```
*
*hydro delta z vol
3230701 0.0 1
3230702 -0.006375 9
3230703 0.0 10
*
*hydro roughness hyd diam vol
3230801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
3230901 0.047 9
*
*hydro fe vol
3231001 00 10
*
*hydro fvcchs jun
3231101 001000 9
*
*hydro ebt vol
3231201 0 16870800. 1345534. 2412844. 0. 0. 1
3231202 0 16870378. 1311986. 2412855. 0. 0. 2
3231203 0 1.687+7 1290552. 2412865. 0. 0. 3
3231204 0 16869594. 1276838. 2412875. 0. 0. 4
3231205 0 16869208. 1267952. 2412885. 0. 0. 5
3231206 0 16868822. 1262115. 2412895. 0. 0. 6
3231207 0 16868438. 1258223. 2412904. 0. 0. 7
3231208 0 16868054. 1255585. 2412914. 0. 0. 8
3231209 0 16867670. 1253766. 2412924. 0. 0. 9
3231210 0 16867264. 1252490. 2412935. 0. 0. 10
*
3231301 .712399 1 * .474559 jun
3231302 .699716 2 * .474559 jun
3231303 .692138 3 * .474559 jun
3231304 .687386 4 * .474559 jun
3231305 .684399 5 * .474559 jun
3231306 .682475 6 * .474559 jun
3231307 .681208 7 * .474559 jun
3231308 .680356 8 * .474559 jun
3231309 .679772 9 * .474559 jun
*
* diamj beta c m jun
3231401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator 3 tubes row 4 (7 tubes)
3240000 sg3tub4 pipe
*
*hydro no. volumes
3240001 10
*
*hydro vol area vol
3240101 0.0009291 10
*
*hydro jun area jun
3240201 0.0 9
*
*hydro length vol
3240301 1.0656 10
*
*hydro volume vol
3240401 0.0 10
*
*hydro horiz ang vol
3240501 0.0 10
*
*hydro vert angle vol
```

```
3240601 0.0 1
3240602 -0.343 9
3240603 0.0 10
*
*hydro delta z vol
3240701 0.0 1
3240702 -0.006375 9
3240703 0.0 10
*
*hydro roughness hyd diam vol
3240801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
3240901 0.047 9
*
*hydro fe vol
3241001 00 10
*
*hydro fvcchs jun
3241101 001000 9
*
*hydro ebt vol
3241201 0 16867574. 1344330. 2412927. 0. 0. 1
3241202 0 16867124. 1311507. 2412938. 0. 0. 2
3241203 0 16866704. 1290416. 2412949. 0. 0. 3
3241204 0 16866288. 1276844. 2412960. 0. 0. 4
3241205 0 16865874. 1268002. 2412970. 0. 0. 5
3241206 0 16865464. 1262162. 2412981. 0. 0. 6
3241207 0 16865052. 1258250. 2412992. 0. 0. 7
3241208 0 16864642. 1255586. 2413003. 0. 0. 8
3241209 0 16864232. 1253742. 2413013. 0. 0. 9
3241210 0 16863800. 1252443. 2413024. 0. 0. 10
*
3241301 .733625 1 * .489024 jun
3241302 .72087 2 * .489024 jun
3241303 .713189 3 * .489024 jun
3241304 .708343 4 * .489024 jun
3241305 .70528 5 * .489024 jun
3241306 .703296 6 * .489024 jun
3241307 .701983 7 * .489024 jun
3241308 .701097 8 * .489024 jun
3241309 .700487 9 * .489024 jun
*
* diamj beta c m jun
3241401 0.013 0.0 1.0 1.0 9
*
*****
* Steam generator tubes 3 row 5 (6 tubes)
3250000 sg3tub5 pipe
*
*hydro no. volumes
3250001 10
*
*hydro vol area vol
3250101 0.0007964 10
*
*hydro jun area jun
3250201 0.0 9
*
*hydro length vol
3250301 1.0656 10
*
*hydro volume vol
3250401 0.0 10
*
*hydro horiz ang vol
```

```

3250501 0.0 10
*
*hydro vert angle vol
3250601 0.0 1
3250602 -0.343 9
3250603 0.0 10
*
*hydro delta z vol
3250701 0.0 1
3250702 -0.006375 9
3250703 0.0 10
*
*hydro roughness hyd diam vol
3250801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
3250901 0.047 0.047 9
*
*hydro fe vol
3251001 00 10
*
*hydro fvcchs jun
3251101 001000 9
*
*hydro ebt
3251201 0 16864478. 1342338. 2413006. 0. 0. 1
3251202 0 1.686447 1310489. 2413019. 0. 0. 2
3251203 0 16863558. 1289920. 2413030. 0. 0. 3
3251204 0 16863118. 1276612. 2413042. 0. 0. 4
3251205 0 16862680. 1267896. 2413053. 0. 0. 5
3251206 0 16862242. 1262111. 2413064. 0. 0. 6
3251207 0 16861808. 1258216. 2413075. 0. 0. 7
3251208 0 16861372. 1255552. 2413086. 0. 0. 8
3251209 0 16860938. 1253700. 2413098. 0. 0. 9
3251210 0 16860482. 1252390. 2413109. 0. 0. 10
*
3251301 .752758 0. jun 1 * .430585
3251302 .740101 0. 2 * .430585
3251303 .732413 0. 3 * .430585
3251304 .727537 0. 4 * .430585
3251305 .724437 0. 5 * .430585
3251306 .72418 0. 6 * .430585
3251307 .721076 0. 7 * .430585
3251308 .720166 0. 8 * .430585
3251309 .719536 0. 9 * .430585
*
* diamj beta c m jun
3251401 0.013 0.0 1.0 1.0 jun 9
*
***** JUNCTION 328 *****
* junctions between the sg tubes and the cold collector
3280000 ccjuns3 mtp1jun
=====
3280001 5 0
*
* Onnm from to area kfor krev fvcchs sub 2ph
3280011 325010000 329050003 0.0007964 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
3280012 00000000 00000000 0 1
* lnm velf velg #
3281011 .719093 .719093 1 * .430585
*
* 2nm Dhyd b c m #
3282011 0.013 1.0 2.0 1.0 1
*
* Onnm from to area kfor krev fvcchs sub 2ph
3280021 324010000 329040003 0.0009291 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
3280022 -1000000 -10000 0 5
*
* lnm velf velg #
3281021 .70006 .70006 2 * .489024
3281031 .679364 .679364 3 * .474559
3281041 .658887 .658887 4 * .460247
3281051 .637913 .637913 5 * .445585
*
* 2nm Dhyd b c m #
3282021 0.013 1.0 2.0 1.0 5
*
***** VOLUME 329 *****
* Steam generator 3 cold collector
=====
3290000 sg3cldc pipe
-----*
*
*hydro no. volumes
3290001 6
*
*hydro vol area vol
3290101 0.0 1
3290102 0.003632 5
3290103 0.0 6
*
*hydro jun area jun
3290201 0.0 5
*
*hydro length vol
3290301 0.508 1
3290302 0.476 4
3290303 0.429 5
3290304 0.051 6
*
*hydro volume vol
3290401 0.001883 1
3290402 0.0 5
3290403 0.0002164 6
*
*hydro horiz ang vol
3290501 0.0 6
*
*hydro vert angle vol
3290601 90.0 6
*
*hydro delta z vol
3290701 0.508 1
3290702 0.476 4
3290703 0.429 5
3290704 0.051 6
*
*hydro roughness hyd diam vol
3290801 5.00e-5 0.068 5
3290802 5.00e-5 0.074 6
*
*hydro Kfwd Krev jun
3290901 0.0 0.0 4
3290902 0.016 0.032 5
*
*hydro fe vol
3291001 00 6
*
*hydro fvcchs jun
3291101 001000 5
*
*hydro ebt

```

```

3291201 0 16874190. 1252369. 2412756. 0. 0. 1
3291202 0 16870660. 1252353. 2412847. 0. 0. 2
3291203 0 16867224. 1252337. 2412936. 0. 0. 3
3291204 0 16863760. 1252324. 2413025. 0. 0. 4
3291205 0 16860440. 1252316. 2413111. 0. 0. 5
3291206 0 16856670. 1263399. 2413156. 0. 0. 6
*
3291301 -.679057 -.679057 0. 1 * -1.854415
3291302 -.51052 -.51052 0. 2 * -1.394168
3291303 -.336744 -.336744 0. 3 * -.919609
3291304 -.1576726 -.1576726 0. 4 * -.430585
3291305 8.09739-11 8.1105-11 0. 5 * 2.2113-10
*
* diamj beta c m jun
3291401 0.068 0.0 1.0 1.0 5
*
***** VOLUME 330 *****
* Steam generator 3 inlet transition region
*****
3300000 sgoutlt3 branch
*****
* no. juns vel/flow
3300001 2 0
* area length volume
3300101 0.0 0.159 0.001069
* azim angle incl angle delta z
3300102 0.0 -90.0 -0.159
* roughness hyd dia pwbfe
3300103 5.00e-5 0.0 00000
* ebt
3300200 0 16876738. 1252368. 2412691. 0.
* from to area Kf Kr fvcabs
3301101 32900000 33000000 0.004301 0.023 0.045 001000
3302101 330010000 335000000 0.004536 0.0 0.0 001000
* veif veig veif
3301201 .711221 .711221 0. * 2.3
3302201 .674372 .674372 0. * 2.3
* hyd dia beta y-int slope
3301110 0.074 0.00 1.00 1.00
3302110 0.076 0.00 1.00 1.00
*
***** VOLUME 335 *****
* Loop 3 pump suction piping of cold leg
*****
3350000 pmpset3 pipe
*****
*
* hydro no. volumes
3350001 14
*
* hydro vol area vol
3350101 0.004536 10
3350102 0.0 11
3350103 0.004536 14
*
* hydro jun area jun
3350201 0.004536 13
*
* hydro length vol
3350301 0.828 5
3350302 1.042 7
3350303 1.151 8
3350304 0.7495 10
3350305 0.75275 14
*
* hydro volume vol
3350401 0.0 10
3350402 0.006931 11

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```

3350403 0.0 14
*
* hydro horiz ang vol
3350501 90.0 8
3350502 -85.0 14
*
* hydro vert angle vol
3350601 -90.0 8
3350602 0.0 10
3350603 90.0 14
*
* hydro delta z
3350701 -.828 5
3350702 -.7425 7
3350703 -.965 8
3350704 0.0 10
3350705 0.65675 11
3350706 0.75275 14
*
* hydro roughness hyd diam vol
3350801 5.00e-5 0.076 14
*
* hydro Kfwd Krev jun
3350901 0.0 0.0 4
3350902 0.13 0.13 5
3350903 0.0 0.0 6
3350904 0.13 0.13 7
3350905 0.25 0.25 8
3350906 0.0 0.0 9
3350907 0.25 0.25 10
3350908 0.0 0.0 13
*
* hydro fe vol
3351001 00 14
*
* hydro fvcabs jun
3351101 001000 13
*
* hydro ebt
3351201 0 16880266. 1252220. 2412600. 0. 0. 1
3351202 0 16886336. 1252073. 2412444. 0. 0. 2
3351203 0 16892408. 1251925. 2412287. 0. 0. 3
3351204 0 16898480. 1251777. 2412131. 0. 0. 4
3351205 0 16904552. 1251630. 2411975. 0. 0. 5
3351206 0 16910282. 1251488. 2411828. 0. 0. 6
3351207 0 16915716. 1251259. 2411683. 0. 0. 7
3351208 0 16921946. 1251053. 2411498. 0. 0. 8
3351209 0 16925424. 1250920. 2411395. 0. 0. 9
3351210 0 16925392. 1250786. 2411396. 0. 0. 10
3351211 0 16923034. 1250581. 2411466. 0. 0. 11
3351212 0 16917684. 1250447. 2411625. 0. 0. 12
3351213 0 16912096. 1250312. 2411781. 0. 0. 13
3351214 0 16906508. 1250178. 2411925. 0. 0. 14
*
* jun
3351301 -.674322 1 * 2.3
3351302 -.67427 2 * 2.3
3351303 -.674219 3 * 2.3
3351304 -.674167 4 * 2.3
3351305 -.674115 5 * 2.3
3351306 -.674051 6 * 2.3
3351307 -.673988 7 * 2.3
3351308 -.673918 8 * 2.3
3351309 -.673873 9 * 2.3
3351310 -.673831 10 * 2.3
3351311 -.673768 11 * 2.3
3351312 -.67373 12 * 2.3
3351313 -.673693 13 * 2.3
*

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```

*      diamj      beta      c      m      jun
3351401 0.076      0.0      1.0      1.0      13
3
*****
* Loop 3 primary coolant pump
*****
3400000 mcp3      pump
=====
*      area      length      volume
3400101 0.0      0.746      0.010
*      azim angle      incl angle      delta z      pvbfe
3400102 0.0      30.0      0.370      00000
*      from      jun area      Kf      Kr      efvcchs
3400108 335010000 0.004536 0.0 0.0 0001000
*      to      jun area      Kf      Kr      efvcchs
3400109 342000000 0.004536 0.0 0.0 0001000
*      hyd dia      beta      y-int      slope
3400110 0.076      0.00      1.00      1.00
3400111 0.076      0.00      1.00      1.00
*      ebt
3400200 0      16907300.      1243874.      2411905.      0.
*      vel/flow      liquid      vapor      int-face
3400201 0      .673655      .673655      0. * 2.3
3400202 0      .671674      .671674      0. * 2.3
*      tabdat-i      2ph-i      2phdiff-i      torque-i      pvel-i      trip      rev-i
3400301 -2      -1      -3      -1      0      1340      1
*      rated vel      in/rated vel      rated flow      rated head
3400302 314.2      .12436      0.022      100.
*      rated torq      mom-iner      rated dens      rated m-torq
3400303 57.2      3.7-2      750.0      0.00
*      coeff-tf2      coeff-tf0      coeff-tf1      coeff-tf3
3400304 0.57      0.57      0.0      0.0
*
*hydro      trip no.      parameter no.
3406100      340      cntrlvar      340
*
*hydro      indp var      speed (rad/s)
3406101 -1.0      314.2
3406102 0.0      0.
3406103 500.0      500.
*
*****
* Piping from pump discharge to isolation valve
*****
*hydro      component name      component type
3420000      pmp3out      singlvol
*-----
*hydro      area      length      volume
3420101      0.004536      0.880      0.0
*      horz angle      vert angle      delta z
3420102      80.0      0.0      0.0
*
*hydro      roughness      hyd diam      fe
3420103      0.00005      0.076      00
*
*hydro ebt pressure      tempe
3420200 0      16910562.      1243628.      2411821.      0.
*
*****
* Cold leg isolation valve
*****
*hydro      cl3vlv      valve
3430000
*-----
*hydro      from      to      area      kf      kr      vcchs
3430101 342010000      345000000      0.004536      0.0      0.0      00100

```



```

* ##### SECONDARY COOLANT SYSTEM ##### $
* ##### VOLUME 350 #####
* Loop 3 Main Feedwater source
3500000 mfw3src tmdpvol
* area length volume
3500101 1.0 1.0 0.0
* azim angle incl angle delta z
3500102 0.0 0.0 0.0
* roughness hyd dia pvbfe
3500103 0.00000 trip search var
3500200 003 0 0
* indep var 0
3500201 0.00 10.0e6 443.15
* ##### JUNCTION 351 #####
* Loop 3 main feedwater flow
3510000 mfw3 tmdpjun
* From To Area
3510101 350010000 359000000 0.0009079
* vel/Kg trip var req. # var req * tranccalc
3510200 1 351
* Time kg/s kg/s m/s
3510201 0.0 0.1667 0. * tranccalc
3510202 9.0 0.1667 0. * tranccalc
3510203 10.0 0.0 0. * tranccalc
* ##### VOLUME 355 #####
* Loop 3 Auxiliary Feedwater source
3550000 afw3src tmdpvol
* area length volume
3550101 1.0 1.0 0.0
* azim angle incl angle delta z
3550102 0.0 0.0 0.0
* roughness hyd dia pvbfe
3550103 0.00000 trip search var
3550200 003 0 0
* indep var 0
3550201 0.00 16.0e6 443.15
* ##### JUNCTION 356 #####
* Loop 3 auxiliary feedwater flow
3560000 afw3 tmdpjun
* From To Area
3560101 355010000 359000000 0.0009079
* vel/Kg trip var req. # var req
3560200 1 356
* Time kg/s kg/s m/s
3560201 -1. 0.0 0. 0.
3560202 0.0 0.0 0. 0.
* ##### VOLUME 359 #####
* Loop 3 Feedwater ring

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3590000 fwring3 branch
* no. juns vel/flow
3590001 1 0
* area length volume
3590101 0.0009079 1.062 0.0
* azim angle incl angle delta z
3590102 0.0 0.0 0.000
* roughness hyd dia pvbfe
3590103 5.0e-5 0.034 00000
* ebt
3590200 0 7173545. 791716. 2580122. 0.
* from to area Kf Kr fvcchs
3591101 359010000 372010003 0.009651 0.0 0.0 001000
* velf velg veli
3591201 .01956143 .0981506 0. * .166677
* hyd dia beta y-int slope
3591110 0.008 0.00 1.00 1.00
* #####
* These components have been superseded. They are being left in the
* input deck for possible future use.
* #####
* ##### VOLUME 360 #####
* Loop 3 sg downcomer
3600000 dc3 annulus
* #####
* hydro no. volumes
3600001 5
* hydro vol area vol
3600101 0.0 5
* hydro jun area jun
3600201 0.0 4
* hydro length vol
3600301 0.374 1
3600302 0.476 4
3600303 0.563 5
* hydro volume vol
3600401 0.00987 1
3600402 0.01256 4
3600403 0.01486 5
* hydro vert angle vol
3600601 -90.0 5
* hydro delta z vol
3600701 -0.374 1
3600702 -0.476 4
3600703 -0.563 5
* hydro roughness hyd diam vol
3600801 1.0e-5 0.04 5
* hydro Kfwd Krev jun
3600901 0.0 0.0 4
* hydro fe vol
3601001 00 5
* hydro fvcchs jun
3601101 001000 4

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*hydro ebt
$3601201 2 7.40e6 0.0 0. 0. 0. 5
*
$3601301 0.0 0.0 0.0 4
* diamj beta c m jun
$3601401 0.04 0.0 1.0 1.0 4
*
***** JUNCTION 365 *****
* Loop 3 sg downcomer-to-riser connection
*=====
$3650000 dcrisr3 mtlpljun
*-----
$3650001 5 0
*
* Onnm from to area kfor krev fvcchs sub 2ph
$3650011 360050003 370010004 0.3694 0.2 0.2 001003 1.0 1.0 1.0
* inc-frm inc-to 0 limit
$3650012 000000000 000000000 0 1
* innm velf velg #
$3651011 0.0 0.0 1
* 2nnm Dhyd b c m #
$3652011 0.032 1.0 2.0 1.0 1
*
* Onnm from to area kfor krev fvcchs sub 2ph
$3650021 360040003 370020004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-frm inc-to 0 limit
$3650022 000000000 000000000 0 2
* innm velf velg #
$3651021 0.0 0.0 2
* 2nnm Dhyd b c m #
$3652021 0.032 1.0 2.0 1.0 2
*
* Onnm from to area kfor krev fvcchs sub 2ph
$3650031 360030003 370030004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-frm inc-to 0 limit
$3650032 000000000 000000000 0 3
* innm velf velg #
$3651031 0.0 0.0 3
* 2nnm Dhyd b c m #
$3652031 0.032 1.0 2.0 1.0 3
*
* Onnm from to area kfor krev fvcchs sub 2ph
$3650041 360020003 370040004 0.2815 5.0 5.0 001003 1.0 1.0 1.0
* inc-frm inc-to 0 limit
$3650042 000000000 000000000 0 4
* innm velf velg #
$3651041 0.0 0.0 4
* 2nnm Dhyd b c m #
$3652041 0.032 1.0 2.0 1.0 4
*
* Onnm from to area kfor krev fvcchs sub 2ph
$3650051 360010003 370050004 0.2413 5.0 5.0 001003 1.0 1.0 1.0
* inc-frm inc-to 0 limit
$3650052 000000000 000000000 0 5
* innm velf velg #
$3651051 0.0 0.0 5
* 2nnm Dhyd b c m #

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```

$3652051 0.032 1.0 2.0 1.0 5
*
***** VOLUME 370 *****
* Loop 3 sg riser
*=====
$3700000 riser3 annulus
*-----
*
*hydro no. volumes
$3700001 5
*
*hydro vol area vol
$3700101 0.0 5
*
*hydro jun area jun
$3700201 0.0 4
*
*hydro length vol
$3700301 0.563 1
$3700302 0.476 4
$3700303 0.374 5
*
*hydro volume vol
$3700401 0.04553 1
$3700402 0.03701 4
$3700403 0.02909 5
*
*hydro vert angle vol
$3700601 90.0 5
*
*hydro delta z vol
$3700701 0.563 1
$3700702 0.476 4
$3700703 0.374 5
*
*hydro roughness hyd diam vol
$3700801 1.0e-5 0.0376 5
*
*hydro Kfwd Krev jun
$3700901 0.0 0.0 4
*
*hydro fe vol
$3701001 00 5
*
*hydro fvcchs jun
$3701101 001000 4
*
*hydro ebt
$3701201 2 7.40e6 0.0 0. 0. 5
*
$3701301 0.0 0.0 0.0 4
* diamj beta c m jun
$3701401 0.0376 0.0 1.0 1.0 4
*
***** VOLUME 372 *****
* Loop 3 sg lower steam dome
*=====
$3720000 lwrdom3 branch
*-----
*
* no. juns vel/flow
$3720001 3 0
* area length volume
$3720101 0.0 0.630 0.09265
* azim angle incl angle delta z
$3720102 0. 90.0 0.630
* roughness hyd dia pvbfe
$3720103 5.0e-5 0.343 01000
* ebt

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*
3751001 00 2
*
*hydro fvcahs jun 1
3751101 001000
*
*hydro ebt
3751201 0 7172153. 1266527. 2580125. .999962 0. 1
3751202 0 7171980. 1266518. 2580135. .99995 0. 2
*
3751301 -.160925 .0291526 0. 1 * .165556
3751401 0.440 0.0 1.0 1.0 1.0 1
*
*****
* Steam line 3
*****
3800000 stmln3 branch
*****
*
* no. juns vel/flow
3800001 1 0
*
* area length volume
3800101 0.0003142 4.74 0.0
* azimuth angle incl angle delta z
3800102 0.0 0.0 0.0
* roughness hyd dia pvpbe
3800103 5.0e-5 0.020 0.0000
* ebt
3800200 0 7161301. 1265995. 2580352. .999952
* from to area kf Kr fvcahs
3801101 375020004 380000000 0.0003142 0.0 0.0 001101
* velg veli
3801201 13.93105 13.98425 0. * .1650946
* hyd dia beta y-int slope
3801110 0.020 0.00 1.00 1.00
*
*****
* Steam line 3 Relief Valve
*****
3810000 relief3 valve
*****
*
*hydro from to area kf kr fvcahs
3810101 380010003 382000000 0.0003142 0.0 0.0 00102
*
* hyd dia beta y-int slope
3810110 0.020 0.00 1.00 1.00
*
* ic velg veli
3810201 0 0. 0. * 0.
*
3810300 trpvlv
3810301 1381
*
*****
* Atmospheric boundary condition for steam relief
*****
3820000 atmos3 tmdpv01
*****
*
* area length volume
3820101 1.0 1.0 0.0
* azimuth angle incl angle delta z
3820102 0.00 0.0 0.0
* roughness hyd dia pvpbe
3820103 0.00000 trip 0.0000 search var
* ebt
3820200 003 0
* indep var
3820201 0.00 1.013e5 300.0

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*
***** JUNCTION 385 *****
* Steam Line 3 Isolation Valve
*****
3850000 isolv3 valve
*****
*
*hydro from to area kf kr fvcahs
3850101 380010000 700040003 0.0003142 0.0 0.0 01101
*
* hyd dia beta y-int slope
3850110 0.020 0.00 1.00 1.00
*
* ic velg veli
3850201 0 13.96317 14.01004 0. * .1650895
*
3850300 mtrvlv
*
* open close rate ic * 19 s closing time
3850301 385 384 0.052632 1.
*
***** LOOP 4 *****
* PRIMARY COOLANT SYSTEM $
*****
* Loop 4 hot leg
*****
4010000 hotleg4 pipe
*****
*
*hydro no. volumes
4010001 7
*
*hydro vol area vol
4010101 0.004536 7
*
*hydro jun area jun
4010201 0.004536 6
*
*hydro length vol
4010301 0.6683 3
4010302 0.420 4
4010303 0.567 7
*
*hydro volume vol
4010401 0.0 7
*
*hydro horiz ang vol
4010501 135.0 7
*
*hydro vert angle vol
4010601 0.0 4
4010602 42.22 5
4010603 90.0 7
*
*hydro delta z vol
4010701 0.0 4
4010702 0.381 5
4010703 0.567 7
*
*hydro roughness hyd diam vol
4010801 5.00e-5 0.076 7
*
*hydro Kfwd Krev jun
4010901 0.0 0.0 3
4010902 0.25 0.25 4

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```

4010903 0.0 0.0 6
*
*hydro fe vol
4150301 0.508 1
4150302 0.476 4
4150303 0.429 5
*
*hydro fvcchs jun
4011101 001000 6
*
*hydro ebt
4011201 0 16891448. 1404577. 2412312. 0. 0. 1
4011202 0 1404449. 2412313. 0. 0. 2
4011203 0 16891380. 1404321. 2412314. 0. 0. 3
4011204 0 16891354. 1404239. 2412315. 0. 0. 4
4011205 0 1.689+7 1404130. 2412350. 0. 0. 5
4011206 0 16886732. 1404021. 2412433. 0. 0. 6
4011207 0 16882850. 1403913. 2412533. 0. 0. 7
*
4011301 .76343 .76343 0. 1 * 2.4
4011302 .763369 .763369 0. 2 * 2.4
4011303 .763308 .763308 0. 3 * 2.4
4011304 .76327 .76327 0. 4 * 2.4
4011305 .76322 .76322 0. 5 * 2.4
4011306 .763173 .763173 0. 6 * 2.4
*
* diamj beta c m jun
4011401 0.076 0.0 1.0 1.0 6
*
*****
* Steam generator 4 inlet transition region
4100000 sginle4 branch
*-----*
* no. juns vel/flow
4100001 2 0
*
* area length volume
4100101 0.0 0.210 0.00129
*
* azim angle incl angle delta z
4100102 0.0 90.0 0.210
*
* roughness hyd dia pwbfe
4100103 5.00e-5 0.0 00000
*
* ebt
4100200 0 16880284. 1403875. 2412599. 0.
*
* from to area Kf Kr fvcchs
4101101 401010000 410000000 0.004536 0.0 0.0 001000
4102101 401010000 415000000 0.004301 0.045 0.023 001000
*
* velf velg velf
4102201 .763127 .763127 0. * 2.4
4102201 .804808 .804808 0. * 2.4
*
* hyd dia beta y-int slope
4101110 0.076 0.00 1.00 1.00
4102110 0.074 0.00 1.00 1.00
*
*****
* Steam generator 4 hot collector
4150000 sgshotc pipe
*-----*
*
* no. volumes
4150001 5
*
*hydro vol area vol
4150101 0.0 0.0 1
4150102 0.003632 4
4150103 0.0 5
*
*hydro jun area jun
4150201 0.0 4

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```

*hydro length vol
4150301 0.508 1
4150302 0.476 4
4150303 0.429 5
*
*hydro volume vol
4150401 0.001849 1
4150402 0.0 4
4150403 0.001588 5
*
*hydro horiz ang vol
4150501 0.0 5
*
*hydro vert angle vol
4150601 90.0 5
*
*hydro delta z vol
4150701 0.508 1
4150702 0.476 4
4150703 0.429 5
*
*hydro roughness hyd diam vol
4150801 5.00e-5 0.068 5
*
*hydro Kfwd Krev jun
4150901 0.0 0.0 4
*
*hydro fe vol
4151001 00 5
*
*hydro fvcchs jun
4151101 001000 4
*
*hydro ebt
4151201 0 16877632. 1402264. 2412668. 0. 0. 1
4151202 0 16874362. 1400652. 2412752. 0. 0. 2
4151203 0 16871184. 1398667. 2412834. 0. 0. 3
4151204 0 1.6868+7 1396076. 2412916. 0. 0. 4
4151205 0 16864916. 1392405. 2412995. 0. 0. 5
*
4151301 .76667 .76667 0. 1 * 1.932563
4151302 .57515 .57515 0. 2 * 1.451223
4151303 .378507 .378507 0. 3 * .956207
4151304 .1767697 .1767697 0. 4 * .447267
*
* diamj beta c m jun
4151401 0.068 0.0 1.0 1.0 4
*
*****
* junctions between the hot collector and the sg tubes
4160000 hcjuns4 mtp1jun
*-----*
4160001 5 0
*
* 0nm from to area kfor krev fvcchs sub 2ph
4160011 415050004 425000000 0.0007964 0.005 0.002 0001002 1.0 1.0 1.0
*
* inc-firm inc-to 0 limit
4160012 000000000 000000000 0 1
*
* lnm velf velf #
4161011 .804386 .804386 1 * .447267
*
* 2nm Dhyd b c m #
4162011 0.013 1.0 2.0 1.0 1
*
* 0nm from to area kfor krev efvcchs sub 2ph

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4160021 415040004 424000000 0.0009291 0.005 0.002 0001002 1.0 1.0 1.0
* inc-frm inc-to 0 limit
4160022 -10000 -1000000 0 5
* innm velf velg #
4161021 .786303 .786303 2 * .508939
4161031 .765993 .765993 3 * .495016
4161041 .74573 .74573 4 * .48134
4161051 .724905 .724905 5 * .467437
* 2nm Dbyd b c m #
4162021 0.013 1.0 2.0 1.0 5
* *****
* Steam generator 4 tubes row 1 (7 tubes)
4210000 sg4tub1 pipe
*-----*
*hydro no. volumes
4210001 10
*hydro vol area vol
4210101 0.0009291 10
*hydro jun area jun
4210201 0.0 9
*hydro length vol
4210301 1.0656 10
*hydro volume vol
4210401 0.0 10
*hydro horiz ang vol
4210501 0.0 10
*hydro vert angle vol
4210601 0.0 1
4210602 -0.343 9
4210603 0.0 10
*hydro delta z vol
4210701 0.0 1
4210702 -0.006375 9
4210703 0.0 10
*hydro roughness hyd diam vol
4210801 5.00e-5 0.013 10
*hydro Kfwd Krev jun
4210901 0.047 9
*hydro fe vol
4211001 0 10
*hydro fvechs jun
4211101 001000 9
*hydro ebt vol
4211201 0 16877222. 1347809. 0. 0. 1
4211202 0 1313410. 2412678. 0. 0. 2
4211203 0 16876812. 2412689. 0. 0. 3
4211204 0 16876432. 2412699. 0. 0. 4
4211205 0 16876054. 2412708. 0. 0. 5
4211206 0 16875680. 2412718. 0. 0. 6
4211207 0 16875306. 2412728. 0. 0. 7
4211208 0 16874934. 2412737. 0. 0. 8
4211209 0 16874562. 2412747. 0. 0. 9
4211210 0 16874192. 2412757. 0. 0. 1
4211211 0 16873798. 2412766. 0. 0. 2
4211212 0 16873426. 2412774. 0. 0. 3
4211213 0 16873054. 2412783. 0. 0. 4
4211214 0 16872682. 2412792. 0. 0. 5
4211215 0 16872310. 2412801. 0. 0. 6
4211216 0 16871938. 2412810. 0. 0. 7
4211217 0 16871566. 2412819. 0. 0. 8
4211218 0 16871194. 2412828. 0. 0. 9
4211219 0 16870822. 2412837. 0. 0. 10
4211220 0 16870450. 2412846. 0. 0. 11
4211221 0 16870078. 2412855. 0. 0. 12
4211222 0 16869706. 2412864. 0. 0. 13
4211223 0 16869334. 2412873. 0. 0. 14
4211224 0 16868962. 2412882. 0. 0. 15
4211225 0 16868590. 2412891. 0. 0. 16
4211226 0 16868218. 2412900. 0. 0. 17
4211227 0 16867846. 2412909. 0. 0. 18
4211228 0 16867474. 2412918. 0. 0. 19
4211229 0 16867102. 2412927. 0. 0. 20
4211230 0 16866730. 2412936. 0. 0. 21
4211231 0 16866358. 2412945. 0. 0. 22
4211232 0 16865986. 2412954. 0. 0. 23
4211233 0 16865614. 2412963. 0. 0. 24
4211234 0 16865242. 2412972. 0. 0. 25
4211235 0 16864870. 2412981. 0. 0. 26
4211236 0 16864498. 2412990. 0. 0. 27
4211237 0 16864126. 2412999. 0. 0. 28
4211238 0 16863754. 2413008. 0. 0. 29
4211239 0 16863382. 2413017. 0. 0. 30
4211240 0 16863010. 2413026. 0. 0. 31
4211241 0 16862638. 2413035. 0. 0. 32
4211242 0 16862266. 2413044. 0. 0. 33
4211243 0 16861894. 2413053. 0. 0. 34
4211244 0 16861522. 2413062. 0. 0. 35
4211245 0 16861150. 2413071. 0. 0. 36
4211246 0 16860778. 2413080. 0. 0. 37
4211247 0 16860406. 2413089. 0. 0. 38
4211248 0 16860034. 2413098. 0. 0. 39
4211249 0 16859662. 2413107. 0. 0. 40
4211250 0 16859290. 2413116. 0. 0. 41
4211251 0 16858918. 2413125. 0. 0. 42
4211252 0 16858546. 2413134. 0. 0. 43
4211253 0 16858174. 2413143. 0. 0. 44
4211254 0 16857802. 2413152. 0. 0. 45
4211255 0 16857430. 2413161. 0. 0. 46
4211256 0 16857058. 2413170. 0. 0. 47
4211257 0 16856686. 2413179. 0. 0. 48
4211258 0 16856314. 2413188. 0. 0. 49
4211259 0 16855942. 2413197. 0. 0. 50
4211260 0 16855570. 2413206. 0. 0. 51
4211261 0 16855198. 2413215. 0. 0. 52
4211262 0 16854826. 2413224. 0. 0. 53
4211263 0 16854454. 2413233. 0. 0. 54
4211264 0 16854082. 2413242. 0. 0. 55
4211265 0 16853710. 2413251. 0. 0. 56
4211266 0 16853338. 2413260. 0. 0. 57
4211267 0 16852966. 2413269. 0. 0. 58
4211268 0 16852594. 2413278. 0. 0. 59
4211269 0 16852222. 2413287. 0. 0. 60
4211270 0 16851850. 2413296. 0. 0. 61
4211271 0 16851478. 2413305. 0. 0. 62
4211272 0 16851106. 2413314. 0. 0. 63
4211273 0 16850734. 2413323. 0. 0. 64
4211274 0 16850362. 2413332. 0. 0. 65
4211275 0 16849990. 2413341. 0. 0. 66
4211276 0 16849618. 2413350. 0. 0. 67
4211277 0 16849246. 2413359. 0. 0. 68
4211278 0 16848874. 2413368. 0. 0. 69
4211279 0 16848502. 2413377. 0. 0. 70
4211280 0 16848130. 2413386. 0. 0. 71
4211281 0 16847758. 2413395. 0. 0. 72
4211282 0 16847386. 2413404. 0. 0. 73
4211283 0 16847014. 2413413. 0. 0. 74
4211284 0 16846642. 2413422. 0. 0. 75
4211285 0 16846270. 2413431. 0. 0. 76
4211286 0 16845898. 2413440. 0. 0. 77
4211287 0 16845526. 2413449. 0. 0. 78
4211288 0 16845154. 2413458. 0. 0. 79
4211289 0 16844782. 2413467. 0. 0. 80
4211290 0 16844410. 2413476. 0. 0. 81
4211291 0 16844038. 2413485. 0. 0. 82
4211292 0 16843666. 2413494. 0. 0. 83
4211293 0 16843294. 2413503. 0. 0. 84
4211294 0 16842922. 2413512. 0. 0. 85
4211295 0 16842550. 2413521. 0. 0. 86
4211296 0 16842178. 2413530. 0. 0. 87
4211297 0 16841806. 2413539. 0. 0. 88
4211298 0 16841434. 2413548. 0. 0. 89
4211299 0 16841062. 2413557. 0. 0. 90
4211300 0 16840690. 2413566. 0. 0. 91
4211301 0 16840318. 2413575. 0. 0. 92
4211302 0 16839946. 2413584. 0. 0. 93
4211303 0 16839574. 2413593. 0. 0. 94
4211304 0 16839202. 2413602. 0. 0. 95
4211305 0 16838830. 2413611. 0. 0. 96
4211306 0 16838458. 2413620. 0. 0. 97
4211307 0 16838086. 2413629. 0. 0. 98
4211308 0 16837714. 2413638. 0. 0. 99
4211309 0 16837342. 2413647. 0. 0. 100
4211310 0 16836970. 2413656. 0. 0. 101
4211311 0 16836598. 2413665. 0. 0. 102
4211312 0 16836226. 2413674. 0. 0. 103
4211313 0 16835854. 2413683. 0. 0. 104
4211314 0 16835482. 2413692. 0. 0. 105
4211315 0 16835110. 2413701. 0. 0. 106
4211316 0 16834738. 2413710. 0. 0. 107
4211317 0 16834366. 2413719. 0. 0. 108
4211318 0 16833994. 2413728. 0. 0. 109
4211319 0 16833622. 2413737. 0. 0. 110
4211320 0 16833250. 2413746. 0. 0. 111
4211321 0 16832878. 2413755. 0. 0. 112
4211322 0 16832506. 2413764. 0. 0. 113
4211323 0 16832134. 2413773. 0. 0. 114
4211324 0 16831762. 2413782. 0. 0. 115
4211325 0 16831390. 2413791. 0. 0. 116
4211326 0 16831018. 2413800. 0. 0. 117
4211327 0 16830646. 2413809. 0. 0. 118
4211328 0 16830274. 2413818. 0. 0. 119
4211329 0 16829902. 2413827. 0. 0. 120
4211330 0 16829530. 2413836. 0. 0. 121
4211331 0 16829158. 2413845. 0. 0. 122
4211332 0 16828786. 2413854. 0. 0. 123
4211333 0 16828414. 2413863. 0. 0. 124
4211334 0 16828042. 2413872. 0. 0. 125
4211335 0 16827670. 2413881. 0. 0. 126
4211336 0 16827298. 2413890. 0. 0. 127
4211337 0 16826926. 2413899. 0. 0. 128
4211338 0 16826554. 2413908. 0. 0. 129
4211339 0 16826182. 2413917. 0. 0. 130
4211340 0 16825810. 2413926. 0. 0. 131
4211341 0 16825438. 2413935. 0. 0. 132
4211342 0 16825066. 2413944. 0. 0. 133
4211343 0 16824694. 2413953. 0. 0. 134
4211344 0 16824322. 2413962. 0. 0. 135
4211345 0 16823950. 2413971. 0. 0. 136
4211346 0 16823578. 2413980. 0. 0. 137
4211347 0 16823206. 2413989. 0. 0. 138
4211348 0 16822834. 2413998. 0. 0. 139
4211349 0 16822462. 2414007. 0. 0. 140
4211350 0 16822090. 2414016. 0. 0. 141
4211351 0 16821718. 2414025. 0. 0. 142
4211352 0 16821346. 2414034. 0. 0. 143
4211353 0 16820974. 2414043. 0. 0. 144
4211354 0 16820602. 2414052. 0. 0. 145
4211355 0 16820230. 2414061. 0. 0. 146
4211356 0 16819858. 2414070. 0. 0. 147
4211357 0 16819486. 2414079. 0. 0. 148
4211358 0 16819114. 2414088. 0. 0. 149
4211359 0 16818742. 2414097. 0. 0. 150
4211360 0 16818370. 2414106. 0. 0. 151
4211361 0 16817998. 2414115. 0. 0. 152
4211362 0 16817626. 2414124. 0. 0. 153
4211363 0 16817254. 2414133. 0. 0. 154
4211364 0 16816882. 2414142. 0. 0. 155
4211365 0 16816510. 2414151. 0. 0. 156
4211366 0 16816138. 2414160. 0. 0. 157
4211367 0 16815766. 2414169. 0. 0. 158
4211368 0 16815394. 2414178. 0. 0. 159
4211369 0 16815022. 2414187. 0. 0. 160
4211370 0 16814650. 2414196. 0. 0. 161
4211371 0 16814278. 2414205. 0. 0. 162
4211372 0 16813906. 2414214. 0. 0. 163
4211373 0 16813534. 2414223. 0. 0. 164
4211374 0 16813162. 2414232. 0. 0. 165
4211375 0 16812790. 2414241. 0. 0. 166
4211376 0 16812418. 2414250. 0. 0. 167
4211377 0 16812046. 2414259. 0. 0. 168
4211378 0 16811674. 2414268. 0. 0. 169
4211379 0 16811302. 2414277. 0. 0. 170
4211380 0 16810930. 2414286. 0. 0. 171
4211381 0 16810558. 2414295. 0. 0. 172
4211382 0 16810186. 2414304. 0. 0. 173
4211383 0 16809814. 2414313. 0. 0. 174
4211384 0 16809442. 2414322. 0. 0. 175
4211385 0 16809070. 2414331. 0. 0. 176
4211386 0 16808698. 2414340. 0. 0. 177
4211387 0 16808326. 2414349. 0. 0. 178
4211388 0 16807954. 2414358. 0. 0. 179
4211389 0 16807582. 2414367. 0. 0. 180
4211390 0 16807210. 2414376. 0. 0. 181
4211391 0 16806838. 2414385. 0. 0. 182
4211392 0 16806466. 2414394. 0. 0. 183
4211393 0 16806094. 2414403. 0. 0. 184
4211394 0 16805722. 2414412. 0. 0. 185
4211395 0 16805350. 2414421. 0. 0. 186
4211396 0 16804978. 2414430. 0. 0. 187
4211397 0 16804606. 2414439. 0. 0. 188
4211398 0 16804234. 2414448. 0. 0. 189
4211399 0 16803862. 2414457. 0. 0. 190
4211400 0 16803490. 2414466. 0. 0. 191
4211401 0 16803118. 2414475. 0. 0. 192
4211402 0 16802746. 2414484. 0. 0. 193
4211403 0 16802374. 2414493. 0. 0. 194
4211404 0 16802002. 2414502. 0. 0. 195
4211405 0 16801630. 2414511. 0. 0. 196
4211406 0 16801258. 2414520. 0. 0. 197
4211407 0 16800886. 2414529. 0. 0. 198
4211408 0 16800514. 2414538. 0. 0. 199
4211409 0 16800142. 2414547. 0. 0. 200
4211410 0 16799770. 2414556. 0. 0. 201
4211411 0 16799398. 2414565. 0. 0. 202
4211412 0 16799026. 2414574. 0. 0. 203
4211413 0 16798654. 2414583. 0. 0. 204
4211414 0 16798282. 2414592. 0. 0. 205
4211415 0 16797910. 2414601. 0. 0. 206
4211416 0 16797538. 2414610. 0. 0. 207
4211417 0 16797166. 2414619. 0. 0. 208
4211418 0 16796794. 2414628. 0. 0. 209
4211419 0 16796422. 2414637. 0. 0. 210
4211420 0 16796050. 2414646. 0. 0. 211
4211421 0 16795678. 2414655. 0. 0. 212
4211422 0 16795306. 2414664. 0. 0. 213
4211423 0 16794934. 2414673. 0. 0. 214
4211424 0 16794562. 2414682. 0. 0. 215
4211425 0 16794190. 2414691. 0. 0. 216
4211426 0 16793818. 2414700. 0. 0. 217
4211427 0 16793446. 2414709. 0. 0. 218
4211428 0 16793074. 2414718. 0. 0. 219
4211429 0 16792702. 2414727. 0. 0. 220
4211430 0 16792330. 2414736. 0. 0. 221
4211431 0 16791958. 2414745. 0. 0. 222
4211432 0 16791586. 2414754. 0. 0. 223
4211433 0 16791214. 2414763. 0. 0. 224
4211434 0 16790842. 2414772. 0. 0. 225
4211435 0 16790470. 2414781. 0. 0. 226
4211436 0 16790098. 2414790. 0. 0. 227
4211437 0 16789726. 2414799. 0. 0. 228
4211438 0 16789354. 2414808. 0. 0. 229
4211439 0 16788982. 2414817. 0. 0. 230
4211440 0 16788610. 2414826. 0. 0. 231
4211441 0 16788238. 2414835. 0. 0. 232
4211442 0 16787866. 2414844. 0. 0. 233
4211443 0 16787494. 2414853. 0. 0. 234
4211444 0 16787122. 2414862. 0. 0. 235
4211445 0 16786750. 2414871. 0. 0. 236
4211446 0 16786378. 2414880. 0. 0. 237
4211447 0 16786006. 2414889. 0. 0. 238
4211448 0 16785634. 2414898. 0. 0. 239
4211449 0 16785262. 2414907. 0. 0. 240
4211450 0 16784890. 2414916. 0. 0. 241
4211451 0 16784518. 2414925. 0. 0. 242
4211452 0 16784146. 2414934. 0. 0. 243
4211453 0 16783774. 2414943. 0. 0. 244
4211454 0 16783402. 2414952. 0. 0. 245
4211455 0 16783030. 2414961. 0. 0. 246
4211456 0 16782658. 2414970. 0. 0. 247
4211457 0 16782286. 2414979. 0. 0. 248
4211458 0 16781914. 2414988. 0. 0. 249
4211459 0 16781542. 2414997. 0. 0. 250
4211460 0 16781170. 2415006. 0. 0. 251
4211461 0 16780798. 2415015. 0. 0. 252
4211462 0 16780426. 2415024. 0. 0. 253
4211463 0 16780054. 2415033. 0. 0. 254
4211464 0 16779682. 2415042. 0. 0. 255
4211465 0 16779310. 2415051. 0. 0. 256
4211466 0 16778938. 2415060. 0. 0. 257
4211467 0 16778566. 2415069. 0. 0. 258
4211468 0 16778194. 2415078. 0. 0. 259
4211469 0 16777822. 2415087. 0. 0. 260
4211470 0 16777450. 2415096. 0. 0. 261
4211471 0 16777078. 2415105. 0. 0. 262
4211472 0 16776706. 2415114. 0. 0. 263
4211473 0 16776334. 2415123. 0. 0. 264
4211474 0 16775962. 2415132. 0. 0. 265
4211475 0 16775590. 2415141. 0. 0. 266
4211476 0 16775218. 2415150. 0. 0. 267
4211477 0 16774846. 2415159. 0. 0. 268
4211478 0 16774474. 2415168. 0. 0. 269
4211479 0 16774102. 2415177. 0. 0. 270
4211480 0 16773730. 2415186. 0. 0. 271
4211481 0 16773358. 2415195. 0. 0. 272
4211482 0 16772986. 2415204. 0. 0. 273
4211483 0 16772614. 2415213. 0. 0. 274
4211484 0 16772242. 2415222. 0. 0. 275
4211485 0 16771870. 2415231. 0. 0. 276
4211486 0 16771498. 2415240. 0. 0. 277
4211487 0 16771126. 2415249. 0. 0. 278
4211488 0 16770754. 2415258. 0. 0. 279
4211489 0 16770382. 2415267. 0. 0. 280
4211490 0 16770010. 2415276. 0. 0. 281
4211491 0 16769638. 2415285. 0. 0. 282
4211492 0 16769266. 2415294. 0. 0. 283
4211493 0 16768894. 2415303. 0. 0. 284
4211494 0 16768522. 2415312. 0. 0. 285
4211495 0 16768150. 2415321. 0. 0. 286
4211496 0 16767778. 2415330. 0. 0. 287
4211497 0 16767406. 2415339. 0. 0. 288
4211498 0 16767034. 2415348. 0. 0. 289
4211499 0 16766662. 2415357. 0. 0. 290
4211500 0 16766290. 2415366. 0. 0. 291
4211501 0 16765918. 2415375. 0. 0. 292
4211502 0 16765546. 2415384. 0. 0. 293
4211503 0 16765174. 2415393. 0. 0. 294
4211504 0 
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4221206 0 16871886. 1262656. 2412816. 0. 0. 6
4221207 0 16871490. 1258679. 2412826. 0. 0. 7
4221208 0 16871092. 1255981. 2412836. 0. 0. 8
4221209 0 16870698. 1254118. 2412846. 0. 0. 9
4221210 0 16870278. 1252809. 2412857. 0. 0. 10
*
4221301 .723271 .723271 0. jun 1 * .48134
4221302 .710204 .710204 0. 2 * .48134
4221303 .702399 .702399 0. 3 * .48134
4221304 .697488 .697488 0. 4 * .48134
4221305 .694397 .694397 0. 5 * .48134
4221306 .692403 .692403 0. 6 * .48134
4221307 .691088 .691088 0. 7 * .48134
4221308 .690204 .690204 0. 8 * .48134
4221309 .689597 .689597 0. 9 * .48134
*
* diamj beta c m jun
4221401 0.013 0.0 1.0 1.0 jun 9
*
*****
* Steam generator 4 tubes row 3 (7 tubes)
4230000 sg4tub3 pipe
*
*hydro no. volumes
4230001 10
*
*hydro vol area vol
4230101 0.0009291 10
*
*hydro jun area jun
4230201 0.0 9
*
*hydro length vol
4230301 1.0656 10
*
*hydro volume vol
4230401 0.0 10
*
*hydro horiz ang vol
4230501 0.0 10
*
*hydro vert angle vol
4230601 0.0 1
4230602 -0.343 9
4230603 0.0 10
*
*hydro delta z vol
4230701 0.0 1
4230702 -0.006375 9
4230703 0.0 10
*
*hydro roughness hyd diam vol
4230801 5.00e-5 0.013 10
*
*hydro kfwid Krev jun
4230901 0.047 9
*
*hydro fe vol
4231001 00 10
*
*hydro fvcchs jun
4231101 001000 9
*
*hydro ebt
4231201 0 16870726. 1346447. 2412846. 0. 0. 1
4231202 0 16870266. 1313086. 2412857. 0. 0. 2
*
4231203 0 16869834. 1291594. 2412869. 0. 0. 3
4231204 0 16869406. 1277741. 2412880. 0. 0. 4
4231205 0 16868982. 1268703. 2412890. 0. 0. 5
4231206 0 16868558. 1262726. 2412901. 0. 0. 6
4231207 0 16868136. 1258717. 2412912. 0. 0. 7
4231208 0 16867716. 1255985. 2412923. 0. 0. 8
4231209 0 16867294. 1254092. 2412934. 0. 0. 9
4231210 0 16866852. 1252758. 2412945. 0. 0. 10
*
4231301 .743488 .743488 0. jun 1 * .495016
4231302 .730293 .730293 0. 2 * .495016
4231303 .722359 .722359 0. 3 * .495016
4231304 .717338 .717338 0. 4 * .495016
4231305 .714162 .714162 0. 5 * .495016
4231306 .712103 .712103 0. 6 * .495016
4231307 .71074 .71074 0. 7 * .495016
4231308 .709819 .709819 0. 8 * .495016
4231309 .709185 .709185 0. 9 * .495016
*
* diamj beta c m jun
4231401 0.013 0.0 1.0 1.0 jun 9
*
*****
* Steam generator 4 tubes row 4 (7 tubes)
4240000 sg4tub4 pipe
*
*hydro no. volumes
4240001 10
*
*hydro vol area vol
4240101 0.0009291 10
*
*hydro jun area jun
4240201 0.0 9
*
*hydro length vol
4240301 1.0656 10
*
*hydro volume vol
4240401 0.0 10
*
*hydro horiz ang vol
4240501 0.0 10
*
*hydro vert angle vol
4240601 0.0 1
4240602 -0.343 9
4240603 0.0 10
*
*hydro delta z vol
4240701 0.0 1
4240702 -0.006375 9
4240703 0.0 10
*
*hydro roughness hyd diam vol
4240801 5.00e-5 0.013 10
*
*hydro kfwid Krev jun
4240901 0.047 9
*
*hydro fe vol
4241001 00 10
*
*hydro fvcchs jun
4241101 001000 9
*
*hydro ebt
4241201 0 16870726. 1346447. 2412846. 0. 0. 1
4241202 0 16870266. 1313086. 2412857. 0. 0. 2
*

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*hydro ebt          2412929. 0. 0. 1
4241201 0          16867504. 1345236.
4241202 0          1.6867+7 1312574.
4241203 0          16866558. 1291422.
4241204 0          16866104. 1277716.
4241205 0          16865654. 1268726.
4241206 0          16865204. 1262754.
4241207 0          16864756. 1258729.
4241208 0          16864308. 1255975.
4241209 0          16863862. 1254059.
4241210 0          16863392. 1252705.
*
4241301 .763887 0. 1 * .508939
4241302 .750639 0. 2 * .508939
4241303 .742614 0. 3 * .508939
4241304 .737508 0. 4 * .508939
4241305 .73426 0. 5 * .508939
4241306 .732145 0. 6 * .508939
4241307 .730738 0. 7 * .508939
4241308 .729783 0. 8 * .508939
4241309 .729123 0. 9 * .508939
*
*hydro diamj beta c m jun
4241401 0.013 0.0 1.0 1.0 1.0 9
*
*****
* Steam generator tubes 4 row 5 (6 tubes)
4250000 sg4tub5 pipe
*-----*
*hydro no. volumes
4250001 10
*
*hydro vol area vol
4250101 0.0007964 10
*
*hydro jun area jun
4250201 0.0 9
*
*hydro length vol
4250301 1.0656 10
*
*hydro volume vol
4250401 0.0 10
*
*hydro horiz ang vol
4250501 0.0 10
*
*hydro vert angle vol
4250601 0.0 1
4250602 -0.343 9
4250603 0.0 10
*
*hydro delta z vol
4250701 0.0 1
4250702 -0.006375 9
4250703 0.0 10
*
*hydro roughness hyd diam vol
4250801 5.00e-5 0.013 10
*
*hydro Kfwd Krev jun
4250901 0.047 0.047 9
*
*hydro fe vol
4251001 00 10
*

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```

*hydro fvcchs jun
4251101 001000 9
*
*hydro ebt          2413008. 0. 0. 1
4251201 0          16864410. 1343283.
4251202 0          16863898. 1311556.
4251203 0          16863414. 1290912.
4251204 0          16862936. 1277468.
4251205 0          16862460. 1268607.
4251206 0          1.6862+7 1262692.
4251207 0          16861514. 1258687.
4251208 0          16861042. 1255935.
4251209 0          16860570. 1254013.
4251210 0          16860076. 1252648.
*
4251301 .782333 0. 1 * .447267
4251302 .769197 0. 2 * .447267
4251303 .761175 0. 3 * .447267
4251304 .756045 0. 4 * .447267
4251305 .752765 0. 5 * .447267
4251306 .750617 0. 6 * .447267
4251307 .749182 0. 7 * .447267
4251308 .748204 0. 8 * .447267
4251309 .747525 0. 9 * .447267
*
*hydro diamj beta c m jun
4251401 0.013 0.0 1.0 1.0 9
*
*****
* JUNCTIONS BETWEEN THE SG TUBES AND THE COLD COLLECTOR
4280000 ccjuns4 mtpl jun
*-----*
4280001 5 0
*
* 0nm from to area kfor krev fvcchs sub 2ph
4280011 425010000 429050003 0.0007964 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
4280012 000000000 000000000 0 1
*
* lnm velf velg #
4281011 .747046 .747046 1 * .447267
*
* 2nm Dhjd b c m #
4282011 0.013 1.0 2.0 1.0 1
*
* 0nm from to area kfor krev fvcchs sub 2ph
4280021 424010000 429040003 0.0009291 0.005 0.002 001001 1.0 1.0 1.0
* inc-firm inc-to 0 limit
4280022 -1000000 -10000 0 5
*
* lnm velf velg #
4281021 .728659 .728659 2 * .508939
4281031 .70874 .70874 3 * .495016
4281041 .689172 .689172 4 * .48134
4281051 .669286 .669286 5 * .467437
*
* 2nm Dhjd b c m #
4282021 0.013 1.0 2.0 1.0 5
*
*****
* Steam generator 4 cold collector
4290000 sg4cldc pipe
*-----*
*hydro no. volumes
4290001 6

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*          no. juns vel/flow
*          2          0
4300001    area          length          volume
*          0.0          0.159          0.001069
4300101    azim angle    inci angle    delta z
*          0.0          -90.0          -0.159
4300102    roughness    hyd dia      pvbfe
*          5.00e-5      0.0          00000
4300103    ebt
*
4300200    0          16876314. 1252634. 2412702. 0.
*          from        to          area      Kf          fvcabs
4301101    42900000 430000000 0.004301 0.023 0.045 001000
4302101    43001000 435000000 0.004536 0.0 0.0 001000
*          velg        velg        velg
4301201    .742237   .742237   0. * 2.4
4302201    .703781   .703781   0. * 2.4
*          hyd dia    beta          y-int    slope
4301110    0.074     0.00         1.00     1.00
4302110    0.076     0.00         1.00     1.00
*
*****
* Loop 4 pump suction piping of cold leg
*****
4350000    pmpsc4      pipe
*-----*
*          no. volumes
4350001    14
*
*hydro    vol area    vol
4350101    0.004536   10
4350102    0.0        11
4350103    0.004536   14
*
*hydro    jun area    jun
4350201    0.004536   13
*
*hydro    length      vol
4350301    0.828       5
4350302    1.042       7
4350303    1.131       8
4350304    0.7495      10
4350305    0.74775     14
*
*hydro    volume      vol
4350401    0.0         10
4350402    0.006908    11
4350403    0.0         14
*
*hydro    horiz ang    vol
4350501    90.0        8
4350502    185.0       14
*
*hydro    vert angle   vol
4350601    -90.0       8
4350602    0.0         10
4350603    90.0        14
*
*hydro    delta z      vol
4350701    -0.828      5
4350702    -0.7425     7
4350703    -0.945      8
4350704    0.0         10
4350705    0.65175     11
4350706    0.74775     14
*
*hydro    roughness    hyd diam    vol
4350801    5.00e-5     0.076      14

```

```

* hydro kfwid jun krev fe 14
4350901 0.0 0.0 0.0 0.0
4350902 0.13 0.13 0.13 0.13
4350903 0.0 0.0 0.0 0.0
4350904 0.13 0.13 0.13 0.13
4350905 0.25 0.25 0.25 0.25
4350906 0.0 0.0 0.0 0.0
4350907 0.25 0.25 0.25 0.25
4350908 0.0 0.0 0.0 0.0
* hydro fe
4351001 00
* hydro fvechs jun
4351101 001000 13
* hydro ebt
4351201 0 16879832. 1252492. 2412611. 0. 0. 1
4351202 0 16885898. 1252351. 2412455. 0. 0. 2
4351203 0 16891966. 1252209. 2412299. 0. 0. 3
4351204 0 16898034. 1252068. 2412143. 0. 0. 4
4351205 0 16904102. 1251926. 2411987. 0. 0. 5
4351206 0 16909828. 1251748. 2411840. 0. 0. 6
4351207 0 16915256. 1251570. 2411697. 0. 0. 7
4351208 0 16921406. 1251377. 2411514. 0. 0. 8
4351209 0 16924802. 1251249. 2411414. 0. 0. 9
4351210 0 16924768. 1251121. 2411415. 0. 0. 10
4351211 0 16922436. 1250925. 2411484. 0. 0. 11
4351212 0 16917110. 1250797. 2411642. 0. 0. 12
4351213 0 16911558. 1250670. 2411795. 0. 0. 13
4351214 0 1.69067 1250542. 2411938. 0. 0. 14
* hydro kfwid jun krev fe 14
4351301 .703731 .703731 0. 1 * 2.4
4351302 .703679 .703679 0. 2 * 2.4
4351303 .703627 .703627 0. 3 * 2.4
4351304 .703575 .703575 0. 4 * 2.4
4351305 .703523 .703523 0. 5 * 2.4
4351306 .703459 .703459 0. 6 * 2.4
4351307 .703395 .703395 0. 7 * 2.4
4351308 .703326 .703326 0. 8 * 2.4
4351309 .703281 .703281 0. 9 * 2.4
4351310 .703239 .703239 0. 10 * 2.4
4351311 .703176 .703176 0. 11 * 2.4
4351312 .703139 .703139 0. 12 * 2.4
4351313 .703102 .703102 0. 13 * 2.4
* diamj beta c m jun
4351401 0.076 0.0 1.0 1.0 13
4351401 0.076 0.0 1.0 1.0 13
* Loop 4 primary coolant pump
***** VOLUME 440 *****
* Loop 4 primary coolant pump
*****
4400000 mcp4 pump
*****
* area length volume
4400101 0.0 0.746 0.010
* azim angle incl angle delta z pvbfe
4400102 0.0 30.0 0.370 00000
* from jun area Kf Kr efvechs
4400108 435010000 0.004536 0.0 0.0 0001000
* to jun area Kf Kr efvechs
4400109 442000000 0.004536 0.0 0.0 0001000
* hyd dia beta y-int slope
4400110 0.076 0.00 1.00 1.00
4400111 0.076 0.00 1.00 1.00
* ebt
4400200 0 16907078. 1244497. 2411910. 0.
* vel/flow liquid vapor int-face
4400201 0 .703064 .703064 0. * 2.4
4400202 0 .701086 .701086 0. * 2.4
* tabdat-i 2ph-i 2phdiff-i torque-i pvel-i trip rev-i
4400301 -2 -1 -3 -1 0 1440 1
* rated vel in/rated vel rated flow rated head
4400302 314.2 .1287575 0.022 100.
* rated torq mom-inner rated dens rated m-torq
4400303 57.2 5.0-2 750.0 0.00
* coeff-tf2 coeff-tf0 coeff-tf1 coeff-tf3
4400304 0.57 0.57 0.0 0.0
* hydro trip no. parameter no.
4406100 440 cctrlvar 440
* hydro indp var speed (rad/s)
4406101 -1.0 314.2
4406102 0.0 0.
4406103 500.0 500.
* ***** VOLUME 442 *****
* Piping from pump discharge to isolation valve
*****
* hydro component name component type
4420000 pmp4out singlvol
* *****
* hydro area length volume
4420101 0.004536 0.880 0.0
* hydro horz angle vert angle delta z
4420102 -10.0 0.0 0.0
* hydro roughness hyd diam fe
4420103 0.00005 0.076 00
* hydro ebt pressure tempe
4420200 0 16910580. 1244262. 2411820. 0.
* ***** JUNCTION 443 *****
* Cold leg isolation valve
*****
4430000 cl4v1v valve
* hydro from to area kf kr vcahs
4430101 442010000 445000000 0.004536 0.0 0.0 00100
4430201 0 .701004 .701004 0. * 2.4
4430300 mtrv1v
* open close rate ic
4430301 442 443 0.1 1.
* ***** VOLUME 445 *****
* Loop 4 reactor vessel inlet section of cold leg
*****
4450000 cl4leg4 pipe
* hydro no. volumes
4450001 4
* hydro vol area vol
4450101 0.004536 4
* hydro jun area jun

```

91

92

93

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4720103 5.0e-5 0.343 01000
*
4720200 0 7174655. 1252518. 2580086. .60982
*
4721101 470010000 472000000 0.10417 0.10 0.16 101000 fvcabs
4722101 472010000 475000000 0.1521 0.0 0.0 001000
*
4721201 -.00802961 .5679 0. * -.00328567
4722201 -.624268 -.0502047 0. * .1731445
*
4721110 hyd dia beta y-int slope
0.0376 1.00 1.00 1.00
4722110 0.0 0.00 1.00 1.00
*
*****
* Loop 4 sg upper portion of steam dome
*****
4750000 uprdm4 pipe
=====
*
*
*hydro no. volumes
4750001 2
*
*hydro vol area vol
4750101 0.1521 2
*
*hydro jun area jun
4750201 0.0 1
*
*hydro length vol
4750301 0.470 2
*
*hydro volume vol
4750401 0.0 2
*
*hydro vert angle vol
4750601 90.0 2
*
*hydro delta z vol
4750701 0.470 2
*
*hydro roughness hyd diam vol
4750801 1.0e-5 0.440 2
*
*hydro Kfwd Krev jun
4750901 0.0 0.0 1
*
*hydro fe vol
4751001 00 2
*
*hydro fvcabs jun
4751101 001000 1
*
*hydro ebt vol
4751201 0 7173604. 1266599. 2580109. .999975 0. 1
4751202 0 7173431. 1266590. 2580119. .999947 0. 2
*
4751301 -.1486163 .0303694 0. jun 1 * .1725543
*
4751401 0.0161 0.0 1.0 1.0 1
*
*****
* Steam line 4
*****
4800000 stmlin4 branch
=====
*
*no. juns vel/flow
4800001 1 0 length volume
*

```

```

4800101 0.0003142 4.74 incl angle 0.0 delta z
*
4800102 0.0 0.0 hyd dia pbbfe
*
4800103 5.0e-5 0.020 00000
*
4800200 0 7161856. 1266024. 2580355. .99995 fvcabs
*
4801101 475020004 480000000 0.0003142 0.0 0.0 001101
*
4801201 14.51316 14.56896 0. * .172048
*
4801110 0.020 0.00 y-int slope
1.00 1.00
*
***** JUNCTION 481 *****
* Steam Line 4 Relief Valve
*****
4810000 relief4 valve
=====
*
*hydro from to area kf kr vccabs
4810101 480010003 482000000 0.0003142 0.0 0.0 00102
*
4810110 hyd dia beta y-int slope
0.020 0.00 1.00 1.00
*
4810201 ic velf velg veli
0 0. 0. * 0.
*
4810300 trpvlv
4810301 1481
*
***** VOLUME 482 *****
* Atmospheric boundary condition for steam relief
*****
4820000 atmos4 tmpdvol
=====
*
*area length volume
4820101 1.0 1.0 0.0
*
4820102 0.00 incl angle delta z
0.0 0.0 0.0
*
4820103 0.00000 roughness hyd dia pbbfe
0.00000 0.0000 00010
*
4820200 ebt trip search var
003 0
*
4820201 0.00 indep var 300.0
*
***** JUNCTION 485 *****
* Steam Line 4 Isolation Valve
*****
4850000 isolv4 valve
=====
*
*hydro from to area kf kr vccabs
4850101 480010000 700040003 0.0003142 0.0 0.0 01101
*
4850110 hyd dia beta y-int slope
0.020 0.00 1.00 1.00
*
4850201 ic velf velg veli
0 14.54942 14.59837 0. * .1720456
*
4850300 mtrvlv
*
*open close rate ic
4850301 485 484 0.055556 1. * 18 s closing time
*

```

5050601	-90.0	1
5050602	0.0	2
5050603	-90.0	6
5050604	0.0	7
*		
*hydro	delta z	vol
5050701	-0.876	1
5050702	0.0	2
5050703	-0.940	6
5050704	0.0	7
*		
*hydro	roughness	hyd diam
5050801	5.0e-5	7
*		
*hydro	Kfwd	jun
5050901	0.41	2
5050902	0.0	5
5050903	0.41	6
*		
*hydro	fe	vol
5051001	00	7
*		
*hydro	efvcahs	jun
5051101	0001000	6
*		
*hydro	eht	vol
5051201	0	1
5051202	0	0.
5051203	0	2
5051204	0	3
5051205	0	4
5051206	0	5
5051207	0	6
*		
5051301	-8.75664-10	-8.93957-10 0.
5051302	-1.536887-9	-1.55746-9 0.
5051303	-2.4766-9	-2.47672-9 0.
5051304	-3.41624-9	-3.416365-9 0.
5051305	-4.35588-9	-4.356-9 0.
5051306	-5.29867-9	-5.314-9 0.
*	diamj	c m
5051401	0.043	0.0 1.0
*		
sl4vl	branch	
no. juns	vel/flow	
area	length	volume
azim angle	incl angle	delta z
45.0	-60.5	-1.171
roughness	hyd dia	t1pvbf
5.0e-5	0.043	0000000
eht		
from to	area kf	efvcahs
0	16896040. 1197302. 2412194. 0.	
401040005 511000000 0.003318 3.04 2.88 0000002		
veif	velg	veif
4.95623-7	4.95625-7	0. * 1.139956-6
hyd dia beta	y-int	slope
0.065	1.00	1.00
*		
*****JUNCTION 513 *****		
* Surge Line 4 Isolation Valve		
5130000	sl4vl	valve
*****\$		

```

*hydro from to area kf kr efvcchs
5130101 511010000 515000000 0.001452 0.0 0.0 0.000100
*
* hyd dia beta y-int slope
5130110 0.043 0.00 1.00 1.00
*
* ic velf velg veli
5130201 0 1.076185-6 1.076198-6 0. * 1.204916-6
*
5130300 mtrv1v
*
* open close rate init
5130301 512 513 0.1 1.
*
=====
5150000 sl4v2 pipe
*-----*
*hydro no. volumes
5150001 6
*hydro vol area vol
5150101 0.001452 6
*hydro length vol
5150301 1.338 2
5150302 1.321 4
5150303 1.790 5
5150304 1.091 6
*hydro volume vol
5150401 0.0 6
*hydro horz angle vol
5150501 0.0 2
5150502 -90.0 4
5150503 0.0 6
*hydro vert angle vol
5150601 -90.0 2
5150602 0.0 4
5150603 -90.0 5
5150604 0.0 6
*hydro delta z vol
5150701 -1.338 2
5150702 0.0 4
5150703 -1.790 5
5150704 0.0 6
*hydro roughness hyd diam vol
5150801 5.0e-5 0.043 6
*hydro Kfwd Krev jun
5150901 0.0 0.0 1
5150902 0.41 0.41 2
5150903 0.0 0.0 3
5150904 0.41 0.41 5
*hydro fe vol
5151001 00 6
*hydro efvcchs jun
5151101 0001000 5
*hydro ebt
5151201 0 16905716. 1108657. 2411945. 0. 0. 1
5151202 0 16916284. 1074555. 2411666. 0. 0. 2

```

```

5151203 0 16921602. 1059103. 2411509. 0. 0. 3
5151204 0 16921602. 1052542. 2411509. 0. 0. 4
5151205 0 16928764. 1057461. 2411296. 0. 0. 5
5151206 0 16935924. 1090671. 2411084. 0. 0. 6
*
5151301 1.058144-6 1.058156-6 0. 1 * 1.229286-6
5151302 1.051243-6 1.051226-6 0. 2 * 1.237432-6
5151303 1.047552-6 1.047552-6 0. 3 * 1.24021-6
5151304 1.045226-6 1.045207-6 0. 4 * 1.240434-6
5151305 1.043977-6 1.043957-6 0. 5 * 1.236732-6
*
5151401 0.043 0.0 1.0 1.0 1.0 5
*
=====
5200000 slcomlo branch
*-----*
* no. juns vel/flow
5200001 2
* area length volume
5200101 0.001452 1.227 0.0
* azimuth angle incl angle delta z
5200102 -90.0 45.0 0.867
* roughness hyd dia tlpvbf
5200103 5.0e-5 0.043 0.000000
* ebt
5200200 0 16932584. 1153015. 2411183. 0. Kr efvcchs
* from to area Kf
5201101 505010000 520000000 0.001452 0.72 1.10 0001000
5202101 515010000 520000000 0.001452 0.72 1.10 0001000
* velf velg veli
5201201 -6.4582-9 -6.44537-9 0. * -7.36953-9
5202201 1.047477-6 1.047489-6 0. * 1.225452-6
* hyd dia beta y-int slope
5201110 0.043 0.00 1.00 1.00
5202110 0.043 0.00 1.00 1.00
*
=====
5250000 slcomhi branch
*-----*
* no. juns vel/flow
5250001 2
* area length volume
5250101 0.0006158 0.843 0.0
* azimuth angle incl angle delta z
5250102 0.0 90.0 0.843
* roughness hyd dia tlpvbf
5250103 5.0e-5 0.028 0.000000
* ebt
5250200 0 16925606. 824717. 2411390. 0. Kr efvcchs
* from to area Kf
5251101 520010000 525000000 0.0006158 0.133 0.170 0001000
5252101 525010000 530000000 0.0006158 0.94 0.49 0000000
* velf velg veli
5251201 2.472455-6 2.472516-6 0. * 1.196547-6
5252201 -2.82218-5 -2.823047-5 0. * -1.296026-5
* hyd dia beta y-int slope
5251110 0.028 0.00 1.00 1.00
5252110 0.028 0.00 1.00 1.00
*
$*=====
$5300000 pzrhtri branch
$*-----*
$ no. juns vel/flow
$5300001 1
$ area length volume
$5300101 0.0 0.719 0.0002161
*$ azimuth angle incl angle delta z
$5300102 0.0 90.0 0.719

```



```

*=====
5720000 pzrrvln branch
*-----
* no. juns vel/flow
5720001 1 0
* area length volume
5720101 0.0002270 1.0 incl angle 0.0 delta z
* azim angle 0.0 0.0
5720102 0.0 hyd dia tlpvbf 0.0
* roughness 5.0e-5 0.017 0000000
5720103 ebt
* 0 16855926. 1655951. 2418339. 1.
5720200 from to area kf Kr efvcchs
* 5721101 535010004 572010001 0.0002270 0.5 1.0 0001002
* velf velg veli
5721201 -2.70704-10 -5.55891-15 0. * -1.46557-16
* hyd dia beta y-int slope
5721110 0.017 0.00 1.00 1.00
*
* pressurizer relief valve
*=====
5750000 pzrrsrv valve
*-----
*
*hydro from to area kf Kr efvcchs
5750101 572010000 578000000 0.0002270 0.0 0.0 0000100
*
* hyd dia beta y-int slope
5750110 0.017 0.00 1.00 1.00
*
* ic velf velg veli
5750201 0 0. 0. 0. * 0.
*
5750300 mtrvlv
*
* open close rate init
5750301 1573 1575 2.0 0.
*
*=====
5780000 pzrrvatm tmdpv01
*-----
* area length volume
5780101 0.0002270 1.0 0.0
* azim angle incl angle delta z
5780102 0.00 0.0 0.0
* roughness hyd dia tlpvbf 0.0
5780103 0.00000 trip search var
* ebt 0
5780200 004
* indep var 0.00 1.0e5 300.0 1.0
5780201 0.00 1.0e5 300.0 1.0
*
* open close rate init
5750301 1573 1575 2.0 0.
*
*=====
5780000 pzrrvatm tmdpv01
*-----
* area length volume
5780101 0.0002270 1.0 0.0
* azim angle incl angle delta z
5780102 0.00 0.0 0.0
* roughness hyd dia tlpvbf 0.0
5780103 0.00000 trip search var
* ebt 0
5780200 004
* indep var 0.00 1.0e5 300.0 1.0
5780201 0.00 1.0e5 300.0 1.0
*
*=====
5820000 pzrrporvl branch
*-----
* no. juns vel/flow
5820001 1 0
* area length volume
5820101 0.0003801 1.0 0.0
* azim angle incl angle delta z
5820102 0.0 0.0 0.0
* roughness hyd dia tlpvbf 0.0
5820103 5.0e-5 0.022 0000000
* ebt
* 0 16855926. 1655951. 2418339. 1.
5820200 from to area kf Kr efvcchs

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```

5821101 535010004 582010001 0.0003801 0.5 1.0 0001002
* velf velg veli
5821201 -5.61836-10 -5.55804-15 0. * -2.45364-16
* hyd dia beta y-int slope
5821110 0.022 0.00 1.00 1.00
*
* pressurizer PORV
*=====
5850000 pzrrporv valve
*-----
*
*hydro from to area kf Kr efvcchs
5850101 582010000 588000000 0.0003801 0.0 0.0 0000100
*
* hyd dia beta y-int slope
5850110 0.022 0.00 1.00 1.00
*
* ic velf velg veli
5850201 0 0. 0. 0. * 0.
*
5850300 mtrvlv
*
* open close rate init
5850301 1583 1585 2.0 0.
*
*=====
5880000 pzrrporva tmdpv01
*-----
* area length volume
5880101 0.0003801 1.0 0.0
* azim angle incl angle delta z
5880102 0.00 0.0 0.0
* roughness hyd dia tlpvbf 0.000010
5880103 0.00000 trip search var
* ebt 0
5880200 004
* indep var 0.00 1.0e5 300.0 1.0
5880201 0.00 1.0e5 300.0 1.0
*
*=====
* EMERGENCY CORE
* COOLING SYSTEMS
* $
*=====
* accumulator 4
*=====
6000000 accum4 accum
*-----
*
*hydro area length volume
6000101 0.02986 0.0 0.2009
*
*hydro horz angle vert angle delta z
6000102 0. 90. 6.728
*
*hydro roughness hyd diam tlpvbf 00
6000103 4.57e-5 0.
*
*hydro pressure temp
6000200 5.90e+6 303.0
*
*hydro to area kf Kr vcchs
6001101 601000000 4.909-4 0.49 0.97 01000
*
* vol lvl length drop thck flg dens hcap trip
6002200 0.16691 0.0 0.0 0.0 0.025 0 0. 0
*
*=====
* VOLUME 601
*=====

```

```

6010000      acc4sl      pipe
*-----*
*
*hydro no. volumes
6010001 2
*
*hydro vol area vol
6010101 4.909-4 1
6010102 6.157-4 2
*
*hydro jun area jun
6010201 4.909-4 1
*
*hydro length vol
6010301 1.200 1
6010302 6.010 2
*
*hydro volume vol
6010401 0.0 2
*
*hydro vert angle vol
6010601 -21.0 1
6010602 -30.2 2
*
*hydro delta z vol
6010701 -0.460 1
6010702 -3.500 2
*
*hydro roughness hyd diam vol
6010801 4.57e-5 0.025 1
6010802 4.57e-5 0.032 2
*
*hydro Kfwd Krev jun
6010901 1.777 1.837 1
*
*hydro fe vol
6011001 0 2
*
*hydro fvcchs jun
6011101 001000 1
*
*hydro ebt
6011201 0 16874942. 112036.6 2412737. 0. 0. 1
6011202 0 16894430. 118031.7 2412235. 0. 0. 2
*
6011301 -5.38914-10 -5.51175-10 0. 1 * -2.65487-10
*
* diamj beta c m jun
6011401 0.025 0.0 1.0 1.0 1
*
*****JUNCTION 603 *****
* accumulator isolation valve
*=====
6030000 acc4out valve
*-----*
*
*hydro from to area kf kr vcchs
6030101 601020002 015040003 6.157-4 0.0 0.0 01101
*
6030201 0 -3.82458-9 -3.851724-9 0. * -1.778327-9
*
6030300 trpvlv
6030301 600
*
*****VOLUME 605 *****
* accumulator 2
*=====
6050000 accum2

```

```

*-----*
*
*hydro area length volume
6050101 0.02986 0.0 0.2009
*
*hydro horz angle vert angle delta z
6050102 0. 90. 6.728
*
*hydro roughness hyd diam tlpvbf
6050103 4.57e-5 0. 00
*
*hydro pressure temp
6050200 6.03e+6 308.0
*
*hydro to area kf kr vcchs
6051101 606000000 4.909-4 0.49 0.97 01000
*
* vol lv1 length drop thck flg dens hcap trip
6052200 0.16691 0.0 0.0 0.025 0 0. 0
*
*****VOLUME 606 *****
6060000 acc2sl pipe
*-----*
*
*hydro no. volumes
6060001 2
*
*hydro vol area vol
6060101 4.909-4 1
6060102 6.157-4 2
*
*hydro jun area jun
6060201 4.909-4 1
*
*hydro length vol
6060301 1.200 1
6060302 5.864 2
*
*hydro volume vol
6060401 0.0 2
*
*hydro vert angle vol
6060601 -21.0 1
6060602 -30.8 2
*
*hydro delta z vol
6060701 -0.460 1
6060702 -3.500 2
*
*hydro roughness hyd diam vol
6060801 4.57e-5 0.025 1
6060802 4.57e-5 0.032 2
*
*hydro Kfwd Krev jun
6060901 1.785 1.856 1
*
*hydro fe vol
6061001 0 2
*
*hydro fvcchs jun
6061101 001000 1
*
*hydro ebt
6061201 0 16875490. 113683.2 2412723. 0. 0. 1
6061202 0 16894702. 270678. 2412228. 0. 0. 2
*
6061301 -5.41105-10 -5.57952-10 0. 1 * -2.62329-10
*

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```

* 6061401 diamj beta c m jun
* 0.025 0.0 1.0 1.0 1
*
***** JUNCTION 608 *****
* accumulator isolation valve *****
* acc2out valve *****$
*-----
*
*hydro from to area kf kr vcabs
6080101 606020002 015040003 6.157-4 0.0 0.0 01101
*
6080201 0 -3.42962-9 -3.45694-9 0. * -1.59468-9
*
6080300 trpvlv
6080301 605
*
*****
* HPIS fluid state *****
*
6400000 hpistdv tndpvol *****
*-----
*
* area length volume
6400101 1.e5 1.0 incl angle delta z
* 0.00 0.0 0.0 0.0
*
* roughness hyd dia pvbfe
6400103 0.00000 0.0000 hyd dia pvbfe
* 00010
*
* ebt trip search var
6400200 003
*
* indep var
6400201 0. 10.0e6 297.1
* 300. 10.0e6 297.1
* 350. 10.0e6 297.15
* 500. 10.0e6 297.15
* 550. 10.0e6 297.1
* 650. 10.0e6 297.2
* 770. 10.0e6 297.2
* 950. 10.0e6 299.05
* 1040. 10.0e6 299.6
*
*****
* HPIS flow boundary condition *****
*-----
*
6410000 hpistdj tndpjun *****
*
* From To Area
6410101 640010000 401030003 0.0001131
*
* vel/Kg trip var req. # var req
6410200 1 641
*
* Time kg/s kg/s m/s
6410201 -1. 0.0 0. 0.
* 6410202 0.0 0.0 0. 0.
* 6410203 2.26 0.0 0. 0.
* 6410204 2.35 0.0800 0. 0.
* 6410205 21.79 0.0933 0. 0.
* 6410206 53.42 0.0967 0. 0.
* 6410207 55.28 0.2000 0. 0.
* 6410208 59.00 0.2000 0. 0.
* 6410209 62.72 0.3467 0. 0.
* 6410210 64.58 0.3467 0. 0.
* 6410211 65.51 0.3900 0. 0.
* 6410212 85.98 0.4000 0. 0.
* 6410213 95.28 0.4133 0. 0.
* 6410214 179.0 0.4180 0. 0.
* 6410215 425.51 0.4200 0. 0.
* 6410216 427.37 0.5633 0. 0.
* 6410217 1050.0 0.5633 0. 0.
*
*****

```

```

6611202 0 16884788. 119472.3 2412484. 0. 0. 2
*
6611301 -5.65851-10 -5.75362-10 0. jun 1 * -2.78726-10
*
* diamj beta c m jun
6611401 0.025 0.0 1.0 1.0 1
*
*hydro roughness hyd diam vol
6660801 4.57e-5 0.025 1
* accumulator isolation valve *****
=====
6630000 acc3out valve *****
=====
*
*hydro from to area kf kr vcabs
6630101 661020002 062060003 6.157-4 0.0 0.0 01101
*
6630201 0 -2.73436-9 -2.75927-9 0. * -1.16309-9
*
6630300 trpvlv
6630301 660
*
* accumulator 1 ***** VOLUME 665 *****
=====
6650000 accum1 accum *****
=====
*
*hydro area length volume
6650101 0.02986 0.0 0.2009
*
*hydro horz angle vert angle delta z
6650102 0. 90. 6.728
*
*hydro roughness hyd diam tlpvbf
6650103 4.57e-5 0. 00
*
*hydro pressure temp
6650200 5.88e+6 306.0
*
*hydro to area kf kr vcabs
6651101 666000000 4.909-4 0.49 0.97 01000
*
* vol lvl length drop thck flg dens hcap trip
6652200 0.16661 0.0 0.0 0.025 0 0. 0
*
***** acc1sl ***** VOLUME 666 *****
6660000 acc1sl pipe *****
*
*hydro no. volumes
6660001 2
*
*hydro vol area vol
6660101 4.909-4 1
6660102 6.157-4 2
*
*hydro jun area jun
6660201 4.909-4 1
*
*hydro length vol
6660301 1.260 1
6660302 3.610 2
*
*hydro volume vol
6660401 0.0 2
*
*hydro vert angle vol
6660601 -20.1 1

```

```

6660602 -25.2 2
*
*hydro delta z vol
6660701 -0.460 1
6660702 -1.700 2
*
*hydro roughness hyd diam vol
6660801 4.57e-5 0.025 1
6660802 4.57e-5 0.032 2
*
*hydro kfwd krev jun
6660901 1.785 1.846 1
*
*hydro fe vol
6661001 00 2
*
*hydro fvcabs jun
6661101 001000 1
*
*hydro ebt
6661201 0 16874160. 112034.1 2412757. 0. 0. 1
6661202 0 16884788. 119472.3 2412484. 0. 0. 2
*
6661301 -5.65851-10 -5.75362-10 0. jun 1 * -2.78726-10
*
* diamj beta c m jun
6661401 0.025 0.0 1.0 1.0 1
*
***** JUNCTION 668 *****
* accumulator isolation valve *****
6680000 acclout valve *****
=====
*
*hydro from to area kf kr vcabs
6680101 666020002 062060003 6.157-4 0.0 0.0 01101
*
6680201 0 -2.73436-9 -2.75927-9 0. * -1.16309-9
*
6680300 trpvlv
6680301 665
*
***** VOLUME 700 *****
* Common steam header *****
=====
7000000 stnhdrr pipe *****
*
7000001 10
*
* flow areas
7000101 0.001452 10
*
* Jct Flow Areas
7000201 0.001452 9
*
* lengths
7000301 1.13 1
7000302 1.011 3
7000303 1.08 4
7000304 2.406 6
7000305 3.85 7
7000306 4.356 8
7000307 6.6 9
7000308 7.324 10
*
* volumes
7000401 0.0 10
*

```

102

```

8020000  atmosh  tndpvol
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*      area      length      volume
8020101  1.e5      1.0      0.0
*      azim angle      delta z
8020102  0.00      0.0      0.0
*      roughness      hyd dia      pvbfe
8020103  0.00000      0.0000      00010
*      ebt      trip      search var
8020200  003      0
*      indep var
8020201  0.00      1.013+5      375.0
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*      Heat Structures
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*      downcomer external wall
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10151000  1      11      2      1      0.05991      0
*
*      loc      flag
10151100  0      2
*
*      dx      int
10151101  0.00139      2
10151102  0.00278      4
10151103  0.00417      6
10151104  0.00555      8
10151105  0.04116      10
*
*      compos.      int
10151201  1      8
10151202  3      10
*
*      source      int
10151301  0.0      10
*
*      temperature flag
10151400  0
*
*      temperature pt
10151401  563.15      11
*
*      vol      inc
10151501  015010000      0
*
*      vol      inc
10151601  -900      0
*
*      source type      mult      D-rt      hs
10151701  0      0.0      0.0      0.0      1
*
*      compos.      int
10151800  1
*
*      Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff      hs
10151801  0.0      10.      10.      10.      0.0      0.0      1.0      8.08      1.1      1.0      1
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*      downcomer external wall
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10152000  1      11      2      1      0.07901      0
*
*      loc      flag
10152100  0      2
*
*      dx      int

```

```

10152101  0.00197      2
10152102  0.00394      4
10152103  0.00591      6
10152104  0.00788      8
10152105  0.02580      10
*
*      compos.      int
10152201  1      8
10152202  3      10
*
*      source      int
10152301  0.0      10
*
*      temperature flag
10152400  0
*
*      temperature pt
10152401  563.15      11
*
*      vol      inc
10152501  015020000      0
*
*      vol      inc
10152601  -900      0
*
*      source type      mult      D-rt      hs
10152701  0      0.0      0.0      0.0      1
*
*      compos.      int
10152800  1
*
*      Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff      hs
10152801  0.0      10.      10.      10.      0.0      0.0      1.0      8.08      1.1      1.0      1
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*      downcomer external wall
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10153000  2      11      2      1      0.09027      0
*
*      loc      flag
10153100  0      2
*
*      dx      int
10153101  0.00251      2
10153102  0.00501      4
10153103  0.00752      6
10153104  0.01003      8
10153105  0.01480      10
*
*      compos.      int
10153201  1      8
10153202  3      10
*
*      source      int
10153301  0.0      10
*
*      temperature flag
10153400  0
*
*      temperature pt
10153401  563.15      11
*
*      vol      inc
10153501  015030000      10000
*
*      vol      inc
10153601  -900      0
*
*      source type      mult
10153701  0      0.0

```

```

* 10153800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10153801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 2
*****
* downcomer external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 10154000 1 11 2 1 0.06938 0
*
* loc flag
* 10154100 0
*
* dx int
* 10154101 0.00152 2
* 10154102 0.00304 4
* 10154103 0.00457 6
* 10154104 0.00609 8
* 10154105 0.03509 10
*
* compos. int
* 10154201 1 8
* 10154202 3 10
*
* source int
* 10154301 0.0 10
*
* temperature flag
* 10154400 0
*
* temperature pt
* 10154401 563.15 11
*
* vol inc
* 10154501 015050000 0
*
* vol inc
* 10154601 -900 0
*
* source type mult
* 10154701 0.0 0.0
*
* 10154800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10154801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 1
*****
* downcomer external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 10155000 9 11 2 1 0.05950 0
*
* loc flag
* 10155100 0
*
* dx int
* 10155101 0.00100 2
* 10155102 0.00200 4
* 10155103 0.00300 6
* 10155104 0.00400 8
* 10155105 0.04525 10
*
* compos. int
* 10155201 1 8
* 10155202 3 10
*
* source int
* 10155301 0.0 10
*
* 10153800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10153801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 2
*****
* downcomer external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 10154000 1 11 2 1 0.06938 0
*
* loc flag
* 10154100 0
*
* dx int
* 10154101 0.00152 2
* 10154102 0.00304 4
* 10154103 0.00457 6
* 10154104 0.00609 8
* 10154105 0.03509 10
*
* compos. int
* 10154201 1 8
* 10154202 3 10
*
* source int
* 10154301 0.0 10
*
* temperature flag
* 10154400 0
*
* temperature pt
* 10154401 563.15 11
*
* vol inc
* 10154501 015050000 0
*
* vol inc
* 10154601 -900 0
*
* source type mult
* 10154701 0.0 0.0
*
* 10154800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10154801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 1
*****
* downcomer external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 10155000 9 11 2 1 0.05950 0
*
* loc flag
* 10155100 0
*
* dx int
* 10155101 0.00100 2
* 10155102 0.00200 4
* 10155103 0.00300 6
* 10155104 0.00400 8
* 10155105 0.04525 10
*
* compos. int
* 10155201 1 8
* 10155202 3 10
*
* source int
* 10155301 0.0 10
*
* 10155400 0
* temperature flag
* 10155401 563.15 11
*
* vol inc
* 10155501 015060000 0
*
* vol inc
* 10155502 015070000 0
*
* vol inc
* 10155503 015080000 0
*
* vol inc
* 10155504 015090000 10000
*
* source type mult
* 10155701 0 0.0 0.0 0.0 0.0 9
*
* 10155800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10155801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 9
*****
* downcomer external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 10156000 1 11 2 1 0.06202 0
*
* loc flag
* 10156100 0 2
*
* dx int
* 10156101 0.00132 2
* 10156102 0.00264 4
* 10156103 0.00396 6
* 10156104 0.00527 8
* 10156105 0.04080 10
*
* compos. int
* 10156201 1 8
* 10156202 3 10
*
* source int
* 10156301 0.0 10
*
* temperature flag
* 10156400 0
*
* temperature pt
* 10156401 563.15 11
*
* vol inc
* 10156501 015050000 0
*
* vol inc
* 10156601 -900 0
*
* source type mult
* 10156701 0 0.0 0.0 0.0 0.0 1
*
* 10156800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
* 10156801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 1
*****
* downcomer external wall
* =====

```



```

*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10181000 1 11 2 1 0.08650 0
*
* loc flag
10181100 0 2
*
* dx int
10181101 0.00107 2
10181102 0.00214 4
10181103 0.00321 6
10181104 0.00428 8
10181105 0.00534 10
*
* compos. int
10181201 1 8
10181202 3 10
*
* source int
10181301 0.0 10
*
* temperature flag
10181400 0
*
* temperature pt
10181401 563.15 11
*
* vol inc type code factor hs
10181501 018010000 0 1 0.826 1
*
* vol inc type code factor hs
10181601 -900 0 4910 1 0.826 1
*
* source type mult D-rt hs
10181701 0 0.0 0.0 0.0 1
*
10181800 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
10181801 0.0 10. 10. 10. 0.0 0.0 1.0 1.57 1.1 1.0 1
*****
* downcomer external wall
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10201000 1 11 2 1 0.07918 0
*
* loc flag
10201100 0 2
*
* dx int
10201101 0.00189 2
10201102 0.00379 4
10201103 0.00568 6
10201104 0.00758 8
10201105 0.02648 10
*
* compos. int
10201201 1 8
10201202 3 10
*
* source int
10201301 0.0 10
*
* temperature flag
10201400 0
*
* temperature pt
10201401 563.15 11
*
* vol inc type code factor hs
10201501 018010000 0 1 0.826 1
*
* vol inc type code factor hs
10201601 -900 0 4910 1 0.826 1
*
* source type mult D-rt hs
10201701 0 0.0 0.0 0.0 1
*
10201800 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
10201801 0.0 10. 10. 10. 0.0 0.0 1.0 1.57 1.1 1.0 1
*****
* downcomer shield
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10201000 1 11 2 1 0.07060 0
*
* loc flag
10201100 0 2
*
* dx int
10201101 0.00107 2
10201102 0.00214 4
10201103 0.00429 6
10201104 0.00214 8
10201105 0.00107 10

```

```

* * compos. int
10101201 1 10
* * source int
10101301 0.0 10
* * temperature flag
10101400 0
* * temperature pt
10101401 563.15 11
* *
10101501 vol inc code type factor hs
10101501 015020000 0 1 1 0.0602 1
10101502 015030000 0 1 1 0.1416 2
10101503 015040000 0 1 1 0.1239 3
* *
* * vol inc code type factor hs
10101601 015020000 0 1 1 0.0602 1
10101602 010010000 0 1 1 0.1416 2
10101603 012010000 0 1 1 0.1239 3
* *
* * source type mult D-rt D-rt hs
10101701 0 0.0 0.0 0.0 0.0 3
* *
10101800 1
* * Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10101801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.460 1.1 1.0 3
* *
10101900 1
* * Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10101901 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.460 1.1 1.0 3
***** STRUCTURE 0202 *****
* perforated cylinder
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10202000 3 11 2 1 0.04401 0
* *
* * loc flag
10202100 0 2
* *
* * dx dx int
10202101 0.00081 2
10202102 0.00162 4
10202103 0.00325 6
10202104 0.00162 8
10202105 0.00081 10
* *
* * compos. int
10202201 1 10
* *
* * source int
10202301 0.0 10
* *
* * temperature flag
10202400 0
* *
* * temperature pt
10202401 563.15 11
* *
* * vol inc code type factor hs
10202501 015160000 0 1 1 0.5027 1
10202502 015170000 0 1 1 0.9026 2
10202503 024010000 0 1 1 0.1158 3
* *
* * vol inc code type factor hs
10202601 020010000 0 1 1 0.5027 1

```

```

10261104 0.00070 8
10261105 0.00875 10
*
* compos. int
10261201 1 8
10261202 3 10
*
* source int
10261301 0.0 10
*
* temperature flag
10261400 0
*
* temperature pt
10261401 563.15 11
*
* vol inc code factor hs
10261501 026010000 0 1 1 0.9025 1
10261502 026020000 0 1 1 1.534 2
10261503 028010000 0 1 1 0.8297 3
*
* vol inc code factor hs
10261601 -900 0 4910 1 0.9025 1
10261602 -900 0 4910 1 1.534 2
10261603 -900 0 4910 1 0.8297 3
*
* source type mult D-rt hs
10261701 0 0.0 0.0 0.0 3
*
10261800 1
* Dhe LHFf LGSr LGSr Kfwd Krev Fboil nclf povd ff hs
10261801 0.0 10. 10. 10. 0.0 0.0 1.0 2.12 1.1 1.0 2
10261802 0.0 10. 10. 10. 0.0 0.0 1.0 0.018 1.1 1.0 3
*****
* lower heater rod simulator (unheated part)
*****
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10301000 2 8 2 1 0.0
*
* loc flag
10301100 0 1
*
* # r
10301101 3 0.00200
10301102 2 0.00415
10301103 2 0.00455
*
* compos. #
10301201 2 3 * copper conductor
10301202 -5 5 * mgo insulator
10301203 -1 7 * cladding
*
* source #
10301301 0.0 7
*
* temperature flag
10301400 0
*
* temperature #
10301401 560.00 8
*
* vol inc type code factor #
10301501 0 0 0 0 0.0 2
*
* vol inc type code factor #
10301601 030010000 0 110 1 51.74 1
10301602 030020000 0 110 1 72.41 2

```

```

*
* type mult D-rt # *source
10301701 0 0.0 0.0 2
*
10301900 0
*
* Dhe Lhf Lher Lgsf Lgar Kfwd Krev Fboil no
10301901 0.0 10. 10. 0. 0.0 0.0 1. 2
*
***** STRUCTURE 0302 *****
* vessel lower flange
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10302000 1 7 2 1 0.13
*
* loc flag
10302100 0 1
*
* # r
10302101 6 0.3
*
* compos. #
10302201 1 6 * stainless steel
*
* source #
10302301 0.0 6
*
* temperature flag
10302400 0
*
* temperature #
10302401 560.00 7
*
* vol inc type code factor #
10302501 030010000 0 1 1 0.308 1
*
* vol inc type code factor #
10302601 -900 0 4910 1 0.308 1
*
* type mult D-rt # *source
10302701 0 0.0 0.0 1
*
10302800 0
*
* Dhe Lhf Lher Lgsf Lgar Kfwd Krev Fboil no
10302801 0.0 10. 10. 0. 0.0 0.0 1. 1
*
***** STRUCTURE 0303 *****
* web region
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10303000 1 7 2 1 0.096
*
* loc flag
10303100 0 1
*
* # r
10303101 6 0.16
*
* compos. #
10303201 1 6 * stainless steel
*
* source #
10303301 0.0 6

```

```

* 10303400 0 temperature flag
*
* 10303401 560.00 7 temperature #
*
* 10303501 030020000 0 1 vol inc type code factor #
* 10303601 -900 0 4910 1 code factor #
*
* 10303701 0 0.0 0.0 0.0 1 type mult D-rt # *source
*
* 10303800 0 Dhe Lhef Lher Lgsf Lgsr Kfwd Krev Fboil no
* 10303801 0.0 10. 10. 0. 0. 0.0 0.0 1. 1
*
***** STRUCTURE 0304 *****
* vessel
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10304000 16 7 2 1 0.0882
*
* 10304100 0 loc flag
*
* 10304101 6 x 0.14
*
* 10304201 1 6 * stainless steel
*
* 10304301 0.0 source #
*
* 10304400 0 temperature flag
*
* 10304401 560.00 7 temperature #
*
* 10304501 030020000 0 1 vol inc type code factor #
* 10304502 040010000 10000 1 4910 1 code factor #
* 10304503 040140000 0 1 4910 1 code factor #
* 10304504 040150000 0 1 4910 1 code factor #
*
* 10304601 -900 0 4910 1 code factor #
* 10304602 -900 0 4910 1 code factor #
* 10304603 -900 0 4910 1 code factor #
* 10304604 -900 0 4910 1 code factor #
*
* 10304701 0 0.0 0.0 0.0 16 type mult D-rt # *source
*
* 10304800 0 Dhe Lhef Lher Lgsf Lgsr Kfwd Krev Fboil no
* 10304801 0.0 10. 10. 0. 0. 0.0 0.0 1. 16
*
***** STRUCTURE 0401 *****

```

```

* fuel rod simulator
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10401000 14 8 2 1 0.0
*
* 10401100 0 loc flag
*
* 10401101 3 x 0.00125
* 10401102 2 0.00415
* 10401103 2 0.00455
*
* 10401201 4 3 * nichrome heater
* 10401202 -5 5 * mgo insulator
* 10401203 -1 7 * cladding
*
* 10401301 1.0 source #
* 10401302 0.0 7
*
* 10401400 0 temperature flag
*
* 10401401 560.00 8 temperature #
*
* 10401501 0 vol inc type code factor #
*
* 10401601 040010000 10000 110 1 42.84 13
* 10401602 040140000 0 110 1 36.12 14
*
* 10401701 100 type mult D-rt #
* 10401702 100 0.072238 0.0 0.0 13
* 10401900 0 100 0.060907 0.0 0.0 14
*
* 10401901 0 Dhe Lhef Lher Lgsf Lgsr Kfwd Krev Fboil no
* 10401901 0.0112 0.1275 3.4025 0.1075 0.1075 0.1 0.1 0 1
* 10401902 0.0112 0.3825 3.1475 0.1275 0.1275 0.1 0.1 0 2
* 10401903 0.0112 0.6375 2.8925 0.1275 0.1275 0.1 0.1 0 3
* 10401904 0.0112 0.8925 2.6375 0.1275 0.1275 0.1 0.1 0 4
* 10401905 0.0112 1.1475 2.3825 0.1275 0.1275 0.1 0.1 0 5
* 10401906 0.0112 1.4025 2.1275 0.1275 0.1275 0.1 0.1 0 6
* 10401907 0.0112 1.6575 1.8725 0.1275 0.1275 0.1 0.1 0 7
* 10401908 0.0112 1.9125 1.6175 0.1275 0.1275 0.1 0.1 0 8
* 10401909 0.0112 2.1675 1.3625 0.1275 0.1275 0.1 0.1 0 9
* 10401910 0.0112 2.4225 1.1075 0.1275 0.1275 0.1 0.1 0 10
* 10401911 0.0112 2.6775 0.8525 0.1275 0.1275 0.1 0.1 0 11
* 10401912 0.0112 2.9325 0.5975 0.1275 0.1275 0.1 0.1 0 12
* 10401913 0.0112 3.1875 0.3425 0.1275 0.1275 0.1 0.1 0 13
* 10401914 0.0112 3.4225 0.1075 0.1075 0.1075 0.1 0.1 0 14
*
***** STRUCTURE 0402 *****
* upper heater rod simulator (unheated part)
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccg
10402000 1 8 2 1 0.0
*
* 10402100 0 loc flag
*

```

```

*      #      r      Lher      Lgsf      Kfwd Krev Fboil no
10402101 5      0.00415
10402102 2      0.00455
*
*      compos.      #      5 * copper conductor
10402201 2      7 * cladding
10402202 1
*      source      #
10402301 0.0      7
*      temperature flag
10402400 0
*
*      temperature #
10402401 560.00      8
*
*      vol      inc      type      code      factor      #
10402501 0      0      0      0      0.0      1
*
*      vol      inc      type      code      factor      #
10402601 040150000      0      110      1      46.20      1
*
*      type      mult      D-rt      #      *source
10402701 0      0.0      0.0      0.0      1
*
10402900 0
*
*      Dhe      Lhef      Lher      Lgsf      Kfwd Krev Fboil no
10402901 0.0      10.      0.      0.      0.0      0.0      1.      1
*
***** STRUCTURE 0451 *****
* core tie plate, stainless steel part
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
=====
*cccg
10451000 1      3      1      1      0.0
*
*      loc      flag
10451100 0      1
*
*      #      r      0.015
10451101 2
*
*      compos.      #      2 * stainless steel
10451201 1
*
*      source      #
10451301 0.0      2
*
*      temperature flag
10451400 0
*
*      temperature #
10451401 560.00      3
*
*      vol      inc      type      code      factor      #
10451501 040150000      0      1      1      0.038      1
*
*      vol      inc      type      code      factor      #
10451601 -900      0      4910      1      0.038      1
*
*      type      mult      D-rt      #      *source
10451701 0      0.0      0.0      0.0      1
*
10451800 0
*
*      Dhe      Lhef      Lher      Lgsf      Kfwd Krev Fboil no
10451801 0.0      10.      10.      0.      0.0      0.0      1.      1
*
***** STRUCTURE 0452 *****
* core tie plate, copper part
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
=====
*cccg
10452000 1      3      1      1      0.0
*
*      loc      flag
10452100 0      1
*
*      #      r      0.030
10452101 2
*
*      compos.      #      2 * copper
10452201 2
*
*      source      #
10452301 0.0      2
*
*      temperature flag
10452400 0
*
*      temperature #
10452401 560.00      3
*
*      vol      inc      type      code      factor      #
10452501 062010000      0      1      1      0.038      1
*
*      vol      inc      type      code      factor      #
10452601 -900      0      4910      1      0.038      1
*
*      type      mult      D-rt      #      *source
10452701 0      0.0      0.0      0.0      1
*
10452800 0
*
*      Dhe      Lhef      Lher      Lgsf      Kfwd Krev Fboil no
10452801 0.0      10.      10.      0.      0.0      0.0      1.      1
*
***** STRUCTURE 0501 *****
* bypass pipe for horizontal section
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
=====
10501000 1      7      2      1      0.02516      0
*
*      loc      flag
10501100 0      1
*
*      int      r.coord
10501101 4      0.02837
10501102 2      0.09000
*
*      compos.      int
10501201 1      4
10501202 3      6
*
*      source      int
10501301 0.0      6
*
*      temperature flag
10501400 0
*

```

```

* 10501401 563.15 temperature pt 7
*
* * upper plenum external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10621000 1 11 2 1 0.11000 0
*
* 10621100 0 2
*
* *
* dx int
10621101 0.00476 2
10621102 0.00952 4
10621103 0.01428 6
10621104 0.01903 8
10621105 0.03500 10
*
* * compos. int
10621201 1 8
10621202 3 10
*
* 10621301 source int
*
* 10621400 0
*
* * temperature flag
*
* *
* temperature pt
10621401 563.15 11
*
* 10621501 vol inc type code factor hs
*
* 10621601 -900 0 4910 1 code factor hs
*
* * source type mult D-rt hs
10621701 0 0.0 0.0 1
*
* 10621800 1
* Dhe LHef LHGr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10621801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
*
* ***** STRUCTURE 0621 *****
* * upper plenum external wall
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10622000 1 11 2 1 0.10280 0
*
* *
* loc flag
10622100 0 2
*
* *
* dx int
10622101 0.00532 2
10622102 0.01064 4
10622103 0.01596 6
10622104 0.02129 8
10622105 0.04373 10
*
* * compos. int
10622201 1 8
10622202 3 10
*
* *
* source int
10622301 0.0 10
*
* *
* temperature flag
10622400 0

```

```

* 10501800 1
* Dhe LHef LHGr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10501801 0.0 10. 10. 10. 0.0 0.0 1.0 8.08 1.1 1.0 1
*
* ***** STRUCTURE 0502 *****
* * vessel
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
*cccy
10502000 9 9 2 1 0.02084
*
* *
* loc flag
10502100 0 1
*
* *
* # r
10502101 6 0.032062
10502102 2 0.090000
*
* * compos. # stainless steel
10502201 1 6
10502202 3 8
*
* *
* source #
10502301 1.0 6
10502302 0.0 8
*
* * temperature flag
10502400 0
*
* *
* temperature #
10502401 560.00 9
*
* *
* vol inc type code factor #
10502501 050020000 0 1 1 0.585 1
10502502 050030000 0 1 1 0.51 2
10502503 050040000 10000 1 1 0.51 7
10502504 050090000 0 1 1 0.636 8
10502505 050100000 0 1 1 2.1475 9
*
* *
* vol inc type code factor #
10502601 -900 0 4910 1 0.585 1
10502602 -900 0 4910 1 0.51 2
10502603 -900 0 4910 1 0.51 7
10502604 -900 0 4910 1 0.636 8
10502605 -900 0 4910 1 2.1475 9
*
* *
* type mult D-rt # *source
10502701 0 0.0 0.0 1
10502702 50 0.14286 0.0 8
10502703 0 0.0 0.0 9
*
* 10502800 0
*
* *
* Dhe LHef LHGr LGSf LGSr Kfwd Krev Fboil no
10502801 0.0 10. 10. 0. 0. 0.0 0.0 1. 9

```

```

* * * * * temperature pt
10622401 563.15 11
* *
* * vol inc
* * type code factor hs
10622501 062020000 0 1 1 0.775 1
* *
* * vol inc
* * type code factor hs
10622601 -900 0 4910 1 0.775 1
* *
* * source type mult
* * D-rt hs
10622701 0 0.0 0.0 1
* *
10622800 1
* * Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10622801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
* *
***** STRUCTURE 0623 *****
* * upper plenum external wall
* *
* * ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10623000 1 11 2 1 0.10104 0
* *
* * loc flag
10623100 0 2
* *
* * dx int
10623101 0.00415 2
10623102 0.00829 4
10623103 0.01244 6
10623104 0.01658 8
10623105 0.04373 10
* *
* * compos. int
10623201 1 8
10623202 3 10
* *
* * source int
10623301 0.0 10
* *
* * temperature flag
10623400 0
* *
* * temperature pt
10623401 563.15 11
* *
* * vol inc
* * type code factor hs
10623501 062030000 0 1 1 0.575 1
* *
* * vol inc
* * type code factor hs
10623601 -900 0 4910 1 0.575 1
* *
* * source type mult
* * D-rt hs
10623701 0 0.0 0.0 1
* *
10623800 1
* * Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10623801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
* *
***** STRUCTURE 0624 *****
* * upper plenum external wall
* *
* * ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10624000 1 11 2 1 0.08989 0
* *
* * loc flag
10624100 0 2

```

```

* * * * * dx int
10624101 0.00474 2
10624102 0.00948 4
10624103 0.01423 6
10624104 0.01897 8
10624105 0.04333 10
* *
* * compos. int
10624201 1 8
10624202 3 10
* *
* * source int
10624301 0.0 10
* *
* * temperature flag
10624400 0
* *
* * temperature pt
10624401 563.15 11
* *
* * vol inc
* * type code factor hs
10624501 062040000 0 1 1 0.525 1
* *
* * vol inc
* * type code factor hs
10624601 -900 0 4910 1 0.525 1
* *
* * source type mult
* * D-rt hs
10624701 0 0.0 0.0 1
* *
10624800 1
* * Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10624801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
* *
***** STRUCTURE 0625 *****
* * upper plenum external wall
* *
* * ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10625000 1 11 2 1 0.08922 0
* *
* * loc flag
10625100 0 2
* *
* * dx int
10625101 0.00170 2
10625102 0.00340 4
10625103 0.00509 6
10625104 0.00679 8
10625105 0.04342 10
* *
* * compos. int
10625201 1 8
10625202 3 10
* *
* * source int
10625301 0.0 10
* *
* * temperature flag
10625400 0
* *
* * temperature pt
10625401 563.15 11
* *
* * vol inc
* * type code factor hs
10625501 062050000 0 1 1 0.475 1
* *
* * vol inc
* * type code factor hs
10625601 -900 0 4910 1 0.475 1

```

```

* source type mult D-rt D-rt hs
10625701 0 0.0 0.0 0.0 1
*
10625800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10625801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
*
***** STRUCTURE 0661 *****
* upper plenum external wall
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10661000 1 11 2 1 0.09027 0
*
* loc flag
10661100 0 2
*
* dx int
10661101 0.00241 2
10661102 0.00483 4
10661103 0.00724 6
10661104 0.00965 8
10661105 0.03573 10
*
* compos. int
10661201 1 8
10661202 3 10
*
* source int
10661301 0.0 10
*
* temperature flag
10661400 0
*
* temperature pt
10661401 563.15 11
*
* vol inc
10661501 062050000 0
*
* vol inc
10661601 -900 0
*
* source type mult D-rt D-rt hs
10661701 0 0.0 0.0 0.0 1
*
* compos. int
10661800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10661801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
*
***** STRUCTURE 0641 *****
* upper plenum external wall
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10641000 1 11 2 1 0.09027 0
*
* loc flag
10641100 0 2
*
* dx int
10641101 0.00241 2
10641102 0.00483 4
10641103 0.00724 6
10641104 0.00965 8
10641105 0.03573 10
*
* compos. int
10641201 1 8
10641202 3 10

```

```

* source int
10641301 0.0 10
*
* temperature flag
10641400 0
*
* temperature pt
10641401 563.15 11
*
* vol inc
10641501 064010000 0
*
* vol inc
10641601 -900 0
*
* source type mult D-rt D-rt hs
10641701 0 0.0 0.0 0.0 1
*
* compos. int
10641800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10641801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
*
***** STRUCTURE 0628 *****
* upper plenum external wall
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10628000 1 11 2 1 0.08871 0
*
* loc flag
10628100 0 2
*
* dx int
10628101 0.00180 2
10628102 0.00360 4
10628103 0.00541 6
10628104 0.00721 8
10628105 0.04263 10
*
* compos. int
10628201 1 8
10628202 3 10
*
* source int
10628301 0.0 10
*
* temperature flag
10628400 0
*
* temperature pt
10628401 563.15 11
*
* vol inc
10628501 062080000 0
*
* vol inc
10628601 -900 0
*
* source type mult D-rt D-rt hs
10628701 0 0.0 0.0 0.0 1
*
* compos. int
10628800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10628801 0.0 10. 10. 10. 0.0 0.0 1.0 4.5 1.1 1.0 1
*
***** STRUCTURE 0629 *****
* upper plenum external wall
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.

```



```

10629000 3 11 2 1 0.09050 0
*
* 10629100 0 loc flag
*
* 10629101 0 dx int
*
* 10629102 0.00160 2
*
* 10629103 0.00320 4
*
* 10629104 0.00480 6
*
* 10629105 0.00640 8
*
* 10629106 0.00800 10
*
* 10629107 0.01000 12
*
* 10629108 0.01250 14
*
* 10629109 0.01500 16
*
* 10629110 0.01750 18
*
* 10629111 0.02000 20
*
* 10629112 0.02250 22
*
* 10629113 0.02500 24
*
* 10629114 0.02750 26
*
* 10629115 0.03000 28
*
* 10629116 0.03250 30
*
* 10629117 0.03500 32
*
* 10629118 0.03750 34
*
* 10629119 0.04000 36
*
* 10629120 0.04250 38
*
* 10629121 0.04500 40
*
* 10629122 0.04750 42
*
* 10629123 0.05000 44
*
* 10629124 0.05250 46
*
* 10629125 0.05500 48
*
* 10629126 0.05750 50
*
* 10629127 0.06000 52
*
* 10629128 0.06250 54
*
* 10629129 0.06500 56
*
* 10629130 0.06750 58
*
* 10629131 0.07000 60
*
* 10629132 0.07250 62
*
* 10629133 0.07500 64
*
* 10629134 0.07750 66
*
* 10629135 0.08000 68
*
* 10629136 0.08250 70
*
* 10629137 0.08500 72
*
* 10629138 0.08750 74
*
* 10629139 0.09000 76
*
* 10629140 0.09250 78
*
* 10629141 0.09500 80
*
* 10629142 0.09750 82
*
* 10629143 0.10000 84
*
* 10629144 0.10250 86
*
* 10629145 0.10500 88
*
* 10629146 0.10750 90
*
* 10629147 0.11000 92
*
* 10629148 0.11250 94
*
* 10629149 0.11500 96
*
* 10629150 0.11750 98
*
* 10629151 0.12000 100
*
* 10629152 0.12250 102
*
* 10629153 0.12500 104
*
* 10629154 0.12750 106
*
* 10629155 0.13000 108
*
* 10629156 0.13250 110
*
* 10629157 0.13500 112
*
* 10629158 0.13750 114
*
* 10629159 0.14000 116
*
* 10629160 0.14250 118
*
* 10629161 0.14500 120
*
* 10629162 0.14750 122
*
* 10629163 0.15000 124
*
* 10629164 0.15250 126
*
* 10629165 0.15500 128
*
* 10629166 0.15750 130
*
* 10629167 0.16000 132
*
* 10629168 0.16250 134
*
* 10629169 0.16500 136
*
* 10629170 0.16750 138
*
* 10629171 0.17000 140
*
* 10629172 0.17250 142
*
* 10629173 0.17500 144
*
* 10629174 0.17750 146
*
* 10629175 0.18000 148
*
* 10629176 0.18250 150
*
* 10629177 0.18500 152
*
* 10629178 0.18750 154
*
* 10629179 0.19000 156
*
* 10629180 0.19250 158
*
* 10629181 0.19500 160
*
* 10629182 0.19750 162
*
* 10629183 0.20000 164
*
* 10629184 0.20250 166
*
* 10629185 0.20500 168
*
* 10629186 0.20750 170
*
* 10629187 0.21000 172
*
* 10629188 0.21250 174
*
* 10629189 0.21500 176
*
* 10629190 0.21750 178
*
* 10629191 0.22000 180
*
* 10629192 0.22250 182
*
* 10629193 0.22500 184
*
* 10629194 0.22750 186
*
* 10629195 0.23000 188
*
* 10629196 0.23250 190
*
* 10629197 0.23500 192
*
* 10629198 0.23750 194
*
* 10629199 0.24000 196
*
* 10629200 0.24250 198
*
* 10629201 0.24500 200
*
* 10629202 0.24750 202
*
* 10629203 0.25000 204
*
* 10629204 0.25250 206
*
* 10629205 0.25500 208
*
* 10629206 0.25750 210
*
* 10629207 0.26000 212
*
* 10629208 0.26250 214
*
* 10629209 0.26500 216
*
* 10629210 0.26750 218
*
* 10629211 0.27000 220
*
* 10629212 0.27250 222
*
* 10629213 0.27500 224
*
* 10629214 0.27750 226
*
* 10629215 0.28000 228
*
* 10629216 0.28250 230
*
* 10629217 0.28500 232
*
* 10629218 0.28750 234
*
* 10629219 0.29000 236
*
* 10629220 0.29250 238
*
* 10629221 0.29500 240
*
* 10629222 0.29750 242
*
* 10629223 0.30000 244
*
* 10629224 0.30250 246
*
* 10629225 0.30500 248
*
* 10629226 0.30750 250
*
* 10629227 0.31000 252
*
* 10629228 0.31250 254
*
* 10629229 0.31500 256
*
* 10629230 0.31750 258
*
* 10629231 0.32000 260
*
* 10629232 0.32250 262
*
* 10629233 0.32500 264
*
* 10629234 0.32750 266
*
* 10629235 0.33000 268
*
* 10629236 0.33250 270
*
* 10629237 0.33500 272
*
* 10629238 0.33750 274
*
* 10629239 0.34000 276
*
* 10629240 0.34250 278
*
* 10629241 0.34500 280
*
* 10629242 0.34750 282
*
* 10629243 0.35000 284
*
* 10629244 0.35250 286
*
* 10629245 0.35500 288
*
* 10629246 0.35750 290
*
* 10629247 0.36000 292
*
* 10629248 0.36250 294
*
* 10629249 0.36500 296
*
* 10629250 0.36750 298
*
* 10629251 0.37000 300
*
* 10629252 0.37250 302
*
* 10629253 0.37500 304
*
* 10629254 0.37750 306
*
* 10629255 0.38000 308
*
* 10629256 0.38250 310
*
* 10629257 0.38500 312
*
* 10629258 0.38750 314
*
* 10629259 0.39000 316
*
* 10629260 0.39250 318
*
* 10629261 0.39500 320
*
* 10629262 0.39750 322
*
* 10629263 0.40000 324
*
* 10629264 0.40250 326
*
* 10629265 0.40500 328
*
* 10629266 0.40750 330
*
* 10629267 0.41000 332
*
* 10629268 0.41250 334
*
* 10629269 0.41500 336
*
* 10629270 0.41750 338
*
* 10629271 0.42000 340
*
* 10629272 0.42250 342
*
* 10629273 0.42500 344
*
* 10629274 0.42750 346
*
* 10629275 0.43000 348
*
* 10629276 0.43250 350
*
* 10629277 0.43500 352
*
* 10629278 0.43750 354
*
* 10629279 0.44000 356
*
* 10629280 0.44250 358
*
* 10629281 0.44500 360
*
* 10629282 0.44750 362
*
* 10629283 0.45000 364
*
* 10629284 0.45250 366
*
* 10629285 0.45500 368
*
* 10629286 0.45750 370
*
* 10629287 0.46000 372
*
* 10629288 0.46250 374
*
* 10629289 0.46500 376
*
* 10629290 0.46750 378
*
* 10629291 0.47000 380
*
* 10629292 0.47250 382
*
* 10629293 0.47500 384
*
* 10629294 0.47750 386
*
* 10629295 0.48000 388
*
* 10629296 0.48250 390
*
* 10629297 0.48500 392
*
* 10629298 0.48750 394
*
* 10629299 0.49000 396
*
* 10629300 0.49250 398
*
* 10629301 0.49500 400
*
* 10629302 0.49750 402
*
* 10629303 0.50000 404
*
* 10629304 0.50250 406
*
* 10629305 0.50500 408
*
* 10629306 0.50750 410
*
* 10629307 0.51000 412
*
* 10629308 0.51250 414
*
* 10629309 0.51500 416
*
* 10629310 0.51750 418
*
* 10629311 0.52000 420
*
* 10629312 0.52250 422
*
* 10629313 0.52500 424
*
* 10629314 0.52750 426
*
* 10629315 0.53000 428
*
* 10629316 0.53250 430
*
* 10629317 0.53500 432
*
* 10629318 0.53750 434
*
* 10629319 0.54000 436
*
* 10629320 0.54250 438
*
* 10629321 0.54500 440
*
* 10629322 0.54750 442
*
* 10629323 0.55000 444
*
* 10629324 0.55250 446
*
* 10629325 0.55500 448
*
* 10629326 0.55750 450
*
* 10629327 0.56000 452
*
* 10629328 0.56250 454
*
* 10629329 0.56500 456
*
* 10629330 0.56750 458
*
* 10629331 0.57000 460
*
* 10629332 0.57250 462
*
* 10629333 0.57500 464
*
* 10629334 0.57750 466
*
* 10629335 0.58000 468
*
* 10629336 0.58250 470
*
* 10629337 0.58500 472
*
* 10629338 0.58750 474
*
* 10629339 0.59000 476
*
* 10629340 0.59250 478
*
* 10629341 0.59500 480
*
* 10629342 0.59750 482
*
* 10629343 0.60000 484
*
* 10629344 0.60250 486
*
* 10629345 0.60500 488
*
* 10629346 0.60750 490
*
* 10629347 0.61000 492
*
* 10629348 0.61250 494
*
* 10629349 0.61500 496
*
* 10629350 0.61750 498
*
* 10629351 0.62000 500
*
* 10629352 0.62250 502
*
* 10629353 0.62500 504
*
* 10629354 0.62750 506
*
* 10629355 0.63000 508
*
* 10629356 0.63250 510
*
* 10629357 0.63500 512
*
* 10629358 0.63750 514
*
* 10629359 0.64000 516
*
* 10629360 0.64250 518
*
* 10629361 0.64500 520
*
* 10629362 0.64750 522
*
* 10629363 0.65000 524
*
* 10629364 0.65250 526
*
* 10629365 0.65500 528
*
* 10629366 0.65750 530
*
* 10629367 0.66000 532
*
* 10629368 0.66250 534
*
* 10629369 0.66500 536
*
* 10629370 0.66750 538
*
* 10629371 0.67000 540
*
* 10629372 0.67250 542
*
* 10629373 0.67500 544
*
* 10629374 0.67750 546
*
* 10629375 0.68000 548
*
* 10629376 0.68250 550
*
* 10629377 0.68500 552
*
* 10629378 0.68750 554
*
* 10629379 0.69000 556
*
* 10629380 0.69250 558
*
* 10629381 0.69500 560
*
* 10629382 0.69750 562
*
* 10629383 0.70000 564
*
* 10629384 0.70250 566
*
* 10629385 0.70500 568
*
* 10629386 0.70750 570
*
* 10629387 0.71000 572
*
* 10629388 0.71250 574
*
* 10629389 0.71500 576
*
* 10629390 0.71750 578
*
* 10629391 0.72000 580
*
* 10629392 0.72250 582
*
* 10629393 0.72500 584
*
* 10629394 0.72750 586
*
* 10629395 0.73000 588
*
* 10629396 0.73250 590
*
* 10629397 0.73500 592
*
* 10629398 0.73750 594
*
* 10629399 0.74000 596
*
* 10629400 0.74250 598
*
* 10629401 0.74500 600
*
* 10629402 0.74750 602
*
* 10629403 0.75000 604
*
* 10629404 0.75250 606
*
* 10629405 0.75500 608
*
* 10629406 0.75750 610
*
* 10629407 0.76000 612
*
* 10629408 0.76250 614
*
* 10629409 0.76500 616
*
* 10629410 0.76750 618
*
* 10629411 0.77000 620
*
* 10629412 0.77250 622
*
* 10629413 0.77500 624
*
* 10629414 0.77750 626
*
* 10629415 0.78000 628
*
* 10629416 0.78250 630
*
* 10629417 0.78500 632
*
* 10629418 0.78750 634
*
* 10629419 0.79000 636
*
* 10629420 0.79250 638
*
* 10629421 0.79500 640
*
* 10629422 0.79750 642
*
* 10629423 0.80000 644
*
* 10629424 0.80250 646
*
* 10629425 0.80500 648
*
* 10629426 0.80750 650
*
* 10629427 0.81000 652
*
* 10629428 0.81250 654
*
* 10629429 0.81500 656
*
* 10629430 0.81750 658
*
* 10629431 0.82000 660
*
* 10629432 0.82250 662
*
* 10629433 0.82500 664
*
* 10629434 0.82750 666
*
* 10629435 0.83000 668
*
* 10629436 0.83250 670
*
* 10629437 0.83500 672
*
* 10629438 0.83750 674
*
* 10629439 0.84000 676
*
* 10629440 0.84250 678
*
* 10629441 0.84500 680
*
* 10629442 0.84750 682
*
* 10629443 0.85000 684
*
* 10629444 0.85250 686
*
* 10629445 0.85500 688
*
* 10629446 0.85750 690
*
* 10629447 0.86000 692
*
* 10629448 0.86250 694
*
* 10629449 0.86500 696
*
* 10629450 0.86750 698
*
* 10629451 0.87000 700
*
* 10629452 0.87250 702
*
* 10629453 0.87500 704
*
* 10629454 0.87750 706
*
* 10629455 0.88000 708
*
* 10629456 0.88250 710
*
* 10629457 0.88500 712
*
* 10629458 0.88750 714
*
* 10629459 0.89000 716
*
* 10629460 0.89250 718
*
* 10629461 0.89500 720
*
* 10629462 0.89750 722
*
* 10629463 0.90000 724
*
* 10629464 0.90250 726
*
* 10629465 0.90500 728
*
* 10629466 0.90750 730
*
* 10629467 0.91000 732
*
* 10629468 0.91250 734
*
* 10629469 0.91500 736
*
* 10629470 0.91750 738
*
* 10629471 0.92000 740
*
* 10629472 0.92250 742
*
* 10629473 0.92500 744
*
* 10629474 0.92750 746
*
* 10629475 0.93000 748
*
* 10629476 0.93250 750
*
* 10629477 0.93500 752
*
* 10629478 0.93750 754
*
* 10629479 0.94000 756
*
* 10629480 0.94250 758
*
* 10629481 0.94500 760
*
* 10629482 0.94750 762
*
* 10629483 0.95000 764
*
* 10629484 0.95250 766
*
* 10629485 0.95500 768
*
* 10629486 0.95750 770
*
* 10629487 0.96000 772
*
* 10629488 0.96250 774
*
* 10629489 0.96500 776
*
* 10629490 0.96750 778
*
* 10629491 0.97000 780
*
* 10629492 0.97250 782
*
* 10629493 0.97500 784
*
* 10629494 0.97750 786
*
* 10629495 0.98000 788
*
* 10629496 0.98250 790
*
* 10629497 0.98500 792
*
* 10629498 0.98750 794
*
* 10629499 0.99000 796
*
* 10629500 0.99250 798
*
* 10629501 0.99500 800
*
* 10629502 0.99750 802
*
* 10629503 1.00000 804
*
* 10629504 1.00250 806
*
* 10629505 1.00500 808
*
* 10629506 1.00750 810
*
* 10629507 1.01000 812
*
* 10629508 1.01250 814
*
* 10629509 1.01500 816
*
* 10629510 1.01750 818
*
* 10629511 1.02000 820
*
* 10629512 1.02250 822
*
* 10629513 1.02500 824
*
* 10629514 1.02750 826
*
* 10629515 1.03000 828
*
* 10629516 1.03250 830
*
* 10629517 1.03500 832
*
* 10629518 1.03750 834
*
* 10629519 1.04000 836
*
* 10629520 1.04250 838
*
* 10629521 1.04500 840
*
* 10629522 1.04750 842
*
* 10629523 1.05000 844
*
* 10629524 1.05250 846
*
* 10629525 1.05500 848
*
* 10629526 1.05750 850
*
* 10629527 1.06000 852
*
* 10629528 1.06250 854
*
* 10629529 1.06500 856
*
* 10629530 1.06750 858
*
* 10629531 1.07000 860
*
* 10629532 1.07250 862
*
* 10629533 1.07500 864
*
* 10629534 1.07750 866
*
* 10629535 1.08000 868
*
* 10629536 1.08250 870
*
* 10629537 1.08500 872
*
* 10629538 1.08750 874
*
* 10629539 1.09000 876
*
* 10629540 1.09250 878
*
* 10629541 1.09500 880
*
* 10629542 1.09750 882
*
* 10629543 1.10000 884
*
* 10629544 1.10250 886
*
* 10629545 1.10500 888
*
* 10629546 1.10750 890
*
* 10629547 1.11000 892
*
* 10629548 1.11250 894
*
* 10629549 1.11500 896
*
* 10629550 1.11750 898
*
* 10629551 1.12000 900
*
* 10629552 1.12250 902
*
* 10629553 1.12500 904
*
* 10629554 1.12750 906
*
* 10629555 1.13000 908
*
* 10629556 1.13250 910
*
* 10629557 1.13500 912
*
* 10629558 1.13750 914
*
* 10629559 1.14000 916
*
* 10629560 1.14250 918
*
* 10629561 1.14500 920
*
* 10629562 1.14750 922
*
* 10629563 1.15000 924
*
* 10629564 1.15250 926
*
* 10629565 1.15500 928
*
* 10629566 1.15750 930
*
* 10629567 1.16000 932
*
* 10629568 1.16250 934
*
* 10629569 1.16500 936
*
* 10629570 1.16750 938
*
* 10629571 1.17000 940
*
* 10629572 1.17250 942
*
* 10629573 1.17500 944
*
* 10629574 1.17750 946
*
* 10629575 1.18000 948
*
* 10629576 1.18250 950
*
* 10629577 1.18500 952
*
* 10629578 1.18750 954
*
* 10629579 1.19000 956
*
* 10629580 1.19250 958
*
* 10629581 1.19500 960
*
* 10629582 1.19750 962
*
* 10629583 1.20000 964
*
* 10629584 1.20250 966
*
* 10629585 1.20500 968
*
* 10629586 1.20750 970
*
* 10629587 1.21000 972
*
* 10629588 1.21250 974
*
* 10629589 1.21500 976
*
* 10629590 1.21750 978
*
* 10629591 1.22000 980
*
* 10629592 1.22250 982
*
* 10629593 1.22500 984
*
* 10629594 1.22750 986
*
* 10629595 1.23000
```

```

*      loc      flag
10632100 0      2
*      dx      int
10632101 0.0080 2
10632102 0.0060 4
10632103 0.0040 6
10632104 0.0020 8
*      compos.  int
10632201 2      8
*      source  int
10632301 0.0    8
*      temperature flag
10632400 0
*      temperature pt
10632401 563.15 9
*      vol      inc      factor      hs
10632501 0      0      0.330      1
10632502 0      0      0.120      2
*      vol      inc      factor      hs
10632601 062010000 0      1      0.330      1
10632602 062020000 0      1      0.120      2
*      source type mult D-rt      hs
10632702 0      0.0    0.0    2
*      10632900 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10632901 0.0 10. 10. 10. 0.0 0.0 1.0 0.45 1.1 1.0 2
*      ***** STRUCTURE 0642 *****
*      upper plenum shield cylinder
*      ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10642000 3 11 2 1 0.07060 0
*      loc      flag
10642100 0      2
*      dx      int
10642101 0.00107 2
10642102 0.00214 4
10642103 0.00429 6
10642104 0.00214 8
10642105 0.00107 10
*      compos.  int
10642201 1      10
*      source  int
10642301 0.0    10
*      temperature flag
10642400 0
*      temperature pt
10642401 563.15 11
*      vol      inc      factor      hs
10642501 062060000 0      1      0.1239 1
10642502 062070000 0      1      0.1416 2
10642503 062080000 0      1      0.0602 3

```

```

*      vol      inc      code      factor      hs
10642601 066010000 0      1      0.1239 1
10642602 064010000 0      1      0.1416 2
10642603 062090000 0      1      0.0602 3
*      source type mult D-rt      hs
10642702 0      0.0    0.0    3
*      10642800 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10642801 0.0 10. 10. 10. 0.0 0.0 1.0 0.460 1.1 1.0 3
*      10642900 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10642901 0.0 10. 10. 10. 0.0 0.0 1.0 0.460 1.1 1.0 3
*      ***** STRUCTURE 0702 *****
*      upper core support plate
*      ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10702000 1 11 1 1 0.0    0
*      loc      flag
10702100 0      2
*      dx      int
10702101 0.00150 2
10702102 0.00300 4
10702103 0.00600 6
10702104 0.00300 8
10702105 0.00150 10
*      compos.  int
10702201 1      10
*      source  int
10702301 0.0    10
*      temperature flag
10702400 0
*      temperature pt
10702401 563.15 11
*      vol      inc      code      factor      hs
10702501 062090000 0      1      0.02385 1
*      vol      inc      code      factor      hs
10702601 070010000 0      1      0.02385 1
*      source type mult D-rt      hs
10702701 0      0.0    0.0    1
*      10702800 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10702801 0.0 10. 10. 10. 0.0 0.0 1.0 1.2 1.1 1.0 1
*      10702900 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10702901 0.0 10. 10. 10. 0.0 0.0 1.0 2.4 1.1 1.0 1
*      ***** STRUCTURE 0703 *****
*      support rod
*      ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
10703000 2 9 2 1 0.07060 0

```

```

*      loc      flag
10703100 0      2
*
*      dx      int
10703101 0.00200 2
10703102 0.00150 4
10703103 0.00100 6
10703104 0.00050 8
*
*      compos.  int
10703201 1      8
*
*      source  int
10703301 0.0    8
*
*      temperature flag
10703400 0
*
*      temperature pt
10703401 563.15 9
*
*      vol      inc      type      code      factor      hs
10703501 0      0      0      1      1.1675 1
10703502 0      0      0      1      1.1975 2
*
*      vol      inc      type      code      factor      hs
10703601 070010000 0 1      1      1.1675 1
10703602 070020000 0 1      1      1.1975 2
*
*      source type      mult      D-rt      hs
10703702 0      0.0    0.0    0      2
*
10703900 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
10703901 0.0 10. 10. 10. 0.0 0.0 1.0 2.4 1.1 1.0 2
*
***** STRUCTURE 1011 *****
* hot leg nozzle and pipe in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11011000 1 11 2 1 0.03800 0
*
*      loc      flag
11011100 0      2
*
*      dx      int
11011101 0.00085 2
11011102 0.00170 4
11011103 0.00255 6
11011104 0.00340 8
11011105 0.03500 10
*
*      compos.  int
11011201 1      8
11011202 3      10
*
*      source  int
11011301 0.0    10
*
*      temperature flag
11011400 0
*
*      temperature pt
11011401 563.15 11
*
*      vol      inc      type      code      factor      hs
11011501 101010000 0 1      1      0.6683 1

```

```

*      vol      inc      type      code      factor      hs
11011601 -900    0      4910    1      0.6683 1
*
*      source type      mult      D-rt      hs
11011701 0      0.0    0.0    0      1
*
11011800 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11011801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
***** STRUCTURE 1012 *****
* hot leg in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11012000 2 11 2 1 0.03800 0
*
*      loc      flag
11012100 0      2
*
*      dx      int
11012101 0.00080 2
11012102 0.00160 4
11012103 0.00240 6
11012104 0.00320 8
11012105 0.03550 10
*
*      compos.  int
11012201 1      8
11012202 3      10
*
*      source type      mult      D-rt      hs
11012301 0      0.0    0.0    0      10
*
*      temperature flag
11012400 0
*
*      temperature pt
11012401 563.15 11
*
*      vol      inc      type      code      factor      hs
11012501 101020000 10000 1      1      0.6683 2
*
*      vol      inc      type      code      factor      hs
11012601 -900    0      4910    1      0.6683 2
*
*      source type      mult      D-rt      hs
11012701 0      0.0    0.0    0      2
*
11012800 1
*      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11012801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 2
*
***** STRUCTURE 1013 *****
* hot leg in loop 1 (loops 2 and 4 contain surge line tees)
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11013000 1 11 2 1 0.03800 0
*
*      loc      flag
11013100 0      2
*
*      dx      int
11013101 0.00080 2
11013102 0.00160 4
11013103 0.00240 6
11013104 0.00320 8
11013105 0.03550 10
*

```

```

* ***** STRUCTURE 1151 *****
* hot collector in loop 1
* =====
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
1151000 5 11 2 1 0.03649 0
*
* loc flag
1151100 0 2
*
* dx int
1151101 0.00083 2
1151102 0.00165 4
1151103 0.00331 6
1151104 0.00165 8
1151105 0.00083 10
*
* compos. int
1151201 1 10
*
* source int
1151301 0.0 10
*
* temperature flag
1151400 0
*
* temperature pt
1151401 563.15 11
*
* vol inc type code factor hs
1151501 11501000 00000 1 1 0.563 1
1151502 11502000 10000 1 1 0.476 4
1151503 11505000 00000 1 1 0.374 5
*
* vol inc type code factor hs
1151601 170010000 00000 1 1 0.563 1
1151602 170020000 10000 1 1 0.476 4
1151603 170050000 00000 1 1 0.374 5
*
* source type mult D-rt hs
1151701 0 0.0 0.0 0.0 5
*
1151800 1
* Dhe LHEf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
1151801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
1151900 1
* Dhe LHEf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
1151901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
* ***** STRUCTURE 1211 *****
* steam generator tubes - level 1 loop 1
* =====
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
1121100 10 11 2 1 0.00650 0
*
* loc flag
1121100 0 2
*
* dx int
1121101 0.000075 2
1121102 0.00150 4
1121103 0.000300 6
1121104 0.000150 8
1121105 0.000075 10
*
* compos. int
1121201 1 10

```

```

* ***** STRUCTURE 1014 *****
* hot leg in loop 1
* =====
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
1101400 3 11 2 1 0.03800 0
*
* loc flag
1101400 0 2
*
* dx int
1101401 0.00080 2
1101402 0.00160 4
1101403 0.00240 6
1101404 0.00320 8
1101405 0.03550 10
*
* compos. int
11014201 1 8
11014202 3 10
*
* source int
11014301 0.0 10
*
* temperature flag
11014400 0
*
* temperature pt
11014401 563.15 11
*
* vol inc type code factor hs
11014501 101050000 10000 1 1 0.567 3
*
* vol inc type code factor hs
11014601 -900 0 4910 1 0.567 3
*
* source type mult D-rt hs
11014701 0 0.0 0.0 0.0 3
*
11014800 1
* Dhe LHEf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11014801 0.0 10. 10. 10. 0.0 0.0 1.0 1.5 1.1 1.0 3
*

```

```

* source int
11211301 0.0 10
*
* temperature flag
11211400 0
*
* temperature pt
11211401 563.15 11
*
* vol inc code factor hs
11211501 121010000 10000 1 7.4592 10
*
* vol inc code factor hs
11211601 170010000 0 134 1 7.4592 10
*
* source type mult D-rt hs
11211701 0 0.0 0.0 10
*
11211800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11211801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11211802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11211803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11211804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11211805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11211806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11211807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
11211808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
11211809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
11211810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
11211900 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11211901 0.0 0.21 2.08 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
* steam generator tubes - level 2 loop 1
*****
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11212000 10 11 2 1 0.00650 0
*
* loc flag
11212100 1211
*
* temperature flag
11212400 0
*
11212800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11212801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11212802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11212803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11212804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11212805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11212806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11212807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
11212808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
11212809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
11212810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
11213800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11213801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11213802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11213803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11213804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11213805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11213806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11213807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
11213808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
11213809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
11213810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
11213900 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11213901 0.0 1.21 1.09 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
* steam generator tubes - level 4 loop 1
*****
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11214000 10 11 2 1 0.00650 0
*
* loc flag
11214100 1211
*
* temperature flag
11214400 0
*
11214800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11214801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11214802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11214803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11214804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11214805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11214806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11214807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7

```

```

11241601 170040000 0 134 1 7.4592 10
*
* source type mult D-rt hs
11241701 0 0.0 0.0 10
*
11241800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11241801 0.0 0.53 10.12 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11241802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11241803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11241804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11241805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11241806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11241807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
11241808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
11241809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
11241810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
11241900 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11241901 0.0 1.68 0.61 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 1251 *****
* steam generator tubes - level 5 loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11251000 10 11 2 1 0.00650 0
*
* loc flag
11251100 1211
*
* temperature flag
11251400 0
*
* temperature pt
11251401 563.15 11
*
* source type mult D-rt hs
11251701 0 0.0 0.0 10
*
11251800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11251801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
11251802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
11251803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
11251804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
11251805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
11251806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
11251807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
11251808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
11251809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
11251810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
11251900 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11251901 0.0 2.11 0.19 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 1291 *****
* cold collector in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11291000 5 11 2 1 0.03649 0

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```

*
* loc flag
11291100 1151
*
* temperature flag
11291400 0
*
* temperature pt
11291401 563.15 11
*
* vol inc code factor hs
11291501 129010000 00000 1 1 0.563 1
11291502 129020000 10000 1 1 0.476 4
11291503 129050000 00000 1 1 0.374 5
*
* vol inc code factor hs
11291601 170010000 00000 1 1 0.563 1
11291602 170020000 10000 1 1 0.476 4
11291603 170050000 00000 1 1 0.374 5
*
* source type mult D-rt hs
11291701 0 0.0 0.0 5
*
11291800 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11291801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
11291900 1
* Dhe LHEF LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11291901 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
***** STRUCTURE 1351 *****
* pump suction piping in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11351000 13 11 2 1 0.03800 0
*
* loc flag
11351100 0 2
*
* dx int
11351101 0.00080 2
11351102 0.00160 4
11351103 0.00240 6
11351104 0.00320 8
11351105 0.03550 10
*
* compos. int
11351201 1 8
11351202 3 10
*
* source int
11351301 0.0 10
*
* temperature flag
11351400 0
*
* temperature pt
11351401 563.15 11
*
* vol inc code factor hs
11351501 135010000 10000 1 1 0.828 5
11351502 135060000 10000 1 1 1.042 7
11351503 135080000 00000 1 1 1.121 8
11351504 135090000 10000 1 1 0.7495 10
11351505 135120000 10000 1 1 0.74525 13
*
* vol inc code factor hs

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11351601 -900      0      4910      1      0.828      5
11351602 -900      0      4910      1      1.042      7
11351603 -900      0      4910      1      1.121      8
11351604 -900      0      4910      1      0.7495     10
11351605 -900      0      4910      1      0.74525     13
*
* source type mult D-rt hs
11351701 0 0.0 0.0 13
*
11351800 1
* Dhe LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11351801 0.0 10. 10. 10. 0.0 0.0 1.0 6.6 1.1 1.0 8
11351802 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 10
11351803 0.0 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 13
*
***** STRUCTURE 1352 *****
* pump suction piping and filter in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11352000 1 11 2 1 0.05912 0
*
* loc flag
11352100 0 2
*
* dx int
11352101 0.00245 2
11352102 0.00489 4
11352103 0.00734 6
11352104 0.00979 8
11352105 0.03550 10
*
* compos. int
11352201 1 8
11352202 3 10
*
* source int
11352301 0.0 10
*
* temperature flag
11352400 0
*
* temperature pt
11352401 563.15 11
*
* vol inc code factor hs
11352501 135110000 00000 1 1 0.74525 1
*
* vol inc code factor hs
11352601 -900 0 4910 1 0.74525 1
*
* source type mult D-rt hs
11352701 0 0.0 0.0 0.0 1
*
11352800 1
* Dhe LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11352801 0.0 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 1401 *****
* main coolant pump in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11401000 1 9 2 1 0.06532 0
*
* loc flag
11401100 0 2
*
* dx int
11401101 0.00757 2

```

```

11401102 0.01513 4
11401103 0.02270 6
11401104 0.03027 8
*
* compos. int
11401201 1 8
*
* source int
11401301 0.0 8
*
* temperature flag
11401400 0
*
* temperature pt
11401401 563.15 9
*
* vol inc code factor hs
11401501 140010000 00000 1 1 0.746 1
*
* vol inc code factor hs
11401601 -900 0 4911 1 0.746 1
*
* source type mult D-rt hs
11401701 0 0.0 0.0 0.0 1
*
11401800 1
* Dhe LHER LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11401801 0.0 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 1421 *****
* cold leg isolation valve in loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11421000 1 11 2 1 0.04355 0
*
* loc flag
11421100 0 2
*
* dx int
11421101 0.00352 2
11421102 0.00704 4
11421103 0.01056 6
11421104 0.01407 8
11421105 0.03550 10
*
* compos. int
11421201 1 8
11421202 3 10
*
* source int
11421301 0.0 10
*
* temperature flag
11421400 0
*
* temperature pt
11421401 563.15 11
*
* vol inc code factor hs
11421501 142010000 00000 1 1 0.880 1
*
* vol inc code factor hs
11421601 -900 0 4910 1 0.880 1
*
* source type mult D-rt hs
11421701 0 0.0 0.0 0.0 1
*
11421800 1

```

```

* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11421801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
***** STRUCTURE 1451 *****
* cold leg in loop 1
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11451000 4 11 2 1 0.03800 0
*
* loc flag
11451100 0 2
*
* dx int
11451101 0.00080 2
11451102 0.00160 4
11451103 0.00240 6
11451104 0.00320 8
11451105 0.00350 10
*
* compos. int
11451201 1 8
11451202 3 10
*
* source int
11451301 0.0 10
*
* temperature flag
11451400 0
*
* temperature pt
11451401 563.15 11
*
* vol inc code factor hs
11451501 145010000 10000 1 1 0.782 3
11451502 145040000 00000 1 1 0.741 4
*
* vol inc code factor hs
11451601 -900 0 4910 1 0.782 3
11451602 -900 0 4910 1 0.741 4
*
* source type mult D-rt hs
11451701 0 0.0 0.0 0.0 4
*
11451800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11451801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 4
*
***** STRUCTURE 1591 *****
* feedwater header for loop 1
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11591000 1 11 2 1 0.07456 0
*
* loc flag
11591100 0 2
*
* dx int
11591101 0.00033 2
11591102 0.00066 4
11591103 0.00133 6
11591104 0.00066 8
11591105 0.00033 10
*
* compos. int
11591201 1 10
*
* source int
11591301 0.0 10

```

```

* temperature flag
11591400 0
*
* temperature pt
11591401 563.15 11
*
* vol inc code factor hs
11591501 159010000 00000 1 1 0.2924 1
*
* vol inc code factor hs
11591601 172010000 0 1 1 0.2924 1
*
* source type mult D-rt hs
11591701 0 0.0 0.0 0.0 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11591800 1
11591801 0.0 10. 10. 10. 0.0 0.0 1.0 0.034 1.1 1.0 1
*
11591900 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11591901 0.0 10. 10. 10. 0.0 0.0 1.0 0.012 1.1 1.0 1
*
***** STRUCTURE 1601 *****
* lower steam generator housing for loop 1
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11601000 1 11 2 1 0.2200 0
*
* loc flag
11601100 0 2
*
* dx int
11601101 0.00793 2
11601102 0.01585 4
11601103 0.02378 6
11601104 0.03170 8
11601105 0.04500 10
*
* compos. int
11601201 1 8
11601202 7 10
*
* source int
11601301 0.0 10
*
* temperature flag
11601400 0
*
* temperature pt
11601401 563.15 11
*
* vol inc code factor hs
11601501 170010000 00000 1 1 0.563 1
*
* vol inc code factor hs
11601601 -900 0 4913 1 0.563 1
*
* source type mult D-rt hs
11601701 0 0.0 0.0 0.0 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
11601800 1
11601801 0.0 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 1
*
***** STRUCTURE 1602 *****
* upper steam generator housing for loop 1

```



```

*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11602000 7 11 2 1 0.2200 0
*
* loc flag
11602100 0 2
*
* dx int
11602101 0.00200 2
11602102 0.00400 4
11602103 0.00600 6
11602104 0.00800 8
11602105 0.04500 10
*
* compos. int
11602201 1 8
11602202 7 10
*
* source int
11602301 0.0 10
*
* temperature flag
11602400 0
*
* temperature pt
11602401 563.15 11
*
* vol inc code factor hs
11602501 170020000 10000 1 1 0.476 3
11602502 170050000 00000 1 1 0.374 4
11602503 172010000 00000 1 1 0.630 5
11602504 175010000 10000 1 1 0.470 7
*
* vol inc code factor hs
11602601 -900 0 4913 1 0.476 3
11602602 -900 0 4913 1 0.374 4
11602603 -900 0 4913 1 0.630 5
11602604 -900 0 4913 1 0.470 7
*
* source type mult D-rt hs
11602701 0 0.0 0.0 0.0 7
*
11602800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
11602801 0.0 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 7
*
*=====
* upper head for steam generator housing for loop 1
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
11603000 1 11 1 1 0.0000 0
*
* loc flag
11603100 0 2
*
* dx int
11603101 0.00456 2
11603102 0.00913 4
11603103 0.01369 6
11603104 0.01825 8
11603105 0.04500 10
*
* compos. int
11603201 1 8
11603202 7 10
*
* source int
11603301 0.0 10

```

```

*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12011000 1 11 2 1 0.03800 0
*
* loc flag
12011100 0 2
*
* dx int
12011101 0.00085 2
12011102 0.00170 4
12011103 0.00255 6
12011104 0.00340 8
12011105 0.03500 10
*
* compos. int
12011201 1 8
12011202 3 10
*
* source int
12011301 0.0 10
*
* temperature flag
12011400 0
*
* temperature pt
12011401 563.15 11
*
* vol inc
12011501 201010000 0
*
* vol inc
12011601 -900 0
*
* source type mult
12011701 0 0.0 1
*
12011800 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
12011801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
***** STRUCTURE 2012 *****
* hot leg in loop 2
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12012000 2 11 2 1 0.03800 0
*
* loc flag
12012100 0 2
*
* dx int
12012101 0.00080 2
12012102 0.00160 4
12012103 0.00240 6
12012104 0.00320 8
12012105 0.03550 10
*
* compos. int
12012201 1 8
12012202 3 10
*
* source int
12012301 0.0 10
*
* temperature flag
12012400 0
*
* temperature pt
12012401 563.15 11
*

```

```

*
* vol inc
12012501 201020000 10000 1
*
* vol inc
12012601 -900 0
*
* source type mult
12012701 0 0.0 0.0 2
*
12012800 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
12012801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 2
*
***** STRUCTURE 2013 *****
* surge line nozzle and hot leg in loop 2
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12013000 1 11 2 1 0.03800 0
*
* loc flag
12013100 0 2
*
* dx int
12013101 0.00088 2
12013102 0.00176 4
12013103 0.00264 6
12013104 0.00352 8
12013105 0.03470 10
*
* compos. int
12013201 1 8
12013202 3 10
*
* source int
12013301 0.0 10
*
* temperature flag
12013400 0
*
* temperature pt
12013401 563.15 11
*
* vol inc
12013501 201040000 0 1
*
* vol inc
12013601 -900 0
*
* source type mult
12013701 0 0.0 0.0 1
*
12013800 1
*
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
12013801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
***** STRUCTURE 2014 *****
* hot leg in loop 2
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12014000 3 11 2 1 0.03800 0
*
* loc flag
12014100 0 2
*
* dx int
12014101 0.00080 2
12014102 0.00160 4
12014103 0.00240 6

```

```

12014104 0.00320 8
12014105 0.03550 10
*
* compos. int
12014201 1 8
12014202 3 10
*
* source int
12014301 0.0 10
*
* temperature flag
12014400 0
*
* temperature pt
12014401 563.15 11
*
* vol inc type code factor hs
12014501 201050000 10000 1 1 0.567 3
*
* vol inc type code factor hs
12014601 -900 0 4910 1 0.567 3
*
* source type mult D-rt hs
12014701 0 0.0 0.0 0.0 3
*
12014800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12014801 0.0 10. 10. 10. 0.0 0.0 1.0 1.5 1.1 1.0 3
*
***** STRUCTURE 2151 *****
* hot collector in loop 2
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12151000 5 11 2 1 0.03649 0
*
* loc flag
12151100 1151
*
* temperature flag
12151400 0
*
* temperature pt
12151401 563.15 11
*
* vol inc type code factor hs
12151501 215010000 00000 1 1 0.563 1
12151502 215020000 10000 1 1 0.476 4
12151503 215050000 00000 1 1 0.374 5
*
* vol inc type code factor hs
12151601 270010000 00000 1 1 0.563 1
12151602 270020000 10000 1 1 0.476 4
12151603 270050000 00000 1 1 0.374 5
*
* source type mult D-rt hs
12151701 0 0.0 0.0 0.0 5
*
12151800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12151801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
12151900 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12151901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
***** STRUCTURE 2211 *****
* steam generator tubes - level 1 loop 2
* =====

```

```

*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12211000 10 11 2 1 0.00650 0
*
* loc flag
12211100 0 2
*
* dx int
12211101 0.000075 2
12211102 0.000150 4
12211103 0.000300 6
12211104 0.000150 8
12211105 0.000075 10
*
* compos. int
12211201 1 10
*
* source int
12211301 0.0 10
*
* temperature flag
12211400 0
*
* temperature pt
12211401 563.15 11
*
* vol inc type code factor hs
12211501 221010000 10000 1 1 7.4592 10
*
* vol inc type code factor hs
12211601 270010000 0 134 1 7.4592 10
*
* source type mult D-rt hs
12211701 0 0.0 0.0 0.0 10
*
12211800 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12211801 0.0 10. 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
12211802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
12211803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
12211804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
12211805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
12211806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
12211807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
12211808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
12211809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
12211810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
12211900 1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12211901 0.0 0.21 2.08 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 2221 *****
* steam generator tubes - level 2 loop 2
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12221000 10 11 2 1 0.00650 0
*
* loc flag
12221100 1211
*
* temperature flag
12221400 0
*
* temperature pt
12221401 563.15 11
*
* vol inc type code factor hs
12221501 222010000 10000 1 1 7.4592 10

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12251805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
12251806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
12251807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
12251808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
12251809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
12251810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
12251900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12251901 0.0 2.11 0.19 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 2291 *****
* cold collector in loop 2
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12291000 5 11 2 1 0.03649 0
*
* loc flag
12291100 1151
*
* temperature flag
12291400 0
*
* source type mult D-rt hs
12291701 0 0.0 0.0 5
*
12291800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12291801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
12291900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12291901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
***** STRUCTURE 2351 *****
* pump suction piping in loop 2
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12351000 13 11 2 1 0.03800 0
*
* loc flag
12351100 0 2
*
* dx int
12351101 0.00080 2
12351102 0.00160 4
12351103 0.00240 6
12351104 0.00320 8
12351105 0.03550 10
*
* compos. int
12351201 1 8
12351202 3 10
*
* source int

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12351301 0.0 10
*
* temperature flag
12351400 0
*
* temperature pt
12351401 563.15 11
*
* vol inc code factor hs
12351501 235010000 10000 1 1 0.828 5
12351502 235060000 10000 1 1 1.042 7
12351503 235080000 00000 1 1 1.136 8
12351504 235090000 10000 1 1 0.7495 10
12351505 235120000 10000 1 1 0.749 13
*
* vol inc code factor hs
12351601 -900 0 4910 1 0.828 5
12351602 -900 0 4910 1 1.042 7
12351603 -900 0 4910 1 1.136 8
12351604 -900 0 4910 1 0.7495 10
12351605 -900 0 4910 1 0.749 13
*
* source type mult D-rt hs
12351701 0 0.0 0.0 13
*
12351800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12351801 0.0 10. 10. 10. 0.0 0.0 1.0 6.6 1.1 1.0 8
12351802 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 10
12351803 0.0 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 13
*
***** STRUCTURE 2352 *****
* pump suction piping and filter in loop 2
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12352000 1 11 2 1 0.05902 0
*
* loc flag
12352100 0 2
*
* dx int
12352101 0.00244 2
12352102 0.00488 4
12352103 0.00732 6
12352104 0.00976 8
12352105 0.03550 10
*
* compos. int
12352201 1 8
12352202 3 10
*
* source int
12352301 0.0 10
*
* temperature flag
12352400 0
*
* temperature pt
12352401 563.15 11
*
* vol inc code factor hs
12352501 235110000 00000 1 1 0.749 1
*
* vol inc code factor hs
12352601 -900 0 4910 1 0.749 1
*
* source type mult D-rt hs
12352701 0 0.0 0.0 1

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* 12352800      1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12352801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 2401 *****
* main coolant pump in loop 2
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12401000 1 9 2 1 0.06532 0
*
* loc flag
12401100 1401
*
* temperature flag
12401400 0
*
* temperature pt
12401401 563.15 9
*
* vol inc code type factor hs
12401501 240010000 00000 1 1 0.746 1
*
* vol inc code type factor hs
12401601 -900 0 4911 1 0.746 1
*
* source type mult D-rt hs
12401701 0 0.0 0.0 0.0 1
*
12401800      1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12401801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 2421 *****
* cold leg isolation valve in loop 2
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12421000 1 11 2 1 0.04355 0
*
* loc flag
12421100 0 2
*
* dx int
12421101 0.00352 2
12421102 0.00704 4
12421103 0.01056 6
12421104 0.01407 8
12421105 0.03550 10
*
* compos. int
12421201 1 8
12421202 3 10
*
* source int
12421301 0.0 10
*
* temperature flag
12421400 0
*
* temperature pt
12421401 563.15 11
*
* vol inc code type factor hs
12421501 242010000 00000 1 1 0.880 1
*
* vol inc code type factor hs
12421601 -900 0 4910 1 0.880 1
*

```

```

* source type mult D-rt hs
12421701 0 0.0 0.0 0.0 1
*
12421800      1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12421801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
***** STRUCTURE 2451 *****
* cold leg in loop 2
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12451000 4 11 2 1 0.03800 0
*
* loc flag
12451100 0 2
*
* dx int
12451101 0.00080 2
12451102 0.00160 4
12451103 0.00240 6
12451104 0.00320 8
12451105 0.03550 10
*
* compos. int
12451201 1 8
12451202 3 10
*
* source int
12451301 0.0 10
*
* temperature flag
12451400 0
*
* temperature pt
12451401 563.15 11
*
* vol inc code factor hs
12451501 245010000 10000 1 1 0.782 3
12451502 245030000 00000 1 1 0.741 4
*
* vol inc code factor hs
12451601 -900 0 4910 1 0.782 3
12451602 -900 0 4910 1 0.741 4
*
* source type mult D-rt hs
12451701 0 0.0 0.0 0.0 4
*
12451800      1
* Dhe LHEf LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
12451801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 4
*
***** STRUCTURE 2591 *****
* feedwater header for loop 2
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12591000 1 11 2 1 0.07456 0
*
* loc flag
12591100 1591 2
*
* temperature flag
12591400 0
*
* temperature pt
12591401 563.15 11
*
* vol inc code factor hs
12591501 259010000 00000 1 1 0.2924 1
*

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*
* 12591601 272010000 0 inc type code factor hs
* source type mult D-rt D-rt hs
* 12591701 0 0.0 0.0 0.0 0.0 1
*
* 12591800 1
* Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 12591801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.034 1.1 1.0 1
*
* 12591900 1
* Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 12591901 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.012 1.1 1.0 1
*
* ***** STRUCTURE 2601 *****
* lower steam generator housing for loop 2
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12601000 1 11 2 1 0.2200 0
*
* loc flag
12601100 1601
*
* temperature flag
12601400 0
*
* temperature pt
12601401 563.15 11
*
* vol inc type code factor hs
12601501 270010000 00000 1 1 0.563 1
*
* vol inc type code factor hs
12601601 -900 0 4913 1 0.563 1
*
* source type mult D-rt hs
12601701 0 0.0 0.0 0.0 1
*
* 12601800 1
* Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 12601801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 1
*
* ***** STRUCTURE 2602 *****
* upper steam generator housing for loop 2
* =====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
12602000 7 11 2 1 0.2200 0
*
* loc flag
12602100 1602 2
*
* temperature flag
12602400 0
*
* temperature pt
12602401 563.15 11
*
* vol inc type code factor hs
12602501 270020000 10000 1 1 0.476 3
12602502 270050000 00000 1 1 0.374 4
12602503 272010000 00000 1 1 0.630 5
12602504 275010000 10000 1 1 0.470 7
*
* vol inc type code factor hs
12602601 -900 0 4913 1 0.476 3
12602602 -900 0 4913 1 0.374 4
12602603 -900 0 4913 1 0.630 5

```

```

* ***** STRUCTURE 3011 *****
* hot leg nozzle and pipe in loop 3
*-----$
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13011000 1 11 2 1 0.03800 0
*
* loc flag
13011100 0 2
*
* dx int
13011101 0.00085 2
13011102 0.00170 4
13011103 0.00255 6
13011104 0.00340 8
13011105 0.03500 10
*
* compos. int
13011201 1 8
13011202 3 10
*
* source int
13011301 0.0 10
*
* temperature flag
13011400 0
*
* temperature pt
13011401 563.15 11
*
* vol inc type code factor hs
13011501 301010000 0 1 1 0.6683 1
*
* vol inc type code factor hs
13011601 -900 0 4910 1 0.6683 1
*
* source type mult D-rt hs
13011701 0 0.0 0.0 1
*
13011800 1
* Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13011801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
* ***** STRUCTURE 3012 *****
* hot leg in loop 3
*-----$
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13012000 2 11 2 1 0.03800 0
*
* loc flag
13012100 0 2
*
* dx int
13012101 0.00080 2
13012102 0.00160 4
13012103 0.00240 6
13012104 0.00320 8
13012105 0.03500 10
*
* compos. int
13012201 1 8
13012202 3 10
*
* source int
13012301 0.0 10
*
* temperature flag
13012400 0

```

```

*
* temperature pt
13012401 563.15 11
*
* vol inc type code factor hs
13012501 301020000 10000 1 1 0.6683 2
*
* vol inc type code factor hs
13012601 -900 0 4910 1 0.6683 2
*
* source type mult D-rt hs
13012701 0 0.0 0.0 0.0 2
*
13012800 1
* Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13012801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 2
*
* ***** STRUCTURE 3013 *****
* hot leg in loop 3 (loops 2 and 4 contain surge line tees)
*-----$
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13013000 1 11 2 1 0.03800 0
*
* loc flag
13013100 0 2
*
* dx int
13013101 0.00080 2
13013102 0.00160 4
13013103 0.00240 6
13013104 0.00320 8
13013105 0.03500 10
*
* compos. int
13013201 1 8
13013202 3 10
*
* source int
13013301 0.0 10
*
* temperature flag
13013400 0
*
* temperature pt
13013401 563.15 11
*
* vol inc type code factor hs
13013501 301040000 0 1 1 0.420 1
*
* vol inc type code factor hs
13013601 -900 0 4910 1 0.420 1
*
* source type mult D-rt hs
13013701 0 0.0 0.0 0.0 1
*
13013800 1
* Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13013801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
* ***** STRUCTURE 3014 *****
* hot leg in loop 3
*-----$
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13014000 3 11 2 1 0.03800 0
*
* loc flag
13014100 0 2
*

```



```

*          dx          int
13014101 0.00080 2
13014102 0.00160 4
13014103 0.00240 6
13014104 0.00320 8
13014105 0.03550 10
*
*      compos.      int
13014201 1 8
13014202 3 10
*
*      source      int
13014301 0.0 10
*
*      temperature flag
13014400 0
*
*      temperature pt
13014401 563.15 11
*
*      vol      inc      type      code      factor      hs
13014501 301050000 10000 1 1 0.567 3
*
*      vol      inc      type      code      factor      hs
13014601 -900 0 4910 1 0.567 3
*
*      source type      mult      D-rt      hs
13014701 0 0.0 0.0 0.0 3
*
13014800 1
*      Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13014801 0.0 10. 10. 10. 0.0 0.0 1.0 1.5 1.1 1.0 3
*
***** STRUCTURE 3151 *****
* hot collector in loop 3
*-----$
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13151000 5 11 2 1 0.03649 0
*
*      loc      flag
13151100 1151
*
*      temperature flag
13151400 0
*
*      temperature pt
13151401 563.15 11
*
*      vol      inc      type      code      factor      hs
13151501 315010000 00000 1 1 0.563 1
13151502 315020000 10000 1 1 0.476 4
13151503 315050000 00000 1 1 0.374 5
*
*      vol      inc      type      code      factor      hs
13151601 370010000 00000 1 1 0.563 1
13151602 370020000 10000 1 1 0.476 4
13151603 370050000 00000 1 1 0.374 5
*
*      source type      mult      D-rt      hs
13151701 0 0.0 0.0 0.0 5
*
13151800 1
*      Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13151801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
*      temperature flag
13151900 1
*      Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13151901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5

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13251801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
13251802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
13251803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
13251804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
13251805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
13251806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
13251807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
13251808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
13251809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
13251810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
13251900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13251901 0.0 2.11 0.19 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 3291 *****
* cold collector in loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13291000 5 11 2 1 0.03649 0
*
* vol inc type code factor hs
13291501 329010000 00000 1 1 0.563 1
13291502 329020000 10000 1 1 0.476 4
13291503 329050000 00000 1 1 0.374 5
*
* vol inc type code factor hs
13291601 370010000 00000 1 1 0.563 1
13291602 370020000 10000 1 1 0.476 4
13291603 370050000 00000 1 1 0.374 5
*
* source type mult D-rt D-rt hs
13291701 0 0.0 0.0 0.0 5
*
13291800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13291801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
13291900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13291901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
***** STRUCTURE 3351 *****
* pump suction piping in loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13351000 13 11 2 1 0.03800 0
*
* loc flag
13351100 0 2
*
* dx int
13351101 0.00080 2
13351102 0.00160 4
13351103 0.00240 6
13351104 0.00320 8
13351105 0.03550 10
*
* compos. int
13352201 1 8
13352202 3 10
*
* source int
13352301 0.0 10
*
* temperature flag
13352400 0
*
* temperature pt
13352401 563.15 11
*
* vol inc type code factor hs
13352501 335110000 00000 1 1 0.75275 1
*
* vol inc type code factor hs

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13352601 -900 0 4910 1 0.75275 1
*
* source type mult D-rt D-rt hs
13352701 0 0.0 0.0 1
*
13352800 1
* Dhe LHEF LHSr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13352801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 3401 *****
* main coolant pump in loop 3
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13401000 1 9 2 1 0.06532 0
*
* loc flag
13401100 1401
*
* temperature flag
13401400 0
*
* temperature pt
13401401 563.15 9
*
* vol inc type code factor hs
13401501 340010000 00000 1 1 0.746 1
*
* vol inc type code factor hs
13401601 -900 0 4911 1 0.746 1
*
* source type mult D-rt D-rt hs
13401701 0 0.0 0.0 0.0 1
*
13401800 1
* Dhe LHEF LHSr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
13401801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
*
***** STRUCTURE 3421 *****
* cold leg isolation valve in loop 3
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13421000 1 11 2 1 0.04355 0
*
* loc flag
13421100 0 2
*
* dx int
13421101 0.00352 2
13421102 0.00704 4
13421103 0.01056 6
13421104 0.01407 8
13421105 0.03550 10
*
* compos. int
13421201 1 8
13421202 3 10
*
* source int
13421301 0.0 10
*
* temperature flag
13421400 0
*
* temperature pt
13421401 563.15 11
*
* vol inc type code factor hs
13421501 342010000 00000 1 1 0.880 1

```

```

13591401 563.15 11
*
* vol inc type code factor hs
13591501 359010000 00000 1 1 0.2924 1
*
* vol inc type code factor hs
13591601 372010000 0 1 1 0.2924 1
*
* source type mult D-rt hs
13591701 0 0.0 0.0 0.0 1
*
13591800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13591801 0.0 10. 10. 10. 0.0 0.0 1.0 0.034 1.1 1.0 1
*
13591900 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13591901 0.0 10. 10. 10. 0.0 0.0 1.0 0.012 1.1 1.0 1
*
***** STRUCTURE 3601 *****
* lower steam generator housing for loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13601000 1 11 2 1 0.2200 0
*
* loc flag
13601100 1601
*
* temperature flag
13601400 0
*
* temperature pt
13601401 563.15 11
*
* vol inc type code factor hs
13601501 370010000 00000 1 1 0.563 1
*
* vol inc type code factor hs
13601601 -900 0 4913 1 0.563 1
*
* source type mult D-rt hs
13601701 0 0.0 0.0 0.0 1
*
13601800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13601801 0.0 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 1
*
***** STRUCTURE 3602 *****
* upper steam generator housing for loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13602000 7 11 2 1 0.2200 0
*
* loc flag
13602100 1602 2
*
* temperature flag
13602400 0
*
* temperature pt
13602401 563.15 11
*
* vol inc type code factor hs
13602501 370020000 10000 1 1 0.476 3
13602502 370050000 00000 1 1 0.374 4
13602503 372010000 00000 1 1 0.630 5
13602504 375010000 10000 1 1 0.470 7
*

```

```

* vol inc type code factor hs
13602601 -900 0 4913 1 0.476 3
13602602 -900 0 4913 1 0.374 4
13602603 -900 0 4913 1 0.630 5
13602604 -900 0 4913 1 0.470 7
*
* source type mult D-rt hs
13602701 0 0.0 0.0 0.0 7
*
13602800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13602801 0.0 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 7
*
***** STRUCTURE 3603 *****
* upper head for steam generator housing for loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13603000 1 11 1 1 0.0000 0
*
* loc flag
13603100 1603 2
*
* temperature flag
13603400 0
*
* temperature pt
13603401 563.15 11
*
* vol inc type code factor hs
13603501 375020000 00000 1 1 0.14941 1
*
* vol inc type code factor hs
13603601 -900 0 4913 1 0.14941 1
*
* source type mult D-rt hs
13603701 0 0.0 0.0 0.0 1
*
13603800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13603801 0.0 10. 10. 10. 0.0 0.0 1.0 0.11 1.1 1.0 1
*
***** STRUCTURE 3701 *****
* lower head of the steam generator housing for loop 3
*=====
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
13701000 2 11 2 1 0.6691 0
*
* loc flag
13701100 1701
*
* temperature flag
13701400 0
*
* temperature pt
13701401 563.15 11
*
* vol inc type code factor hs
13701501 310010000 2000000 1 1 0.01701 2
*
* vol inc type code factor hs
13701601 370010000 0 1 1 0.01701 2
*
* source type mult D-rt hs
13701701 0 0.0 0.0 0.0 2
*
13701800 1
* Dhe LHEF LGSF LGSr Kfwd Krev Fboil nclf povd ff hs
13701801 0.0 10. 10. 10. 0.0 0.0 1.0 0.200 1.1 1.0 2
*

```

```

* 13701900      1      Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff  hs
* 13701901 0.0 10. 10. 10. 0.0 0.0 1.0 0.11 1.1 1.0 2
*
* ***** STRUCTURE 4011 *****
* * hot leg nozzle and pipe in loop 4
* *
* * ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 14011000 1 11 2 1 0.03800 0
*
* * loc flag
* 14011100 0 2
*
* * dx int
* 14011101 0.00085 2
* 14011102 0.00170 4
* 14011103 0.00255 6
* 14011104 0.00340 8
* 14011105 0.00350 10
*
* * compos. int
* 14011201 1 8
* 14011202 3 10
*
* * source int
* 14011301 0.0 10
*
* * temperature flag
* 14011400 0
*
* * temperature pt
* 14011401 563.15 11
*
* * vol inc
* 14011501 401010000 0
*
* * type
* 14011601 -900 0
*
* * D-rt hs
* 14011701 0 0.0 0.0 1
*
* * source int
* 14011800 1
*
* * Dhe LHEF LGSf LGSr Kfwd Krev Fboil nclf povd ff  hs
* 14011801 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 1
*
* ***** STRUCTURE 4012 *****
* * hot leg in loop 4
* *
* * ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 14012000 2 11 2 1 0.03800 0
*
* * loc flag
* 14012100 0 2
*
* * dx int
* 14012101 0.00080 2
* 14012102 0.00160 4
* 14012103 0.00240 6
* 14012104 0.00320 8
* 14012105 0.00350 10
*
* * compos. int
* 14012201 1 8
* 14012202 3 10
*
* * source int

```

```

* 14151900 1
* Dhe LHEf LHSr LGSf Kfwd Krev Fboil nclf povd ff hs
14151901 0.0 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
*****
* steam generator tubes - level 1 loop 4
*****
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14211000 10 11 2 1 0.00650 0
*
* loc flag
14211100 0 2
*
* dx dx int
14211101 0.000075 2
14211102 0.000150 4
14211103 0.000300 6
14211104 0.000150 8
14211105 0.000075 10
*
* compos. int
14211201 1 10
*
* source int
14211301 0.0 10
*
* temperature flag
14211400 0
*
* temperature pt
14211401 563.15 11
*
* vol inc type code factor hs
14211501 421010000 10000 1 1 7.4592 10
*
* vol inc type code factor hs
14211601 470010000 0 134 1 7.4592 10
*
* source type mult D-rt hs
14211701 0 0.0 0.0 0.0 10
*
14211800 1
* Dhe LHEf LHSr LGSf Kfwd Krev Fboil nclf povd ff hs
14211801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
14211802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
14211803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
14211804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
14211805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
14211806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
14211807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
14211808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
14211809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
14211810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
14211900 1
* Dhe LHEf LHSr LGSf Kfwd Krev Fboil nclf povd ff hs
14211901 0.0 0.21 2.08 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
*****
* steam generator tubes - level 2 loop 4
*****
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14221000 10 11 2 1 0.00650 0
*
* loc flag
14221100 1211
*

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```

* 14014100 0 2
* dx dx int
14014101 0.00080 2
14014102 0.00160 4
14014103 0.00240 6
14014104 0.00320 8
14014105 0.03550 10
*
* compos. int
14014201 1 8
14014202 3 10
*
* source int
14014301 0.0 10
*
* temperature flag
14014400 0
*
* temperature pt
14014401 563.15 11
*
* vol inc type code factor hs
14014501 401050000 10000 1 1 0.567 3
*
* vol inc type code factor hs
14014601 -900 0 4910 1 0.567 3
*
* source type mult D-rt hs
14014701 0 0.0 0.0 0.0 3
*
14014800 1
* Dhe LHEf LHSr LGSf Kfwd Krev Fboil nclf povd ff hs
14014801 0.0 10. 10. 10. 0.0 0.0 1.0 1.5 1.1 1.0 3
*
*****
* hot collector in loop 4
*****
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14151000 5 11 2 1 0.03649 0
*
* loc flag
14151100 1151
*
* temperature flag
14151400 0
*
* temperature pt
14151401 563.15 11
*
* vol inc type code factor hs
14151501 415010000 00000 1 1 0.563 1
14151502 415020000 10000 1 1 0.476 4
14151503 415050000 00000 1 1 0.374 5
*
* vol inc type code factor hs
14151601 470010000 00000 1 1 0.563 1
14151602 470020000 10000 1 1 0.476 4
14151603 470050000 00000 1 1 0.374 5
*
* source type mult D-rt hs
14151701 0 0.0 0.0 0.0 5
*
14151800 1
* Dhe LHEf LHSr LGSf Kfwd Krev Fboil nclf povd ff hs
14151801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5

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```

* 14231900 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14231901 0.0 1.21 1.09 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
* *****
* steam generator tubes - level 4 loop 4
* *****
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 14241000 10 11 2 1 0.00650 0
*
* loc flag
* 14241100 1211
*
* temperature flag
* 14241400 0
*
* temperature pt
* 14241401 563.15 11
*
* vol inc type code factor hs
* 14241501 424010000 10000 1 1 7.4592 10
*
* vol inc type code factor hs
* 14241601 470040000 0 134 1 7.4592 10
*
* source type mult D-rt D-lt hs
* 14241701 0 0.0 0.0 0.0 10
*
* 14241800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14241801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
* 14241802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
* 14241803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
* 14241804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
* 14241805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
* 14241806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
* 14241807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
* 14241808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
* 14241809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
* 14241810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
* 14241900 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14241901 0.0 0.73 1.56 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
* *****
* steam generator tubes - level 3 loop 4
* *****
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
* 14231000 10 11 2 1 0.00650 0
*
* loc flag
* 14231100 1211
*
* temperature flag
* 14231400 0
*
* temperature pt
* 14231401 563.15 11
*
* vol inc type code factor hs
* 14231501 423010000 10000 1 1 7.4592 10
*
* vol inc type code factor hs
* 14231601 470030000 0 134 1 7.4592 10
*
* source type mult D-rt D-lt hs
* 14231701 0 0.0 0.0 0.0 10
*
* 14231800 1
* Dhe LHEf LHEr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14231801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
* 14231802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
* 14231803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
* 14231804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
* 14231805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
* 14231806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
* 14231807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
* 14231808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
* 14231809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
* 14231810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10

```



```

14251701 0 0.0 0.0 0.0 0.0 10
*
14251800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14251801 0.0 0.53 10.12 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 1
14251802 0.0 1.60 9.06 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 2
14251803 0.0 2.66 7.99 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 3
14251804 0.0 3.73 6.93 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 4
14251805 0.0 4.80 5.86 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 5
14251806 0.0 5.86 4.80 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 6
14251807 0.0 6.93 3.73 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 7
14251808 0.0 7.99 2.66 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 8
14251809 0.0 9.06 1.60 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 9
14251810 0.0 10.12 0.53 10. 10. 0.0 0.0 1.0 0.013 1.1 1.2 10
*
14251900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14251901 0.0 2.11 0.19 10. 10. 0.0 0.0 1.0 2.3 1.56 1.0 10
*
***** STRUCTURE 4291 *****
* cold collector in loop 4
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14291000 5 11 2 1 0.03649 0
*
* loc flag
14291100 1151
*
* temperature flag
14291400 0
*
* temperature pt
14291401 563.15 11
*
14291501 vol inc code factor hs
14291501 429010000 00000 1 1 0.563 1
14291502 429020000 10000 1 1 0.476 4
14291503 429050000 00000 1 1 0.374 5
*
* vol inc code factor hs
14291601 470010000 00000 1 1 0.563 1
14291602 470020000 10000 1 1 0.476 4
14291603 470050000 00000 1 1 0.374 5
*
* source type mult D-rt hs
14291701 0 0.0 0.0 0.0 5
*
14291800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14291801 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
14291900 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14291901 0.0 10. 10. 10. 0.0 0.0 1.0 2.37 1.1 1.0 5
*
***** STRUCTURE 4351 *****
* pump suction piping in loop 4
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14351000 13 11 2 1 0.03800 0
*
* loc flag
14351100 0 2
*
* dx int
14351101 0.00080 2
14351102 0.00160 4
14351103 0.00240 6

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```

14351104 0.00320 8
14351105 0.03550 10
*
* compos. int
14351201 1 8
14351202 3 10
*
* source int
14351301 0.0 10
*
* temperature flag
14351400 0
*
* temperature pt
14351401 563.15 11
*
* vol inc code factor hs
14351501 435010000 10000 1 1 0.828 5
14351502 435060000 10000 1 1 1.042 7
14351503 435080000 00000 1 1 1.131 8
14351504 435090000 10000 1 1 0.7495 10
14351505 435120000 10000 1 1 0.74775 13
*
* vol inc code factor hs
14351601 -900 0 4910 1 0.828 5
14351602 -900 0 4910 1 1.042 7
14351603 -900 0 4910 1 1.131 8
14351604 -900 0 4910 1 0.7495 10
14351605 -900 0 4910 1 0.74775 13
*
* source type mult D-rt hs
14351701 0 0.0 0.0 0.0 13
*
14351800 1
* Dhe LHf LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14351801 0.0 10. 10. 10. 0.0 0.0 1.0 6.6 1.1 1.0 8
14351802 0.0 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 10
14351803 0.0 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 13
*
***** STRUCTURE 4352 *****
* pump suction piping and filter in loop 4
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14352000 1 11 2 1 0.05906 0
*
* loc flag
14352100 0 2
*
* dx int
14352101 0.00244 2
14352102 0.00489 4
14352103 0.00733 6
14352104 0.00977 8
14352105 0.03550 10
*
* compos. int
14352201 1 8
14352202 3 10
*
* source int
14352301 0.0 10
*
* temperature flag
14352400 0
*
* temperature pt
14352401 563.15 11
*

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```

* 14352501 435110000 00000 1 1 code factor hs
* 14352601 -900 0 4910 1 type code factor hs
* 14352701 0 0.0 0.0 D-rt hs
* 14352800 1 Dhe LHEF LGSr Kfwd Krev Fboil nclf povd ff hs
* 14352801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
* ***** STRUCTURE 4401 *****
* main coolant pump in loop 4
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14401000 1 9 2 1 0.06532 0
* 14401100 1401 loc flag
* 14401400 0 temperature flag
* 14401501 440010000 00000 1 1 type code factor hs
* 14401601 -900 0 4911 1 type code factor hs
* 14401701 0 0.0 0.0 D-rt hs
* 14401800 1 Dhe LHEF LGSr Kfwd Krev Fboil nclf povd ff hs
* 14401801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 2.9 1.1 1.0 1
* ***** STRUCTURE 4421 *****
* cold leg isolation valve in loop 4
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14421000 1 11 2 1 0.04355 0
* 14421100 0 2 loc flag
* 14421101 0.00352 2 dx int
* 14421102 0.00704 4 14421103 0.01056 6 14421104 0.01407 8 14421105 0.03550 10
* 14421201 1 8 compos. int
* 14421202 3 10 14421301 0.0 10 source int
* 14421400 0 temperature flag
* ***** STRUCTURE 4451 *****
* cold leg in loop 4
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14451000 4 11 2 1 0.03800 0
* 14451100 0 2 loc flag
* 14451101 0.00080 2 dx int
* 14451102 0.00160 4 14451103 0.00240 6 14451104 0.00320 8 14451105 0.03550 10
* 14451201 1 8 compos. int
* 14451202 3 10 14451301 0.0 10 source int
* 14451400 0 temperature flag
* 14451401 563.15 11 temperature pt
* 14451501 445010000 10000 1 1 type code factor hs
* 14451502 445030000 00000 1 1 1 0.741 4
* 14451601 -900 0 4910 1 type code factor hs
* 14451602 -900 0 4910 1 1 0.741 4
* 14451701 0 0.0 0.0 D-rt hs
* 14451800 1 Dhe LHEF LGSr Kfwd Krev Fboil nclf povd ff hs
* 14451801 0.0 10. 10. 10. 10. 0.0 0.0 1.0 0.076 1.1 1.0 4
* ***** STRUCTURE 4591 *****
* feedwater header for loop 4
*ht str ht.strs m.pts geom init 1.coord refl b.vol ax.incr.
14591000 1 11 2 1 0.07456 0
* 14591100 1591 loc flag

```

```

* 14591400 0 temperature flag
*
* 14591401 563.15 11 temperature pt
*
* 14591501 459010000 00000 vol inc type code factor hs
* 14591601 472010000 0 vol inc type code factor hs
* 14591701 0 mult D-rt D-rt hs
* 14591800 1 Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14591901 0 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.034 1.1 1.0 1
*
* 14591900 1 Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14591901 0 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.012 1.1 1.0 1
*
* ***** STRUCTURE 4601 *****
* lower steam generator housing for loop 4
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14601000 1 11 2 1 0.2200 0
*
* 14601100 1601 loc flag
*
* 14601400 0 temperature flag
*
* 14601401 563.15 11 temperature pt
*
* 14601501 470010000 00000 vol inc type code factor hs
* 14601601 470010000 0 vol inc type code factor hs
* 14601701 0 mult D-rt D-rt hs
*
* 14601800 1 Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
* 14601801 0 10. 10. 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 1
*
* ***** STRUCTURE 4602 *****
* upper steam generator housing for loop 4
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14602000 7 11 2 1 0.2200 0
*
* 14602100 1602 loc flag
*
* 14602400 0 temperature flag
*
* 14602401 563.15 11 temperature pt
*
* 14602501 470020000 10000 vol inc type code factor hs
*
14602502 470050000 00000 1 1 0.374 4
14602503 472010000 00000 1 1 0.630 5
14602504 475010000 10000 1 1 0.470 7
*
* vol inc type code factor hs
14602601 -900 0 4913 1 0.476 3
14602602 -900 0 4913 1 0.374 4
14602603 -900 0 4913 1 0.630 5
14602604 -900 0 4913 1 0.470 7
*
* source type mult D-rt D-rt hs
14602701 0 0.0 0.0 0.0 7
*
14602800 1
* Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14602801 0 10. 10. 10. 10. 10. 0.0 0.0 1.0 3.9 1.1 1.0 7
*
* ***** STRUCTURE 4603 *****
* upper head for steam generator housing for loop 4
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14603000 1 11 1 1 0.0000 0
*
* 14603100 1603 loc flag
*
* 14603401 563.15 11 temperature pt
*
* 14603501 475020000 00000 vol inc type code factor hs
* 14603601 -900 0 4913 1 0.14941 1
*
* source type mult D-rt D-rt hs
14603701 0 0.0 0.0 0.0 1
*
14603800 1
* Dhe LHEF LHER LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
14603801 0 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.11 1.1 1.0 1
*
* ***** STRUCTURE 4701 *****
* lower head of the steam generator housing for loop 4
*
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
14701000 2 11 2 1 0.6691 0
*
* 14701100 1701 loc flag
*
* 14701400 0 temperature flag
*
* 14701401 563.15 11 temperature pt
*
* 14701501 410010000 2000000 vol inc type code factor hs
*
* 14701601 470010000 0 vol inc type code factor hs
*
* source type mult D-rt D-rt hs
14701701 0 0.0 0.0 0.0 2

```

```

* 14701800      1      Dhe  LHEf  LHER  LGSf  LGSr  Kfwd  Krev  Fboil nclf povd ff  hs
* 14701801 0.0 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.200 1.1 1.0 2
*
* 14701900      1      Dhe  LHEf  LHER  LGSf  LGSr  Kfwd  Krev  Fboil nclf povd ff  hs
* 14701901 0.0 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.11 1.1 1.0 2
*
* ***** STRUCTURE 5010 *****
* pressurizer surge line in loop 2
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15010000 1 11 2 1 0.0215 0
*
* loc flag
15010100 0 1
*
* intervals radius
15010101 2 0.0222
15010102 2 0.0236
15010103 2 0.0257
15010104 2 0.0285
15010105 2 0.090
*
* compos. int
15010201 1 8
15010202 3 10
*
* source int
15010301 0.0 10
*
* temperature flag
15010400 0
*
* temperature pt
15010401 550.0 11
*
* vol inc type code factor hs
15010501 501010000 00000 1 1 1.126 1
*
* vol inc type code factor hs
15010601 -900 0 4912 1 1.126 1
*
* source type mult D-rt hs
15010701 0 0.0 0.0 1
*
* 15010800      1      Dhe  LHEf  LHER  LGSf  LGSr  Kfwd  Krev  Fboil nclf povd ff  hs
* 15010801 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 1.877 1.1 1.0 1
*
* ***** STRUCTURE 5050 *****
* pressurizer surge line in loop 2
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15050000 7 11 2 1 0.0215 0
*
* loc
15050100 5010
*
* temperature flag
15050400 0
*
* temperature pt
15050401 550.0 11
*
* vol inc type code factor hs
15050501 505010000 00000 1 1 0.876 1
*

```

```

15050502 505020000 00000 1 1 0.662 2
15050503 505030000 10000 1 1 0.940 6
15050504 505070000 00000 1 1 1.031 7
*
* vol inc type code factor hs
15050601 -900 0 4912 1 0.876 1
15050602 -900 0 4912 1 0.662 2
15050603 -900 0 4912 1 0.940 6
15050604 -900 0 4912 1 1.031 7
*
* source type mult D-rt hs
15050701 0 0.0 0.0 7
*
* 15050800      1      Dhe  LHEf  LHER  LGSf  LGSr  Kfwd  Krev  Fboil nclf povd ff  hs
* 15050801 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 1.877 1.1 1.0 1
* 15050802 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.043 1.1 1.0 2
* 15050803 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 3.760 1.1 1.0 6
* 15050804 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 0.043 1.1 1.0 7
*
* ***** STRUCTURE 5110 *****
* pressurizer surge line in loop 4
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15110000 1 11 2 1 0.0215 0
*
* loc
15110100 5010
*
* temperature flag
15110400 0
*
* temperature pt
15110401 550.0 11
*
* vol inc type code factor hs
15110501 511010000 00000 1 1 1.345 1
*
* vol inc type code factor hs
15110601 -900 0 4912 1 1.345 1
*
* source type mult D-rt hs
15110701 0 0.0 0.0 1
*
* 15110800      1      Dhe  LHEf  LHER  LGSf  LGSr  Kfwd  Krev  Fboil nclf povd ff  hs
* 15110801 0.043 10. 10. 10. 10. 10. 10. 0.0 0.0 1.0 3.847 1.1 1.0 1
*
* ***** STRUCTURE 5150 *****
* pressurizer surge line in loop 4
* ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15150000 6 11 2 1 0.0215 0
*
* loc
15150100 5010
*
* temperature flag
15150400 0
*
* temperature pt
15150401 550.0 11
*
* vol inc type code factor hs
15150501 515010000 10000 1 1 1.338 2
15150502 515030000 10000 1 1 1.321 4
15150503 515050000 00000 1 1 1.790 5
15150504 515060000 00000 1 1 1.091 6

```



```

*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15301000 1 11 1 1 0.0
*
* loc flag
15301100 0 1
*
* intervals radius
15301101 2 0.0111
15301102 2 0.0333
15301103 2 0.0666
15301104 2 0.1110
15301105 2 0.1965
*
* compos. int
15301201 1 8
15301202 3 10
*
* source int
15301301 0.0 10
*
* temperature flag
15301400 0
*
* temperature pt
15301401 550.0 11
*
* vol inc
15301501 530010000 00000
*
* vol inc
15301601 -900 0
*
* source type mult D-rt D-rt hs
15301701 0 0.0 0.0 1
*
15301800 1
*
* Dhe LHEF LHSr LGSf LGSr Kfwd Krev Fboil nclf povd ff hs
15301801 0.163 10. 10. 10. 10. 0.0 0.0 1.0 0.01 1.1 1.0 1
*
***** STRUCTURE 5302 *****
* pressurizer heaters
*ht str ht.strs m.pts geom init l.coord refl b.vol ax.incr.
15302000 1 6 2 1 0.0
*
* loc flag
15302100 0 1
*
* intervals radius
15302101 1 0.005
15302102 4 0.0065
*
* compos. int
15302201 6 1
15302202 1 5
*
* source int
15302301 1.0 1
15302302 0.0 5
*
* temperature flag
15302400 0
*
* temperature pt
15302401 550.0 6
*
* vol inc
15302501 0 0
*
* type code
15302501 0 0 1
*
* factor hs
15302501 18.0 1

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```

20100207      1073.      341.
*
20100251      273.      3.465e6
20100252      273.      3.516e6
20100253      473.      3.576e6
20100254      573.      3.635e6
20100255      673.      3.693e6
20100256      773.      3.797e6
20100257      1073.      3.455e6
***** COMPOSITION 3 *****
=====
20100300 tbl/fctn      1      1      * glass wool
*-----
20100301
*
20100351      3.42e4
***** COMPOSITION 4 *****
=====
20100400 tbl/fctn      1      1      * nichrome
*-----
20100401      373.      15.0
20100402      1273.      27.0
*
20100451      373.      3.864e6
20100452      1273.      3.864e6
***** COMPOSITION 5 *****
=====
20100500 tbl/fctn      1      1      * magnesium oxide
*-----
20100501      373.      5.0
20100502      1273.      2.5
*
20100551      373.      3.026e6
20100552      1273.      3.664e6
***** COMPOSITION 6 *****
=====
20100600 tbl/fctn      1      1      * periclase
*-----
20100601      373.      3.73
20100602      473.      3.35
20100603      673.      2.60
20100604      773.      2.33
20100605      873.      2.15
20100606      923.      2.12
20100607      1073.      2.30
20100608      1173.      2.50
20100609      1273.      2.80
*
20100651      373.      3.026e6
20100652      1273.      3.664e6
***** COMPOSITION 7 *****
=====
20100700 tbl/fctn      1      1      * secondary insulation
*-----
20100701      1.0
*
20100751      3.42e4
*-----
* bypass power table
*20205000 power      0
*20205001      0.0      17.4e3
20205000 power      50
20205001      -1.0      0.0
20205002      0.0      17.4e3
20205003      5.0      17.4e3
20205004      6.0      16.8e3
20205005      24.0      16.8e3
20205006      30.0      14.0e3

20205007      39.0      12.0e3
20205008      61.0      11.2e3
20205009      90.0      11.85e3
20205010      110.0      11.6e3
20205011      149.0      11.65e3
20205012      200.0      11.2e3
20205013      278.0      11.13e3
20205014      350.0      11.2e3
20205015      446.0      11.4e3
20205016      545.0      11.9e3
20205017      559.0      11.6e3
20205018      1200.0      11.6e3
*-----
* core simulator power table
20100000 power      0      1.0      1.e6
20210001      0.0      1.520
20210002      5.0      1.520
20210003      6.0      1.410
20210004      13.0      1.410
20210005      15.0      1.388
20210006      24.0      1.388
20210007      28.0      1.200
20210008      36.0      1.040
20210009      44.0      1.010
20210010      50.0      1.001
20210011      61.0      0.971
20210012      90.0      1.015
20210013      106.0      1.005
20210014      147.0      1.012
20210015      198.0      0.985
20210016      327.0      0.985
20210017      350.0      0.990
20210018      1200.0      0.990
*-----
* pressurizer heater power table
20253000 power      1533
20253001      0.0      0.0
20253002      1.0      70.0e3
*-----
* ambient air -- 33 deg C
*-----
20290000 temp      306.15
20290001      0.0
*-----
* heat transfer coefficient to air
*-----
20291000 htc-temp      0      1.0      0.0      1.2
20291001      348.15      2.579
20291002      398.15      3.250
20291003      440.98      3.660
20291004      498.15      4.095
*-----
* exterior heat transfer coefficient for main coolant pumps
*-----
20291100 htc-temp
20291101      306.15      1926.
*-----
* heat transfer coefficient to air for pressurizer and surge line
*-----
20291200 htc-temp
20291201      381.2      2.59
20291202      404.0      2.93
20291203      416.7      3.12
20291204      442.6      3.53
20291205      449.8      3.99
*-----
* heat transfer coefficient to air for secondary coolant system
*-----

```

```

20291300 htc-temp
20291301 381.2 10.0
*****$
* CONTROL VARIABLES $
*****$
20500000 9999
*
*=====
* core collapsed liquid level
*=====
*ctlvar name type factor init f c min max
20500400 corlcvl sum 1.0 3.53 1 0
*
*ctlvar a0 coeff var parameter coeff var parameter
20500401 0.0 0.255 voidf 040010000 0.255 voidf 040020000
20500402 0.255 voidf 040030000 0.255 voidf 040040000
20500403 0.255 voidf 040050000 0.255 voidf 040060000
20500404 0.255 voidf 040070000 0.255 voidf 040080000
20500405 0.255 voidf 040090000 0.255 voidf 040100000
20500406 0.255 voidf 040110000 0.255 voidf 040120000
20500407 0.255 voidf 040130000 0.215 voidf 040140000
*
*=====
* Bypass heater maximum wall temperature
*=====
*ctlvar name type factor init f
20500500 bytrtmx stfnctn 1.0 506.002 1
*
*ctlvar function var name param var name param
20500501 max htemp 050200201 htemp 050200301
20500502 htemp 050200401 htemp 050200501
20500503 htemp 050200601 htemp 050200701
20500504 htemp 050200801
*
*=====
* main circulation pump speed controllers
*=====
*ctlvar name type factor
20501400 "MCP1 spd" constant 39.0738 * trancalc
*
*ctlvar name type factor
20502400 "MCP2 spd" constant 39.0749 * trancalc
*
*ctlvar name type factor
20503400 "MCP3 spd" constant 39.0739 * trancalc
*
*ctlvar name type factor
20504400 "MCP4 spd" constant 40.4556 * trancalc
*
* steam generator power (kw)
*=====
*ctlvar name type factor init f c min max
20501610 sg1tbl-q sum -0.001 67.4524 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501611 0.0 1.0 q 121010000 1.0 q 121020000
20501612 1.0 q 121030000 1.0 q 121040000
20501613 1.0 q 121050000 1.0 q 121060000
20501614 1.0 q 121070000 1.0 q 121080000
20501615 1.0 q 121090000 1.0 q 121100000
*
*ctlvar name type factor init f c min max
20501620 sg1tb2-q sum -0.001 68.9221 1 0
*

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```

*ctlvar a0 coeff var name param coeff var name param
20501621 0.0 1.0 q 122010000 1.0 q 122020000
20501622 1.0 q 122030000 1.0 q 122040000
20501623 1.0 q 122050000 1.0 q 122060000
20501624 1.0 q 122070000 1.0 q 122080000
20501625 1.0 q 122090000 1.0 q 122100000
*
*ctlvar name type factor init f c min max
20501630 sg1tb3-q sum -0.001 70.101 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501631 0.0 1.0 q 123010000 1.0 q 123020000
20501632 1.0 q 123030000 1.0 q 123040000
20501633 1.0 q 123050000 1.0 q 123060000
20501634 1.0 q 123070000 1.0 q 123080000
20501635 1.0 q 123090000 1.0 q 123100000
*
*ctlvar name type factor init f c min max
20501640 sg1tb4-q sum -0.001 70.941 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501641 0.0 1.0 q 124010000 1.0 q 124020000
20501642 1.0 q 124030000 1.0 q 124040000
20501643 1.0 q 124050000 1.0 q 124060000
20501644 1.0 q 124070000 1.0 q 124080000
20501645 1.0 q 124090000 1.0 q 124100000
*
*ctlvar name type factor init f c min max
20501650 sg1tb5-q sum -0.001 60.8294 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501651 0.0 1.0 q 125010000 1.0 q 125020000
20501652 1.0 q 125030000 1.0 q 125040000
20501653 1.0 q 125050000 1.0 q 125060000
20501654 1.0 q 125070000 1.0 q 125080000
20501655 1.0 q 125090000 1.0 q 125100000
*
*ctlvar name type factor init f c min max
20501660 sg1hc-q sum -0.001 14.06567 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501661 0.0 1.0 q 115010000 1.0 q 115020000
20501662 1.0 q 115030000 1.0 q 115040000
20501663 1.0 q 115050000
*
*ctlvar name type factor init f c min max
20501670 sg1cc-q sum -0.001 .284509 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501671 0.0 1.0 q 129010000 1.0 q 129020000
20501672 1.0 q 129030000 1.0 q 129040000
20501673 1.0 q 129050000 1.0 q 129060000
*
*ctlvar name type factor init f c min max
20501700 sg1-q sum 1.0 347.601 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20501701 0.0 1.0 cntrlvar 161 1.0 cntrlvar 162
20501702 1.0 cntrlvar 163 1.0 cntrlvar 164
20501703 1.0 cntrlvar 165 1.0 cntrlvar 166
20501704 1.0 cntrlvar 167 -0.001 q 110010000
20501705 -0.001 q 130010000 -0.001 q 159010000
*
*ctlvar name type factor init f c min max
20502610 sg2tbl-q sum -0.001 67.4517 1 0
*
*ctlvar a0 coeff var name param coeff var name param
20502611 0.0 1.0 q 221010000 1.0 q 221020000

```


20502612	1.0	q	221030000	1.0	q	221040000			
20502613	1.0	q	221050000	1.0	q	221060000			
20502614	1.0	q	221070000	1.0	q	221080000			
20502615	1.0	q	221090000	1.0	q	221100000			
*ctlvar	name	type	factor	init	f c	min	max		
20502620	sg2tb2-q	sum	-0.001	68.9214	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502621	0.0	1.0	q	222010000	1.0	q	222020000		
20502622	1.0	q	222030000	1.0	q	222040000			
20502623	1.0	q	222050000	1.0	q	222060000			
20502624	1.0	q	222070000	1.0	q	222080000			
20502625	1.0	q	222090000	1.0	q	222100000			
*ctlvar	name	type	factor	init	f c	min	max		
20502630	sg2tb3-q	sum	-0.001	70.1002	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502631	0.0	1.0	q	223010000	1.0	q	223020000		
20502632	1.0	q	223030000	1.0	q	223040000			
20502633	1.0	q	223050000	1.0	q	223060000			
20502634	1.0	q	223070000	1.0	q	223080000			
20502635	1.0	q	223090000	1.0	q	223100000			
*ctlvar	name	type	factor	init	f c	min	max		
20502640	sg2tb4-q	sum	-0.001	70.9403	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502641	0.0	1.0	q	224010000	1.0	q	224020000		
20502642	1.0	q	224030000	1.0	q	224040000			
20502643	1.0	q	224050000	1.0	q	224060000			
20502644	1.0	q	224070000	1.0	q	224080000			
20502645	1.0	q	224090000	1.0	q	224100000			
*ctlvar	name	type	factor	init	f c	min	max		
20502650	sg2tb5-q	sum	-0.001	60.8296	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502651	0.0	1.0	q	225010000	1.0	q	225020000		
20502652	1.0	q	225030000	1.0	q	225040000			
20502653	1.0	q	225050000	1.0	q	225060000			
20502654	1.0	q	225070000	1.0	q	225080000			
20502655	1.0	q	225090000	1.0	q	225100000			
*ctlvar	name	type	factor	init	f c	min	max		
20502660	sg2hc-q	sum	-0.001	14.0655	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502661	0.0	1.0	q	215010000	1.0	q	215020000		
20502662	1.0	q	215030000	1.0	q	215040000			
20502663	1.0	q	215050000						
*ctlvar	name	type	factor	init	f c	min	max		
20502670	sg2cc-q	sum	-0.001	.284579	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502671	0.0	1.0	q	229010000	1.0	q	229020000		
20502672	1.0	q	229030000	1.0	q	229040000			
20502673	1.0	q	229050000	1.0	q	229060000			
*ctlvar	name	type	factor	init	f c	min	max		
20502700	sg2-q	sum	1.0	347.59	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20502701	0.0	1.0	cntrlvar 261	1.0	cntrlvar 262				
20502702	1.0	cntrlvar 263		1.0	cntrlvar 264				
20502703	1.0	cntrlvar 265		1.0	cntrlvar 266				

20502704	1.0	cntrlvar 267							
20502705	-0.001	q	230010000	-0.001	q	210010000			
*ctlvar	name	type	factor	init	f c	min	max		
20503610	sg3tb1-q	sum	-0.001	67.4817	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503611	0.0	1.0	q	321010000	1.0	q	321020000		
20503612	1.0	q	321030000	1.0	q	321040000			
20503613	1.0	q	321050000	1.0	q	321060000			
20503614	1.0	q	321070000	1.0	q	321080000			
20503615	1.0	q	321090000	1.0	q	321100000			
*ctlvar	name	type	factor	init	f c	min	max		
20503620	sg3tb2-q	sum	-0.001	68.9532	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503621	0.0	1.0	q	322010000	1.0	q	322020000		
20503622	1.0	q	322030000	1.0	q	322040000			
20503623	1.0	q	322050000	1.0	q	322060000			
20503624	1.0	q	322070000	1.0	q	322080000			
20503625	1.0	q	322090000	1.0	q	322100000			
*ctlvar	name	type	factor	init	f c	min	max		
20503630	sg3tb3-q	sum	-0.001	70.1335	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503631	0.0	1.0	q	323010000	1.0	q	323020000		
20503632	1.0	q	323030000	1.0	q	323040000			
20503633	1.0	q	323050000	1.0	q	323060000			
20503634	1.0	q	323070000	1.0	q	323080000			
20503635	1.0	q	323090000	1.0	q	323100000			
*ctlvar	name	type	factor	init	f c	min	max		
20503640	sg3tb4-q	sum	-0.001	70.9744	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503641	0.0	1.0	q	324010000	1.0	q	324020000		
20503642	1.0	q	324030000	1.0	q	324040000			
20503643	1.0	q	324050000	1.0	q	324060000			
20503644	1.0	q	324070000	1.0	q	324080000			
20503645	1.0	q	324090000	1.0	q	324100000			
*ctlvar	name	type	factor	init	f c	min	max		
20503650	sg3tb5-q	sum	-0.001	60.8548	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503651	0.0	1.0	q	325010000	1.0	q	325020000		
20503652	1.0	q	325030000	1.0	q	325040000			
20503653	1.0	q	325050000	1.0	q	325060000			
20503654	1.0	q	325070000	1.0	q	325080000			
20503655	1.0	q	325090000	1.0	q	325100000			
*ctlvar	name	type	factor	init	f c	min	max		
20503660	sg3hc-q	sum	-0.001	14.07266	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503661	0.0	1.0	q	315010000	1.0	q	315020000		
20503662	1.0	q	315030000	1.0	q	315040000			
20503663	1.0	q	315050000						
*ctlvar	name	type	factor	init	f c	min	max		
20503670	sg3cc-q	sum	-0.001	.284378	1 0				
*ctlvar	a0	coeff	var name	coeff	var name	param			
20503671	0.0	1.0	q	329010000	1.0	q	329020000		
20503672	1.0	q	329030000	1.0	q	329040000			
20503673	1.0	q	329050000	1.0	q	329060000			


```

* accumulator 3 level
=====
*ctlvar      name      type      factor      init      f c      min      max
20506600    acc3lv1    sum      33.48962    4.11001    1 0
*
*ctlvar      a0      coeff      variable name      parameter no.
20506601    -0.022395    1.0      acvliq      660
*
=====
* accumulator 1 level
=====
*ctlvar      name      type      factor      init      f c      min      max
20506650    acc1lv1    sum      33.48962    4.08992    1 0
*
*ctlvar      a0      coeff      variable name      parameter no.
20506651    -0.022395    1.0      acvliq      665
*
=====
* integrated break flow rate
=====
*
20508010    ibrkflo    integral    1.0      0.      1
20508011    mflowj    801000000
*
=====
* vessel differential pressures (kPa)
=====
*
*ctlvar      name      type      factor      init      f c      min      max
20510010    ycldp01    sum      0.001      -8.5575    1 0
*
*ctlvar      a0      coeff      var      parameter
20510011    0.0      1.0      p      015010000
20510012    -1.0      p      012010000
*
*ctlvar      name      type      factor      init      f c      min      max
20510020    ycldp02    sum      0.001      -4.07784    1 0
*
*ctlvar      a0      coeff      var      parameter
20510021    0.0      1.0      p      012010000
20510022    -1.0      p      015050000
*
*ctlvar      name      type      factor      init      f c      min      max
20510030    ycldp03    sum      0.001      -25.6075    1 0
*
*ctlvar      a0      coeff      var      parameter
20510031    0.0      1.0      p      015050000
20510032    -1.0      p      015130000
*
*ctlvar      name      type      factor      init      f c      min      max
20510040    ycldp04    sum      0.001      -11.39573    1 0
*
*ctlvar      a0      coeff      var      parameter
20510041    0.0      1.0      p      015130000
20510042    -1.0      p      020010000
*
*ctlvar      name      type      factor      init      f c      min      max
20510050    ycldp05    sum      0.001      -8.38906    1 0
*
*ctlvar      a0      coeff      var      parameter
20510051    0.0      1.0      p      020010000
20510052    -1.0      p      022010000
*
*ctlvar      name      type      factor      init      f c      min      max
20510060    ycldp06    sum      0.001      8.52291    1 0
*
=====
*ctlvar      a0      coeff      var      parameter
20510061    0.0      1.0      p      020010000
20510062    -1.0      p      030020000
*
*ctlvar      name      type      factor      init      f c      min      max
20510070    ycldp07    sum      0.001      -7.45213    1 0
*
*ctlvar      a0      coeff      var      parameter
20510071    0.0      1.0      p      040040000
20510072    -1.0      p      030020000
*
*ctlvar      name      type      factor      init      f c      min      max
20510080    ycldp08    sum      0.001      -8.07858    1 0
*
*ctlvar      a0      coeff      var      parameter
20510081    0.0      1.0      p      040080000
20510082    -1.0      p      040040000
*
*ctlvar      name      type      factor      init      f c      min      max
20510090    ycldp09    sum      0.001      -4.70918    1 0
*
*ctlvar      a0      coeff      var      parameter
20510091    0.0      1.0      p      040100000
20510092    -1.0      p      040080000
*
*ctlvar      name      type      factor      init      f c      min      max
20510100    ycldp10    sum      0.001      -7.96534    1 0
*
*ctlvar      a0      coeff      var      parameter
20510101    0.0      1.0      p      040140000
20510102    -1.0      p      040100000
*
*ctlvar      name      type      factor      init      f c      min      max
20510110    ycldp11    sum      0.001      -6.00502    1 0
*
*ctlvar      a0      coeff      var      parameter
20510111    0.0      1.0      p      062010000
20510112    -1.0      p      040140000
*
*ctlvar      name      type      factor      init      f c      min      max
20510120    ycldp12    sum      0.001      -5.79419    1 0
*
*ctlvar      a0      coeff      var      parameter
20510121    0.0      1.0      p      062030000
20510122    -1.0      p      062010000
*
*ctlvar      name      type      factor      init      f c      min      max
20510130    ycldp13    sum      0.001      -11.09935    1 0
*
*ctlvar      a0      coeff      var      parameter
20510131    0.0      1.0      p      066010000
20510132    -1.0      p      062030000
*
*ctlvar      name      type      factor      init      f c      min      max
20510140    ycldp14    sum      0.001      -10.4164    1 0
*
*ctlvar      a0      coeff      var      parameter
20510141    0.0      1.0      p      062090000
20510142    -1.0      p      066010000
*
*ctlvar      name      type      factor      init      f c      min      max
20510150    ycldp15    sum      0.001      -17.54303    1 0
*
*ctlvar      a0      coeff      var      parameter
20510151    0.0      1.0      p      070020000
20510152    -1.0      p      062090000
*
*ctlvar      name      type      factor      init      f c      min      max

```

```

20510160 ycldp16 sum 0.001 18.54562 1 0
*
*ctlvar a0 coeff var parameter
20510161 0.0 1.0 p 012010000
20510162 -1.0 p 066010000
*
*ctlvar name type factor
20510170 ycldp17 sum 0.001 -35.1788 1 0
*
*ctlvar a0 coeff var parameter
20510171 0.0 1.0 p 050100000
20510172 -1.0 p 050020000
*
*=====
* dc differential pressure (kPa)
*=====
*
*ctlvar name type factor
20510200 ycldpdc sum 1.0 -41.0811 1 0
*
*ctlvar a0 coeff var parameter
20510201 0.0 1.0 cntrlvar 1002
20510202 1.0 cntrlvar 1004
*=====
* core differential pressure (kPa)
*=====
*
*ctlvar name type factor
20510300 ycldpco sum 1.0 -28.2052 1 0
*
*ctlvar a0 coeff var parameter
20510301 0.0 1.0 cntrlvar 1007
20510302 1.0 cntrlvar 1009
*=====
* upper plenum differential pressure (kPa)
*=====
*
*ctlvar name type factor
20510400 ycldpup sum 1.0 -22.89856 1 0
*
*ctlvar a0 coeff var parameter
20510401 0.0 1.0 cntrlvar 1011
20510402 1.0 cntrlvar 1013
*=====
* loop idifferential pressures (kPa)
*=====
*
*ctlvar name type factor
20511010 yaldp01 sum 0.001 1.586833 1 0
*
*ctlvar a0 coeff var parameter
20511011 0.0 1.0 p 066010000
20511012 -1.0 p 101040000
*
*ctlvar name type factor
20511020 yaldp02 sum 0.001 8.95972 1 0
*
*ctlvar a0 coeff var parameter
20511021 0.0 1.0 p 101040000
20511022 -1.0 p 101070000
*
*ctlvar name type factor
20511030 yaldp03 sum 0.001 3.627034 1 0
*
*ctlvar a0 coeff var parameter
20511031 0.0 1.0 p 101070000
20511032 -1.0 p 135010000
*
*ctlvar name type factor
20511040 yaldp04 sum 0.001 -22.0563 1 0
*
*ctlvar a0 coeff var parameter
20511041 0.0 1.0 p 135010000
20511042 -1.0 p 135040000
*
*ctlvar name type factor
20511050 yaldp05 sum 0.001 -24.3481 1 0
*
*ctlvar a0 coeff var parameter
20511051 0.0 1.0 p 135040000
20511052 -1.0 p 135090000
*
*ctlvar name type factor
20511060 yaldp06 sum 0.001 -14.7393 1 0
*
*ctlvar a0 coeff var parameter
20511061 0.0 1.0 p 145030000
20511062 -1.0 p 135090000
*
*ctlvar name type factor
20511080 yaldp08 sum 0.001 4.09756 1 0
*
*ctlvar a0 coeff var parameter
20511081 0.0 1.0 p 135090000
20511082 -1.0 p 135110000
*
*ctlvar name type factor
20511090 yaldp09 sum 0.001 -10.54117 1 0
*
*ctlvar a0 coeff var parameter
20511091 0.0 1.0 p 142010000
20511092 -1.0 p 135110000
*
*ctlvar name type factor
20511100 yaldp10 sum 0.001 .1005723 1 0
*
*ctlvar a0 coeff var parameter
20511101 0.0 1.0 p 142010000
20511102 -1.0 p 145030000
*
*ctlvar name type factor
20511110 yaldp11 sum 0.001 -1.054094 1 0
*
*ctlvar a0 coeff var parameter
20511111 0.0 1.0 p 145030000
20511112 -1.0 p 012010000
*
*ctlvar name type factor
20511130 yaldp13 sum 0.001 -19.83667 1 0
*
*ctlvar a0 coeff var parameter
20511131 0.0 1.0 p 115050000
20511132 -1.0 p 101070000
*
*ctlvar name type factor
20511140 yaldp14 sum 0.001 -20.93663 1 0
*
*ctlvar a0 coeff var parameter
20511141 0.0 1.0 p 129060000
20511142 -1.0 p 135010000
*=====
* loop 1 hot leg differential pressure (kPa)
*=====
*
*ctlvar name type factor
20511200 yalhleg sum 1.0 10.54655 1 0
*

```

```

*ctlvar a0 coeff var parameter coeff var parameter
20511201 0.0 1.0 cntrlvar 1101 1.0 cntrlvar 1102
*=====
* loop 1 loop seal down differential pressure (kPa)
*=====
*
*ctlvar name type factor init f c min max
20511300 yalsldn sum 1.0 -46.4044 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20511301 0.0 1.0 cntrlvar 1104 1.0 cntrlvar 1105
*=====
* loop 1 loop seal up differential pressure (kPa)
*=====
*
*ctlvar name type factor init f c min max
20511400 yalslup sum 1.0 14.63873 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20511401 0.0 1.0 cntrlvar 1108 -1.0 cntrlvar 1109
*=====
* loop 1 cold leg differential pressure (kPa)
*=====
*
*ctlvar name type factor init f c min max
20511500 yalcleg sum 1.0 -.953522 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20511501 0.0 1.0 cntrlvar 1110 1.0 cntrlvar 1111
*=====
* dc heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20520150 dchloss sum -0.001 4.06223 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520151 0.0 1.0 q 015010000 1.0 q 015020000
20520152 1.0 q 010010000 1.0 q 012010000
20520153 1.0 q 015050000 1.0 q 015060000
20520154 1.0 q 015070000 1.0 q 015080000
20520155 1.0 q 015090000 1.0 q 015100000
20520156 1.0 q 015110000 1.0 q 015120000
20520157 1.0 q 015130000 1.0 q 015140000
20520158 1.0 q 015150000 1.0 q 018010000
+ 1.0 q 020010000 1.0 q 022010000
*=====
* dc to upper plenum bypass heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20520260 dcuphls sum -0.001 .586694 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520261 0.0 1.0 q 026010000 1.0 q 026020000
20520262 1.0 q 028010000
*=====
* below heated core heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20520300 csllhss sum -0.001 1.410086 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520301 0.0 1.0 q 024010000 1.0 q 030010000
20520302 1.0 q 030020000
*=====
* core simulator power (kW)
*=====
*
*ctlvar name type factor init f c min max

```

```

20520390 htrpow function 0.001 1520. 1 0
*
*ctlvar parameter table
20520391 time 0 100
*=====
* core heat loss (kW); accounts for core power
*=====
*
*ctlvar name type factor init f c min max
20520400 corhlss sum -0.001 4.44427 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520401 0.0 1.0 q 040010000 1.0 q 040020000
20520402 1.0 q 040030000 1.0 q 040040000
20520403 1.0 q 040050000 1.0 q 040060000
20520404 1.0 q 040070000 1.0 q 040080000
20520405 1.0 q 040090000 1.0 q 040100000
20520406 1.0 q 040110000 1.0 q 040120000
20520407 1.0 q 040130000 1.0 q 040140000
20520408 1.0 q 040150000 -1000. cntrlvar 2039
*=====
* bypass power (kW)
*=====
*
*ctlvar name type factor init f c min max
20520490 htrpow function 0.001 17.4 1 0
*=====
*
*ctlvar parameter table
20520491 time 0 50
*=====
* core bypass heat loss (kW); accounts for power addition
*=====
*
*ctlvar name type factor init f c min max
20520500 byphlss sum -0.001 2.54326 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520501 0.0 1.0 q 050010000 1.0 q 050020000
20520502 1.0 q 050030000 1.0 q 050040000
20520503 1.0 q 050050000 1.0 q 050060000
20520504 1.0 q 050070000 1.0 q 050080000
20520505 1.0 q 050090000 1.0 q 050100000
20520506 -1000. cntrlvar 2049
*=====
* upper plenum heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20520620 uphloss sum -0.001 4.10173 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520621 0.0 1.0 q 062010000 1.0 q 062020000
20520622 1.0 q 062030000 1.0 q 062040000
20520623 1.0 q 062050000 1.0 q 064010000
20520624 1.0 q 066010000 1.0 q 062080000
20520625 1.0 q 062090000 1.0 q 070010000
20520626 1.0 q 070020000
*=====
* reactor heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20520800 rxhloss sum 1.0 17.14827 1 0
*=====
*
*ctlvar a0 coeff var parameter coeff var parameter
20520801 0.0 1.0 cntrlvar 2015 1.0 cntrlvar 2026
20520802 1.0 cntrlvar 2030 1.0 cntrlvar 2040
20520803 1.0 cntrlvar 2050 1.0 cntrlvar 2062
*=====
* hot leg 1 heat loss (kW)
*=====
*
*ctlvar name type factor init f c min max
20521010 hlhlhss sum -0.001 1.93183 1 0

```

```

*
*ctlvar a0 coeff var parameter
20521011 0.0 1.0 q 101010000 1.0 q 101020000
20521012 1.0 1.0 q 101030000 1.0 q 101040000
20521013 1.0 1.0 q 101050000 1.0 q 101060000
20521014 1.0 1.0 q 101070000
*=====
* pump suction 1 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20521350 ps1hiss sum -0.001 5.06786 1 0
*=====
* main coolant pump 1 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20521351 0.0 1.0 q 135010000 1.0 q 135020000
20521352 1.0 1.0 q 135030000 1.0 q 135040000
20521353 1.0 1.0 q 135050000 1.0 q 135060000
20521354 1.0 1.0 q 135070000 1.0 q 135080000
20521355 1.0 1.0 q 135090000 1.0 q 135100000
20521356 1.0 1.0 q 135110000 1.0 q 135120000
20521357 1.0 1.0 q 135130000 1.0 q 135140000
*=====
* main coolant pump 1 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20521400 mcphlss sum -0.001 14.67846 1 0
*=====
* cold leg 1 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20521401 0.0 1.0 q 140010000
*=====
* cold leg 1 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20521450 cl1hiss sum -0.001 1.84306 1 0
*=====
* primary loop 1 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20521451 0.0 1.0 q 142010000 1.0 q 142020000
20521452 1.0 1.0 q 145020000 1.0 q 145030000
20521453 1.0 1.0 q 145040000
*=====
* primary loop 1 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20521500 lp1hiss sum 1.0 23.5212 1 0
*=====
* sg1 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20521501 0.0 1.0 cntrlvar 2101 1.0 cntrlvar 2135
20521502 1.0 cntrlvar 2140 1.0 cntrlvar 2145
*=====
* sg1 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20521600 sg1hiss sum -0.001 11.2829 1 0
*=====
* hot leg 2 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20521601 0.0 1.0 q 170010000 1.0 q 170020000
20521602 1.0 1.0 q 170030000 1.0 q 170040000
20521603 1.0 1.0 q 170050000 1.0 q 170060000
20521604 1.0 1.0 q 175010000 1.0 q 175020000
20521605 -1000. cntrlvar 170
*=====
* hot leg 2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522010 hl2hiss sum -0.001 1.935623 1 0
*=====
* hot leg 3 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522011 0.0 1.0 q 201010000 1.0 q 201020000
20522012 1.0 1.0 q 201030000 1.0 q 201040000
*=====
* pump suction 2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522350 ps2hiss sum -0.001 5.0804 1 0
*=====
* main coolant pump 2 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522351 0.0 1.0 q 235010000 1.0 q 235020000
20522352 1.0 1.0 q 235030000 1.0 q 235040000
20522353 1.0 1.0 q 235050000 1.0 q 235060000
20522354 1.0 1.0 q 235070000 1.0 q 235080000
20522355 1.0 1.0 q 235090000 1.0 q 235100000
20522356 1.0 1.0 q 235110000 1.0 q 235120000
20522357 1.0 1.0 q 235130000 1.0 q 235140000
*=====
* main coolant pump 2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522400 mcphlss sum -0.001 14.67838 1 0
*=====
* cold leg 2 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522401 0.0 1.0 q 240010000
*=====
* cold leg 2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522450 cl2hiss sum -0.001 1.84301 1 0
*=====
* primary loop 2 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522451 0.0 1.0 q 242010000 1.0 q 242020000
20522452 1.0 1.0 q 245020000 1.0 q 245030000
20522453 1.0 1.0 q 245040000
*=====
* primary loop 2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522500 lp2hiss sum 1.0 23.5374 1 0
*=====
* sg2 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522501 0.0 1.0 cntrlvar 2201 1.0 cntrlvar 2235
20522502 1.0 cntrlvar 2240 1.0 cntrlvar 2245
*=====
* sg2 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20522600 sg2hiss sum -0.001 11.28042 1 0
*=====
* hot leg 3 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20522601 0.0 1.0 q 270010000 1.0 q 270020000
20522602 1.0 1.0 q 270030000 1.0 q 270040000
20522603 1.0 1.0 q 270050000 1.0 q 270060000
20522604 1.0 1.0 q 275010000 1.0 q 275020000
20522605 -1000. cntrlvar 270
*=====
* hot leg 3 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20523010 hl3hiss sum -0.001 1.93183 1 0
*=====
* hot leg 3 heat loss (kW)
*=====
*ctlvar a0 coeff var parameter
20523011 0.0 1.0 q 301010000 1.0 q 301020000
20523012 1.0 1.0 q 301030000 1.0 q 301040000
20523013 1.0 1.0 q 301050000 1.0 q 301060000
20523014 1.0 1.0 q 301070000
*=====
* pump suction 3 heat loss (kW)
*=====
*ctlvar name type factor init f c min max
20523015 ps3hiss sum -0.001 5.0804 1 0
*=====

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=====
*ctlvar name type factor init f c min max
20523350 ps3hlss sum -0.001 5.09277 1 0
*
*ctlvar a0 coeff var parameter
20523351 0.0 1.0 q 335010000
20523352 1.0 q 335030000
20523353 1.0 q 335050000
20523354 1.0 q 335070000
20523355 1.0 q 335090000
20523356 1.0 q 335110000
20523357 1.0 q 335130000
=====
* main coolant pump 3 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20523400 mcphlss sum -0.001 14.6774 1 0
*
*ctlvar a0 coeff var parameter
20523401 0.0 1.0 q 340010000
=====
* cold leg 3 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20523450 cl3hlss sum -0.001 1.84293 1 0
*
*ctlvar a0 coeff var parameter
20523451 0.0 1.0 q 342010000
20523452 1.0 q 345020000
20523453 1.0 q 345040000
=====
* primary loop 3 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20523500 lp3hlss sum 1.0 23.54493 1 0
*
*ctlvar a0 coeff var parameter
20523501 0.0 1.0 cntrlvar 2301
20523502 1.0 cntrlvar 2340
20523503 1.0 cntrlvar 2345
=====
* sg3 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20523600 sg3hlss sum -0.001 11.16849 1 0
*
*ctlvar a0 coeff var parameter
20523601 0.0 1.0 q 370010000
20523602 1.0 q 370030000
20523603 1.0 q 370050000
20523604 1.0 q 370070000
20523605 -1000. cntrlvar 370
=====
* hot leg 4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524010 hl4hlss sum -0.001 1.935756 1 0
*
*ctlvar a0 coeff var parameter
20524011 0.0 1.0 q 401010000
20524012 1.0 q 401030000
20524013 1.0 q 401050000
20524014 1.0 q 401070000
=====
* pump suction 4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524350 ps4hlss sum -0.001 5.07764 1 0
*

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=====
*ctlvar a0 coeff var parameter
20524351 0.0 1.0 q 435010000
20524352 1.0 q 435030000
20524353 1.0 q 435050000
20524354 1.0 q 435070000
20524355 1.0 q 435090000
20524356 1.0 q 435110000
20524357 1.0 q 435130000
=====
* main coolant pump 4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524400 mcphlss sum -0.001 14.6858 1 0
*
*ctlvar a0 coeff var parameter
20524401 0.0 1.0 q 440010000
=====
* cold leg 4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524450 cl3hlss sum -0.001 1.844066 1 0
*
*ctlvar a0 coeff var parameter
20524451 0.0 1.0 q 442010000
20524452 1.0 q 445020000
20524453 1.0 q 445040000
=====
* primary loop 4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524500 lp4hlss sum 1.0 23.54327 1 0
*
*ctlvar a0 coeff var parameter
20524501 0.0 1.0 cntrlvar 2401
20524502 1.0 cntrlvar 2440
20524503 1.0 cntrlvar 2445
=====
* sg4 heat loss (kW)
=====
*ctlvar name type factor init f c min max
20524600 sg4hlss sum -0.001 11.11618 1 0
*
*ctlvar a0 coeff var parameter
20524601 0.0 1.0 q 470010000
20524602 1.0 q 470030000
20524603 1.0 q 470050000
20524604 1.0 q 475010000
20524605 -1000. cntrlvar 470
=====
* prr surge line heat loss (kW)
=====
*ctlvar name type factor init f c min max
20525050 ps1hlss sum -0.001 .056419 1 0
*
*ctlvar a0 coeff var parameter
20525051 0.0 1.0 q 501010000
20525052 1.0 q 505020000
20525053 1.0 q 505040000
20525054 1.0 q 505060000
20525055 1.0 q 511010000
20525056 1.0 q 515020000
20525057 1.0 q 515040000
20525058 1.0 q 515060000
20525059 1.0 q 525010000
=====
* prr heater power (kW)
=====
*ctlvar name type factor init f c min max
20525300 htrpow function 0.001 0. 1 0
*

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```

*-----$
*ctrlvar      parameter      table
20525301      time      0      530
*-----$
* p2r heat loss (kW): accounts for heater power
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525350      pzrrlss      sum      -0.001      7.89802      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525351      0.0      1.0      q      530010000      1.0      q      530020000
20525352      1.0      q      530030000      1.0      q      530040000
20525353      1.0      q      530050000      1.0      q      530060000
20525354      1.0      q      530070000      1.0      q      530080000
20525355      1.0      q      530100000      -1000.      cntrlvar      2530
*-----$
* p2r and surge line heat loss (kW)
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525400      tpzrlss      sum      1.0      7.95444      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525401      0.0      1.0      cntrlvar      2505      1.0      cntrlvar      2535
*-----$
* total pump heat loss (kW)
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525450      tncplss      sum      1.0      58.7201      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525451      0.0      1.0      cntrlvar      2140      1.0      cntrlvar      2240
20525452      1.0      cntrlvar      2340      1.0      cntrlvar      2440
*-----$
* total primary heat loss
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525500      pcstot      sum      1.0      119.2495      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525501      0.0      1.0      cntrlvar      2080      1.0      cntrlvar      2150
20525502      1.0      cntrlvar      2250      1.0      cntrlvar      2350
20525503      1.0      cntrlvar      2450      1.0      cntrlvar      2505
20525504      1.0      cntrlvar      2535
*-----$
* total primary heat loss without mcp and p2r (kW)
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525550      tpcsawo      sum      1.0      52.575      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525551      0.0      1.0      cntrlvar      2550      1.0      cntrlvar      2540
20525552      -1.0      cntrlvar      2545
*-----$
* total secondary heat loss
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525600      scstot      sum      1.0      44.848      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525601      0.0      1.0      cntrlvar      2160      1.0      cntrlvar      2260
20525602      1.0      cntrlvar      2360      1.0      cntrlvar      2460
*-----$
* total primary and secondary heat loss (kW)
*-----$
*ctrlvar      name      type      factor      init      f      c      min      max
20525650      prlsec      sum      1.0      164.0975      1      0
*-----$
*ctrlvar      a0      coeff      var      parameter
20525651      0.0      1.0      cntrlvar      2550      1.0      cntrlvar      2560
*-----$
* STEADY STATE CONTROLLERS/COMPONENTS
*-----$
* MCP controllers for loop flow rate
*-----$
*20501390      lp1flerr      sum      1.0      -5.91028-9      0      * sscalc
*20501391      2.3      -1.0      mflowj      143000000      * sscalc
*20501400      mcp1spd      integral      10.0      39.0738      0      3      0.      400.      * sscalc
*20501401      cntrlvar      139      * sscalc
*-----$
*20502390      lp2flerr      sum      1.0      -5.91648-9      0      * sscalc
*20502391      2.3      -1.0      mflowj      243000000      * sscalc
*20502400      mcp2spd      integral      10.0      39.07494      0      3      0.      400.      * sscalc
*20502401      cntrlvar      239      * sscalc
*-----$
*20503390      lp3flerr      sum      1.0      -5.79646-9      0      * sscalc
*20503391      2.3      -1.0      mflowj      343000000      * sscalc
*20503400      mcp3spd      integral      10.0      39.07394      0      3      0.      400.      * sscalc
*20503401      cntrlvar      339      * sscalc
*-----$
*20504390      lp4flerr      sum      1.0      -6.28985-9      0      * sscalc
*20504391      2.4      -1.0      mflowj      443000000      * sscalc
*20504400      mcp4spd      integral      10.0      40.4556      0      3      0.      400.      * sscalc
*20504401      cntrlvar      439      * sscalc
*-----$
* Primary coolant system pressure control
*-----$
*9050000      pressure      tmdpvol      * sscalc
*9050101      1.0      0.1      0.0      0.0      0.0      0.0      0.0      10      * sscalc
*9050200      2      * sscalc
*9050201      0.0      16.855e6      1.0      * sscalc
*-----$
*9060000      prescon      snljun      * sscalc
*9060101      535010000      905000000      0.1      0.      0.      0000000      * sscalc
*9060201      0      -1.12e522      -3.03643-4      0.      * sscalc
*-----$
* Pressurizer level control
*-----$
*9100000      makeup      tmdpvol      * sscalc
*9100101      1.0      0.1      0.0      0.0      0.0      0.0      0.0      10      * sscalc
*9100200      2      0      P      530010000      * sscalc
*9100201      1.e5      1.e5      0.0      * sscalc
*9100202      17.e6      17.e6      0.0      * sscalc
*-----$
*9110000      pzlvictl      tmdpjun      * sscalc
*9110101      910010000      530000000      0.05      * sscalc
*9110200      1      0      cntrlvar      9501      * sscalc
*9110201      -10.0      -10.0      0.0      0.0      * sscalc
*9110202      0.0      0.0      0.0      0.0      * sscalc
*9110203      10.0      10.0      0.0      0.0      * sscalc
*-----$
*20595000      pzrvler      sum      1.0      -2.17335-7      0      * sscalc
*20595001      6.99      -1.0      cntrlvar      532      * sscalc
*20595010      pzrflow      prop-int      1.0      -.001823546      0      3      -5.0      5.0      * sscalc
*20595011      1.0      1.0      cntrlvar      9500      * sscalc
*-----$
* Steam generator pressure controller
*-----$
*20500450      tcoldave      sum      0.25      559.7      1      * sscalc
*20500451      0.0      1.0      tempf      145040000      1.0      tempf      245040000      * sscalc
*20500452      1.0      tempf      345040000      1.0      tempf      445040000      * sscalc
*20597040      cltuperr      sum      1.0e5      .1903553      0      * sscalc
*20597041      559.7      -1.0      cntrlvar      45      * sscalc
*20597050      stmvilvp      prop-int      1.0      7117636.      0      * sscalc
*20597051      0.4      0.01      cntrlvar      9704      * sscalc

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* Steam generator level control
*-----
*1510200 1 0 cntrlvar 9151 * sscal
*1510201 0.0 0.0 0.0 * sscal
*1510202 5.0 0.0 0.0 * sscal
*
20501600 sgllvlevel sum 1.0 1.71 1 0.476 voidf 170030000
20501601 -0.017 0.476 voidf 170020000 0.476 voidf 170030000
20501602 0.476 voidf 170040000 0.374 voidf 170050000
20501603 0.630 voidf 172010000 0.470 voidf 175010000
20501604 0.235 voidf 175020000
*20591500 sgllvler sum 1.0 1.78624-7 0 * sscal
*20591501 1.71 -1.0 cntrlvar 160 * sscal
*20591510 sgflow prop-int 1.0 .1666206 0 3 -5.0 5.0 * sscal
*20591511 1.0 0.037 cntrlvar 9150 * sscal
*
*2510200 1 0 cntrlvar 9251 * sscal
*2510201 0.0 0.0 0.0 0.0 * sscal
*2510202 5.0 0.0 0.0 0.0 * sscal
*
20502600 sg2lv101 sum 1.0 1.71 1 0.476 voidf 270030000
20502601 -0.017 0.476 voidf 270020000 0.476 voidf 270030000
20502602 0.476 voidf 270040000 0.374 voidf 270050000
20502603 0.630 voidf 272010000 0.470 voidf 275010000
20502604 0.235 voidf 275020000
*20592500 sg2lvler sum 1.0 1.944328-7 0 * sscal
*20592501 1.71 -1.0 cntrlvar 260 * sscal
*20592510 sg2flow prop-int 1.0 .1666202 0 3 -5.0 5.0 * sscal
*20592511 1.0 0.037 cntrlvar 9250 * sscal
*
*3510200 1 0 cntrlvar 9351 * sscal
*3510201 0.0 0.0 0.0 0.0 * sscal
*3510202 5.0 0.0 0.0 0.0 * sscal
*
20503600 sg3lv101 sum 1.0 1.84 1 0.476 voidf 370020000 0.476 voidf 370030000
20503601 -0.017 0.476 voidf 370040000 0.374 voidf 370050000
20503602 0.476 voidf 370040000 0.374 voidf 370050000
20503603 0.630 voidf 372010000 0.470 voidf 375010000
20503604 0.235 voidf 375020000
*20593500 sg3lvler sum 1.0 1.73368-8 0 * sscal
*20593501 1.84 -1.0 cntrlvar 360 * sscal
*20593510 sg3flow prop-int 1.0 .1666778 0 3 -5.0 5.0 * sscal
*20593511 1.0 0.037 cntrlvar 9350 * sscal
*
*4510200 1 0 cntrlvar 9451 * sscal
*4510201 0.0 0.0 0.0 0.0 * sscal
*4510202 5.0 0.0 0.0 0.0 * sscal
*
20504600 sg4lv101 sum 1.0 1.74 1 0.476 voidf 470020000 0.476 voidf 470030000
20504601 -0.017 0.476 voidf 470040000 0.374 voidf 470050000
20504602 0.476 voidf 470040000 0.374 voidf 470050000
20504603 0.630 voidf 472010000 0.470 voidf 475010000
20504604 0.235 voidf 475020000
*20594500 sg4lvler sum 1.0 6.29914-8 0 * sscal
*20594501 1.74 -1.0 cntrlvar 460 * sscal
*20594510 sg4flow prop-int 1.0 .1738995 0 3 -5.0 5.0 * sscal
*20594511 1.0 0.037 cntrlvar 9450 * sscal
*
*-----
*
*

```