

APPENDIX E

ANNOTATED STEADY-STATE INPUT-DATA TRACIN FILE

We present in Appendix E a complete input-data TRACIN file listing with annotation for a Westinghouse three-loop plant model. Various parts of this plant model are used to provide examples in Sections 5 and 7. If you understand this plant model and have the assembled database for the facility that you wish to model, you are prepared to develop your own TRAC-M input-data model. Although this sample TRAC-M model does not include all possible modeling features, we consider it to embody good practices for primary-side, secondary-side, and control-procedure modeling. The annotation should assist you in understanding the nature of the input-data model and its TRACIN file. This TRACIN was originally developed for TRAC-P, but it is also valid for TRAC-M.

The annotation is of two types. First, the input-data TRACIN file is well commented and has FORTRAN variable-name labels. The variable-name labels were generated by the GOCVRT program with the NAMELIST-variable INLAB option when it converted the TRAC-PF1/MOD1 Version 11.2 input-data TRACIN file in App. B of the TRAC-PF1/MOD1 User's Guide to the TRAC-PF1/MOD2 Version 5.3 input-data TRACIN file in Appendix B of the TRAC-PF1/MOD2 User's Guide. The developer's comments were transferred manually from the TRAC-PF1/MOD1 input-data TRACIN file to the TRAC-PF1/MOD2 input-data TRACIN file because the INLAB option does not transfer comments from the old input-data TRACIN file. After the title cards in the listing, diagrams on comment lines are provided of the VESSEL component with its internal PIPE and HTSTR components and of the component-network model for the primary-side loops and secondary-side steam and feedwater lines, which show the junction coupling of the hydraulic components. These diagrams have been provided to help the user more easily grasp the connectiveness and nature of the full-plant model. We consider this format for documenting an input-data TRACIN file to be exemplary and recommend that TRAC-M users follow these practices during the creation of their own input-data TRACIN file. Second, we have provided supplemental notes that should help one to understand the input data and the modeling they do. These notes reference the input-data TRACIN file listing in Section E.9. You will find it convenient to have the listing and notes side by side as you review this input-data model. The loose-leaf notebook format of the TRAC-M User's Manual permits you to do this.

We recognize that there are significant differences between analyzing an input-data TRACIN file prepared by someone else and generating an input-data model yourself. However, we believe TRAC-M users will find the annotated input-data TRACIN file to be a useful source of information to aid them in understanding the TRAC-M input-data format in Section 6.

As discussed in Section 6.1., an input-data TRACIN file is divided into eight major sections. We have grouped these notes in the same form. We will discuss references to the input-data TRACIN-file listing in Section E.9 within each section.

E.1. Main Data

The following supplemental notes refer to the input-data TRACIN file listing in Section E.8. by callouts that are marked on the listing; for example e is for note 1. The text of the notes for the Main-Data card section follows:

1. Main-Data card 1 specifies a FREE-format for the input data.
2. Main-Data card 2 specifies that 27 title cards follow this record. With INOPT = 1, the user is exercising the NAMELIST option, which will specify its input data before Main-Data card 3. IEOS = 0 defines the gas phase as water vapor and noncondensable gas, NMAT = 0 specifies no user-defined materials will be input, and ID2O = 0 defines H₂O as the modeled fluid.
3. Diagrams on comment lines are shown here for the 3D VESSEL component and its internal PIPE and HTSTR components and the component network of each of the three primary-side loops, secondary-side steam lines, and secondary-side feedwater lines in the full-plant model. Such diagrams are helpful in relating the coupling of individual components to other components as well as relating their location in the overall network model.
4. With INOPT = 1 on Main-Data card 2, the user has specified values for 13 NAMELIST variables:
 - a. FDFHL = 0.0 turns the Forslund-Rohsenow film-boiling correlation in standard blowdown heat transfer fully off;
 - b. IADDED = 10 outputs a line of numerical-solution timestep results every 10 timesteps to the terminal and TRCMSG file;
 - c. ICFLOW = 2 defines choked-flow option 2, which requires additional input for all 1D hydraulic components. See PIPE component 2 for an example of turning the choked-flow model off with all ICFLG array elements specified to be 0, and see VALVE component 45 for an example of specifying choked-flow modeling at a specified cell edge with one of its ICFLG array elements specified to be 1;
 - d. IKFAC = 1 defines K-factor additive loss coefficients rather than FRIC additive loss coefficients to be input for the irreversible form losses (see note 78 on PIPE component 2);
 - e. IMFR = 3 sends the VESSEL-component phasic mass flows to the graphics-data TRCGRF file;
 - f. IOLAB = 1 with INLAB = 0 (default) generates no INLAB file in English units; what it does is require units labels to be input for control blocks and trips so that their unit symbols are output with their values because of IUNOUT = 1 (default) outputting unit symbols;

- g. IPOWR = -1 and TPOWR = 2.0 s results in the steady-state power level in powered HTSTR (heat structure) component ROD 900 being set on at 2.0 s into the steady-state calculation;
 - h. IUNLAB = 8 states that 8 user-defined units-name labels are to be input for defining the units of some control blocks and trips;
 - i. NEWRFD = 1 turns on the reflood model when the IRFTR2 trip of powered HTSTR component ROD 900 is set ON;
 - j. NFRC1 = 2 specifies that forward KFAC and reverse RKFAC (because IKFAC = 1) additive loss coefficients are to be input for all 1D hydraulic components;
 - k. NHTSTR = 21 indicates that there are 21 HTSTR components defined after the NCOMP-NHTSTR = 132-21 = 111 hydraulic components in the component data section of the TRACIN file; and
 - l. NOAIR = 0 turns on the evaluation of the noncondensable-gas partial pressure.
5. Defining DSTEP = 0 indicates that this is an initial calculation (not a restart calculation based on the data dump of a previous calculation) that starts at time TIMET = 0.0 s. See Appendix F for changes in this card when restarting from a previous calculation data dump.
 6. Defining STDYST = 2 indicates that a constrained steady-state calculation is to be performed. Be aware that there are some significant differences between user-specified steady-state and transient calculations. Section 3.6. TRAC-M/F90 and the Theory Manual describes these differences. See note 40 provided later for trip 1 and trip -407 for further information about trip definitions for a steady-state calculation. To define NCOMP and NJUN, the user needs to count the number of hydraulic and heat-structure components and the number of junctions connecting hydraulic components in the model. After reading all the component data, TRAC-M will print an error message if it has a different count and will suggest the value it expects based on the component data. TRAC-M needs the user to input these values in advance of the component data for it to reserve needed memory space for the component data that is to be read in. Common practice is to set the water-packer model on with IPAK = 1.
 7. The CSS calculation is to be evaluated with NCONTR = 3 CSS controllers internally defined and evaluated by TRAC-M.
 8. The number of each type of control parameter on Main-Data card 7 is known only after you have specified all the hydraulic and heat-structure component data and have defined the signal variables, control blocks, and trips required by their component actions in the control procedure. NTCF = 80 is obtained by summing the number of tabular-data values for control-

block function operations 100, 101, and 102. For example, in this input-data model, the following function operation 101 control blocks have tabular data: -15, -408, -436, -1160, -2160, -3160, -4242, -4243, -4304, -4318, -4320, -4334, -4336, and -4338. The total number of tabular-data pairs is $40 = 13+2+2+2+2+2+2+2+3+2+2+2+2+2$ and the number of tabular-data values is twice the number of pairs (i.e., 80). See Secs. 3.5 and 6.3.5.2 and Section 2.4.6 in the Theory Manual for a discussion of the multipass control-parameter evaluation procedure. For this input-data model, only $NTCP = 1$ multipass control-parameter evaluation pass is performed to evaluate the control-parameter values each timestep.

9. All $NCOMP = 132$ hydraulic and heat-structure component numbers are specified here for the IORDER array. All hydraulic component numbers must be input before the heat-structure component numbers; the same order applies for their component data that are specified later. Within each of these two categories, the component numbers can be input in any order and not necessarily in the order that the component data are specified. The five numbers per line IORDER-array output from GOCVRT were replaced here with one to three numbers per line followed by a skip (s) LOAD-format directive so that similar component types and functions can be grouped and commented. The selection of FREE-format input (see Main-Data card 1, note 1) permits the entry of comments and data values on the same line. Note that the steam-generator secondary-side PIPE and TEE hydraulic components and HTSTR component heat-transfer paths (which previously were internal to the STGEN components) now are listed in the IORDER array and are counted as part of the NCOMP total number of components. The PIPE and TEE hydraulic-component junctions are counted as part of NJUN. Also note that no-flow FILL components 202 and 203 rather than PIPE component 202 are defined for the steady-state calculation to model conditions prior to the double-ended-guillotine break, single-tube transient initiator.

E.2. Countercurrent Flow-Limitation Data

This data block is not input because $NCCFL = 0$ on Main-Data card 6. Counter-current flow will be modeled directly by the phasic motion equations if it occurs during the hydraulic simulation.

E.3. Material-Properties Data

This data block is not input because $NMAT = 0$ on Main-Data card 2. The TRAC-M internally-defined material properties IDs 1 to 12 are appropriate for this problem.

E.4. Hydraulic-Path Steady-State Initialization Data

This data block is not input because STDYST = 2 on Main-Data card 4. This feature requires STDYST = 3 or 4 for its data block to be input and its initial temperature- and velocity-distribution solution estimate to be evaluated.

E.5. Control-Parameter Data

There are six subsections of data in this data block: CSS-controller data, multipass control-parameter evaluation data, signal-variable data, control-block data, trip data, and radiation-enclosure data.

E.5.1. CSS-controller data.

Only one of the four types of CSS controllers is input specified in this data block. These controllers are defined internally by TRAC-M and evaluated during a CSS calculation only. The CSS controller's action overrides the component-action procedure of the component (even when the component-action table is evaluated during the steady-state calculation because it is controlled by a trip whose set status is ON).

10. The NCONTR = 3 (Word 4 on Main-Data card 6) controllers are a CSS type 1 controller that adjusts the pump-impeller rotational speed of PUMP components 16, 26, and 36 to achieve a desired coolant mass flow across pump-impeller mesh-cell interface 2. The desired phasic coolant mass flows when NMPCSS = -1 (rather than the desired phasic velocities when NMPCSS = 0) are specified with the values $ML = 4.2590E+03 \text{ kg s}^{-1}$ ($3.3802E+07 \text{ lb}_m \text{ h}^{-1}$) and $MV = 0.0 \text{ kg s}^{-1}$ ($0.0 \text{ lb}_m \text{ h}^{-1}$) at interface 2 in the VL and VV array data of each PUMP component.

This problem in the TRAC-PF1/MOD2 Version 5.3 and 5.4 Users Guide had NCONTR = 12 CSS controllers, which also included:

- a. three CSS type 2 controllers that adjusted the secondary-side steam-flow control VALVES for a desired upstream pressure,
- b. three CSS type 3 controllers that adjusted the secondary-side feedwater control VALVES for a feedwater mass inflow that equals the steam mass outflow, and
- c. three CSS type 4 controllers that adjusted the secondary-side pressure in one steam generator and the heat-transfer inner- and outer-surface areas in the other two steam generators for a desired primary-side downstream coolant temperature.

These controllers were eliminated because they desired the same secondary-side conditions in all three steam generators even though the secondary-side piping is different in each of the steam generators. We thought that applying these CSS controllers over-constrained the steady-state solution that caused it to have difficulty satisfying steady-state convergence. After eliminating these 9 CSS controllers, there was

diminished secondary-side oscillatory behavior, but oscillatory behavior still persisted such that $EPS = 1.0000E-04 \text{ s}^{-1}$ steady-state convergence still could not be satisfied.

E.5.2. Multipass control-parameter evaluation data.

This data block is not input because only $NTCP = 1$ multipass control-parameter evaluation pass is to be evaluated. This means that all signal variables, control blocks, and trips are evaluated during a single evaluation pass each timestep (see note 8).

E.5.3. Signal-variable data.

There are $NTSV = 65$ signal variables defined based on Main-Data card 7 (see note 8). Refer to the signal-variable parameters Table 6-1 in Sec. 6.3.5.3 for a listing of the system parameters that can be monitored by signal variables.

11. The specification of signal variables usually occurs in parallel with the definition of the control procedure for component actions. Thus, we recommend that the list of signal variables evolve as the input data are developed for the component actions of each hydraulic and heat-structure component.
12. Parameter variable $ISVN = 0$ is problem time when $ILCN = 0$.
13. Parameter variable $ISVN = 18$ is the reactor-core neutronic power in powered HTSTR component ROD $ILCN = 900$.
14. Parameter variable $ISVN = 23$ is the liquid coolant temperature in the intact-loop hot-leg PIPE component $ILCN = 10$ in cell $ICN1 = 1$ that has a junction 10 connection to VESSEL component 1.
15. Parameter variable $ISVN = 21$ is the loop 1 secondary-side steam-line pressure in TEE component $ILCN = 110$ in cell $ICN1 = 3$, which along with signal variable IDs 222 and 333 for loops 2 and 3 defines the signal-expression trip signals of trip IDs 1001, 1002, and 1003, respectively.
16. Parameter variable $ISVN = 32$ is the liquid mass flow in PUMP component $ILCN = 16$ at its mesh-cell interface $ICN1 = 1$.
17. Parameter variable $ISVN = -21$ is the pressure in the loop 1 accumulator check VALVE component $ILCN = 52$; its negative sign indicates that it defines the pressure difference between cell $ICN1 = 2$ and cell $ICN2 = 3$, which by Trip ID 520 controls the opening and closing of the adjustable VALVE interface of VALVE component 52.
18. Parameter variable $ISVN = 69$ is the total mixture mass flow of coolant (liquid feedwater) across the $ICN1 = 1$ interface (junction 100) of PIPE component $ILCN = 100$ that enters the boiler section of the loop 1 steam generator.

19. Parameter variable ISVN = 42 is the adjustable VALVE-interface flow-area fraction of the loop 1 feedwater control VALVE component ILCN = 154 that is an input signal to control block -1014 for defining the VALVE interface's adjusted flow-area fraction whose adjustment is controlled by trip IVTR = 1 of VALVE component 154.
20. Parameter variable ISVN = 56 is the set-status value of trip ILCN = 16.

E.5.4. Control-block data.

Control blocks are identified by negative-value ID numbers while signal variables are identified by positive-value ID numbers. The notes that follow will address the different control-block function operators that are used among the NTCB = 238 control blocks specified on Main-Data card 7. Eight user-defined units-name labels are defined on lines 596 to 606 to define control-block parameter units that are not defined internally by TRAC-M in Table 6-2.

21. Control block IDCB = -1 defines a "constant" value by function operation ICBN = 9. The constant is a temperature difference of CBCON1 = 0.0000E+00 K. Note that the CBXMIN minimum and CBXMAX maximum values for the control block are also 0.0000E+00 K for consistency because the constant value does not change.
22. Control block IDCB = -15 evaluates a "function of one independent variable," which is a linearly interpolated evaluation of tabular data by function operation ICBN = 101. The independent-variable dependence of the tabular data is the signal variable ICB1 = 4001 steam-line header pressure. There are ICB2 = 13 tabular-data pairs where each data pair has an independent-variable value of pressure and a dependent-variable value of the square root of the saturated-steam density. The square root of density units required the user-defined units-name label LUSQRDEN.
23. Control block IDCB = -22 evaluates a logical "and" operator by function operation ICBN = 5. If the values of input control blocks ICB1 = -142 and ICB2 = -242 are both 1.0, control block -22 will be assigned the CBGAIN = 1.0000E+00 value; otherwise, it will be assigned the value 0.0.
24. Control block IDCB = -28 evaluates a logical "inclusive or" operator by function operation ICBN = 25. If the values of input control blocks ICB1 = -22 and ICB2 = -24 sum to 0.0, control block -28 will be assigned the value 0.0; otherwise, it will be assigned the CBGAIN = 1.0000E+00 value.
25. Control block IDCB = -50 evaluates the "maximum of two signals" operator by function operation ICBN = 35. The maximum of the values of input control blocks ICB1 = -55 and ICB2 = -110 defines the output signal of control block -50.

Control blocks -108 through -170, -208 through -270, and -308 through -370 evaluate two limits for each of the three primary-coolant loops. The two limits are the high over-temperature ΔT limit and the high over-power ΔT limit. Control-block definitions will be annotated for the first loop only because the definitions are similar for each loop. Note that the control block ID numbering convention clearly identifies the loop number by the hundredths digit in the control-block ID number.

26. Control block IDCB = -108 evaluates the addition operator by function operation ICBN = 3. The sum of input signal variables ICB1 = 101 and ICB2 = 181 for the hot- and cold-leg temperatures of loop 1 gives an average temperature when multiplied by CBGAIN = 5.0000E-01. That average temperature is constrained between the limit values of CBXMIN = 0.0000E+00 K and CBXMAX = 2.0000E+03 K.
27. Control block IDCB = -110 evaluates the "weighted summer" operator by function operation ICBN = 59. Constants CBCON1 = 5.0000E-01 and CBCON2 = 5.0000E-01 are multiplied by the temperatures of input control blocks ICB1 = -108 and ICB2 = -109, respectively, and then summed. The value of control block -110 is initially the value 0.0 K and thereafter the value from its previous evaluation.
28. Control block IDCB = -118 evaluates the subtraction operator by function operation ICBN = 54. The input signal variable 181 cold-leg temperature of loop 1 is subtracted from the input signal variable 101 hot-leg temperature of loop 1 to define the output signal temperature difference of control block -118, which is constrained between the CBXMIN = -2.0000E+03 K and CBXMAX = 2.0000E+03 K temperature limits.

The high over-temperature ΔT limit is evaluated with control blocks -130, -132, -134, -136, -138, and -140. The measured $\dot{y}T$ defined by tabular data is compared with the ΔT limit in control block -142. The high over-power ΔT limit is evaluated with control blocks -148, -149, -150, -152, -154, -156, -158, -160, -162, -164, -166, and -168. The measured ΔT defined by tabular data is compared with this evaluated ΔT limit in control block -170. The results of the limits comparisons from all three loops are evaluated by control blocks -22, -24, and -26 (based on control blocks -142, -242, and -342) and control blocks -32, -34, and -36 (based on control blocks -170, -270, and -370).

Control blocks -28 and -30 and control blocks -38 and -40 are used to evaluate whether either of the ΔT limits have been exceeded in two of the three loops. The values from control blocks -30 and -40 are compared with temperature limits by trip IDs 48 and 50. The set status on these trips is input to the definition of the trip-controlled-trip signals of trip IDs 120 and 160, which define the trip signals of reactor-trips-subset-1 trip ID 12 and turbine trip ID 16.

The objective of tracing the flow of this control block and trip network is to: (1) provide an example of using control blocks to evaluate logic that provides input for trip action, (2) show that control-block and trip evaluations require planning and organization of

information, and (3) show that developing a new model requires both a detailed understanding of what is to be modeled and how the control features are to be organized in the TRAC-M input-data file. The logic in a control schematic can have its operations modeled one-for-one by control blocks and trips. Sometimes with a little thought, however, a control schematic can have several of its operations combined into one control block or trip because of the multiple features they can be defined to perform. For example, a control block evaluates its function operation, multiplies that result by a gain factor, and constrains that product value between minimum and maximum limit values.

29. Control block IDCB = -132 evaluates a "lead-lag transfer function" operator by function operation ICBN = 30. The Laplace-transform operator $(1.0 + \text{CBCON1} \cdot s) / (1.0 + \text{CBCON2} \cdot s)$, where the constants $\text{CBCON1} = 2.0000\text{E}+01 \text{ s}$, and $\text{CBCON2} = 3.0000\text{E}+00 \text{ s}$, is applied to the control block $\text{ICB1} = -130 \text{ X1}$ input signal to evaluate the first-order differential equation $\text{CBCON2} \cdot d\text{XOUT}/dt + \text{XOUT} = \text{CBCON1} \cdot d\text{X1}/dt + \text{X1}$ for the control block -132 XOUT output signal.
30. Control block IDCB = -142 evaluates a "greater than" operator by function operation ICBN = 21. The control block is assigned the $\text{CBGAIN} = 1.0000\text{E}+00$ value if the value of the control block $\text{ICB1} = -120$ output signal is greater than the value of the control block $\text{ICB2} = -140$ output signal; otherwise, it is assigned the value 0.0.
31. Control block IDCB = -148 evaluates a "step" operator by function operation ICBN = 53. The control block has an output value of 0.0 until the problem time reaches $\text{CBCON1} = 1.0000\text{E}-04 \text{ s}$; thereafter, it has the $\text{CBGAIN} = 1.0000\text{E}+00$ value.
32. Control block IDCB = -149 evaluates a "derivative" operator by function operation ICBN = 12. The finite-difference time derivative of the control block $\text{ICB1} = -110$ average-temperature output signal is multiplied by $\text{CBGAIN} = 1.0000\text{E}+01 \text{ s}$ and constrained between the $\text{CBXMIN} = -1.0000\text{E}+02 \text{ K}$ and $\text{CBXMAX} = 1.0000\text{E}+02 \text{ K}$ temperature-difference limits.
33. Control block IDCB = -150 evaluates a "multiply" operator by function operation ICBN = 39. The values of the control block $\text{ICB1} = -148$ output signal and the control block $\text{ICB2} = -149$ temperature-difference output signal are multiplied together and constrained between the $\text{CBXMIN} = -1.0000\text{E}+02 \text{ K}$ and $\text{CBXMAX} = 1.0000\text{E}+02 \text{ K}$ temperature-difference limits.
34. Control block IDCB = -152 evaluates a "first order lag" operator by function operation ICBN = 26. The Laplace-transform operator $1.0 / (1.0 + \text{CBCON1} \cdot s)$, where the constant $\text{CBCON1} = 1.0000\text{E}+01 \text{ s}$, is applied to the control block $\text{ICB1} = -150 \text{ X1}$ input signal to evaluate the first-order

differential equation $CBCON1 \cdot dXOUT/dt + XOUT = X1$ for the control block -152 XOUT output signal.

The pressurizer control procedure is defined by control blocks -406 through -450. The overall procedure is subdivided into three coupled subsystems for level, pressure, and heater control. Figure E-1 shows a schematic of the pressurizer control procedure. In referring to Fig. E-1, you need to be aware of the following nomenclature: SV xxxx refers to a signal variable with ID number xxxx, CV -xxxx refers to a control block with ID number -xxxx, and OP xxx refers to a control-block function operation xxx. Function operations referenced in Fig. E-1 are arithmetic (+, -, *), integration ($\frac{1}{2}$), tabular-data (function) evaluation, value comparison (.GT.), and logical test (.OR.). The output signal from the level-control subsystem is used to define the pressurizer makeup/letdown flow requirement. Level information is also used in the pressurizer heater-control logic. The output signal from the pressure-control subsystem is used to define the pressurizer sprayer requirement (CV -434). Pressure information is also used in the heater-control logic. The output signal from the heater-control subsystem (CV -450) is used to define the pressurizer heater power and is based on level and pressure inputs. Only three control blocks -432, -444, and -450 will be described for the pressurizer control procedure. They contain control-block function operations that we have not previously discussed.

35. Control block IDCB = -432 evaluates an "integration" operator by function operation ICBN = 23. The pressure-difference output signal of control block ICB1 = -430 is integrated over problem time.
36. Control block IDCB = -444 evaluates a "input switch" operator by function operation ICBN = 22. If the logical value output signal of control block ICB3 = -442 is 1.0, control block -444 is assigned the output-signal value of control block ICB1 = -10; if the logical value of control block ICB3 = -442 is 0.0, control block -444 is assigned the output-signal value of control block ICB2 = -2.
37. Control block IDCB = -450 evaluates a "gate" operator by function operation ICBN = 19. If the logical value output signal of control block ICB2 = -448 is 1.0, control block -450 is assigned the output-signal value of control block ICB1 = -446; otherwise, it is assigned the value 0.0.

The loop 1 steam-generator level-control procedure is defined by control blocks -1004 to -1706 and control blocks -4241 to -4243, with the exception of control blocks -1110 to -1162, which define the loop 1 secondary-side main steam-isolation valve trip logic and PORV control logic. Similar control blocks are defined for loops 2 and 3. To help interpret the control logic, the user needs to refer to Fig. E-2. The overall control system is divided into two subsystems: level control and flow control. The output of the level-control subsystem is a level-error signal (CV -1008). The output of the flow-control subsystem is an error signal reflecting the difference between the steam flow leaving the steam-generator secondary and the feedwater flow (CV -1010). These two signals are summed to provide a combined flow and level error. After conditioning, the control-system

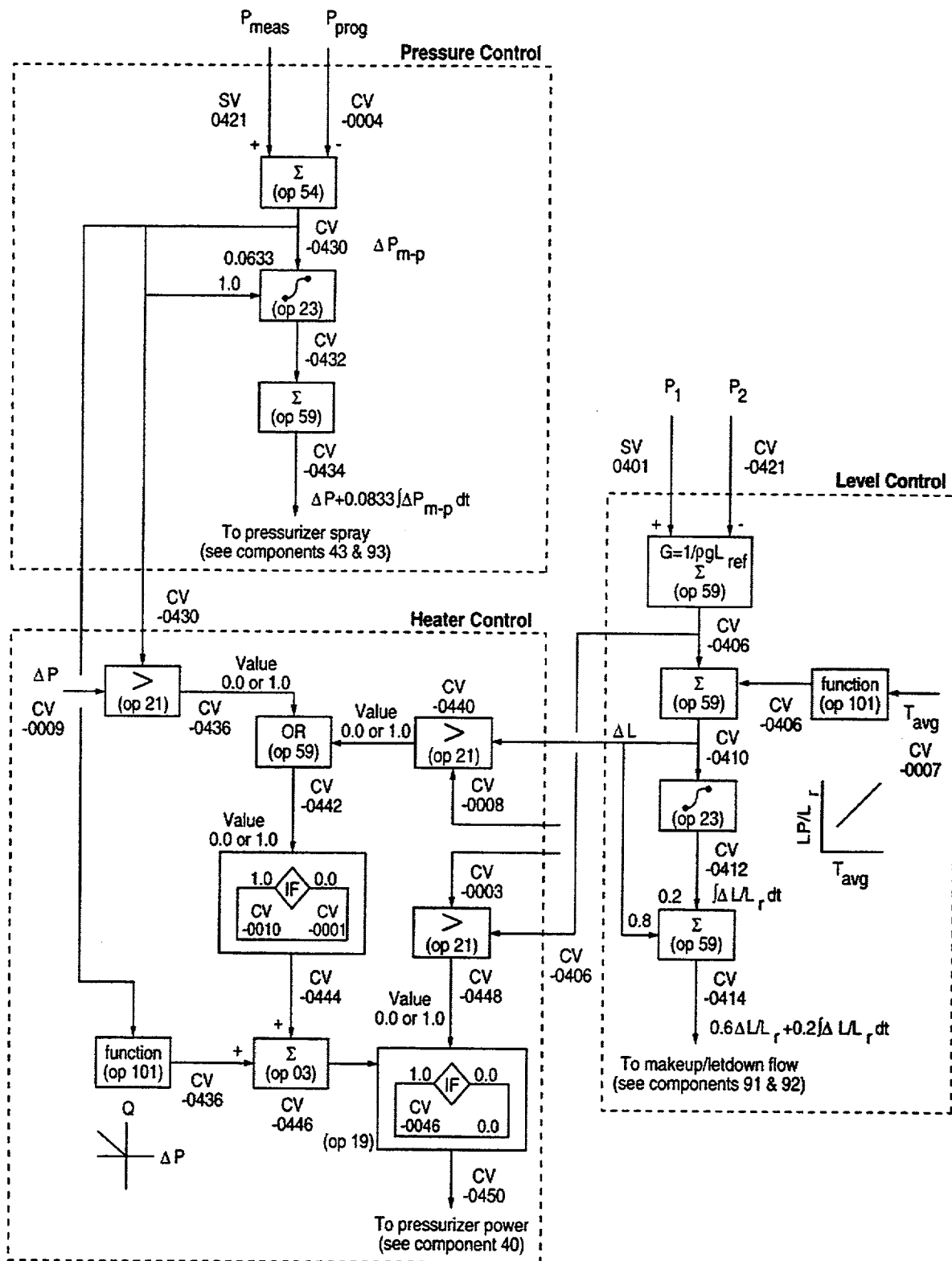


Fig. E-1 Pressurizer control procedure.

(CV-1014) is used to adjust the loop 1 main feedwater-regulation valve. We will discuss only control blocks -1104 and -1106, which contain control-block operations that we have not previously described.

38. Control block IDCB = -1104 evaluates an "absolute" operator by function operation ICBN = 1. The absolute value of the signal variable ICB1 = 1135 loop 1 steam-line pressure difference is evaluated to define the output signal of control block -1104.
39. Control block IDCB = -1106 evaluates a "square root" operator by function operation ICBN = 52. The square root of the loop 1 steam-line pressure-difference absolute value of the control block ICB1 = -1104 output signal is multiplied by CBGAIN = 8.4779E-01 m². The units of the control block -1106 output signal is defined by the user-defined units-name label LUASQRTP.

The remainder of the Westinghouse three-loop plant control logic is shown in Fig. E-3. You are urged to review the input-data file definitions of the other control block using Fig. E-3 as an aid. All the control-block function operations shown in Fig. E-3 have been discussed already in the notes.

E.5.5. Trip data.

The trip-dimension variable data are defined on the first card in this data subset (line 2648). There are NTSE = 3 signal-expression trip signals for trip IDs 1001, 1002, and 1003; and NTCT = 20 trip-controlled-trip trip signals for trip IDs 10 to 38 (in intervals of 2), 21, 46, 100, 200, 300, and 422 (2 of the 21 trips used the same trip-controlled-trip trip signal). No setpoint-factor tables are defined (NTSF = 0), no trips control the generation of a data-dump edit and end of the calculation (NTDP = 0), and no trip-controlled special timestep data are defined (NTSD = 0).

40. This trip is initiated to ON_{forward} with ISET = 1 to have user-specified component actions (defined by the component data) that are controlled by this trip evaluated during the steady-state calculation. TRAC-M does not evaluate a component action during a steady-state calculation unless a controlling trip is defined and its set status is ON_{forward} (ISET = 1) or ON_{reverse} (ISET = -1). ISET is specified by the user through input (in this case) or evaluated by TRAC-M at the beginning of each timestep during a steady-state calculation for trips with a negative-valued ID number. Positive-valued ID number trips are not evaluated during a steady-state calculation. See hydraulic components 43, 91, 92, 93, 154, 254, and 354 for examples of component actions being controlled by trip ID 1 and are evaluated during the steady-state calculation. See trip ID -407 for an example of a trip that is evaluated during both the steady-state and transient calculations.

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- Level control**
- CV -4241 → function (op 101) → CV -4242 → function (op 101) → CV -4243 → Σ (op 54) → CV -1006
- CV -1006 → Σ (op 59) → CV -1007 → Σ (op 54) → CV -1006
- CV -1006 → Σ (op 54) → CV -1005 → Lag (op 25) → CV -1004 → Σ (op 54) → CV -1006
- Flow control**
- steam-line flow AP SV 1135 → ABS (op 1) → CV -1104 → C-22179 SORT (op 52) → CV -1006
- feedwater flow AP SV 1714 → ABS (op 1) → CV -1704 → C-71264 SORT (op 52) → CV -1706
- CV -1006 → Σ (op 54) → CV -1009
- CV -1706 → Σ (op 54) → CV -1009
- CV -1009 → Σ (op 39) → CV -1009
- Combined flow and level error**
- CV -1006 → Σ (op 3) → CV -1011 → Σ (op 69) → CV -1013 → Σ (op 3) → CV -1014
- CV -1014 → To loop-1 main feedwater regulating valve (component 154)

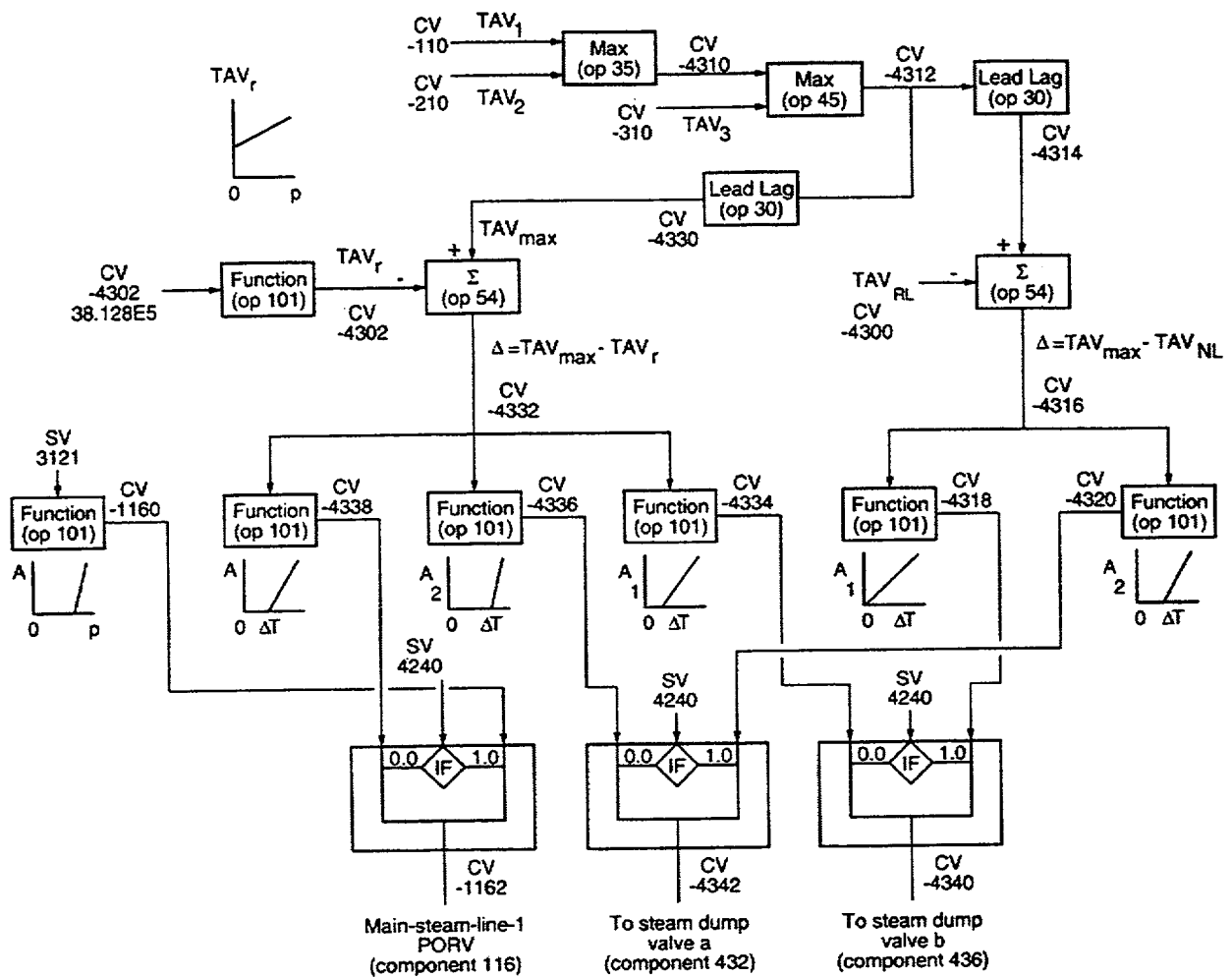


Fig. E-3 Steam-dump control procedure.

42. The trip signal is defined by signal variable $IDSG = 1$ (problem time) because $ITST = -1$ has a magnitude of 1 indicating the trip is a signal-variable/control-block trip (the trip signal of such a trip is defined by a signal variable when $IDSG > 0$ or by a control block when $IDSG < 0$). During the transient calculation (when the trip is evaluated because $IDTP = 1$ is positive), the trip signal will be compared with the defined setpoint values to determine the trip set status. $ITST = -1$ having a minus sign prevents the outputting of a message to the terminal and TRCMSG file when the trip signal crosses a tested setpoint and when its set status is changed.
43. Setpoints S_1 and S_2 have values $SETP(1) = -1.0000E+00$ and $SETP(2) = 0.0000E+00$, respectively. Evaluating the trip and a possible change in its set status during the transient calculation involves comparing the trip signal (signal variable ID 1) value with the S_1 setpoint value that it must cross to change its $ON_{forward}$ set status to OFF (when the trip is OFF, the trip

signal needs to cross the S_2 setpoint to change its OFF set status to $ON_{forward}$). Because problem time is not negative valued, the $ON_{forward}$ set status of trip ID 1 will remain $ON_{forward}$ throughout the entire transient calculation as well as the steady-state calculation.

Trip ID 10 Signal-range diagram.



44. The signal-range type, shown in the signal-range diagram above, is ISRT = 2 with two subranges and two setpoints. The initial trip set status ISET = 0 is OFF and will stay OFF during the entire steady-state calculation because the trip has a positive-valued ID number and will not be evaluated during the steady-state calculation.
45. The trip-controlled-trip trip signal (ITST = 3) has the ID number IDSG = 100. Its definition at the end of the trip-data section (lines 3401 to 3405) is the sum (because IDSG has a positive value) of the set status of trips ITN(1) = 12 and ITN(2) = 14. Both these trips have a type 2 signal-range with possible ISET values of 0.0 or 1.0, so the trip-controlled-trip trip signal will have the value 0.0, 1.0, or 2.0.
46. Setpoints S_1 and S_2 have values SETP(1) = 1.0000E-01 and SETP(2) = 9.0000E-01. Trip ID 10 will be set to $ON_{forward}$ if either trip ID 12 or trip ID 14 is set to $ON_{forward}$ based on the trip-controlled-trip trip signal definition in note 45.
47. A huge DTSP(1) = 1.0000E+06 s setpoint delay time has been defined for setting trip ID 10 OFF. Because of this, once trip ID 10 is set to $ON_{forward}$, it will remain there even if the trip-controlled-trip trip-signal value changes to 0.0. Actually, this will not occur because both trips ID 12 and trip ID 14 have the same large setpoint delay time for setting their trips OFF.

Trip IDs 12 to 28.

48. These trips have the same form as trip ID 10. The only differences are in the defined form of their trip-controlled-trip trip signal, the nonzero DTSP(2) setpoint delay times for setting trip ID 21 (2.0000E+01 s), trip ID 22 (1.0000E+06 s), and trip IDs 26 and 28 (3.0000E+01 s) to $ON_{forward}$, and a SETP(2) = 1.8000E+00 setpoint for setting trip 24 to $ON_{forward}$. The later will occur only if two or three of the three trips ITN(1) = 40, ITN(2) = 42,

and ITN(3) = 44, whose summed set status defines the trip-controlled-trip signal IDSG = 240, are set to 1.0 to yield a cumulative value of 2.0 or 3.0. This is referred to as (2/3) logic of a coincidence trip.

Trip IDs 30 to 38.

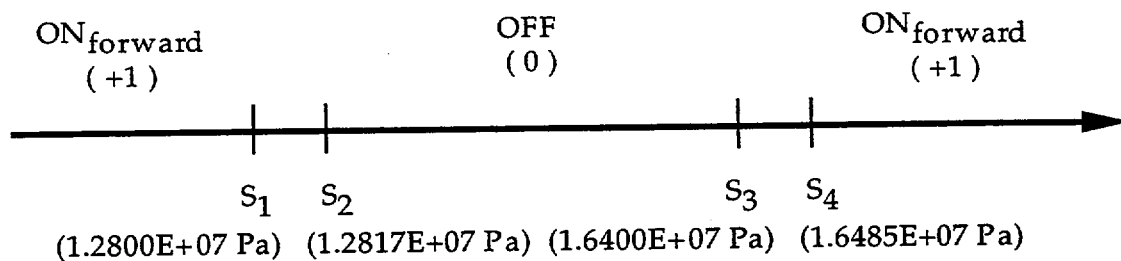
49. These trips have the same form as trip ID 10 except the setpoint delay time for setting these trips OFF is DTSP(1) = 0.0000E+00 s.

For the remaining trips in the input-data TRACIN file, the following notes will discuss only new features that are implemented. Only those trips will be annotated.

Trip ID 40.

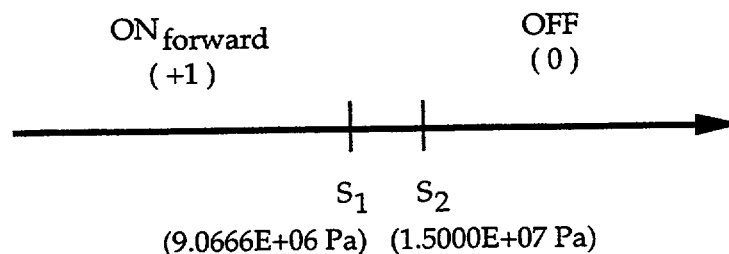
50. The trip signal IDSG = -1118 is a control-block output signal because ITST = -1 has a magnitude of 1.

Trip ID 54 Signal-range diagram.



51. The signal-range type in the signal-range diagram above is ISRT = 5 with three subranges and four setpoints. The initial trip set status is OFF (ISET = 0). When the pressurizer-pressure value of signal variable IDSG = 421 (because ITST = 1) is equal to or greater than SETP(4) = 1.6485E+07 Pa (2.3909E+03 psia) or equal to or less than SETP(1) = 1.2800E+07 Pa (1.8565E+03 psia), the trip status is set to ON_{forward} with a setpoint delay time of 0.0000E+00 s. Thereafter, resetting the set status to OFF requires that the value of signal variable 421 be equal to or less than SETP(3) = 1.6400E+07 Pa (2.3786E+03 psia) or equal to or greater than SETP(2) = 1.2817E+07 Pa (1.8589E+03 psia).

Trip ID 58 Signal-range diagram.



52. The signal-range type in the signal-range diagram above is ISRT = 1 with two subranges and two setpoints. The initial trip set status is OFF (ISET = 0). If the signal variable IDSG = 421 pressurizer-pressure value is equal to or less than SETP(1) = 9.0666E+06 Pa (1.3150E+03 psia), the trip set status is set to ON_{forward} with a setpoint time delay of DTSP(1) = 0.0000E+00 s. Thereafter, resetting the set status to OFF requires that the pressure value of signal variable 421 be equal to or greater than SETP(2) = 1.5000E+07 Pa (2.1756E+03 psia).

Trip ID 60.

53. Trip ID 60 has a ISRT = 1 signal-range diagram like trip ID 58. When the signal-variable IDSG = 421 trip-signal pressurizer-pressure value falls below SETP(1) = 1.1928E+07 Pa (1.6744E+03 psia), the set status of trip ID 60 is changed to ON_{forward} with no time delay in order to activate the safety-injection system based on this low-pressure trip.

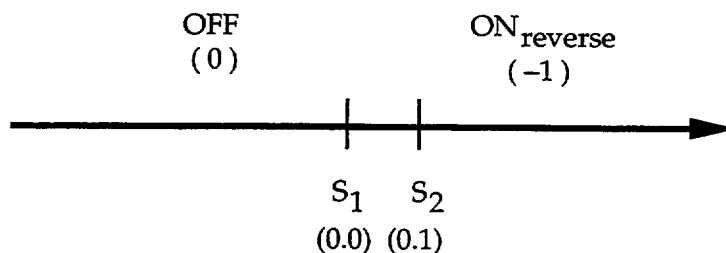
Trip ID 100 (also IDs 200 and 300).

54. This trip illustrates (2/2) logic of a coincidence trip. In principle, this trip behaves like trip ID 24 discussed earlier (see note 48). In this case, however, trip-controlled-trip trip signal IDSG = 1000 sums only the set status of two trips ITN(1) = 1020 and ITN(2) = 1040. Both trips (2/2) are required to have an ON_{forward} set status (because SETP(2) = 1.8000E+00) for trip 100 to be reset from OFF (its initial ISET = 0 specification) to ON_{forward}.

Trip ID -407.

55. Among the NTRP = 72 (word 4 on Main-Data card 7) trips, this is the only trip that will be evaluated during the steady-state calculation because its ID number has a negative value. All the other trips with positive-valued ID numbers will have their input-specified initial set status (defined by ISET) throughout the steady-state calculation. During the transient calculation, all 72 trips will be evaluated.

Trip ID 422 Signal-range diagram.

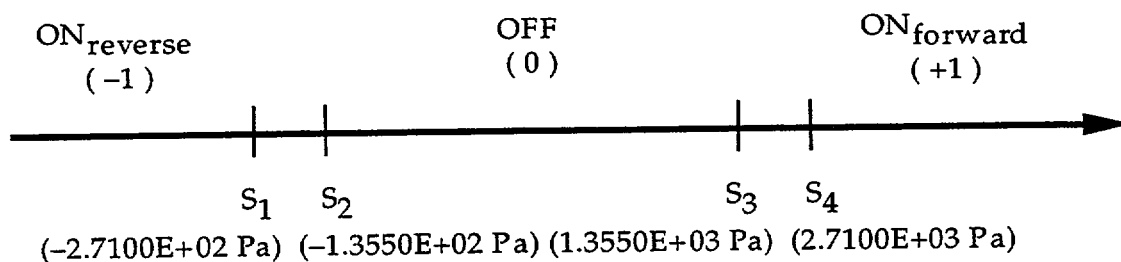


56. The signal-range type in the signal-range diagram above is $ISRT = -2$ with two subranges and two setpoints. A -2 signal-range type differs from the 2 signal-range type of trip ID 10 by switching the $ON_{forward}$ set-status label to an $ON_{reverse}$ set-status label.
57. Trip ID 422 is an example of a $(1/5)$ logic coincidence trip. Its trip signal is defined by the trip-controlled-trip trip signal $IDSG = 400$, which sums the set status of five trips $ITN(1) = 20$, $ITN(2) = 36$, $ITN(3) = 423$, $ITN(4) = 1500$, and $ITN(5) = 3500$. Setting any one of these trips to $ON_{forward}$ will set the set status of trip ID 422 to $ON_{reverse}$ because $SETP(2) = 1.0000E-01$.

Trip ID 423.

58. This trip has an initial set status of OFF ($ISRT = 0$) that will not change during the steady-state and transient calculations because both setpoint delay times $DTSP(1) = DTSP(2) = 1.0000E+06$ s.

Trip ID 520 Signal-range diagram.



59. The signal-range type in the signal-range diagram above is $ISRT = -3$ with three subranges and four setpoints. The initial trip set status is $ON_{reverse}$ ($ISRT = -1$). When the pressure-difference value of signal variable $IDSG = 521$ ($ITST = 1$) is greater than or equal to $SETP(2) = -1.3550E+02$ Pa ($1.9653E-02$ psia) and less than $SETP(4) = 2.7100E+03$ Pa ($3.9305E-01$ psia), the trip set status is reset to OFF with a setpoint delay time of $DTSP(2) = 0.0000E+00$ s. When the pressure-difference value of signal variable $IDSG = 521$ is \pm $SETP(4) = 2.7100E+03$ Pa ($3.9305E-01$ psia), the trip set status is reset to $ON_{forward}$ with a setpoint delay time of $DTSP(4) = 0.0000E+00$ s. This signal-range type has three different set-status labels where it tests for a potential change of set status to either of the other two set-status labels. Based on the current set status, the trip signal is compared with only two of the four setpoint values. The setpoints tested are those that lie closest to the subrange of the other two set-status labels.

Trip ID 1001.

60. The trip signal is a signal-expression defined by $IDSG = 1120$ at the end of the trip-data section. The trip signal is a signal-expression because $ITST = -2$ has a magnitude of 2. The signal expression has $INSE = 2$

subexpressions with $INCEN = 0$ constants. The subtraction arithmetic operator $ISE(1,1) = 2$ for the first subexpression subtracts the value of signal variable $ISE(3,1) = 222$ from the value of signal variable $ISE(2,1) = 111$ giving the difference of steam-line pressures in loops 1 and 2. The absolute value arithmetic operator $ISE(1,2) = 8$ for the second subexpression takes the absolute value of the pressure difference evaluated by the first subexpression $ISE(2,2) = 901$.

The above discussion on trip definitions addresses the different modeling features provided by trips that are used in this input-data model. The physical significance of what is being modeled has not been given the same emphasis. While both aspects are important to developing a model utilizing trip logic ON/OFF switches, a knowledge of the definable features of a trip is needed before trips can be applied as control switches in an actual control procedure. We hope that the above examples and those in Section 7, along with the trip input-data format description in Section 6.3.5.6 and the control-procedure description on trips in Section 3.3. and the TRAC-M/F90 Theory Manual, will provide a sufficient introduction for the TRAC-M user.

E.5.6. Radiation-enclosure data.

This data block is not input because NAMELIST variable $NENCL = 0$ (default) defines no HTSTR-component radiation enclosures.

E.6. Component Data

We have tried to reduce the amount of annotation that is needed for the component data. Two guidelines have been followed. First, beginning with the initial component in the input listing, we went through the listing and commented on all items we felt needed to be annotated. A subsequent appearance of a similar item was not annotated. Consequently, many components toward the end of the component-data section have not been annotated. The reader interested in a specific item in a component near the end of the listing that is not annotated will need to search through the components before it to see whether a note has been provided on that item. Second, because this is a three-loop plant model, we have chosen only to annotate the components in loop 1 that are input first and not their similar components in loops 2 and 3 that are input later. The loop-2 steam-generator double-ended-guillotine break, single-tube rupture to be modeled by PIPE component 202 but here replaced by no-flow FILL components 202 and 203 and the loop-3 pressurizer modeled by BREAK, FILL, PIPE, PRIZER, TEE, and VALVE components 40 through 48 also have been annotated. We have followed a similar approach of annotating the components on the secondary side of loop 1 that are input first but not their similar components of loops 2 and 3 that are input later.

VESSEL Component 1 : Reactor vessel.

61. The 3D VESSEL component 1 has the largest data requirement of any of the TRAC-M components. The reader should not be intimidated by the amount of data. Much of the data are repetitive. As with all TRAC-M model-development activities, a good nodding diagram of the reactor

VESSEL component is helpful. See the VESSEL noding diagram in Fig. 5-6 and the diagram of the VESSEL component provided on comment lines at the beginning of this input-data TRACIN file listing.

62. There are NASX = 12 axial levels, NRSX = 2 radial rings, NTSX = 6 azimuthal sectors, and NCSR = 18 junction source connections of 1D hydraulic components to the VESSEL component (6 junction source connections to the hot and cold legs of each of the three primary-coolant loops and 12 junction source connections to the top and bottom ends of 6 guide-tube PIPE components).
63. The TRAC-M user who modeled the vessel did not exercise the VESSEL-component option of variables IDCU, IDCL, and IDCR where TRAC-M internally defines the axial and radial boundaries of the downcomer within the 3D VESSEL component mesh-cell grid. The reason for not having done this was to permit the user to model radial-direction leakage around the hot-leg pipe penetrations in level 8 and to specify a nonzero flow area at the top of the downcomer (the top axial interface of all six azimuthal-sector mesh cells in radial ring 2 of level 10). This requires the user to individually specify appropriate radial- and axial-interface flow areas to model the presence of the downcomer. The above leakage flow path was not modeled by a vent-valve between the downcomer and the upper plenum (NVENT = 0). Subsequent to the development of this VESSEL component input-data model, the INOPTS NAMELIST variable IGEOM3 now is provided to allow the user to set a non-zero flow areas between the downcomer and upper-plenum mesh cells of the VESSEL component when IDCU, IDCL, and IDCR are input with nonzero (positive) values. The user should always input positive values for variables IDCU, IDCL and IDCR because special flow-regime maps are used in the downcomer based on these parameters.
64. See Fig. 5-6 for the location of the core outer-radial interface at ICRR = 1 and the upper-axial interface level of the bottom and top of the core region at ICRL = ILCSP = 2 and ICRU = IUCSP = 6, respectively, and the top of the upper-head support plate at IUHP = 10. ICONC = 1 requires ISOLUT = 1 (word 3 on Main-Data card 6) to input CONC-array solute-concentration ratios in the liquid coolant.
65. SHELV = 0.0 m (0.0 ft) isn't needed to shift the Z-array elements on the next data record to define the height of the level interfaces because GRAV rather than ELEV values are input specified for the 1D hydraulic components that are connected to the VESSEL component. NAMELIST variable IELV = 1 would need to be specified to input ELEV values for 1D hydraulic components and require the value of SHELV for shifting the Z-array element values of the VESSEL component.

66. The mesh-cell outer-interface location values of Z, X or RAD, and Y or TH must increase monotonically to define the Cartesian (IGEOM = 1) or right-circular cylinder (IGEOM = 0) orthogonal mesh-cell grid of the VESSEL component.
67. LISRL identifies the VESSEL level number that a junction source connection connects to. All the horizontal hot- and cold-leg pipes connect to level 8 as shown in Fig. 5-6. The vertical guide-tube pipes within the VESSEL connect to the top interfaces of levels 7 or 9 at their bottom and level 12 at their top. Being connected to a level means fluid flows across the source-connection junction into or out of mesh cells in that level. LISRC identifies the "relative" cell number within each horizontal-plane level that a source-connection junction connects to. The relative cell number is a composite number of the y- or θ -direction cell number plus the product of the x- or r-direction cell number minus one and the total number of y- or θ -direction mesh cells. Being connected to a VESSEL-component mesh cell means fluid flows across the source-connection junction into or out of the mesh cell. LISRF identifies the mesh-cell interface face number a source-connection junction connects to. The face number is 1 for a y- or θ -direction interface, 2 for a z-direction interface, and 3 for a x- or r-direction interface. The face number has the same numerical sign as that of the interface's fluid velocity flowing out of the mesh cell (i.e., a + or - value for positive- or negative-direction flow). It is recommended that all 1D hydraulic-component loops starting and ending in a VESSEL component start and end with the same magnitude face number when SET3D numerics are evaluated (NAMELIST variable NOSETS = 0 or 2). Failure to do so may have a negative impact on the TRAC-M numerics by requiring a smaller timestep size. LJUNS defines the junction number of the source connection. Of the NCSR = 18 (word 4 on VESSEL Card number 2) source-connection junctions, the first three connect to the hot-leg side PIPE or TEE of each primary-coolant loop, the next three connect to the cold-leg side TEE of each primary-coolant loop, the next six connect to the bottom end of the six guide-tube PIPEs, and the last six connect to the top end of the six guide-tube PIPEs.
68. $NRSX \times NTSX = 2 \times 6 = 12$ values for each parameter array, defining the fluid state in a mesh cell or on one of its three positive face-number interfaces, are specified for each of the twelve mesh cells in the horizontal plane of a VESSEL level. Each of the parameter arrays, whose label is shown by a "*" comment *, is defined in the input-format description of Section 6.3.7.11. The subsequent notes for VESSEL component 1 will try to provide further information on items that are commonly misinterpreted.
69. Because NAMELIST variable IKFAC = 1, CFZp-d (where p=L,V defines the fluid phase and d=T,Z,R or d=Y,Z,X defines the interface perpendicular-direction label in cylindrical or Cartesian geometry) specifies K factors rather than FRICs for defining the additive irreversible form losses. For

IKFAC = 0, the 3D CFZp-d values for TRAC-PF1/MOD2 have the same definition as FRICs for the 1D components, while for TRAC-PF1/MOD1 the CFZp-d values are not multiplied by the hydraulic diameter and have an inverse length dimension. The value of CFZp-d used by TRAC-M must be zero or positive. Although it is not modeled in this VESSEL component, applying a negative sign to a nonzero value of CFZL-d will result in TRAC-M internally evaluating the irreversible form loss of an abrupt flow-area change between the mesh cells adjacent to the interface. Then TRAC-M adds that value to the absolute value of CFZL-d and to the value of CFZV-d to define the phasic irreversible form losses.

70. VOL is the fraction of the VESSEL mesh-cell geometric volume occupied by coolant; 1.0-VOL is the fraction of the mesh-cell geometric volume occupied by structure. This is a different definition than the coolant volume in a mesh cell that VOL defines for 1D hydraulic components. For a 3D orthogonal mesh-cell volume, determining the coolant volume fraction for input usually is easier than determining the coolant volume.
71. FA-d (where d=T,Z,R or d=Y,Z,X defines the interface perpendicular-direction label in cylindrical or Cartesian geometry) is the fraction of the mesh-cell interface surface area for the positive face that is open to coolant flow (not blocked by structure). This is a different defining form than the flow area that FA defines for the mesh-cell interfaces in 1D hydraulic components.
72. The CONC solute concentration is the ratio of solute mass to liquid-coolant mass (not solute mass per unit volume). The ratio value of CONC does not necessarily go to zero as the ALPN gas-phase volume fraction goes to unity. The CONC array input is not required if ICONC = 0 (see input for note 64). ICONC = 1 only when ISOLUT = 1 (word 3 on Main-Data card 6).
73. Repeat level cards are useful for specifying input data for subsequent axial levels when two or more axial levels have identical data.
74. In level 8, the radial-interface flow-area fraction of 5.4000E-02 in "relative" cells 1, 3, and 5 models bypass flow from the downcomer to the upper plenum around the hot-leg pipe penetrations. Note that the flow-area fractions of the hot- and cold-leg pipe connections to their source-connection radial interfaces are not defined in the FA-R data. That area is defined by the source-connection junction interface flow area of the connecting 1D hydraulic components. Thus, for source-connection junction interfaces, FA-d = 0.0000E+00 is specified unless there is leakage flow across the interface (like the bypass flow internal to the VESSEL discussed above).

PIPE Component 2 : Guide tube 1.

75. This flow-tube PIPE component is inside the VESSEL component, see Fig. 5-6.
76. The PIPE-wall heat-transfer calculation will not be performed because $NODES = 0$. If $NODES > 0$ had been defined, the PIPE-wall heat-transfer calculation would be directly coupled only to the coolant inside the guide-tube PIPE component. A HTSTR component is needed if the PIPE-wall heat-transfer calculation is to couple the VESSEL coolant to the guide-tube coolant. Such heat-transfer coupling is not modeled.
77. The VESSEL-component source-connection junction data discussed in note 67 shows that $JUN1 = 2$ connects to the $LISRF = 2$ top interface of "relative" mesh cell $LISRC = 1$ in level $LISRL = 7$ of the VESSEL upper plenum and $JUN2 = 94$ connects to the $LISRF = -2$ bottom interface of "relative" mesh cell $LISRC = 1$ in level $LISRL = 12$ of the VESSEL upper head.
78. NAMELIST variable $NFRC1 = 2$ requires the user to input forward-direction and reverse-direction flow additive form-loss coefficients for all 1D hydraulic components. NAMELIST variable $IKFAC = 1$ also requires that the additive form-loss coefficients be defined as K factors rather than FRICs. Forward-direction flow models an abrupt contraction at the $JUN1$ junction interface ($FRIC(1) = 0.5$) and an abrupt expansion at the $JUN2$ junction interface ($FRIC(5) = 1.0$). Reverse-direction flow models the opposite condition.
79. NAMELIST variable $ICFLOW = 2$ requires that the choked-flow-model array $ICFLG$ be input for all 1D hydraulic components. The choked-flow model is evaluated at each component interface I where $ICFLG(I) = 1$. For this component, the choked-flow model is not evaluated at any of its interfaces because $ICFLG(I) = 0$ for $I=1,2,...,NCELLS+1$.
80. When the flow-area change between adjacent mesh cells is abrupt, the user can define $NFF(I)$ with a negative value and have TRAC-M internally evaluate the interface I irreversible form-loss $KFAC$ ($FRIC$) or $RKFAC$ ($RFRIC$) value. Otherwise, for an abrupt (as well as semiabrupt) flow-area change, the user needs to determine appropriate forward-direction and reverse-direction irreversible form-loss coefficient values and input them with the $KFAC$ (FRI) and $RKFAC$ ($RFRIC$) arrays. The latter was done for this component as discussed in note 78. The former was not done because the abrupt flow-area change would have been based on the end mesh cell of PIPE component 2 and the source-connection junction mesh cell of VESSEL component 1. This would have resulted in the flow area in the VESSEL being dictated by the size of the VESSEL-component mesh cell. The actual flow area in the VESSEL may be larger or smaller than that of the VESSEL mesh cell. Because of this, a negative value of $NFF(I)$ at a

source-connection junction to a VESSEL is not allowed. The user must input the flow-area change irreversible form-loss KFAC (FRIC) and RKFAC (RFRIC) values.

81. Zero velocities are input as the initial condition for the steady-state calculation. The CSS calculation then accelerates the primary-side coolant as a result of pump-impeller rotation and the secondary-side coolant as a result of different pressure boundary conditions until steady-state flow conditions are realized everywhere in the modeled system. Initiating steady-state calculations from no-flow conditions is easiest for the user to define. Otherwise, extreme care would need to be taken when defining nonzero velocities to avoid initial pack and stretch conditions in liquid-solid ($ALP(I) = 0.0$) mesh cells due to mismatched inflow and outflow. Such a steady-state initial solution estimate phasic velocity (and temperature) distribution can be defined internally by TRAC-M during the initialization phase of the calculation by using the hydraulic-path steady-state initialization procedure (see Section E.4.). Please note that for CSS type 1 controllers, the user's desired velocity or mass flow must be input to the VL and VV arrays at the PUMP-impeller interface.
82. The initial temperatures in the guide tubes in the VESSEL upper plenum are defined to be 581.0 K (586.1 °F). All components from the steam-generator outlets to the vessel cold-leg connections are defined to be the 559.1 K (546.7 °F) steady-state cold-leg temperature. Elsewhere on the primary side, except for the pressurizer, the initial temperatures have been defined to be the 591.1 K (604.3 °F) steady-state hot-leg temperature. Another approach would have been to define all primary-side temperatures (except for the pressurizer) to be the steady-state cold-leg temperature and then let the reactor-core power heat up the coolant to the hot-leg temperature condition. This avoids large variations in local temperature that would require more flow passes around the coolant loop to achieve converged steady-state conditions. This is especially true when CSS controllers are making inappropriate hardware adjustments based on local temperature conditions perturbed by the initial ramp-up in coolant flow.
83. The initial pressure in all primary-side components (except the PRIZER component) is defined by the $1.5500E+07$ Pa ($2.2481E+03$ psia) steady-state hot-leg pressure. For ease in inputting the pressure distribution, hydraulic-head effects on the pressure in the initial stagnant coolant have been neglected. The CSS calculation will need to begin with a small initial timestep size ($DTMIN = 1.0000E-03$ s) to evaluate the initial rapid transient that establishes hydraulic-head effects in the pressure distribution.

PIPE Component 10 : Loop 1 hot-leg pipe (loop 3 has a TEE component whose side tube connects to the pressurizer).

84. A lumped-parameter heat-transfer model with $NODES = 1$ is defined for the PIPE wall. The accuracy requirements for this heat-transfer calculation depend upon the relative importance of the stored energy and/or heat losses through this PIPE wall during the accident scenario. $NODES = 1$ implies that the importance of this heat-transfer calculation accuracy is low. This noding would be appropriate for a very fast transient (i.e. LBLOCA) where there is insufficient time available for significant heat transfer to occur as compared with the reactor core or for a very slow transient (i.e. station blackout) where heat losses through the PIPE wall may be important but the actual transient response or small temperature gradient within the PIPE wall is not important.
85. The heat-transfer coefficients $HOUTp$ ($p=L,V$ defines the fluid phase) are $0.0000E+00 \text{ W m}^{-2} \text{ K}^{-1}$ ($0.0000E+00 \text{ Btu h}^{-1} \text{ ft}^2 \text{ }^{\circ}\text{F}^{-1}$) on the PIPE-wall outer surface defining an adiabatic boundary condition to the external environment. The external-environment fluid temperatures $TOUTp$ are specified with realistic values of $3.0000E+02 \text{ K}$ ($8.0330E+01 \text{ }^{\circ}\text{F}$) for air, but their values have no effect when their difference from the PIPE-wall outer-surface temperature is multiplied by $HOUTp = 0.0000E+00 \text{ W m}^{-2} \text{ K}^{-1}$. With an adiabatic boundary condition on the PIPE-wall outer surface, the heat-transfer calculation only couples the PIPE wall to the internal hot-leg coolant.
86. Defining $NODES > 0$ requires these additional records of input data be specified for the QPPP volumetric energy source, MATID material type, and TW temperature of the PIPE wall.

PIPE Component 12 : Loop 1 steam generator primary-coolant channel (a detailed noding diagram is shown in Fig. 5-7).

87. The steam-generator primary-coolant channel PIPE component 12 has $NCELLS = 18$ mesh cells with cells 3 through 16 having heat-transfer coupling to the secondary-coolant channel (see Fig. 5-7). The heat-transfer path between the primary and secondary sides is evaluated by HTSTR component ROD 910. The steam-generator secondary side is modeled by three components: PIPE component 100 models the boiler section which has heat-transfer coupling to the primary coolant of PIPE component 12, TEE component 105 models the steam separator and dome, and TEE component 190 models the downcomer and feedwater supply. A structure-surface roughness of $EPSW = 0.0 \text{ m}$ is defined for evaluating the wall-surface friction factor inside the steam-generator tubes.
88. Flow-area change and turning flow losses are specified in the KFAC and RKFAC additive loss coefficient K factors. The entrance and exit junction

interface values of 5.0000E-01 and 2.0000E-01 model expansion and contraction, respectively, for both flow directions, but the tube entrance and exit interface values of 3.0000e-01 and 5.0000e-01 model contraction and expansion, respectively, for only forward flow.

89. Nine of the NCELLS = 18 mesh cells are defined with the hot-leg temperature of 5.9110E+02 K (6.0431E+02 °F) and the other nine mesh cells are defined with the cold-leg temperature of 5.5910e+02 K (5.4671E+02°F). Without an initial coolant-flow condition, little is gained by modeling a gradual change in temperature from hot-leg temperature cell 2 to cold-leg temperature cell 16.

PUMP Component 16 : Loop 1 primary-coolant pump.

90. IPMPTR = 22 is the ID number of the trip that controls the PUMP component action. For pump type IPMPTY = 2, TRAC-M internally evaluates the pump-impeller rotation speed rather than defining it from the pump component-action table (which is not input by specifying IPMPSTV = 0 and NPMPTB = 0). When trip ID 22 is set ON, the electrical power to the pump is tripped off and the pump-impeller rotational speed coasts down based on the inertia of its flywheel and its torque losses for pump type IPMPTY = 2.
91. ROMGMX = 5.0000E+01 rad s⁻² (4.7746E+02 rpm s⁻¹) defines the maximum rate of change of the pump-impeller rotational speed. This maximum rate constrains the evaluated rate of change from pump type 2 (in this case) (or the defined rate of change from the pump component-action table for pump type IPMPTY = 1) and the controller-adjusted rate of change when a type 1 or type 3 CSS controller is applied to the PUMP component (in this case, a type 1 CSS controller is applied to PUMP component 16). A common modeling mistake is to define a value of 0.0000E+00 rad s⁻² (0.0000E+00 rpm s⁻¹) for ROMGMX, which does not allow the pump-impeller rotational speed to change. The same situation applies to all other component-action types where an applied variation of the component action doesn't occur because the user specified a zero value for the component-action maximum rate of change parameter.

TEE Component 17 : Loop 1 cold-leg pipe section 1A.

92. IPOW1 = 1 models the component action of power deposited directly in the TEE main-tube coolant by the kinetic energy applied to the coolant by the upstream primary-coolant pump impeller rotation. IPOW2 = 0 deposits no power in the side-tube coolant.
93. Trip IPWTR1 = 22 controls the evaluation of the primary-side power-deposited-in-the-coolant component-action table. The table has |NPWTB1| = |-2| = 2 data pairs with a relative-value independent

variable (because NPWTB1 is negative valued). Its relative value is the summed change in problem time (defined by signal variable IPWSV1 = 1) during the time that trip ID 22 is set to ON_{forward} (i.e., the timestep size multiplied by the trip set status, which is summed over all timesteps).

94. PWIN1 = 2.6670E+06 W (9.1002E+06 Btu h⁻¹) is the initial total power deposited in the coolant of the NCELL1 = 1 TEE main-tube mesh cell. If there is more than one main-tube mesh cell, the fractional portions of that total power that are deposited in each mesh cell are based on a constant power per unit length. The PWIN1 initial power is applied to the main-tube coolant if trip IPWTR1 = 22 is initially OFF. When trip 22 is set to ON_{forward}, the POWTB1 table is evaluated to determine the total power deposited in the main-tube coolant. The ordinate values of the input POWTB1 table were not renormalized during input because they are multiplied by PWSCL1 = 1.0000E+00. The user-specified RPWMX1 = 1.0000E+10 W s⁻¹ (3.4121E+10 Btu h⁻¹ s⁻¹) maximum rate of change of power deposited in the main-tube coolant will not constrain the maximum rate of 2.6670E+06 W s⁻¹ (9.1002E+06 Btu h⁻¹ s⁻¹) that the table evaluates between 0.0000E+00 s and 1.0000E+00 s. When trip ID 22 is set OFF after being ON_{forward}, the power deposited in the main-tube coolant is defined by PWOFF1 = 2.6670E+06 W (9.1002E+06 Btu h⁻¹). That means that setting trip ID 22 OFF after being ON_{forward} [during which time the table-evaluated power decreases to 0.0 W (0.0 Btu h⁻¹) in one second] will result in the power being set back to its initial level at a maximum rate of RPWMX1 = 1.0000E+10 W s⁻¹ (3.4121E+10 Btu h⁻¹ s⁻¹). That requires PWOFF1/RPWMX1 = 2.6670E-04 s to ramp back up from zero to the PWOFF1 power level. The value of RPWMX1 is too large, because 2.667E-04 s is too short a time interval for ramping the pump-impeller rotational speed and its power deposited in the coolant back to its nominal operating condition. Because the setpoint delay times of trip ID 22 are DTSP(I) = 1.0000E+06 s, the initial OFF set status of trip ID 22 will not change during the transient calculation, and the power level will be constant at PWIN1 = 2.6670E+06 W (9.1002E+06 Btu h⁻¹) throughout the steady-state and transient calculations. Even though defining these large setpoint delay times prevents a pump trip from happening (and a ramp down of the power it deposits in the coolant directly), the modeling capability is already provided in the input data to model the effect of tripping the pump power off by redefining the trip 22 setpoint delay times to realistic delay-time values. Such is the case for this input-data TRACIN file where the transient calculation may be evaluated with or without the primary-coolant pumps being tripped depending upon the delay times of trip ID 22. This is a good example of the care that one must take in understanding an existing input-data model. All parameters of a model except one parameter may be set up to initiate a certain transient behavior. Not considering the value of that one parameter may lead the user to believe that the modeled transient behavior is being simulated in the TRAC-M calculation when it is not. A comment should be made at trip ID 22 and at PUMP components 16, 26, and 36 that the trip

ID 22 setpoint delay times of 1.0000E+06 s prevent a pump coastdown simulation.

TEE Component 22 : Loop 2 steam-generator primary-coolant channel.

95. TEE component 22 differs from PIPE component 12 in that it has a TEE rather than a PIPE modeling the steam-generator primary-coolant channel and a TEE rather than a PIPE component 200 modeling the boiler-section of the secondary-coolant channel. The side tubes of both these TEEs are connected to no-flow FILL components 202 and 203 for the steady-state calculation and to a PIPE component 202 for the transient calculation to model a single-tube, double-ended-guillotine break. The loop 2 steam generator in Fig. 5-9 doesn't show this modeling for a single-tube rupture because it is a generic model of the loop 2 steam generator for all possible transient-initiator conditions.

TEE Component 30 : Loop 3 hot-leg channel.

96. The modeling of this TEE component 30 hot-leg coolant channel is similar to that of PIPE component 10 except for its side tube that connects to the pressurizer modeled by components 40 through 48.

PIPE Component 40 : Pressurizer heater section.

97. IPOW = 1 models the heaters that deposit power directly in the coolant in the lower section of the pressurizer. This modeling feature of depositing power directly in the coolant is discussed for TEE component 17 (notes 92, 93, and 94) where power from the primary-coolant pump impeller rotation is deposited directly in the coolant.
98. POWIN = 2.0000E+05 W (6.8243E+05 Btu h⁻¹) defines the initial heater power deposited in the NCELLS = 3 mesh cells of PIPE component 40. Trip IPOWTR = -407 (evaluated during the steady-state calculation, because IPOWTR is negative as well as evaluated during the transient calculation) controls the evaluation of the component-action table for which there is no tabular data (NPOWTB = 0). This means that the table's independent variable, control block IPOWSV = -450, defines the heater power directly. The control-procedure logic that determines the output signal of control block -450 is shown in Fig. E-1.
99. The PIPE wall has heat-transfer coupling to the gas phase in the external environment with a heat-transfer coefficient of HOUTV = 4.0000E+01 W m⁻² K⁻¹ (7.0444E+00 Btu ft⁻² °F⁻¹ h⁻¹) and an external gas temperature of TOUTV = 3.1000E+02 K (9.8330E+01 °F).
100. The input specified thermal-hydraulic state of PIPE component 40 should be near its steady-state values (slightly below or at saturated conditions) in

the lower heater section of the pressurizer. If the defined liquid is superheated ($TL > TSAT$), liquid inventory will be lost because of liquid flashing to vapor and vapor flowing out of the PRIZER component 42 lower junction (because a PRIZER is similar to a pressure boundary condition during a steady-state calculation; see note 101) from TEE component 41; if the liquid is too subcooled, the low heater power and near no-flow conditions will require a large amount of problem time to reach the steady-state condition. A similar comment applies to the other components modeling the pressurizer.

PRIZER Component 42 : Pressurizer steam dome and sprayer.

101. This is the upper-most steam-dome section of the pressurizer, which is modeled with a PRIZER component to maintain the pressurizer steady-state pressure during the steady-state calculation. TRAC-M achieves this during a steady-state calculation by internally modeling the physical size of a PRIZER component (except for its two junction flow areas) $1.0E+35$ times larger.
102. $PSET = 1.5500E+07$ Pa ($2.2481E+03$ psia) is the desired pressure setpoint for heater/sprayer control during the transient calculation. $DPMAX = 3.4400E+05$ Pa ($4.9893E+01$ psia) is the pressure range for ramping the heater/sprayer power on. When the pressure falls below $PSET$, power is ramped on from zero to its maximum value of $QHEAT$ as the pressure falls from $PSET$ to $PSET - DPMAX$; when the pressure rises above $PSET$, power is ramped on from zero to its minimum value of $-QHEAT$ as the pressure rises from $PSET$ to $PSET + DPMAX$. The maximum heater power $QHEAT$ has been set to $0.0000E+00$ W ($0.0000E+00$ Btu h^{-1}) to turn this modeling feature off because the heater is being modeled by PIPE component 40 in the liquid lower section of the pressurizer. Doing this results in the sprayer (its effect approximated by power removal) also not being modeled by PRIZER component 42. The sprayer coolant mass flow is modeled more appropriately by FILL component 43 (see note 103).

FILL Component 43 : Pressurizer-sprayer mass-flow boundary condition.

103. The pressure-control subsystem of the pressurizer control procedure in Fig. E-1 evaluates a control block -434 output signal that is input to the mass-flow component actions of FILL components 43 and 93. Their mass-flow component-action tables are identical but have opposite numerical signs. Mass flow is withdrawn from the loop 3 cold leg by FILL component 93 and is injected into the pressurizer by FILL component 43 without modeling the physical piping and valve control that exists between the two locations.

VALVE Component 45 : Power operated relief valve (PORV).

104. Trip IVTR = 450 controls the opening and closing of the adjustable flow-area (at mesh-cell interface IVPS = 2) component action of VALVE component 45. The VTB1-array table defines a VALVE flow-area fraction adjustment rate of $(1.0 - 0.0)/(2.0 \text{ s} - 0.0 \text{ s}) = 0.5 \text{ s}^{-1}$ (based on its tabular data and its independent variable IVSV = 1 being a signal variable defining problem time). This is less than the RVMX = $2.0000\text{E}+00 \text{ s}^{-1}$ maximum rate of adjustment. The adjustable-valve flow-area fraction will increase at a rate of 0.5 s^{-1} when the trip ID 450 set status is ON_{forward} and will decrease at the same rate when the trip ID 450 set status is ON_{reverse}. The VALVE's adjustable flow-area fraction stays constant at its last evaluated flow-area fraction when trip ID 450 is OFF.
105. The FA(IVPS) = FA(2) = $1.9000\text{E}-02 \text{ m}^2$ ($2.0451\text{E}-01 \text{ ft}^2$) interface flow-area input is replaced by the product of FAVLVE = $0.0000\text{E}+00$ initially and AVLVE = $2.0400\text{E}-03 \text{ m}^2$ ($2.1958\text{E}-02 \text{ ft}^2$) evaluated at the being of each timestep.
106. ICFLG(2) = 1 has been specified to have TRAC-M evaluate the choked-flow model at the VALVE's adjustable IVPS = 2 interface.

BREAK Component 47 : PORV atmospheric-pressure boundary condition.

107. BREAK component 47 defines a PIN = $1.0135\text{E}+05 \text{ Pa}$ ($1.4700\text{E}+01 \text{ psia}$) atmospheric-pressure boundary condition adjacent to the PORV adjustable interface.
108. Coolant flow through the PORV adjustable interface (when it is open) under-goes an expansion from an average flow area of $\text{VOL}(1)/\text{DX}(1) = 1.9000\text{E}-02 \text{ m}^2$ ($2.0451\text{E}-01 \text{ ft}^2$) in VALVE component 45 to an average flow area of $\text{VOLIN}/\text{DXIN} = 2.9210\text{E}-01 \text{ m}^2$ ($3.1441\text{E}+00 \text{ ft}^2$) in BREAK component 47 while passing through an orifice adjustable-valve flow area no greater than AVLVE = $2.0400\text{E}-03 \text{ m}^2$ ($2.1958\text{E}-02 \text{ ft}^2$). VALVE component 45 needs to model both orifice and flow-area change irreversible form losses at VALVE interface IVPS = 2 with appropriate values for KFAC(2) and RKFAC(2).

FILL Component 49 : no-flow top end of the loop 1 accumulator.

109. The loop 1 accumulator is modeled by PIPE component 50, which requires the no-flow FILL component 49 connected to its JUN1 = 49 top end. The ACCUM component has been eliminated from TRAC-P, so a no-flow FILL and PIPE component replace it.

PIPE Component 50 : loop 1 accumulator.

110. PIPE component 50 replaces ACCUM component 50 because the ACCUM component is no longer modeled by TRAC-P. The PIPE's accumulator model option IACC = 1 is used to calculate the liquid level, volumetric liquid outflow, and discharged liquid volume and to implement the interface sharpener for an ACCUM-like model. The liquid-separator ACCUM-like model at the JUN2 junction (which doesn't allow the gas phase to cross the JUN2 interface) requires IACC = 2 and is not modeled by PIPE component 50.
111. Unlike the ACCUM component with no wall heat transfer, PIPE component 50 evaluates wall heat transfer with a NODES = 1 lumped parameter model. Heat transfer is evaluated from the PIPE's internal fluid to the gas phase in the external environment [where HQUTV = 5.0000E+00 W m⁻² K⁻¹ (8.8055E-01 Btu h⁻¹ ft⁻² °F⁻¹) and TOUTV = 3.2200E+02 K (1.1993E+02°F) for a very hot air environment].

VALVE Component 52 : Loop 1 accumulator check valve.

112. The accumulator check VALVE component 52 opens or closes in 1.0000E-01 s based on the VTB1 table where its independent variable is problem time defined by signal variable IVSV = 1. Evaluating the VTB1-table valve adjustment is based on trip IVTR = 520 control. The VTB1 table is linearly interpolated based on its independent variable being relative time (timestep size multiplied by the trip ID 520 set status that is summed each timestep) because NVTB1 = -2 has a negative value. Refer to note 58 for a description of how trip ID 520 changes its set status based on the trip signal's pressure difference across the VALVE's adjustable interface.

FILL Component 56 High-pressure injection system.

113. FILL component 56 models the high-pressure injection system (HPIS) mass flow as a function of the loop 1 cold-leg pressure. Trip IFTR = 21 is a safety-injection delivery signal trip (with a trip-controlled-trip trip signal defined by trips ITN(1) = 24, ITN(2) = 38, and ITN(3) = 60), which controls the mass-flow component-action table evaluation. Trip ID 21 is initially OFF and the FILL mass flow is FLOWIN = 0.0000E+00 kg s⁻¹ (0.0000E+00 lb_m h⁻¹). When any one of the trip IDs 24, 38, and 60 is set to ON_{forward}, trip ID 21 is set to ON_{forward} and the FILL mass-flow versus cold-leg pressure component-action table is evaluated. The mass flow evaluated from this table is constrained by a maximum rate of change of RFMX = 1.0000E+10 kg s⁻² (7.9366E+13 lb_m h⁻¹ s⁻¹). The VMTB table that is defined has its ordinate values (second, fourth, sixth, etc., values entered) scaled by the VMSCS = 2.4700E-01 factor. This is done because the table being input is the total HPIS mass flow for the plant vs pressure. The VMSCS scale factor indicates the fraction of the total HPIS mass flow going to loop 1, which is

based on the relative lengths of HPIS piping in each loop. If trip ID 21 is set OFF after being set to ON_{forward}, the mass flow is reset to FLWOFF = 0.0000E+00 kg s⁻¹ (0.0000e+00 lb_m h⁻¹) at a RFMX maximum rate of change in mass flow to get there.

PIPE Component 100 : Loop 1 steam-generator boiler section.

114. PIPE component 100, which had been an internal secondary-side component of STGEN component 12, is modeled identically as a separate component.

TEE Component 105 : Loop 1 steam-generator separator and dome sections.

115. TEE component 105, which had been an internal secondary-side component of STGEN component 12, is modeled as a separate component. Its previous JCELL = 5 cell has been divided into 3 equal size cells 5, 6, and 7 with JCELL = 6 to satisfy the TEE user guideline that the main-tube flow area not changed between JCELL-1 and JCELL+1.

TEE Component 110 : Loop 1 main steam line.

116. The choked-flow model evaluation flag ICFLG is set to 1 at two mesh-cell interfaces. The first location is at the flow-limiter orifice junction 110 where the main steam line connects to the steam-generator steam dome; the second location is at a flow-area reduction (venturi meter). These flags are set to model choked-flow conditions that may occur at these locations if a main-steam-line break is modeled in a transient calculation that restarts from the final data dump of this steady-state calculation.
117. NFF = -1 is defined at five mesh-cell interfaces to model the irreversible form losses of flow-area changes that are assumed to be abrupt between the mesh cells on each side of the interface. The irreversible form loss due to the flow-limiter orifice at mesh-cell interface 1 is not modeled by KFAC(1) and RKFAC(1), and its irreversible form loss should be modeled. NFF < 0 only models the irreversible form loss effect of flow-area change between mesh cells on each side of the interface and not between a mesh cell and its interface for an orifice plate.
118. NFF(1) = -1 at the internal junction to the TEE side tube does not model the irreversible form losses due to flow turning into or out of the side tube and due to an abrupt change in flow area between the main tube and side tube. To make the user aware of this, NFF(1) < 0 is not allowed at the internal-junction interface. KFAC(1) and RKFAC(1) need to be defined with those irreversible form losses. A flow-area change between JCELL and the first cell of the TEE side tube requires that KFAC(1) and RKFAC(1) be defined with a positive value. That positive value has been defined to be very

small, $KFAC(1) = RKFAC(1) = 1.0000E-10$. The TEE JCELL-interface motion-equation momentum-convection terms in TRAC-M have derivational errors that evaluate additional flow losses across the three JCELL interfaces. These additional flow losses are assumed to approximate the irreversible form losses such that they do not need to be input specified by the $KFAC(1)$ and $RKFAC(1)$ values.

FILL Component 114 : Loop 1 main steam-line safety-relief valve.

119. FILL component 114 is used to model a bank of four safety-relief valves. This is a good example of using a simple model to describe a complex hardware system. In cases such as this, a simple model is sufficient for modeling the essential nature of the hardware system as it affects the phenomena of interest in the transient.
120. The VMTB component-action table, which is not trip controlled ($IFTR = 0$) and is evaluated each timestep only during the transient calculation, defines coolant mass flow as a function of signal variable $IVSV = 1121$, the pressure in the steam-line header of TEE component 112 upstream of the safety-relief valves. There is no mass flow for pressures $< 7.5500E+06$ Pa ($1.0950E+03$ psia); mass flow increases from $0.0000E+00$ $kg\ s^{-1}$ ($0.0000E+00$ $lb_m\ h^{-1}$) to a maximum value of $4.3200E+02$ $kg\ s^{-1}$ ($3.4286E+06$ $lb_m\ h^{-1}$) (when all four safety-relief valves are open) as the pressure increases from $7.5500E+06$ Pa ($1.0950E+03$ psia) to $8.2000E+06$ Pa ($1.1893E+03$ psia).

VALVE Component 116 : Loop 1 main steam-line power-operated relief valve.

121. VALVE component 116 has its adjustable-interface flow-area fraction defined by control block $IVSV = -1162$ because its component-action table has no tabular data ($NVTB1 = 0$). Control block -1162 is defined by the control logic in Fig. E-3. The rate of flow-area fraction change defined by control block -1162 is constrained by $RVMX = 5.0000E+00\ s^{-1}$ before applying it to the VALVE's adjustable interface at $IVPS = 2$.
122. $ICFLG(2) = 1$ specifies that TRAC-M is to evaluate the choked-flow model at the VALVE's adjustable interface at $IVPS = 2$.

VALVE Component 120 : Loop 1 main steam-line isolation (control) valve.

123. VALVE component 120 models both the main steam-line isolation valve and the downstream piping. This practice minimizes the number of components as suggested in the general guidelines.
124. The adjustable flow-area fraction of this VALVE is specified to be $FAVLVE = 4.0000E-01$ at steady state. This closure state is highly uncertain. Its should be adjusted to give an upstream cell pressure of $5.4158E+06$ Pa

(7.8550E+02 psia), which corresponds to a steam-generator steam dome pressure of 5.5158E+06 Pa (8.0000E+02 psia). This had been done by a CSS type 2 controller in the previous input-data model, but was eliminated from this input-data model because of an over-constraint concern as to why steady-state convergence wasn't being satisfied. While secondary-side oscillatory behavior continues to prevent steady-state convergence, the magnitude of the oscillatory behavior is less without the CCS type 2, 3, and 4 (now 5) controllers. This is probably the result of eliminating the over-constraint condition of the CSS type 4 (now 5) controllers. The CSS type 2 and 3 controllers should be reintroduced to this steady-state calculation model the next time it is evaluated to adjust appropriately the secondary-side pressure and feedwater mass flow of each steam generator. If this isolation valve is to be kept 100% open rather than operated as a steam-flow control valve (SFCV), then the turbine-pressure boundary condition of BREAK component 424 should be adjusted.

VALVE Component 154 : Loop 1 main feedwater-control valve.

125. VALVE component 154 has two control procedures applied to it during the transient calculation:
 - a. before trip IVTROV = 422 was set from OFF to ON_{reverse}, control block IVSV = -1014 adjusts the VALVE's adjustable-interface flow-area fraction with a RVMX = 1.0000E-02 s⁻¹ maximum rate of change because the VALVE component-action table has no tabular data (NVTB1 = 0); the level-control logic in Fig. E-2 defines control block -1014 to maintain the steam-generator secondary-side liquid level, and
 - b. when trip IVTROV = 422 is set to ON_{reverse}, the VALVE's adjustable-interface flow area is ramped closed at a flow-area fraction closure rate of RVOV = 5.0000E-02 s⁻¹.

FILL Component 169 : Loop 1 steam-driven auxiliary feedwater mass flow.

126. Initially, the auxiliary feedwater mass flow is FLOWIN = 0.0000E+00 kg s⁻¹ (0.0000E+00 lb_m h⁻¹) until the component-action table controlling trip IFTR = 28 is set from OFF to ON_{forward}. Control block IFSV = -1005, which defines the loop 1 steam-generator secondary-side liquid level, is the auxiliary feedwater mass-flow component-action table independent variable. Fig. E-2 shows the steam-generator liquid-level control logic defining control block -1005. The VMTB table has NFTB = 2 tabular data pairs. Trip ID 28 requires that trip ID 46 be set to ON_{forward} followed by a 30.0 s setpoint delay time before trip ID 28 is set to ON_{forward}. Trip ID 46 requires that 2 of the 3 trips (IDs 1010, 2010, and 3010) that monitor the liquid level in each of the steam generators be set to ON_{forward} before trip ID 46 is set to ON_{forward}. Because of the magnitude of their trip ID numbers affecting the order of their evaluation each timestep, trip ID 46 will be set to ON_{forward} one

timestep after 2 of its 3 trips are set to $ON_{forward}$ and trip ID 28 will be set to $ON_{forward}$ 1 timestep after that. Therefore, a time delay of 30.0 s plus 2 timesteps have been built into this trip-control logic.

FILL Components 202 and 203: Loop 2 steam-generator double-ended guillotine-break single-tube rupture modeling.

127. FILL components 202 and 203 define no-flow boundary conditions at the junction 201 and 203 connections to the primary- and secondary-coolant sides of the loop 2 steam generator during the steady-state calculation. At the start of the transient calculation, both FILL components will be eliminated and replaced by a new PIPE component 202 to provide a leakage path between the steam generator primary- and secondary-coolant sides. The PIPE's flow area is twice the inside flow area of a single tube because the double-ended-guillotine break, single-tube initiator for the transient results in flow out of both break ends of the single tube. The two halves of the single tube provide a two-tube leakage path between the primary- and secondary-coolant sides.

VALVE Component 432 : Steam-dump valve A in bank 2.

128. Refer to Fig. E-3 for the control-system logic used by VALVE component 432 to model two steam-dump valves.

HTSTR Component ROD 900 : Reactor-core fuel rods.

129. HTSTR component ROD 900 evaluates a 2D heat-transfer calculation ($IAXCND = 1$) in powered ($NOPOWER = 0$) cylindrical-geometry ROD elements. The heat-transfer calculation in the axial direction is evaluated with explicit numerics because NAMELIST variable $NRSLV = 0$ (default value). Specifying $NRSLV = 1$ to evaluated implicit numerics is recommended when a fine axial-mesh calculation is to be performed. The fine mesh may be either input defined or automatically generated by TRAC-M (see notes 137 and 138). Trip $IRFTR = 9997$ controls the automatic generation of a fine axial mesh by TRAC-P.
130. The neutronic power in $NCRX = 6$ average ROD elements and $NRODS - NCRX = 12 - 6 = 6$ supplemental (peak-power) ROD elements will be determined from the solution of the reactor point-kinetics equations ($IRPWTY = 4$) with no reactivity feedback ($IRPWTY < 10$). Reactivity feedback (based on the fuel temperature, coolant temperature, gas volume fraction, and solute concentration changing in the fueled-core region) is modeled when 10 is added to the value of $IRPWTY$. Each of the $I = 1, \dots, 6$ average ROD elements represents $RDX(I) = 5.3380E+03$ fuel-rod elements in the reactor core.

131. Programmed reactivity is initially $REACT = 0.0000E+00$ and defined by the trip $IRPWTR = 10$ controlled component-action table $RPWTB$ to simulate control-rod insertion into the reactor core. The independent variable of table $RPWTB$ is relative problem time (based on signal variable $IRPWSV = 1$ and the number of tabular data pairs $NRPWTB = -4$ having a negative value). Relative problem time is the summed time intervals during which trip ID 10 is set to $ON_{forward}$ (evaluated as the timestep size multiplied by the trip ID 10 set status and summed overall all timesteps).
132. During the steady-state calculation, the reactor-core power is initially zero until NAMELIST-variable problem time $TPOWER = 2.0$ s when the power is set on at its $RPOWRI = 2.3000E+09$ W ($7.8479E+09$ Btu h^{-1}) steady-state power level. During the transient calculation, the total power is held constant at its initial $RPOWRI$ power level (because $REACT = 0.0$) until trip $IRPWTR = 10$ is set from OFF to $ON_{forward}$ and the reactor point-kinetics equations are evaluated for the total reactor-core power.
133. $NDGX = 6$ delayed-neutron groups and $NDHX = 11$ decay-heat groups are modeled as part of the reactor point-kinetics equation calculation. Because $NDGX$ and $NDHX$ are input specified with positive values rather than 0, their group constants and concentrations are input in the array-data section rather than defined by the default 6 delayed-neutron and 69 decay-heat group parameters in TRAC-P.
134. The axial power-shape component-action table has only $NZPWTB = 1$ datum pair with one problem time (signal variable $IZPWSV = 1$) value and one axial-power shape with $NCRZ + 1 = 5$ values. Thus, the axial-power shape will be constant and will not change its shape during the transient as well as the steady-state calculation. Because $NZPWZ = 0$ is not > 1 , the axial-power shape defined by the table has $NCRZ + 1 = 5$ values rather than $NZPWZ$ values. $NZPWI = 0$ indicates the input axial-power shape has a histogram shape with step changes at the midpoints between the axial node rows of the ROD element.
135. Each ROD element has $NODES = 8$ radial nodes ($NODES - 1 = 7$ radial intervals) and $NCRZ = 4$ axial intervals between node rows ($NCRZ + 1 = 5$ axial node rows).
136. The $NODES - 1 = 7$ radial intervals between nodes have mixed-oxide fuel in the first four intervals [$MATRD(I) = 1$ for $I=1,2,3,4$], gap gases in the fifth interval [$MATRD(5) = 3$], and zircaloy cladding in the last two intervals [$MATRD(I) = 2$ for $I=6,7$]. Material-type assignments to intervals can be made arbitrarily except that gap gases cannot be assigned to the first or last interval because the gas needs to be contained between structures within the element. The radial location of each node in the ROD element is defined by array $RADRD$.

137. Trip IRFTR = 9997 controls the addition of fine axial-mesh permanent and temporary node rows to the input-specified axial mesh (see note 135). Trip 9997 is defined to be set from OFF to ON_{forward} at 1.0000E+10 s. Thus, such an addition of node rows will not take place during the normal evaluation of the TEND = 2.0000E+02 s steady-state calculation. This modeling capability to add axial-direction fine-mesh node rows, however, can be implemented by changing the trip 9997 setpoint SETP(2) = 1.0000E+10 s to a problem time that will be reached during the steady-state calculation.
138. The permanent axial mesh addition defined by NFAX(I) = 5 adds 5 node rows to each of the 4 axial intervals for a total of 25 axial node rows when trip 9997 is set to ON_{forward}. The addition of up to 175 additional temporary node rows (up to a maximum of NZMAX = 200 node rows) may be done by TRAC-M based on internally programmed criteria. When trip 9997 is set OFF, both the temporary and permanent node rows that were added are removed from the 2D heat-transfer calculation's axial mesh (leaving the input axial mesh of NCRZ + 1 = 5 node rows).
139. Each of the NCRX = 6 average and NRODS–NCRX = 6 supplemental ROD elements (discussed in note 130) have their RADRD(8) = 5.3848E-03 m (1.7667E-02 ft) outer radial surface (IDBCO = 2) heat-transfer coupled to the hydraulic cells in each of the 6 azimuthal (theta) sectors of ring 1 (based on array IDROD input) of VESSEL component NHCOMO = 1 in axial levels 3 through 6 of the fueled reactor-core region (based on array NHCELO input).
140. The RADRD(1) = 0.0000E+00 m (0.0000E+00 ft) inner radial surface has an adiabatic (IDBCI = 0) heat-transfer boundary condition.
141. The Z array defining the axial location of the axial node rows must have the same ΔZ interval widths as the ΔZ (DX for 1D hydraulic components) interval widths of the hydraulic cells the node-row intervals are coupled to. The Z-array element values, however, can be shifted by a constant amount between their heat structure and hydraulic component definitions. In the present case, both the Z-array elements and their ΔZ intervals in HTSTR component ROD 900 are the same as the Z array defined for VESSEL component NHCOMO = 1 that the ROD-element outer surface is coupled to.

HTSTR Component SLAB 901 : Structure SLABs in the VESSEL.

142. HTSTR component SLAB 901 evaluates a 1D heat-transfer calculation (IAXCND = 0) in unpowered (NOPOWR = 1) Cartesian-geometry SLAB elements.
143. There are NCRX = 12 average SLAB elements that are heat-transfer coupled on their outer surface (IDBCO = 2) to the hydraulic cells in the 6

azimuthal (theta) sectors of ring 1 and 6 azimuthal sectors of ring 2 in level 1 of VESSEL component NHCOMO = 1. Array IDROD defines the azimuthal and ring relative-cell locations; array NHCELO defines the axial location. For coupling to a VESSEL component, the axial-level number below node row 1 should be the NHCELO(2) = 1 axial-level number above node row 1 with a negative value (i.e., NHCELO(1) = -1), and the axial-level number above node-row NCRZ + 1 = 2 should be the NHCELO(2) = 1 axial-level number below node-row NCRZ + 1 plus 1 (i.e., NHCELO(3) = 2). There are no supplemental SLAB elements because NRODS - NCRX = 6 - 6 = 0. This should be the case for all unpowered (NOPOWR = 1) ROD or SLAB elements.

HTSTR Component ROD 910 : Loop 1 steam-generator tubes.

144. The 14 heat-transfer paths between the loop 1 steam-generator primary- and secondary-coolant sides of STGEN component 12 are now modeled by HTSTR component ROD 910 with NCRX = 1 element having NCRZ = 14 axial intervals between node rows. HTSTR component RODs 920 and 930 do the same for STGEN components 22 and 32 of loops 2 and 3. The geometry modeling is identical except that the HTSTR nodes are at the hydraulic-cell edges while the STGEN nodes were at the hydraulic-cell centers. This results in a slight difference in their numerical solution for coarse mesh-cell sizes.

HTSTR Component SLAB 931: Loops 1, 2, and 3 steam-generator wrapper wall between the boiler and downcomer sections.

145. The 10 heat-transfer paths between the steam-generator 7 boiler cells plus 3 steam-separator cells and the 10 downcomer cells of STGEN components 12, 22, and 32 are now modeled by HTSTR component SLAB 931 with NCRX = 3 elements (one for each loop's steam generator) having NCRZ = 12 axial intervals between node rows. There are 2 more axial intervals than STGEN heat-transfer paths because the downcomer TEE JCELL = 2 was divided equally into 3 cells to satisfy the TEE user guideline. One STGEN heat-transfer path became 3 axial intervals between node rows.
146. Each of the NCRX = 3 SLAB elements of this HTSTR are coupled to different 1D hydraulic components of the 3 coolant loops. This multiple 1D hydraulic-component coupling is modeled by specifying M1D > 0 and inputting multiple sets of the NHCOMI, NHCELI, NHCOMO, and NHCELO arrays to define the hydraulic coupling of each SLAB element. HTSTR components RODs 932 to 938 model the remaining heat-transfer structures of all 3 steam generators in a similar manner. TRAC-M requires that such multiple 1D hydraulic-component coupled HTSTRs (with M1D > 0) be input after all single hydraulic-component coupled HTSTRs (with M1D = 0). Their M1D identification numbers must be different and

increase in value with the order of inputting such multiple 1D hydraulic-component coupled HTSTRs.

E.7. Timestep Data

Three sets of timestep data have been defined for the CSS calculation. Each set, applied during a specific problem-time domain, provides the user with the ability to define the timestep-size range and the frequency of generating various solution-state output edits. The TRAC-M user needs to have insight into the dynamics of the solution and the times that solution information is needed in order to specify these output-edit frequencies appropriately.

147. DTMIN defines the minimum timestep size that TRAC-M will use until problem time TEND. A TRAC-M error message will be generated and the calculation terminated if the timestep size needs to be reduced below the DTMIN value. DTMIN is used as the initial timestep size for an initial (nonrestart) calculation unless NAMELIST variable DTSTRT > 0.0 s or NAMELIST variable ICDELTA = 1 is defined. DTMAX defines the maximum timestep size that TRAC-M will use until problem time TEND. Selecting an appropriate value is important. Selecting too small a value for DTMAX will result in TRAC-M executing at that timestep size for most of the calculation and requiring more timesteps than it would if a larger timestep size had been used to evaluate a given amount of problem time. Selecting too large a value for DTMAX may result in TRAC-M internally increasing the timestep size to a large value and then getting into numerical difficulty converging a timestep solution when the solution varies more rapidly. Trying to recover with backup calculations that reduce the timestep size to a very small value may end up requiring more calculative effort than if a smaller DTMAX value had been used. Sometimes after numerous backups, the TRAC-M calculation is unable to recover, even after reducing the timestep size to DTMIN, and the calculation terminates with a warning message saying that the timestep size cannot be reduced further. TEND is the ending problem time for using the parameters in the timestep data set. The last timestep data set TEND (before DTMIN < 0.0) defines the problem time to end the calculation. Heat transfer is evaluated with the timestep size multiplied by |RTWFP| in a steady-state calculation when RTWFP is positive valued and in a transient calculation when RTWFP is negative valued. Numerical solution difficulties can occur when too large a value of RTWFP is used when axial heat-transfer is evaluated with explicit numerics. RTWFP = 100.0 is larger than the recommended value of 10.0, but a larger value can be used when the axial distance between node rows is large (>1.0000E-01 m, >3.2808E-01 ft). The magnitude of RTWFP should be reduced toward the value of 1.0 with each timestep data set. Accelerated convergence of the heat-transfer solution to its steady-state solution is no longer needed after the initial 5 or 10 s of problem time, and temperature oscillations that may prevent steady-state convergence can be avoided. POWERC = 1.0000E+20 turns off

the convection-power difference timestep-size control that limits the explicit temporal error of evaluating HTSTR-component surface convection heat-transfer coupling to the fluid of hydraulic components.

148. The parameters EDINT, GFINT, DMPINT, and SEDINT on the second record of a timestep data set define the time intervals between large edits to the TRCOUT file, graphics edits to the TRCXTV file, data-dump edits to the TRCDMP file, and short edits to the TRCOUT file, respectively. A short edit also is generated every time a large edit is generated. For a large system model, the printout from each large edit can be 5,000 to 10,000 lines, so you need to select the EDINT edit interval with care to avoid generating data that is too voluminous to effectively use. The short and large edits from this Westinghouse three-loop plant model require 33 and 9722 lines, respectively, in the TRCOUT file. At Los Alamos, XTV-generated graphics are used extensively to examine and understand calculative results. The GFINT graphics interval you select should depend on the time frame of the calculation that is to be plotted. Slowly varying results may require only 100 time points of data; rapidly varying results may require 400 to 800 time points of data. When both situations occur in a single calculation, different timestep data sets with GFINT being large during the slow portion/s and small during the rapid portion/s can provide appropriate detail where needed in time. The DMPINT time interval between restart data dumps needs to reflect the amount of TRAC-M calculative effort between data dumps (that would have to be partially redone when a restart calculation has to go back further in time than desired to the first available data dump), the likelihood that such a restart calculation would ever need to be done (because of the unforeseen times for branch calculations or because of a TRAC-M error exit), and the problem times when planned branch calculations are to be started. The cost of storing massive restart data-dump files (because of frequent data dumps) for long periods of time should also be considered.
149. A record with a negative real value in the first fourteen-character word field (to be read in for DTMIN) must follow the last timestep data set.

E.8. Input-Data TRACIN File Listing

The input-data TRACIN file listing for the Westinghouse three-loop plant model begins on the next page.

```

1 free format ← 1
2 *
3 *****
4 * main data *
5 *****
6 *
7 *          numtcr          ieos          inopt          nmat          id2o
8          27              0              1              0              0 ← 2
9 this is a sample problem for the trac-p users guide manual.  it models
10 a westinghouse 2308-mwt powered nuclear-core, three-loop pressurized
11 water reactor with constrained steady-state and transient calculations.
12 this full-plant model evaluates a steam-generator single-tube double-
13 ended-guillotine break transient with primary-coolant pumps operating.
14 this input-data model contains the following components and subsystems:
15 1) three-dimensional (r=2,t=6,z=12) reactor vessel;
16 2) vessel upper-plenum guide tubes;
17 3) powered-rod and unpowered-slab heat structures in the vessel;
18 4) three primary- and secondary-coolant loops modeled individually;
19 5) makeup, letdown, and pressurizer-sprayer cvcs flows;
20 6) accumulator and hpsi fills in each primary-coolant loop;
21 7) pressurizer and pressurizer porv and srv;
22 8) pressurizer, steam generator, and steam-dump control systems;
23 9) single-tube degb leakage path in loop 2 steam generator;
24 10) main-steam and steam-dump lines;
25 11) high-pressure feedwater system after hp heaters; and
26 12) auxiliary-feedwater fills (motor and steam driven).
27 the w3loop input-data model has the following developmental history:
28 james lime created the trac-pf1/mod1 input-data model on 7/84.
29 robert steinke converted the trac-pf1/mod1 input-data model with
30 gocnvt to a trac-pf1/mod2 input-data model and added component-
31 network diagrams on 9/90. marvin salazar added units labels to
32 the control blocks and trips for si/english units i/o on 10/93.
33 robert steinke replaced stgen components with htstr, pipe, and tee
34 components on 2/96. James lime upgraded the w3loop input-data model
35 to be consistent with the current h.b.robinson plant model on 5/96.
36 *
37 *          vessel component 1 contains:
38 *              6 guide-tube pipe components 2 to 7,
39 *              1 powered rod heat-structure component 900
40 *              and 9 unpowered slab htstr components 901 to 909
41 *
42 *          #####
43 *          level 12 ##### slab 909  94,96,98 95,97,99 #####
44 *          #####-----|---|---|---#####
45 *          11 #slab 908| slab 905 | | | | pipes 3,5,7#
46 *          #-----|-----|---|---|---|-----#
47 *          10 #slab 908| slab 905 | | | | | | #
48 *          #-----|-----|---|---|---|-----#

```

```

49 *      9 #slab 907| slab 905 | | | 3,5,7 | | #
50 *      #-----|-----| - |-----|-----#
51 *      8 #slab 906| slab 905 | | | pipes 2,4,6 | | #
52 *      #-----|-----| - |-----|-----#
53 *      7 #slab 903| slab 905 | 2,4,6 | | | #
54 *      #-----|-----|-----|-----|-----#
55 *      6 #slab 903| slab 904 | rod 900 | | | #
56 *      #-----|-----|-----|-----|-----#
57 *      5 #slab 903| slab 904 | rod 900 | | | #
58 *      #-----|-----|-----|-----|-----#
59 *      4 #slab 903| slab 904 | rod 900 | | | #
60 *      #-----|-----|-----|-----|-----#
61 *      3 #slab 903| slab 904 | rod 900 | | | #
62 *      #-----|-----|-----|-----|-----#
63 *      2 #slab 903| slab 902 | | | | | #
64 *      #-----|-----|-----|-----|-----#
65 *      1 #slab 901| slab 901 | | | | | #
66 *      #####
67 *      ring 2 ring 1 c.l. ring 1 ring 2
68 *
69 *      the vessel has 6 azimuthal sectors with
70 *      level 8, ring 1, +3 face source connections in sectors 1,3,5
71 *      with junction numbers 10,20,30 and
72 *      level 8, ring 2, +3 face source connections in sectors 2,4,6
73 *      with junction numbers 19,29,39
74 *
75 *      guide-tube pipe components 2, 3, ..., 7 junction numbers
76 *      are 2&94, 3&95, ..., 7&99 with +2 and -2 face connections
77 *
78 *      these rod and slab heat-structure components
79 *      have a structure element in each of the 6 azimuthal sectors
80 *
81 *      accumulator check
82 *      #####
83 *      # fill # # pipe # #valve #
84 *      # 49 # 50# 50 # 52# 52 #
85 *      #####
86 *      hpis 54
87 *      #####
88 *      loop 1 primary side # fill # # tee # # fill #
89 *      # 56 # 56# 54 # # 91 #
90 *      steam #####
91 *      generator 58 91
92 *      #####
93 *      # pipe # # pipe # # pipe # # pump # # tee # # tee #
94 *      10# 10 # 12# 12 # 14# 14 # 16# 16 # 17# 17 # 18# 18 # 19
95 *      #####
96 *      rod 910 |||||

```



```

97 *          #####
98 *          # pipe #
99 *          #####100# 100 #
100 *          # tee # #####
101 *          185# 190 #      105
102 *          #####190#####
103 *          # tee #
104 *          # 105 # ##### accumulator check #####
105 *          ##### # fill # # pipe # #valve #
106 *          110 # 59 # 60# 60 # 62# 62 #
107 *          ##### ##### cvcs
108 *          hpis 64 makeup
109 *          ##### #####
110 *          loop 2 primary side # fill # # tee # # fill #
111 *          # 66 # 66# 64 # # 92 #
112 *          steam #####
113 *          generator 68 92
114 *          ##### #####
115 *          # pipe # # tee # # pipe # # pump # # tee # # tee #
116 *          20# 20 # 22# 22 # 24# 24 # 26# 26 # 27# 27 # 28# 28 # 29
117 *          ##### #####
118 *          rod 920 |||||201
119 *          ##### pipe 202 provides the
120 *          # tee # # pipe # single-tube degb rupture
121 *          #####200# 200 #203# 202 # flow path during the transient
122 *          # tee # #####
123 *          285# 290 # 205 pipe 202 is replaced by
124 *          #####290##### no-flow fills 202 and 203
125 *          # tee # during the steady-state calc
126 *          # 205 #
127 *          #####
128 *          210 #####
129 *          201 \ 201# 202 #
130 *          sprayer srv atm ##### ----\ #####
131 *          ##### # pipe # ----/ #####
132 *          # fill # #break # 203# 202 # / 203# fill #
133 *          # 43 # # 48 # ##### # 203 #
134 *          ##### #####
135 *          43 48 porv atm accumulator
136 *          ##### #####
137 *          #prizer# #valve # #break # # pipe # # fill #
138 *          # 42 # # 46 # # 47 # # 70 # 70# 69 #
139 *          ##### #####
140 *          42 46 47 72
141 *          #####
142 *          # tee # # tee # #valve # check #valve #
143 *          # 41 # 44# 44 # 45# 45 # # 72 #
144 *          ##### ##### cvcs

```

```

145 *          41          hpis          74          sprayer
146 *          #####          #####          #####
147 *          # pipe #    loop 3 primary side  # fill #    # tee #    # fill #
148 *          # 40 #          # 76 # 76# 74 #    # 93 #
149 *          #####          steam          #####          #####
150 *          40          generator          78          93
151 *          #####          #####          #####          #####
152 *          # tee #    # pipe #    # pipe #    # pump #    # tee #    # tee #
153 *          30# 30 # 32# 32 # 34# 34 # 36# 36 # 37# 37 # 38# 38 # 39
154 *          #####          #####          #####          #####
155 *          rod 930 |||||
156 *          #####
157 *          # pipe #
158 *          #####300# 300 #
159 *          # tee #    #####
160 *          385# 390 #    305
161 *          #####390#####
162 *          # tee #
163 *          # 305 #
164 *          #####
165 *          310
166 *
167 *          the tubes of each steam generator are modeled by rods 910,920,930
168 *          remaining structure of all three steam generators are modeled by
169 *          slab 931 for the wrapper between the boiler/st.dome and downcomer
170 *          rods 932 and 933 for the lower and upper outer shells
171 *          rods 934 and 935 for the inlet and outlet tube sheets
172 *          rods 936 and 937 for the inlet and outlet lower plena
173 *          rod 938 for the secondary dryers
174 *
175 *          loop 1 secondary side          loop 2 secondary side
176 *          srv          porv atm          porv atm          srv
177 *          #####          #####          #####          #####
178 *          # fill #    #break #          #break #    # fill #
179 *          # 114 #    # 118 #          # 218 #    # 214 #
180 *          #####          #####          #####          #####
181 *          114          118          218          214
182 *          #####          #####          #####          #####
183 *          # tee #    #valve #          #valve #    # tee #
184 *          # 112 #116# 116 #          # 216 #216# 212 #
185 *          #####          #####          #####          #####
186 *          112          212
187 *          #####          #####          #####          #####
188 *          # tee #    #valve #    # tee #    #valve #    # tee #
189 *          110# 110 #120# 120 #122# 400 #222# 220 #220# 210 #210
190 *          #####          #####          #####          #####
191 *          410          turbine-stop turbine b.c.
192 *          #####          #####          #####          #####
193 *          # tee #    #valve #    # tee #    # tee #    #valve #    #break #

```



```

194 * 310# 310 #320# 320 #322# 410 #420# 420 #422# 422 #424# 424 #
195 * ##### ##### ##### ##### ##### #####
196 * 312 430
197 * ##### ##### ##### ##### #####
198 * # tee # #valve # # tee # #valve # #break #
199 * # 312 #316# 316 # # 430 #436# 436 #438# 438 #
200 * ##### ##### #####
201 * 314 318 432 steam-dump b condenser
202 * ##### ##### b b.c.
203 * # fill # #break # #valve # #break #
204 * # 314 # # 318 # # 432 #434# 434 #
205 * ##### #####
206 * srv porv atm steam-dump a condenser a b.c.
207 * loop 3 secondary side steam-dump and turbine-stop valves
208 *
209 * mdafw sdafw
210 * #####
211 * # fill # # fill # loop 1 secondary-
212 * # 179 # # 169 # side feedwater
213 * #####
214 * 179 170
215 * ##### ##### ##### #####
216 * # tee # # tee # #valve # # tee # #break #
217 * 185# 180 #180# 170 #158# 154 #154# 150 #150# 576 #
218 * ##### ##### ##### #####
219 * 151 mfw b.c.
220 * #####
221 * # fill # # fill # loop 2 secondary-
222 * # 279 # # 269 # side feedwater
223 * #####
224 * 279 270 151
225 * ##### ##### #####
226 * # tee # # tee # #valve # # tee #
227 * 285# 280 #280# 270 #258# 254 #254# 250 #
228 * ##### ##### #####
229 * 351
230 * #####
231 * # fill # # fill # loop 3 secondary-
232 * # 379 # # 369 # side feedwater
233 * #####
234 * 379 370 351 mfw b.c.
235 * ##### ##### #####
236 * # tee # # tee # #valve # # tee # #break #
237 * 385# 380 #380# 370 #358# 354 #354# 350 #350# 578 #
238 * ##### ##### #####
239 *
240 * *****
241 * namelist data *
242 * *****

```

```

243 *
244 &inopts
245   fdfhl=0.0, iadded=10, icflow=2, ikfac=1, imfr=3, iolab=1, ipowr=-1, ← [4]
246   iunlab=8, newrfd=1, nfrcl=2, nhtstr=21, noair=0, tpowr=2.0 ← [132]
247 &end
248 *
249 *       dstep       timet ← [5]
250 *       0       0.0000e+00
251 *       stdyst       transi       ncomp       njun       ipak ← [6]
252 *       2           0           132       123       1
253 *       epso       epss
254 *       1.0000e-04  1.0000e-04
255 *       oitmax       sitmax       isolut       ncontr ← [7]       nccfl
256 *       10           10           1           3           0
257 *       ntsv       ntcbl       ntcfl       ntrp       ntcp ← [8]
258 *       65           238           80           72           1
259 *
260 *****
261 * component-number data *
262 *****
263 *
264 *iorder*           1 s * reactor vessel
265 *iorder*       2   3   4 s * rod guide-tube pipes
266 *iorder*       5   6   7 s * rod guide-tube pipes
267 *iorder*      10  20  30 s * loops 1, 2, & 3 hot-leg sections
268 *iorder*      12  22  32 s * loops 1, 2, & 3 steam generators
269 *iorder*      14  24  34 s * loops 1, 2, & 3 loop seals ← [9]
270 *iorder*      16  26  36 s * loops 1, 2, & 3 primary-coolant pumps
271 *iorder*      17  27  37 s * loops 1a, 2a, & 3a cold-leg sections
272 *iorder*      18  28  38 s * loops 1b, 2b, & 3b cold-leg sections
273 *iorder*      40  41  42 s * prizer heater, middle, & sprayer sects.
274 *iorder*      43  44  45 s * prizer sprayer vel.b.c., rv hd., & porv
275 *iorder*      46  47  48 s * prizer srv & porv and srv pressure b.c.
276 *iorder*      49  59  69 s * loops 1, 2, & 3 accumulator top boundary
277 *iorder*      50  60  70 s * loops 1, 2, & 3 accumulators
278 *iorder*      52  62  72 s * loops 1, 2, & 3 accum. check valves.
279 *iorder*      54  64  74 s * loops 1, 2, & 3 accum/hpsi tees
280 *iorder*      56  66  76 s * loops 1, 2, & 3 hpsi velocity b.c.
281 *iorder*      91  92  93 s * loops 1, 2, & 3 cvcs velocity b.c.
282 *iorder*     100 200 300 s * loops 1, 2, & 3 steam-gen. boilers
283 *iorder*     105 205 305 s * loops 1, 2, & 3 steam-gen. domes
284 *iorder*     110 210 310 s * loops 1, 2, & 3 main steam lines
285 *iorder*     112 212 312 s * main steam-line porv/srv junctions
286 *iorder*     114 214 314 s * main steam-line srvs
287 *iorder*     116 216 316 s * main steam-line porvs
288 *iorder*     118 218 318 s * main steam-line porv pressure b.c.
289 *iorder*     120 220 320 s * loops 1, 2, & 3 main steam-isol. valves
290 *iorder*     150 250 350 s * hp-heater discharge lines
291 *iorder*     154 254 354 s * loops 1, 2, & 3 mfw regulating valves

```

```

292 *iorder* 169 269 369 s * loops 1, 2, & 3 sdafw velocity b.c.
293 *iorder* 170 270 370 s * loops 1, 2, & 3 mfwcw discharge headers
294 *iorder* 179 279 379 s * loops 1, 2, & 3 mdafw velocity b.c.
295 *iorder* 180 280 380 s * loops 1, 2, & 3 mfw lines
296 *iorder* 190 290 390 s * loops 1, 2, & 3 steam-gen. downcomers
297 *iorder* 202 203 s * st.gen.tube rupture fill no-flow b.c.
298 *iorder* 400 410 s * main-steam-line header tees
299 *iorder* 420 s * combined turbine & steam-dump line
300 *iorder* 422 424 s * turbine stop valve & pressure b.c.
301 *iorder* 430 s * combined steam-dump line
302 *iorder* 432 436 s * steam-dump valves a & b
303 *iorder* 434 438 s * steam-dump pressure b.c.
304 *iorder* 576 578 s * feedwater pressure b.c.
305 *iorder* 900 s * reactor-core fuel rods
306 *iorder* 901 902 903 s * vessel structure 11,r1&2 12,r1 12-7,r2
307 *iorder* 904 905 906 s * vessel structure 13-6,r1 17-11,r1 18,r2
308 *iorder* 907 908 909 s * vessel structure 19,r2 110&11,r2 112,r1
309 *iorder* 910 920 930 s * st.gen.tubes in loops 1,2,3
310 *iorder* 931 s * boiler/steam-dome to downcomer wrapper
311 *iorder* 932 933 s * lower and upper outer shells
312 *iorder* 934 935 s * inlet and outlet tube sheets
313 *iorder* 936 937 s * inlet and outlet lower plena
314 *iorder* 938 e * secondary dryers
315 *
316 *****
317 * control-parameter data *
318 *****
319 *
320 * constrained steady-state controller data
321 *
322 * type 1 controller to adjust the loop 1 pump-impeller rotational speed
323 * numcss amncss amxcss nmpcss napcss
324 * 16 0.0000e+00 2.0000e+02 -1 0
325 *
326 * type 1 controller to adjust the loop 2 pump-impeller rotational speed
327 * numcss amncss amxcss nmpcss napcss
328 * 26 0.0000e+00 2.0000e+02 -1 0
329 *
330 * type 1 controller to adjust the loop 3 pump-impeller rotational speed
331 * numcss amncss amxcss nmpcss napcss
332 * 36 0.0000e+00 2.0000e+02 -1 0
333 *
334 * signal variables
335 *
336 * problem time
337 * idsv isvn ilcn icn1 icn2
338 * 1 0 0 0 0
339 *
340 * reactor-core power

```

91

10

11

12

341 *	idsv	isvn	ilcn	icn1	icn2	← 13
342	11	18	900	0	0	
343 *						
344 *	loop 1 hot-leg liquid temperature					
345 *	idsv	isvn	ilcn	icn1	icn2	← 14
346	101	23	10	1	0	
347 *						
348 *	loop 1 steam-line pressure for signal-expression trip					
349 *	idsv	isvn	ilcn	icn1	icn2	← 15
350	111	21	110	3	0	
351 *						
352 *	loop 1 primary-coolant pump mass flow					
353 *	idsv	isvn	ilcn	icn1	icn2	← 16
354	161	32	16	1	0	
355 *						
356 *	loop 1 cold-leg pressure					
357 *	idsv	isvn	ilcn	icn1	icn2	
358	171	21	17	1	0	
359 *						
360 *	loop 1 cold-leg liquid temperature					
361 *	idsv	isvn	ilcn	icn1	icn2	
362	181	23	18	4	0	
363 *						
364 *	loop 2 hot-leg liquid temperature					
365 *	idsv	isvn	ilcn	icn1	icn2	
366	201	23	20	1	0	
367 *						
368 *	loop 2 steam-line pressure for signal-expression trip					
369 *	idsv	isvn	ilcn	icn1	icn2	
370	222	21	210	3	0	
371 *						
372 *	loop 2 primary-coolant pump mass flow					
373 *	idsv	isvn	ilcn	icn1	icn2	
374	261	32	26	1	0	
375 *						
376 *	loop 2 cold-leg pressure					
377 *	idsv	isvn	ilcn	icn1	icn2	
378	271	21	27	1	0	
379 *						
380 *	loop 2 cold-leg liquid temperature					
381 *	idsv	isvn	ilcn	icn1	icn2	
382	281	23	28	4	0	
383 *						
384 *	loop 3 hot-leg liquid temperature					
385 *	idsv	isvn	ilcn	icn1	icn2	
386	301	23	30	1	0	
387 *						
388 *	loop 3 steam-line pressure for signal-expression trip					
389 *	idsv	isvn	ilcn	icn1	icn2	
390	333	21	310	3	0	

391 *					
392 *	loop 3 primary-coolant pump mass flow				
393 *	idsv	isvn	ilcn	icn1	icn2
394	361	32	36	1	0
395 *					
396 *	loop 3 cold-leg pressure				
397 *	idsv	isvn	ilcn	icn1	icn2
398	371	21	37	1	0
399 *					
400 *	loop 3 cold-leg liquid temperature				
401 *	idsv	isvn	ilcn	icn1	icn2
402	381	23	38	4	0
403 *					
404 *	lower-tap pressurizer pressure				
405 *	idsv	isvn	ilcn	icn1	icn2
406	401	21	40	1	0
407 *					
408 *	upper-tap pressurizer pressure				
409 *	idsv	isvn	ilcn	icn1	icn2
410	421	21	42	1	0
411 *					
412 *	loop 1 accumulator-tank pressure				
413 *	idsv	isvn	ilcn	icn1	icn2
414	501	21	50	1	0
415 *					
416 *	loop 2 accumulator-tank pressure				
417 *	idsv	isvn	ilcn	icn1	icn2
418	601	21	60	1	0
419 *					
420 *	loop 3 accumulator-tank pressure				
421 *	idsv	isvn	ilcn	icn1	icn2
422	701	21	70	1	0
423 *					
424 *	loop 1 accumulator check-valve delta-p				
425 *	idsv	isvn	ilcn	icn1	icn2
426	521	-21	52	2	3
427 *					
428 *	loop 2 accumulator check-valve delta-p				
429 *	idsv	isvn	ilcn	icn1	icn2
430	621	-21	62	2	3
431 *					
432 *	loop 3 accumulator check-valve delta-p				
433 *	idsv	isvn	ilcn	icn1	icn2
434	721	-21	72	2	3
435 *					
436 *	steam generator 1 boiler flow				
437 *	idsv	isvn	ilcn	icn1	icn2
438	1000	69	100	1	0
439 *					

← 17

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440 *	loop 1 steam-generator upper-tap pressure				
441 *	idsv	isvn	ilcn	icn1	icn2
442	1051	21	105	8	0
443 *					
444 *	steam generator 1 steam line total mass flow				
445 *	idsv	isvn	ilcn	icn1	icn2
446	1100	69	110	5	0
447 *					
448 *	loop 1 steam-line pressure				
449 *	idsv	isvn	ilcn	icn1	icn2
450	1101	21	110	3	0
451 *					
452 *	loop 1 steam-line srv pressure				
453 *	idsv	isvn	ilcn	icn1	icn2
454	1121	21	112	1	0
455 *					
456 *	loop 1 steam-line delta pressure				
457 *	idsv	isvn	ilcn	icn1	icn2
458	1135	-21	110	3	5
459 *					
460 *	loop 1 main-feedwater pump a mass flow				
461 *	idsv	isvn	ilcn	icn1	icn2
462	1501	32	150	1	0
463 *					
464 *	loop 1 main-feedwater control-valve flow area				
465 *	idsv	isvn	ilcn	icn1	icn2
466	1541	42	154	0	0
467 *					
468 *	steam generator 1 feedwater flow				
469 *	idsv	isvn	ilcn	icn1	icn2
470	1700	69	170	4	0
471 *					
472 *	loop 1 feedwater-line delta pressure				
473 *	idsv	isvn	ilcn	icn1	icn2
474	1714	-21	170	1	4
475 *					
476 *	loop 1 steam-generator narrow-range-tap pressure				
477 *	idsv	isvn	ilcn	icn1	icn2
478	1903	21	190	5	0
479 *					
480 *	loop 1 steam-generator lower-tap pressure				
481 *	idsv	isvn	ilcn	icn1	icn2
482	1910	21	190	12	0
483 *					
484 *	steam generator 2 boiler flow				
485 *	idsv	isvn	ilcn	icn1	icn2
486	2000	69	200	1	0
487 *					

← 120

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488 *	loop 2 steam-generator upper-tap pressure				
489 *	idsv	isvn	ilcn	icn1	icn2
490	2051	21	205	8	0
491 *					
492 *	steam generator 2 steam line total mass flow				
493 *	idsv	isvn	ilcn	icn1	icn2
494	2100	69	210	5	0
495 *					
496 *	loop 2 steam-line pressure				
497 *	idsv	isvn	ilcn	icn1	icn2
498	2101	21	210	3	0
499 *					
500 *	loop 2 steam-line srv pressure				
501 *	idsv	isvn	ilcn	icn1	icn2
502	2121	21	212	1	0
503 *					
504 *	loop 2 steam-line delta pressure				
505 *	idsv	isvn	ilcn	icn1	icn2
506	2135	-21	210	3	5
507 *					
508 *	loop 2 main-feedwater control-valve flow area				
509 *	idsv	isvn	ilcn	icn1	icn2
510	2541	42	254	0	0
511 *					
512 *	steam generator 2 feedwater flow				
513 *	idsv	isvn	ilcn	icn1	icn2
514	2700	69	270	4	0
515 *					
516 *	loop 2 feedwater-line delta pressure				
517 *	idsv	isvn	ilcn	icn1	icn2
518	2714	-21	270	1	4
519 *					
520 *	loop 2 steam-generator narrow-range-tap pressure				
521 *	idsv	isvn	ilcn	icn1	icn2
522	2903	21	290	5	0
523 *					
524 *	loop 2 steam-generator lower-tap pressure				
525 *	idsv	isvn	ilcn	icn1	icn2
526	2910	21	290	12	0
527 *					
528 *	steam generator 3 boiler flow				
529 *	idsv	isvn	ilcn	icn1	icn2
530	3000	69	300	1	0
531 *					
532 *	loop 3 steam-generator upper-tap pressure				
533 *	idsv	isvn	ilcn	icn1	icn2
534	3051	21	305	8	0
535 *					

536 *	steam generator 3 steam line total mass flow				
537 *	idsv	isvn	ilcn	icn1	icn2
538	3100	69	310	5	0
539 *					
540 *	loop 3 steam-line pressure				
541 *	idsv	isvn	ilcn	icn1	icn2
542	3101	21	310	3	0
543 *					
544 *	loop 3 steam-line srv pressure				
545 *	idsv	isvn	ilcn	icn1	icn2
546	3121	21	312	1	0
547 *					
548 *	loop 3 steam-line delta pressure				
549 *	idsv	isvn	ilcn	icn1	icn2
550	3135	-21	310	3	5
551 *					
552 *	loop 3 main-feedwater pump b mass flow				
553 *	idsv	isvn	ilcn	icn1	icn2
554	3501	32	350	1	0
555 *					
556 *	loop 3 main-feedwater control-valve flow area				
557 *	idsv	isvn	ilcn	icn1	icn2
558	3541	42	354	0	0
559 *					
560 *	steam generator 3 feedwater flow				
561 *	idsv	isvn	ilcn	icn1	icn2
562	3700	69	370	4	0
563 *					
564 *	loop 3 feedwater-line delta pressure				
565 *	idsv	isvn	ilcn	icn1	icn2
566	3714	-21	370	1	4
567 *					
568 *	loop 3 steam-generator narrow-range-tap pressure				
569 *	idsv	isvn	ilcn	icn1	icn2
570	3903	21	390	5	0
571 *					
572 *	loop 3 steam-generator lower-tap pressure				
573 *	idsv	isvn	ilcn	icn1	icn2
574	3910	21	390	12	0
575 *					
576 *	steam-line header pressure				
577 *	idsv	isvn	ilcn	icn1	icn2
578	4001	21	410	2	0
579 *					
580 *	turbine stop valve flow-area fraction				
581 *	idsv	isvn	ilcn	icn1	icn2
582	4220	42	422	0	0
583 *					

584 *	turbine-trip set-status					
585 *	idsv	isvn	ilcn	icn1	icn2	
586	4240	56	16	0	0	
587 *						
588 *	average-rod peak cladding temperature					
589 *	idsv	isvn	ilcn	icn1	icn2	
590	9000	59	900	0	0	
591 *						
592 *	hot-rod peak cladding temperature					
593 *	idsv	isvn	ilcn	icn1	icn2	
594	9010	60	900	0	0	
595 *						
596 *	user defined unit labels					
597 *						
598 *	lulabel	lunitsi	luniteng	ufactor	ushift	
599	lusqrden	lusqrt(kg/m3)	lusqr(lb/ft3)	2.4986e-01	0.0000e+00	
600	ludtpdp	luk/pa	luf/psid	1.2411e+04	0.0000e+00	
601	lurpress	lu1/pa	lu1/psia	6.8948e+03	0.0000e+00	
602	lupresst	lupaxs	lupsidxs	1.4504e-04	0.0000e+00	
603	lurtime	lu1/s	lu1/s	1.0000e+00	0.0000e+00	
604	luasqrtp	lum2xsqrt(pa)	luft2sq(psid)	1.2963e-01	0.0000e+00	
605	lusqrtml	lusqrt(kgxm)	lusqr(lbmxf)	2.6894e+00	0.0000e+00	
606	lurmflow	lus/kg	luhr/lbm	1.2600e-04	0.0000e+00	
607 *						
608 *	control blocks					
609 *						
610 *	constant zero temperature difference					
611 *	idcb	icbn	icb1	icb2	icb3	
612	-1	9	0	0	0	
613 *	lugain	luxmin	luxmax	lucon1	lucon2	
614	lunounit	lutempd	lutempd	lutempd	lutempd	
615 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2	
616	1.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
617 *						
618 *	constant zero power					
619 *	idcb	icbn	icb1	icb2	icb3	
620	-2	9	0	0	0	
621 *	lugain	luxmin	luxmax	lucon1	lucon2	
622	lunounit	lupower	lupower	lupower	lupower	
623 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2	
624	1.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
625 *						
626 *	constant pressurizer low-level heater setpoint					
627 *	idcb	icbn	icb1	icb2	icb3	
628	-3	9	0	0	0	
629 *	lugain	luxmin	luxmax	lucon1	lucon2	
630	lunounit	lunounit	lunounit	lunounit	lunounit	
631 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2	
632	1.0000e+00	1.4400e-01	1.4400e-01	1.4400e-01	1.4400e-01	

← 20

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633 *					
634 *	constant nominal primary-side operating pressure				
635 *	idcb	icbn	icb1	icb2	icb3
636	-4	9	0	0	0
637 *	lugain	luxmin	luxmax	lucon1	lucon2
638	lunounit	lupressa	lupressa	lupressa	lupressa
639 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
640	1.0000e+00	1.5513e+07	1.5513e+07	1.5513e+07	1.5513e+07
641 *					
642 *	constant porv setpoint				
643 *	idcb	icbn	icb1	icb2	icb3
644	-5	9	0	0	0
645 *	lugain	luxmin	luxmax	lucon1	lucon2
646	lunounit	lupressa	lupressa	lupressa	lupressa
647 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
648	1.0000e+00	1.6203e+07	1.6203e+07	1.6203e+07	1.6203e+07
649 *					
650 *	constant srv setpoint				
651 *	idcb	icbn	icb1	icb2	icb3
652	-6	9	0	0	0
653 *	lugain	luxmin	luxmax	lucon1	lucon2
654	lunounit	lupressa	lupressa	lupressa	lupressa
655 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
656	1.0000e+00	1.7237e+07	1.7237e+07	1.7237e+07	1.7237e+07
657 *					
658 *	constant tave for prizer-level control				
659 *	idcb	icbn	icb1	icb2	icb3
660	-7	9	0	0	0
661 *	lugain	luxmin	luxmax	lucon1	lucon2
662	lunounit	lutemp	lutemp	lutemp	lutemp
663 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
664	1.0000e+00	5.7420e+02	5.7420e+02	5.7420e+02	5.7420e+02
665 *					
666 *	constant back-up heater gate setpoint				
667 *	idcb	icbn	icb1	icb2	icb3
668	-8	9	0	0	0
669 *	lugain	luxmin	luxmax	lucon1	lucon2
670	lunounit	lunounit	lunounit	lunounit	lunounit
671 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
672	1.0000e+00	5.0000e-02	5.0000e-02	5.0000e-02	5.0000e-02
673 *					
674 *	constant back-up heater delta-pressure setpoint				
675 *	idcb	icbn	icb1	icb2	icb3
676	-9	9	0	0	0
677 *	lugain	luxmin	luxmax	lucon1	lucon2
678	lunounit	lupressd	lupressd	lupressd	lupressd
679 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
680	1.0000e+00	-1.3790e+05	-1.3790e+05	-1.3790e+05	-1.3790e+05
681 *					

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682 *      constant back-up heater power
683 *          idcb          icbn          icb1          icb2          icb3
684 *          -10           9             0             0             0
685 *          lugain        luxmin        luxmax        lucon1        lucon2
686 *          lunounit      lupower      lupower      lupower      lupower
687 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
688 *      1.0000e+00      4.0870e+05      4.0870e+05      4.0870e+05      4.0870e+05
689 *
690 *      constant 412.7 kg/s ref steam mass flow, 1/412.7 = 2.423e-03 s/kg
691 *          idcb          icbn          icb1          icb2          icb3
692 *          -11           9             0             0             0
693 *          lugain        luxmin        luxmax        lucon1        lucon2
694 *          lunounit      lurmflow      lurmflow      lurmflow      lurmflow
695 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
696 *      1.0000e+00      2.4230e-03      2.4230e-03      2.4230e-03      2.4230e-03
697 *
698 *      constant high-steam-mass-flow setpoint
699 *          idcb          icbn          icb1          icb2          icb3
700 *          -12           9             0             0             0
701 *          lugain        luxmin        luxmax        lucon1        lucon2
702 *          lunounit      lumassfw      lumassfw      lumassfw      lumassfw
703 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
704 *      1.0000e+00      4.5400e+02      4.5400e+02      4.5400e+02      4.5400e+02
705 *
706 *      constant low steam-pressure setpoint
707 *          idcb          icbn          icb1          icb2          icb3
708 *          -13           9             0             0             0
709 *          lugain        luxmin        luxmax        lucon1        lucon2
710 *          lunounit      lupressa      lupressa      lupressa      lunounit
711 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
712 *      1.0000e+00      4.3300e+06      4.3300e+06      4.3300e+06      4.3300e+06
713 *
714 *      constant low tavg setpoint
715 *          idcb          icbn          icb1          icb2          icb3
716 *          -14           9             0             0             0
717 *          lugain        luxmin        luxmax        lucon1        lucon2
718 *          lunounit      lutemp        lutemp        lutemp        lutemp
719 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
720 *      1.0000e+00      5.5700e+02      5.5700e+02      5.5700e+02      5.5700e+02
721 *
722 *      sqrt(saturated-steam density) vs pressure table
723 *          idcb          icbn          icb1          icb2          icb3
724 *          -15           101          4001          13             0
725 *          lugain        luxmin        luxmax        lucon1        lucon2
726 *          lunounit      lusqrden      lusqrden      lunounit      lusqrden
727 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
728 *      1.0000e+00      7.7356e-01      7.5000e+00      0.0000e+00      4.5813e+00
729 *          luytab        luxtab
730 *          lusqrden      lupressa

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731 *
732 * cbftb *      1.0000e+05    7.7356e-01    5.0000e+05    1.6685e+00    1.0000e+06
733 * cbftb *      2.2985e+00    1.5000e+06    2.7742e+00    2.0000e+06    3.1875e+00
734 * cbftb *      3.0000e+06    3.9064e+00    4.0000e+06    4.5200e+00    5.0000e+06
735 * cbftb *      5.0715e+00    6.0000e+06    5.5857e+00    7.0000e+06    6.0762e+00
736 * cbftb *      8.0000e+06    6.5544e+00    9.0000e+06    7.0264e+00    1.0000e+07
737 * cbftb *      7.5000e+00e
738 *
739 *      constant reference full-power tavg (tavgo)
740 *          idcb          icbn          icb1          icb2          icb3
741          -16            9            0            0            0
742 *          lugain        luxmin        luxmax        lucon1        lucon2
743          lunounit        lutemp        lutemp        lutemp        lutemp
744 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
745          1.0000e+00    5.7510e+02    5.7510e+02    5.7510e+02    5.7510e+02
746 *
747 *      constant over-temperature dt (k1)
748 *          idcb          icbn          icb1          icb2          icb3
749          -17            9            0            0            0
750 *          lugain        luxmin        luxmax        lucon1        lucon2
751          lunounit        lutempd        lutempd        lutempd        lutempd
752 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
753          1.0000e+00    1.1620e+00    1.1620e+00    1.1620e+00    1.1620e+00
754 *
755 *      constant axial neutron flux factor (fdi)
756 *          idcb          icbn          icb1          icb2          icb3
757          -18            9            0            0            0
758 *          lugain        luxmin        luxmax        lucon1        lucon2
759          lunounit        lutempd        lutempd        lutempd        lutempd
760 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
761          1.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
762 *
763 *      constant over-power dt constant (k4)
764 *          idcb          icbn          icb1          icb2          icb3
765          -19            9            0            0            0
766 *          lugain        luxmin        luxmax        lucon1        lucon2
767          lunounit        lutempd        lutempd        lutempd        lutempd
768 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
769          1.0000e+00    1.0720e+00    1.0720e+00    1.0720e+00    1.0720e+00
770 *
771 *      high over-temperature dt in 2/3 loops
772 *
773 *      dt1 and dt2 .gt. dt limit
774 *          idcb          icbn          icb1          icb2          icb3
775          -22            5          -142          -242            0
776 *          lugain        luxmin        luxmax        lucon1        lucon2
777          lunounit        lunounit        lunounit        lunounit        lunounit
778 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
779          1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00

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780 *
781 *   dt1 and dt3 .gt. dt limit
782 *       idcb       icbn       icb1       icb2       icb3
783 *       -24        5        -142       -342        0
784 *       lugain     luxmin     luxmax     lucon1     lucon2
785 *       lunounit   lunounit   lunounit   lunounit   lunounit
786 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
787 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
788 *
789 *   dt2 and dt3 .gt. dt limit
790 *       idcb       icbn       icb1       icb2       icb3
791 *       -26        5        -242       -342        0
792 *       lugain     luxmin     luxmax     lucon1     lucon2
793 *       lunounit   lunounit   lunounit   lunounit   lunounit
794 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
795 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
796 *
797 *   dt1 and dt2 .or. dt1 and dt3 .gt. dt limit
798 *       idcb       icbn       icb1       icb2       icb3
799 *       -28        25        -22       -24        0
800 *       lugain     luxmin     luxmax     lucon1     lucon2
801 *       lunounit   lunounit   lunounit   lunounit   lunounit
802 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
803 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
804 *
805 *   dt1 and dt2 .or. dt1 and dt3 .or. dt2 and dt3 .gt. dt limit
806 *       idcb       icbn       icb1       icb2       icb3
807 *       -30        25        -28       -26        0
808 *       lugain     luxmin     luxmax     lucon1     lucon2
809 *       lunounit   lunounit   lunounit   lunounit   lunounit
810 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
811 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
812 *
813 *   high over-power dt in 2/3 loops
814 *
815 *   dt1 and dt2 .gt. dt limit
816 *       idcb       icbn       icb1       icb2       icb3
817 *       -32        5        -170       -270        0
818 *       lugain     luxmin     luxmax     lucon1     lucon2
819 *       lunounit   lunounit   lunounit   lunounit   lunounit
820 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
821 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
822 *
823 *   dt1 and dt3 .gt. dt limit
824 *       idcb       icbn       icb1       icb2       icb3
825 *       -34        5        -170       -370        0
826 *       lugain     luxmin     luxmax     lucon1     lucon2
827 *       lunounit   lunounit   lunounit   lunounit   lunounit
828 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
829 *   1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00

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830 *
831 *      dt2 and dt3 .gt. dt limit
832 *          idcb          icbn          icb1          icb2          icb3
833 *          -36           5           -270          -370           0
834 *          lugain        luxmin        luxmax        lucon1        lucon2
835 *          lunounit      lunounit      lunounit      lunounit      lunounit
836 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
837 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
838 *
839 *      dt1 and dt2 .or. dt1 and dt3 .gt. dt limit
840 *          idcb          icbn          icb1          icb2          icb3
841 *          -38           25           -32           -34           0
842 *          lugain        luxmin        luxmax        lucon1        lucon2
843 *          lunounit      lunounit      lunounit      lunounit      lunounit
844 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
845 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
846 *
847 *      dt1 and dt2 .or. dt1 and dt3 .or. dt2 and dt3 .gt. dt limit
848 *          idcb          icbn          icb1          icb2          icb3
849 *          -40           25           -38           -36           0
850 *          lugain        luxmin        luxmax        lucon1        lucon2
851 *          lunounit      lunounit      lunounit      lunounit      lunounit
852 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
853 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
854 *
855 *      amax1(tavg1,tavg2,tavg3)
856 *          idcb          icbn          icb1          icb2          icb3
857 *          -50           35           -55           -110           0
858 *          lugain        luxmin        luxmax        lucon1        lucon2
859 *          lunounit      lutemp        lutemp        lunounit      lutemp
860 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
861 *      1.0000e+00      0.0000e+00      2.0000e+03      0.0000e+00      0.0000e+00
862 *
863 *      amax1(tavg2,tavg3)
864 *          idcb          icbn          icb1          icb2          icb3
865 *          -55           35           -210          -310           0
866 *          lugain        luxmin        luxmax        lucon1        lucon2
867 *          lunounit      lutemp        lutemp        lunounit      lutemp
868 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
869 *      1.0000e+00      0.0000e+00      2.0000e+03      0.0000e+00      0.0000e+00
870 *
871 *      loop 1 tavg = 0.5x(thot+tcold)
872 *          idcb          icbn          icb1          icb2          icb3
873 *          -108          3           101          181           0
874 *          lugain        luxmin        luxmax        lucon1        lucon2
875 *          lunounit      lutemp        lutemp        lunounit      lutemp
876 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
877 *      5.0000e-01      0.0000e+00      2.0000e+03      0.0000e+00      0.0000e+00
878 *

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← 25

← 26

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879 *   loop 1 tavgl=0.5x(tavgl+tavgl) initializes tavgl=575.1
880 *       idcb          icbn          icb1          icb2          icb3
881 *       -109          3             -110          -110          0
882 *       lugain        luxmin        luxmax        lucon1        lucon2
883 *       lunounit      lutemp        lutemp        lunounit      lunounit
884 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
885 *       5.0000e-01    0.0000e+00    2.0000e+03    0.0000e+00    5.7510e+02
886 *
887 *   loop 1 smoothed tavgl
888 *       idcb          icbn          icb1          icb2          icb3
889 *       -110          59            -108          -109          0
890 *       lugain        luxmin        luxmax        lucon1        lucon2
891 *       lunounit      lutemp        lutemp        lunounit      lunounit
892 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
893 *       1.0000e+00    0.0000e+00    2.0000e+03    5.0000e-01    5.0000e-01
894 *
895 *   loop 1 dt = thot-tcold
896 *       idcb          icbn          icb1          icb2          icb3
897 *       -118          54            101          181          0
898 *       lugain        luxmin        luxmax        lucon1        lucon2
899 *       lunounit      lutemp        lutemp        lunounit      lunounit
900 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
901 *       1.0000e+00    -2.0000e+03    2.0000e+03    0.0000e+00    0.0000e+00
902 *
903 *   loop 1 dt1 = 0.5x(dt1+dt1) initializes dt1 = 32.0
904 *       idcb          icbn          icb1          icb2          icb3
905 *       -119          3             -120          -120          0
906 *       lugain        luxmin        luxmax        lucon1        lucon2
907 *       lunounit      lutemp        lutemp        lunounit      lunounit
908 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
909 *       5.0000e-01    -2.0000e+03    2.0000e+03    0.0000e+00    3.2000e+01
910 *
911 *   loop 1 smoothed dt1
912 *       idcb          icbn          icb1          icb2          icb3
913 *       -120          59            -118          -119          0
914 *       lugain        luxmin        luxmax        lucon1        lucon2
915 *       lunounit      lutemp        lutemp        lunounit      lunounit
916 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
917 *       1.0000e+00    -2.0000e+03    2.0000e+03    5.0000e-01    5.0000e-01
918 *
919 *   loop 1 high over-temperature dt limit calculation
920 *
921 *       dt limit = dttox(k1-k2x(tavg-tavgo)x
922 *                   ((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)-fdi)
923 *
924 *       k2x(tavg-tavgo)
925 *       idcb          icbn          icb1          icb2          icb3
926 *       -130          54            -110          -16          0
927 *       lugain        luxmin        luxmax        lucon1        lucon2

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← 27

← 28

928	lunounit	lutempd	lutempd	lunounit	lutempd
929 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
930	1.8630e-02	-5.0000e-01	5.0000e-01	0.0000e+00	0.0000e+00
931 *					
932 *	$k2x(tavg-tavg0)x((1.0+t1xs)/(1.0+t2xs))$				
933 *	idcb	icbn	icb1	icb2	icb3
934	-132	30	-130	0	0
935 *	lugain	luxmin	luxmax	lucon1	lucon2
936	lunounit	lutempd	lutempd	lutime	lutime
937 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
938	1.0000e+00	-5.0000e-01	5.0000e-01	2.0000e+01	3.0000e+00
939 *					
940 *	$k3x(p-po)$				
941 *	idcb	icbn	icb1	icb2	icb3
942	-134	54	421	-4	0
943 *	lugain	luxmin	luxmax	lucon1	lucon2
944	ludtpdp	lutempd	lutempd	lunounit	lutempd
945 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
946	1.1572e-07	-1.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
947 *					
948 *	$k1-k2x(tavg-tavg0)x((1.0+t1xs)/(1.0+t2xs))$				
949 *	idcb	icbn	icb1	icb2	icb3
950	-136	54	-17	-132	0
951 *	lugain	luxmin	luxmax	lucon1	lucon2
952	lunounit	lutempd	lutempd	lunounit	lutempd
953 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
954	1.0000e+00	0.0000e+00	1.1620e+00	0.0000e+00	0.0000e+00
955 *					
956 *	$k1-k2x(tavg-tavg0)x((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)$				
957 *	idcb	icbn	icb1	icb2	icb3
958	-138	3	-136	-134	0
959 *	lugain	luxmin	luxmax	lucon1	lucon2
960	lunounit	lutempd	lutempd	lunounit	lutempd
961 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
962	1.0000e+00	0.0000e+00	2.0000e+00	0.0000e+00	0.0000e+00
963 *					
964 *	dt limit				
965 *	idcb	icbn	icb1	icb2	icb3
966	-140	54	-138	-18	0
967 *	lugain	luxmin	luxmax	lucon1	lucon2
968	lunounit	lutempd	lutempd	lunounit	lutempd
969 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
970	3.2000e+01	0.0000e+00	6.4000e+01	0.0000e+00	0.0000e+00
971 *					
972 *	dt measured .gt. dt limit				
973 *	idcb	icbn	icb1	icb2	icb3
974	-142	21	-120	-140	0
975 *	lugain	luxmin	luxmax	lucon1	lucon2
976	lunounit	lunounit	lunounit	lunounit	lunounit

← 29

← 30


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977 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
978      1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
979 *
980 *      loop 1 high over-power dt limit calculation
981 *
982 *      dt limit = dttox(k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavg0)-fdi)
983 *
984 *      step time delay on t3sxtavg evaluation
985 *      idcb      icbn      icb1      icb2      icb3
986      -148      53      0      0      0
987 *      lugain      luxmin      luxmax      lucon1      lucon2
988      lunounit      lunounit      lunounit      ltime      lunounit
989 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
990      1.0000e+00    0.0000e+00    1.0000e+00    1.0000e-04    0.0000e+00
991 *
992 *      t3sxtavg, t3 = 10 s
993 *      idcb      icbn      icb1      icb2      icb3
994      -149      12      -110      0      0
995 *      lugain      luxmin      luxmax      lucon1      lucon2
996      ltime      lutempd      lutempd      lunounit      lutempd
997 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
998      1.0000e+01    -1.0000e+02    1.0000e+02    0.0000e+00    0.0000e+00
999 *
1000 *      t3sxtavg after time delay
1001 *      idcb      icbn      icb1      icb2      icb3
1002      -150      39      -148      -149      0
1003 *      lugain      luxmin      luxmax      lucon1      lucon2
1004      lunounit      lutempd      lutempd      lunounit      lutempd
1005 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1006      1.0000e+00    -1.0000e+02    1.0000e+02    0.0000e+00    0.0000e+00
1007 *
1008 *      t3sxtavg/(1.0+t3s)
1009 *      idcb      icbn      icb1      icb2      icb3
1010      -152      26      -150      0      0
1011 *      lugain      luxmin      luxmax      lucon1      lucon2
1012      lunounit      lutempd      lutempd      ltime      lutempd
1013 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1014      1.0000e+00    -1.0000e+02    1.0000e+02    1.0000e+01    0.0000e+00
1015 *
1016 *      k5 = 0.036 if tavg is increasing, k5 = 0.0 otherwise
1017 *      idcb      icbn      icb1      icb2      icb3
1018      -154      21      -150      -1      0
1019 *      lugain      luxmin      luxmax      lucon1      lucon2
1020      lunounit      lunounit      lunounit      lunounit      lunounit
1021 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1022      3.6000e-02    0.0000e+00    3.6000e-02    0.0000e+00    0.0000e+00
1023 *
1024 *      k5xt3sxtavg/(1.0+t3s)
1025 *      idcb      icbn      icb1      icb2      icb3
1026      -156      39      -154      -152      0

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← 31

← 32

← 33

← 34

1027 *	lugain	luxmin	luxmax	lucon1	lucon2
1028	lunounit	lutempd	lutempd	lunounit	lutempd
1029 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1030	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1031 *					
1032 *	k4-k5xt3sxtavg/(1.0+t3s)				
1033 *	idcb	icbn	icb1	icb2	icb3
1034	-158	54	-19	-156	0
1035 *	lugain	luxmin	luxmax	lucon1	lucon2
1036	lunounit	lutempd	lutempd	lunounit	lutempd
1037 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1038	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1039 *					
1040 *	tavg-tavgo				
1041 *	idcb	icbn	icb1	icb2	icb3
1042	-160	54	-110	-16	0
1043 *	lugain	luxmin	luxmax	lucon1	lucon2
1044	lunounit	lutempd	lutempd	lunounit	lutempd
1045 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1046	1.0000e+00	-2.0000e+03	2.0000e+03	0.0000e+00	0.0000e+00
1047 *					
1048 *	k6 = 0.004023 if tavg .gt. tavgo, k6 = 0.0 otherwise				
1049 *	idcb	icbn	icb1	icb2	icb3
1050	-162	21	-160	-1	0
1051 *	lugain	luxmin	luxmax	lucon1	lucon2
1052	lunounit	lunounit	lunounit	lunounit	lunounit
1053 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1054	4.0230e-03	0.0000e+00	4.0230e-03	0.0000e+00	0.0000e+00
1055 *					
1056 *	k6x(tavg-tavgo)				
1057 *	idcb	icbn	icb1	icb2	icb3
1058	-164	39	-162	-160	0
1059 *	lugain	luxmin	luxmax	lucon1	lucon2
1060	lunounit	lutempd	lutempd	lunounit	lutempd
1061 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1062	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1063 *					
1064 *	k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavgo)				
1065 *	idcb	icbn	icb1	icb2	icb3
1066	-166	54	-158	-164	0
1067 *	lugain	luxmin	luxmax	lucon1	lucon2
1068	lunounit	lutempd	lutempd	lunounit	lutempd
1069 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1070	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1071 *					
1072 *	dt limit				
1073 *	idcb	icbn	icb1	icb2	icb3
1074	-168	54	-166	-18	0
1075 *	lugain	luxmin	luxmax	lucon1	lucon2

1076	lunounit	lutempd	lutempd	lunounit	lutempd
1077 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1078	3.2000e+01	0.0000e+00	3.5000e+01	0.0000e+00	0.0000e+00
1079 *					
1080 *	dt measured .gt. dt limit				
1081 *	idcb	icbn	icb1	icb2	icb3
1082	-170	21	-120	-168	0
1083 *	lugain	luxmin	luxmax	lucon1	lucon2
1084	lunounit	lunounit	lunounit	lunounit	lunounit
1085 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1086	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1087 *					
1088 *	loop 2 tavg = 0.5x(thot+tcold)				
1089 *	idcb	icbn	icb1	icb2	icb3
1090	-208	3	201	281	0
1091 *	lugain	luxmin	luxmax	lucon1	lucon2
1092	lunounit	lutemp	lutemp	lunounit	lutemp
1093 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1094	5.0000e-01	0.0000e+00	2.0000e+03	0.0000e+00	0.0000e+00
1095 *					
1096 *	loop 2 tavg2=0.5x(tavg2+tavg2) initializes tavg2=575.1				
1097 *	idcb	icbn	icb1	icb2	icb3
1098	-209	3	-210	-210	0
1099 *	lugain	luxmin	luxmax	lucon1	lucon2
1100	lunounit	lutemp	lutemp	lunounit	lutemp
1101 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1102	5.0000e-01	0.0000e+00	2.0000e+03	0.0000e+00	5.7510e+02
1103 *					
1104 *	loop 2 smoothed tavg2				
1105 *	idcb	icbn	icb1	icb2	icb3
1106	-210	59	-208	-209	0
1107 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1108	lunounit	lutemp	lutemp	lunounit	lutemp
1109 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1110	1.0000e+00	0.0000e+00	2.0000e+03	5.0000e-01	5.0000e-01
1111 *					
1112 *	loop 2 dt = thot-tcold				
1113 *	idcb	icbn	icb1	icb2	icb3
1114	-218	54	201	281	0
1115 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1116	lunounit	lutemp	lutemp	lunounit	lutemp
1117 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1118	1.0000e+00	-2.0000e+03	2.0000e+03	0.0000e+00	0.0000e+00
1119 *					
1120 *	loop 2 dt2 = 0.5x(dt2+dt2) initializes dt2 = 32.0				
1121 *	idcb	icbn	icb1	icb2	icb3
1122	-219	3	-220	-220	0
1123 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1124	lunounit	lutemp	lutemp	lunounit	lutemp

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1125 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1126      5.0000e-01    -2.0000e+03    2.0000e+03    0.0000e+00    3.2000e+01
1127 *
1128 *      loop 2 smoothed dt2
1129 *      idcb      icbn      icb1      icb2      icb3
1130      -220      59      -218      -219      0
1131 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1132      lunounit      lutemp      lutemp      lunounit      lutemp
1133 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1134      1.0000e+00    -2.0000e+03    2.0000e+03    5.0000e-01    5.0000e-01
1135 *
1136 *      loop 2 high over-temperature dt limit calculation
1137 *
1138 *      dt limit = dttox(k1-k2x(tavg-tavgo)x
1139 *                  ((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)-fdi)
1140 *
1141 *      k2x(tavg-tavgo)
1142 *      idcb      icbn      icb1      icb2      icb3
1143      -230      54      -210      -16      0
1144 *      lugain      luxmin      luxmax      lucon1      lucon2
1145      lunounit      lutempd      lutempd      lunounit      lutempd
1146 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1147      1.8630e-02    -5.0000e-01    5.0000e-01    0.0000e+00    0.0000e+00
1148 *
1149 *      k2x(tavg-tavgo)x((1.0+t1xs)/(1.0+t2xs))
1150 *      idcb      icbn      icb1      icb2      icb3
1151      -232      30      -230      0      0
1152 *      lugain      luxmin      luxmax      lucon1      lucon2
1153      lunounit      lutempd      lutempd      lutime      lutime
1154 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1155      1.0000e+00    -5.0000e-01    5.0000e-01    2.0000e+01    3.0000e+00
1156 *
1157 *      k3x(p-po)
1158 *      idcb      icbn      icb1      icb2      icb3
1159      -234      54      421      -4      0
1160 *      lugain      luxmin      luxmax      lucon1      lucon2
1161      ludtpdp      lutempd      lutempd      lunounit      lutempd
1162 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1163      1.1572e-07    -1.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
1164 *
1165 *      k1-k2x(tavg-tavgo)x((1.0+t1xs)/(1.0+t2xs))
1166 *      idcb      icbn      icb1      icb2      icb3
1167      -236      54      -17      -232      0
1168 *      lugain      luxmin      luxmax      lucon1      lucon2
1169      lunounit      lutempd      lutempd      lunounit      lutempd
1170 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1171      1.0000e+00    0.0000e+00    1.1620e+00    0.0000e+00    0.0000e+00
1172 *
1173 *      k1-k2x(tavg-tavgo)x((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)

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1174 *      idcb      icbn      icb1      icb2      icb3
1175      -238          3      -236      -234          0
1176 *      lugain      luxmin      luxmax      lucon1      lucon2
1177      lunounit      lutempd      lutempd      lunounit      lutempd
1178 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1179      1.0000e+00      0.0000e+00      2.0000e+00      0.0000e+00      0.0000e+00
1180 *
1181 *      dt limit
1182 *      idcb      icbn      icb1      icb2      icb3
1183      -240          54      -238      -18          0
1184 *      lugain      luxmin      luxmax      lucon1      lucon2
1185      lunounit      lutempd      lutempd      lunounit      lutempd
1186 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1187      3.2000e+01      0.0000e+00      6.4000e+01      0.0000e+00      0.0000e+00
1188 *
1189 *      dt measured .gt. dt limit
1190 *      idcb      icbn      icb1      icb2      icb3
1191      -242          21      -220      -240          0
1192 *      lugain      luxmin      luxmax      lucon1      lucon2
1193      lunounit      lunounit      lunounit      lunounit      lunounit
1194 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1195      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1196 *
1197 *      loop 2 high over-power dt limit calculation
1198 *
1199 *      dt limit = dttox(k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavg0)-fdi)
1200 *
1201 *      step time delay on t3sxtavg evaluation
1202 *      idcb      icbn      icb1      icb2      icb3
1203      -248          53          0          0          0
1204 *      lugain      luxmin      luxmax      lucon1      lucon2
1205      lunounit      lunounit      lunounit      luntime      lunounit
1206 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1207      1.0000e+00      0.0000e+00      1.0000e+00      1.0000e-04      0.0000e+00
1208 *
1209 *      t3sxtavg, t3 = 10 s
1210 *      idcb      icbn      icb1      icb2      icb3
1211      -249          12      -210          0          0
1212 *      lugain      luxmin      luxmax      lucon1      lucon2
1213      luntime      lutempd      lutempd      lunounit      lutempd
1214 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1215      1.0000e+01      -1.0000e+02      1.0000e+02      0.0000e+00      0.0000e+00
1216 *
1217 *      t3sxtavg after time delay
1218 *      idcb      icbn      icb1      icb2      icb3
1219      -250          39      -248      -249          0
1220 *      lugain      luxmin      luxmax      lucon1      lucon2
1221      lunounit      lutempd      lutempd      lunounit      lutempd
1222 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1223      1.0000e+00      -1.0000e+02      1.0000e+02      0.0000e+00      0.0000e+00

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1224 *
1225 *      t3sxtavg/(1.0+t3s)
1226 *      idcb      icbn      icb1      icb2      icb3
1227 *      -252      26      -250      0      0
1228 *      lugain      luxmin      luxmax      lucon1      lucon2
1229 *      lunounit      lutempd      lutempd      lutime      lutempd
1230 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1231 *      1.0000e+00      -1.0000e+02      1.0000e+02      1.0000e+01      0.0000e+00
1232 *
1233 *      k5 = 0.036 if tavg is increasing, k5 = 0.0 otherwise
1234 *      idcb      icbn      icb1      icb2      icb3
1235 *      -254      21      -250      -1      0
1236 *      lugain      luxmin      luxmax      lucon1      lucon2
1237 *      lunounit      lunounit      lunounit      lunounit      lunounit
1238 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1239 *      3.6000e-02      0.0000e+00      3.6000e-02      0.0000e+00      0.0000e+00
1240 *
1241 *      k5xt3sxtavg/(1.0+t3s)
1242 *      idcb      icbn      icb1      icb2      icb3
1243 *      -256      39      -254      -252      0
1244 *      lugain      luxmin      luxmax      lucon1      lucon2
1245 *      lunounit      lutempd      lutempd      lunounit      lutempd
1246 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1247 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1248 *
1249 *      k4-k5xt3sxtavg/(1.0+t3s)
1250 *      idcb      icbn      icb1      icb2      icb3
1251 *      -258      54      -19      -256      0
1252 *      lugain      luxmin      luxmax      lucon1      lucon2
1253 *      lunounit      lutempd      lutempd      lunounit      lutempd
1254 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1255 *      1.0000e+00      0.0000e+00      1.0720e+00      0.0000e+00      0.0000e+00
1256 *
1257 *      tavg-tavgo
1258 *      idcb      icbn      icb1      icb2      icb3
1259 *      -260      54      -210      -16      0
1260 *      lugain      luxmin      luxmax      lucon1      lucon2
1261 *      lunounit      lutempd      lutempd      lunounit      lutempd
1262 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1263 *      1.0000e+00      -2.0000e+03      2.0000e+03      0.0000e+00      0.0000e+00
1264 *
1265 *      k6 = 0.004023 if tavg .gt. tavgo, k6 = 0.0 otherwise
1266 *      idcb      icbn      icb1      icb2      icb3
1267 *      -262      21      -260      -1      0
1268 *      lugain      luxmin      luxmax      lucon1      lucon2
1269 *      lunounit      lunounit      lunounit      lunounit      lunounit
1270 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1271 *      4.0230e-03      0.0000e+00      4.0230e-03      0.0000e+00      0.0000e+00
1272 *

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1273 *      k6x(tavg-tavg0)
1274 *      idcb      icbn      icb1      icb2      icb3
1275 *      -264      39      -262      -260      0
1276 *      lugain      luxmin      luxmax      lucon1      lucon2
1277 *      lunounit      lutemp      lutemp      lunounit      lutemp
1278 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1279 *      1.0000e+00      0.0000e+00      1.0720e+00      0.0000e+00      0.0000e+00
1280 *
1281 *      k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavg0)
1282 *      idcb      icbn      icb1      icb2      icb3
1283 *      -266      54      -258      -264      0
1284 *      lugain      luxmin      luxmax      lucon1      lucon2
1285 *      lunounit      lutemp      lutemp      lunounit      lutemp
1286 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1287 *      1.0000e+00      0.0000e+00      1.0720e+00      0.0000e+00      0.0000e+00
1288 *
1289 *      dt limit
1290 *      idcb      icbn      icb1      icb2      icb3
1291 *      -268      54      -266      -18      0
1292 *      lugain      luxmin      luxmax      lucon1      lucon2
1293 *      lunounit      lutemp      lutemp      lunounit      lutemp
1294 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1295 *      3.2000e+01      0.0000e+00      3.5000e+01      0.0000e+00      0.0000e+00
1296 *
1297 *      dt measured .gt. dt limit
1298 *      idcb      icbn      icb1      icb2      icb3
1299 *      -270      21      -220      -268      0
1300 *      lugain      luxmin      luxmax      lucon1      lucon2
1301 *      lunounit      lunounit      lunounit      lunounit      lunounit
1302 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1303 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1304 *
1305 *      loop 3 tavg = 0.5x(thot+tcold)
1306 *      idcb      icbn      icb1      icb2      icb3
1307 *      -308      3      301      381      0
1308 *      lugain      luxmin      luxmax      lucon1      lucon2
1309 *      lunounit      lutemp      lutemp      lunounit      lutemp
1310 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1311 *      5.0000e-01      0.0000e+00      2.0000e+03      0.0000e+00      0.0000e+00
1312 *
1313 *      loop 3 tavg3=0.5x(tavg3+tavg3) initializes tavg3=575.1
1314 *      idcb      icbn      icb1      icb2      icb3
1315 *      -309      3      -310      -310      0
1316 *      lugain      luxmin      luxmax      lucon1      lucon2
1317 *      lunounit      lutemp      lutemp      lunounit      lutemp
1318 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1319 *      5.0000e-01      0.0000e+00      2.0000e+03      0.0000e+00      5.7510e+02
1320 *

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1321 *      loop 3 smoothed tavg3
1322 *          idcb          icbn          icb1          icb2          icb3
1323          -310           59           -308           -309           0
1324 *          lugain        luxmin        luxmax        lucon1        lucon2
1325          lunounit        lutemp        lutemp        lunounit        lutemp
1326 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1327          1.0000e+00      0.0000e+00      2.0000e+03      5.0000e-01      5.0000e-01
1328 *
1329 *      loop 3 dt = thot-tcold
1330 *          idcb          icbn          icb1          icb2          icb3
1331          -318           54           301           381           0
1332 *          lugain        luxmin        luxmax        lucon1        lucon2
1333          lunounit        lutemp        lutemp        lunounit        lutemp
1334 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1335          1.0000e+00      -2.0000e+03      2.0000e+03      0.0000e+00      0.0000e+00
1336 *
1337 *      loop 3 dt3 = 0.5x(dt3+dt3) initializes dt3 = 32.0
1338 *          idcb          icbn          icb1          icb2          icb3
1339          -319           3           -320           -320           0
1340 *          lugain        luxmin        luxmax        lucon1        lucon2
1341          lunounit        lutemp        lutemp        lunounit        lutemp
1342 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1343          5.0000e-01      -2.0000e+03      2.0000e+03      0.0000e+00      3.2000e+01
1344 *
1345 *      loop 3 smoothed dt3
1346 *          idcb          icbn          icb1          icb2          icb3
1347          -320           59           -318           -319           0
1348 *          lugain        luxmin        luxmax        lucon1        lucon2
1349          lunounit        lutempd        lutempd        lunounit        lunounit
1350 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1351          1.0000e+00      -2.0000e+03      2.0000e+03      5.0000e-01      5.0000e-01
1352 *
1353 *      loop 3 high over-temperature dt limit calculation
1354 *
1355 *      dt limit = dttox(k1-k2x(tavg-tavg0)x
1356 *                  ((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)-fdi)
1357 *
1358 *      k2x(tavg-tavg0)
1359 *          idcb          icbn          icb1          icb2          icb3
1360          -330           54           -310           -16           0
1361 *          lugain        luxmin        luxmax        lucon1        lucon2
1362          lunounit        lutempd        lutempd        lunounit        lutempd
1363 *          cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1364          1.8630e-02      -5.0000e-01      5.0000e-01      0.0000e+00      0.0000e+00
1365 *
1366 *      k2x(tavg-tavg0)x((1.0+t1xs)/(1.0+t2xs))
1367 *          idcb          icbn          icb1          icb2          icb3
1368          -332           30           -330           0           0
1369 *          lugain        luxmin        luxmax        lucon1        lucon2

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1370	lunounit	lutempd	lutempd	lutime	lutime
1371 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1372	1.0000e+00	-5.0000e-01	5.0000e-01	2.0000e+01	3.0000e+00
1373 *					
1374 *	k3x(p-po)				
1375 *	idcb	icbn	icb1	icb2	icb3
1376	-334	54	421	-4	0
1377 *	lugain	luxmin	luxmax	lucon1	lucon2
1378	ludtpdp	lutempd	lutempd	lunounit	lutempd
1379 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1380	1.1572e-07	-1.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1381 *					
1382 *	k1-k2x(tavg-tavgo)x((1.0+t1xs)/(1.0+t2xs))				
1383 *	idcb	icbn	icb1	icb2	icb3
1384	-336	54	-17	-332	0
1385 *	lugain	luxmin	luxmax	lucon1	lucon2
1386	lunounit	lutempd	lutempd	lunounit	lutempd
1387 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1388	1.0000e+00	0.0000e+00	1.1620e+00	0.0000e+00	0.0000e+00
1389 *					
1390 *	k1-k2x(tavg-tavgo)x((1.0+t1xs)/(1.0+t2xs))+k3x(p-po)				
1391 *	idcb	icbn	icb1	icb2	icb3
1392	-338	3	-336	-334	0
1393 *	lugain	luxmin	luxmax	lucon1	lucon2
1394	lunounit	lutempd	lutempd	lunounit	lutempd
1395 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1396	1.0000e+00	0.0000e+00	2.0000e+00	0.0000e+00	0.0000e+00
1397 *					
1398 *	dt limit				
1399 *	idcb	icbn	icb1	icb2	icb3
1400	-340	54	-338	-18	0
1401 *	lugain	luxmin	luxmax	lucon1	lucon2
1402	lunounit	lutempd	lutempd	lunounit	lutempd
1403 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1404	3.2000e+01	0.0000e+00	6.4000e+01	0.0000e+00	0.0000e+00
1405 *					
1406 *	dt measured .gt. dt limit				
1407 *	idcb	icbn	icb1	icb2	icb3
1408	-342	21	-320	-340	0
1409 *	lugain	luxmin	luxmax	lucon1	lucon2
1410	lunounit	lunounit	lunounit	lunounit	lunounit
1411 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1412	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1413 *					
1414 *	loop 3 high over-power dt limit calculation				
1415 *					
1416 *	dt limit = dttox(k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavgo)-fdi)				
1417 *					
1418 *	time delay on t3sxtavg evaluation				

1419 *	idcb	icbn	icb1	icb2	icb3
1420	-348	53	0	0	0
1421 *	lugain	luxmin	luxmax	lucon1	lucon2
1422	lunounit	lunounit	lunounit	lunounit	lunounit
1423 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1424	1.0000e+00	0.0000e+00	1.0000e+00	1.0000e-04	0.0000e+00
1425 *					
1426 *	t3sxtavg, t3 = 10 s				
1427 *	idcb	icbn	icb1	icb2	icb3
1428	-349	12	-310	0	0
1429 *	lugain	luxmin	luxmax	lucon1	lucon2
1430	lunounit	lutempd	lutempd	lunounit	lutempd
1431 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1432	1.0000e+01	-1.0000e+02	1.0000e+02	0.0000e+00	0.0000e+00
1433 *					
1434 *	t3sxtavg after time delay				
1435 *	idcb	icbn	icb1	icb2	icb3
1436	-350	39	-348	-349	0
1437 *	lugain	luxmin	luxmax	lucon1	lucon2
1438	lunounit	lutempd	lutempd	lunounit	lutempd
1439 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1440	1.0000e+00	-1.0000e+02	1.0000e+02	0.0000e+00	0.0000e+00
1441 *					
1442 *	t3sxtavg/(1.0+t3s)				
1443 *	idcb	icbn	icb1	icb2	icb3
1444	-352	26	-350	0	0
1445 *	lugain	luxmin	luxmax	lucon1	lucon2
1446	lunounit	lutempd	lutempd	lunounit	lutempd
1447 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1448	1.0000e+00	-1.0000e+02	1.0000e+02	1.0000e+01	0.0000e+00
1449 *					
1450 *	k5 = 0.036 if tavg is increasing, k5 = 0.0 otherwise				
1451 *	idcb	icbn	icb1	icb2	icb3
1452	-354	21	-350	-1	0
1453 *	lugain	luxmin	luxmax	lucon1	lucon2
1454	lunounit	lunounit	lunounit	lunounit	lunounit
1455 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1456	3.6000e-02	0.0000e+00	3.6000e-02	0.0000e+00	0.0000e+00
1457 *					
1458 *	k5xt3sxtavg/(1.0+t3s)				
1459 *	idcb	icbn	icb1	icb2	icb3
1460	-356	39	-354	-352	0
1461 *	lugain	luxmin	luxmax	lucon1	lucon2
1462	lunounit	lutempd	lutempd	lunounit	lutempd
1463 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1464	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1465 *					
1466 *	k4-k5xt3sxtavg/(1.0+t3s)				
1467 *	idcb	icbn	icb1	icb2	icb3
1468	-358	54	-19	-356	0

1469 *	lugain	luxmin	luxmax	lucon1	lucon2
1470	lunounit	lutempd	lutempd	lunounit	lutempd
1471 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1472	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1473 *					
1474 *	tavg-tavgo				
1475 *	idcb	icbn	icb1	icb2	icb3
1476	-360	54	-310	-16	0
1477 *	lugain	luxmin	luxmax	lucon1	lucon2
1478	lunounit	lutempd	lutempd	lunounit	lutempd
1479 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1480	1.0000e+00	-2.0000e+03	2.0000e+03	0.0000e+00	0.0000e+00
1481 *					
1482 *	k6 = 0.004023 if tavg .gt. tavgo, k6 = 0.0 otherwise				
1483 *	idcb	icbn	icb1	icb2	icb3
1484	-362	21	-360	-1	0
1485 *	lugain	luxmin	luxmax	lucon1	lucon2
1486	lunounit	lunounit	lunounit	lunounit	lunounit
1487 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1488	4.0230e-03	0.0000e+00	4.0230e-03	0.0000e+00	0.0000e+00
1489 *					
1490 *	k6x(tavg-tavgo)				
1491 *	idcb	icbn	icb1	icb2	icb3
1492	-364	39	-362	-360	0
1493 *	lugain	luxmin	luxmax	lucon1	lucon2
1494	lunounit	lutempd	lutempd	lunounit	lutempd
1495 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1496	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1497 *					
1498 *	k4-k5xt3sxtavg/(1.0+t3s)-k6x(tavg-tavgo)				
1499 *	idcb	icbn	icb1	icb2	icb3
1500	-366	54	-358	-364	0
1501 *	lugain	luxmin	luxmax	lucon1	lucon2
1502	lunounit	lutempd	lutempd	lunounit	lutempd
1503 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1504	1.0000e+00	0.0000e+00	1.0720e+00	0.0000e+00	0.0000e+00
1505 *					
1506 *	dt limit				
1507 *	idcb	icbn	icb1	icb2	icb3
1508	-368	54	-366	-18	0
1509 *	lugain	luxmin	luxmax	lucon1	lucon2
1510	lunounit	lutempd	lutempd	lunounit	lutempd
1511 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1512	3.2000e+01	0.0000e+00	3.5000e+01	0.0000e+00	0.0000e+00
1513 *					
1514 *	dt measured .gt. dt limit				
1515 *	idcb	icbn	icb1	icb2	icb3
1516	-370	21	-320	-368	0
1517 *	lugain	luxmin	luxmax	lucon1	lucon2

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1518      lunounit      lunounit      lunounit      lunounit      lunounit
1519 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1520      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1521 *
1522 *      pressurizer level control
1523 *
1524 *      prizer fractional level = dp/(rhoxgxlref)
1525 *      where rhog = 5993.8 kg/m2/s2 and lref = 9.794 m
1526 *      such that 1.0/(rhoxgxlref) = 1.7304e-05 1/pa
1527 *      idcb      icbn      icb1      icb2      icb3
1528      -406      54      401      421      0
1529 *      lugain      luxmin      luxmax      lucon1      lucon2
1530      lurpress      lunounit      lunounit      lunounit      lunounit
1531 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1532      1.7304e-05      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1533 *
1534 *      prizer level versus tave table
1535 *      idcb      icbn      icb1      icb2      icb3
1536      -408      101      -7      2      0
1537 *      lugain      luxmin      luxmax      lucon1      lucon2
1538      lunounit      lunounit      lunounit      lunounit      lunounit
1539 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1540      1.0000e+00      3.9200e-01      4.5800e-01      0.0000e+00      0.0000e+00
1541 *      luytab      luxtab
1542      lunounit      lutemp
1543 *
1544 *      cbftb *      5.4980e+02      3.9200e-01      5.5380e+02      4.5800e-01e
1545 *
1546 *      delta level = 1(evaluated)-1(table)
1547 *      idcb      icbn      icb1      icb2      icb3
1548      -410      54      -406      -408      0
1549 *      lugain      luxmin      luxmax      lucon1      lucon2
1550      lunounit      lunounit      lunounit      lunounit      lunounit
1551 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1552      1.0000e+00      -1.0000e-01      1.0000e-01      0.0000e+00      0.0000e+00
1553 *
1554 *      integrator for pi controller
1555 *      idcb      icbn      icb1      icb2      icb3
1556      -412      23      -410      0      0
1557 *      lugain      luxmin      luxmax      lucon1      lucon2
1558      lunounit      lunounit      lunounit      lunounit      lunounit
1559 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1560      1.0000e+00      -1.0000e-01      1.0000e-01      0.0000e+00      0.0000e+00
1561 *
1562 *      weighted sum for pi controller
1563 *      idcb      icbn      icb1      icb2      icb3
1564      -414      59      -410      -412      0
1565 *      lugain      luxmin      luxmax      lucon1      lucon2
1566      lunounit      lunounit      lunounit      lunounit      lunounit

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1567 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1568      5.0000e+01    -1.0000e+00    1.0000e+00    8.0000e-01    2.0000e-01
1569 *
1570 *      pressurizer pressure control
1571 *
1572 *      prizer delta pressure = p(evaluated)-p(table)
1573 *      idcb      icbn      icb1      icb2      icb3
1574      -430      54      421      -4      0
1575 *      lugain      luxmin      luxmax      lucon1      lucon2
1576      lunounit      lupressd      lupressd      lunounit      lupressd
1577 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1578      1.0000e+00    -2.0000e+07    2.0000e+07    0.0000e+00    0.0000e+00
1579 *
1580 *      pi controller integrator
1581 *      idcb      icbn      icb1      icb2      icb3
1582      -432      23      -430      0      0
1583 *      lugain      luxmin      luxmax      lucon1      lucon2
1584      lunounit      lupresst      lupresst      lunounit      lupresst
1585 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1586      1.0000e+00    -1.0000e+02    1.0000e+02    0.0000e+00    0.0000e+00
1587 *
1588 *      pi controller weighted sum
1589 *      output controls pressurizer spray taken from loop 3 cold leg
1590 *      idcb      icbn      icb1      icb2      icb3
1591      -434      59      -430      -432      0
1592 *      lugain      luxmin      luxmax      lucon1      lucon2
1593      lunounit      lupressd      lupressd      lunounit      lurtime
1594 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1595      1.0000e+00    -1.0000e+20    1.0000e+20    1.0000e+00    8.3300e-02
1596 *
1597 *      pressurizer heater control
1598 *
1599 *      proportional heaters power versus delta pressure table
1600 *      idcb      icbn      icb1      icb2      icb3
1601      -436      101      -430      2      0
1602 *      lugain      luxmin      luxmax      lucon1      lucon2
1603      lunounit      lupower      lupower      lunounit      lupower
1604 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1605      1.0000e+00    0.0000e+00    4.0000e+05    0.0000e+00    0.0000e+00
1606 *      luytab      luxtab
1607      lupower      lupressd
1608 *
1609 *      cbftb *      -1.0340e+05    1.8170e+05    1.0340e+05    0.0000e+00e
1610 *
1611 *      delta pressure .gt. setpoint
1612 *      idcb      icbn      icb1      icb2      icb3
1613      -438      21      -9      -430      0
1614 *      lugain      luxmin      luxmax      lucon1      lucon2
1615      lunounit      lunounit      lunounit      lunounit      lunounit

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← 35

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1616 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1617	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1618 *					
1619 *	delta level .gt. 0.05				
1620 *	idcb	icbn	icb1	icb2	icb3
1621	-440	21	-410	-8	0
1622 *	lugain	luxmin	luxmax	lucon1	lucon2
1623	lunounit	lunounit	lunounit	lunounit	lunounit
1624 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1625	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1626 *					
1627 *	gate signal for pressure or level limit exceeded				
1628 *	idcb	icbn	icb1	icb2	icb3
1629	-442	25	-438	-440	0
1630 *	lugain	luxmin	luxmax	lucon1	lucon2
1631	lunounit	lunounit	lunounit	lunounit	lunounit
1632 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1633	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1634 *					
1635 *	input switch for zero or full b/u heater output				
1636 *	idcb	icbn	icb1	icb2	icb3
1637	-444	22	-10	-2	-442
1638 *	lugain	luxmin	luxmax	lucon1	lucon2
1639	lunounit	lupower	lupower	lunounit	lupower
1640 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1641	1.0000e+00	0.0000e+00	4.0870e+05	0.0000e+00	0.0000e+00
1642 *					
1643 *	sum of b/u plus proportional heater power				
1644 *	idcb	icbn	icb1	icb2	icb3
1645	-446	3	-444	-436	0
1646 *	lugain	luxmin	luxmax	lucon1	lucon2
1647	lunounit	lupower	lupower	lunounit	lupower
1648 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1649	1.0000e+00	0.0000e+00	1.3000e+06	0.0000e+00	0.0000e+00
1650 *					
1651 *	1(evaluated)/fs .gt. 0.144				
1652 *	idcb	icbn	icb1	icb2	icb3
1653	-448	21	-406	-3	0
1654 *	lugain	luxmin	luxmax	lucon1	lucon2
1655	lunounit	lunounit	lunounit	lunounit	lunounit
1656 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1657	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1658 *					
1659 *	low level gated total heater power				
1660 *	idcb	icbn	icb1	icb2	icb3
1661	-450	19	-446	-448	0
1662 *	lugain	luxmin	luxmax	lucon1	lucon2
1663	lunounit	lupower	lupower	lunounit	lupower
1664 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1665	1.0000e+00	0.0000e+00	1.3000e+06	0.0000e+00	0.0000e+00

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← 37

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1666 *
1667 *   loop 1 accumulator-valve delta pressure
1668 *       idcb      icbn      icb1      icb2      icb3
1669 *       -521      54        521      171      0
1670 *       lugain     luxmin     luxmax     lucon1     lucon2
1671 *       lunounit   lupressd   lupressd   lunounit   lupressd
1672 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1673 *   1.0000e+00   -1.0000e+07   1.0000e+07   0.0000e+00   0.0000e+00
1674 *
1675 *   loop 2 accumulator-valve delta pressure
1676 *       idcb      icbn      icb1      icb2      icb3
1677 *       -621      54        621      271      0
1678 *       lugain     luxmin     luxmax     lucon1     lucon2
1679 *       lunounit   lupressd   lupressd   lunounit   lupressd
1680 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1681 *   1.0000e+00   -1.0000e+07   1.0000e+07   0.0000e+00   0.0000e+00
1682 *
1683 *   loop 3 accumulator-valve delta pressure
1684 *       idcb      icbn      icb1      icb2      icb3
1685 *       -721      54        721      371      0
1686 *       lugain     luxmin     luxmax     lucon1     lucon2
1687 *       lunounit   lupressd   lupressd   lunounit   lupressd
1688 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1689 *   1.0000e+00   -1.0000e+07   1.0000e+07   0.0000e+00   0.0000e+00
1690 *
1691 *   loop 1 steam-gen level control
1692 *
1693 *   constant one
1694 *       idcb      icbn      icb1      icb2      icb3
1695 *       -1000     9        0        0        0
1696 *       lugain     luxmin     luxmax     lucon1     lucon2
1697 *       lurpress   lunounit   lunounit   lunounit   lunounit
1698 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1699 *   1.0000e+00   1.0000e+00   1.0000e+00   1.0000e+00   0.0000e+00
1700 *
1701 *   steam generator 1 non-zero steam flow
1702 *       idcb      icbn      icb1      icb2      icb3
1703 *       -1001     39       -1000     1100     0
1704 *       lugain     luxmin     luxmax     lucon1     lucon2
1705 *       lurpress   lunounit   lunounit   lunounit   lunounit
1706 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1707 *   1.0000e+00   1.0000e-06   1.0000e+06   0.0000e+00   0.0000e+00
1708 *
1709 *   steam generator 1 recirculation ratio (boiler flow/steam flow)
1710 *       idcb      icbn      icb1      icb2      icb3
1711 *       -1002     14       1000     -1001     0
1712 *       lugain     luxmin     luxmax     lucon1     lucon2
1713 *       lurpress   lunounit   lunounit   lunounit   lunounit
1714 *       cbgain     cbxmin     cbxmax     cbcon1     cbcon2
1715 *   0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00

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1716 *
1717 *   loop 1 steam-gen level fraction = dp/(rhogxlref)
1718 *   where rhog = 8173.2 kg/m2/s2 and lref = 4.461 m
1719 *   such that 1.0/(rhogxlref) = 2.6363e-05 1/pa
1720 *       idcb       icbn       icb1       icb2       icb3
1721 *       -1004       54        1903       1051       0
1722 *       lugain      luxmin      luxmax      lucon1      lucon2
1723 *       lurpress    lunounit    lunounit    lunounit    lunounit
1724 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1725 *   2.6363e-05      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1726 *
1727 *   loop 1 steam-gen level signal lag
1728 *       idcb       icbn       icb1       icb2       icb3
1729 *       -1005       26        -1004       0         0
1730 *       lugain      luxmin      luxmax      lucon1      lucon2
1731 *       lunounit    lunounit    lunounit    lunounit    lunounit
1732 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1733 *   1.0000e+00      0.0000e+00      1.0000e+02      1.0000e+00      0.0000e+00
1734 *
1735 *   loop 1 steam-gen level error = 1(table)-1(evaluated)
1736 *       idcb       icbn       icb1       icb2       icb3
1737 *       -1006       54        -4243      -1005       0
1738 *       lugain      luxmin      luxmax      lucon1      lucon2
1739 *       lunounit    lunounit    lunounit    lunounit    lunounit
1740 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1741 *   1.0000e+00      -1.0000e+02      1.0000e+02      0.0000e+00      0.0000e+00
1742 *
1743 *   loop 1 steam-gen integration for level pi controller
1744 *       idcb       icbn       icb1       icb2       icb3
1745 *       -1007       23        -1006       0         0
1746 *       lugain      luxmin      luxmax      lucon1      lucon2
1747 *       lunounit    luntime     luntime     lunounit    luntime
1748 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1749 *   1.0000e+00      -1.0000e-01      1.0000e-01      1.0000e+00      0.0000e+00
1750 *
1751 *   loop 1 steam-gen weighted sum for level pi controller
1752 *       idcb       icbn       icb1       icb2       icb3
1753 *       -1008       59        -1006      -1007       0
1754 *       lugain      luxmin      luxmax      lucon1      lucon2
1755 *       lunounit    lunounit    lunounit    lunounit    lurtime
1756 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1757 *   1.0000e+00      -1.0000e+02      1.0000e+02      1.0000e+00      1.0000e-01
1758 *
1759 *   loop 1 steam-gen flow error, mstm-mfw
1760 *       idcb       icbn       icb1       icb2       icb3
1761 *       -1009       54        -1109      -1706       0
1762 *       lugain      luxmin      luxmax      lucon1      lucon2
1763 *       lunounit    lumassfw     lumassfw     lunounit    lumassfw
1764 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1765 *   1.0000e+00      -1.0000e+03      1.0000e+03      0.0000e+00      0.0000e+00

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1766 *
1767 *      loop 1 steam-gen flow error fraction, (mstm-mfw)/mss
1768 *      idcb      icbn      icb1      icb2      icb3
1769 *      -1010      39      -1009      -11      0
1770 *      lugain      luxmin      luxmax      lucon1      lucon2
1771 *      lunounit      lunounit      lunounit      lunounit      lunounit
1772 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1773 *      1.0000e+00      -2.0000e+00      2.0000e+00      0.0000e+00      0.0000e+00
1774 *
1775 *      loop 1 steam-gen combined flow and level error
1776 *      idcb      icbn      icb1      icb2      icb3
1777 *      -1011      3      -1008      -1010      0
1778 *      lugain      luxmin      luxmax      lucon1      lucon2
1779 *      lunounit      lunounit      lunounit      lunounit      lunounit
1780 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1781 *      1.0000e+00      -2.0000e+01      2.0000e+01      0.0000e+00      0.0000e+00
1782 *
1783 *      loop 1 steam-gen integration for error of pi controller
1784 *      idcb      icbn      icb1      icb2      icb3
1785 *      -1012      23      -1011      0      0
1786 *      lugain      luxmin      luxmax      lucon1      lucon2
1787 *      lunounit      luntime      luntime      lunounit      luntime
1788 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1789 *      1.0000e+00      -1.0000e-01      1.0000e-01      1.0000e+00      0.0000e+00
1790 *
1791 *      loop 1 steam-gen weighted sum error for pi controller
1792 *      idcb      icbn      icb1      icb2      icb3
1793 *      -1013      59      -1011      -1012      0
1794 *      lugain      luxmin      luxmax      lucon1      lucon2
1795 *      lunounit      lunounit      lunounit      lunounit      lurtime
1796 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1797 *      1.0000e+00      -1.0000e-01      1.0000e-01      1.0000e+00      1.0000e-01
1798 *
1799 *      loop 1 steam-gen adjusted main-fdw control-valve flow area
1800 *      idcb      icbn      icb1      icb2      icb3
1801 *      -1014      3      -1013      1541      0
1802 *      lugain      luxmin      luxmax      lucon1      lucon2
1803 *      lunounit      lunounit      lunounit      lunounit      lunounit
1804 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1805 *      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1806 *
1807 *      loop 1 steam-line abs(delta pressure)
1808 *      idcb      icbn      icb1      icb2      icb3
1809 *      -1104      1      1135      0      0
1810 *      lugain      luxmin      luxmax      lucon1      lucon2
1811 *      lunounit      lupressd      lupressd      lunounit      lupressd
1812 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1813 *      1.0000e+00      0.0000e+00      1.0000e+08      0.0000e+00      0.0000e+00
1814 *

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1815 *    loop 1 steam-line kxsqrt(delta pressure) where k = 0.84779
1816 *          idcb          icbn          icb1          icb2          icb3
1817 *          -1106          52          -1104          0          0
1818 *          lugain          luxmin          luxmax          lucon1          lucon2
1819 *          luarea          luasqrtp          luasqrtp          lunounit          luasqrtp
1820 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1821 *    8.4779e-01    -1.0000e+08    1.0000e+08    0.0000e+00    0.0000e+00
1822 *
1823 *    loop 1 steam-line mass flow
1824 *          idcb          icbn          icb1          icb2          icb3
1825 *          -1109          39          -1106          -15          0
1826 *          lugain          luxmin          luxmax          lucon1          lucon2
1827 *          lunounit          lumassfw          lumassfw          lunounit          lumassfw
1828 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1829 *    1.0000e+00    0.0000e+00    1.0000e+06    0.0000e+00    0.0000e+00
1830 *
1831 *    loop 1 steam-gen main steam-isolation valve (msiv) trip logic
1832 *          idcb          icbn          icb1          icb2          icb3
1833 *          -1110          34          -110          -14          0
1834 *          lugain          luxmin          luxmax          lucon1          lucon2
1835 *          lunounit          lunounit          lunounit          lunounit          lunounit
1836 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1837 *    1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
1838 *
1839 *    loop 1 low steam pressure trip signal
1840 *          idcb          icbn          icb1          icb2          icb3
1841 *          -1112          34          111          -13          0
1842 *          lugain          luxmin          luxmax          lucon1          lucon2
1843 *          lunounit          lunounit          lunounit          lunounit          lunounit
1844 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1845 *    1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
1846 *
1847 *    loop 1 high steam flow trip signal
1848 *          idcb          icbn          icb1          icb2          icb3
1849 *          -1114          21          -1109          -12          0
1850 *          lugain          luxmin          luxmax          lucon1          lucon2
1851 *          lunounit          lunounit          lunounit          lunounit          lunounit
1852 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1853 *    1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
1854 *
1855 *    loop 1 low tavg or low steam pressure trip signal
1856 *          idcb          icbn          icb1          icb2          icb3
1857 *          -1116          25          -1110          -1112          0
1858 *          lugain          luxmin          luxmax          lucon1          lucon2
1859 *          lunounit          lunounit          lunounit          lunounit          lunounit
1860 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
1861 *    1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
1862 *
1863 *    loop 1 high mass flow and (low tavg or low press) trip signal

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1864 *      idcb      icbn      icb1      icb2      icb3
1865      -1118      5      -1114      -1116      0
1866 *      lugain      luxmin      luxmax      lucon1      lucon2
1867      lunounit      lunounit      lunounit      lunounit      lunounit
1868 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1869      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1870 *
1871 *      loop 1 steam-line porv control logic
1872 *
1873 *      loop 1 steam-line porv area fr vs presstable (turb-trip mode)
1874 *      idcb      icbn      icb1      icb2      icb3
1875      -1160      101      1121      2      0
1876 *      lugain      luxmin      luxmax      lucon1      lucon2
1877      lunounit      lunounit      lunounit      lunounit      lunounit
1878 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1879      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1880 *      luytab      luxtab
1881      lunounit      lupressa
1882 *
1883 *      cbftb *      7.2400e+06      0.0000e+00      7.4500e+06      1.0000e+00e
1884 *
1885 *      loop 1 steam-line porv area (turbine trip or load rejection)
1886 *      idcb      icbn      icb1      icb2      icb3
1887      -1162      22      -1160      -4338      4240
1888 *      lugain      luxmin      luxmax      lucon1      lucon2
1889      lunounit      lunounit      lunounit      lunounit      lunounit
1890 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1891      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
1892 *
1893 *      loop 1 feedwater line abs(delta pressure)
1894 *      idcb      icbn      icb1      icb2      icb3
1895      -1704      1      1714      0      0
1896 *      lugain      luxmin      luxmax      lucon1      lucon2
1897      lunounit      lupressd      lupressd      lunounit      lupressd
1898 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1899      1.0000e+00      0.0000e+00      1.0000e+08      0.0000e+00      0.0000e+00
1900 *
1901 *      loop 1 feedwater mass flow = kxsqrt(delta pressure), k=1.46999
1902 *      idcb      icbn      icb1      icb2      icb3
1903      -1706      52      -1704      0      0
1904 *      lugain      luxmin      luxmax      lucon1      lucon2
1905      lusqrtml      lumassfw      lumassfw      lunounit      lumassfw
1906 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
1907      1.46999e00      0.0000e+00      1.0000e+04      0.0000e+00      0.0000e+00
1908 *
1909 *      loop 2 steam-gen level control
1910 *
1911 *      constant one
1912 *      idcb      icbn      icb1      icb2      icb3
1913      -2000      9      0      0      0

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1914 *	lugain	luxmin	luxmax	lucon1	lucon2
1915	lusqrtml	lumassfw	lumassfw	lunounit	lumassfw
1916 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1917	1.0000e+00	1.0000e+00	1.0000e+00	1.0000e+00	0.0000e+00
1918 *					
1919 *	steam generator 2 non-zero steam flow				
1920 *	idcb	icbn	icb1	icb2	icb3
1921	-2001	39	-2000	2100	0
1922 *	lugain	luxmin	luxmax	lucon1	lucon2
1923	lusqrtml	lumassfw	lumassfw	lunounit	lumassfw
1924 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1925	1.0000e+00	1.0000e-06	1.0000e+06	0.0000e+00	0.0000e+00
1926 *					
1927 *	steam generator 2 recirculation ratio (boiler flow/steam flow)				
1928 *	idcb	icbn	icb1	icb2	icb3
1929	-2002	14	2000	-2001	0
1930 *	lugain	luxmin	luxmax	lucon1	lucon2
1931	lusqrtml	lumassfw	lumassfw	lunounit	lumassfw
1932 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1933	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
1934 *					
1935 *	loop 2 steam-gen level fraction = dp/(rhogxlref)				
1936 *	where rhog = 8173.2 kg/m2/s2 and lref = 4.461 m				
1937 *	such that 1.0/(rhogxlref) = 2.6363e-05 1/pa				
1938 *	idcb	icbn	icb1	icb2	icb3
1939	-2004	54	2903	2051	0
1940 *	lugain	luxmin	luxmax	lucon1	lucon2
1941	lurpress	lunounit	lunounit	lunounit	lunounit
1942 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1943	2.6363e-05	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
1944 *					
1945 *	loop 2 steam-gen level signal lag				
1946 *	idcb	icbn	icb1	icb2	icb3
1947	-2005	26	-2004	0	0
1948 *	lugain	luxmin	luxmax	lucon1	lucon2
1949	lunounit	lunounit	lunounit	lunounit	lunounit
1950 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1951	1.0000e+00	0.0000e+00	1.0000e+02	1.0000e+00	0.0000e+00
1952 *					
1953 *	loop 2 steam-gen level error = 1(table)-1(evaluated)				
1954 *	idcb	icbn	icb1	icb2	icb3
1955	-2006	54	-4243	-2005	0
1956 *	lugain	luxmin	luxmax	lucon1	lucon2
1957	lunounit	lunounit	lunounit	lunounit	lunounit
1958 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1959	1.0000e+00	-1.0000e+02	1.0000e+02	0.0000e+00	0.0000e+00
1960 *					
1961 *	loop 2 steam-gen integration of level for pi controller				
1962 *	idcb	icbn	icb1	icb2	icb3
1963	-2007	23	-2006	0	0

1964 *	lugain	luxmin	luxmax	lucon1	lucon2
1965	lunounit	lutime	lutime	lunounit	lutime
1966 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1967	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	0.0000e+00
1968 *					
1969 *	loop 2 steam-gen weighted sum for level of pi controller				
1970 *	idcb	icbn	icb1	icb2	icb3
1971	-2008	59	-2006	-2007	0
1972 *	lugain	luxmin	luxmax	lucon1	lucon2
1973	lunounit	lunounit	lunounit	lunounit	lutime
1974 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1975	1.0000e+00	-1.0000e+02	1.0000e+02	1.0000e+00	1.0000e-01
1976 *					
1977 *	loop 2 steam-gen mass flow error, mstm-mfw				
1978 *	idcb	icbn	icb1	icb2	icb3
1979	-2009	54	-2109	-2706	0
1980 *	lugain	luxmin	luxmax	lucon1	lucon2
1981	lunounit	lumassfw	lumassfw	lunounit	lumassfw
1982 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1983	1.0000e+00	-1.0000e+03	1.0000e+03	0.0000e+00	0.0000e+00
1984 *					
1985 *	loop 2 steam-gen mass flow error fraction, (mstm-mfw)/mss				
1986 *	idcb	icbn	icb1	icb2	icb3
1987	-2010	39	-2009	-11	0
1988 *	lugain	luxmin	luxmax	lucon1	lucon2
1989	lunounit	lunounit	lunounit	lunounit	lunounit
1990 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1991	1.0000e+00	-2.0000e+00	2.0000e+00	0.0000e+00	0.0000e+00
1992 *					
1993 *	loop 2 steam-gen combined flow and level error				
1994 *	idcb	icbn	icb1	icb2	icb3
1995	-2011	3	-2008	-2010	0
1996 *	lugain	luxmin	luxmax	lucon1	lucon2
1997	lunounit	lunounit	lunounit	lunounit	lunounit
1998 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
1999	1.0000e+00	-2.0000e+01	2.0000e+01	0.0000e+00	0.0000e+00
2000 *					
2001 *	loop 2 steam-gen integration for error of pi controller				
2002 *	idcb	icbn	icb1	icb2	icb3
2003	-2012	23	-2011	0	0
2004 *	lugain	luxmin	luxmax	lucon1	lucon2
2005	lunounit	lutime	lutime	lunounit	lutime
2006 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2007	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	0.0000e+00
2008 *					
2009 *	loop 2 steam-gen weighted sum for error of pi controller				
2010 *	idcb	icbn	icb1	icb2	icb3
2011	-2013	59	-2011	-2012	0
2012 *	lugain	luxmin	luxmax	lucon1	lucon2

2013	lunounit	lunounit	lunounit	lunounit	lurtime
2014 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2015	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	1.0000e-01
2016 *					
2017 *	loop 2 steam-gen adjusted main-fdw control-valve flow area				
2018 *	idcb	icbn	icb1	icb2	icb3
2019	-2014	3	-2013	2541	0
2020 *	lugain	luxmin	luxmax	lucon1	lucon2
2021	lunounit	lunounit	lunounit	lunounit	lunounit
2022 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2023	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2024 *					
2025 *	loop 2 steam-line abs(delta pressure)				
2026 *	idcb	icbn	icb1	icb2	icb3
2027	-2104	1	2135	0	0
2028 *	lugain	luxmin	luxmax	lucon1	lucon2
2029	lunounit	lupressd	lupressd	lunounit	lupressd
2030 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2031	1.0000e+00	0.0000e+00	1.0000e+08	0.0000e+00	0.0000e+00
2032 *					
2033 *	loop 2 steam-line kxsqrt(delta pressure) where k = 0.84779				
2034 *	idcb	icbn	icb1	icb2	icb3
2035	-2106	52	-2104	0	0
2036 *	lugain	luxmin	luxmax	lucon1	lucon2
2037	luarea	luasqrtp	luasqrtp	lunounit	luasqrtp
2038 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2039	0.84779-01	-1.0000e+08	1.0000e+08	0.0000e+00	0.0000e+00
2040 *					
2041 *	loop 2 steam-line mass flow				
2042 *	idcb	icbn	icb1	icb2	icb3
2043	-2109	39	-2106	-15	0
2044 *	lugain	luxmin	luxmax	lucon1	lucon2
2045	lunounit	lumassfw	lumassfw	lunounit	lumassfw
2046 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2047	1.0000e+00	0.0000e+00	1.0000e+06	0.0000e+00	0.0000e+00
2048 *					
2049 *	loop 2 steam-gen main steam-isolation valve (msiv) trip logic				
2050 *	idcb	icbn	icb1	icb2	icb3
2051	-2110	34	-210	-14	0
2052 *	lugain	luxmin	luxmax	lucon1	lucon2
2053	lunounit	lunounit	lunounit	lunounit	lunounit
2054 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2055	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2056 *					
2057 *	loop 2 low steam pressure trip signal				
2058 *	idcb	icbn	icb1	icb2	icb3
2059	-2112	34	222	-13	0
2060 *	lugain	luxmin	luxmax	lucon1	lucon2
2061	lunounit	lunounit	lunounit	lunounit	lunounit

2062 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2063	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2064 *					
2065 *	loop 2 high steam flow trip signal				
2066 *	idcb	icbn	icb1	icb2	icb3
2067	-2114	21	-2109	-12	0
2068 *	lugain	luxmin	luxmax	lucon1	lucon2
2069	lunounit	lunounit	lunounit	lunounit	lunounit
2070 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2071	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2072 *					
2073 *	loop 2 low tavg or low steam pressure trip signal				
2074 *	idcb	icbn	icb1	icb2	icb3
2075	-2116	25	-2110	-2112	0
2076 *	lugain	luxmin	luxmax	lucon1	lucon2
2077	lunounit	lunounit	lunounit	lunounit	lunounit
2078 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2079	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2080 *					
2081 *	loop 2 high flow and (low tavg or low pressure) trip signal				
2082 *	idcb	icbn	icb1	icb2	icb3
2083	-2118	5	-2114	-2116	0
2084 *	lugain	luxmin	luxmax	lucon1	lucon2
2085	lunounit	lunounit	lunounit	lunounit	lunounit
2086 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2087	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2088 *					
2089 *	loop 2 steam-line porv control logic				
2090 *					
2091 *	loop 2 steam-line porv area fr vs press table (turb-trip mode)				
2092 *	idcb	icbn	icb1	icb2	icb3
2093	-2160	101	2121	2	0
2094 *	lugain	luxmin	luxmax	lucon1	lucon2
2095	lunounit	lunounit	lunounit	lunounit	lunounit
2096 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2097	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2098 *	luytab	luxtab			
2099	lunounit	lupressa			
2100 *					
2101 *	cbftb *	7.2400e+06	0.0000e+00	7.4500e+06	1.0000e+00e
2102 *					
2103 *	loop 2 steam-line porv area (turbine trip or load rejection)				
2104 *	idcb	icbn	icb1	icb2	icb3
2105	-2162	22	-2160	-4338	4240
2106 *	lugain	luxmin	luxmax	lucon1	lucon2
2107	lunounit	lunounit	lunounit	lunounit	lunounit
2108 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2109	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2110 *					

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2111 *    loop 2 feedwater-line abs(delta pressure)
2112 *          idcb          icbn          icb1          icb2          icb3
2113 *          -2704          1          2714          0          0
2114 *          lugain          luxmin          luxmax          lucon1          lucon2
2115 *          lunounit          lupressd          lupressd          lunounit          lupressd
2116 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2117 *    1.0000e+00    0.0000e+00    1.0000e+08    0.0000e+00    0.0000e+00
2118 *
2119 *    loop 2 feedwater mass flow = kxsqrt(delta pressure), k = 0.74264
2120 *          idcb          icbn          icb1          icb2          icb3
2121 *          -2706          52          -2704          0          0
2122 *          lugain          luxmin          luxmax          lucon1          lucon2
2123 *          lusqrtml          lumassfw          lumassfw          lunounit          lumassfw
2124 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2125 *    7.4264e-01    0.0000e+00    1.0000e+04    0.0000e+00    0.0000e+00
2126 *
2127 *    loop 3 steam-gen level control
2128 *
2129 *    loop 3 steam-gen level fraction = dp/(rhogxlref)
2130 *    where rhog = 8173.2 kg/m2/s2 and lref = 4.461 m
2131 *    such that 1.0/(rhogxlref) = 2.6363e-05 1/pa
2132 *          idcb          icbn          icb1          icb2          icb3
2133 *          -3004          54          3903          3051          0
2134 *          lugain          luxmin          luxmax          lucon1          lucon2
2135 *          lurpress          lunounit          lunounit          lunounit          lunounit
2136 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2137 *    2.6363e-05    0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
2138 *
2139 *    loop 3 steam-gen level signal lag
2140 *          idcb          icbn          icb1          icb2          icb3
2141 *          -3005          26          -3004          0          0
2142 *          lugain          luxmin          luxmax          lucon1          lucon2
2143 *          lunounit          lunounit          lunounit          lunounit          lunounit
2144 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2145 *    1.0000e+00    0.0000e+00    1.0000e+02    1.0000e+00    0.0000e+00
2146 *
2147 *    loop 3 steam-gen level error = l(table)-l(evaluated)
2148 *          idcb          icbn          icb1          icb2          icb3
2149 *          -3006          54          -4243          -3005          0
2150 *          lugain          luxmin          luxmax          lucon1          lucon2
2151 *          lunounit          lunounit          lunounit          lunounit          lunounit
2152 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2153 *    1.0000e+00    -1.0000e+02    1.0000e+02    0.0000e+00    0.0000e+00
2154 *
2155 *    loop 3 steam-gen level integration for pi controller
2156 *          idcb          icbn          icb1          icb2          icb3
2157 *          -3007          23          -3006          0          0
2158 *          lugain          luxmin          luxmax          lucon1          lucon2
2159 *          lunounit          luptime          luptime          lunounit          luptime

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2160 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2161	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	0.0000e+00
2162 *					
2163 *	loop 3 steam-gen weighted sum for level of pi controller				
2164 *	idcb	icbn	icb1	icb2	icb3
2165	-3008	59	-3006	-3007	0
2166 *	lugain	luxmin	luxmax	lucon1	lucon2
2167	lunounit	lunounit	lunounit	lunounit	lurtime
2168 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2169	1.0000e+00	-1.0000e+02	1.0000e+02	1.0000e+00	1.0000e-01
2170 *					
2171 *	loop 3 steam-gen flow error, mstm-mfw				
2172 *	idcb	icbn	icb1	icb2	icb3
2173	-3009	54	-3109	-3706	0
2174 *	lugain	luxmin	luxmax	lucon1	lucon2
2175	lunounit	lumassfw	lumassfw	lunounit	lumassfw
2176 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2177	1.0000e+00	-1.0000e+03	1.0000e+03	0.0000e+00	0.0000e+00
2178 *					
2179 *	loop 3 steam-gen flow error fraction, (mstm-mfw)/mss				
2180 *	idcb	icbn	icb1	icb2	icb3
2181	-3010	39	-3009	-11	0
2182 *	lugain	luxmin	luxmax	lucon1	lucon2
2183	lunounit	lunounit	lunounit	lunounit	lunounit
2184 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2185	1.0000e+00	-2.0000e+00	2.0000e+00	0.0000e+00	0.0000e+00
2186 *					
2187 *	loop 3 steam-gen combined flow and level error				
2188 *	idcb	icbn	icb1	icb2	icb3
2189	-3011	3	-3008	-3010	0
2190 *	lugain	luxmin	luxmax	lucon1	lucon2
2191	lunounit	lunounit	lunounit	lunounit	lunounit
2192 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2193	1.0000e+00	-2.0000e+01	2.0000e+01	0.0000e+00	0.0000e+00
2194 *					
2195 *	loop 3 steam-gen integration of error for pi controller				
2196 *	idcb	icbn	icb1	icb2	icb3
2197	-3012	23	-3011	0	0
2198 *	lugain	luxmin	luxmax	lucon1	lucon2
2199	lunounit	lurtime	lurtime	lunounit	lurtime
2200 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2201	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	0.0000e+00
2202 *					
2203 *	loop 3 steam-gen weighted sum for pi controller				
2204 *	idcb	icbn	icb1	icb2	icb3
2205	-3013	59	-3011	-3012	0
2206 *	lugain	luxmin	luxmax	lucon1	lucon2
2207	lunounit	lunounit	lunounit	lunounit	lurtime
2208 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2209	1.0000e+00	-1.0000e-01	1.0000e-01	1.0000e+00	1.0000e-01

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2210 *
2211 *   loop 3 steam-gen adjusted main-fdw control-valve flow area
2212 *       idcb       icbn       icb1       icb2       icb3
2213 *       -3014       3         -3013       3541       0
2214 *       lugain      luxmin      luxmax      lucon1      lucon2
2215 *       lunounit     lunounit     lunounit     lunounit     lunounit
2216 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2217 *       1.0000e+00   0.0000e+00   1.0000e+00   0.0000e+00   0.0000e+00
2218 *
2219 *   loop 3 steam-line abs(delta pressure)
2220 *       idcb       icbn       icb1       icb2       icb3
2221 *       -3104       1         3135       0         0
2222 *       lugain      luxmin      luxmax      lucon1      lucon2
2223 *       lunounit     lupressd     lupressd     lunounit     lupressd
2224 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2225 *       1.0000e+00   0.0000e+00   1.0000e+08   0.0000e+00   0.0000e+00
2226 *
2227 *   loop 3 steam-line kxsqrt(delta pressure) where k= 0.22179 m2
2228 *       idcb       icbn       icb1       icb2       icb3
2229 *       -3106       52        -3104       0         0
2230 *       lugain      luxmin      luxmax      lucon1      lucon2
2231 *       luarea      luasqrtp     luasqrtp     lunounit     luasqrtp
2232 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2233 *       1.46999     0.0000e+00   1.0000e+04   0.0000e+00   0.0000e+00
2234 *
2235 *   loop 3 steam-gen level control
2236 *
2237 *   constant one
2238 *       idcb       icbn       icb1       icb2       icb3
2239 *       -3000       9         0         0         0
2240 *       lugain      luxmin      luxmax      lucon1      lucon2
2241 *       luarea      luasqrtp     luasqrtp     lunounit     luasqrtp
2242 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2243 *       1.0000e+00   1.0000e+00   1.0000e+00   1.0000e+00   0.0000e+00
2244 *
2245 *   steam generator 3 non-zero steam flow
2246 *       idcb       icbn       icb1       icb2       icb3
2247 *       -3001       39        -3000       3100       0
2248 *       lugain      luxmin      luxmax      lucon1      lucon2
2249 *       luarea      luasqrtp     luasqrtp     lunounit     luasqrtp
2250 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2251 *       1.0000e+00   1.0000e-06   1.0000e+06   0.0000e+00   0.0000e+00
2252 *
2253 *   steam generator 3 recirculation ratio (boiler flow/steam flow)
2254 *       idcb       icbn       icb1       icb2       icb3
2255 *       -3002       14        3000       -3001       0
2256 *       lugain      luxmin      luxmax      lucon1      lucon2
2257 *       luarea      luasqrtp     luasqrtp     lunounit     luasqrtp
2258 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2259 *       0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00

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2260 *
2261 *   loop 3 steam-gen level fraction = dp/(rhogxlref)
2262 *   where rhog = 8173.2 kg/m2/s2 and lref = 4.461 m
2263 *   such that 1.0/(rhogxlref) = 2.6363e-05 1/pa
2264 *       idcb      icbn      icb1      icb2      icb3
2265 *       -3004      54      3903      3051      0
2266 *       lugain      luxmin      luxmax      lucon1      lucon2
2267 *       lurpress      lunounit      lunounit      lunounit      lunounit
2268 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2269 *   2.6363e-05      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2270 *
2271 *   loop 3 steam-gen level signal lag
2272 *       idcb      icbn      icb1      icb2      icb3
2273 *       -3005      26      -3004      0      0
2274 *       lugain      luxmin      luxmax      lucon1      lucon2
2275 *       lunounit      lunounit      lunounit      lunounit      lunounit
2276 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2277 *   1.0000e+00      0.0000e+00      1.0000e+02      1.0000e+00      0.0000e+00
2278 *
2279 *   loop 3 steam-gen level error = 1(table)-1(evaluated)
2280 *       idcb      icbn      icb1      icb2      icb3
2281 *       -3006      54      -4243      -3005      0
2282 *       lugain      luxmin      luxmax      lucon1      lucon2
2283 *       lunounit      lunounit      lunounit      lunounit      lunounit
2284 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2285 *   1.0000e+00      -1.0000e+02      1.0000e+02      0.0000e+00      0.0000e+00
2286 *
2287 *   loop 3 steam-gen level integration for pi controller
2288 *       idcb      icbn      icb1      icb2      icb3
2289 *       -3007      23      -3006      0      0
2290 *       lugain      luxmin      luxmax      lucon1      lucon2
2291 *       lunounit      luntime      luntime      lunounit      luntime
2292 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2293 *   1.0000e+00      -1.0000e-01      1.0000e-01      1.0000e+00      0.0000e+00
2294 *
2295 *   loop 3 steam-gen weighted sum for level of pi controller
2296 *       idcb      icbn      icb1      icb2      icb3
2297 *       -3008      59      -3006      -3007      0
2298 *       lugain      luxmin      luxmax      lucon1      lucon2
2299 *       lunounit      lunounit      lunounit      lunounit      lurtime
2300 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2301 *   1.0000e+00      -1.0000e+02      1.0000e+02      1.0000e+00      1.0000e-01
2302 *
2303 *   loop 3 steam-gen flow error, mstm-mfw
2304 *       idcb      icbn      icb1      icb2      icb3
2305 *       -3009      54      -3109      -3706      0
2306 *       lugain      luxmin      luxmax      lucon1      lucon2
2307 *       lunounit      lumassfw      lumassfw      lunounit      lumassfw
2308 *       cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2309 *   1.0000e+00      -1.0000e+03      1.0000e+03      0.0000e+00      0.0000e+00

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2310 *
2311 *   loop 3 steam-gen flow error fraction, (mstm-mfw)/mss
2312 *       idcb       icbn       icb1       icb2       icb3
2313 *       -3010      39        -3009      -11        0
2314 *       lugain      luxmin      luxmax      lucon1      lucon2
2315 *       lunounit     lunounit     lunounit     lunounit     lunounit
2316 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2317 *       1.0000e+00   -2.0000e+00   2.0000e+00   0.0000e+00   0.0000e+00
2318 *
2319 *   loop 3 steam-gen combined flow and level error
2320 *       idcb       icbn       icb1       icb2       icb3
2321 *       -3011      3         -3008      -3010      0
2322 *       lugain      luxmin      luxmax      lucon1      lucon2
2323 *       lunounit     lunounit     lunounit     lunounit     lunounit
2324 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2325 *       1.0000e+00   -2.0000e+01   2.0000e+01   0.0000e+00   0.0000e+00
2326 *
2327 *   loop 3 steam-gen integration of error for pi controller
2328 *       idcb       icbn       icb1       icb2       icb3
2329 *       -3012      23        -3011      0         0
2330 *       lugain      luxmin      luxmax      lucon1      lucon2
2331 *       lunounit     lutime      lutime      lunounit     lutime
2332 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2333 *       1.0000e+00   -1.0000e-01   1.0000e-01   1.0000e+00   0.0000e+00
2334 *
2335 *   loop 3 steam-gen weighted sum for pi controller
2336 *       idcb       icbn       icb1       icb2       icb3
2337 *       -3013      59        -3011      -3012      0
2338 *       lugain      luxmin      luxmax      lucon1      lucon2
2339 *       lunounit     lunounit     lunounit     lunounit     lutime
2340 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2341 *       1.0000e+00   -1.0000e-01   1.0000e-01   1.0000e+00   1.0000e-01
2342 *
2343 *   loop 3 steam-gen adjusted main-fdw control-valve flow area
2344 *       idcb       icbn       icb1       icb2       icb3
2345 *       -3014      3         -3013      3541      0
2346 *       lugain      luxmin      luxmax      lucon1      lucon2
2347 *       lunounit     lunounit     lunounit     lunounit     lunounit
2348 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2349 *       1.0000e+00   0.0000e+00   1.0000e+00   0.0000e+00   0.0000e+00
2350 *
2351 *   loop 3 steam-line abs(delta pressure)
2352 *       idcb       icbn       icb1       icb2       icb3
2353 *       -3104      1         3135      0         0
2354 *       lugain      luxmin      luxmax      lucon1      lucon2
2355 *       lunounit     lupressd     lupressd     lunounit     lupressd
2356 *       cbgain       cbxmin      cbxmax      cbcon1      cbcon2
2357 *       1.0000e+00   0.0000e+00   1.0000e+08   0.0000e+00   0.0000e+00
2358 *

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2359 *    loop 3 steam-line kxsqrt(delta pressure) where k= 0.22179 m2
2360 *          idcb          icbn          icb1          icb2          icb3
2361 *          -3106          52          -3104          0          0
2362 *          lugain          luxmin          luxmax          lucon1          lucon2
2363 *          luarea          luasqrrtp          luasqrrtp          lunounit          luasqrrtp
2364 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2365 *          0.84779      -1.0000e+08      1.0000e+08      0.0000e+00      0.0000e+00
2366 *
2367 *    loop 3 steam-line mass flow
2368 *          idcb          icbn          icb1          icb2          icb3
2369 *          -3109          39          -3106          -15          0
2370 *          lugain          luxmin          luxmax          lucon1          lucon2
2371 *          lunounit          lumassfw          lumassfw          lunounit          lumassfw
2372 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2373 *          1.0000e+00      0.0000e+00      1.0000e+06      0.0000e+00      0.0000e+00
2374 *
2375 *    loop 3 steam-gen main steam-isolation valve (msiv) trip logic
2376 *          idcb          icbn          icb1          icb2          icb3
2377 *          -3110          34          -310          -14          0
2378 *          lugain          luxmin          luxmax          lucon1          lucon2
2379 *          lunounit          lunounit          lunounit          lunounit          lunounit
2380 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2381 *          1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2382 *
2383 *    loop 3 low steam pressure trip signal
2384 *          idcb          icbn          icb1          icb2          icb3
2385 *          -3112          34          333          -13          0
2386 *          lugain          luxmin          luxmax          lucon1          lucon2
2387 *          lunounit          lunounit          lunounit          lunounit          lunounit
2388 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2389 *          1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2390 *
2391 *    loop 3 high steam flow trip signal
2392 *          idcb          icbn          icb1          icb2          icb3
2393 *          -3114          21          -3109          -12          0
2394 *          lugain          luxmin          luxmax          lucon1          lucon2
2395 *          lunounit          lunounit          lunounit          lunounit          lunounit
2396 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2397 *          1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2398 *
2399 *    loop 3 low tavg or low steam pressure trip signal
2400 *          idcb          icbn          icb1          icb2          icb3
2401 *          -3116          25          -3110          -3112          0
2402 *          lugain          luxmin          luxmax          lucon1          lucon2
2403 *          lunounit          lunounit          lunounit          lunounit          lunounit
2404 *          cbgain          cbxmin          cbxmax          cbcon1          cbcon2
2405 *          1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2406 *
2407 *    loop 3 high flow and (low tavg or low pressure) trip signal

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2408 *	idcb	icbn	icb1	icb2	icb3
2409	-3118	5	-3114	-3116	0
2410 *	lugain	luxmin	luxmax	lucon1	lucon2
2411	lunounit	lunounit	lunounit	lunounit	lunounit
2412 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2413	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2414 *					
2415 *	loop 3 steam-line porv control logic				
2416 *					
2417 *	loop 3 steam-line porv area fr vs press table (turb-trip mode)				
2418 *	idcb	icbn	icb1	icb2	icb3
2419	-3160	101	3121	2	0
2420 *	lugain	luxmin	luxmax	lucon1	lucon2
2421	lunounit	lunounit	lunounit	lunounit	lunounit
2422 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2423	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2424 *	luytab	luxtab			
2425	lunounit	lupressa			
2426 *					
2427 *	cbftb *	7.2400e+06	0.0000e+00	7.4500e+06	1.0000e+00e
2428 *					
2429 *	loop 3 steam-line porv area (turbine trip or load rejection)				
2430 *	idcb	icbn	icb1	icb2	icb3
2431	-3162	22	-3160	-4338	4240
2432 *	lugain	luxmin	luxmax	lucon1	lucon2
2433	lunounit	lunounit	lunounit	lunounit	lunounit
2434 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2435	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2436 *					
2437 *	loop 3 feedwater-line abs(delta pressure)				
2438 *	idcb	icbn	icb1	icb2	icb3
2439	-3704	1	3714	0	0
2440 *	lugain	luxmin	luxmax	lucon1	lucon2
2441	lunounit	lupressd	lupressd	lunounit	lupressd
2442 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2443	1.0000e+00	0.0000e+00	1.0000e+08	0.0000e+00	0.0000e+00
2444 *					
2445 *	loop 3 feedwater mass flow = kxsqrt(delta pressure), k = 1.46999				
2446 *	idcb	icbn	icb1	icb2	icb3
2447	-3706	52	-3704	0	0
2448 *	lugain	luxmin	luxmax	lucon1	lucon2
2449	lusqrtml	lumassfw	lumassfw	lunounit	lumassfw
2450 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2451	1.46999	0.0000e+00	1.0000e+04	0.0000e+00	0.0000e+00
2452 *					
2453 *	programmed steam-generator level				
2454 *					
2455 *	constant reference turbine pressure				
2456 *	idcb	icbn	icb1	icb2	icb3
2457	-4241	9	0	0	0

2458 *	lugain	luxmin	luxmax	lucon1	lucon2
2459	lupressa	lupressa	lupressa	lupressa	lupressa
2460 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2461	1.0000e+00	5.6172e+06	5.6172e+06	5.6172e+06	5.6172e+06
2462 *					
2463 *	power fraction versus turbine pressure table				
2464 *	idcb	icbn	icb1	icb2	icb3
2465	-4242	101	-4241	2	0
2466 *	lugain	luxmin	luxmax	lucon1	lucon2
2467	lunounit	lunounit	lunounit	lunounit	lunounit
2468 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2469	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2470 *	luytab	luxtab			
2471	lunounit	lupressa			
2472 *					
2473 *	cbftb *	1.0135e+05	0.0000e+00	5.6172e+06	1.0000e+00e
2474 *					
2475 *	steam-generator level fraction versus power fraction table				
2476 *	idcb	icbn	icb1	icb2	icb3
2477	-4243	101	-4242	2	0
2478 *	lugain	luxmin	luxmax	lucon1	lucon2
2479	lunounit	lunounit	lunounit	lunounit	lunounit
2480 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2481	1.0000e+00	0.0000e+00	5.2000e-01	0.0000e+00	0.0000e+00
2482 *	luytab	luxtab			
2483	lunounit	lunounit			
2484 *					
2485 *	cbftb *	0.0000e+00	3.9000e-01	2.0000e-01	5.2000e-01e
2486 *					
2487 *	steam-dump control system				
2488 *					
2489 *	constant no-load tavg temperature = 559.3 k				
2490 *	idcb	icbn	icb1	icb2	icb3
2491	-4300	9	0	0	0
2492 *	lugain	luxmin	luxmax	lucon1	lucon2
2493	lunounit	lutemp	lutemp	lutemp	lutemp
2494 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2495	1.0000e+00	5.5930e+02	5.5930e+02	5.5930e+02	5.5930e+02
2496 *					
2497 *	constant turbine impulse-stage pressure (tip)				
2498 *	idcb	icbn	icb1	icb2	icb3
2499	-4302	9	0	0	0
2500 *	lugain	luxmin	luxmax	lucon1	lucon2
2501	lunounit	lupressa	lupressa	lupressa	lupressa
2502 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2503	1.0000e+00	3.8128e+06	3.8128e+06	3.8128e+06	3.8128e+06
2504 *					
2505 *	reference tavg temperature table versus pressure (tip)				
2506 *	idcb	icbn	icb1	icb2	icb3
2507	-4304	101	-4302	3	0

2508 *	lugain	luxmin	luxmax	lucon1	lucon2
2509	lunounit	lutemp	lutemp	lunounit	lutemp
2510 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2511	1.0000e+00	5.5930e+02	5.7510e+02	0.0000e+00	5.6890e+02
2512 *	luytab	luxtab			
2513	lutemp	lupressa			
2514 *					
2515 * cbftb *	0.0000e+00	5.5930e+02	3.6542e+06	5.6890e+02	3.8128e+06
2516 * cbftb *	5.7510e+02e				
2517 *					
2518 *	amax1(tavg1,tavg2)				
2519 *	idcb	icbn	icb1	icb2	icb3
2520	-4310	35	-110	-210	0
2521 *	lugain	luxmin	luxmax	lucon1	lucon2
2522	lunounit	lutemp	lutemp	lunounit	lutemp
2523 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2524	1.0000e+00	0.0000e+00	1.0000e+03	0.0000e+00	0.0000e+00
2525 *					
2526 *	amax1(tavg1,tavg2,tavg3)				
2527 *	idcb	icbn	icb1	icb2	icb3
2528	-4312	35	-4310	-310	0
2529 *	lugain	luxmin	luxmax	lucon1	lucon2
2530	lunounit	lutemp	lutemp	lunounit	lutemp
2531 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2532	1.0000e+00	0.0000e+00	1.0000e+03	0.0000e+00	0.0000e+00
2533 *					
2534 *	turbine-trip lead/lag maximum tavg				
2535 *	idcb	icbn	icb1	icb2	icb3
2536	-4314	30	-4312	0	0
2537 *	lugain	luxmin	luxmax	lucon1	lucon2
2538	lunounit	lutemp	lutemp	lutime	lutime
2539 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2540	1.0000e+00	0.0000e+00	1.0000e+03	5.0000e-01	5.0000e-01
2541 *					
2542 *	tavg(maximum) - tavg(no-load)				
2543 *	idcb	icbn	icb1	icb2	icb3
2544	-4316	54	-4314	-4300	0
2545 *	lugain	luxmin	luxmax	lucon1	lucon2
2546	lunounit	lutempd	lutempd	lunounit	lutempd
2547 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2548	1.0000e+00	-1.0000e+03	1.0000e+03	0.0000e+00	0.0000e+00
2549 *					
2550 *	bank 1 turbine-trip cdv area fraction table				
2551 *	idcb	icbn	icb1	icb2	icb3
2552	-4318	101	-4316	2	0
2553 *	lugain	luxmin	luxmax	lucon1	lucon2
2554	lunounit	lunounit	lunounit	lunounit	lunounit
2555 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2556	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00


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2557 *      luytab      luxtab
2558      lunounit      lutempd
2559 *
2560 * cbftb * r02 0.0000e+00      1.0000e+01      1.0000e+00e
2561 *
2562 *      bank 2 turbine-trip cdv area fraction table
2563 *      idcb      icbn      icb1      icb2      icb3
2564      -4320      101      -4316      2      0
2565 *      lugain      luxmin      luxmax      lucon1      lucon2
2566      lunounit      lunounit      lunounit      lunounit      lunounit
2567 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2568      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2569 *      luytab      luxtab
2570      lunounit      lutempd
2571 *
2572 * cbftb *      1.0000e+01      0.0000e+00      1.6700e+01      1.0000e+00e
2573 *
2574 *      load-rejection control mode (turbine not tripped)
2575 *
2576 *      load-reject lead/lag maximum tavg
2577 *      idcb      icbn      icb1      icb2      icb3
2578      -4330      30      -4312      0      0
2579 *      lugain      luxmin      luxmax      lucon1      lucon2
2580      lunounit      lutemp      lutemp      ltime      ltime
2581 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2582      1.0000e+00      0.0000e+00      1.0000e+03      2.5000e+01      5.0000e+00
2583 *
2584 *      tavg(maximum) - tavg(reference)
2585 *      idcb      icbn      icb1      icb2      icb3
2586      -4332      54      -4330      -4304      0
2587 *      lugain      luxmin      luxmax      lucon1      lucon2
2588      lunounit      lutempd      lutempd      lunounit      lutempd
2589 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2590      1.0000e+00      -1.0000e+03      1.0000e+03      0.0000e+00      0.0000e+00
2591 *
2592 *      bank 1 load-reject cdv area fraction table
2593 *      idcb      icbn      icb1      icb2      icb3
2594      -4334      101      -4332      2      0
2595 *      lugain      luxmin      luxmax      lucon1      lucon2
2596      lunounit      lunounit      lunounit      lunounit      lunounit
2597 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
2598      1.0000e+00      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
2599 *      luytab      luxtab
2600      lunounit      lutempd
2601 *
2602 * cbftb *      1.1100e+00      0.0000e+00      6.7200e+00      1.0000e+00e
2603 *
2604 *      bank 2 load-reject cdv area fraction table
2605 *      idcb      icbn      icb1      icb2      icb3
2606      -4336      101      -4332      2      0

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2607 *	lugain	luxmin	luxmax	lucon1	lucon2
2608	lunounit	lunounit	lunounit	lunounit	lunounit
2609 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2610	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2611 *	luytab	luxtab			
2612	lunounit	lutempd			
2613 *					
2614 * cbftb *	6.7200e+00	0.0000e+00	9.2000e+00	1.0000e+00e	
2615 *					
2616 *	porv load-reject area fraction				
2617 *	idcb	icbn	icb1	icb2	icb3
2618	-4338	101	-4332	2	0
2619 *	lugain	luxmin	luxmax	lucon1	lucon2
2620	lunounit	lunounit	lunounit	lunounit	lunounit
2621 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2622	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2623 *	luytab	luxtab			
2624	lunounit	lutempd			
2625 *					
2626 * cbftb *	9.2000e+00	0.0000e+00	1.8100e+01	1.0000e+00e	
2627 *					
2628 *	bank 1 cdv area fraction (turbine-trip or load-reject)				
2629 *	idcb	icbn	icb1	icb2	icb3
2630	-4340	22	-4318	-4334	4240
2631 *	lugain	luxmin	luxmax	lucon1	lucon2
2632	lunounit	lunounit	lunounit	lunounit	lunounit
2633 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2634	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2635 *					
2636 *	bank 2 cdv area fraction (turbine-trip or load-reject)				
2637 *	idcb	icbn	icb1	icb2	icb3
2638	-4342	22	-4320	-4336	4240
2639 *	lugain	luxmin	luxmax	lucon1	lucon2
2640	lunounit	lunounit	lunounit	lunounit	lunounit
2641 *	cbgain	cbxmin	cbxmax	cbcon1	cbcon2
2642	1.0000e+00	0.0000e+00	1.0000e+00	0.0000e+00	0.0000e+00
2643 *					
2644 * trips					
2645 *					
2646 *	trip-dimension variables data				
2647 *	ntse	ntct	ntsf	ntdp	ntsd
2648	3	20	0	0	0
2649 *					
2650 *	0.0 s problem time steady-state trip				
2651 *	idtp	isrt	iset	itst	idsg
2652	1	2	1	-1	1
2653 *	setp(1)	setp(2)			
2654	-1.0000e+00	0.0000e+00			
2655 *	dtsp(1)	dtsp(2)			
2656	0.0000e+00	0.0000e+00			

41

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43

42

2657 *	ifsp(1)	ifsp(2)			
2658	0	0			
2659 *					
2660 *	reactor trip subsets 1 and 2				
2661 *	idtp	isrt	iset	itst	idsg
2662	10	2	0	3	100
2663 *	setp(1)	setp(2)			
2664	1.0000e-01	9.0000e-01			
2665 *	dtsp(1)	dtsp(2)			
2666	1.0000e+06	0.0000e+00			
2667 *	ifsp(1)	ifsp(2)			
2668	0	0			
2669 *					
2670 *	reactor trips subset 1				
2671 *	idtp	isrt	iset	itst	idsg
2672	12	2	0	-3	120
2673 *	setp(1)	setp(2)			
2674	1.0000e-01	9.0000e-01			
2675 *	dtsp(1)	dtsp(2)			
2676	1.0000e+06	0.0000e+00			
2677 *	ifsp(1)	ifsp(2)			
2678	0	0			
2679 *					
2680 *	reactor trips subset 2				
2681 *	idtp	isrt	iset	itst	idsg
2682	14	2	0	-3	140
2683 *	setp(1)	setp(2)			
2684	1.0000e-01	9.0000e-01			
2685 *	dtsp(1)	dtsp(2)			
2686	1.0000e+06	0.0000e+00			
2687 *	ifsp(1)	ifsp(2)			
2688	0	0			
2689 *					
2690 *	turbine trip				
2691 *	idtp	isrt	iset	itst	idsg
2692	16	2	0	3	160
2693 *	setp(1)	setp(2)			
2694	1.0000e-01	9.0000e-01			
2695 *	dtsp(1)	dtsp(2)			
2696	1.0000e+06	0.0000e+00			
2697 *	ifsp(1)	ifsp(2)			
2698	0	0			
2699 *					
2700 *	tsv trip				
2701 *	idtp	isrt	iset	itst	idsg
2702	18	2	0	3	180
2703 *	setp(1)	setp(2)			
2704	1.0000e-01	9.0000e-01			
2705 *	dtsp(1)	dtsp(2)			
2706	1.0000e+06	0.0000e+00			

2707 *	ifsp(1)	ifsp(2)			
2708	0	0			
2709 *					
2710 *	safety-injection actuation signal (sias) trip				
2711 *	idtp	isrt	iset	itst	idsg
2712	20	2	0	3	200
2713 *	setp(1)	setp(2)			
2714	1.0000e-01	9.0000e-01			
2715 *	dtsp(1)	dtsp(2)			
2716	1.0000e+06	0.0000e+00			
2717 *	ifsp(1)	ifsp(2)			
2718	0	0			
2719 *					
2720 *	safety-injection (si) delivery signal trip				
2721 *	idtp	isrt	iset	itst	idsg
2722	21	2	0	3	200
2723 *	setp(1)	setp(2)			
2724	1.0000e-01	9.0000e-01			
2725 *	dtsp(1)	dtsp(2)			
2726	1.0000e+06	2.0000e+01			
2727 *	ifsp(1)	ifsp(2)			
2728	0	0			
2729 *					
2730 *	primary-coolant pump trip				
2731 *	idtp	isrt	iset	itst	idsg
2732	22	2	0	3	220
2733 *	setp(1)	setp(2)			
2734	1.0000e-01	9.0000e-01			
2735 *	dtsp(1)	dtsp(2)			
2736	1.0000e+06	1.0000e+06			
2737 *	ifsp(1)	ifsp(2)			
2738	0	0			
2739 *					
2740 *	(2/3) logic msiv trip				
2741 *	idtp	isrt	iset	itst	idsg
2742	24	2	0	3	240
2743 *	setp(1)	setp(2)			
2744	1.0000e-01	1.8000e+00			
2745 *	dtsp(1)	dtsp(2)			
2746	1.0000e+06	0.0000e+00			
2747 *	ifsp(1)	ifsp(2)			
2748	0	0			
2749 *					
2750 *	mdafw trip (30.0 s flow delay)				
2751 *	idtp	isrt	iset	itst	idsg
2752	26	2	0	3	260
2753 *	setp(1)	setp(2)			
2754	1.0000e-01	9.0000e-01			
2755 *	dtsp(1)	dtsp(2)			
2756	1.0000e+06	3.0000e+01			

2757 *	ifsp(1)	ifsp(2)				
2758	0	0				
2759 *						
2760 *	sdafw trip (30.0 s flow delay)					
2761 *	idtp	isrt	iset	itst	idsg	
2762	28	2	0	3	280	← 126
2763 *	setp(1)	setp(2)				
2764	1.0000e-01	9.0000e-01				
2765 *	dtsp(1)	dtsp(2)				
2766	1.0000e+06	3.0000e+01				← 48
2767 *	ifsp(1)	ifsp(2)				
2768	0	0				
2769 *						
2770 *	low primary-coolant flow trip					
2771 *	idtp	isrt	iset	itst	idsg	
2772	30	2	0	3	300	
2773 *	setp(1)	setp(2)				
2774	1.0000e-01	9.0000e-01				
2775 *	dtsp(1)	dtsp(2)				
2776	0.0000e+00	0.0000e+00				← 49
2777 *	ifsp(1)	ifsp(2)				
2778	0	0				
2779 *						
2780 *	loops 1, 2, and 3 steam-generator mismatch trip					
2781 *	idtp	isrt	iset	itst	idsg	
2782	32	2	0	3	320	
2783 *	setp(1)	setp(2)				
2784	1.0000e-01	9.0000e-01				
2785 *	dtsp(1)	dtsp(2)				
2786	0.0000e+00	0.0000e+00				← 49
2787 *	ifsp(1)	ifsp(2)				
2788	0	0				
2789 *						
2790 *	steam-generator low level trip					
2791 *	idtp	isrt	iset	itst	idsg	
2792	34	2	0	3	340	
2793 *	setp(1)	setp(2)				
2794	1.0000e-01	9.0000e-01				
2795 *	dtsp(1)	dtsp(2)				
2796	0.0000e+00	0.0000e+00				← 49
2797 *	ifsp(1)	ifsp(2)				
2798	0	0				
2799 *						
2800 *	steam-generator high level trip					
2801 *	idtp	isrt	iset	itst	idsg	
2802	36	2	0	3	360	
2803 *	setp(1)	setp(2)				
2804	1.0000e-01	9.0000e-01				
2805 *	dtsp(1)	dtsp(2)				
2806	0.0000e+00	0.0000e+00				← 49

2807 *	ifsp(1)	ifsp(2)			
2808	0	0			
2809 *					
2810 *	high steam-generator delta pressure trip				
2811 *	idtp	isrt	iset	itst	idsg
2812	38	2	0	3	380
2813 *	setp(1)	setp(2)		113	
2814	1.0000e-01	9.0000e-01			
2815 *	dtsp(1)	dtsp(2)			
2816	0.0000e+00	0.0000e+00	49		
2817 *	ifsp(1)	ifsp(2)			
2818	0	0			
2819 *					
2820 *	loop 1 msiv trip signal				
2821 *	idtp	isrt	iset	itst	idsg
2822	40	2	0	-1	-1118
2823 *	setp(1)	setp(2)		48	
2824	1.0000e-01	9.0000e-01			
2825 *	dtsp(1)	dtsp(2)			
2826	0.0000e+00	0.0000e+00			
2827 *	ifsp(1)	ifsp(2)			
2828	0	0			
2829 *					
2830 *	loop 2 msiv trip signal				
2831 *	idtp	isrt	iset	itst	idsg
2832	42	2	0	-1	-2118
2833 *	setp(1)	setp(2)		48	
2834	1.0000e-01	9.0000e-01			
2835 *	dtsp(1)	dtsp(2)			
2836	0.0000e+00	0.0000e+00			
2837 *	ifsp(1)	ifsp(2)			
2838	0	0			
2839 *					
2840 *	loop 3 msiv trip signal				
2841 *	idtp	isrt	iset	itst	idsg
2842	44	2	0	-1	-3118
2843 *	setp(1)	setp(2)		48	
2844	1.0000e-01	9.0000e-01			
2845 *	dtsp(1)	dtsp(2)			
2846	0.0000e+00	0.0000e+00			
2847 *	ifsp(1)	ifsp(2)			
2848	0	0			
2849 *					
2850 *	2/3 low steam-generator level trip				
2851 *	idtp	isrt	iset	itst	idsg
2852	46	2	0	3	460
2853 *	setp(1)	setp(2)			
2854	1.0000e-01	1.8000e+00			
2855 *	dtsp(1)	dtsp(2)			
2856	0.0000e+00	0.0000e+00			

2857 *	ifsp(1)	ifsp(2)			
2858	0	0			
2859 *					
2860 *	over-temperature delta temperature				
2861 *	idtp	isrt	iset	itst	idsg
2862	48	2	0	1	-30
2863 *	setp(1)	setp(2)			
2864	0.0000e+00	1.0000e+01			
2865 *	dtsp(1)	dtsp(2)			
2866	0.0000e+00	0.0000e+00			
2867 *	ifsp(1)	ifsp(2)			
2868	0	0			
2869 *					
2870 *	over-power delta temperature				
2871 *	idtp	isrt	iset	itst	idsg
2872	50	2	0	1	-40
2873 *	setp(1)	setp(2)			
2874	0.0000e+00	1.0000e+01			
2875 *	dtsp(1)	dtsp(2)			
2876	0.0000e+00	0.0000e+00			
2877 *	ifsp(1)	ifsp(2)			
2878	0	0			
2879 *					
2880 *	high reactor-core power				
2881 *	idtp	isrt	iset	itst	idsg
2882	52	2	0	1	11
2883 *	setp(1)	setp(2)			
2884	1.0000e+07	2.4840e+09			
2885 *	dtsp(1)	dtsp(2)			
2886	0.0000e+00	0.0000e+00			
2887 *	ifsp(1)	ifsp(2)			
2888	0	0			
2889 *					
2890 *	high or low pressurizer pressure				
2891 *	idtp	isrt	iset	itst	idsg
2892	54	5	0	1	421
2893 *	setp(1)	setp(2)	setp(3)	setp(4)	
2894	1.2800e+07	1.2817e+07	1.6400e+07	1.6485e+07	
2895 *	dtsp(1)	dtsp(2)	dtsp(3)	dtsp(4)	
2896	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
2897 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
2898	0	0	0	0	
2899 *					
2900 *	pressurizer level trip				
2901 *	idtp	isrt	iset	itst	idsg
2902	56	2	0	1	-406
2903 *	setp(1)	setp(2)			
2904	5.0000e-01	9.1000e-01			
2905 *	dtsp(1)	dtsp(2)			
2906	0.0000e+00	0.0000e+00			

← 51

2907 *	ifsp(1)	ifsp(2)				
2908	0	0				
2909 *						
2910 *	primary-coolant pump low-pressure trip					
2911 *	idtp	isrt	iset	itst	idsg	
2912	58	1	0	1	421	← 52
2913 *	setp(1)	setp(2)				
2914	9.0666e+06	1.5000e+07				
2915 *	dtsp(1)	dtsp(2)				
2916	0.0000e+00	0.0000e+00				
2917 *	ifsp(1)	ifsp(2)				
2918	0	0				
2919 *						
2920 *	safety-injection actuation signal (sias) low-pressure trip					
2921 *	idtp	isrt	iset	itst	idsg	
2922	60	1	0	1	421	← 53
2923 *	setp(1)	setp(2)				
2924	1.1928e+07	1.5000e+07				
2925 *	dtsp(1)	dtsp(2)				
2926	0.0000e+00	0.0000e+00				
2927 *	ifsp(1)	ifsp(2)				
2928	0	0				
2929 *						
2930 *	loop 1 steam-generator mismatch trip (2/2)					
2931 *	idtp	isrt	iset	itst	idsg	
2932	100	2	0	-3	1000	← 54
2933 *	setp(1)	setp(2)				
2934	1.0000e-01	1.8000e+00				
2935 *	dtsp(1)	dtsp(2)				
2936	0.0000e+00	0.0000e+00				
2937 *	ifsp(1)	ifsp(2)				
2938	0	0				
2939 *						
2940 *	loop 1 low-flow trip					
2941 *	idtp	isrt	iset	itst	idsg	
2942	110	1	0	-1	161	
2943 *	setp(1)	setp(2)				
2944	3.8760e+03	4.2000e+03				
2945 *	dtsp(1)	dtsp(2)				
2946	0.0000e+00	0.0000e+00				
2947 *	ifsp(1)	ifsp(2)				
2948	0	0				
2949 *						
2950 *	loop 1 low tavg trip					
2951 *	idtp	isrt	iset	itst	idsg	
2952	120	1	0	-1	-110	
2953 *	setp(1)	setp(2)				
2954	5.5700e+02	5.7000e+02				
2955 *	dtsp(1)	dtsp(2)				
2956	0.0000e+00	0.0000e+00				

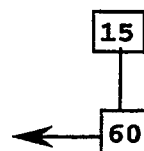
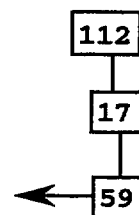
2957 *	ifsp(1)	ifsp(2)			
2958	0	0			
2959 *					
2960 *	loop 2 steam-generator mismatch trip (2/2)				
2961 *	idtp	isrt	iset	itst	idsg
2962	200	2	0	-3	2000
2963 *	setp(1)	setp(2)			
2964	1.0000e-01	1.8000e+00			
2965 *	dtsp(1)	dtsp(2)			
2966	0.0000e+00	0.0000e+00			
2967 *	ifsp(1)	ifsp(2)			
2968	0	0			
2969 *					
2970 *	loop 2 low-flow trip				
2971 *	idtp	isrt	iset	itst	idsg
2972	210	1	0	-1	261
2973 *	setp(1)	setp(2)			
2974	3.8760e+03	4.2000e+03			
2975 *	dtsp(1)	dtsp(2)			
2976	0.0000e+00	0.0000e+00			
2977 *	ifsp(1)	ifsp(2)			
2978	0	0			
2979 *					
2980 *	loop 2 low tavg trip				
2981 *	idtp	isrt	iset	itst	idsg
2982	220	1	0	-1	-210
2983 *	setp(1)	setp(2)			
2984	5.5700e+02	5.7000e+02			
2985 *	dtsp(1)	dtsp(2)			
2986	0.0000e+00	0.0000e+00			
2987 *	ifsp(1)	ifsp(2)			
2988	0	0			
2989 *					
2990 *	loop 3 steam-generator mismatch trip (2/2)				
2991 *	idtp	isrt	iset	itst	idsg
2992	300	2	0	-3	3000
2993 *	setp(1)	setp(2)			
2994	1.0000e-01	1.8000e+00			
2995 *	dtsp(1)	dtsp(2)			
2996	0.0000e+00	0.0000e+00			
2997 *	ifsp(1)	ifsp(2)			
2998	0	0			
2999 *					
3000 *	loop 3 low-flow trip				
3001 *	idtp	isrt	iset	itst	idsg
3002	310	1	0	-1	361
3003 *	setp(1)	setp(2)			
3004	3.8760e+03	4.2000e+03			
3005 *	dtsp(1)	dtsp(2)			
3006	0.0000e+00	0.0000e+00			

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3007 *      ifsp(1)      ifsp(2)
3008          0          0
3009 *
3010 *      loop 3 low tavg trip
3011 *          idtp      isrt      iset      itst      idsg
3012          320          1          0          -1      -310
3013 *          setp(1)      setp(2)
3014      5.5700e+02      5.7000e+02
3015 *          dtsp(1)      dtsp(2)
3016      0.0000e+00      0.0000e+00
3017 *          ifsp(1)      ifsp(2)
3018          0          0
3019 *
3020 *      pressurizer heater low-level trip
3021 *          idtp      isrt      iset      itst      idsg
3022      -407 ← [40] — 2 — [55] 0          1      -406
3023 *          setp(1)      setp(2)
3024      1.4400e-01      1.5000e-01 [98]
3025 *          dtsp(1)      dtsp(2)
3026      0.0000e+00      0.0000e+00
3027 *          ifsp(1)      ifsp(2)
3028          0          0
3029 *
3030 *      main feedwater control valve closure trip (to simulate mfw-pump trip)
3031 *          idtp      isrt      iset      itst      idsg
3032          422          -2 ← [56] 0          3      400 ← [57]
3033 *          setp(1)      setp(2)
3034      0.0000e+00      1.0000e-01 ← [57]
3035 *          dtsp(1)      dtsp(2)
3036      0.0000e+00      0.0000e+00
3037 *          ifsp(1)      ifsp(2)
3038          0          0
3039 *
3040 *      main feedwater pump manual trip (trips mfwcvcs)
3041 *          idtp      isrt      iset      itst      idsg
3042          423          2          0          -1      1
3043 *          setp(1)      setp(2)
3044      0.0000e+00      9.0000e-01 ← [57] — [58]
3045 *          dtsp(1)      dtsp(2)
3046      1.0000e+06      1.0000e+06 ← [58]
3047 *          ifsp(1)      ifsp(2)
3048          0          0
3049 *
3050 *      pressurizer porv high-pressure trip
3051 *          idtp      isrt      iset      itst      idsg
3052          450          -3          -1          1      421 ← [104]
3053 *          setp(1)      setp(2)      setp(3)      setp(4)
3054      1.5720e+07      1.5950e+07      1.5960e+07      1.6200e+07
3055 *          dtsp(1)      dtsp(2)      dtsp(3)      dtsp(4)
3056      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00

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3057 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
3058	0	0	0	0	
3059 *					
3060 *	pressurizer srv high-pressure trip				
3061 *	idtp	isrt	iset	itst	idsg
3062	460	-3	-1	1	421
3063 *	setp(1)	setp(2)	setp(3)	setp(4)	
3064	1.6720e+07	1.6950e+07	1.6960e+07	1.7240e+07	
3065 *	dtsp(1)	dtsp(2)	dtsp(3)	dtsp(4)	
3066	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
3067 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
3068	0	0	0	0	
3069 *					
3070 *	loop 1 accumulator check-valve trip				
3071 *	idtp	isrt	iset	itst	idsg
3072	520	-3	-1	-1	521
3073 *	setp(1)	setp(2)	setp(3)	setp(4)	
3074	-2.7100e+02	-1.3550e+02	1.3550e+03	2.7100e+03	
3075 *	dtsp(1)	dtsp(2)	dtsp(3)	dtsp(4)	
3076	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
3077 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
3078	0	0	0	0	
3079 *					
3080 *	loop 2 accumulator check-valve trip				
3081 *	idtp	isrt	iset	itst	idsg
3082	620	-3	-1	-1	621
3083 *	setp(1)	setp(2)	setp(3)	setp(4)	
3084	-2.7100e+02	-1.3550e+02	1.3550e+03	2.7100e+03	
3085 *	dtsp(1)	dtsp(2)	dtsp(3)	dtsp(4)	
3086	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
3087 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
3088	0	0	0	0	
3089 *					
3090 *	loop 3 accumulator check-valve trip				
3091 *	idtp	isrt	iset	itst	idsg
3092	720	-3	-1	-1	721
3093 *	setp(1)	setp(2)	setp(3)	setp(4)	
3094	-2.7100e+02	-1.3550e+02	1.3550e+03	2.7100e+03	
3095 *	dtsp(1)	dtsp(2)	dtsp(3)	dtsp(4)	
3096	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
3097 *	ifsp(1)	ifsp(2)	ifsp(3)	ifsp(4)	
3098	0	0	0	0	
3099 *					
3100 *	steam-line high delta-pressure (p1-p2) trip				
3101 *	idtp	isrt	iset	itst	idsg
3102	1001	2	0	-2	1120
3103 *	lutrpsig				
3104	lupressd				
3105 *	setp(1)	setp(2)			
3106	1.0000e+05	6.8950e+05			



3107 *	dtsp(1)	dtsp(2)				
3108	0.0000e+00	0.0000e+00				
3109 *	ifsp(1)	ifsp(2)				
3110	0	0				
3111 *						
3112 *	steam-line high delta-pressure (p1-p3) trip					
3113 *	idtp	isrt	iset	itst	idsg	
3114	1002	2	0	-2	1130	← 15
3115 *	lutrpsig					
3116	lupressd					
3117 *	setp(1)	setp(2)				
3118	1.0000e+05	6.8950e+05				
3119 *	dtsp(1)	dtsp(2)				
3120	0.0000e+00	0.0000e+00				
3121 *	ifsp(1)	ifsp(2)				
3122	0	0				
3123 *						
3124 *	steam-line high delta-pressure (p2-p3) trip					
3125 *	idtp	isrt	iset	itst	idsg	
3126	1003	2	0	-2	1230	← 15
3127 *	lutrpsig					
3128	lupressd					
3129 *	setp(1)	setp(2)				
3130	1.0000e+05	6.8950e+05				
3131 *	dtsp(1)	dtsp(2)				
3132	0.0000e+00	0.0000e+00				
3133 *	ifsp(1)	ifsp(2)				
3134	0	0				
3135 *						
3136 *	loop 1 steam-generator 15% low-level signal trip					
3137 *	idtp	isrt	iset	itst	idsg	
3138	1010	1	0	-1	-1005	← 126
3139 *	setp(1)	setp(2)				
3140	1.5000e-01	5.0000e-01				
3141 *	dtsp(1)	dtsp(2)				
3142	0.0000e+00	0.0000e+00				
3143 *	ifsp(1)	ifsp(2)				
3144	0	0				
3145 *						
3146 *	loop 1 steam-generator 30% low-level signal trip					
3147 *	idtp	isrt	iset	itst	idsg	
3148	1020	1	0	-1	-1005	← 54
3149 *	setp(1)	setp(2)				
3150	3.0000e-01	5.0000e-01				
3151 *	dtsp(1)	dtsp(2)				
3152	0.0000e+00	0.0000e+00				
3153 *	ifsp(1)	ifsp(2)				
3154	0	0				
3155 *						

3156 *	loop 1 steam-generator 75% high-level signal trip					
3157 *	idtp	isrt	iset	itst	idsg	
3158	1030	2	0	-1	-1005	
3159 *	setp(1)	setp(2)				
3160	5.4000e-01	7.5000e-01				
3161 *	dtsp(1)	dtsp(2)				
3162	0.0000e+00	0.0000e+00				
3163 *	ifsp(1)	ifsp(2)				
3164	0	0				
3165 *						
3166 *	loop 1 steam-generator flow mismatch signal trip					
3167 *	idtp	isrt	iset	itst	idsg	
3168	1040	2	0	-1	-1009	
3169 *	setp(1)	setp(2)				
3170	8.0000e+00	8.0640e+01				
3171 *	dtsp(1)	dtsp(2)				
3172	0.0000e+00	0.0000e+00				
3173 *	ifsp(1)	ifsp(2)				
3174	0	0				
3175 *						
3176 *	loop 1 steam-generator high steam flow trip					
3177 *	idtp	isrt	iset	itst	idsg	
3178	1050	2	0	-1	-1109	
3179 *	setp(1)	setp(2)				
3180	4.2000e+02	4.5400e+02				
3181 *	dtsp(1)	dtsp(2)				
3182	0.0000e+00	0.0000e+00				
3183 *	ifsp(1)	ifsp(2)				
3184	0	0				
3185 *						
3186 *	loop 1 steam-generator low steam pressure trip					
3187 *	idtp	isrt	iset	itst	idsg	
3188	1060	1	0	-1	1101	
3189 *	setp(1)	setp(2)				
3190	4.3300e+06	5.0000e+06				
3191 *	dtsp(1)	dtsp(2)				
3192	0.0000e+00	0.0000e+00				
3193 *	ifsp(1)	ifsp(2)				
3194	0	0				
3195 *						
3196 *	main feedwater pump a low-flow signal trip					
3197 *	idtp	isrt	iset	itst	idsg	
3198	1500	1	0	-1	1501	
3199 *	setp(1)	setp(2)				
3200	6.5400e+01	1.0000e+02				
3201 *	dtsp(1)	dtsp(2)				
3202	0.0000e+00	0.0000e+00				
3203 *	ifsp(1)	ifsp(2)				
3204	0	0				
3205 *						

3206 *	loop 2 steam-generator 15% low-level signal trip				
3207 *	idtp	isrt	iset	itst	idsg
3208	2010	1	0	-1	-2005
3209 *	setp(1)	setp(2)			
3210	1.5000e-01	5.0000e-01			
3211 *	dtsp(1)	dtsp(2)			
3212	0.0000e+00	0.0000e+00			
3213 *	ifsp(1)	ifsp(2)			
3214	0	0			
3215 *					
3216 *	loop 2 steam-generator 30% low-level signal trip				
3217 *	idtp	isrt	iset	itst	idsg
3218	2020	1	0	-1	-2005
3219 *	setp(1)	setp(2)			
3220	3.0000e-01	5.0000e-01			
3221 *	dtsp(1)	dtsp(2)			
3222	0.0000e+00	0.0000e+00			
3223 *	ifsp(1)	ifsp(2)			
3224	0	0			
3225 *					
3226 *	loop 2 steam-generator 75% high-level signal trip				
3227 *	idtp	isrt	iset	itst	idsg
3228	2030	2	0	-1	-2005
3229 *	setp(1)	setp(2)			
3230	5.4000e-01	7.5000e-01			
3231 *	dtsp(1)	dtsp(2)			
3232	0.0000e+00	0.0000e+00			
3233 *	ifsp(1)	ifsp(2)			
3234	0	0			
3235 *					
3236 *	loop 2 steam-generator flow mismatch signal trip				
3237 *	idtp	isrt	iset	itst	idsg
3238	2040	2	0	-1	-2009
3239 *	setp(1)	setp(2)			
3240	8.0000e+00	8.0640e+01			
3241 *	dtsp(1)	dtsp(2)			
3242	0.0000e+00	0.0000e+00			
3243 *	ifsp(1)	ifsp(2)			
3244	0	0			
3245 *					
3246 *	loop 2 steam-generator high steam flow trip				
3247 *	idtp	isrt	iset	itst	idsg
3248	2050	2	0	-1	-2109
3249 *	setp(1)	setp(2)			
3250	4.2000e+02	4.5400e+02			
3251 *	dtsp(1)	dtsp(2)			
3252	0.0000e+00	0.0000e+00			
3253 *	ifsp(1)	ifsp(2)			
3254	0	0			
3255 *					

```

3256 *      loop 2 steam-generator low steam pressure trip
3257 *      idtp      isrt      iset      itst      idsg
3258          2060          1          0          -1      2101
3259 *      setp(1)      setp(2)
3260      4.3300e+06      5.0000e+06
3261 *      dtsp(1)      dtsp(2)
3262      0.0000e+00      0.0000e+00
3263 *      ifsp(1)      ifsp(2)
3264          0          0
3265 *
3266 *      loop 3 steam-generator 15% low-level signal trip
3267 *      idtp      isrt      iset      itst      idsg
3268          3010          1          0          -1      -3005
3269 *      setp(1)      setp(2)
3270      1.5000e-01      5.0000e-01
3271 *      dtsp(1)      dtsp(2)
3272      0.0000e+00      0.0000e+00
3273 *      ifsp(1)      ifsp(2)
3274          0          0
3275 *
3276 *      loop 3 steam-generator 30% low-level signal trip
3277 *      idtp      isrt      iset      itst      idsg
3278          3020          1          0          -1      -3005
3279 *      setp(1)      setp(2)
3280      3.0000e-01      5.0000e-01
3281 *      dtsp(1)      dtsp(2)
3282      0.0000e+00      0.0000e+00
3283 *      ifsp(1)      ifsp(2)
3284          0          0
3285 *
3286 *      loop 3 steam-generator 75% high-level signal trip
3287 *      idtp      isrt      iset      itst      idsg
3288          3030          2          0          -1      -3005
3289 *      setp(1)      setp(2)
3290      5.4000e-01      7.5000e-01
3291 *      dtsp(1)      dtsp(2)
3292      0.0000e+00      0.0000e+00
3293 *      ifsp(1)      ifsp(2)
3294          0          0
3295 *
3296 *      loop 3 steam-generator flow mismatch signal trip
3297 *      idtp      isrt      iset      itst      idsg
3298          3040          2          0          -1      -3009
3299 *      setp(1)      setp(2)
3300      8.0000e+00      8.0640e+01
3301 *      dtsp(1)      dtsp(2)
3302      0.0000e+00      0.0000e+00
3303 *      ifsp(1)      ifsp(2)
3304          0          0
3305 *

```

← 126

3306 *	loop 3 steam-generator high steam flow trip					
3307 *	idtp	isrt	iset	itst	idsg	
3308	3050	2	0	-1	-3109	
3309 *	setp(1)	setp(2)				
3310	4.2000e+02	4.5400e+02				
3311 *	dtsp(1)	dtsp(2)				
3312	0.0000e+00	0.0000e+00				
3313 *	ifsp(1)	ifsp(2)				
3314	0	0				
3315 *						
3316 *	loop 3 steam-generator low steam pressure trip					
3317 *	idtp	isrt	iset	itst	idsg	
3318	3060	1	0	-1	3101	
3319 *	setp(1)	setp(2)				
3320	4.3300e+06	5.0000e+06				
3321 *	dtsp(1)	dtsp(2)				
3322	0.0000e+00	0.0000e+00				
3323 *	ifsp(1)	ifsp(2)				
3324	0	0				
3325 *						
3326 *	main feedwater pump b low-flow signal trip					
3327 *	idtp	isrt	iset	itst	idsg	
3328	3500	1	0	-1	3501	
3329 *	setp(1)	setp(2)				
3330	6.5400e+01	1.0000e+02				
3331 *	dtsp(1)	dtsp(2)				
3332	0.0000e+00	0.0000e+00				
3333 *	ifsp(1)	ifsp(2)				
3334	0	0				
3335 *						
3336 *	user-specified pump trip					
3337 *	idtp	isrt	iset	itst	idsg	
3338	9996	2	0	1	1	
3339 *	setp(1)	setp(2)				
3340	0.0000e+00	1.0000e+10	*set for no trip			
3341 *	dtsp(1)	dtsp(2)				
3342	0.0000e+00	0.0000e+00				
3343 *	ifsp(1)	ifsp(2)				
3344	0	0				
3345 *						
3346 *	heat-structure fine-mesh trip					
3347 *	idtp	isrt	iset	itst	idsg	
3348	9997	2	0	1	1	
3349 *	setp(1)	setp(2)				
3350	-1.0000e+00	1.0000e+10	* set to not trip on axial fine mesh			
3351 *	dtsp(1)	dtsp(2)				
3352	0.0000e+00	0.0000e+00				
3353 *	ifsp(1)	ifsp(2)				
3354	0	0				
3355 *						

57

138
137
129


```

3356 *   reflood trip
3357 *       idtp      isrt      iset      itst      idsg
3358 *       9998      2        0        -1        1
3359 *       setp(1)   setp(2)
3360 *   0.0000e+00   1.0000e+10 * set to not trip on reflood model
3361 *       dtsp(1)   dtsp(2)
3362 *   0.0000e+00   0.0000e+00
3363 *       ifsp(1)   ifsp(2)
3364 *       0         0
3365 *
3366 *   no-trip problem-time trip (used in tct trip signals)
3367 *       idtp      isrt      iset      itst      idsg
3368 *       9999      2        0        -1        1
3369 *       setp(1)   setp(2)
3370 *   0.0000e+00   1.0000e+10
3371 *       dtsp(1)   dtsp(2)
3372 *   0.0000e+00   0.0000e+00
3373 *       ifsp(1)   ifsp(2)
3374 *       0         0
3375 *
3376 *   signal expression defining data
3377 *
3378 *   abs(p1-p2)
3379 *       idse      inse      incn
3380 *       1120      2        0 ← [60] [15]
3381 *       ise(1,j)  ise(2,j)  ise(3,j)
3382 *       2        111      222
3383 *       8        901      0
3384 *
3385 *   abs(p1-p3)
3386 *       idse      inse      incn
3387 *       1130      2        0 ← [15]
3388 *       ise(1,j)  ise(2,j)  ise(3,j)
3389 *       2        111      333
3390 *       8        901      0
3391 *
3392 *   abs(p2-p3)
3393 *       idse      inse      incn
3394 *       1230      2        0 ← [15]
3395 *       ise(1,j)  ise(2,j)  ise(3,j)
3396 *       2        222      333
3397 *       8        901      0
3398 *
3399 *   trip-controlled-trip (tct) signal defining data
3400 *
3401 *   reactor-core-power scram trip tct signals 1 and 2
3402 *       idtn      intn
3403 *       100      2 ← [45]
3404 *       itn(1)   itn(2)
3405 *       12       14

```

```

3406 *
3407 * reactor-core-power scram trip tct signal 1
3408 *      idtn      intn
3409 *      120      10
3410 *      itn(1)    itn(2)    itn(3)    itn(4)    itn(5)
3411 *      16      18      20      30      48
3412 *      itn(6)    itn(7)    itn(8)    itn(9)    itn(10)
3413 *      50      52      54      56      58
3414 *
3415 * reactor-core-power scram trip tct signal 2
3416 *      idtn      intn
3417 *      140      2
3418 *      itn(1)    itn(2)
3419 *      32      34
3420 *
3421 * turbine-trip tct signal
3422 *      idtn      intn
3423 *      160      4
3424 *      itn(1)    itn(2)    itn(3)    itn(4)
3425 *      10      36      48      50
3426 *
3427 * tsv-trip tct signal
3428 *      idtn      intn
3429 *      180      2
3430 *      itn(1)    itn(2)
3431 *      16      9999
3432 *
3433 * safety-injection actuation signal (sias) trip tct signal
3434 *      idtn      intn
3435 *      200      3
3436 *      itn(1)    itn(2)    itn(3)
3437 *      24      38      60 ← 113
3438 *
3439 * primary-coolant pump trip tct signal
3440 *      idtn      intn
3441 *      220      2
3442 *      itn(1)    itn(2)
3443 *      58      9996
3444 *
3445 * msiv-trip tct signal
3446 *      idtn      intn
3447 *      240      3 ← 48
3448 *      itn(1)    itn(2)    itn(3)
3449 *      40      42      44
3450 *
3451 * mdafw-trip tct signal
3452 *      idtn      intn
3453 *      260      2
3454 *      itn(1)    itn(2)
3455 *      20      34

```

3456 *					
3457 *	sdafw-trip tct signal				
3458 *	idtn	intn			
3459 *	280	2	← 126		
3460 *	itn(1)	itn(2)			
3461 *	46	9999			
3462 *					
3463 *	low primary-coolant flow trip tct signal				
3464 *	idtn	intn			
3465 *	300	3			
3466 *	itn(1)	itn(2)	itn(3)		
3467 *	110	210	310		
3468 *					
3469 *	loops 1, 2, and 3 steam-generator mismatch tct signal				
3470 *	idtn	intn			
3471 *	320	3			
3472 *	itn(1)	itn(2)	itn(3)		
3473 *	100	200	300		
3474 *					
3475 *	low steam-generator level trip tct signal				
3476 *	idtn	intn			
3477 *	340	3			
3478 *	itn(1)	itn(2)	itn(3)		
3479 *	1010	2010	3010		
3480 *					
3481 *	high steam-generator level trip tct siganl				
3482 *	idtn	intn			
3483 *	360	3			
3484 *	itn(1)	itn(2)	itn(3)		
3485 *	1030	2030	3030		
3486 *					
3487 *	high steam-generator delta-pressure trip tct signal				
3488 *	idtn	intn			
3489 *	380	3			
3490 *	itn(1)	itn(2)	itn(3)		
3491 *	1001	1002	1003		
3492 *					
3493 *	main feedwater pump trip tct signal				
3494 *	idtn	intn			
3495 *	400	5			
3496 *	itn(1)	itn(2)	itn(3)	itn(4)	itn(5)
3497 *	20	36	423	1500	3500
3498 *					
3499 *	steam-generator low-level trip (2/3) tct signal				
3500 *	idtn	intn			
3501 *	460	3			
3502 *	itn(1)	itn(2)	itn(3)		
3503 *	1010	2010	3010		
3504 *					

```

3505 *      loop 1 steam-generator mismatch tct signal
3506 *          idtn          intn
3507 *          1000          2 ← 54
3508 *          itn(1)        itn(2)
3509 *          1020          1040
3510 *
3511 *      loop 2 steam-generator mismatch tct signal
3512 *          idtn          intn
3513 *          2000          2
3514 *          itn(1)        itn(2)
3515 *          2020          2040
3516 *
3517 *      loop 3 steam-generator mismatch tct signal
3518 *          idtn          intn
3519 *          3000          2
3520 *          itn(1)        itn(2)
3521 *          3030          3040
3522 *
3523 *****
3524 * component data *
3525 *****
3526 *
3527 *****
3528 *****      type          num          id          ctitle
3529 vessel          1          1 $1$ reactor vessel ← 61
3530 *      nasx          nrsx          ntsx          ncsr          ivssbf
3531 *      12          2          6          18          0 ← 62
3532 *      idcu          idcl          idcr          icru          icrl
3533 *      0          0          0 ← 63 6          2
3534 *      icrr          ilcsp          iucsp          iuhp          iconc ← 64
3535 *      1          2          6          10          1
3536 *      igeom          nvent          nvvtb          nsgrid          iext
3537 *      0          0 ← 63 0          0          0
3538 *      shelv          epsw
3539 *      0.0000e+00 ← 65 0.0000e+00
3540 *
3541 * geometry mesh-cell size data
3542 * z          *      1.7526e+00  3.0004e+00  3.9148e+00  4.8292e+00  5.7436e+00
3543 * z          *      6.6580e+00  7.6714e+00  8.5287e+00  9.3613e+00  1.0194e+01
3544 * z          *      1.1127e+01  1.2245e+01e
3545 * rad          *      1.7002e+00  1.9749e+00e
3546 * th          *      6.0000e+01  1.2000e+02  1.8000e+02  2.4000e+02  3.0000e+02
3547 * th          *      3.6000e+02e
3548 *
3549 * fraction of unheated structure
3550 * funh * f      0.0000e+00e
3551 * nhsca * f      900e
3552 *
3553 * source connections to the vessel
3554 *

```

Diagram illustrating connections between variables and components:

- Variable 54 points to the value 2 in the first loop.
- Variable 61 points to the title "\$1\$ reactor vessel".
- Variable 62 points to the value 0 in the ivssbf row.
- Variable 63 points to the value 0 in the idcr row and the value 0 in the nvvtb row.
- Variable 64 points to the value 2 in the icru row and the value 1 in the iconc row.
- Variable 65 points to the value 0.0000e+00 in the epsw row.
- Variables 141 and 66 are connected by a line, with 66 pointing to the value 5.7436e+00.

3555	*	loop 1 hot-leg connection				
3556	*	lisrl	lisrc	lisrf	ljuns	
3557		8	1	3	10	← 67
3558	*					
3559	*	loop 2 hot-leg connection				
3560	*	lisrl	lisrc	lisrf	ljuns	
3561		8	3	3	20	
3562	*					
3563	*	loop 3 hot-leg connection				
3564	*	lisrl	lisrc	lisrf	ljuns	
3565		8	5	3	30	
3566	*					
3567	*	loop 1 cold-leg connection				
3568	*	lisrl	lisrc	lisrf	ljuns	
3569		8	8	3	19	
3570	*					
3571	*	loop 2 cold-leg connection				
3572	*	lisrl	lisrc	lisrf	ljuns	
3573		8	10	3	29	
3574	*					
3575	*	loop 3 cold-leg connection				
3576	*	lisrl	lisrc	lisrf	ljuns	
3577		8	12	3	39	
3578	*					
3579	*	theta sector 1 upper-plenum connection				
3580	*	lisrl	lisrc	lisrf	ljuns	
3581		7	1	2	2	← 77
3582	*					
3583	*	theta sector 2 upper-plenum connection				
3584	*	lisrl	lisrc	lisrf	ljuns	
3585		9	2	2	3	
3586	*					
3587	*	theta sector 3 upper-plenum connection				
3588	*	lisrl	lisrc	lisrf	ljuns	
3589		7	3	2	4	
3590	*					
3591	*	theta sector 4 upper-plenum connection				
3592	*	lisrl	lisrc	lisrf	ljuns	
3593		9	4	2	5	
3594	*					
3595	*	theta sector 5 upper-plenum connection				
3596	*	lisrl	lisrc	lisrf	ljuns	
3597		7	5	2	6	
3598	*					
3599	*	theta sector 6 upper-plenum connection				
3600	*	lisrl	lisrc	lisrf	ljuns	
3601		9	6	2	7	
3602	*					
3603	*	theta sector 1 upper-head connection				

3604 *	lisrl	lisrc	lisrf	ljuns	
3605	12	1	-2	94	← 77
3606 *					
3607 *	theta sector 2 upper-head connection				
3608 *	lisrl	lisrc	lisrf	ljuns	
3609	12	2	-2	95	
3610 *					
3611 *	theta sector 3 upper-head connection				
3612 *	lisrl	lisrc	lisrf	ljuns	
3613	12	3	-2	96	
3614 *					
3615 *	theta sector 4 upper-head connection				
3616 *	lisrl	lisrc	lisrf	ljuns	
3617	12	4	-2	97	
3618 *					
3619 *	theta sector 5 upper-head connection				
3620 *	lisrl	lisrc	lisrf	ljuns	
3621	12	5	-2	98	
3622 *					
3623 *	theta sector 6 upper-head connection				
3624 *	lisrl	lisrc	lisrf	ljuns	
3625	12	6	-2	99	
3626 *					
3627 *	level	1	bottom lower plenum		← 68
3628 *					
3629 *	cfzl-t*	f	0.0000e+00e		
3630 *	cfzl-z*	r06	0.0000e+00r06 1.0000e-02e		
3631 *	cfzl-r*	f	0.0000e+00e		← 69
3632 *	cfzv-t*	f	0.0000e+00e		
3633 *	cfzv-z*	r06	0.0000e+00r06 1.0000e-02e		
3634 *	cfzv-r*	f	0.0000e+00e		
3635 *	vol	* r06	7.5260e-01r06 3.1510e-01e		← 70
3636 *	fa-t	* r06	7.5260e-01r06 2.5000e-01e		
3637 *	fa-z	* r06	4.1060e-01r06 3.1500e-01e		← 71
3638 *	fa-r	* r06	3.4000e-01r06 0.0000e+00e		
3639 *	hd-t	* r06	9.7200e-01r06 6.6800e-01e		
3640 *	hd-z	* r06	2.0830e-01r06 6.6800e-01e		
3641 *	hd-r	* r06	9.7200e-01r06 6.6800e-01e		
3642 *	alpn	* f	0.0000e+00e		← 72
3643 *	vvv-t	* f	0.0000e+00e		
3644 *	vvv-z	* f	0.0000e+00e		
3645 *	vvv-r	* f	0.0000e+00e		
3646 *	vln-t	* f	0.0000e+00e		
3647 *	vln-z	* f	0.0000e+00e		
3648 *	vln-r	* f	0.0000e+00e		
3649 *	tvn	* f	5.5910e+02e		
3650 *	tln	* f	5.5910e+02e		
3651 *	pn	* f	1.5500e+07e		
3652 *	pan	* f	0.0000e+00e		

```

3653 * conc * f 0.0000e+00e ← 72
3654 *
3655 * level 2 top lower plenum
3656 *
3657 * cfzl-t* f 0.0000e+00e
3658 * cfzl-z* r06 2.4900e+00r06 0.0000e+00e
3659 * cfzl-r* f 0.0000e+00e
3660 * cfzv-t* f 0.0000e+00e
3661 * cfzv-z* r06 2.4900e+00r06 0.0000e+00e
3662 * cfzv-r* f 0.0000e+00e
3663 * vol * r06 5.9500e-01r06 7.3630e-01e
3664 * fa-t * r06 5.9500e-01r06 5.6350e-01e
3665 * fa-z * r06 4.2630e-01r06 5.7390e-01e
3666 * fa-r * f 0.0000e+00e
3667 * hd-t * r06 2.0800e-01r06 1.5620e-01e
3668 * hd-z * r06 1.3410e-02r06 1.5620e-01e
3669 * hd-r * r06 2.0800e-01r06 1.5620e-01e
3670 * alpn * f 0.0000e+00e
3671 * vvn-t * f 0.0000e+00e
3672 * vvn-z * f 0.0000e+00e
3673 * vvn-r * f 0.0000e+00e
3674 * vln-t * f 0.0000e+00e
3675 * vln-z * f 0.0000e+00e
3676 * vln-r * f 0.0000e+00e
3677 * tvn * r06 5.7510e+02r06 5.5910e+02e
3678 * tln * r06 5.7510e+02r06 5.5910e+02e
3679 * pn * f 1.5500e+07e
3680 * pan * f 0.0000e+00e
3681 * conc * f 0.0000e+00e
3682 *
3683 * level 3 fueled-core region (levels 3 to 6)
3684 *
3685 * cfzl-t* r06 2.7000e+01r06 0.0000e+00e
3686 * cfzl-z* r06 1.2499e+00r06 0.0000e+00e
3687 * cfzl-r* r06 2.7000e+01r06 0.0000e+00e
3688 * cfzv-t* r06 2.7000e+01r06 0.0000e+00e
3689 * cfzv-z* r06 1.2499e+00r06 0.0000e+00e
3690 * cfzv-r* r06 2.7000e+01r06 0.0000e+00e
3691 * vol * r06 4.4840e-01r06 5.7390e-01e
3692 * fa-t * r06 1.9000e-01r06 5.6350e-01e
3693 * fa-z * r06 4.2630e-01r06 5.7390e-01e
3694 * fa-r * f 0.0000e+00e
3695 * hd-t * r06 1.3410e-02r06 1.5620e-01e
3696 * hd-z * r06 1.3410e-02r06 1.5620e-01e
3697 * hd-r * r06 1.3410e-02r06 1.5620e-01e
3698 * alpn * f 0.0000e+00e
3699 * vvn-t * f 0.0000e+00e
3700 * vvn-z * f 0.0000e+00e
3701 * vvn-r * f 0.0000e+00e

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3702 * vln-t * f 0.0000e+00e
3703 * vln-z * f 0.0000e+00e
3704 * vln-r * f 0.0000e+00e
3705 * tvn * r06 5.9110e+02r06 5.5910e+02e
3706 * tln * r06 5.9110e+02r06 5.5910e+02e
3707 * pn * f 1.5500e+07e
3708 * pan * f 0.0000e+00e
3709 * conc * f 0.0000e+00e
3710 *
3711 repeat level 3 ← 73
3712 *
3713 repeat level 3
3714 *
3715 repeat level 3
3716 *
3717 * level 7 upper plenum (level 1 of 4)
3718 *
3719 * cfzl-t* f 0.0000e+00e
3720 * cfzl-z* f 0.0000e+00e
3721 * cfzl-r* f 0.0000e+00e
3722 * cfzv-t* f 0.0000e+00e
3723 * cfzv-z* f 0.0000e+00e
3724 * cfzv-r* f 0.0000e+00e
3725 * vol * r06 7.5880e-01r06 6.7330e-01e
3726 * fa-t * r06 7.5880e-01r06 6.8800e-01e
3727 * fa-z * r06 7.5880e-01 3.8770e-01 8.2350e-01 3.8770e-01 8.2350e-01
3728 * fa-z * 3.8770e-01 8.2350e-01e
3729 * fa-r * f 0.0000e+00e
3730 * hd-t * r06 5.3000e-01r06 4.4610e-01e
3731 * hd-z * r06 5.3000e-01 3.1820e-01 4.4610e-01 3.1820e-01 4.4610e-01
3732 * hd-z * 3.1820e-01 4.4610e-01e
3733 * hd-r * r06 5.3000e-01r06 4.4610e-01e
3734 * alpn * f 0.0000e+00e
3735 * vvn-t * f 0.0000e+00e
3736 * vvn-z * f 0.0000e+00e
3737 * vvn-r * f 0.0000e+00e
3738 * vln-t * f 0.0000e+00e
3739 * vln-z * f 0.0000e+00e
3740 * vln-r * f 0.0000e+00e
3741 * tvn * r06 5.9110e+02r06 5.5910e+02e
3742 * tln * r06 5.9110e+02r06 5.5910e+02e
3743 * pn * f 1.5500e+07e
3744 * pan * f 0.0000e+00e
3745 * conc * f 0.0000e+00e
3746 *
3747 * level 8 upper plenum (level 2 of 4)
3748 *
3749 * cfzl-t* r06 0.0000e+00r06 1.0000e-02e
3750 * cfzl-z* r06 0.0000e+00r06 1.0000e-02e

```

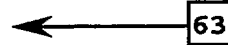

3751	*	cfzl-r*	2.0000e+03	0.0000e+00	2.0000e+03	0.0000e+00	2.0000e+03
3752	*	cfzl-r*	r07	0.0000e+00e			
3753	*	cfzv-t*	r06	0.0000e+00r06	1.0000e-02e		
3754	*	cfzv-z*	r06	0.0000e+00r06	1.0000e-02e		
3755	*	cfzv-r*	2.0000e+03	0.0000e+00	2.0000e+03	0.0000e+00	2.0000e+03
3756	*	cfzv-r*	r07	0.0000e+00e			
3757	*	vol	* r06	9.3580e-01	4.1040e-01	8.2350e-01	4.1040e-01
3758	*	vol	*	4.1040e-01	8.2350e-01e		8.2350e-01
3759	*	fa-t	* r06	9.3580e-01r06	8.1200e-01e		
3760	*	fa-z	* r06	9.3580e-01	3.8770e-01	8.2350e-01	3.8770e-01
3761	*	fa-z	*	3.8770e-01	8.2350e-01e		
3762	*	fa-r	*	5.4000e-02	0.0000e+00	5.4000e-02	0.0000e+00
3763	*	fa-r	* r07	0.0000e+00e			
3764	*	hd-t	* r06	5.3000e-01r06	4.4610e-01e		
3765	*	hd-z	* r06	5.3000e-01	3.1820e-01	4.4610e-01	3.1820e-01
3766	*	hd-z	*	3.1820e-01	4.4610e-01e		
3767	*	hd-r	* r06	5.3000e-01r06	4.4610e-01e		
3768	*	alpn	* f	0.0000e+00e			
3769	*	vvn-t	* f	0.0000e+00e			
3770	*	vvn-z	* f	0.0000e+00e			
3771	*	vvn-r	* f	0.0000e+00e			
3772	*	vln-t	* f	0.0000e+00e			
3773	*	vln-z	* f	0.0000e+00e			
3774	*	vln-r	* f	0.0000e+00e			
3775	*	tvn	* r06	5.9110e+02r06	5.5910e+02e		
3776	*	tlm	* r06	5.9110e+02r06	5.5910e+02e		
3777	*	pn	* f	1.5500e+07e			
3778	*	pan	* f	0.0000e+00e			
3779	*	conc	* f	0.0000e+00e			
3780	*						
3781	*	level	9	upper plenum (level 3 or 4)			
3782	*						
3783	*	cfzl-t*	f	0.0000e+00e			
3784	*	cfzl-z*	f	0.0000e+00e			
3785	*	cfzl-r*	f	0.0000e+00e			
3786	*	cfzv-t*	f	0.0000e+00e			
3787	*	cfzv-z*	f	0.0000e+00e			
3788	*	cfzv-r*	f	0.0000e+00e			
3789	*	vol	* r06	9.3910e-01r06	8.2350e-01e		
3790	*	fa-t	* r06	9.3910e-01r06	8.1200e-01e		
3791	*	fa-z	* r06	9.3910e-01r06	8.2350e-01e		
3792	*	fa-r	* f	0.0000e+00e			
3793	*	hd-t	* r06	5.3000e-01r06	4.4610e-01e		
3794	*	hd-z	* r06	5.3000e-01r06	4.4610e-01e		
3795	*	hd-r	* r06	5.3000e-01r06	4.4610e-01e		
3796	*	alpn	* f	0.0000e+00e			
3797	*	vvn-t	* f	0.0000e+00e			
3798	*	vvn-z	* f	0.0000e+00e			
3799	*	vvn-r	* f	0.0000e+00e			



```

3800 * vln-t * f 0.0000e+00e
3801 * vln-z * f 0.0000e+00e
3802 * vln-r * f 0.0000e+00e
3803 * tvn * r06 5.9110e+02r06 5.5910e+02e
3804 * tln * r06 5.9110e+02r06 5.5910e+02e
3805 * pn * f 1.5500e+07e
3806 * pan * f 0.0000e+00e
3807 * conc * f 0.0000e+00e
3808 *
3809 * level 10 upper plenum (level 4 of 4)
3810 *
3811 * cfzl-t* f 0.0000e+00e
3812 * cfzl-z* r06 0.0000e+00r06 3.5000e+03e
3813 * cfzl-r* f 0.0000e+00e
3814 * cfzv-t* f 0.0000e+00e
3815 * cfzv-z* r06 0.0000e+00r06 3.5000e+03e
3816 * cfzv-r* f 0.0000e+00e
3817 * vol * r06 9.3910e-01r06 4.5740e-01e
3818 * fa-t * r06 9.3910e-01r06 4.5700e-01e
3819 * fa-z * r06 0.0000e+00r06 2.2040e-02e
3820 * fa-r * f 0.0000e+00e
3821 * hd-t * r06 5.3000e-01r06 4.4610e-01e
3822 * hd-z * r06 5.3000e-01r06 4.4610e-01e
3823 * hd-r * r06 5.3000e-01r06 4.4610e-01e
3824 * alpn * f 0.0000e+00e
3825 * vvn-t * f 0.0000e+00e
3826 * vvn-z * f 0.0000e+00e
3827 * vvn-r * f 0.0000e+00e
3828 * vln-t * f 0.0000e+00e
3829 * vln-z * f 0.0000e+00e
3830 * vln-r * f 0.0000e+00e
3831 * tvn * r06 5.9110e+02r06 5.5910e+02e
3832 * tln * r06 5.9110e+02r06 5.5910e+02e
3833 * pn * f 1.5500e+07e
3834 * pan * f 0.0000e+00e
3835 * conc * f 0.0000e+00e
3836 *
3837 * level 11 bottom upper head
3838 *
3839 * cfzl-t* f 0.0000e+00e
3840 * cfzl-z* f 0.0000e+00e
3841 * cfzl-r* f 0.0000e+00e
3842 * cfzv-t* f 0.0000e+00e
3843 * cfzv-z* f 0.0000e+00e
3844 * cfzv-r* f 0.0000e+00e
3845 * vol * r06 9.0010e-01r06 5.6550e-01e
3846 * fa-t * r06 9.0010e-01r06 5.0000e-01e
3847 * fa-z * r06 9.0010e-01r06 0.0000e+00e
3848 * fa-r * r06 4.5000e-01r06 0.0000e+00e

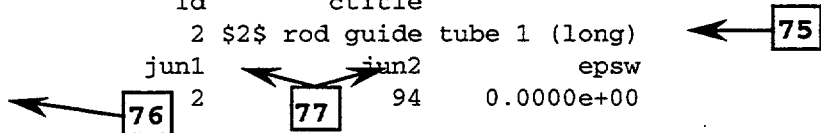
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3849 * hd-t * r06 1.0440e+00r06 6.0400e-01e
3850 * hd-z * r06 1.0440e+00r06 6.0400e-01e
3851 * hd-r * r06 1.0440e+00r06 6.0400e-01e
3852 * alpn * f 0.0000e+00e
3853 * vvn-t * f 0.0000e+00e
3854 * vvn-z * f 0.0000e+00e
3855 * vvn-r * f 0.0000e+00e
3856 * vln-t * f 0.0000e+00e
3857 * vln-z * f 0.0000e+00e
3858 * vln-r * f 0.0000e+00e
3859 * tvn * f 5.8100e+02e
3860 * tln * f 5.8100e+02e
3861 * pn * f 1.5500e+07e
3862 * pan * f 0.0000e+00e
3863 * conc * f 0.0000e+00e
3864 *
3865 * level 12 top upper head
3866 *
3867 * cfzl-t* f 0.0000e+00e
3868 * cfzl-z* f 0.0000e+00e
3869 * cfzl-r* f 0.0000e+00e
3870 * cfzv-t* f 0.0000e+00e
3871 * cfzv-z* f 0.0000e+00e
3872 * cfzv-r* f 0.0000e+00e
3873 * vol * r06 5.1640e-01r06 0.0000e+00e
3874 * fa-t * r06 5.1640e-01r06 0.0000e+00e
3875 * fa-z * f 0.0000e+00e
3876 * fa-r * f 0.0000e+00e
3877 * hd-t * r06 1.0060e+00r06 0.0000e+00e
3878 * hd-z * r06 1.0060e+00r06 0.0000e+00e
3879 * hd-r * r06 1.0060e+00r06 0.0000e+00e
3880 * alpn * f 0.0000e+00e
3881 * vvn-t * f 0.0000e+00e
3882 * vvn-z * f 0.0000e+00e
3883 * vvn-r * f 0.0000e+00e
3884 * vln-t * f 0.0000e+00e
3885 * vln-z * f 0.0000e+00e
3886 * vln-r * f 0.0000e+00e
3887 * tvn * f 5.8100e+02e
3888 * tln * f 5.8100e+02e
3889 * pn * f 1.5500e+07e
3890 * pan * f 0.0000e+00e
3891 * conc * f 0.0000e+00e
3892 *
3893 *****
3894 ***** type num id ctitle
3895 pipe 2 2 $2$ rod guide tube 1 (long)
3896 * ncells nodes jun1 jun2 epsw
3897 4 0 2 94 0.0000e+00

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3898 *	ichf	iconc	iacc	ipow	
3899	1	1	0	0	
3900 *	radin	th	houtl	houtv	toutl
3901	4.0945e-01	6.3500e-03	0.0000e+00	0.0000e+00	3.0000e+02
3902 *	toutv	powin	powoff	rpowmx	powscl
3903	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
3904 *					
3905 * dx	*	8.5725e-01r02	8.3264e-01	9.3345e-01e	
3906 * vol	*	1.7880e-02r02	1.7370e-02	1.9470e-02e	
3907 * fa	* f	2.0860e-02e			
3908 * kf	* f	5.0000e-01r03	0.0000e+00	1.0000e+00e	← [78] [80]
3909 * rk	* f	1.0000e+00r03	0.0000e+00	5.0000e-01e	
3910 * grav	* f	1.0000e+00e			
3911 * hd	* f	6.0000e-02e			
3912 * ic	* f	0e	← [79] [4c]		
3913 * nff	* f	1e	← [80]		
3914 * alp	* f	0.0000e+00e			
3915 * vl	* f	0.0000e+00e	← [81]		
3916 * vv	* f	0.0000e+00e			
3917 * tl	* f	5.8100e+02e	← [82]		
3918 * tv	* f	5.8100e+02e			
3919 * p	* f	1.5500e+07e	← [83]		
3920 * pa	* f	0.0000e+00e			
3921 * conc	* f	0.0000e+00e			
3922 *					
3923	*****				
3924	*****	type	num	id	ctitle
3925	pipe		3	3	\$3\$ rod guide tube 2 (short)
3926 *	ncells	nodes	jun1	jun2	epsw
3927	2	0	3	95	0.0000e+00
3928 *	ichf	iconc	iacc	ipow	
3929	1	1	0	0	
3930 *	radin	th	houtl	houtv	toutl
3931	4.0945e-01	6.3500e-03	0.0000e+00	0.0000e+00	3.0000e+02
3932 *	toutv	powin	powoff	rpowmx	powscl
3933	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
3934 *					
3935 * dx	*	8.3264e-01	9.3345e-01e		
3936 * vol	*	1.7370e-02	1.9470e-02e		
3937 * fa	* f	2.0860e-02e			
3938 * kf	* f	5.0000e-01	0.0000e+00	1.0000e+00e	
3939 * rk	* f	1.0000e+00	0.0000e+00	5.0000e-01e	
3940 * grav	* f	1.0000e+00e			
3941 * hd	* f	6.0000e-02e			
3942 * ic	* f	0e			
3943 * nff	* f	1e			
3944 * alp	* f	0.0000e+00e			
3945 * vl	* f	0.0000e+00e			
3946 * vv	* f	0.0000e+00e			
3947 * tl	* f	5.8100e+02e			

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3948 * tv      * f    5.8100e+02e
3949 * p       * f    1.5500e+07e
3950 * pa      * f    0.0000e+00e
3951 * conc    * f    0.0000e+00e
3952 *
3953 *****
3954 *****      type          num          id          ctitle
3955 pipe                4                4 $4$ rod guide tube 3 (long)
3956 *          ncells      nodes      jun1      jun2      epsw
3957          4                0                4          96      0.0000e+00
3958 *          ichf        iconc        iacc        ipow
3959          1                1                0          0
3960 *          radin        th          hout1      houtv      tout1
3961      4.0945e-01      6.3500e-03      0.0000e+00      0.0000e+00      3.0000e+02
3962 *          toutv      powin      powoff      rpowmx      powsc1
3963      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
3964 *
3965 * dx      *      8.5725e-01r02 8.3264e-01      9.3345e-01e
3966 * vol      *      1.7880e-02r02 1.7370e-02      1.9470e-02e
3967 * fa      * f    2.0860e-02e
3968 * kfacs *      5.0000e-01r03 0.0000e+00      1.0000e+00e
3969 * rkfac *      1.0000e+00r03 0.0000e+00      5.0000e-01e
3970 * grav * f    1.0000e+00e
3971 * hd      * f    6.0000e-02e
3972 * icflg * f          0e
3973 * nff      * f          1e
3974 * alp      * f    0.0000e+00e
3975 * vl      * f    0.0000e+00e
3976 * vv      * f    0.0000e+00e
3977 * tl      * f    5.8100e+02e
3978 * tv      * f    5.8100e+02e
3979 * p       * f    1.5500e+07e
3980 * pa      * f    0.0000e+00e
3981 * conc    * f    0.0000e+00e
3982 *
3983 *****
3984 *****      type          num          id          ctitle
3985 pipe                5                5 $5$ rod guide tube 4 (short)
3986 *          ncells      nodes      jun1      jun2      epsw
3987          2                0                5          97      0.0000e+00
3988 *          ichf        iconc        iacc        ipow
3989          1                1                0          0
3990 *          radin        th          hout1      houtv      tout1
3991      4.0945e-01      6.3500e-03      0.0000e+00      0.0000e+00      3.0000e+02
3992 *          toutv      powin      powoff      rpowmx      powsc1
3993      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
3994 *
3995 * dx      *      8.3264e-01      9.3345e-01e
3996 * vol      *      1.7370e-02      1.9470e-02e
3997 * fa      * f    2.0860e-02e

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3998 * kfac *      5.0000e-01    0.0000e+00    1.0000e+00e
3999 * rkfac *     1.0000e+00    0.0000e+00    5.0000e-01e
4000 * grav * f     1.0000e+00e
4001 * hd * f       6.0000e-02e
4002 * icflg * f           0e
4003 * nff * f           1e
4004 * alp * f       0.0000e+00e
4005 * vl * f        0.0000e+00e
4006 * vv * f        0.0000e+00e
4007 * tl * f       5.8100e+02e
4008 * tv * f       5.8100e+02e
4009 * p * f        1.5500e+07e
4010 * pa * f        0.0000e+00e
4011 * conc * f      0.0000e+00e
4012 *
4013 *****
4014 *****      type          num          id          ctitle
4015 pipe                6              6 $6$ rod guide tube 5 (long)
4016 *          ncells      nodes      jun1      jun2      epsw
4017          4              0              6          98      0.0000e+00
4018 *          ichf      iconc      iacc      ipow
4019          1              1              0              0
4020 *          radin      th      hout1      houtv      tout1
4021      4.0945e-01      6.3500e-03      0.0000e+00      0.0000e+00      3.0000e+02
4022 *          toutv      powin      powoff      rpownmx      pownsc1
4023      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
4024 *
4025 * dx *      8.5725e-01r02 8.3264e-01      9.3345e-01e
4026 * vol *      1.7880e-02r02 1.7370e-02      1.9470e-02e
4027 * fa * f      2.0860e-02e
4028 * kfac *      5.0000e-01r03 0.0000e+00      1.0000e+00e
4029 * rkfac *      1.0000e+00r03 0.0000e+00      5.0000e-01e
4030 * grav * f      1.0000e+00e
4031 * hd * f       6.0000e-02e
4032 * icflg * f           0e
4033 * nff * f           1e
4034 * alp * f       0.0000e+00e
4035 * vl * f        0.0000e+00e
4036 * vv * f        0.0000e+00e
4037 * tl * f       5.8100e+02e
4038 * tv * f       5.8100e+02e
4039 * p * f        1.5500e+07e
4040 * pa * f        0.0000e+00e
4041 * conc * f      0.0000e+00e
4042 *
4043 *****
4044 *****      type          num          id          ctitle
4045 pipe                7              7 $7$ rod guide tube 6 (short)
4046 *          ncells      nodes      jun1      jun2      epsw
4047          2              0              7          99      0.0000e+00

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4048 *      ichf      iconc      iacc      ipow
4049 *      1          1          0          0
4050 *      radin      th      houtl      houtv      toutl
4051 *      4.0945e-01  6.3500e-03  0.0000e+00  0.0000e+00  3.0000e+02
4052 *      toutv      powin      powoff      rpowmx      powsc1
4053 *      3.0000e+02  0.0000e+00  0.0000e+00  0.0000e+00  0.0000e+00
4054 *
4055 * dx      *      8.3264e-01  9.3345e-01e
4056 * vol      *      1.7370e-02  1.9470e-02e
4057 * fa      * f      2.0860e-02e
4058 * kfacc      *      5.0000e-01  0.0000e+00  1.0000e+00e
4059 * rkfac      *      1.0000e+00  0.0000e+00  5.0000e-01e
4060 * grav      * f      1.0000e+00e
4061 * hd      * f      6.0000e-02e
4062 * icflg      * f      0e
4063 * nff      * f      1e
4064 * alp      * f      0.0000e+00e
4065 * vl      * f      0.0000e+00e
4066 * vv      * f      0.0000e+00e
4067 * tl      * f      5.8100e+02e
4068 * tv      * f      5.8100e+02e
4069 * p      * f      1.5500e+07e
4070 * pa      * f      0.0000e+00e
4071 * conc      * f      0.0000e+00e
4072 *
4073 *****
4074 *****      type      num      id      ctitle
4075 pipe      10      84 10 $10$ hot leg 1
4076 *      ncells      nodes      jun1      jun2      epsw
4077 *      6          1          10      12      0.0000e+00
4078 *      ichf      iconc      iacc      ipow
4079 *      1          1          0          0
4080 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
4081 *      0          0          0          0          0
4082 *      radin      th      houtl      houtv      toutl
4083 *      3.6830e-01  6.3500e-02  0.0000e+00  0.0000e+00  3.0000e+02
4084 *      toutv      85 powin      powoff      rpowmx      powsc1
4085 *      3.0000e+02  0.0000e+00  0.0000e+00  0.0000e+00  0.0000e+00
4086 *      qp3in      qp3off      rqp3mx      qp3sc1
4087 *      0.0000e+00  0.0000e+00  0.0000e+00  1.0000e+00  86
4088 *
4089 * dx      * r04 1.2090e+00  5.9250e-01  1.1970e+00e
4090 * vol      * r04 5.1520e-01  2.5250e-01  5.1007e-01e
4091 * fa      * r06 4.2614e-01  4.8695e-01e
4092 * kfacc      *      3.0000e-01r05 0.0000e+00  5.0000e-01e
4093 * rkfac      *      6.0000e-01r05 0.0000e+00  2.0000e-01e
4094 * grav      * r06 0.0000e+00  7.6600e-01e
4095 * hd      * r06 7.3660e-01  7.8740e-01e
4096 * icflg      * f      0e
4097 * nff      * f      1e

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4098 * alp      * f      0.0000e+00e
4099 * vl       * f      0.0000e+00e
4100 * vv       * f      0.0000e+00e
4101 * tl       * f      5.9110e+02e
4102 * tv       * f      5.9110e+02e
4103 * p        * f      1.5500e+07e
4104 * pa       * f      0.0000e+00e
4105 * qppp     * f      0.0000e+00e
4106 * matid    *          7e
4107 * tw       * f      5.9110e+02e
4108 * conc     * f      0.0000e+00e
4109 *
4110 *****
4111 *****      type          num          id          ctitle
4112 pipe                12          12 $12$ steam-gen primary 1
4113 *          ncells      nodes          jun1          jun2          epsw
4114          18              0          12          14      0.0000e+00
4115 *          ichf        iconc          iacc          ipow
4116          1              1              0              0
4117 *          radin        th          hout1          houtv          tout1
4118      9.8400e-03      1.2700e-03      0.0000e+00      0.0000e+00      3.0000e+02
4119 *          toutv        powin        powoff          rpownmx          powscl
4120      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
4121 *
4122 * dx      *      1.0668e+00      1.2192e+00r14 1.3320e+00      1.2192e+00      1.0668e+00
4123 * dx      * e
4124 * vol     *      1.4640e+00      2.8320e+00r14 1.2573e+00      2.8320e+00      1.4640e+00
4125 * vol     * e
4126 * fa      *      4.8695e-01      2.3226e+00r15 9.4392e-01      2.3226e+00      4.8695e-01
4127 * fa      * e
4128 * kfac    *      5.0000e-01      0.0000e+00      3.0000e-01r13 1.3530e-02      0.5000e+00
4129 * kfac    *      0.0000e+00      2.0000e-01e
4130 * rkfac   *      2.0000e-01      0.0000e+00      3.0000e-01r13 1.3530e-02      0.5000e+00
4131 * rkfac   *      0.0000e+00      5.0000e-01e
4132 * grav    *      7.6600e-01r08 1.0000e+00      0.0000e+00r08-1.0000e+00      -7.6600e-01
4133 * grav    * e
4134 * hd      *      7.8740e-01      1.4844e+00r15 1.9685e-02      1.4844e+00      7.8740e-01
4135 * hd      * e
4136 * icflg   * f          0e
4137 * nff     * f          1e
4138 * alp     * f      0.0000e+00e
4139 * vl      * f      0.0000e+00e
4140 * vv      * f      0.0000e+00e
4141 * tl      * r09 5.9110e+02r09 5.5910e+02e
4142 * tv      * r09 5.9110e+02r09 5.5910e+02e
4143 * p       * f      1.5500e+07e
4144 * pa      * f      0.0000e+00e
4145 * conc    * f      0.0000e+00e
4146 *

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4147 *****
4148 *****      type          num          id          ctitle
4149 pipe                14                14 $14$ loop seal 1
4150 *          ncells          nodes          jun1          jun2          epsw
4151          6                1                14                16          0.0000e+00
4152 *          ichf            iconc            iacc            ipow
4153          1                1                0                0
4154 *          igp3tr          igp3sv          ngp3tb          ngp3sv          ngp3rf
4155          0                0                0                0                0
4156 *          radin          th              houtl          houtv          toutl
4157          3.9370e-01        6.6680e-02        0.0000e+00        0.0000e+00        3.0000e+02
4158 *          toutv          powin          powoff          rpowmx          powsc1
4159          3.0000e+02        0.0000e+00        0.0000e+00        0.0000e+00        0.0000e+00
4160 *          qp3in          qp3off          rqp3mx          qp3sc1
4161          0.0000e+00        0.0000e+00        0.0000e+00        1.0000e+00
4162 *
4163 * dx      *          9.5768e-01      8.3972e-01      1.1484e+00r02 1.6961e+00      1.1484e+00
4164 * dx      * e
4165 * vol      *          4.6634e-01      4.0890e-01      5.5921e-01r02 8.2589e-01      5.5921e-01
4166 * vol      * e
4167 * fa      * f          4.8695e-01e
4168 * kfacc      *          2.0000e-01r06 0.0000e+00e
4169 * rkfac      *          5.0000e-01r06 0.0000e+00e
4170 * grav      *          -7.6600e-01r02 -1.0000e+00      -5.6067e-01      0.0000e+00      5.6067e-01
4171 * grav      *          1.0000e+00e
4172 * hd      * f          7.8740e-01e
4173 * icflg      * f          0e
4174 * nff      * f          1e
4175 * alp      * f          0.0000e+00e
4176 * vl      * f          0.0000e+00e
4177 * vv      * f          0.0000e+00e
4178 * tl      * f          5.5910e+02e
4179 * tv      * f          5.5910e+02e
4180 * p      * f          1.5500e+07e
4181 * pa      * f          0.0000e+00e
4182 * qppp      * f          0.0000e+00e
4183 * matid      *          7e
4184 * tw      * f          5.5910e+02e
4185 * conc      * f          0.0000e+00e
4186 *
4187 *****
4188 *****      type          num          id          ctitle
4189 pump                16                16 $16$ reactor-coolant pump 1
4190 *          ncells          nodes          jun1          jun2          epsw
4191          3                5                16                17          0.0000e+00
4192 *          ichf            iconc            ipmpty          irp          ipm
4193          1                1                2                0                1
4194 *          ipmptr          ipmpsv          npmpbtb          npmpsv          npmprf
4195          22                0                0                0                0

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4196 *	iqp3tr	iqp3sv	nqp3tb	nqp3sv	nqp3rf
4197	0	0	0	0	0
4198 *	radin	th	houtl	houtv	toutl
4199	1.7052e-01	4.6656e-01	0.0000e+00	0.0000e+00	3.0000e+02
4200 *	toutv	effmi			
4201	3.0000e+02	2.9500e+03			
4202 *	tfr0	tfr1	tfr2	tfr3	tfrb
4203	6.4800e+01	0.0000e+00	1.5554e+03	0.0000e+00	0.0000e+00
4204 *	tfrl0	tfrl1	tfrl2	tfrl3	
4205	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
4206 *	rhead	rtork	rflow	rrho	romega
4207	7.8000e+02	3.2404e+04	5.5835e+00	7.5575e+02	1.2360e+02
4208 *	omegan	omgoff	romgm	omgsc1	npmpsd
4209	1.2360e+02	0.0000e+00	5.0000e+01	1.0000e+00	0
4210 *	qp3in	qp3off	rqp3mx	qp3sc1	
4211	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
4212 *	option				
4213	2				
4214 *					
4215 * dx *	2.4640e+00	4.5000e+00	9.8640e-01e		
4216 * vol *	1.6850e+00	3.3738e+00	3.7799e-01e		
4217 * fa *	4.8695e-01r02	6.8384e-01	3.8320e-01e		
4218 * kfac * f	0.0000e+00e				
4219 * rkfac * f	0.0000e+00e				
4220 * grav *	1.0000e+00r03	0.0000e+00e			
4221 * hd *	7.8740e-01r02	9.3311e-01	6.9850e-01e		
4222 * icflg * f	0e				
4223 * nff * f	1e				
4224 * alp * f	0.0000e+00e				
4225 * ml *	0.0000e+00	4.2590e+03r02	0.0000e+00e		
4226 * vl x f	0.0000e+00e				
4227 * vv * f	0.0000e+00e				
4228 * tl * f	5.5910e+02e				
4229 * tv * f	5.5910e+02e				
4230 * p * f	1.5500e+07e				
4231 * pa * f	0.0000e+00e				
4232 * qppp * f	0.0000e+00e				
4233 * matid * f	7e				
4234 * tw * f	5.5910e+02e				
4235 * conc * f	0.0000e+00e				
4236 *					
4237 *****					
4238 *****	type	num	id	ctitle	
4239 tee		17	17	\$17\$ cold leg section 1a	
4240 *	jcell	nodes	ichf	cost	epsw
4241	1	1	1	0.0000e+00	0.0000e+00
4242 *	iconc1	ncell1	jun1	jun2	ipow1
4243	1	1	17	18	1
4244 *	ipwtr1	ipwsv1	npwtb1	npwsv1	npwrf1
4245	22	1	-2	0	0

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4246 *	iqptr1	iqpsv1	nqptb1	nqpsv1	nqprf1
4247	0	0	0	0	0
4248 *	radin1	th1	hout11	houtv1	tout11
4249	3.4925e-01	6.6680e-02	0.0000e+00	0.0000e+00	3.0000e+02
4250 *	toutv1	pwin1	pwoff1	rpwmx1	pwscl1
4251	3.0000e+02	2.6670e+06	2.6670e+06	1.0000e+10	1.0000e+00
4252 *	qp1n1	qpoff1	rqpmx1	qp1cl1	
4253	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
4254 *	iconc2	ncell2	jun3	ipow2	
4255	1	1	58	0	
4256 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
4257	0	0	0	0	0
4258 *	radin2	th2	hout12	houtv2	tout12
4259	1.1113e-01	2.5400e-02	0.0000e+00	0.0000e+00	3.0000e+02
4260 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
4261	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
4262 *	qp1n2	qpoff2	rqpmx2	qp1cl2	
4263	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
4264 *					
4265 *	main-cell arrays				
4266 *	dx	*	1.1686e+00e		
4267 *	vol	*	4.4781e-01e		
4268 *	fa	* f	3.8320e-01e		
4269 *	kfac	* f	0.0000e+00e		
4270 *	rkfac	* f	0.0000e+00e		
4271 *	grav	* f	0.0000e+00e		
4272 *	hd	* f	6.9850e-01e		
4273 *	icflg	* f	0e		
4274 *	nff	* f	1e		
4275 *	alp	*	0.0000e+00e		
4276 *	vl	* f	0.0000e+00e		
4277 *	vv	* f	0.0000e+00e		
4278 *	tl	*	5.5910e+02e		
4279 *	tv	*	5.5910e+02e		
4280 *	p	*	1.5500e+07e		
4281 *	pa	*	0.0000e+00e		
4282 *	qppp	*	0.0000e+00e		
4283 *	matid	*	7e		
4284 *	tw	*	5.5910e+02e		
4285 *	conc	*	0.0000e+00e		
4286 *	powtb1*		0.0000e+00	2.6670e+06	1.0000e+00
4287 *					0.0000e+00e
4288 *	side-cell arrays (eccs junction)				
4289 *	dx	*	0.762e+00e		
4290 *	vol	*	2.9489e-02e		
4291 *	fa	* f	3.8700e-02e		
4292 *	kfac	*	1.0000e-10	0.0000e+00e	
4293 *	rkfac	*	1.0000e-10	0.0000e+00e	
4294 *	grav	*	1.0000e+00	0.0000e+00e	
4295 *	hd	* f	2.2225e-01e		

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4296 * icflg * f          0e
4297 * nff *             1          1e
4298 * alp *             0.0000e+00e
4299 * vl * f           0.0000e+00e
4300 * vv * f           0.0000e+00e
4301 * tl *             5.5910e+02e
4302 * tv *             5.5910e+02e
4303 * p *              1.5500e+07e
4304 * pa *             0.0000e+00e
4305 * qppp *           0.0000e+00e
4306 * matid *           7e
4307 * tw *             5.5910e+02e
4308 * conc *           0.0000e+00e
4309 *
4310 *****
4311 *****      type          num          id          ctitle
4312 tee          18          18 $18$ cold leg section 1b
4313 *          jcell          nodes          ichf          cost          epsw
4314          1          1          1          0.0000e+00          0.0000e+00
4315 *          iconc1          ncell1          jun1          jun2          ipow1
4316          1          4          18          19          0
4317 *          iqptr1          iqpsv1          ngptb1          ngpsv1          ngprf1
4318          0          0          0          0          0
4319 *          radin1          th1          hout11          houtv1          tout11
4320          3.4925e-01          6.6680e-02          0.0000e+00          0.0000e+00          3.0000e+02
4321 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
4322          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
4323 *          qpin1          qpoff1          rqpwx1          qpscl1
4324          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
4325 *          iconc2          ncell2          jun3          ipow2
4326          1          1          91          0
4327 *          iqptr2          iqpsv2          ngptb2          ngpsv2          ngprf2
4328          0          0          0          0          0
4329 *          radin2          th2          hout12          houtv2          tout12
4330          3.3400e-02          1.1100e-02          0.0000e+00          0.0000e+00          3.0000e+02
4331 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
4332          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
4333 *          qpin2          qpoff2          rqpwx2          qpscl2
4334          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
4335 *
4336 * main-cell arrays
4337 * dx * f          1.1033e+00e
4338 * vol * r03          4.2278e-01          4.9953e-01e
4339 * fa * r04          3.8320e-01          5.7717e-01e
4340 * kfacs * r04          0.0000e+00          3.0000e-01e
4341 * rkfac * r04          0.0000e+00          3.0000e-01e
4342 * grav * f          0.0000e+00e
4343 * hd * r04          6.9850e-01          8.5725e-01e
4344 * icflg * f          0e
4345 * nff * f          1e

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4346 * alp      * f      0.0000e+00e
4347 * vl       * f      0.0000e+00e
4348 * vv       * f      0.0000e+00e
4349 * tl       * f      5.5910e+02e
4350 * tv       * f      5.5910e+02e
4351 * p        * f      1.5500e+07e
4352 * pa       * f      0.0000e+00e
4353 * qppp     * f      0.0000e+00e
4354 * matid    *          7e
4355 * tw       * f      5.5910e+02e
4356 * conc     * f      0.0000e+00e
4357 *
4358 * side-cell arrays (cvcs junction)
4359 * dx       *      3.0480e+00e
4360 * vol      *      1.0640e-02e
4361 * fa       * f      3.4900e-03e
4362 * kfacs    *      1.0000e-10      0.0000e+00e
4363 * rkfac    *      1.0000e-10      0.0000e+00e
4364 * grav     * f      0.0000e+00e
4365 * hd       * f      6.6700e-02e
4366 * icflg    * f          0e
4367 * nff      * f          1e
4368 * alp      *      0.0000e+00e
4369 * vl       * f      0.0000e+00e
4370 * vv       * f      0.0000e+00e
4371 * tl       *      5.5910e+02e
4372 * tv       *      5.5910e+02e
4373 * p        *      1.5500e+07e
4374 * pa       *      0.0000e+00e
4375 * qppp     *      0.0000e+00e
4376 * matid    *          7e
4377 * tw       *      5.5910e+02e
4378 * conc     *      0.0000e+00e
4379 *
4380 *****
4381 *****      type          num          id          ctitle
4382 pipe                20          20 $20$ hot leg 2
4383 *      ncells        nodes          jun1          jun2          epsw
4384      6                1          20          22      0.0000e+00
4385 *      ichf          iconc          iacc          ipow
4386      1                1          0          0
4387 *      iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
4388      0                0          0          0          0
4389 *      radin          th          houtl          houtv          toutl
4390      3.6830e-01      6.3500e-02      0.0000e+00      0.0000e+00      3.0000e+02
4391 *      toutv          powin          powoff          rpowmx          powsc1
4392      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
4393 *      qp3in          qp3off          rqp3mx          qp3sc1
4394      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
4395 *

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4396 * dx      * r04 1.2090e+00    5.9250e-01    1.1970e+00e
4397 * vol     * r04 5.1520e-01    2.5250e-01    5.1007e-01e
4398 * fa      * r06 4.2614e-01    4.8695e-01e
4399 * kfacs   *      3.0000e-01r05 0.0000e+00    5.0000e-01e
4400 * rkfac    *      6.0000e-01r05 0.0000e+00    2.0000e-01e
4401 * grav    * r06 0.0000e+00    7.6600e-01e
4402 * hd      * r06 7.3660e-01    7.8740e-01e
4403 * icflg   * f      0e
4404 * nff     * f      1e
4405 * alp     * f 0.0000e+00e
4406 * vl     * f 0.0000e+00e
4407 * vv     * f 0.0000e+00e
4408 * tl     * f 5.9110e+02e
4409 * tv     * f 5.9110e+02e
4410 * p      * f 1.5500e+07e
4411 * pa     * f 0.0000e+00e
4412 * qppp   * f 0.0000e+00e
4413 * matid  *      7e
4414 * tw     * f 5.9110e+02e
4415 * conc   * f 0.0000e+00e
4416 *
4417 *****
4418 *****      type          num          id          ctitle
4419 tee                22                22 $22$ steam-gen primary 2
4420 *      jcell        nodes          ichf          cost          epsw
4421      7                0                1    0.0000e+00    0.0000e+00
4422 *      iconcl       ncell1         jun1          jun2          ipow1
4423      1                18                22          24                0
4424 *      radin1        th1          hout1         houtv1         tout11
4425      9.8400e-03      1.2700e-03    0.0000e+00    0.0000e+00    3.0000e+02
4426 *      toutv1       pwin1         pwoff1         rpwmx1         pwsc11
4427      3.0000e+02      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
4428 *      iconc2       ncell2         jun3          ipow2
4429      1                1                201          0
4430 *      radin2        th2          hout1         houtv2         tout12
4431      9.8400e-03      1.2700e-03    0.0000e+00    0.0000e+00    3.0000e+02
4432 *      toutv2       pwin2         pwoff2         rpwmx2         pwsc12
4433      3.0000e+02      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
4434 *
4435 * main-cell arrays
4436 * dx      *      1.0668e+00    1.2192e+00r14 1.3320e+00    1.2192e+00    1.0668e+00
4437 * dx      * e
4438 * vol     *      1.4640e+00    2.8320e+00r14 1.2573e+00    2.8320e+00    1.4640e+00
4439 * vol     * e
4440 * fa      *      4.8695e-01    2.3226e+00r15 9.4392e-01    2.3226e+00    4.8695e-01
4441 * fa      * e
4442 * kfacs   *      5.0000e-01    0.0000e+00    3.0000e-01r13 1.3530e-02    0.5000e+00
4443 * kfacs   *      0.0000e+00    2.0000e-01e
4444 * rkfac    *      2.0000e-01    0.0000e+00    3.0000e-01r13 1.3530e-02    0.5000e+00
4445 * rkfac    *      0.0000e+00    5.0000e-01e

```

```

4446 * grav * 7.6600e-01r08 1.0000e+00 0.0000e+00r08-1.0000e+00 -7.6600e-01
4447 * grav * e
4448 * hd * 7.8740e-01 1.4844e+00r15 1.9685e-02 1.4844e+00 7.8740e-01
4449 * hd * e
4450 * icflg * f 0e
4451 * nff * f 1e
4452 * alp * f 0.0000e+00e
4453 * vl * f 0.0000e+00e
4454 * vv * f 0.0000e+00e
4455 * tl * r09 5.9110e+02r09 5.5910e+02e
4456 * tv * r09 5.9110e+02r09 5.5910e+02e
4457 * p * f 1.5500e+07e
4458 * pa * f 0.0000e+00e
4459 * conc * f 0.0000e+00e
4460 *
4461 * side-cell arrays (for sgtr)
4462 * dx * 5.0000e-01e
4463 * vol * 6.0868e-04e
4464 * fa * f 1.21736e-3e
4465 * kfacc * 1.0000e-10 0.0000e+00e
4466 * rkfac * 1.0000e-10 0.0000e+00e
4467 * grav * f 0.0000e+00e
4468 * hd * f 1.9685e-02e
4469 * icflg * f 0e
4470 * nff * 1 -1e
4471 * alp * 0.0000e+00e
4472 * vl * f 0.0000e+00e
4473 * vv * f 0.0000e+00e
4474 * tl * 5.8000e+02e
4475 * tv * 5.8000e+02e
4476 * p * 1.5500e+07e
4477 * pa * 0.0000e+00e
4478 * conc * 0.0000e+00e
4479 *
4480 *****
4481 ***** type num id ctitle
4482 pipe 24 24 $24$ loop seal 2
4483 * ncells nodes jun1 jun2 epsw
4484 6 1 24 26 0.0000e+00
4485 * ichf iconc iacc ipow
4486 1 1 0 0
4487 * iqp3tr iqp3sv nqp3tb nqp3sv nqp3rf
4488 0 0 0 0 0
4489 * radin th hout1 houtv tout1
4490 3.9370e-01 6.6680e-02 0.0000e+00 0.0000e+00 3.0000e+02
4491 * toutv powin powoff rpowmx powsc1
4492 3.0000e+02 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
4493 * qp3in qp3off rqp3mx qp3sc1
4494 0.0000e+00 0.0000e+00 0.0000e+00 1.0000e+00
4495 *

```

```

4496 * dx      *      9.5768e-01      8.3972e-01      1.1484e+00r02 1.6961e+00      1.1484e+00
4497 * dx      * e
4498 * vol      *      4.6634e-01      4.0890e-01      5.5921e-01r02 8.2589e-01      5.5921e-01
4499 * vol      * e
4500 * fa      * f      4.8695e-01e
4501 * kfacs   *      2.0000e-01r06 0.0000e+00e
4502 * rkfac    *      5.0000e-01r06 0.0000e+00e
4503 * grav     *      -7.6600e-01r02-1.0000e+00      -5.6067e-01      0.0000e+00      5.6067e-01
4504 * grav     *      1.0000e+00e
4505 * hd      * f      7.8740e-01e
4506 * icflg    * f              0e
4507 * nff      * f              1e
4508 * alp      * f      0.0000e+00e
4509 * vl      * f      0.0000e+00e
4510 * vv      * f      0.0000e+00e
4511 * tl      * f      5.5910e+02e
4512 * tv      * f      5.5910e+02e
4513 * p        * f      1.5500e+07e
4514 * pa      * f      0.0000e+00e
4515 * qppp     * f      0.0000e+00e
4516 * matid    *              7e
4517 * tw      * f      5.5910e+02e
4518 * conc     * f      0.0000e+00e
4519 *
4520 *****
4521 *****      type              num      id      ctitle
4522 pump              26              26 $26$ reactor-coolant pump 2
4523 *      ncells      nodes      jun1      jun2      epsw
4524      3              5              26              27      0.0000e+00
4525 *      ichf      iconc      ipmpty      irp      ipm
4526      1              1              2              0              1
4527 *      ipmptr      ipmpsv      npmpbtb      npmpsv      npmprf
4528      22              0              0              0              0
4529 *      iq3ptr      iq3sv      nqp3tb      nqp3sv      nqp3rf
4530      0              0              0              0              0
4531 *      radin      th      houtl      houtv      toutl
4532      1.7052e-01      4.6656e-01      0.0000e+00      0.0000e+00      3.0000e+02
4533 *      toutv      effmi
4534      3.0000e+02      2.9500e+03
4535 *      tfr0      tfr1      tfr2      tfr3      tfrb
4536      6.4800e+01      0.0000e+00      1.5554e+03      0.0000e+00      0.0000e+00
4537 *      tfrl0      tfrl1      tfrl2      tfrl3
4538      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
4539 *      rhead      rtork      rflow      rrho      romea
4540      7.8000e+02      3.2404e+04      5.5835e+00      7.5575e+02      1.2360e+02
4541 *      omegan      omgoff      romgmxx      omgscl      npmpsd
4542      1.2360e+02      0.0000e+00      5.0000e+01      1.0000e+00      0
4543 *      qp3in      qp3off      rqp3mx      qp3scl
4544      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00

```



```

4545 *      option
4546      2
4547 *
4548 * dx      *      2.4640e+00      4.5000e+00      9.8640e-01e
4549 * vol    *      1.6850e+00      3.3738e+00      3.7799e-01e
4550 * fa      *      4.8695e-01r02  6.8384e-01      3.8320e-01e
4551 * kfacs  * f      0.0000e+00e
4552 * rkfac  * f      0.0000e+00e
4553 * grav   *      1.0000e+00r03  0.0000e+00e
4554 * hd      *      7.8740e-01r02  9.3311e-01      6.9850e-01e
4555 * icflg  * f              0e
4556 * nff     * f              1e
4557 * alp     * f      0.0000e+00e
4558 * ml      *      0.0000e+00      4.2590e+03r02  0.0000e+00e
4559 * vl      x f      0.0000e+00e
4560 * vv      * f      0.0000e+00e
4561 * tl      * f      5.5910e+02e
4562 * tv      * f      5.5910e+02e
4563 * p       * f      1.5500e+07e
4564 * pa      * f      0.0000e+00e
4565 * qppp    * f      0.0000e+00e
4566 * matid   * f              7e
4567 * tw      * f      5.5910e+02e
4568 * conc   * f      0.0000e+00e
4569 *
4570 *****
4571 *****      type              num              id              ctitle
4572 tee                27              27 $27$ cold leg section 2a
4573 *      jcell          nodes          ichf          cost          epsw
4574      1              1              1      0.0000e+00      0.0000e+00
4575 *      iconc1         ncell1         jun1          jun2          ipow1
4576      1              1              27          28              1
4577 *      ipwtr1         ipwsv1         npwtb1         npwsv1         npwrf1
4578      22             1              -2              0              0
4579 *      iqptr1         iqpsv1         nqptb1         nqpsv1         nqprf1
4580      0              0              0              0              0
4581 *      radin1         th1           hout11         houtv1         tout11
4582      3.4925e-01      6.6680e-02      0.0000e+00      0.0000e+00      3.0000e+02
4583 *      toutv1         pwin1         pwoff1         rpwmx1         pwscl1
4584      3.0000e+02      2.6670e+06      2.6670e+06      1.0000e+10      1.0000e+00
4585 *      qp1n1          qpoff1         rqpwx1         qpscl1
4586      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
4587 *      iconc2         ncell2         jun3          ipow2
4588      1              1              68              0
4589 *      iqptr2         iqpsv2         nqptb2         nqpsv2         nqprf2
4590      0              0              0              0              0
4591 *      radin2         th2           hout12         houtv2         tout12
4592      1.1113e-01      2.5400e-02      0.0000e+00      0.0000e+00      3.0000e+02
4593 *      toutv2         pwin2         pwoff2         rpwmx2         pwscl2
4594      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00

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4595 *          qpin2          qpoff2          rqpms2          qpmsc12
4596      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
4597 *
4598 * main-cell arrays
4599 * dx      *      1.1686e+00e
4600 * vol     *      4.4781e-01e
4601 * fa      * f      3.8320e-01e
4602 * kfacs   * f      0.0000e+00e
4603 * rkfac   * f      0.0000e+00e
4604 * grav    * f      0.0000e+00e
4605 * hd      * f      6.9850e-01e
4606 * icflg   * f              0e
4607 * nff      * f              1e
4608 * alp      *      0.0000e+00e
4609 * vl       * f      0.0000e+00e
4610 * vv       * f      0.0000e+00e
4611 * tl       *      5.5910e+02e
4612 * tv       *      5.5910e+02e
4613 * p        *      1.5500e+07e
4614 * pa       *      0.0000e+00e
4615 * qppp     *      0.0000e+00e
4616 * matid    *              7e
4617 * tw        *      5.5910e+02e
4618 * conc     *      0.0000e+00e
4619 * powtbl1*      0.0000e+00      2.6670e+06      1.0000e+00      0.0000e+00e
4620 *
4621 * side-cell arrays (eccs junction)
4622 * dx      *      0.762e+00e
4623 * vol     *      2.9489e-02e
4624 * fa      * f      3.8700e-02e
4625 * kfacs   *      1.0000e-10      0.0000e+00e
4626 * rkfac   *      1.0000e-10      0.0000e+00e
4627 * grav    *      1.0000e+00      0.0000e+00e
4628 * hd      * f      2.2225e-01e
4629 * icflg   * f              0e
4630 * nff      *      1              1e
4631 * alp      *      0.0000e+00e
4632 * vl       * f      0.0000e+00e
4633 * vv       * f      0.0000e+00e
4634 * tl       *      5.5910e+02e
4635 * tv       *      5.5910e+02e
4636 * p        *      1.5500e+07e
4637 * pa       *      0.0000e+00e
4638 * qppp     *      0.0000e+00e
4639 * matid    *              7e
4640 * tw        *      5.5910e+02e
4641 * conc     *      0.0000e+00e
4642 *
4643 *****

```

id	ctitle	num	type
4644	*****		
4645	tee	28	
4646	* jcell	nodes	
4647	* 1	1	
4648	* iconc1	ncell1	
4649	* 1	4	
4650	* iqptr1	iqpsv1	
4651	* 0	0	
4652	* radin1	th1	
4653	* 3.4925e-01	6.6680e-02	
4654	* toutv1	pwin1	
4655	* 3.0000e+02	0.0000e+00	
4656	* qpin1	qpoff1	
4657	* 0.0000e+00	0.0000e+00	
4658	* iconc2	ncell2	
4659	* 1	1	
4660	* iqptr2	iqpsv2	
4661	* 0	0	
4662	* radin2	th2	
4663	* 3.3400e-02	1.1100e-02	
4664	* toutv2	pwin2	
4665	* 3.0000e+02	0.0000e+00	
4666	* qpin2	qpoff2	
4667	* 0.0000e+00	0.0000e+00	
4668	*		
4669	* main-cell arrays		
4670	* dx * f	1.1033e+00e	
4671	* vol * r03	4.2278e-01	4.9953e-01e
4672	* fa * r04	3.8320e-01	5.7717e-01e
4673	* kfacs * r04	0.0000e+00	3.0000e-01e
4674	* rkfac * r04	0.0000e+00	3.0000e-01e
4675	* grav * f	0.0000e+00e	
4676	* hd * r04	6.9850e-01	8.5725e-01e
4677	* icflg * f	0e	
4678	* nff * f	1e	
4679	* alp * f	0.0000e+00e	
4680	* vl * f	0.0000e+00e	
4681	* vv * f	0.0000e+00e	
4682	* tl * f	5.5910e+02e	
4683	* tv * f	5.5910e+02e	
4684	* p * f	1.5500e+07e	
4685	* pa * f	0.0000e+00e	
4686	* qppp * f	0.0000e+00e	
4687	* matid *	7e	
4688	* tw * f	5.5910e+02e	
4689	* conc * f	0.0000e+00e	
4690	*		
4691	* side-cell arrays (cvcs junction)		
4692	* dx *	3.0480e+00e	
4693	* vol *	1.0640e-02e	

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4694 * fa      * f      3.4900e-03e
4695 * kfacs  *      1.0000e-10    0.0000e+00e
4696 * rkfac  *      1.0000e-10    0.0000e+00e
4697 * grav   * f      0.0000e+00e
4698 * hd      * f      6.6700e-02e
4699 * icflg   * f              0e
4700 * nff     * f              1e
4701 * alp     *      0.0000e+00e
4702 * vl      * f      0.0000e+00e
4703 * vv      * f      0.0000e+00e
4704 * tl      *      5.5910e+02e
4705 * tv      *      5.5910e+02e
4706 * p       *      1.5500e+07e
4707 * pa      *      0.0000e+00e
4708 * qppp    *      0.0000e+00e
4709 * matid   *              7e
4710 * tw      *      5.5910e+02e
4711 * conc    *      0.0000e+00e
4712 *
4713 *****
4714 *****      type          num          id          ctitle
4715 tee          30          30 $30$ hot leg 3
4716 *          jcell          nodes          ichf          cost          epsw
4717          5          1          1          0.0000e+00          0.0000e+00
4718 *          iconcl          ncell1          jun1          jun2          ipow1
4719          1          6          30          32          0
4720 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
4721          0          0          0          0          0
4722 *          radin1          th1          hout11          houtv1          tout11
4723          3.6830e-01          6.3500e-02          0.0000e+00          0.0000e+00          3.0000e+02
4724 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
4725          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
4726 *          qpin1          qpoff1          rqpwx1          qpscl1
4727          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
4728 *          iconc2          ncell2          jun3          ipow2
4729          1          4          40          0
4730 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
4731          0          0          0          0          0
4732 *          radin2          th2          hout12          houtv2          tout12
4733          1.3335e-01          2.8580e-02          0.0000e+00          0.0000e+00          3.0000e+02
4734 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
4735          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
4736 *          qpin2          qpoff2          rqpwx2          qpscl2
4737          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
4738 *
4739 * main-cell arrays
4740 * dx      * r04 1.2090e+00          5.9250e-01          1.1970e+00e
4741 * vol     * r04 5.1520e-01          2.5250e-01          5.1007e-01e
4742 * fa      * r06 4.2614e-01          4.8695e-01e
4743 * kfacs  *      3.0000e-01r05 0.0000e+00          5.0000e-01e

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4744 * rkfac *      6.0000e-01r05 0.0000e+00      2.0000e-01e
4745 * grav * r06 0.0000e+00      7.6600e-01e
4746 * hd * r06 7.3660e-01      7.8740e-01e
4747 * icflg * f      0e
4748 * nff * f      1e
4749 * alp * f      0.0000e+00e
4750 * vl * f      0.0000e+00e
4751 * vv * f      0.0000e+00e
4752 * tl * f      5.9110e+02e
4753 * tv * f      5.9110e+02e
4754 * p * f      1.5500e+07e
4755 * pa * f      0.0000e+00e
4756 * qppp * f      0.0000e+00e
4757 * matid *      7e
4758 * tw * f      5.9110e+02e
4759 * conc * f      0.0000e+00e
4760 *
4761 * side-cell arrays (pressurizer surge line)
4762 * dx * r03 3.6189e+00      4.6878e+00e
4763 * vol * r03 2.0217e-01      2.6786e-01e
4764 * fa * r04 5.5860e-02      6.7000e-02e
4765 * kfacs *      1.0000e-10r04 0.0000e+00e
4766 * rkfac *      1.0000e-10r04 0.0000e+00e
4767 * grav * r04 0.0000e+00      1.0000e+00e
4768 * hd * r04 2.6670e-01      2.9210e-01e
4769 * icflg * f      0e
4770 * nff * r04      1      -1e
4771 * alp * f      0.0000e+00e
4772 * vl * f      0.0000e+00e
4773 * vv * f      0.0000e+00e
4774 * tl * f      5.9110e+02e
4775 * tv * f      5.9110e+02e
4776 * p * f      1.5500e+07e
4777 * pa * f      0.0000e+00e
4778 * qppp * f      0.0000e+00e
4779 * matid *      7e
4780 * tw * f      5.9110e+02e
4781 * conc * f      0.0000e+00e
4782 *
4783 *****
4784 *****      type      num      id      ctitle
4785 pipe      32      32 $32$ steam-gen primary 3
4786 *      ncells      nodes      jun1      jun2      epsw
4787      18      0      32      34      0.0000e+00
4788 *      ichf      iconc      iacc      ipow
4789      1      1      0      0
4790 *      radin      th      hout1      houtv      tout1
4791      9.8400e-03      1.2700e-03      0.0000e+00      0.0000e+00      3.0000e+02
4792 *      toutv      powin      powoff      rpownx      pownsl
4793      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00

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4794 *
4795 * dx      *      1.0668e+00      1.2192e+00r14 1.3320e+00      1.2192e+00      1.0668e+00
4796 * dx      * e
4797 * vol     *      1.4640e+00      2.8320e+00r14 1.2573e+00      2.8320e+00      1.4640e+00
4798 * vol     * e
4799 * fa      *      4.8695e-01      2.3226e+00r15 9.4392e-01      2.3226e+00      4.8695e-01
4800 * fa      * e
4801 * kfacs   *      5.0000e-01      0.0000e+00      3.0000e-01r13 1.3530e-02      0.5000e+00
4802 * kfacs   *      0.0000e+00      2.0000e-01e
4803 * rkfac   *      2.0000e-01      0.0000e+00      3.0000e-01r13 1.3530e-02      0.5000e+00
4804 * rkfac   *      0.0000e+00      5.0000e-01e
4805 * grav    *      7.6600e-01r08 1.0000e+00      0.0000e+00r08-1.0000e+00      -7.6600e-01
4806 * grav    * e
4807 * hd      *      7.8740e-01      1.4844e+00r15 1.9685e-02      1.4844e+00      7.8740e-01
4808 * hd      * e
4809 * icflg   * f      0e
4810 * nff     * f      1e
4811 * alp     * f      0.0000e+00e
4812 * vl      * f      0.0000e+00e
4813 * vv      * f      0.0000e+00e
4814 * tl      * r09 5.9110e+02r09 5.5910e+02e
4815 * tv      * r09 5.9110e+02r09 5.5910e+02e
4816 * p       * f      1.5500e+07e
4817 * pa      * f      0.0000e+00e
4818 * conc    * f      0.0000e+00e
4819 *
4820 *****
4821 *****      type      num      id      ctitle
4822 pipe      34      34 $34$ loop seal 3
4823 *      ncells      nodes      jun1      jun2      epsw
4824      6      1      34      36      0.0000e+00
4825 *      ichf      iconc      iacc      ipow
4826      1      1      0      0
4827 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
4828      0      0      0      0      0
4829 *      radin      th      hout1      houtv      tout1
4830      3.9370e-01      6.6680e-02      0.0000e+00      0.0000e+00      3.0000e+02
4831 *      toutv      powin      powoff      rpowmx      powscl
4832      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
4833 *      qp3in      qp3off      rqp3mx      qp3scl
4834      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
4835 *
4836 * dx      *      9.5768e-01      8.3972e-01      1.1484e+00r02 1.6961e+00      1.1484e+00
4837 * dx      * e
4838 * vol     *      4.6634e-01      4.0890e-01      5.5921e-01r02 8.2589e-01      5.5921e-01
4839 * vol     * e
4840 * fa      * f      4.8695e-01e
4841 * kfacs   *      2.0000e-01r06 0.0000e+00e
4842 * rkfac   *      5.0000e-01r06 0.0000e+00e

```

```

4843 * grav * -7.6600e-01r02-1.0000e+00 -5.6067e-01 0.0000e+00 5.6067e-01
4844 * grav * 1.0000e+00e
4845 * hd * f 7.8740e-01e
4846 * icflg * f 0e
4847 * nff * f 1e
4848 * alp * f 0.0000e+00e
4849 * vl * f 0.0000e+00e
4850 * vv * f 0.0000e+00e
4851 * tl * f 5.5910e+02e
4852 * tv * f 5.5910e+02e
4853 * p * f 1.5500e+07e
4854 * pa * f 0.0000e+00e
4855 * qppp * f 0.0000e+00e
4856 * matid * 7e
4857 * tw * f 5.5910e+02e
4858 * conc * f 0.0000e+00e
4859 *
4860 *****
4861 ***** type num id ctitle
4862 pump 36 36 $36$ reactor-coolant pump 3
4863 * ncells nodes jun1 jun2 epsw
4864 * 3 5 36 37 0.0000e+00
4865 * ichf iconc ipmpty irp ipm
4866 * 1 1 2 0 1
4867 * ipmptr ipmpsv npmptb npmpsv npmprf
4868 * 22 0 0 0 0
4869 * iq3tr iq3sv nqp3tb nqp3sv nqp3rf
4870 * 0 0 0 0 0
4871 * radin th hout1 houtv tout1
4872 * 1.7052e-01 4.6656e-01 0.0000e+00 0.0000e+00 3.0000e+02
4873 * toutv effmi
4874 * 3.0000e+02 2.9500e+03
4875 * tfr0 tfr1 tfr2 tfr3 tfrb
4876 * 6.4800e+01 0.0000e+00 1.5554e+03 0.0000e+00 0.0000e+00
4877 * tfrl0 tfrl1 tfrl2 tfrl3
4878 * 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
4879 * rhead rtork rflow rrho romea
4880 * 7.8000e+02 3.2404e+04 5.5835e+00 7.5575e+02 1.2360e+02
4881 * omegan omgoff romgm omgscl npmpsd
4882 * 1.2360e+02 0.0000e+00 5.0000e+01 1.0000e+00 0
4883 * qp3in qp3off rqp3mx qp3scl
4884 * 0.0000e+00 0.0000e+00 0.0000e+00 1.0000e+00
4885 * option
4886 * 2
4887 *
4888 * dx * 2.4640e+00 4.5000e+00 9.8640e-01e
4889 * vol * 1.6850e+00 3.3738e+00 3.7799e-01e
4890 * fa * 4.8695e-01r02 6.8384e-01 3.8320e-01e
4891 * kfacs * f 0.0000e+00e
4892 * rkfac * f 0.0000e+00e

```

```

4893 * grav *      1.0000e+00r03 0.0000e+00e
4894 * hd *        7.8740e-01r02 9.3311e-01    6.9850e-01e
4895 * icflg * f          0e
4896 * nff * f          1e
4897 * alp * f      0.0000e+00e
4898 * ml *        0.0000e+00    4.2590e+03r02 0.0000e+00e
4899 * vl x f      0.0000e+00e
4900 * vv * f      0.0000e+00e
4901 * tl * f      5.5910e+02e
4902 * tv * f      5.5910e+02e
4903 * p * f       1.5500e+07e
4904 * pa * f      0.0000e+00e
4905 * qppp * f      0.0000e+00e
4906 * matid * f          7e
4907 * tw * f      5.5910e+02e
4908 * conc * f      0.0000e+00e
4909 *
4910 *****
4911 *****      type          num          id          ctitle
4912 tee          37          37 $37$ cold leg section 3a
4913 *          jcell          nodes          ichf          cost          epsw
4914          1          1          1    0.0000e+00    0.0000e+00
4915 *          iconcl          ncell1          jun1          jun2          ipow1
4916          1          1          37          38          1
4917 *          ipwtr1          ipwsv1          npwtb1          npwsv1          npwrf1
4918          22          1          -2          0          0
4919 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
4920          0          0          0          0          0
4921 *          radin1          th1          houtl1          houtv1          toutl1
4922          3.4925e-01    6.6680e-02    0.0000e+00    0.0000e+00    3.0000e+02
4923 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
4924          3.0000e+02    2.6670e+06    2.6670e+06    1.0000e+10    1.0000e+00
4925 *          qpin1          qpoff1          rqpmx1          qpscl1
4926          0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
4927 *          iconc2          ncell2          jun3          ipow2
4928          1          1          78          0
4929 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
4930          0          0          0          0          0
4931 *          radin2          th2          houtl2          houtv2          toutl2
4932          1.1113e-01    2.5400e-02    0.0000e+00    0.0000e+00    3.0000e+02
4933 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
4934          3.0000e+02    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
4935 *          qpin2          qpoff2          rqpmx2          qpscl2
4936          0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
4937 *
4938 * main-cell arrays
4939 * dx *          1.1686e+00e
4940 * vol *          4.4781e-01e
4941 * fa * f      3.8320e-01e
4942 * kfacs * f      0.0000e+00e

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4943 * rkfac * f 0.0000e+00e
4944 * grav * f 0.0000e+00e
4945 * hd * f 6.9850e-01e
4946 * icflg * f 0e
4947 * nff * f 1e
4948 * alp * 0.0000e+00e
4949 * vl * f 0.0000e+00e
4950 * vv * f 0.0000e+00e
4951 * tl * 5.5910e+02e
4952 * tv * 5.5910e+02e
4953 * p * 1.5500e+07e
4954 * pa * 0.0000e+00e
4955 * qppp * 0.0000e+00e
4956 * matid * 7e
4957 * tw * 5.5910e+02e
4958 * conc * 0.0000e+00e
4959 * powtb1* 0.0000e+00 2.6670e+06 1.0000e+00 0.0000e+00e
4960 *
4961 * side-cell arrays (eccs junction)
4962 * dx * 0.762e+00e
4963 * vol * 2.9489e-02e
4964 * fa * f 3.8700e-02e
4965 * kfac * 1.0000e-10 0.0000e+00e
4966 * rkfac * 1.0000e-10 0.0000e+00e
4967 * grav * 1.0000e+00 0.0000e+00e
4968 * hd * f 2.2225e-01e
4969 * icflg * f 0e
4970 * nff * 1 1e
4971 * alp * 0.0000e+00e
4972 * vl * f 0.0000e+00e
4973 * vv * f 0.0000e+00e
4974 * tl * 5.5910e+02e
4975 * tv * 5.5910e+02e
4976 * p * 1.5500e+07e
4977 * pa * 0.0000e+00e
4978 * qppp * 0.0000e+00e
4979 * matid * 7e
4980 * tw * 5.5910e+02e
4981 * conc * 0.0000e+00e
4982 *
4983 *****
4984 ***** type num id ctitle
4985 tee 38 38 $38$ cold leg section 3b
4986 * jcell nodes ichf cost epsw
4987 1 1 1 0.0000e+00 0.0000e+00
4988 * iconcl ncell1 jun1 jun2 ipow1
4989 1 4 38 39 0
4990 * iqptr1 iqpsv1 nqptb1 nqpsv1 nqprf1
4991 0 0 0 0 0

```

4992 *	radin1	th1	houtl1	houtv1	toutl1
4993	3.4925e-01	6.6680e-02	0.0000e+00	0.0000e+00	3.0000e+02
4994 *	toutv1	pwin1	pwoff1	rpwmx1	pwscl1
4995	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
4996 *	qpwin1	qpoff1	rqpmx1	qpscl1	
4997	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
4998 *	iconc2	ncell2	jun3	ipow2	
4999	1	1	93	0	
5000 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
5001	0	0	0	0	0
5002 *	radin2	th2	houtl2	houtv2	toutl2
5003	3.3400e-02	1.1100e-02	0.0000e+00	0.0000e+00	3.0000e+02
5004 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
5005	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
5006 *	qpwin2	qpoff2	rqpmx2	qpscl2	
5007	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
5008 *					
5009 *	main-cell arrays				
5010 *	dx	* f	1.1033e+00e		
5011 *	vol	* r03	4.2278e-01	4.9953e-01e	
5012 *	fa	* r04	3.8320e-01	5.7717e-01e	
5013 *	kfac	* r04	0.0000e+00	3.0000e-01e	
5014 *	rkfac	* r04	0.0000e+00	3.0000e-01e	
5015 *	grav	* f	0.0000e+00e		
5016 *	hd	* r04	6.9850e-01	8.5725e-01e	
5017 *	icflg	* f	0e		
5018 *	nff	* f	1e		
5019 *	alp	* f	0.0000e+00e		
5020 *	vl	* f	0.0000e+00e		
5021 *	vv	* f	0.0000e+00e		
5022 *	tl	* f	5.5910e+02e		
5023 *	tv	* f	5.5910e+02e		
5024 *	p	* f	1.5500e+07e		
5025 *	pa	* f	0.0000e+00e		
5026 *	qppp	* f	0.0000e+00e		
5027 *	matid	*	7e		
5028 *	tw	* f	5.5910e+02e		
5029 *	conc	* f	0.0000e+00e		
5030 *					
5031 *	side-cell arrays (cvcs junction)				
5032 *	dx	*	3.0480e+00e		
5033 *	vol	*	1.0640e-02e		
5034 *	fa	* f	3.4900e-03e		
5035 *	kfac	*	1.0000e-10	0.0000e+00e	
5036 *	rkfac	*	1.0000e-10	0.0000e+00e	
5037 *	grav	* f	0.0000e+00e		
5038 *	hd	* f	6.6700e-02e		
5039 *	icflg	* f	0e		
5040 *	nff	* f	1e		
5041 *	alp	*	0.0000e+00e		

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5042 * vl      * f      0.0000e+00e
5043 * vv      * f      0.0000e+00e
5044 * tl      *          5.5910e+02e
5045 * tv      *          5.5910e+02e
5046 * p       *          1.5500e+07e
5047 * pa      *          0.0000e+00e
5048 * qppp    *          0.0000e+00e
5049 * matid   *          7e
5050 * tw      *          5.5910e+02e
5051 * conc    *          0.0000e+00e
5052 *
5053 *****
5054 *****      type          num          id          ctitle
5055 pipe          40          40 $40$ prizer heater section
5056 *          ncells        nodes        jun1        jun2        epsw
5057 *          3            5            41          40          0.0000e+00
5058 *          ichf          iconc          iacc          ipow
5059 *          1            1            0            1
5060 *          ipowtr        ipowsv        npowtb        npowsv        npowrf
5061 *          -407          -450          0            0            0
5062 *          iq3tr         iq3sv         nqp3tb        nqp3sv        nqp3rf
5063 *          0            0            0            0            0
5064 *          radin          th            hout1        houtv
5065 *          1.0855e+00     1.0922e-01  0.0000e+00  4.0000e+01  3.0000e+02
5066 *          toutv         powin        powoff        rpowmx        powsc1
5067 *          3.1000e+02     2.0000e+05  0.0000e+00  1.0000e+10  1.0000e+00
5068 *          qp3in         qp3off        rqp3mx        qp3sc1
5069 *          0.0000e+00     0.0000e+00  1.0000e+10  1.0000e+00
5070 *
5071 * dx      *          1.1400e+00r02 5.3100e-01e
5072 * vol     *          3.9519e+00  1.6871e+00  7.6739e-01e
5073 * fa      * r02 3.5434e+00  2.6570e+00  6.7000e-02e
5074 * kfacs   * r02 0.0000e+00  1.0000e-02  0.0000e+00e
5075 * rkfac   * r02 0.0000e+00  2.0000e-02  0.0000e+00e
5076 * grav    * f      -1.0000e+00e
5077 * hd      * r02 2.1240e+00  1.8393e+00  2.9210e-01e
5078 * icflg   * f          0e
5079 * nff      * r03          1          -1e
5080 * alp     * f      0.0000e+00e
5081 * vl      * f      0.0000e+00e
5082 * vv      * f      0.0000e+00e
5083 * tl      * f      6.1800e+02e
5084 * tv      * f      6.1800e+02e
5085 * p       * f      1.5500e+07e
5086 * pa      * f      0.0000e+00e
5087 * qppp    * f      0.0000e+00e
5088 * matid   * f          9e
5089 * tw      * f      6.1800e+02e
5090 * conc    * f      0.0000e+00e
5091 *

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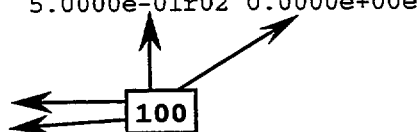
98

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5092 *****
5093 *****      type              num              id              ctitle
5094 tee              41              41 $41$ prizer middle section
5095 *      jcell              nodes              ichf              cost              epsw
5096              2              5              1      0.0000e+00      0.0000e+00
5097 *      iconc1              ncell1              jun1              jun2              ipow1
5098              1              10              42              41              0
5099 *      iqptr1              iqpsv1              ngptb1              ngpsv1              ngprf1
5100              0              0              0              0              0
5101 *      radin1              th1              hout1              houtv1              tout1
5102      1.0620e+00      1.0922e-01      0.0000e+00      4.0000e+01      3.0000e+02
5103 *      toutv1              pwin1              pwoff1              rpwm1              pwsc1
5104      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
5105 *      qp1              qpoff1              rqp1              qp1              qp1
5106      0.0000e+00      0.0000e+00      1.0000e+10      1.0000e+00
5107 *      iconc2              ncell2              jun3              ipow2
5108              1              1              44              0
5109 *      iqptr2              iqpsv2              ngptb2              ngpsv2              ngprf2
5110              0              0              0              0              0
5111 *      radin2              th2              hout2              houtv2              tout2
5112      1.0000e+00      1.0000e-02      0.0000e+00      0.0000e+00      3.0000e+02
5113 *      toutv2              pwin2              pwoff2              rpwm2              pwsc2
5114      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
5115 *      qp2              qpoff2              rqp2              qp2              qp2
5116      0.0000e+00      0.0000e+00      1.0000e+10      1.0000e+00
5117 *
5118 * main-cell arrays
5119 * dx      * r03 1.7700e-01r07 1.1222e+00e
5120 * vol      * r03 5.7483e-01r07 3.9763e+00e
5121 * fa      *      2.6570e+00r02 3.2476e+00r08 3.5434e+00e
5122 * kfac      *      2.0000e-02r10 0.0000e+00e
5123 * rkfac      *      1.0000e-02r10 0.0000e+00e
5124 * grav      * f -1.0000e+00e
5125 * hd      *      1.8393e+00r10 2.1240e+00e
5126 * icflg      * f      0e
5127 * nff      * f      1e
5128 * alp      * r07 1.0000e+00      5.0000e-01r02 0.0000e+00e
5129 * vl      * f 0.0000e+00e
5130 * vv      * f 0.0000e+00e
5131 * tl      * f 6.1800e+02e
5132 * tv      * f 6.1800e+02e
5133 * p      * f 1.5500e+07e
5134 * pa      * f 0.0000e+00e
5135 * qppp      * f 0.0000e+00e
5136 * matid      * f      9e
5137 * tw      * f 6.1800e+02e
5138 * conc      * f 0.0000e+00e
5139 *
5140 * side-cell arrays
5141 * dx      *      1.0000e+00e

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```

5142 * vol * 5.8000e-02e
5143 * fa * f 5.8000e-02e
5144 * kfacs * 1.0000e-10 0.0000e+00e
5145 * rkfac * 1.0000e-10 0.0000e+00e
5146 * grav * f 0.0000e+00e
5147 * hd * f 2.7200e-01e
5148 * icflg * f 0e
5149 * nff * f 1e
5150 * alp * 1.0000e+00e
5151 * vl * f 0.0000e+00e
5152 * vv * f 0.0000e+00e
5153 * tl * 6.1800e+02e
5154 * tv * 6.1800e+02e
5155 * p * 1.5500e+07e
5156 * pa * 0.0000e+00e
5157 * qppp * f 0.0000e+00e
5158 * matid * f 9e
5159 * tw * f 6.1800e+02e
5160 * conc * 0.0000e+00e
5161 *
5162 *****
5163 ***** type num id ctitle
5164 prizer 42 42 $42$ prizer sprayer section
5165 * ncells nodes jun1 jun2
5166 1 5 43 42
5167 * ichf iconc qp3in
5168 1 1 0.0000e+00
5169 * radin th hout1 houtv tout1
5170 1.0929e+00 1.0922e-01 0.0000e+00 4.0000e+01 3.0000e+02
5171 * toutv qheat pset dpmax zhtr
5172 3.1000e+02 0.0000e+00 1.5500e+07 3.4400e+05 0.0000e+00
5173 *
5174 * dx * 5.3100e-01e
5175 * vol * 7.8438e-01e
5176 * fa * 6.3200e-03 2.6570e+00e
5177 * kfacs * 0.0000e+00 2.0000e-02e
5178 * rkfac * 0.0000e+00 1.0000e-02e
5179 * grav * f -1.0000e+00e
5180 * hd * 8.9610e-02 1.8393e+00e
5181 * icflg * f 0e
5182 * nff * f 1e
5183 * alp * 1.0000e+00e
5184 * vl * f 0.0000e+00e
5185 * vv * f 0.0000e+00e
5186 * tl * 6.1800e+02e
5187 * tv * 6.1800e+02e
5188 * p * 1.5500e+07e
5189 * pa * 0.0000e+00e
5190 * qppp * f 0.0000e+00e
5191 * matid * f 9e

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5192 * tw      * f      6.1800e+02e
5193 * conc    *          0.0000e+00e
5194 *
5195 *****
5196 *****      type          num          id          ctitle
5197 fill          43          43 $43$ prizer spray fill
5198 *          jun1          ifty          ioff
5199          43          5          0
5200 *          iftr          ifsv          nftb          nfsv          nfrf
5201          1          -434 ← 103          2          0          0
5202 *          twtold          rfmix          concin          felv
5203          0.0000e+00          2.8000e+00          0.0000e+00          0.0000e+00
5204 *          dxin          volin          alpin          vlin          tlin
5205          1.0000e+00          1.0000e+00          0.0000e+00          0.0000e+00          5.5910e+02
5206 *          pin          pain          flowin          vvin          tvin
5207          1.5500e+07          0.0000e+00          0.0000e+00          0.0000e+00          5.5910e+02
5208 *          vm scl          vv scl
5209          1.0000e+00          1.0000e+00
5210 *
5211 * vmtb *          1.7237e+05          5.0000e-02          5.1711e+05          2.8260e+01e ← 103
5212 *
5213 *****
5214 *****      type          num          id          ctitle
5215 tee          44          44 $44$ prizer porv/srv header
5216 *          jcell          nodes          ichf          cost          epsw
5217          2          1          1          0.0000e+00          0.0000e+00
5218 *          iconc1          ncell1          jun1          jun2          ipow1
5219          1          3          44          45          0
5220 *          iqptr1          iqpsv1          ngptb1          ngpsv1          ngprf1
5221          0          0          0          0          0
5222 *          radin1          th1          hout11          houtv1          tout11
5223          1.0000e-01          1.0000e-02          0.0000e+00          0.0000e+00          3.0000e+02
5224 *          toutv1          pwin1          pwoff1          rpwmx1          pwscl1
5225          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
5226 *          qpin1          qpoff1          rqpwx1          qpscl1
5227          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
5228 *          iconc2          ncell2          jun3          ipow2
5229          1          1          46          0
5230 *          iqptr2          iqpsv2          ngptb2          ngpsv2          ngprf2
5231          0          0          0          0          0
5232 *          radin2          th2          hout12          houtv2          tout12
5233          1.0000e-01          1.0000e-02          0.0000e+00          0.0000e+00          3.0000e+02
5234 *          toutv2          pwin2          pwoff2          rpwmx2          pwscl2
5235          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
5236 *          qpin2          qpoff2          rqpwx2          qpscl2
5237          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
5238 *
5239 * main-cell arrays
5240 * dx      * f      3.3333e-01e
5241 * vol      * f      1.3000e-02e

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```

5242 * fa      *      5.8000e-02r02 3.9000e-02      1.9000e-02e
5243 * kfacs  * f      0.0000e+00e
5244 * rkfac  * f      0.0000e+00e
5245 * grav   * f      0.0000e+00e
5246 * hd     *      2.7200e-01r02 2.1400e-01      1.5600e-01e
5247 * icflg  * f              0e
5248 * nff    * r03              1      -1e
5249 * alp    * f      1.0000e+00e
5250 * vl     * f      0.0000e+00e
5251 * vv     * f      0.0000e+00e
5252 * tl     * f      6.1800e+02e
5253 * tv     * f      6.1800e+02e
5254 * p      * f      1.5500e+07e
5255 * pa     * f      0.0000e+00e
5256 * qppp   * f      0.0000e+00e
5257 * matid  *              9e
5258 * tw     * f      6.1800e+02e
5259 * conc   * f      0.0000e+00e
5260 *
5261 * side-cell arrays
5262 * dx      *      1.0000e+00e
5263 * vol     *      3.9000e-02e
5264 * fa      * f      3.9000e-02e
5265 * kfacs  *      1.0000e-10      0.0000e+00e
5266 * rkfac  *      1.0000e-10      0.0000e+00e
5267 * grav   * f      0.0000e+00e
5268 * hd     * f      2.2300e-01e
5269 * icflg  * f              0e
5270 * nff    * f              1e
5271 * alp    *      1.0000e+00e
5272 * vl     * f      0.0000e+00e
5273 * vv     * f      0.0000e+00e
5274 * tl     *      6.1800e+02e
5275 * tv     *      6.1800e+02e
5276 * p      *      1.5500e+07e
5277 * pa     *      0.0000e+00e
5278 * qppp   *      0.0000e+00e
5279 * matid  *              9e
5280 * tw     *      6.1800e+02e
5281 * conc   *      0.0000e+00e
5282 *
5283 *****
5284 *****      type              num              id              ctitle
5285 valve              45              45 $45$ prizer porv
5286 *      ncells      nodes      jun1      jun2      epsw
5287      1              1              45              47      0.0000e+00
5288 *      ichf      iconc      ivty      ivps      nvtb2
5289      1              1              3              2      104 0
5290 *      ivtr      ivsv      nvtb1      nvsv      nvrf
5291      450      104 1      -2              0      105 0

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5292 *	iqp3tr	iqp3sv	nqp3tb	nqp3sv	nqp3rf
5293	0	0	0	0	0
5294 *	ivtrov	ivtyov			
5295	0	0			
5296 *	rvmx	rvov	fminov	fmaxov	
5297	2.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
5298 *	radin	th	houtl	houtv	toutl
5299	1.0000e-01	1.0000e-02	0.0000e+00	0.0000e+00	3.0000e+02
5300 *	toutv	avlv	hvlv	favlv	xpos
5301	3.0000e+02	2.0400e-03	5.1000e-02	0.0000e+00	0.0000e+00
5302 *	qp3in	qp3off	rqp3mx	qp3scl	
5303	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
5304 *					
5305 *	dx	1.0000e+00e			
5306 *	vol	1.9000e-02e			
5307 *	fa	1.9000e-02e			
5308 *	kfac	0.0000e+00e			
5309 *	rkfac	0.0000e+00e			
5310 *	grav	0.0000e+00e			
5311 *	hd	1.5600e-01	5.1000e-02e		
5312 *	icflg	0	1e		
5313 *	nff	-1	1e		
5314 *	alp	1.0000e+00e			
5315 *	vl	0.0000e+00e			
5316 *	vv	0.0000e+00e			
5317 *	tl	6.1800e+02e			
5318 *	tv	6.1800e+02e			
5319 *	p	1.5500e+07e			
5320 *	pa	0.0000e+00e			
5321 *	qppp	0.0000e+00e			
5322 *	matid	9e			
5323 *	tw	6.1800e+02e			
5324 *	conc	0.0000e+00e			
5325 *	vtb1	r02 0.0000e+00	2.0000e+00	1.0000e+00e	
5326 *					
5327	*****				
5328	***** type	num	id	ctitle	
5329	valve	46	46	\$46\$ prizer srv	
5330 *	ncells	nodes	jun1	jun2	epsw
5331	1	1	46	48	0.0000e+00
5332 *	ichf	iconc	ivty	ivps	nvtb2
5333	1	1	3	2	0
5334 *	ivtr	ivsv	nvtb1	nvsv	nvrif
5335	460	1	-2	0	0
5336 *	iqp3tr	iqp3sv	nqp3tb	nqp3sv	nqp3rf
5337	0	0	0	0	0
5338 *	ivtrov	ivtyov			
5339	0	0			
5340 *	rvmx	rvov	fminov	fmaxov	
5341	5.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	


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5342 *      radin      th      houtl      houtv      toutl
5343      1.0000e-01    1.0000e-02    0.0000e+00    0.0000e+00    3.0000e+02
5344 *      toutv      avlve      hvlve      favlve      xpos
5345      3.0000e+02    3.6800e-03    6.8500e-02    0.0000e+00    0.0000e+00
5346 *      qp3in      qp3off      rqp3mx      qp3scl
5347      0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
5348 *
5349 * dx      *      1.0000e+00e
5350 * vol      *      3.9000e-02e
5351 * fa      *      3.9000e-02    3.6800e-03e
5352 * kfacs * f      0.0000e+00e
5353 * rkfac * f      0.0000e+00e
5354 * grav * f      0.0000e+00e
5355 * hd      *      2.2300e-01    6.8500e-02e
5356 * icflg *      0      1e
5357 * nff * f      1e
5358 * alp *      1.0000e+00e
5359 * vl * f      0.0000e+00e
5360 * vv * f      0.0000e+00e
5361 * tl *      6.1800e+02e
5362 * tv *      6.1800e+02e
5363 * p *      1.5500e+07e
5364 * pa *      0.0000e+00e
5365 * qppp *      0.0000e+00e
5366 * matid *      9e
5367 * tw *      6.1800e+02e
5368 * conc *      0.0000e+00e
5369 * vtbl * r02 0.0000e+00r02 1.0000e+00e
5370 *
5371 *****
5372 *****      type      num      id      ctitle
5373 break      47      47 $47$ prizer porv boundary
5374 *      jun1      108      ibty      isat      ioff
5375      47      0      0      1
5376 *      dxin      volin      alpin      tin      pin
5377      1.0000e+00    2.9210e-01    1.0000e+00    3.7316e+02    1.0135e+05
5378 *      pain      concin      rbmx      poff      belv
5379      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
5380 *
5381 *****
5382 *****      type      num      id      ctitle
5383 break      48      48 $48$ prizer srv boundary
5384 *      jun1      ibty      isat      ioff
5385      48      0      0      1
5386 *      dxin      volin      alpin      tin      pin
5387      1.0000e+00    2.9210e-01    1.0000e+00    3.7316e+02    1.0135e+05
5388 *      pain      concin      rbmx      poff      belv
5389      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
5390 *

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5391 *****
5392 *****      type          num          id          ctitle
5393 fill          49          49 $49$ acc-1 bc
5394 *            jun1          ifty          ioff
5395             49             2 ← 109          0
5396 *            twtold          rfmix          concin          felv
5397      0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
5398 *            dxin          volin          alpin          vlin          tlin
5399      1.0000e+00      5.0870e-02      0.0000e+00      0.0000e+00      5.4800e+02
5400 *            pin          pain          flowin          vvin          tvin
5401      5.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4800e+02
5402 *
5403 *****
5404 *****      type          num          id          ctitle
5405 pipe          50          50 $50$ accumulator 1
5406 *            ncells          nodes          jun1          jun2          epsw
5407             5             1 ← 111          49          52          1.0000e-04
5408 *            ichf          iconc          iacc          ipow
5409             0             1             1 ← 110          0
5410 *            iqp3tr          iqp3sv          nqp3tb          nqp3sv          nqp3rf
5411             0             0             0             0             0
5412 *            radin ← 111          th          hout1          houtv ← 111          but1
5413      1.4890e+00      3.4900e-02      0.0000e+00      5.0000e+00      3.0000e+02
5414 *            toutv          powin          powoff          rpowmx          powsc1
5415      3.2200e+02      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5416 *            qp3in          qp3off          rqp3mx          qp3sc1
5417      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5418 *
5419 * dx      *      1.48907e+0r02 1.4478e+00r02 7.44535e-1e
5420 * vol      *      6.90931e00r02 1.00808e10      4.79015e00      2.15916e00e
5421 * fa      *      5.0870e-02r03 6.96594e00      5.22446e00      5.0870e-02e
5422 * kfacc * f      0.0000e+00e
5423 * rkfac * f      0.0000e+00e
5424 * grav * f      -1.0000e+00e
5425 * hd      *      2.5451e-01r03 2.97814e00      2.57947e00      2.5451e-01e
5426 * icflg * f          0e
5427 * nff      * f          -1e
5428 * alp      *      1.0000e+00      5.0843e-01r03 0.0000e+00e
5429 * vl      * f      0.0000e+00e
5430 * vv      * f      0.0000e+00e
5431 * tl      * f      3.2200e+02e
5432 * tv      * f      3.2200e+02e
5433 * p      * f      4.4471e+06e
5434 * pa      * r02 4.43542e06r03 0.0000e+00e
5435 * qppp * f      0.0000e+00e
5436 * matid * f          7e ← 111
5437 * tw      * f      3.2200e+02e
5438 * conc * f      0.0000e+00e
5439 *

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5440 *****
5441 *****      type              num              id              ctitle
5442 valve              52              52 $52$ acc-1 check valve
5443 *      ncells              nodes              jun1              jun2              epsw
5444      7              1              52              54      1.0000e-05
5445 *      ichf              iconc              ivty              ivps              nvtb2
5446      0              1              3              3              0
5447 *      ivtr              ivsv              nvtb1              nvsv              nvrfr
5448      520              1              -2              0              0
5449 *      iqp3tr              iqp3sv              nqp3tb              nqp3sv              nqp3rf
5450      0              0              0              0              0
5451 *      ivtrov              ivtyov
5452      0              0
5453 *      rvmx              rvov              fminov              fmaxov
5454      1.0000e+10      1.0000e+10      0.0000e+00      1.0000e+00
5455 *      radin              th              hout1              houtv              tout1
5456      8.6500e-02      2.3000e-02      0.0000e+00      0.0000e+00      3.0000e+02
5457 *      toutv              avlve              hvlve              favlve              xpos
5458      3.0000e+02      5.0870e-02      2.5451e-01      0.0000e+00      0.0000e+00
5459 *      qp3in              qp3off              rqp3mx              qp3scl
5460      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5461 *
5462 * dx      *      1.04242e00      1.96901e00r02      3.1090e+00r03      4.6390e+00e
5463 * vol      *      5.3030e-02      1.0016e-01r02      1.2033e-01r03      1.7953e-01e
5464 * fa      * r03      5.0870e-02r05      3.8700e-02e
5465 * kfac      * f      0.0000e+00e
5466 * rkfac      * r02      0.0000e+00      1.0000e+20r05      0.0000e+00e
5467 * grav      * r02-1.0000e+00      0.0000e+00      1.0000e+00r04      0.0000e+00e
5468 * hd      * r03      2.5451e-01r05      2.2225e-01e
5469 * icflg      * f      0e
5470 * nff      * r07      -1              1e
5471 * alp      * f      0.0000e+00e
5472 * vl      * f      0.0000e+00e
5473 * vv      * f      0.0000e+00e
5474 * tl      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5475 * tl      * e
5476 * tv      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5477 * tv      * e
5478 * p      * r02      4.4471e+06r05      1.5500e+07e
5479 * pa      * f      0.0000e+00e
5480 * qppp      * f      0.0000e+00e
5481 * matid      * f      7e
5482 * tw      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5483 * tw      * e
5484 * conc      * f      0.0000e+00e
5485 * vtb1      * r02      0.0000e+00      1.0000e-01      1.0000e+00e      ← 112
5486 *
5487 *****

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id	ctitle	num	type
5488	*****	54	tee
5489	\$54\$ accum/hpsi tee 1	54	tee
5490	cost	nodes	jcell
5491	0.0000e+00	1	1
5492	ipow1	ncell1	iconc1
5493	0	1	1
5494	nqprf1	iqpsv1	iqptr1
5495	0	0	0
5496	tout11	th1	radin1
5497	0.0000e+00	2.5400e-02	1.1113e-01
5498	0.0000e+00	0.0000e+00	toutv1
5499	0.0000e+00	0.0000e+00	0.0000e+00
5500	qpscl1	qpoff1	qpini1
5501	0.0000e+00	0.0000e+00	0.0000e+00
5502	ipow2	ncell2	iconc2
5503	0	1	1
5504	nqprf2	iqpsv2	iqptr2
5505	0	0	0
5506	tout12	th2	radin2
5507	0.0000e+00	8.7100e-03	2.1450e-02
5508	0.0000e+00	0.0000e+00	toutv2
5509	0.0000e+00	0.0000e+00	0.0000e+00
5510	qpscl2	qpoff2	qpini2
5511	0.0000e+00	0.0000e+00	0.0000e+00
5512			
5513		2.2860e+00e	* dx *
5514		8.8468e-02e	* vol *
5515		3.8700e-02e	* fa * f
5516		0.0000e+00e	* kfacs * f
5517		0.0000e+00e	* rkfac * f
5518		0.0000e+00e	* grav * f
5519		2.2225e-01e	* hd * f
5520		0e	* icflg * f
5521	1e	1	* nff *
5522		0.0000e+00e	* alp *
5523		0.0000e+00e	* vl * f
5524		0.0000e+00e	* vv * f
5525		5.5000e+02e	* tl *
5526		5.5000e+02e	* tv *
5527		1.5500e+07e	* p *
5528		0.0000e+00e	* pa *
5529		0.0000e+00e	* qppp *
5530		7e	* matid *
5531		5.5000e+02e	* tw *
5532		0.0000e+00e	* conc *
5533			*
5534		6.1889e+00e	* dx *
5535		8.9464e-03e	* vol *
5536		1.4456e-03e	* fa * f

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5537 * kfac *      5.0000e-01    0.0000e+00e
5538 * rkfac *     5.0000e-01    0.0000e+00e
5539 * grav * f     0.0000e+00e
5540 * hd * f       4.2900e-02e
5541 * icflg * f           0e
5542 * nff * f           1e
5543 * alp *        0.0000e+00e
5544 * vl * f       0.0000e+00e
5545 * vv * f       0.0000e+00e
5546 * tl *        5.5000e+02e
5547 * tv *        5.5000e+02e
5548 * p *         1.5500e+07e
5549 * pa *        0.0000e+00e
5550 * qppp *       0.0000e+00e
5551 * matid *           7e
5552 * tw *        5.5000e+02e
5553 * conc *       0.0000e+00e
5554 *
5555 *****
5556 *****      type          num          id          ctitle
5557 fill                    56          56 $56$ hpsi fill 1
5558 *          jun1          ifty          ioff
5559          56              8              2
5560 *          iftr          ifsv          nftb          nfsv          nfrf
5561          21              171           11              0              0
5562 *          twtold          rfmix          concin          felv
5563          0.0000e+00          1.0000e+10          0.0000e+00          0.0000e+00
5564 *          dxin          volin          alpin          vlin          tlin
5565          1.0000e+00          1.0000e+00          0.0000e+00          0.0000e+00          3.0000e+02
5566 *          pin          pain          flowin          vvin          tvin
5567          7.0000e+06          0.0000e+00          0.0000e+00          0.0000e+00          3.0000e+02
5568 *          flwoff          vloff          vvoff          alpoft
5569          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
5570 *          vmscl          vvscl
5571          2.4700e-01          2.4700e-01
5572 *
5573 * vmtb *          1.0100e+05          6.6000e+01          1.4800e+06          6.1000e+01          2.8590e+06
5574 * vmtb *          5.5800e+01          4.2380e+06          5.0100e+01          5.6170e+06          4.3500e+01
5575 * vmtb *          6.9960e+06          3.6100e+01          7.6860e+06          3.1800e+01          8.3750e+06
5576 * vmtb *          2.6500e+01          9.0650e+06          2.0400e+01          9.7540e+06          1.1300e+01
5577 * vmtb *          1.0168e+07          0.0000e+00e
5578 *
5579 *****
5580 *****      type          num          id          ctitle
5581 fill                    59          59 $59$ acc-2 bc
5582 *          jun1          ifty          ioff
5583          59              2              0
5584 *          twtold          rfmix          concin          felv
5585          0.0000e+00          1.0000e+20          0.0000e+00          0.0000e+00

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5586 *          dxin          volin          alpin          vlin          tlin
5587      1.0000e+00      5.0870e-02      0.0000e+00      0.0000e+00      5.4800e+02
5588 *          pin          pain          flowin          vvin          tvin
5589      5.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4800e+02
5590 *
5591 *****
5592 *****      type          num          id          ctitle
5593 pipe          60          60 $60$ accumulator 2
5594 *          ncells          nodes          jun1          jun2          epsw
5595      5          1          59          62      1.0000e-04
5596 *          ichf          iconc          iacc          ipow
5597      0          1          1          0
5598 *          iqp3tr          iqp3sv          nqp3tb          nqp3sv          nqp3rf
5599      0          0          0          0          0
5600 *          radin          th          hout1          houtv          tout1
5601      1.4890e+00      3.4900e-02      0.0000e+00      5.0000e+00      3.0000e+02
5602 *          toutv          powin          powoff          rpownmx          powsc1
5603      3.2200e+02      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5604 *          qp3in          qp3off          rqp3mx          qp3sc1
5605      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5606 *
5607 * dx      *      1.48907e+0r02 1.4478e+00r02 7.44535e-1e
5608 * vol      *      6.90931e00r02 1.00808e10 4.79015e00 2.15916e00e
5609 * fa      *      5.0870e-02r03 6.96594e00 5.22446e00 5.0870e-02e
5610 * kfacs * f      0.0000e+00e
5611 * rkfac * f      0.0000e+00e
5612 * grav * f      -1.0000e+00e
5613 * hd      *      2.5451e-01r03 2.97814e00 2.57947e00 2.5451e-01e
5614 * icflg * f      0e
5615 * nff      * f      -1e
5616 * alp      *      1.0000e+00 5.0843e-01r03 0.0000e+00e
5617 * vl      * f      0.0000e+00e
5618 * vv      * f      0.0000e+00e
5619 * tl      * f      3.2200e+02e
5620 * tv      * f      3.2200e+02e
5621 * p      * f      4.4471e+06e
5622 * pa      * r02 4.43542e06r03 0.0000e+00e
5623 * qppp * f      0.0000e+00e
5624 * matid * f      7e
5625 * tw      * f      3.2200e+02e
5626 * conc * f      0.0000e+00e
5627 *
5628 *****
5629 *****      type          num          id          ctitle
5630 valve          62          62 $62$ acc-2 check valve
5631 *          ncells          nodes          jun1          jun2          epsw
5632      7          1          62          64      1.0000e-05
5633 *          ichf          iconc          ivty          ivps          nvth2
5634      0          1          3          3          0

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5635 *      ivtr      ivsv      nvtb1      nvsv      nvrf
5636      620      1      -2      0      0
5637 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
5638      0      0      0      0      0
5639 *      ivtrov      ivtyov
5640      0      0
5641 *      rvmx      rvov      fminov      fmaxov
5642      1.0000e+10      1.0000e+10      0.0000e+00      1.0000e+00
5643 *      radin      th      houtl      houtv      toutl
5644      8.6500e-02      2.3000e-02      0.0000e+00      0.0000e+00      3.0000e+02
5645 *      toutv      avlve      hvlve      favlve      xpos
5646      3.0000e+02      5.0870e-02      2.5451e-01      0.0000e+00      0.0000e+00
5647 *      qp3in      qp3off      rqp3mx      qp3scl
5648      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5649 *
5650 * dx      *      1.04242e00      1.96901e00r02      3.1090e+00r03      3.3500e+00e
5651 * vol      *      5.3030e-02      1.0016e-01r02      1.2033e-01r03      1.2964e-01e
5652 * fa      * r03      5.0870e-02r05      3.8700e-02e
5653 * kfacc      * f      0.0000e+00e
5654 * rkfac      * r02      0.0000e+00      1.0000e+20r05      0.0000e+00e
5655 * grav      * r02      -1.0000e+00      0.0000e+00      1.0000e+00r04      0.0000e+00e
5656 * hd      * r03      2.5451e-01r05      2.2225e-01e
5657 * icflg      * f      0e
5658 * nff      * r07      -1      1e
5659 * alp      * f      0.0000e+00e
5660 * vl      * f      0.0000e+00e
5661 * vv      * f      0.0000e+00e
5662 * tl      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5663 * tl      * e
5664 * tv      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5665 * tv      * e
5666 * p      * r02      4.4471e+06r05      1.5500e+07e
5667 * pa      * f      0.0000e+00e
5668 * qppp      * f      0.0000e+00e
5669 * matid      * f      7e
5670 * tw      * r03      3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5671 * tw      * e
5672 * conc      * f      0.0000e+00e
5673 * vtb1      * r02      0.0000e+00      1.0000e-01      1.0000e+00e
5674 *
5675 *****
5676 *****      type      num      id      ctitle
5677 tee      64      64      $64$ accum/hpsi tee 2
5678 *      jcell      nodes      ichf      cost      epsw
5679      1      1      1      0.0000e+00      0.0000e+00
5680 *      iconcl      ncell1      jun1      jun2      ipow1
5681      1      1      64      68      0
5682 *      iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
5683      0      0      0      0      0

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5684 *	radin1	th1	hout11	houtv1	tout11
5685	1.1113e-01	2.5400e-02	0.0000e+00	0.0000e+00	0.0000e+00
5686 *	toutv1				
5687	0.0000e+00				
5688 *	qp1n1	qpoff1	rqpmx1	qpscl1	
5689	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
5690 *	iconc2	ncell2	jun3	ipow2	
5691	1	1	66	0	
5692 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
5693	0	0	0	0	0
5694 *	radin2	th2	hout12	houtv2	tout12
5695	2.1450e-02	8.7100e-03	0.0000e+00	0.0000e+00	0.0000e+00
5696 *	toutv2				
5697	0.0000e+00				
5698 *	qp1n2	qpoff2	rqpmx2	qpscl2	
5699	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
5700 *					
5701 * dx *	2.2860e+00e				
5702 * vol *	8.8468e-02e				
5703 * fa * f	3.8700e-02e				
5704 * kfac * f	0.0000e+00e				
5705 * rkfac * f	0.0000e+00e				
5706 * grav * f	0.0000e+00e				
5707 * hd * f	2.2225e-01e				
5708 * icflg * f	0e				
5709 * nff *	1	1e			
5710 * alp *	0.0000e+00e				
5711 * vl * f	0.0000e+00e				
5712 * vv * f	0.0000e+00e				
5713 * tl *	5.5000e+02e				
5714 * tv *	5.5000e+02e				
5715 * p *	1.5500e+07e				
5716 * pa *	0.0000e+00e				
5717 * qppp *	0.0000e+00e				
5718 * matid *	7e				
5719 * tw *	5.5000e+02e				
5720 * conc *	0.0000e+00e				
5721 *					
5722 * dx *	6.1889e+00e				
5723 * vol *	8.9464e-03e				
5724 * fa * f	1.4456e-03e				
5725 * kfac *	5.0000e-01	0.0000e+00e			
5726 * rkfac *	5.0000e-01	0.0000e+00e			
5727 * grav * f	0.0000e+00e				
5728 * hd * f	4.2900e-02e				
5729 * icflg * f	0e				
5730 * nff * f	1e				
5731 * alp *	0.0000e+00e				
5732 * vl * f	0.0000e+00e				
5733 * vv * f	0.0000e+00e				


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5734 * t1      *      5.5000e+02e
5735 * tv      *      5.5000e+02e
5736 * p       *      1.5500e+07e
5737 * pa      *      0.0000e+00e
5738 * qppp    *      0.0000e+00e
5739 * matid   *          7e
5740 * tw      *      5.5000e+02e
5741 * conc    *      0.0000e+00e
5742 *
5743 *****
5744 *****      type          num          id          ctitle
5745 fill                66                66 $66$ hpsi fill 2
5746 *          jun1      ifty          ioff
5747          66          8          2
5748 *          iftr      ifsv          nftb          nfsv          nfrf
5749          21          271          11          0          0
5750 *          twtold      rfmix          concin          felv
5751          0.0000e+00      1.0000e+10      0.0000e+00      0.0000e+00
5752 *          dxin      volin          alpin          vlin          tlin
5753          1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
5754 *          pin      pain          flowin          vvin          tvin
5755          7.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
5756 *          flwoff      vloff          vvoff          alpoff
5757          0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
5758 *          vmscl      vvscl
5759          3.1600e-01      3.1600e-01
5760 *
5761 * vmtb *      1.0100e+05      6.6000e+01      1.4800e+06      6.1000e+01      2.8590e+06
5762 * vmtb *      5.5800e+01      4.2380e+06      5.0100e+01      5.6170e+06      4.3500e+01
5763 * vmtb *      6.9960e+06      3.6100e+01      7.6860e+06      3.1800e+01      8.3750e+06
5764 * vmtb *      2.6500e+01      9.0650e+06      2.0400e+01      9.7540e+06      1.1300e+01
5765 * vmtb *      1.0168e+07      0.0000e+00e
5766 *
5767 *****
5768 *****      type          num          id          ctitle
5769 fill                69                69 $69$ acc-3 bc
5770 *          jun1      ifty          ioff
5771          69          2          0
5772 *          twtold      rfmix          concin          felv
5773          0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
5774 *          dxin      volin          alpin          vlin          tlin
5775          1.0000e+00      5.0870e-02      0.0000e+00      0.0000e+00      5.4800e+02
5776 *          pin      pain          flowin          vvin          tvin
5777          5.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4800e+02
5778 *
5779 *****
5780 *****      type          num          id          ctitle
5781 pipe                70                70 $70$ accumulator 3
5782 *          ncells      nodes          jun1          jun2          epsw
5783          5          1          69          72          1.0000e-04

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5784 *      ichf      iconc      iacc      ipow
5785          0          1          1          0
5786 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
5787          0          0          0          0          0
5788 *      radin      th      houtl      houtv      toutl
5789      1.4890e+00      3.4900e-02      0.0000e+00      5.0000e+00      3.0000e+02
5790 *      toutv      powin      powoff      rpowmx      powsc1
5791      3.2200e+02      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5792 *      qp3in      qp3off      rqp3mx      qp3sc1
5793      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5794 *
5795 * dx *      1.48907e+0r02 1.4478e+00r02 7.44535e-1e
5796 * vol *      6.90931e00r02 1.00808e10      4.79015e00      2.15916e00e
5797 * fa *      5.0870e-02r03 6.96594e00      5.22446e00      5.0870e-02e
5798 * kfacs * f 0.0000e+00e
5799 * rkfac * f 0.0000e+00e
5800 * grav * f -1.0000e+00e
5801 * hd *      2.5451e-01r03 2.97814e00      2.57947e00      2.5451e-01e
5802 * icflg * f      0e
5803 * nff * f      -1e
5804 * alp *      1.0000e+00      5.0843e-01r03 0.0000e+00e
5805 * vl * f 0.0000e+00e
5806 * vv * f 0.0000e+00e
5807 * tl * f 3.2200e+02e
5808 * tv * f 3.2200e+02e
5809 * p * f 4.4471e+06e
5810 * pa * r02 4.43542e06r03 0.0000e+00e
5811 * qppp * f 0.0000e+00e
5812 * matid * f      7e
5813 * tw * f 3.2200e+02e
5814 * conc * f 0.0000e+00e
5815 *
5816 *****
5817 *****      type      num      id      ctitle
5818 valve      72      72 $72$ acc-3 check valve
5819 *      ncells      nodes      jun1      jun2      epsw
5820          7          1          72          74      1.0000e-05
5821 *      ichf      iconc      ivty      ivps      nvtb2
5822          0          1          3          3          0
5823 *      ivtr      ivsv      nvtb1      nvsv      nvrf
5824          720          1          -2          0          0
5825 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
5826          0          0          0          0          0
5827 *      ivtrov      ivtyov
5828          0          0
5829 *      rvmx      rvov      fminov      fmaxov
5830      1.0000e+10      1.0000e+10      0.0000e+00      1.0000e+00
5831 *      radin      th      houtl      houtv      toutl
5832      8.6500e-02      2.3000e-02      0.0000e+00      0.0000e+00      3.0000e+02

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5833 *          toutv          avlve          hvlve          favlve          xpos
5834      3.0000e+02      5.0870e-02      2.5451e-01      0.0000e+00      0.0000e+00
5835 *          qp3in          qp3off          rqp3mx          qp3scl
5836      0.0000e+00      0.0000e+00      1.0000e+20      1.0000e+00
5837 *
5838 * dx      *          1.04242e00      1.96901e00r02 3.1090e+00r03 4.0630e+00e
5839 * vol      *          5.3030e-02      1.0016e-01r02 1.2033e-01r03 1.5725e-01e
5840 * fa      * r03 5.0870e-02r05 3.8700e-02e
5841 * kfacs   * f      0.0000e+00e
5842 * rkfac   * r02 0.0000e+00      1.0000e+20r05 0.0000e+00e
5843 * grav    * r02-1.0000e+00      0.0000e+00      1.0000e+00r04 0.0000e+00e
5844 * hd      * r03 2.5451e-01r05 2.2225e-01e
5845 * icflg   * f          0e
5846 * nff     * r07          -1          1e
5847 * alp     * f      0.0000e+00e
5848 * vl      * f      0.0000e+00e
5849 * vv      * f      0.0000e+00e
5850 * tl      * r03 3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5851 * tl      * e
5852 * tv      * r03 3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5853 * tv      * e
5854 * p       * r02 4.4471e+06r05 1.5500e+07e
5855 * pa      * f      0.0000e+00e
5856 * qppp    * f      0.0000e+00e
5857 * matid   * f          7e
5858 * tw      * r03 3.2200e+02      3.5000e+02      3.7900e+02      4.3600e+02      4.9300e+02
5859 * tw      * e
5860 * conc    * f      0.0000e+00e
5861 * vtbl    * r02 0.0000e+00      1.0000e-01      1.0000e+00e
5862 *
5863 *****
5864 *****      type          num          id          ctitle
5865 tee          74          74 $74$ accum/hpsi tee 3
5866 *          jcell          nodes          ichf          cost          epsw
5867      1          1          1      0.0000e+00      0.0000e+00
5868 *          iconc1          ncell1          jun1          jun2          ipow1
5869      1          1          74          78          0
5870 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
5871      0          0          0          0          0
5872 *          radin1          th1          hout11          houtv1          tout11
5873      1.1113e-01      2.5400e-02      0.0000e+00      0.0000e+00      0.0000e+00
5874 *          toutv1
5875      0.0000e+00
5876 *          qp1n1          qpoff1          rqpwx1          qp1scl1
5877      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
5878 *          iconc2          ncell2          jun3          ipow2
5879      1          1          76          0
5880 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
5881      0          0          0          0          0

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	radin2	th2	hout12	houtv2	tout12
5882 *					
5883	2.1450e-02	8.7100e-03	0.0000e+00	0.0000e+00	0.0000e+00
5884 *					
5885	0.0000e+00				
5886 *	qp1n2	qpoff2	rqpmx2	qpocl2	
5887	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
5888 *					
5889 * dx *	2.2860e+00e				
5890 * vol *	8.8468e-02e				
5891 * fa * f	3.8700e-02e				
5892 * kfacc * f	0.0000e+00e				
5893 * rkfac * f	0.0000e+00e				
5894 * grav * f	0.0000e+00e				
5895 * hd * f	2.2225e-01e				
5896 * icflg * f	0e				
5897 * nff *	1	1e			
5898 * alp *	0.0000e+00e				
5899 * vl * f	0.0000e+00e				
5900 * vv * f	0.0000e+00e				
5901 * tl *	5.5000e+02e				
5902 * tv *	5.5000e+02e				
5903 * p *	1.5500e+07e				
5904 * pa *	0.0000e+00e				
5905 * qppp *	0.0000e+00e				
5906 * matid *	7e				
5907 * tw *	5.5000e+02e				
5908 * conc *	0.0000e+00e				
5909 *					
5910 * dx *	6.1889e+00e				
5911 * vol *	8.9464e-03e				
5912 * fa * f	1.4456e-03e				
5913 * kfacc *	5.0000e-01	0.0000e+00e			
5914 * rkfac *	5.0000e-01	0.0000e+00e			
5915 * grav * f	0.0000e+00e				
5916 * hd * f	4.2900e-02e				
5917 * icflg * f	0e				
5918 * nff * f	1e				
5919 * alp *	0.0000e+00e				
5920 * vl * f	0.0000e+00e				
5921 * vv * f	0.0000e+00e				
5922 * tl *	5.5000e+02e				
5923 * tv *	5.5000e+02e				
5924 * p *	1.5500e+07e				
5925 * pa *	0.0000e+00e				
5926 * qppp *	0.0000e+00e				
5927 * matid *	7e				
5928 * tw *	5.5000e+02e				
5929 * conc *	0.0000e+00e				
5930 *					
5931	*****				

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5932 ***** type          num          id          ctitle
5933 fill                76          76 $76$ hpsi fill 3
5934 *          jun1        ifty        ioff
5935          76                8                2
5936 *          iftr        ifsv        nftb        nfsv        nfrf
5937          21                371        11                0                0
5938 *          twtold        rfmix        concin        felv
5939          0.0000e+00        1.0000e+10        0.0000e+00        0.0000e+00
5940 *          dxin        volin        alpin        vlin        tlin
5941          1.0000e+00        1.0000e+00        0.0000e+00        0.0000e+00        3.0000e+02
5942 *          pin        pain        flowin        vvin        tvin
5943          7.0000e+06        0.0000e+00        0.0000e+00        0.0000e+00        3.0000e+02
5944 *          flwoff        vloff        vvoff        alpoff
5945          0.0000e+00        0.0000e+00        0.0000e+00        0.0000e+00
5946 *          vmscl        vvscl
5947          4.3700e-01        4.3700e-01
5948 *
5949 * vmtb *          1.0100e+05        6.6000e+01        1.4800e+06        6.1000e+01        2.8590e+06
5950 * vmtb *          5.5800e+01        4.2380e+06        5.0100e+01        5.6170e+06        4.3500e+01
5951 * vmtb *          6.9960e+06        3.6100e+01        7.6860e+06        3.1800e+01        8.3750e+06
5952 * vmtb *          2.6500e+01        9.0650e+06        2.0400e+01        9.7540e+06        1.1300e+01
5953 * vmtb *          1.0168e+07        0.0000e+00e
5954 *
5955 *****
5956 ***** type          num          id          ctitle
5957 fill                91          91 $91$ cvcs 1 (letdown flow)
5958 *          jun1        ifty        ioff
5959          91                5                0
5960 *          iftr        ifsv        nftb        nfsv        nfrf
5961          1                -414        2                0                0
5962 *          twtold        rfmix        concin        felv
5963          0.0000e+00        2.5750e+00        0.0000e+00        0.0000e+00
5964 *          dxin        volin        alpin        vlin        tlin
5965          1.0000e+00        1.0000e+00        0.0000e+00        0.0000e+00        5.5900e+02
5966 *          pin        pain        flowin        vvin        tvin
5967          1.5500e+07        0.0000e+00        0.0000e+00        0.0000e+00        5.5900e+02
5968 *          vmscl        vvscl
5969          5.0000e+00        1.0000e+00
5970 *
5971 * vmtb * r02 0.0000e+00        1.0000e+00        -2.5750e+00e
5972 *
5973 *****
5974 ***** type          num          id          ctitle
5975 fill                92          92 $92$ cvcs 2 (makeup flow)
5976 *          jun1        ifty        ioff
5977          92                5                0
5978 *          iftr        ifsv        nftb        nfsv        nfrf
5979          1                -414        2                0                0
5980 *          twtold        rfmix        concin        felv
5981          0.0000e+00        1.1289e+00        0.0000e+00        0.0000e+00

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5982 *      dxin      volin      alpin      vlin      tlin
5983      1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      5.2900e+02
5984 *      pin      pain      flowin      vvin      tvin
5985      1.5500e+07      0.0000e+00      0.0000e+00      0.0000e+00      5.2900e+02
5986 *      vmscl      vvscl
5987      2.0000e+00      1.0000e+00
5988 *
5989 * vmtb *      -1.0000e+00      1.1289e+01r02 0.0000e+00e
5990 *
5991 *****
5992 *****      type      num      id      ctitle
5993 fill      93      93 $93$ cvcs 3 (prizer sprayer)
5994 *      jun1      ifty      ioff
5995      93      5      0
5996 *      iftr      ifsv      nftb      nfsv      nfrf
5997      1      -434 ← 103 2      0      0
5998 *      twtold      rfmix      concin      felv
5999      0.0000e+00      2.8000e+00      0.0000e+00      0.0000e+00
6000 *      dxin      volin      alpin      vlin      tlin
6001      1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      5.5900e+02
6002 *      pin      pain      flowin      vvin      tvin
6003      1.5500e+07      0.0000e+00      0.0000e+00      0.0000e+00      5.5900e+02
6004 *      vmscl      vvscl
6005      1.0000e+00      1.0000e+00
6006 *
6007 * vmtb *      1.7237e+05      -5.0000e-02      5.1711e+05      -2.8260e+01e ← 103
6008 *
6009 *****
6010 *****      type      num      id      ctitle
6011 pipe      100      100 $100$ steam-gen boiler 1 ← 114
6012 *      ncells      nodes      jun1      jun2      epsw
6013      7      0      100      105      0.0000e+00
6014 *      ichf      iconc      iacc      ipow
6015      1      1      0      0
6016 *      radin      th      hout1      houtv      tout1
6017      1.4821e+00      9.5250e-03      0.0000e+00      0.0000e+00      3.0000e+02
6018 *      toutv      powin      powoff      rpownx      pownsl
6019      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6020 *
6021 * dx * f 1.3320e+00e
6022 * vol * r06 5.8490e+00 6.7440e+00e
6023 * fa * 2.8456e+00r06 4.3911e+00 4.2500e+00e
6024 * kfacs * 2.1500e+02r07 0.0000e+00e
6025 * rkfac * 1.0000e+03r07 0.0000e+00e
6026 * grav * 0.0000e+00r07 1.0000e+00e
6027 * hd * r07 9.1200e-03 3.2410e+00e
6028 * icflg * f 0e
6029 * nff * f 1e
6030 * alp * r05 0.0000e+00 5.0000e-01 1.0000e+00e
6031 * vl * f 0.0000e+00e

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6032 * vv      * f      0.0000e+00e
6033 * tl      * f      5.4211e+02e
6034 * tv      * f      5.4212e+02e
6035 * p       * f      5.4158e+06e
6036 * pa      * f      0.0000e+00e
6037 * conc    * f      0.0000e+00e
6038 *
6039 *****
6040 *****      type          num          id          ctitle
6041 tee                105          105 $105$ separator & dome 1
6042 *          jcell          nodes          ichf          cost          epsw
6043          6 ← 115          0          1          0.0000e+00          0.0000e+00
6044 *          iconc1          ncell1          jun1          jun2          ipow1
6045          1          8          105          190          0
6046 *          radin1          th1          hout11          houtv1          tout11
6047          6.5380e-01          9.5250e-03          0.0000e+00          0.0000e+00          3.0000e+02
6048 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
6049          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
6050 *          iconc2          ncell2          jun3          ipow2
6051          1          4          110          0
6052 *          radin2          th2          hout12          houtv2          tout12
6053          2.0193e+00          8.8900e-02          0.0000e+00          0.0000e+00          3.0000e+02
6054 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
6055          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
6056 *
6057 * main-cell arrays (separator region)
6058 * dx      *          1.2440e+00          1.1670e+00          1.0910e+00          1.0000e+00r03 3.3333e-01
6059 * dx      *          1.0000e+00e
6060 * vol     *          7.6460e+00r02 4.5570e+00          5.6630e+00r03 2.4353e+00          8.9610e+00
6061 * vol     * e
6062 * fa      *          4.2500e+00r03 4.0320e+00          5.5740e+00r02 7.3060e+00          6.9880e+00
6063 * fa      *          8.5590e+00e
6064 * kfacc  * f          0.0000e+00e
6065 * rkfac  * f          0.0000e+00e
6066 * grav   * r04 1.0000e+00r04 0.0000e+00          -1.0000e+00e
6067 * hd      *          3.2410e+00r03 1.3080e+00          2.6640e+00r02 2.8210e+00          2.9780e+00
6068 * hd      *          1.2070e+00e
6069 * icflg  * f          0e
6070 * nff     * f          1e
6071 * alp     * f          1.0000e+00e
6072 * vl      * f          0.0000e+00e
6073 * vv      * f          0.0000e+00e
6074 * tl      * f          5.4211e+02e
6075 * tv      * f          5.4212e+02e
6076 * p       * f          5.4158e+06e
6077 * pa      * f          0.0000e+00e
6078 * conc    * f          0.0000e+00e
6079 *
6080 * side-cell arrays (steam dome)
6081 * dx      *          1.0150e+00          9.3900e-01          7.0000e-01          2.3900e-01e

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6082 * vol      * r02 5.1080e+00      7.0000e+00      1.6220e+00e
6083 * fa       * r02 5.0325e+00      6.0000e+00      6.7866e+00      1.2897e-01e
6084 * kfacs    * r02 1.0000e-10r03 0.0000e+00e
6085 * rkfac     * r02 1.0000e-10r03 0.0000e+00e
6086 * grav      * f  1.0000e+00e
6087 * hd        *      4.3220e+00      3.4380e+00      2.0480e+00      1.0000e+00      6.0985e-01
6088 * hd        * e
6089 * icflg     * r04      0      1e
6090 * nff       * r04      1      -1e
6091 * alp       * f  1.0000e+00e
6092 * vl        * f  0.0000e+00e
6093 * vv        * f  0.0000e+00e
6094 * tl        * f  5.4211e+02e
6095 * tv        * f  5.4212e+02e
6096 * p         * f  5.4158e+06e
6097 * pa        * f  0.0000e+00e
6098 * conc      * f  0.0000e+00e
6099 *
6100 *****
6101 *****      type      num      id      ctitle
6102 tee          110      110 $110$ main steam line 1
6103 *           jcell      nodes      ichf      cost      epsw
6104           16          1          1      0.0000e+00      0.0000e+00
6105 *           iconcl      ncell1      jun1      jun2      ipow1
6106           1          16          110      120          0
6107 *           iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
6108           0          0          0          0          0
6109 *           radin1      th1      houtl1      houtv1      toutl1
6110      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6111 *           toutv1      pwin1      pwoff1      rpwmx1      pwsc11
6112      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6113 *           qp1n1      qpoff1      rqp1mx1      qp1sc11
6114      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6115 *           iconc2      ncell2      jun3      ipow2
6116           1          1          112          0
6117 *           iqptr2      iqpsv2      nqptb2      nqpsv2      nqprf2
6118           0          0          0          0          0
6119 *           radin2      th2      houtl2      houtv2      toutl2
6120      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6121 *           toutv2      pwin2      pwoff2      rpwmx2      pwsc12
6122      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6123 *           qp1n2      qpoff2      rqp1mx2      qp1sc12
6124      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6125 *
6126 * main-cell arrays (26-inch main steam line)
6127 * dx         *      2.2860e+00      5.0292e+00r03 4.4806e+00r10 4.5126e+00      2.2860e+00
6128 * dx         * e
6129 * vol        *      6.6775e-01      1.4733e+00r03 1.3088e+00r10 1.3181e+00      6.6775e-01
6130 * vol        * e

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6131 * fa      *      1.2897e-01    2.1054e-01    2.9210e-01    2.1091e-01    1.2972e-01
6132 * fa      *      2.1091e-01r11 2.9210e-01e
6133 * kfacs   * f      0.0000e+00e ← [117]
6134 * rkfac    * f      0.0000e+00e
6135 * grav     *      1.0000e+00    0.0000e+00r03-1.0000e+00r12 0.0000e+00e
6136 * hd       * f      6.0985e-01e
6137 * icflg    *      1r03          0          1r12          0e
6138 * nff      * r02      -1          1r03          1r11          1e
6139 * alp      * f      1.0000e+00e
6140 * vl       * f      0.0000e+00e
6141 * vv       * f      0.0000e+00e
6142 * tl       * f      5.4211e+02e
6143 * tv       * f      5.4212e+02e
6144 * p        * f      5.4158e+06e
6145 * pa       * f      0.0000e+00e
6146 * qppp     * f      0.0000e+00e
6147 * matid    *      9e
6148 * tw       * f      5.4211e+02e
6149 * conc     * f      0.0000e+00e
6150 *
6151 * side-cell arrays (relief-valves header)
6152 * dx        *      1.0000e+00e
6153 * vol       *      2.9210e-01e
6154 * fa        * f      2.9210e-01e
6155 * kfacs     *      1.0000e-10    0.0000e+00e
6156 * rkfac     *      1.0000e-10    0.0000e+00e
6157 * grav      * f      1.0000e+00e
6158 * hd        * f      6.0985e-01e
6159 * icflg     * f      0e
6160 * nff       * f      1e ← [118]
6161 * alp       *      1.0000e+00e
6162 * vl        * f      0.0000e+00e
6163 * vv        * f      0.0000e+00e
6164 * tl        *      5.4211e+02e
6165 * tv        *      5.4212e+02e
6166 * p         *      5.4158e+06e
6167 * pa        *      0.0000e+00e
6168 * qppp      *      0.0000e+00e
6169 * matid     *      9e
6170 * tw        *      5.4211e+02e
6171 * conc      *      0.0000e+00e
6172 *
6173 *****
6174 *****      type          num          id          ctitle
6175 tee          112          112 $112$ msl 1 porv/srv header
6176 *          jcell         nodes        ichf         cost          epsw
6177          1              1              1      0.0000e+00    0.0000e+00
6178 *          iconcl        ncell11       jun1          jun2          ipow1
6179          1              1              112          114              0

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6180 *	iqptr1	iqpsv1	nqptb1	nqpsv1	nqprf1
6181	0	0	0	0	0
6182 *	radin1	th1	houtl1	houtv1	toutl1
6183	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
6184 *	toutv1	pwin1	pwoff1	rpwmx1	pwscl1
6185	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
6186 *	qp1n1	qpoff1	rqpmx1	qpscl1	
6187	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
6188 *	iconc2	ncell2	jun3	ipow2	
6189	1	1	116	0	
6190 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
6191	0	0	0	0	0
6192 *	radin2	th2	houtl2	houtv2	toutl2
6193	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
6194 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
6195	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
6196 *	qp1n2	qpoff2	rqpmx2	qpscl2	
6197	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
6198 *					
6199 *	main-cell arrays (header inlet to srv outlet)				
6200 *	dx	*	1.0000e+00e		
6201 *	vol	*	2.9210e-01e		
6202 *	fa	* f	2.9210e-01e		
6203 *	kfac	* f	0.0000e+00e		
6204 *	rkfac	* f	0.0000e+00e		
6205 *	grav	* f	1.0000e+00e		
6206 *	hd	* f	6.0985e-01e		
6207 *	icflg	* f	0e		
6208 *	nff	* f	1e		
6209 *	alp	*	1.0000e+00e		
6210 *	vl	* f	0.0000e+00e		
6211 *	vv	* f	0.0000e+00e		
6212 *	tl	*	5.4211e+02e		
6213 *	tv	*	5.4212e+02e		
6214 *	p	*	5.4158e+06e		
6215 *	pa	*	0.0000e+00e		
6216 *	qppp	*	0.0000e+00e		
6217 *	matid	*	9e		
6218 *	tw	*	5.4211e+02e		
6219 *	conc	*	0.0000e+00e		
6220 *					
6221 *	side-cell arrays (header outlet to porv)				
6222 *	dx	*	1.0000e+00e		
6223 *	vol	*	2.9210e-01e		
6224 *	fa	* f	2.9210e-01e		
6225 *	kfac	*	1.0000e-10	0.0000e+00e	
6226 *	rkfac	*	1.0000e-10	0.0000e+00e	
6227 *	grav	* f	0.0000e+00e		
6228 *	hd	* f	6.0985e-01e		
6229 *	icflg	* f	0e		

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6230 * nff      * f      1e
6231 * alp      *      1.0000e+00e
6232 * vl       * f      0.0000e+00e
6233 * vv       * f      0.0000e+00e
6234 * tl       *      5.4211e+02e
6235 * tv       *      5.4212e+02e
6236 * p        *      5.4158e+06e
6237 * pa       *      0.0000e+00e
6238 * qppp     *      0.0000e+00e
6239 * matid    *      9e
6240 * tw       *      5.4211e+02e
6241 * conc     *      0.0000e+00e
6242 *
6243 *****
6244 *****      type          num          id          ctitle
6245 fill                114          114 $114$ msl 1 srv ← 119
6246 *                jun1          ifty          ioff
6247 *                114                5                0
6248 *                iftr 120          ifsv          nftb          nfsv          nfrf
6249 *                0                1121          9                0                0
6250 *                twtold          rfmix          concin          felv
6251 *                0.0000e+00      1.0000e+10      0.0000e+00      0.0000e+00
6252 *                dxin          volin          alpin          vlin          tlin
6253 *                1.0000e+00      2.9210e-01      1.0000e+00      0.0000e+00      5.4211e+02
6254 *                pin          pain          flowin          vvin          tvin
6255 *                5.4158e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4212e+02
6256 *                vmscl          vvscl
6257 *                1.0000e+00      1.0000e+00 120
6258 *
6259 * vmtb *      7.5500e+06      0.0000e+00      7.5800e+06      -5.8300e+01      7.6900e+06
6260 * vmtb *      -6.3000e+01      7.7200e+06      -1.2490e+02      7.8200e+06      -1.4730e+02
6261 * vmtb *      7.8600e+06      -2.3920e+02      .9200e+06      -2.4550e+02      7.9600e+06
6262 * vmtb *      -3.5610e+02      8.2000e+06      -4.3200e+02e
6263 *
6264 *****
6265 *****      type          num          id          ctitle
6266 valve                116          116 $116$ msl 1 porv
6267 *                ncells          nodes          jun1          jun2          epsw
6268 *                1                1                116          122 118      0.0000e+00
6269 *                ichf          iconc          ivty          ivps          nvtb2
6270 *                1                1                1          121          0
6271 *                ivtr          ivsv          nvtb1          nvsv          nvrf
6272 *                0                -1162      121          0                0
6273 *                iqp3tr          iqp3sv          nqp3tb          nqp3sv          nqp3rf
6274 *                0                0                0                0                0
6275 *                ivtrov          ivtyov
6276 *                0                0
6277 *                rvmx 121          vov          fminov          fmaxov
6278 *                5.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00

```

6279 *	radin	th	houtl	houtv	toutl
6280	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
6281 *	toutv	avlve	hvlve	favlve	xpos
6282	3.0000e+02	4.1484e-03	1.5240e-01	0.0000e+00	0.0000e+00
6283 *	qp3in	qp3off	rqp3mx	qp3scl	
6284	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
6285 *					
6286 * dx	*	1.0000e+00e			
6287 * vol	*	2.9210e-01e			
6288 * fa	* f	2.9210e-01e			
6289 * kfac	* f	0.0000e+00e			
6290 * rkfac	* f	0.0000e+00e			
6291 * grav	* f	0.0000e+00e			
6292 * hd	* f	6.0985e-01e			
6293 * icflg	*	0	1e ←	122	
6294 * nff	* f	1e			
6295 * alp	*	1.0000e+00e			
6296 * vl	* f	0.0000e+00e			
6297 * vv	* f	0.0000e+00e			
6298 * tl	*	5.4211e+02e			
6299 * tv	*	5.4212e+02e			
6300 * p	*	5.4158e+06e			
6301 * pa	*	0.0000e+00e			
6302 * qppp	*	0.0000e+00e			
6303 * matid	*	9e			
6304 * tw	*	5.4211e+02e			
6305 * conc	*	0.0000e+00e			
6306 *					
6307	*****				
6308	*****	type	num	id	ctitle
6309	break		118	118	\$118\$ msl 1 porv boundary
6310 *	jun1	ibty	isat	ioff	
6311	118	0	0	1	
6312 *	dxin	volin	alpin	tin	pin
6313	1.0000e+00	2.9210e-01	1.0000e+00	3.7316e+02	1.0135e+05
6314 *	pain	concin	rbmx	poff	belv
6315	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
6316 *					
6317	*****				
6318	*****	type	num	id	ctitle
6319	valve		120	120	\$120\$ msiv line 1 ← 123
6320 *	ncells	nodes	jun1	jun2	epsw
6321	5	1	120	122	0.0000e+00
6322 *	ichf	iconc	ivty	ivps	nvb2
6323	1	1	3	2	0
6324 *	ivtr	ivsv	nvb1	nvsv	nvrf
6325	24	1	-2	0	0
6326 *	iqp3tr	iqp3sv	nqp3tb	nqp3sv	nqp3rf
6327	0	0	0	0	0

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6328 *      ivtrov      ivtyov
6329      0      0
6330 *      rvmx      rvov      fminov      fmaxov
6331      1.0000e-01      0.0000e+00      0.0000e+00      1.0000e+00
6332 *      radin      th      houtl      houtv      toutl
6333      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6334 *      toutv      avlve      hvlve      favlve      xpos
6335      3.0000e+02      2.9210e-01      6.0985e-01      4.0000e-01      4.0000e-01
6336 *      qp3in      qp3off      rqp3mx      qp3scl
6337      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6338 *
6339 *      cell arrays (26-inch main steam line)
6340 * dx      *      2.2860e+00r04 4.5994e+00e
6341 * vol      *      6.6775e-01r04 1.3409e+00e
6342 * fa      * f      2.9210e-01e
6343 * kfacs      * r05 0.0000e+00      2.0000e-02e
6344 * rkfac      * r05 0.0000e+00      2.0000e-02e
6345 * grav      * f      0.0000e+00e
6346 * hd      * f      6.0985e-01e
6347 * icflg      *      0      1r04      0e
6348 * nff      * f      1e
6349 * alp      * f      1.0000e+00e
6350 * vl      * f      0.0000e+00e
6351 * vv      * f      0.0000e+00e
6352 * tl      * f      5.4211e+02e
6353 * tv      * f      5.4212e+02e
6354 * p      * f      5.4158e+06e
6355 * pa      * f      0.0000e+00e
6356 * qppp      * f      0.0000e+00e
6357 * matid      *      9e
6358 * tw      * f      5.4211e+02e
6359 * conc      * f      0.0000e+00e
6360 * vtbl      *      -6.0000e+00      1.0000e+00      4.0000e+00      0.0000e+00e
6361 *
6362 *****
6363 *****      type      num      id      ctitle
6364 tee      150      150 $150$ hp heater discharge line
6365 *      jcell      nodes      ichf      cost      epsw
6366      2      5      1      0.0000e+00      0.0000e+00
6367 *      iconcl      ncell1      jun1      jun2      ipow1
6368      1      2      150      151      0
6369 *      iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
6370      0      0      0      0      0
6371 *      radin1      th1      houtl1      houtv1      toutl1
6372      2.2150e-01      3.2540e-02      0.0000e+00      0.0000e+00      3.0000e+02
6373 *      toutv1      pwin1      pwoff1      rpwmxl      pwscl1
6374      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6375 *      qp1n1      qpoff1      rqp1mx1      qp1scl1
6376      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00

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6377 *	iconc2	ncell2	jun3	ipow2	
6378	1	1	154	0	
6379 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
6380	0	0	0	0	0
6381 *	radin2	th2	houtl2	houtv2	toutl2
6382	2.6590e-01	3.8900e-02	0.0000e+00	0.0000e+00	3.0000e+02
6383 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
6384	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
6385 *	qpwin2	qpoff2	rqpmx2	qpvc12	
6386	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
6387 *					
6388 *	main-cell arrays				
6389 *	dx	*	4.0180e+00	1.1369e+00e	
6390 *	vol	*	8.9255e-01	2.5255e-01e	
6391 *	fa	*	1.5408e-01r02	2.2214e-01e	
6392 *	kfac	* f	3.0000e-01e		
6393 *	rkfac	* f	3.0000e-01e		
6394 *	grav	* f	0.0000e+00e		
6395 *	hd	*	4.4300e-01r02	5.3180e-01e	
6396 *	icflg	* f	0e		
6397 *	nff	* f	1e		
6398 *	alp	* f	0.0000e+00e		
6399 *	vl	* f	0.0000e+00e		
6400 *	vv	* f	0.0000e+00e		
6401 *	tl	* f	4.8870e+02e		
6402 *	tv	* f	4.8870e+02e		
6403 *	p	* f	5.4158e+06e		
6404 *	pa	* f	0.0000e+00e		
6405 *	qppp	* f	0.0000e+00e		
6406 *	matid	* f	9e		
6407 *	tw	* f	4.8870e+02e		
6408 *	conc	* f	0.0000e+00e		
6409 *					
6410 *	side-cell arrays				
6411 *	dx	*	3.0479e+00e		
6412 *	vol	*	3.0000e-01e		
6413 *	fa	* f	9.8430e-02e		
6414 *	kfac	* f	3.0000e-01e		
6415 *	rkfac	* f	3.0000e-01e		
6416 *	grav	* f	0.0000e+00e		
6417 *	hd	* f	3.5400e-01e		
6418 *	icflg	* f	0e		
6419 *	nff	* f	1e		
6420 *	alp	*	0.0000e+00e		
6421 *	vl	* f	0.0000e+00e		
6422 *	vv	* f	0.0000e+00e		
6423 *	tl	*	4.8870e+02e		
6424 *	tv	*	4.8870e+02e		
6425 *	p	*	5.4158e+06e		
6426 *	pa	*	0.0000e+00e		

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6427 * qppp * f 0.0000e+00e
6428 * matid * f 9e
6429 * tw * f 4.8870e+02e
6430 * conc * 0.0000e+00e
6431 *
6432 *****
6433 ***** type num id ctitle
6434 valve 154 154 $154$ mfwcv-1 regulating valve
6435 * ncells nodes jun1 jun2 epsw
6436 2 5 154 158 0.0000e+00
6437 * ichf iconc ivty ivps nvtyb2
6438 1 1 3 2 0
6439 * ivtr 19 ivsv 125 nvtyb1 nvsv nvrf
6440 1 -1014 0 0 0
6441 * iqp3tr iqp3sv nqp3tb nqp3sv nqp3rf
6442 0 0 0 0 0
6443 * ivtrov 125 ivtyov
6444 422 0
6445 * rvmx rvov fminov fmaxov
6446 1.0000e-02 5.0000e-02 0.0000e+00 1.0000e+00
6447 * radin th houtl houtv toutl
6448 1.7700e-01 2.6200e-02 0.0000e+00 0.0000e+00 3.0000e+02
6449 * toutv avlve hvlve favlve xpos
6450 3.0000e+02 8.0000e-02 3.1900e-01 4.0000e-01 4.0000e-01
6451 * qp3in qp3off rqp3mx qp3scl
6452 0.0000e+00 0.0000e+00 0.0000e+00 1.0000e+00
6453 *
6454 * dx * f 1.5239e+00e
6455 * vol * f 1.5000e-01e
6456 * fa * f 9.8430e-02e
6457 * kfacs * f 3.0000e-01e
6458 * rkfac * f 3.0000e-01e
6459 * grav * f 0.0000e+00e
6460 * hd * f 3.5400e-01e
6461 * icflg * f 0e
6462 * nff * f 1e
6463 * alp * f 0.0000e+00e
6464 * vl * f 0.0000e+00e
6465 * vv * f 0.0000e+00e
6466 * tl * f 4.8870e+02e
6467 * tv * f 4.8870e+02e
6468 * p * f 5.4158e+06e
6469 * pa * f 0.0000e+00e
6470 * qppp * f 0.0000e+00e
6471 * matid * f 9e
6472 * tw * f 4.8870e+02e
6473 * conc * f 0.0000e+00e
6474 *
6475 *****

```

```

6476 *****      type          num          id          ctitle
6477 fill          169          169 $169$ sdafw fill 1
6478 *            jun1          ifty          ioff
6479              170              8              2
6480 *            iftr          ifsv          nftb          nfsv          nfrf
6481              28          -1005              2              0          0
6482 *            twtold          rfmX          concin          felv
6483      0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
6484 *            dxin          volin          alpin          vlin          tlin
6485      1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
6486 *            pin          pain          flowin          vvin          tvin
6487      5.4158e+06      0.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
6488 *            flwoff          vloff          vvoff          alpoff
6489      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6490 *            vmScl          vvscl
6491      1.0000e+00      1.0000e+00
6492 *
6493 * vmtb *          7.4000e-01      9.4635e+00      7.6000e-01      0.0000e+00e
6494 *
6495 *****
6496 *****      type          num          id          ctitle
6497 tee          170          170 $170$ mfwcV-1 discharge line
6498 *            jcell          nodes          ichf          cost          epsw
6499              1              5              1      0.0000e+00      0.0000e+00
6500 *            iconcl          ncell1          jun1          jun2          ipow1
6501              1              6              158          180              0
6502 *            iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
6503              0              0              0              0              0
6504 *            radin1          th1          hout11          houtv1          tout11
6505      1.7700e-01      2.6200e-02      0.0000e+00      0.0000e+00      3.0000e+02
6506 *            toutv1          pwin1          pwoff1          rpwmX1          pwsc11
6507      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6508 *            qpin1          qpoff1          rqpmX1          qpscl1
6509      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6510 *            iconc2          ncell2          jun3          ipow2
6511              1              1              170              0
6512 *            iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
6513              0              0              0              0              0
6514 *            radin2          th2          hout12          houtv2          tout12
6515      4.8600e-02      8.5600e-03      0.0000e+00      0.0000e+00      3.0000e+02
6516 *            toutv2          pwin2          pwoff2          rpwmX2          pwsc12
6517      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6518 *            qpin2          qpoff2          rqpmX2          qpscl2
6519      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6520 *
6521 * main-cell arrays
6522 * dx      * f      6.0957e+00e
6523 * vol      * f      6.0000e-01e
6524 * fa      * r02 9.8430e-02      7.3830e-02      4.9220e-02      7.3830e-02r02 9.8430e-02
6525 e

```



```

6526 * kfac * f 3.0000e-01e
6527 * rkfac * f 3.0000e-01e
6528 * grav * 0.0000e+00 1.0000e+00r05 0.0000e+00e
6529 * hd * f 3.5400e-01e
6530 * icflg * f 0e
6531 * nff * f 1e
6532 * alp * f 0.0000e+00e
6533 * vl * f 0.0000e+00e
6534 * vv * f 0.0000e+00e
6535 * tl * f 4.8870e+02e
6536 * tv * f 4.8870e+02e
6537 * p * f 5.4158e+06e
6538 * pa * f 0.0000e+00e
6539 * qppp * f 0.0000e+00e
6540 * matid * f 9e
6541 * tw * f 4.8870e+02e
6542 * conc * f 0.0000e+00e
6543 *
6544 * side-cell arrays
6545 * dx * 1.5240e+00e
6546 * vol * 1.1300e-02e
6547 * fa * f 7.4200e-03e
6548 * kfac * f 3.0000e-01e
6549 * rkfac * f 3.0000e-01e
6550 * grav * f 0.0000e+00e
6551 * hd * f 9.7200e-02e
6552 * icflg * f 0e
6553 * nff * f 1e
6554 * alp * 0.0000e+00e
6555 * vl * f 0.0000e+00e
6556 * vv * f 0.0000e+00e
6557 * tl * 4.8870e+02e
6558 * tv * 4.8870e+02e
6559 * p * 5.4158e+06e
6560 * pa * 0.0000e+00e
6561 * qppp * f 0.0000e+00e
6562 * matid * f 9e
6563 * tw * f 4.8870e+02e
6564 * conc * 0.0000e+00e
6565 *
6566 *****
6567 ***** type num id ctitle
6568 fill 179 179 $179$ mdafw fill 1
6569 * junl ifty ioff
6570 179 8 2
6571 * iftr ifsv nftb nfsv nfrf
6572 26 -1005 2 0 0
6573 * twtold rfmx concin felv
6574 0.0000e+00 2.0000e+00 0.0000e+00 0.0000e+00

```

```

6575 *      dxin      volin      alpin      vlin      tlin
6576      1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
6577 *      pin      pain      flowin      vvin      tvin
6578      5.4158e+06      0.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
6579 *      flwoff      vloff      vvoff      alpoff
6580      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6581 *      vm scl      vv scl
6582      1.0000e+00      1.0000e+00
6583 *
6584 * vmtb *      7.4000e-01      9.4635e+00      7.6000e-01      0.0000e+00e
6585 *
6586 *****
6587 *****      type      num      id      ctitle
6588 tee      180      180 $180$ mfw line 1
6589 *      jcell      nodes      ichf      cost      epsw
6590      1      5      1      0.0000e+00      0.0000e+00
6591 *      iconcl      ncell1      jun1      jun2      ipow1
6592      1      8      180      185      0
6593 *      iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
6594      0      0      0      0      0
6595 *      radin1      th1      hout11      houtv1      tout11
6596      1.7700e-01      2.6200e-02      0.0000e+00      0.0000e+00      3.0000e+02
6597 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
6598      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6599 *      qpin1      qpoff1      rqpmx1      qpscl1
6600      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6601 *      iconc2      ncell2      jun3      ipow2
6602      1      1      179      0
6603 *      iqptr2      iqpsv2      nqptb2      nqpsv2      nqprf2
6604      0      0      0      0      0
6605 *      radin2      th2      hout12      houtv2      tout12
6606      4.8600e-02      8.5600e-03      0.0000e+00      0.0000e+00      3.0000e+02
6607 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
6608      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6609 *      qpin2      qpoff2      rqpmx2      qpscl2
6610      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6611 *
6612 * main-cell arrays
6613 * dx * r06 6.0957e+00r02 5.3033e+00e
6614 * vol * r06 6.0000e-01r02 5.2200e-01e
6615 * fa * f 9.8430e-02e
6616 * kfacs * f 3.0000e-01e
6617 * rkfac * f 3.0000e-01e
6618 * grav * r07 0.0000e+00r02 1.0000e+00e
6619 * hd * f 3.5400e-01e
6620 * icflg * f 0e
6621 * nff * f 1e
6622 * alp * f 0.0000e+00e
6623 * vl * f 0.0000e+00e
6624 * vv * f 0.0000e+00e

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```

6625 * t1      * f      4.8870e+02e
6626 * tv      * f      4.8870e+02e
6627 * p       * f      5.4158e+06e
6628 * pa      * f      0.0000e+00e
6629 * qppp    * f      0.0000e+00e
6630 * matid   * f              9e
6631 * tw      * f      4.8870e+02e
6632 * conc    * f      0.0000e+00e
6633 *
6634 * side-cell arrays
6635 * dx      *          8.8390e+00e
6636 * vol     *          6.5560e-02e
6637 * fa     * f      7.4200e-03e
6638 * kfac   * f      3.0000e-01e
6639 * rkfac  * f      3.0000e-01e
6640 * grav   * f      0.0000e+00e
6641 * hd     * f      9.7200e-02e
6642 * icflg  * f              0e
6643 * nff    * f              1e
6644 * alp     *          0.0000e+00e
6645 * vl     * f      0.0000e+00e
6646 * vv     * f      0.0000e+00e
6647 * t1     *          4.8870e+02e
6648 * tv     *          4.8870e+02e
6649 * p      *          5.4158e+06e
6650 * pa     *          0.0000e+00e
6651 * qppp   * f      0.0000e+00e
6652 * matid  * f              9e
6653 * tw     * f      4.8870e+02e
6654 * conc  *          0.0000e+00e
6655 *
6656 *****
6657 *****      type          num          id          ctitle
6658 tee          190          190 $190$ steam-gen downcomer 1
6659 *      jcell      nodes      ichf      cost      epsw
6660      3          0          1      0.0000e+00      0.0000e+00
6661 *      iconc1      ncell1      jun1      jun2      ipow1
6662      1          12          190          100          0
6663 *      radin1      th1      hout11      houtv1      tout11
6664      1.0920e-01      3.8040e-02      0.0000e+00      0.0000e+00      3.0000e+02
6665 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
6666      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6667 *      iconc2      ncell2      jun3      ipow2
6668      1          1          185          0
6669 *      radin2      th2      hout12      houtv2      tout12
6670      1.7700e-01      2.6200e-02      0.0000e+00      0.0000e+00      3.0000e+02
6671 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
6672      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6673 *

```

```

6674 * main-cell arrays (downcomer annulus)
6675 * dx      *      1.0910e+00r03 3.8900e-01      1.2440e+00r07 1.3320e+00e
6676 * vol     *      9.7890e+00r03 3.2630e+00      7.5320e+00      2.7290e+00      8.0750e-01
6677 * vol     * r05 7.0000e-01e
6678 * fa      *      8.5590e+00      8.6600e+00r02 8.3882e+00      8.6600e+00      3.3610e+00
6679 * fa      *      1.2350e+00r05 5.2120e-01      2.8456e+00e
6680 * kfac    * r04 0.0000e+00      1.0000e-01r02 3.0000e-01r05 0.0000e+00      2.1500e+02
6681 * kfac    * e
6682 * rkfac   * r04 0.0000e+00      2.0000e-01r02 6.0000e-01r05 0.0000e+00      1.0000e+03
6683 * rkfac   * e
6684 * grav    * r12-1.0000e+00      0.0000e+00e
6685 * hd      *      1.2070e+00r04 1.3750e+00      6.0000e-01      2.5280e-01r05 1.0912e-01
6686 * hd      *      9.1200e-03e
6687 * icflg   * f      0e
6688 * nff      * f      1e
6689 * alp      * r04 1.0000e+00      7.2195e-01r07 0.0000e+00e
6690 * vl      * f      0.0000e+00e
6691 * vv      * f      0.0000e+00e
6692 * tl      * f      4.9330e+02e
6693 * tv      * f      4.9330e+02e
6694 * p        * f      5.4158e+06e
6695 * pa      * f      0.0000e+00e
6696 * conc    * f      0.0000e+00e
6697 *
6698 * side-cell arrays (feedwater inlet)
6699 * dx      *      1.4569e+00e
6700 * vol     *      1.4340e-01e
6701 * fa      * f      9.8430e-02e
6702 * kfac    *      5.0000e-01      3.0000e-01e
6703 * rkfac   *      1.0000e+00      3.0000e-01e
6704 * grav    *      0.0000e+00      -1.0000e+00e
6705 * hd      * f      3.5400e-01e
6706 * icflg   * f      0e
6707 * nff      * f      1e
6708 * alp      *      0.0000e+00e
6709 * vl      * f      0.0000e+00e
6710 * vv      * f      0.0000e+00e
6711 * tl      *      4.8870e+02e
6712 * tv      *      4.8870e+02e
6713 * p        *      5.4158e+06e
6714 * pa      *      0.0000e+00e
6715 * conc    *      0.0000e+00e
6716 *
6717 *****
6718 *****      type      num      id      ctitle
6719 tee      200      200 $200$ steam-gen boiler 2
6720 *      jcell      nodes      ichf      cost      epsw
6721      5      0      1      0.0000e+00      0.0000e+00
6722 *      iconcl      ncell1      jun1      jun2      ipow1
6723      1      7      200      205      0

```

```

6724 *      radin1      th1      houtl1      houtv1      toutl1
6725      1.4821e+00      9.5250e-03      0.0000e+00      0.0000e+00      3.0000e+02
6726 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
6727      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6728 *      iconc2      ncell2      jun3      ipow2
6729      1      1      203      0
6730 *      radin2      th2      houtl2      houtv2      toutl2
6731      9.8400e-03      1.2700e-03      0.0000e+00      0.0000e+00      3.0000e+02
6732 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
6733      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6734 *
6735 * main-cell arrays (boiler region)
6736 * dx      * f      1.3320e+00e
6737 * vol      * r06      5.8490e+00      6.7440e+00e
6738 * fa      *      2.8456e+00r06      4.3911e+00      4.2500e+00e
6739 * kfacs *      2.1500e+02r07      0.0000e+00e
6740 * rkfac *      1.0000e+03r07      0.0000e+00e
6741 * grav *      0.0000e+00r07      1.0000e+00e
6742 * hd      * r07      9.1200e-03      3.2410e+00e
6743 * icflg * f      0e
6744 * nff      * f      1e
6745 * alp      * r05      0.0000e+00      5.0000e-01      1.0000e+00e
6746 * vl      * f      0.0000e+00e
6747 * vv      * f      0.0000e+00e
6748 * tl      * f      5.4211e+02e
6749 * tv      * f      5.4212e+02e
6750 * p      * f      5.4158e+06e
6751 * pa      * f      0.0000e+00e
6752 * conc * f      0.0000e+00e
6753 *
6754 * side-cell arrays (for sgtr)
6755 * dx      *      5.0000e-01e
6756 * vol      *      6.0868e-04e
6757 * fa      * f      1.21736e-3e
6758 * kfacs *      1.0000e-10      0.0000e+00e
6759 * rkfac *      1.0000e-10      0.0000e+00e
6760 * grav * f      0.0000e+00e
6761 * hd      * f      1.9685e-02e
6762 * icflg *      0      0e
6763 * nff      *      1      -1e
6764 * alp      *      0.0000e+00e
6765 * vl      * f      0.0000e+00e
6766 * vv      * f      0.0000e+00e
6767 * tl      *      5.4211e+02e
6768 * tv      *      5.4212e+02e
6769 * p      *      5.4158e+06e
6770 * pa      *      0.0000e+00e
6771 * conc *      0.0000e+00e
6772 *
6773 *****

```

```

6774 ***** type          num          id          ctitle
6775 fill                202          202 $202$ sgtr bc during s/s ← 127
6776 *          jun1      ifty          ioff
6777          201          2          0
6778 *          twtold      rfmix          concin          felv
6779          0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
6780 *          dxin          volin          alpin          vlin          tlin
6781          1.0000e+00      5.0870e-02      0.0000e+00      0.0000e+00      5.4800e+02
6782 *          pin          pain          flowin          vvin          tvin
6783          5.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4800e+02
6784 *
6785 *****
6786 ***** type          num          id          ctitle
6787 fill                203          203 $203$ sgtr bc during s/s ← 127
6788 *          jun1      ifty          ioff
6789          203          2          0
6790 *          twtold      rfmix          concin          felv
6791          0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
6792 *          dxin          volin          alpin          vlin          tlin
6793          1.0000e+00      5.0870e-02      0.0000e+00      0.0000e+00      5.4800e+02
6794 *          pin          pain          flowin          vvin          tvin
6795          5.0000e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4800e+02
6796 *
6797 *****
6798 ***** type          num          id          ctitle
6799 tee                205          205 $205$ separator & dome 2
6800 *          jcell      nodes          ichf          cost          epsw
6801          6          0          1      0.0000e+00      0.0000e+00
6802 *          iconc1      ncell1          jun1          jun2          ipow1
6803          1          8          205          290          0
6804 *          radin1      th1          hout1          houtv1          tout1
6805          6.5380e-01      9.5250e-03      0.0000e+00      0.0000e+00      3.0000e+02
6806 *          toutv1      pwin1          pwoff1          rpwmix1          pwscl1
6807          3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6808 *          iconc2      ncell2          jun3          ipow2
6809          1          4          210          0
6810 *          radin2      th2          hout2          houtv2          tout2
6811          2.0193e+00      8.8900e-02      0.0000e+00      0.0000e+00      3.0000e+02
6812 *          toutv2      pwin2          pwoff2          rpwmix2          pwscl2
6813          3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6814 *
6815 * main-cell arrays (separator region)
6816 * dx          *          1.2440e+00      1.1670e+00      1.0910e+00      1.0000e+00r03 3.3333e-01
6817 * dx          *          1.0000e+00e
6818 * vol          *          7.6460e+00r02 4.5570e+00      5.6630e+00r03 2.4353e+00      8.9610e+00
6819 * vol          * e
6820 * fa          *          4.2500e+00r03 4.0320e+00      5.5740e+00r02 7.3060e+00      6.9880e+00
6821 * fa          *          8.5590e+00e
6822 * kf          * f          0.0000e+00e
6823 * rk          * f          0.0000e+00e

```

```

6824 * grav * r04 1.0000e+00r04 0.0000e+00 -1.0000e+00e
6825 * hd * 3.2410e+00r03 1.3080e+00 2.6640e+00r02 2.8210e+00 2.9780e+00
6826 * hd * 1.2070e+00e
6827 * icflg * f 0e
6828 * nff * f 1e
6829 * alp * f 1.0000e+00e
6830 * vl * f 0.0000e+00e
6831 * vv * f 0.0000e+00e
6832 * tl * f 5.4211e+02e
6833 * tv * f 5.4212e+02e
6834 * p * f 5.4158e+06e
6835 * pa * f 0.0000e+00e
6836 * conc * f 0.0000e+00e
6837 *
6838 * side-cell arrays (steam dome)
6839 * dx * 1.0150e+00 9.3900e-01 7.0000e-01 2.3900e-01e
6840 * vol * r02 5.1080e+00 7.0000e+00 1.6220e+00e
6841 * fa * r02 5.0325e+00 6.0000e+00 6.7866e+00 1.2897e-01e
6842 * kfacs * r02 1.0000e-10r03 0.0000e+00e
6843 * rkfac * r02 1.0000e-10r03 0.0000e+00e
6844 * grav * f 1.0000e+00e
6845 * hd * 4.3220e+00 3.4380e+00 2.0480e+00 1.0000e+00 6.0985e-01
6846 * hd * e
6847 * icflg * r04 0 1e
6848 * nff * r04 1 -1e
6849 * alp * f 1.0000e+00e
6850 * vl * f 0.0000e+00e
6851 * vv * f 0.0000e+00e
6852 * tl * f 5.4211e+02e
6853 * tv * f 5.4212e+02e
6854 * p * f 5.4158e+06e
6855 * pa * f 0.0000e+00e
6856 * conc * f 0.0000e+00e
6857 *
6858 *****
6859 ***** type num id ctitle
6860 tee 210 210 $210$ main steam line 2
6861 * jcell nodes ichf cost epsw
6862 * 9 1 1 0.0000e+00 0.0000e+00
6863 * iconc1 ncell1 jun1 jun2 ipow1
6864 * 1 9 210 220 0
6865 * iqptr1 iqpsv1 nqptb1 nqpsv1 nqprf1
6866 * 0 0 0 0 0
6867 * radin1 th1 hout11 houtv1 tout11
6868 * 3.0493e-01 2.5270e-02 0.0000e+00 0.0000e+00 3.0000e+02
6869 * toutv1 pwin1 pwoff1 rpwmxl pwsc11
6870 * 3.0000e+02 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
6871 * qp1n1 qpoff1 rqp1mx1 qp1sc11
6872 * 0.0000e+00 0.0000e+00 0.0000e+00 1.0000e+00

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6873 *      iconc2      ncell2      jun3      ipow2
6874      1      1      212      0
6875 *      iqptr2      iqpsv2      nqptb2      nqpsv2      nqprf2
6876      0      0      0      0      0
6877 *      radin2      th2      hout12      houtv2      tout12
6878      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6879 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
6880      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6881 *      qpwin2      qpoff2      rqpwx2      qpvc12
6882      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6883 *
6884 * main-cell arrays (26-inch main steam line)
6885 * dx      *      2.2860e+00      5.0292e+00r03      4.4806e+00r03      4.5363e+00      2.2860e+00
6886 * dx      * e
6887 * vol      *      6.6775e-01      1.4733e+00r03      1.3088e+00r03      1.3251e+00      6.6775e-01
6888 * vol      * e
6889 * fa      *      1.2897e-01      2.1054e-01      2.9210e-01      2.1091e-01      1.2972e-01
6890 * fa      *      2.1091e-01r04      2.9210e-01e
6891 * kfacc      * f      0.0000e+00e
6892 * rkfac      * f      0.0000e+00e
6893 * grav      *      1.0000e+00      0.0000e+00r03-1.0000e+00r05      0.0000e+00e
6894 * hd      * f      6.0985e-01e
6895 * icflg      *      1r03      0      1r05      0e
6896 * nff      * r02      -1      1r03      -1r04      1e
6897 * alp      * f      1.0000e+00e
6898 * vl      * f      0.0000e+00e
6899 * vv      * f      0.0000e+00e
6900 * tl      * f      5.4211e+02e
6901 * tv      * f      5.4212e+02e
6902 * p      * f      5.4158e+06e
6903 * pa      * f      0.0000e+00e
6904 * qppp      * f      0.0000e+00e
6905 * matid      *      9e
6906 * tw      * f      5.4211e+02e
6907 * conc      * f      0.0000e+00e
6908 *
6909 * side-cell arrays (relief-valves header)
6910 * dx      *      1.0000e+00e
6911 * vol      *      2.9210e-01e
6912 * fa      * f      2.9210e-01e
6913 * kfacc      *      1.0000e-10      0.0000e+00e
6914 * rkfac      *      1.0000e-10      0.0000e+00e
6915 * grav      * f      1.0000e+00e
6916 * hd      * f      6.0985e-01e
6917 * icflg      * f      0e
6918 * nff      * f      1e
6919 * alp      *      1.0000e+00e
6920 * vl      * f      0.0000e+00e
6921 * vv      * f      0.0000e+00e
6922 * tl      *      5.4211e+02e

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6923 * tv      *      5.4212e+02e
6924 * p       *      5.4158e+06e
6925 * pa      *      0.0000e+00e
6926 * qppp    *      0.0000e+00e
6927 * matid   *          9e
6928 * tw      *      5.4211e+02e
6929 * conc    *      0.0000e+00e
6930 *
6931 *****
6932 *****      type          num          id          ctitle
6933 tee                212          212 $212$ msl 2 porv/srv header
6934 *          jcell          nodes          ichf          cost          epsw
6935          1              1              1          0.0000e+00      0.0000e+00
6936 *          iconc1          ncell1          jun1          jun2          ipow1
6937          1              1              212          214              0
6938 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
6939          0              0              0              0              0
6940 *          radin1          th1             hout11          houtv1          tout11
6941          3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6942 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
6943          3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6944 *          qp1n1          qpoff1          rqp1mx1          qp1sc11
6945          0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6946 *          iconc2          ncell2          jun3          ipow2
6947          1              1              216              0
6948 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
6949          0              0              0              0              0
6950 *          radin2          th2             hout12          houtv2          tout12
6951          3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
6952 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
6953          3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
6954 *          qp1n2          qpoff2          rqp1mx2          qp1sc12
6955          0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
6956 *
6957 * main-cell arrays (header inlet to srv outlet)
6958 * dx      *      1.0000e+00e
6959 * vol     *      2.9210e-01e
6960 * fa      * f      2.9210e-01e
6961 * kf1ac   * f      0.0000e+00e
6962 * rk1fac   * f      0.0000e+00e
6963 * grav    * f      1.0000e+00e
6964 * hd      * f      6.0985e-01e
6965 * icflg   * f          0e
6966 * nff     * f          1e
6967 * alp     *      1.0000e+00e
6968 * vl      * f      0.0000e+00e
6969 * vv      * f      0.0000e+00e
6970 * t1      *      5.4211e+02e
6971 * tv      *      5.4212e+02e
6972 * p       *      5.4158e+06e

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6973 * pa * 0.0000e+00e
6974 * qppp * 0.0000e+00e
6975 * matid * 9e
6976 * tw * 5.4211e+02e
6977 * conc * 0.0000e+00e
6978 *
6979 * side-cell arrays (header outlet to porv)
6980 * dx * 1.0000e+00e
6981 * vol * 2.9210e-01e
6982 * fa * f 2.9210e-01e
6983 * kfacs * 1.0000e-10 0.0000e+00e
6984 * rkfac * 1.0000e-10 0.0000e+00e
6985 * grav * f 0.0000e+00e
6986 * hd * f 6.0985e-01e
6987 * icflg * f 0e
6988 * nff * f 1e
6989 * alp * 1.0000e+00e
6990 * vl * f 0.0000e+00e
6991 * vv * f 0.0000e+00e
6992 * tl * 5.4211e+02e
6993 * tv * 5.4212e+02e
6994 * p * 5.4158e+06e
6995 * pa * 0.0000e+00e
6996 * qppp * 0.0000e+00e
6997 * matid * 9e
6998 * tw * 5.4211e+02e
6999 * conc * 0.0000e+00e
7000 *
7001 *****
7002 ***** type num id ctitle
7003 fill 214 214 $214$ msl 2 srv
7004 * jun1 ifty ioff
7005 214 5 0
7006 * iftr ifsv nftb nfv nfrf
7007 0 2121 9 0 0
7008 * twtold rfmxc concin felv
7009 0.0000e+00 1.0000e+10 0.0000e+00 0.0000e+00
7010 * dxin volin alpin vlin tlin
7011 1.0000e+00 2.9210e-01 1.0000e+00 0.0000e+00 5.4211e+02
7012 * pin pain flowin vvin tvin
7013 5.4158e+06 0.0000e+00 0.0000e+00 0.0000e+00 5.4212e+02
7014 * vmscl vvscl
7015 1.0000e+00 1.0000e+00
7016 *
7017 * vmtb * 7.5500e+06 0.0000e+00 7.5800e+06 -5.8300e+01 7.6900e+06
7018 * vmtb * -6.3000e+01 7.7200e+06 -1.2490e+02 7.8200e+06 -1.4730e+02
7019 * vmtb * 7.8600e+06 -2.3920e+02 7.9200e+06 -2.4550e+02 7.9600e+06
7020 * vmtb * -3.5610e+02 8.2000e+06 -4.3200e+02e
7021 *
7022 *****

```

	type	num	id	ctitle	
7023	*****				
7024	valve	216	216	\$216\$ msl 2 porv	
7025	* ncells	nodes	jun1	jun2	epsw
7026	1	1	216	218	0.0000e+00
7027	* ichf	iconc	ivty	ivps	nvtyb2
7028	1	1	1	2	0
7029	* ivtr	ivsv	nvtyb1	nvsv	nvrf
7030	0	-2162	0	0	0
7031	* iqp3tr	iqp3sv	nqp3tb	nqp3sv	nqp3rf
7032	0	0	0	0	0
7033	* ivtrov	ivtyov			
7034	0	0			
7035	* rvmx	rvov	fminov	fmaxov	
7036	5.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7037	* radin	th	hout1	houtv	tout1
7038	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
7039	* toutv	avlv	hvlv	favlv	xpos
7040	3.0000e+02	4.1484e-03	1.5240e-01	0.0000e+00	0.0000e+00
7041	* qp3in	qp3off	rqp3mx	qp3scl	
7042	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7043	*				
7044	* dx	*	1.0000e+00e		
7045	* vol	*	2.9210e-01e		
7046	* fa	* f	2.9210e-01e		
7047	* kfacc	* f	0.0000e+00e		
7048	* rkfac	* f	0.0000e+00e		
7049	* grav	* f	0.0000e+00e		
7050	* hd	* f	6.0985e-01e		
7051	* icflg	*	0	1e	
7052	* nff	* f	1e		
7053	* alp	*	1.0000e+00e		
7054	* vl	* f	0.0000e+00e		
7055	* vv	* f	0.0000e+00e		
7056	* tl	*	5.4211e+02e		
7057	* tv	*	5.4212e+02e		
7058	* p	*	5.4158e+06e		
7059	* pa	*	0.0000e+00e		
7060	* qppp	*	0.0000e+00e		
7061	* matid	*	9e		
7062	* tw	*	5.4211e+02e		
7063	* conc	*	0.0000e+00e		
7064	*				
7065	*****				
7066	*****				
7067	break	218	218	\$218\$ msl 2 porv boundary	
7068	* jun1	ibty	isat	ioff	
7069	218	0	0	1	
7070	* dxin	volin	alpin	tin	pin
7071	1.0000e+00	2.9210e-01	1.0000e+00	3.7316e+02	1.0135e+05

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7072 *      pain      concin      rbmx      poff      belv
7073      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7074 *
7075 *****
7076 *****      type      num      id      ctitle
7077 valve      220      220 $220$ msiv line 2
7078 *      ncells      nodes      jun1      jun2      epsw
7079      6      1      220      222      0.0000e+00
7080 *      ichf      iconc      ivty      ivps      nvtb2
7081      1      1      3      2      0
7082 *      ivtr      ivsv      nvtb1      nvsv      nvrf
7083      24      1      -2      0      0
7084 *      igp3tr      igp3sv      nqp3tb      nqp3sv      nqp3rf
7085      0      0      0      0      0
7086 *      ivtrov      ivtyov
7087      0      0
7088 *      rvmx      rvov      fminov      fmaxov
7089      1.0000e-01      0.0000e+00      0.0000e+00      1.0000e+00
7090 *      radin      th      houtl      houtv      toutl
7091      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
7092 *      toutv      avlve      hvlve      favlve      xpos
7093      3.0000e+02      2.9210e-01      6.0985e-01      4.0000e-01      4.0000e-01
7094 *      qp3in      qp3off      rqp3mx      qp3scl
7095      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7096 *
7097 * dx      *      2.2860e+00r05 4.2428e+00e
7098 * vol      *      6.6775e-01r05 1.2394e+00e
7099 * fa      * f      2.9210e-01e
7100 * kfacs      * r06 0.0000e+00      2.0000e-02e
7101 * rkfac      * r06 0.0000e+00      2.0000e-02e
7102 * grav      * f      0.0000e+00e
7103 * hd      * f      6.0985e-01e
7104 * icflg      *      0      1r05      0e
7105 * nff      * f      1e
7106 * alp      * f      1.0000e+00e
7107 * vl      * f      0.0000e+00e
7108 * vv      * f      0.0000e+00e
7109 * tl      * f      5.4211e+02e
7110 * tv      * f      5.4212e+02e
7111 * p      * f      5.4158e+06e
7112 * pa      * f      0.0000e+00e
7113 * qppp      * f      0.0000e+00e
7114 * matid      *      9e
7115 * tw      * f      5.4211e+02e
7116 * conc      * f      0.0000e+00e
7117 * vtb1      *      -6.0000e+00      1.0000e+00      4.0000e+00      0.0000e+00e
7118 *
7119 *****
7120 *****      type      num      id      ctitle
7121 tee      250      250 $250$ hp heater discharge line

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7122 *	jcell	nodes	ichf	cost	epsw
7123	1	5	1	0.0000e+00	0.0000e+00
7124 *	iconc1	ncell1	jun1	jun2	ipow1
7125	1	1	151	351	0
7126 *	iqptr1	iqpsv1	nqptb1	nqpsv1	nqprf1
7127	0	0	0	0	0
7128 *	radin1	th1	hout11	houtv1	tout11
7129	2.6590e-01	3.8900e-02	0.0000e+00	0.0000e+00	3.0000e+02
7130 *	toutv1	pwin1	pwoff1	rpwmx1	pwscl1
7131	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7132 *	qp1n1	qpoff1	rqpmx1	qpscl1	
7133	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7134 *	iconc2	ncell2	jun3	ipow2	
7135	1	1	254	0	
7136 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
7137	0	0	0	0	0
7138 *	radin2	th2	hout12	houtv2	tout12
7139	1.7700e-01	2.6200e-02	0.0000e+00	0.0000e+00	3.0000e+02
7140 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
7141	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7142 *	qp1n2	qpoff2	rqpmx2	qpscl2	
7143	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7144 *					
7145 *	main-cell arrays				
7146 *	dx	*	1.1369e+00e		
7147 *	vol	*	2.5255e-01e		
7148 *	fa	* f	2.2214e-01e		
7149 *	kfac	* f	3.0000e-01e		
7150 *	rkfac	* f	3.0000e-01e		
7151 *	grav	* f	0.0000e+00e		
7152 *	hd	* f	5.3180e-01e		
7153 *	icflg	* f	0e		
7154 *	nff	* f	1e		
7155 *	alp	*	0.0000e+00e		
7156 *	vl	* f	0.0000e+00e		
7157 *	vv	* f	0.0000e+00e		
7158 *	tl	*	4.8870e+02e		
7159 *	tv	*	4.8870e+02e		
7160 *	p	*	5.4158e+06e		
7161 *	pa	*	0.0000e+00e		
7162 *	qppp	* f	0.0000e+00e		
7163 *	matid	* f	9e		
7164 *	tw	* f	4.8870e+02e		
7165 *	conc	*	0.0000e+00e		
7166 *					
7167 *	side-cell arrays				
7168 *	dx	*	3.0479e+00e		
7169 *	vol	*	3.0000e-01e		
7170 *	fa	*	2.2214e-01	9.8430e-02e	
7171 *	kfac	* f	3.0000e-01e		

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7172 * rkfac * f 3.0000e-01e
7173 * grav * f 0.0000e+00e
7174 * hd * 5.3180e-01 3.5400e-01e
7175 * icflg * f 0e
7176 * nff * f 1e
7177 * alp * 0.0000e+00e
7178 * vl * f 0.0000e+00e
7179 * vv * f 0.0000e+00e
7180 * tl * 4.8870e+02e
7181 * tv * 4.8870e+02e
7182 * p * 5.4158e+06e
7183 * pa * 0.0000e+00e
7184 * qppp * f 0.0000e+00e
7185 * matid * f 9e
7186 * tw * f 4.8870e+02e
7187 * conc * 0.0000e+00e
7188 *
7189 *****
7190 ***** type num id ctitle
7191 valve 254 254 $254$ mfwcv-2 regulating valve
7192 * ncells nodes jun1 jun2 epsw
7193 2 5 254 258 0.0000e+00
7194 * ichf iconc ivty ivps nvtb2
7195 1 1 3 2 0
7196 * ivtr ivsv nvtb1 nvsv nvrf
7197 1 -2014 0 0 0
7198 * iqp3tr iqp3sv nqp3tb nqp3sv nqp3rf
7199 0 0 0 0 0
7200 * ivtrov ivtyov
7201 422 0
7202 * rvmx rvov fminov fmaxov
7203 1.0000e-02 5.0000e-02 0.0000e+00 1.0000e+00
7204 * radin th hout1 houtv tout1
7205 1.7700e-01 2.6200e-02 0.0000e+00 0.0000e+00 3.0000e+02
7206 * toutv avlve hvlve favlve xpos
7207 3.0000e+02 8.0000e-02 3.1900e-01 4.0000e-01 4.0000e-01
7208 * qp3in qp3off rqp3mx qp3scl
7209 0.0000e+00 0.0000e+00 0.0000e+00 1.0000e+00
7210 *
7211 * dx * f 1.5239e+00e
7212 * vol * f 1.5000e-01e
7213 * fa * f 9.8430e-02e
7214 * kfacs * f 3.0000e-01e
7215 * rkfac * f 3.0000e-01e
7216 * grav * f 0.0000e+00e
7217 * hd * f 3.5400e-01e
7218 * icflg * f 0e
7219 * nff * f 1e
7220 * alp * f 0.0000e+00e
7221 * vl * f 0.0000e+00e

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7222 * vv      * f    0.0000e+00e
7223 * tl      * f    4.8870e+02e
7224 * tv      * f    4.8870e+02e
7225 * p       * f    5.4158e+06e
7226 * pa      * f    0.0000e+00e
7227 * qppp    * f    0.0000e+00e
7228 * matid   * f           9e
7229 * tw      * f    4.8870e+02e
7230 * conc    * f    0.0000e+00e
7231 *
7232 *****
7233 *****      type          num          id          ctitle
7234 fill                269          269 $269$ sdafw fill 2
7235 *          jun1          ifty          ioff
7236          270                8                2
7237 *          iftr          ifsv          nftb          nfsv          nfrf
7238          28          -2005                2                0                0
7239 *          twtold          rfmX          concin          felv
7240          0.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00
7241 *          dxin          volin          alpin          vlin          tlin
7242          1.0000e+00    1.0000e+00    0.0000e+00    0.0000e+00    3.0000e+02
7243 *          pin          pain          flowin          vvin          tvin
7244          5.4158e+06    0.0000e+00    0.0000e+00    0.0000e+00    3.0000e+02
7245 *          flwoff          vloff          vvoff          alpoff
7246          0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
7247 *          vmscl          vvscl
7248          1.0000e+00    1.0000e+00
7249 *
7250 * vmtb *          7.4000e-01    9.4635e+00    7.6000e-01    0.0000e+00e
7251 *
7252 *****
7253 *****      type          num          id          ctitle
7254 tee                270          270 $270$ mfwcv-2 discharge line
7255 *          jcell          nodes          ichf          cost          epsw
7256          1                5                1    0.0000e+00    0.0000e+00
7257 *          iconcl          ncell1          jun1          jun2          ipow1
7258          1                6          258          280                0
7259 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
7260          0                0                0                0                0
7261 *          radin1          th1          hout11          houtv1          tout11
7262          1.7700e-01    2.6200e-02    0.0000e+00    0.0000e+00    3.0000e+02
7263 *          toutv1          pwin1          pwoff1          rpwmX1          pwscl1
7264          3.0000e+02    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
7265 *          qp1n1          qpoff1          rqpMx1          qpscl1
7266          0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
7267 *          iconc2          ncell2          jun3          ipow2
7268          1                1          270                0
7269 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
7270          0                0                0                0                0

```

7271 *	radin2	th2	hout12	houtv2	tout12
7272	4.8600e-02	8.5600e-03	0.0000e+00	0.0000e+00	3.0000e+02
7273 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
7274	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7275 *	qpin2	qpoff2	rqpmx2	qpocl2	
7276	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7277 *					
7278 *	main-cell arrays				
7279 *	dx	* f	6.0957e+00e		
7280 *	vol	* f	6.0000e-01e		
7281 *	fa	* r02	9.8430e-02	7.3830e-02	4.9220e-02 7.3830e-02r02 9.8430e-02
7282 e					
7283 *	kfac	* f	3.0000e-01e		
7284 *	rkfac	* f	3.0000e-01e		
7285 *	grav	*	0.0000e+00	1.0000e+00r05	0.0000e+00e
7286 *	hd	* f	3.5400e-01e		
7287 *	icflg	* f	0e		
7288 *	nff	* f	1e		
7289 *	alp	* f	0.0000e+00e		
7290 *	vl	* f	0.0000e+00e		
7291 *	vv	* f	0.0000e+00e		
7292 *	tl	* f	4.8870e+02e		
7293 *	tv	* f	4.8870e+02e		
7294 *	p	* f	5.4158e+06e		
7295 *	pa	* f	0.0000e+00e		
7296 *	qppp	* f	0.0000e+00e		
7297 *	matid	* f	9e		
7298 *	tw	* f	4.8870e+02e		
7299 *	conc	* f	0.0000e+00e		
7300 *					
7301 *	side-cell arrays				
7302 *	dx	*	1.5240e+00e		
7303 *	vol	*	1.1300e-02e		
7304 *	fa	* f	7.4200e-03e		
7305 *	kfac	* f	3.0000e-01e		
7306 *	rkfac	* f	3.0000e-01e		
7307 *	grav	* f	0.0000e+00e		
7308 *	hd	* f	9.7200e-02e		
7309 *	icflg	* f	0e		
7310 *	nff	* f	1e		
7311 *	alp	*	0.0000e+00e		
7312 *	vl	* f	0.0000e+00e		
7313 *	vv	* f	0.0000e+00e		
7314 *	tl	*	4.8870e+02e		
7315 *	tv	*	4.8870e+02e		
7316 *	p	*	5.4158e+06e		
7317 *	pa	*	0.0000e+00e		
7318 *	qppp	* f	0.0000e+00e		
7319 *	matid	* f	9e		
7320 *	tw	* f	4.8870e+02e		


```

7321 * conc *      0.0000e+00e
7322 *
7323 *****
7324 *****      type          num          id          ctitle
7325 fill          279          279 $279$ mdafw fill 2
7326 *          jun1          ifty          ioff
7327          279          8          2
7328 *          iftr          ifsv          nftb          nfsv          nfrf
7329          26          -2005          2          0          0
7330 *          twtold          rfmix          concin          felv
7331          0.0000e+00          2.0000e+00          0.0000e+00          0.0000e+00
7332 *          dxin          volin          alpin          vlin          tlin
7333          1.0000e+00          1.0000e+00          0.0000e+00          0.0000e+00          3.0000e+02
7334 *          pin          pain          flowin          vvin          tvin
7335          5.4158e+06          0.0000e+00          0.0000e+00          0.0000e+00          3.0000e+02
7336 *          flwoff          vloff          vvoff          alpoff
7337          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
7338 *          vmscl          vvscl
7339          1.0000e+00          1.0000e+00
7340 *
7341 * vmtb *      7.4000e-01      9.4635e+00      7.6000e-01      0.0000e+00e
7342 *
7343 *****
7344 *****      type          num          id          ctitle
7345 tee          280          280 $280$ mfw line 2
7346 *          jcell          nodes          ichf          cost          epsw
7347          1          5          1          0.0000e+00          0.0000e+00
7348 *          iconcl          ncell1          jun1          jun2          ipow1
7349          1          4          280          285          0
7350 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
7351          0          0          0          0          0
7352 *          radin1          th1          houtl1          houtv1          toutl1
7353          1.7700e-01          2.6200e-02          0.0000e+00          0.0000e+00          3.0000e+02
7354 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
7355          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
7356 *          qp1n1          qpoff1          rqp1mx1          qp1sc11
7357          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
7358 *          iconc2          ncell2          jun3          ipow2
7359          1          1          279          0
7360 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
7361          0          0          0          0          0
7362 *          radin2          th2          houtl2          houtv2          toutl2
7363          4.8600e-02          8.5600e-03          0.0000e+00          0.0000e+00          3.0000e+02
7364 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
7365          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
7366 *          qp1n2          qpoff2          rqp1mx2          qp1sc12
7367          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
7368 *
7369 * main-cell arrays
7370 * dx      * r02 4.9680e+00r02 5.3040e+00e

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7371 * vol      * r02 4.8900e-01r02 5.2200e-01e
7372 * fa       * f   9.8430e-02e
7373 * kfacs    * f   3.0000e-01e
7374 * rkfac    * f   3.0000e-01e
7375 * grav     * r03 0.0000e+00r02 1.0000e+00e
7376 * hd       * f   3.5400e-01e
7377 * icflg    * f           0e
7378 * nff      * f           1e
7379 * alp      * f   0.0000e+00e
7380 * vl       * f   0.0000e+00e
7381 * vv       * f   0.0000e+00e
7382 * tl       * f   4.8870e+02e
7383 * tv       * f   4.8870e+02e
7384 * p        * f   5.4158e+06e
7385 * pa       * f   0.0000e+00e
7386 * qppp     * f   0.0000e+00e
7387 * matid    * f           9e
7388 * tw       * f   4.8870e+02e
7389 * conc     * f   0.0000e+00e
7390 *
7391 * side-cell arrays
7392 * dx       *      8.8390e+00e
7393 * vol      *      6.5560e-02e
7394 * fa       * f   7.4200e-03e
7395 * kfacs    * f   3.0000e-01e
7396 * rkfac    * f   3.0000e-01e
7397 * grav     * f   0.0000e+00e
7398 * hd       * f   9.7200e-02e
7399 * icflg    * f           0e
7400 * nff      * f           1e
7401 * alp      *      0.0000e+00e
7402 * vl       * f   0.0000e+00e
7403 * vv       * f   0.0000e+00e
7404 * tl       *      4.8870e+02e
7405 * tv       *      4.8870e+02e
7406 * p        *      5.4158e+06e
7407 * pa       *      0.0000e+00e
7408 * qppp     * f   0.0000e+00e
7409 * matid    * f           9e
7410 * tw       * f   4.8870e+02e
7411 * conc     *      0.0000e+00e
7412 *
7413 *****
7414 *****      type          num          id          ctitle
7415 tee                290          290 $290$ steam-gen downcomer 2
7416 *                jcell      nodes      ichf      cost          epsw
7417                3              0              1   0.0000e+00   0.0000e+00
7418 *                iconcl      ncell1      jun1      jun2          ipow1
7419                1              12          290      200              0

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7420 *	radin1	th1	houtl1	houtv1	toutl1	
7421	1.0920e-01	3.8040e-02	0.0000e+00	0.0000e+00	3.0000e+02	
7422 *	toutv1	pwini	pwoff1	rpwmxl	pwscl1	
7423	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
7424 *	iconc2	ncell2	jun3	ipow2		
7425	1	1	285	0		
7426 *	radin2	th2	houtl2	houtv2	toutl2	
7427	1.7700e-01	2.6200e-02	0.0000e+00	0.0000e+00	3.0000e+02	
7428 *	toutv2	pwini2	pwoff2	rpwmxl2	pwscl2	
7429	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	
7430 *						
7431 *	main-cell arrays (downcomer annulus)					
7432 *	dx	*	1.0910e+00r03	3.8900e-01	1.2440e+00r07	1.3320e+00e
7433 *	vol	*	9.7890e+00r03	3.2630e+00	7.5320e+00	2.7290e+00 8.0750e-01
7434 *	vol	*	r05	7.0000e-01e		
7435 *	fa	*	8.5590e+00	8.6600e+00r02	8.3882e+00	8.6600e+00 3.3610e+00
7436 *	fa	*	1.2350e+00r05	5.2120e-01	2.8456e+00e	
7437 *	kfac	*	r04	0.0000e+00	1.0000e-01r02	3.0000e-01r05 0.0000e+00 2.1500e+02
7438 *	kfac	*	e			
7439 *	rkfacs	*	r04	0.0000e+00	2.0000e-01r02	6.0000e-01r05 0.0000e+00 1.0000e+03
7440 *	rkfacs	*	e			
7441 *	grav	*	r12	-1.0000e+00	0.0000e+00e	
7442 *	hd	*	1.2070e+00r04	1.3750e+00	6.0000e-01	2.5280e-01r05 1.0912e-01
7443 *	hd	*	9.1200e-03e			
7444 *	icflg	*	f	0e		
7445 *	nff	*	f	1e		
7446 *	alp	*	r04	1.0000e+00	7.2195e-01r07	0.0000e+00e
7447 *	vl	*	f	0.0000e+00e		
7448 *	vv	*	f	0.0000e+00e		
7449 *	tl	*	f	4.9330e+02e		
7450 *	tv	*	f	4.9330e+02e		
7451 *	p	*	f	5.4158e+06e		
7452 *	pa	*	f	0.0000e+00e		
7453 *	conc	*	f	0.0000e+00e		
7454 *						
7455 *	side-cell arrays (feedwater inlet)					
7456 *	dx	*	1.4569e+00e			
7457 *	vol	*	1.4340e-01e			
7458 *	fa	*	f	9.8430e-02e		
7459 *	kfac	*	5.0000e-01	3.0000e-01e		
7460 *	rkfacs	*	1.0000e+00	3.0000e-01e		
7461 *	grav	*	0.0000e+00	-1.0000e+00e		
7462 *	hd	*	f	3.5400e-01e		
7463 *	icflg	*	f	0e		
7464 *	nff	*	f	1e		
7465 *	alp	*	0.0000e+00e			
7466 *	vl	*	f	0.0000e+00e		
7467 *	vv	*	f	0.0000e+00e		
7468 *	tl	*	4.8870e+02e			
7469 *	tv	*	4.8870e+02e			

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7470 * p      *      5.4158e+06e
7471 * pa     *      0.0000e+00e
7472 * conc   *      0.0000e+00e
7473 *
7474 *****
7475 *****      type          num          id          ctitle
7476 pipe              300              300 $300$ steam-gen boiler 3
7477 *          ncells      nodes      jun1      jun2      epsw
7478          7              0              300      305      0.0000e+00
7479 *          ichf      iconc      iacc      ipow
7480          1              1              0              0
7481 *          radin      th      hout1      houtv      tout1
7482      1.4821e+00      9.5250e-03      0.0000e+00      0.0000e+00      3.0000e+02
7483 *          toutv      powin      powoff      rpwmxx      pwscl
7484      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7485 *
7486 * dx      * f      1.3320e+00e
7487 * vol      * r06      5.8490e+00      6.7440e+00e
7488 * fa      *      2.8456e+00r06      4.3911e+00      4.2500e+00e
7489 * kfacc      *      2.1500e+02r07      0.0000e+00e
7490 * rkfac      *      1.0000e+03r07      0.0000e+00e
7491 * grav      *      0.0000e+00r07      1.0000e+00e
7492 * hd      * r07      9.1200e-03      3.2410e+00e
7493 * icflg      * f      0e
7494 * nff      * f      1e
7495 * alp      * r05      0.0000e+00      5.0000e-01      1.0000e+00e
7496 * vl      * f      0.0000e+00e
7497 * vv      * f      0.0000e+00e
7498 * tl      * f      5.4211e+02e
7499 * tv      * f      5.4212e+02e
7500 * p      * f      5.4158e+06e
7501 * pa      * f      0.0000e+00e
7502 * conc      * f      0.0000e+00e
7503 *
7504 *****
7505 *****      type          num          id          ctitle
7506 tee              305              305 $305$ separator & dome 3
7507 *          jcell      nodes      ichf      cost      epsw
7508          6              0              1      0.0000e+00      0.0000e+00
7509 *          iconc1      ncell1      jun1      jun2      ipow1
7510          1              8              305      390              0
7511 *          radin1      th1      hout11      houtv1      tout11
7512      6.5380e-01      9.5250e-03      0.0000e+00      0.0000e+00      3.0000e+02
7513 *          toutv1      pwin1      powoff1      rpwmxx1      pwscl1
7514      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7515 *          iconc2      ncell2      jun3      ipow2
7516          1              4              310              0
7517 *          radin2      th2      hout12      houtv2      tout12
7518      2.0193e+00      8.8900e-02      0.0000e+00      0.0000e+00      3.0000e+02

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7519 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
7520      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7521 *
7522 * main-cell arrays (separator region)
7523 * dx      *      1.2440e+00      1.1670e+00      1.0910e+00      1.0000e+00r03 3.3333e-01
7524 * dx      *      1.0000e+00e
7525 * vol      *      7.6460e+00r02 4.5570e+00      5.6630e+00r03 2.4353e+00      8.9610e+00
7526 * vol      * e
7527 * fa      *      4.2500e+00r03 4.0320e+00      5.5740e+00r02 7.3060e+00      6.9880e+00
7528 * fa      *      8.5590e+00e
7529 * kfacs * f      0.0000e+00e
7530 * rkfac * f      0.0000e+00e
7531 * grav * r04 1.0000e+00r04 0.0000e+00      -1.0000e+00e
7532 * hd      *      3.2410e+00r03 1.3080e+00      2.6640e+00r02 2.8210e+00      2.9780e+00
7533 * hd      *      1.2070e+00e
7534 * icflg * f      0e
7535 * nff * f      1e
7536 * alp * f      1.0000e+00e
7537 * vl * f      0.0000e+00e
7538 * vv * f      0.0000e+00e
7539 * tl * f      5.4211e+02e
7540 * tv * f      5.4212e+02e
7541 * p * f      5.4158e+06e
7542 * pa * f      0.0000e+00e
7543 * conc * f      0.0000e+00e
7544 *
7545 * side-cell arrays (steam dome)
7546 * dx *      1.0150e+00      9.3900e-01      7.0000e-01      2.3900e-01e
7547 * vol * r02 5.1080e+00      7.0000e+00      1.6220e+00e
7548 * fa * r02 5.0325e+00      6.0000e+00      6.7866e+00      1.2897e-01e
7549 * kfacs * r02 1.0000e-10r03 0.0000e+00e
7550 * rkfac * r02 1.0000e-10r03 0.0000e+00e
7551 * grav * f      1.0000e+00e
7552 * hd *      4.3220e+00      3.4380e+00      2.0480e+00      1.0000e+00      6.0985e-01
7553 * hd * e
7554 * icflg * r04      0      1e
7555 * nff * r04      1      -1e
7556 * alp * f      1.0000e+00e
7557 * vl * f      0.0000e+00e
7558 * vv * f      0.0000e+00e
7559 * tl * f      5.4211e+02e
7560 * tv * f      5.4212e+02e
7561 * p * f      5.4158e+06e
7562 * pa * f      0.0000e+00e
7563 * conc * f      0.0000e+00e
7564 *
7565 *****
7566 *****      type      num      id      ctitle
7567 tee      310      310 $310$ main steam line 3

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	jcell	nodes	ichf	cost	epsw
7568 *	jcell	nodes	ichf	cost	epsw
7569	14	1	1	0.0000e+00	0.0000e+00
7570 *	iconc1	ncell1	jun1	jun2	ipow1
7571	1	14	310	320	0
7572 *	iqptr1	iqpsv1	nqptb1	nqpsv1	nqprf1
7573	0	0	0	0	0
7574 *	radin1	th1	hout11	houtv1	tout11
7575	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
7576 *	toutv1	pwin1	pwoff1	rpwm1	pwscl1
7577	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7578 *	qp1	qpoff1	rqpm1	qpscl1	
7579	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7580 *	iconc2	ncell2	jun3	ipow2	
7581	1	1	312	0	
7582 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
7583	0	0	0	0	0
7584 *	radin2	th2	hout12	houtv2	tout12
7585	3.0493e-01	2.5270e-02	0.0000e+00	0.0000e+00	3.0000e+02
7586 *	toutv2	pwin2	pwoff2	rpwm2	pwscl2
7587	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7588 *	qp2	qpoff2	rqpm2	qpscl2	
7589	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7590 *					
7591 *	main-cell arrays (26-inch main steam line)				
7592 *	dx	*	2.2860e+00	5.0292e+00r03	4.4806e+00r08 4.2573e+00 2.2860e+00
7593 *	dx	* e			
7594 *	vol	*	6.6775e-01	1.4733e+00r03	1.3088e+00r08 1.2436e+00 6.6775e-01
7595 *	vol	* e			
7596 *	fa	*	1.2897e-01	2.1054e-01	2.9210e-01 2.1091e-01 1.2972e-01
7597 *	fa	*	2.1091e-01r09	2.9210e-01e	
7598 *	kfac	* f	0.0000e+00e		
7599 *	rkfac	* f	0.0000e+00e		
7600 *	grav	*	1.0000e+00	0.0000e+00r03-1.0000e+00r10	0.0000e+00e
7601 *	hd	* f	6.0985e-01e		
7602 *	icflg	*	1r03	0	1r10 0e
7603 *	nff	* r02	-1	1r03	-1r09 1e
7604 *	alp	* f	1.0000e+00e		
7605 *	vl	* f	0.0000e+00e		
7606 *	vv	* f	0.0000e+00e		
7607 *	tl	* f	5.4211e+02e		
7608 *	tv	* f	5.4212e+02e		
7609 *	p	* f	5.4158e+06e		
7610 *	pa	* f	0.0000e+00e		
7611 *	qppp	* f	0.0000e+00e		
7612 *	matid	*	9e		
7613 *	tw	* f	5.4211e+02e		
7614 *	conc	* f	0.0000e+00e		
7615 *					
7616 *	side-cell arrays (relief-valves header)				
7617 *	dx	*	1.0000e+00e		

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7618 * vol      *      2.9210e-01e
7619 * fa      * f      2.9210e-01e
7620 * kfacs   *      1.0000e-10      0.0000e+00e
7621 * rkfac   *      1.0000e-10      0.0000e+00e
7622 * grav    * f      1.0000e+00e
7623 * hd      * f      6.0985e-01e
7624 * icflg   * f              0e
7625 * nff     * f              1e
7626 * alp     *      1.0000e+00e
7627 * vl      * f      0.0000e+00e
7628 * vv      * f      0.0000e+00e
7629 * tl      *      5.4211e+02e
7630 * tv      *      5.4212e+02e
7631 * p       *      5.4158e+06e
7632 * pa      *      0.0000e+00e
7633 * qppp    *      0.0000e+00e
7634 * matid   *              9e
7635 * tw      *      5.4211e+02e
7636 * conc    *      0.0000e+00e
7637 *
7638 *****
7639 *****      type          num          id          ctitle
7640 tee                312          312 $312$ msl 3 porv/srv header
7641 *      jcell        nodes        ichf          cost          epsw
7642      1              1              1      0.0000e+00      0.0000e+00
7643 *      iconcl        ncell1        jun1          jun2          ipow1
7644      1              1              312          314              0
7645 *      iqptr1        iqpsv1        nqptb1        nqpsv1        nqprf1
7646      0              0              0              0              0
7647 *      radin1        th1          hout11        houtv1        tout11
7648      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
7649 *      toutv1        pwin1        pwoff1        rpwmx1        pwsc11
7650      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7651 *      qp1n1        qpoff1        rqp1mx1        qp1sc11
7652      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7653 *      iconc2        ncell2        jun3          ipow2
7654      1              1              316              0
7655 *      iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
7656      0              0              0              0              0
7657 *      radin2        th2          hout12        houtv2        tout12
7658      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
7659 *      toutv2        pwin2        pwoff2        rpwmx2        pwsc12
7660      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7661 *      qp1n2        qpoff2        rqp1mx2        qp1sc12
7662      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7663 *
7664 * main-cell arrays (header inlet to srv outlet)
7665 * dx      *      1.0000e+00e
7666 * vol     *      2.9210e-01e
7667 * fa     * f      2.9210e-01e

```

```

7668 * kfac * f 0.0000e+00e
7669 * rkfac * f 0.0000e+00e
7670 * grav * f 1.0000e+00e
7671 * hd * f 6.0985e-01e
7672 * icflg * f 0e
7673 * nff * f 1e
7674 * alp * 1.0000e+00e
7675 * vl * f 0.0000e+00e
7676 * vv * f 0.0000e+00e
7677 * tl * 5.4211e+02e
7678 * tv * 5.4212e+02e
7679 * p * 5.4158e+06e
7680 * pa * 0.0000e+00e
7681 * qppp * 0.0000e+00e
7682 * matid * 9e
7683 * tw * 5.4211e+02e
7684 * conc * 0.0000e+00e
7685 *
7686 * side-cell arrays (header outlet to porv)
7687 * dx * 1.0000e+00e
7688 * vol * 2.9210e-01e
7689 * fa * f 2.9210e-01e
7690 * kfac * 1.0000e-10 0.0000e+00e
7691 * rkfac * 1.0000e-10 0.0000e+00e
7692 * grav * f 0.0000e+00e
7693 * hd * f 6.0985e-01e
7694 * icflg * f 0e
7695 * nff * f 1e
7696 * alp * 1.0000e+00e
7697 * vl * f 0.0000e+00e
7698 * vv * f 0.0000e+00e
7699 * tl * 5.4211e+02e
7700 * tv * 5.4212e+02e
7701 * p * 5.4158e+06e
7702 * pa * 0.0000e+00e
7703 * qppp * 0.0000e+00e
7704 * matid * 9e
7705 * tw * 5.4211e+02e
7706 * conc * 0.0000e+00e
7707 *
7708 *****
7709 ***** type num id ctitle
7710 fill 314 314 $314$ msl 3 srv
7711 * jun1 ifty ioff
7712 314 5 0
7713 * iftr ifsv nftb nfsv nfrf
7714 0 3121 9 0 0
7715 * twtold rfmxc concin felv
7716 0.0000e+00 1.0000e+10 0.0000e+00 0.0000e+00

```



```

7717 *          dxin          volin          alpin          vlin          tlin
7718      1.0000e+00      2.9210e-01      1.0000e+00      0.0000e+00      5.4211e+02
7719 *          pin          pain          flowin          vvin          tvin
7720      5.4158e+06      0.0000e+00      0.0000e+00      0.0000e+00      5.4212e+02
7721 *          vmscl          vvscl
7722      1.0000e+00      1.0000e+00
7723 *
7724 * vmtb *      7.5500e+06      0.0000e+00      7.5800e+06      -5.8300e+01      7.6900e+06
7725 * vmtb *      -6.3000e+01      7.7200e+06      -1.2490e+02      7.8200e+06      -1.4730e+02
7726 * vmtb *      7.8600e+06      -2.3920e+02      7.9200e+06      -2.4550e+02      7.9600e+06
7727 * vmtb *      -3.5610e+02      8.2000e+06      -4.3200e+02e
7728 *
7729 *****
7730 *****      type          num          id          ctitle
7731 valve          316          316 $316$ msl 3 porv
7732 *      ncells          nodes          jun1          jun2          epsw
7733      1          1          316          318      0.0000e+00
7734 *      ichf          iconc          ivty          ivps          nvtb2
7735      1          1          1          2          0
7736 *      ivtr          ivsv          nvtb1          nvsv          nvrfr
7737      0          -3162          0          0          0
7738 *      iq3tr          iq3sv          nqp3tb          nqp3sv          nqp3rf
7739      0          0          0          0          0
7740 *      ivtrov          ivtyov
7741      0          0
7742 *      rvmx          rvov          fminov          fmaxov
7743      5.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7744 *      radin          th          houtl          houtv          toutl
7745      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
7746 *      toutv          avlve          hvlve          favlve          xpos
7747      3.0000e+02      4.1484e-03      1.5240e-01      0.0000e+00      0.0000e+00
7748 *      qp3in          qp3off          rqp3mx          qp3scl
7749      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7750 *
7751 * dx *      1.0000e+00e
7752 * vol *      2.9210e-01e
7753 * fa * f      2.9210e-01e
7754 * kfacc * f      0.0000e+00e
7755 * rkfac * f      0.0000e+00e
7756 * grav * f      0.0000e+00e
7757 * hd * f      6.0985e-01e
7758 * icflg *      0          1e
7759 * nff * f      1e
7760 * alp *      1.0000e+00e
7761 * vl * f      0.0000e+00e
7762 * vv * f      0.0000e+00e
7763 * tl *      5.4211e+02e
7764 * tv *      5.4212e+02e
7765 * p *      5.4158e+06e
7766 * pa *      0.0000e+00e

```

```

7767 * qppp *      0.0000e+00e
7768 * matid *      9e
7769 * tw *      5.4211e+02e
7770 * conc *      0.0000e+00e
7771 *
7772 *****
7773 *****      type      num      id      ctitle
7774 break      318      318 $318$ msl 3 porv boundary
7775 *      jun1      ibty      isat      ioff
7776      318      0      0      1
7777 *      dxin      volin      alpin      tin      pin
7778      1.0000e+00      2.9210e-01      1.0000e+00      3.7316e+02      1.0135e+05
7779 *      pain      concin      rbmx      poff      belv
7780      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7781 *
7782 *****
7783 *****      type      num      id      ctitle
7784 valve      320      320 $320$ msiv line 3
7785 *      ncells      nodes      jun1      jun2      epsw
7786      7      1      320      322      0.0000e+00
7787 *      ichf      iconc      ivty      ivps      nvtb2
7788      1      1      3      2      0
7789 *      ivtr      ivsv      nvtb1      nvsv      nvrf
7790      24      1      -2      0      0
7791 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
7792      0      0      0      0      0
7793 *      ivtrov      ivtyov
7794      0      0
7795 *      rvmx      rvov      fminov      fmaxov
7796      1.0000e-01      0.0000e+00      0.0000e+00      1.0000e+00
7797 *      radin      th      houtl      houtv      toutl
7798      3.0493e-01      2.5270e-02      0.0000e+00      0.0000e+00      3.0000e+02
7799 *      toutv      avlve      hvlve      favlve      xpos
7800      3.0000e+02      2.9210e-01      6.0985e-01      4.0000e-01      4.0000e-01
7801 *      qp3in      qp3off      rqp3mx      qp3scl
7802      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7803 *
7804 * main-cell arrays (26-inch main steam line)
7805 * dx *      2.2860e+00r06 4.1078e+00e
7806 * vol *      6.6775e-01r06 1.1999e+00e
7807 * fa * f      2.9210e-01e
7808 * kfacs * r07 0.0000e+00      2.0000e-02e
7809 * rkfac * r07 0.0000e+00      2.0000e-02e
7810 * grav * f      0.0000e+00e
7811 * hd * f      6.0985e-01e
7812 * icflg *      0      1r06      0e
7813 * nff * f      1e
7814 * alp * f      1.0000e+00e
7815 * vl * f      0.0000e+00e
7816 * vv * f      0.0000e+00e

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```

7817 * t1      * f      5.4211e+02e
7818 * tv      * f      5.4212e+02e
7819 * p       * f      5.4158e+06e
7820 * pa      * f      0.0000e+00e
7821 * qppp    * f      0.0000e+00e
7822 * matid   *          9e
7823 * tw      * f      5.4211e+02e
7824 * conc    * f      0.0000e+00e
7825 * vtb1    *      -6.0000e+00    1.0000e+00    4.0000e+00    0.0000e+00e
7826 *
7827 *****
7828 *****      type          num          id          ctitle
7829 tee                350          350 $350$ hp heater discharge line
7830 *      jcell      nodes          ichf          cost          epsw
7831          2          5          1    0.0000e+00    0.0000e+00
7832 *      iconcl      ncell1      jun1          jun2          ipow1
7833          1          2          350          351          0
7834 *      iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
7835          0          0          0          0          0
7836 *      radin1      th1          houtl1      houtv1      toutl1
7837      2.2150e-01    3.2540e-02    0.0000e+00    0.0000e+00    3.0000e+02
7838 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
7839      3.0000e+02    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
7840 *      qpini      qpoff1      rqpmx1      qpscl1
7841      0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
7842 *      iconc2      ncell2      jun3          ipow2
7843          1          1          354          0
7844 *      iqptr2      iqpsv2      nqptb2      nqpsv2      nqprf2
7845          0          0          0          0          0
7846 *      radin2      th2          houtl2      houtv2      toutl2
7847      2.6590e-01    3.8900e-02    0.0000e+00    0.0000e+00    3.0000e+02
7848 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
7849      3.0000e+02    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
7850 *      qpini      qpoff2      rqpmx2      qpscl2
7851      0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+00
7852 *
7853 * main-cell arrays
7854 * dx      *      4.9122e+00    1.1369e+00e
7855 * vol    *      1.0912e+00    2.5255e-01e
7856 * fa     *      1.5408e-01r02 2.2214e-01e
7857 * kfac   * f      3.0000e-01e
7858 * rkfac  * f      3.0000e-01e
7859 * grav   * f      0.0000e+00e
7860 * hd     *      4.4300e-01r02 5.3180e-01e
7861 * icflg  * f          0e
7862 * nff     * f          1e
7863 * alp     * f      0.0000e+00e
7864 * vl     * f      0.0000e+00e
7865 * vv     * f      0.0000e+00e
7866 * t1     * f      4.8870e+02e

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```

7867 * tv      * f      4.8870e+02e
7868 * p       * f      5.4158e+06e
7869 * pa      * f      0.0000e+00e
7870 * qppp    * f      0.0000e+00e
7871 * matid   * f              9e
7872 * tw      * f      4.8870e+02e
7873 * conc    * f      0.0000e+00e
7874 *
7875 * side-cell arrays
7876 * dx      *          3.0479e+00e
7877 * vol     *          3.0000e-01e
7878 * fa      * f      9.8430e-02e
7879 * kfacs   * f      3.0000e-01e
7880 * rkfac   * f      3.0000e-01e
7881 * grav    * f      0.0000e+00e
7882 * hd      * f      3.5400e-01e
7883 * icflg   * f              0e
7884 * nff     * f              1e
7885 * alp     *          0.0000e+00e
7886 * vl      * f      0.0000e+00e
7887 * vv      * f      0.0000e+00e
7888 * tl      *          4.8870e+02e
7889 * tv      *          4.8870e+02e
7890 * p       *          5.4158e+06e
7891 * pa      *          0.0000e+00e
7892 * qppp    * f      0.0000e+00e
7893 * matid   * f              9e
7894 * tw      * f      4.8870e+02e
7895 * conc    *          0.0000e+00e
7896 *
7897 *****
7898 *****      type          num          id          ctitle
7899 valve                354          354 $354$ mfwcv-3 regulating valve
7900 *      ncells      nodes      jun1      jun2      epsw
7901      2              5          354          358      0.0000e+00
7902 *      ichf      iconc      ivty      ivps      nvb2
7903      1              1          3          2              0
7904 *      ivtr      ivsv      nvb1      nvsv      nvrf
7905      1          -3014          0          0              0
7906 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
7907      0              0          0          0              0
7908 *      ivtrov      ivtyov
7909      422              0
7910 *      rvmx      rvov      fminov      fmaxov
7911      2.0000e-02      5.0000e-02      0.0000e+00      1.0000e+00
7912 *      radin      th      hout1      houtv      tout1
7913      1.7700e-01      2.6200e-02      0.0000e+00      0.0000e+00      3.0000e+02
7914 *      toutv      avlve      hvlve      favlve      xpos
7915      3.0000e+02      8.0000e-02      3.1900e-01      4.0000e-01      4.0000e-01

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```

7916 *          qp3in          qp3off          rqp3mx          qp3scl
7917          0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
7918 *
7919 * dx      * f      1.5239e+00e
7920 * vol     * f      1.5000e-01e
7921 * fa      * f      9.8430e-02e
7922 * kfacs   * f      3.0000e-01e
7923 * rkfac   * f      3.0000e-01e
7924 * grav    * f      0.0000e+00e
7925 * hd      * f      3.5400e-01e
7926 * icflg   * f              0e
7927 * nff      * f              1e
7928 * alp      * f      0.0000e+00e
7929 * vl      * f      0.0000e+00e
7930 * vv      * f      0.0000e+00e
7931 * tl      * f      4.8870e+02e
7932 * tv      * f      4.8870e+02e
7933 * p        * f      5.4158e+06e
7934 * pa      * f      0.0000e+00e
7935 * qppp     * f      0.0000e+00e
7936 * matid   * f              9e
7937 * tw      * f      4.8870e+02e
7938 * conc    * f      0.0000e+00e
7939 *
7940 *****
7941 *****      type          num          id          ctitle
7942 fill              369          369 $369$ sdafw fill 3
7943 *          jun1          ifty          ioff
7944          370              8              2
7945 *          iftr          ifsv          nftb          nfsv          nfrf
7946          28          -3005              2              0              0
7947 *          twtold          rfmix          concin          felv
7948          0.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00
7949 *          dxin          volin          alpin          vlin          tlin
7950          1.0000e+00      1.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
7951 *          pin          pain          flowin          vvin          tvin
7952          5.4158e+06      0.0000e+00      0.0000e+00      0.0000e+00      3.0000e+02
7953 *          flwoff          vloff          vvoff          alpoft
7954          0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
7955 *          vmscl          vvscl
7956          1.0000e+00      1.0000e+00
7957 *
7958 * vmtb *          7.4000e-01      9.4635e+00      7.6000e-01      0.0000e+00e
7959 *
7960 *****
7961 *****      type          num          id          ctitle
7962 tee              370          370 $370$ mfwcv-3 discharge line
7963 *          jcell          nodes          ichf          cost          epsw
7964          1              5              1      0.0000e+00      0.0000e+00

```

7965 *	iconc1	ncell1	jun1	jun2	ipow1
7966	1	6	358	380	0
7967 *	iqptr1	iqpsv1	nqptb1	nqpsv1	nqprf1
7968	0	0	0	0	0
7969 *	radin1	th1	houtl1	houtv1	toutl1
7970	1.7700e-01	2.6200e-02	0.0000e+00	0.0000e+00	3.0000e+02
7971 *	toutv1	pwin1	pwoff1	rpwmx1	pwscl1
7972	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7973 *	qp1n1	qpoff1	rqpmx1	qp1scl1	
7974	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7975 *	iconc2	ncell2	jun3	ipow2	
7976	1	1	370	0	
7977 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
7978	0	0	0	0	0
7979 *	radin2	th2	houtl2	houtv2	toutl2
7980	4.8600e-02	8.5600e-03	0.0000e+00	0.0000e+00	3.0000e+02
7981 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
7982	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
7983 *	qp1n2	qpoff2	rqpmx2	qp1scl2	
7984	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
7985 *					
7986 *	main-cell arrays				
7987 *	dx	* f	6.0957e+00e		
7988 *	vol	* f	6.0000e-01e		
7989 *	fa	* r02	9.8430e-02	7.3830e-02	4.9220e-02 7.3830e-02r02 9.8430e-02
7990 *	fa	* e			
7991 *	kfac	* f	3.0000e-01e		
7992 *	rkmfac	* f	3.0000e-01e		
7993 *	grav	*	0.0000e+00	1.0000e+00r05	0.0000e+00e
7994 *	hd	* f	3.5400e-01e		
7995 *	icflg	* f	0e		
7996 *	nff	* f	1e		
7997 *	alp	* f	0.0000e+00e		
7998 *	vl	* f	0.0000e+00e		
7999 *	vv	* f	0.0000e+00e		
8000 *	tl	* f	4.8870e+02e		
8001 *	tv	* f	4.8870e+02e		
8002 *	p	* f	5.4158e+06e		
8003 *	pa	* f	0.0000e+00e		
8004 *	qppp	* f	0.0000e+00e		
8005 *	matid	* f	9e		
8006 *	tw	* f	4.8870e+02e		
8007 *	conc	* f	0.0000e+00e		
8008 *					
8009 *	side-cell arrays				
8010 *	dx	*	1.5240e+00e		
8011 *	vol	*	1.1300e-02e		
8012 *	fa	* f	7.4200e-03e		
8013 *	kfac	* f	3.0000e-01e		
8014 *	rkmfac	* f	3.0000e-01e		

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8015 * grav * f 0.0000e+00e
8016 * hd * f 9.7200e-02e
8017 * icflg * f 0e
8018 * nff * f 1e
8019 * alp * 0.0000e+00e
8020 * vl * f 0.0000e+00e
8021 * vv * f 0.0000e+00e
8022 * tl * 4.8870e+02e
8023 * tv * 4.8870e+02e
8024 * p * 5.4158e+06e
8025 * pa * 0.0000e+00e
8026 * qppp * f 0.0000e+00e
8027 * matid * f 9e
8028 * tw * f 4.8870e+02e
8029 * conc * 0.0000e+00e
8030 *
8031 *****
8032 ***** type num id ctitle
8033 fill 379 379 $379$ mdafw fill 3
8034 * jun1 ifty ioff
8035 379 8 2
8036 * iftr ifsv nftb nfsv nfrf
8037 26 -3005 2 0 0
8038 * twtold rfmxc concin felv
8039 0.0000e+00 2.0000e+00 0.0000e+00 0.0000e+00
8040 * dxin volin alpin vlin tlin
8041 1.0000e+00 1.0000e+00 0.0000e+00 0.0000e+00 3.0000e+02
8042 * pin pain flowin vvin tvin
8043 5.4158e+06 0.0000e+00 0.0000e+00 0.0000e+00 3.0000e+02
8044 * flwoff vlofff vvoff alpofff
8045 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
8046 * vmscl vvscl
8047 1.0000e+00 1.0000e+00
8048 *
8049 * vmtb * 7.4000e-01 9.4635e+00 7.6000e-01 0.0000e+00e
8050 *
8051 *****
8052 ***** type num id ctitle
8053 tee 380 380 $380$ mfw line 3
8054 * jcell nodes ichf cost epsw
8055 4 5 1 0.0000e+00 0.0000e+00
8056 * iconcl ncell1 jun1 jun2 ipow1
8057 1 6 380 385 0
8058 * iqptr1 iqpsv1 nqptb1 nqpsv1 nqprf1
8059 0 0 0 0 0
8060 * radin1 th1 hout11 houtv1 tout11
8061 1.7700e-01 2.6200e-02 0.0000e+00 0.0000e+00 3.0000e+02
8062 * toutv1 pwini pwoff1 rpwmxl pwscl1
8063 3.0000e+02 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00

```

8064 *	qp1n1	qpoff1	rqpmx1	qpscl1	
8065	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
8066 *	iconc2	ncell12	.jun3	ipow2	
8067	1	1	379	0	
8068 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
8069	0	0	0	0	0
8070 *	radin2	th2	hout12	houtv2	tout12
8071	4.8600e-02	8.5600e-03	0.0000e+00	0.0000e+00	3.0000e+02
8072 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
8073	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
8074 *	qp1n2	qpoff2	rqpmx2	qpscl2	
8075	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
8076 *					
8077 *	main-cell arrays				
8078 * dx	* r02	6.0957e+00	8.1886e+00	6.9186e+00r02	5.3033e+00e
8079 * vol	* r02	6.0000e-01	8.0600e-01	6.8100e-01r02	5.2200e-01e
8080 * fa	* f	9.8430e-02e			
8081 * kfacc	* f	3.0000e-01e			
8082 * rkfac	* f	3.0000e-01e			
8083 * grav	* r05	0.0000e+00r02	1.0000e+00e		
8084 * hd	* f	3.5400e-01e			
8085 * icflg	* f	0e			
8086 * nff	* f	1e			
8087 * alp	* f	0.0000e+00e			
8088 * vl	* f	0.0000e+00e			
8089 * vv	* f	0.0000e+00e			
8090 * tl	* f	4.8870e+02e			
8091 * tv	* f	4.8870e+02e			
8092 * p	* f	5.4158e+06e			
8093 * pa	* f	0.0000e+00e			
8094 * qppp	* f	0.0000e+00e			
8095 * matid	* f	9e			
8096 * tw	* f	4.8870e+02e			
8097 * conc	* f	0.0000e+00e			
8098 *					
8099 *	side-cell arrays				
8100 * dx	*	8.8390e+00e			
8101 * vol	*	6.5560e-02e			
8102 * fa	* f	7.4200e-03e			
8103 * kfacc	* f	3.0000e-01e			
8104 * rkfac	* f	3.0000e-01e			
8105 * grav	* f	0.0000e+00e			
8106 * hd	* f	9.7200e-02e			
8107 * icflg	* f	0e			
8108 * nff	* f	1e			
8109 * alp	*	0.0000e+00e			
8110 * vl	* f	0.0000e+00e			
8111 * vv	* f	0.0000e+00e			
8112 * tl	*	4.8870e+02e			
8113 * tv	*	4.8870e+02e			


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8114 * p      *      5.4158e+06e
8115 * pa     *      0.0000e+00e
8116 * qppp   * f      0.0000e+00e
8117 * matid  * f           9e
8118 * tw     * f      4.8870e+02e
8119 * conc   *      0.0000e+00e
8120 *
8121 *****
8122 *****      type          num          id          ctitle
8123 tee                390          390 $390$ steam-gen downcomer 3
8124 *      jcell      nodes      ichf      cost      epsw
8125      3              0              1      0.0000e+00      0.0000e+00
8126 *      iconc1      ncell1      jun1      jun2      ipow1
8127      1              12          390      300              0
8128 *      radin1      th1      hout11      houtv1      tout11
8129      1.0920e-01      3.8040e-02      0.0000e+00      0.0000e+00      3.0000e+02
8130 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
8131      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8132 *      iconc2      ncell2      jun3      ipow2
8133      1              1          385              0
8134 *      radin2      th2      hout12      houtv2      tout12
8135      1.7700e-01      2.6200e-02      0.0000e+00      0.0000e+00      3.0000e+02
8136 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
8137      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8138 *
8139 * main-cell arrays (downcomer annulus)
8140 * dx      *      1.0910e+00r03 3.8900e-01      1.2440e+00r07 1.3320e+00e
8141 * vol     *      9.7890e+00r03 3.2630e+00      7.5320e+00      2.7290e+00      8.0750e-01
8142 * vol     * r05 7.0000e-01e
8143 * fa      *      8.5590e+00      8.6600e+00r02 8.3882e+00      8.6600e+00      3.3610e+00
8144 * fa      *      1.2350e+00r05 5.2120e-01      2.8456e+00e
8145 * kfacs   * r04 0.0000e+00      1.0000e-01r02 3.0000e-01r05 0.0000e+00      2.1500e+02
8146 * kfacs   * e
8147 * rkfac   * r04 0.0000e+00      2.0000e-01r02 6.0000e-01r05 0.0000e+00      1.0000e+03
8148 * rkfac   * e
8149 * grav     * r12-1.0000e+00      0.0000e+00e
8150 * hd      *      1.2070e+00r04 1.3750e+00      6.0000e-01      2.5280e-01r05 1.0912e-01
8151 * hd      *      9.1200e-03e
8152 * icflg   * f              0e
8153 * nff      * f              1e
8154 * alp      * r04 1.0000e+00      7.2195e-01r07 0.0000e+00e
8155 * vl      * f      0.0000e+00e
8156 * vv      * f      0.0000e+00e
8157 * tl      * f      4.9330e+02e
8158 * tv      * f      4.9330e+02e
8159 * p      * f      5.4158e+06e
8160 * pa     * f      0.0000e+00e
8161 * conc    * f      0.0000e+00e
8162 *

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8163 * side-cell arrays (feedwater inlet)
8164 * dx      *      1.4569e+00e
8165 * vol     *      1.4340e-01e
8166 * fa      * f     9.8430e-02e
8167 * kfacs   *      5.0000e-01   3.0000e-01e
8168 * rkfac   *      1.0000e+00   3.0000e-01e
8169 * grav    *      0.0000e+00  -1.0000e+00e
8170 * hd      * f     3.5400e-01e
8171 * icflg   * f           0e
8172 * nff     * f           1e
8173 * alp     *      0.0000e+00e
8174 * vl      * f     0.0000e+00e
8175 * vv      * f     0.0000e+00e
8176 * tl      *      4.8870e+02e
8177 * tv      *      4.8870e+02e
8178 * p       *      5.4158e+06e
8179 * pa      *      0.0000e+00e
8180 * conc    *      0.0000e+00e
8181 *
8182 *****
8183 *****      type          num          id          ctitle
8184 tee          400          400 $400$ steam-line header inlet
8185 *          jcell          nodes          ichf          cost          epsw
8186          3          1          1          0.0000e+00          0.0000e+00
8187 *          iconcl          ncell1          jun1          jun2          ipow1
8188          1          3          122          410          0
8189 *          iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
8190          0          0          0          0          0
8191 *          radin1          th1          hout11          houtv1          tout11
8192          8.4445e-01          7.0000e-02          0.0000e+00          0.0000e+00          3.0000e+02
8193 *          toutv1          pwin1          pwoff1          rpwmx1          pwsc11
8194          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
8195 *          qp1n1          qpoff1          rqp1mx1          qp1sc11
8196          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
8197 *          iconc2          ncell12          jun3          ipow2
8198          1          1          222          0
8199 *          iqptr2          iqpsv2          nqptb2          nqpsv2          nqprf2
8200          0          0          0          0          0
8201 *          radin2          th2          hout12          houtv2          tout12
8202          3.0493e-01          2.5270e-02          0.0000e+00          0.0000e+00          3.0000e+02
8203 *          toutv2          pwin2          pwoff2          rpwmx2          pwsc12
8204          3.0000e+02          0.0000e+00          0.0000e+00          0.0000e+00          0.0000e+00
8205 *          qp1n2          qpoff2          rqp1mx2          qp1sc12
8206          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
8207 *
8208 * main-cell arrays (main steam line 1 inlet to header)
8209 * dx      * f     9.1440e-01e
8210 * vol     *      1.0242e+00r02 2.0485e+00e
8211 * fa      *      2.9210e-01r03 2.2403e+00e
8212 * kfacs   * r02 2.0000e-02r02 0.0000e+00e

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8213 * rkfac * r02 2.0000e-02r02 0.0000e+00e
8214 * grav * f 0.0000e+00e
8215 * hd * 6.0985e-01r03 1.6889e+00e
8216 * icflg * f 0e
8217 * nff * f 1e
8218 * alp * f 1.0000e+00e
8219 * vl * f 0.0000e+00e
8220 * vv * f 0.0000e+00e
8221 * tl * f 5.4211e+02e
8222 * tv * f 5.4212e+02e
8223 * p * f 5.4158e+06e
8224 * pa * f 0.0000e+00e
8225 * qppp * f 0.0000e+00e
8226 * matid * 9e
8227 * tw * f 5.4211e+02e
8228 * conc * f 0.0000e+00e
8229 *
8230 * side-cell arrays
8231 * dx * 9.1440e-01e
8232 * vol * 1.0242e+00e
8233 * fa * 1.1200e+00 2.9210e-01e
8234 * kfacs * f 2.0000e-02e
8235 * rkfac * f 2.0000e-02e
8236 * grav * f 0.0000e+00e
8237 * hd * 1.6889e+00 6.0985e-01e
8238 * icflg * f 0e
8239 * nff * f 1e
8240 * alp * 1.0000e+00e
8241 * vl * f 0.0000e+00e
8242 * vv * f 0.0000e+00e
8243 * tl * 5.4211e+02e
8244 * tv * 5.4212e+02e
8245 * p * 5.4158e+06e
8246 * pa * 0.0000e+00e
8247 * qppp * 0.0000e+00e
8248 * matid * 9e
8249 * tw * 5.4211e+02e
8250 * conc * 0.0000e+00e
8251 *
8252 *****
8253 ***** type num id ctitle
8254 tee 410 410 $410$ steam-line header outlet
8255 * jcell nodes ichf cost epsw
8256 2 1 1 0.0000e+00 0.0000e+00
8257 * iconcl1 ncell11 jun1 jun2 ipow1
8258 1 3 322 420 0
8259 * iqptr1 iqpsv1 nqptb1 nqpsv1 nqprf1
8260 0 0 0 0 0
8261 * radin1 th1 hout11 houtv1 tout11
8262 3.0493e-01 2.5270e-02 0.0000e+00 0.0000e+00 3.0000e+02

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8263 *	toutv1	pwin1	pwoff1	rpwmx1	pwsc11
8264	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
8265 *	qp1n1	qpoff1	rqpmx1	qp1sc11	
8266	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
8267 *	iconc2	ncell2	jun3	ipow2	
8268	1	1	410	0	
8269 *	iqptr2	iqpsv2	nqptb2	nqpsv2	nqprf2
8270	0	0	0	0	0
8271 *	radin2	th2	hout12	houtv2	tout12
8272	8.4445e-01	7.0000e-02	0.0000e+00	0.0000e+00	3.0000e+02
8273 *	toutv2	pwin2	pwoff2	rpwmx2	pwsc12
8274	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
8275 *	qp1n2	qpoff2	rqpmx2	qp1sc12	
8276	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
8277 *					
8278 *	main-cell arrays (msl 3 inlet to header and header outlet)				
8279 *	dx	* f	6.0960e-01e		
8280 *	vol	* f	6.8283e-01e		
8281 *	fa	*	2.9210e-01r02	1.1201e+00	8.8491e-01e
8282 *	kfac	*	2.0000e-02r03	0.0000e+00e	
8283 *	rkfac	*	2.0000e-02r03	0.0000e+00e	
8284 *	grav	* f	0.0000e+00e		
8285 *	hd	*	6.0985e-01r02	6.8021e-01	7.5057e-01e
8286 *	icflg	* f	0e		
8287 *	nff	* f	1e		
8288 *	alp	* f	1.0000e+00e		
8289 *	vl	* f	0.0000e+00e		
8290 *	vv	* f	0.0000e+00e		
8291 *	tl	* f	5.4211e+02e		
8292 *	tv	* f	5.4212e+02e		
8293 *	p	* f	5.4158e+06e		
8294 *	pa	* f	0.0000e+00e		
8295 *	qppp	* f	0.0000e+00e		
8296 *	matid	*	9e		
8297 *	tw	* f	5.4211e+02e		
8298 *	conc	* f	0.0000e+00e		
8299 *					
8300 *	side-cell arrays (msl 1 and 2 inlet to header)				
8301 *	dx	*	9.1440e-01e		
8302 *	vol	*	2.0485e+00e		
8303 *	fa	* f	2.2403e+00e		
8304 *	kfac	*	1.0000e-10	0.0000e+00e	
8305 *	rkfac	*	1.0000e-10	0.0000e+00e	
8306 *	grav	* f	0.0000e+00e		
8307 *	hd	* f	1.6889e+00e		
8308 *	icflg	* f	0e		
8309 *	nff	* f	1e		
8310 *	alp	*	1.0000e+00e		
8311 *	vl	* f	0.0000e+00e		
8312 *	vv	* f	0.0000e+00e		

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8313 * tl      *      5.4211e+02e
8314 * tv      *      5.4212e+02e
8315 * p       *      5.4158e+06e
8316 * pa      *      0.0000e+00e
8317 * qppp    *      0.0000e+00e
8318 * matid   *          9e
8319 * tw      *      5.4211e+02e
8320 * conc    *      0.0000e+00e
8321 *
8322 *****
8323 *****      type          num          id          ctitle
8324 tee                420          420 $420$ turbine/steam-dump line
8325 *      jcell      nodes          ichf          cost          epsw
8326          4                1                1      0.0000e+00      0.0000e+00
8327 *      iconc1      ncell1      jun1          jun2          ipow1
8328          1                8          420          422                0
8329 *      iqptr1      iqpsv1      nqptb1      nqpsv1      nqprf1
8330          0                0                0                0                0
8331 *      radin1      th1          hout11      houtv1      tout11
8332      3.7529e-01      3.1110e-02      0.0000e+00      0.0000e+00      3.0000e+02
8333 *      toutv1      pwin1      pwoff1      rpwmx1      pwsc11
8334      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8335 *      qpin1      qpoff1      rqpwx1      qpscl1
8336      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
8337 *      iconc2      ncell2      jun3          ipow2
8338          1                6          430                0
8339 *      iqptr2      iqpsv2      nqptb2      nqpsv2      nqprf2
8340          0                0                0                0                0
8341 *      radin2      th2          hout12      houtv2      tout12
8342      1.8654e-01      1.6660e-02      0.0000e+00      0.0000e+00      3.0000e+02
8343 *      toutv2      pwin2      pwoff2      rpwmx2      pwsc12
8344      3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8345 *      qpin2      qpoff2      rqpwx2      qpscl2
8346      0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
8347 *
8348 * main-cell arrays (combined 2 32-inch turbine steam lines
8349 * dx      * f      4.7833e+00e
8350 * vol     * f      4.2328e+00e
8351 * fa      * f      8.8491e-01e
8352 * kfacs  * f      0.0000e+00e
8353 * rkfac   * f      0.0000e+00e
8354 * grav    * f      0.0000e+00e
8355 * hd      * f      7.5057e-01e
8356 * icflg   * f          0e
8357 * nff     * f          1e
8358 * alp     * f      1.0000e+00e
8359 * vl      * f      0.0000e+00e
8360 * vv      * f      0.0000e+00e
8361 * tl      * f      5.4211e+02e
8362 * tv      * f      5.4212e+02e

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8363 * p      * f      5.4158e+06e
8364 * pa     * f      0.0000e+00e
8365 * qppp   * f      0.0000e+00e
8366 * matid  *          9e
8367 * tw     * f      5.4211e+02e
8368 * conc   * f      0.0000e+00e
8369 *
8370 * side-cell arrays (combined 2 16-inch + 1 12-inch steam-dump lines)
8371 * dx      * f      4.8248e+00e
8372 * vol     * f      1.3858e+00e
8373 * fa      * f      2.8722e-01e
8374 * kfacs  *          1.0000e-10r06 0.0000e+00e
8375 * rkfac   *          1.0000e-10r06 0.0000e+00e
8376 * grav    * f      0.0000e+00e
8377 * hd      * f      3.7308e-01e
8378 * icflg   * f          0e
8379 * nff     * f          1e
8380 * alp     * f      1.0000e+00e
8381 * vl      * f      0.0000e+00e
8382 * vv      * f      0.0000e+00e
8383 * tl      * f      5.4211e+02e
8384 * tv      * f      5.4212e+02e
8385 * p      * f      5.4158e+06e
8386 * pa     * f      0.0000e+00e
8387 * qppp   * f      0.0000e+00e
8388 * matid  *          9e
8389 * tw     * f      5.4211e+02e
8390 * conc   * f      0.0000e+00e
8391 *
8392 *****
8393 *****      type          num          id          ctitle
8394 valve                422          422 $422$ turbine stop valve
8395 *          ncells        nodes        jun1          jun2          epsw
8396          1              1              422          424          0.0000e+00
8397 *          ichf          iconc        ivty          ivps          nvtb2
8398          1              1              3              2              0
8399 *          ivtr          ivsv        nvtb1          nvsv          nvrf
8400          18             1              -2              0              0
8401 *          iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
8402          0              0              0              0              0
8403 *          ivtrov        ivtyov
8404          0              0
8405 *          rvmx          rvov          fminov          fmaxov
8406          4.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
8407 *          radin          th          hout1          houtv          tout1
8408          3.7529e-01      3.1110e-02      0.0000e+00      0.0000e+00      3.0000e+02
8409 *          toutv          avlve          hvlve          favlve          xpos
8410          3.0000e+02      8.8491e-01      7.5057e-01      1.0000e+00      1.0000e+00
8411 *          qp3in          qp3off        rqp3mx          qp3scl
8412          0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00

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8413 *
8414 * dx      *      4.7833e+00e
8415 * vol     *      4.2328e+00e
8416 * fa      * f      8.8491e-01e
8417 * kfacs  * f      0.0000e+00e
8418 * rkfac   * f      0.0000e+00e
8419 * grav    * f      0.0000e+00e
8420 * hd      * f      7.5057e-01e
8421 * icflg   * f           0e
8422 * nff     *      1      -1e
8423 * alp     *      1.0000e+00e
8424 * vl      * f      0.0000e+00e
8425 * vv      * f      0.0000e+00e
8426 * tl      *      5.4211e+02e
8427 * tv      *      5.4212e+02e
8428 * p       *      5.4158e+06e
8429 * pa      *      0.0000e+00e
8430 * qppp    *      0.0000e+00e
8431 * matid   *           9e
8432 * tw      *      5.4211e+02e
8433 * conc    *      0.0000e+00e
8434 * vtbl    *      0.0000e+00      1.0000e+00      2.5000e-01      0.0000e+00e
8435 *
8436 *****
8437 *****      type          num          id          ctitle
8438 break              424              424 $424$ turbine pressure b.c.
8439 *                jun1          ibty          isat          ioff
8440                424              0              3              1
8441 *                dxin          volin          alpin          tin          pin
8442                4.7833e+00      4.2328e+01      1.0000e+00      5.4220e+02      5.3224e+06
8443 *                pain          concin          rbmx          poff          belv
8444                0.0000e+00      0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
8445 *
8446 *****
8447 *****      type          num          id          ctitle
8448 tee                430              430 $430$ steam-dump line
8449 *                jcell          nodes          ichf          cost          epsw
8450                2              1              1      0.0000e+00      0.0000e+00
8451 *                iconc1          ncell1          jun1          jun2          ipow1
8452                1              6              430          432              0
8453 *                iqptr1          iqpsv1          nqptb1          nqpsv1          nqprf1
8454                0              0              0              0              0
8455 *                radin1          th1          hout11          houtv1          tout11
8456                1.8654e-01      1.6660e-02      0.0000e+00      0.0000e+00      3.0000e+02
8457 *                toutv1          pwin1          pwoff1          rpwmx1          pwsc11
8458                3.0000e+02      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8459 *                qp1n1          qpoff1          rqp1mx1          qp1sc11
8460                0.0000e+00      0.0000e+00      0.0000e+00      1.0000e+00
8461 *                iconc2          ncell2          jun3          ipow2
8462                1              1              436              0

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8463 *	iqptr2	iqpsv2	ngptb2	ngpsv2	ngprf2
8464	0	0	0	0	0
8465 *	radin2	th2	houtl2	houtv2	toutl2
8466	1.4765e-01	1.4270e-02	0.0000e+00	0.0000e+00	3.0000e+02
8467 *	toutv2	pwin2	pwoff2	rpwmx2	pwscl2
8468	3.0000e+02	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
8469 *	qpin2	qpoff2	rqpmx2	qpscl2	
8470	0.0000e+00	0.0000e+00	0.0000e+00	1.0000e+00	
8471 *					
8472 *	main-cell arrays				
8473 * dx	* r03	1.6083e+00r02	5.1565e+00	4.2405e+00e	
8474 * vol	* r03	3.3933e-01r02	7.0633e-01	5.8086e-01e	
8475 * fa	*	2.8722e-01r02	2.1099e-01r04	1.3698e-01e	
8476 * kf	* f	0.0000e+00e			
8477 * rk	* f	0.0000e+00e			
8478 * grav	* f	0.0000e+00e			
8479 * hd	*	3.7308e-01r06	2.9530e-01e		
8480 * icflg	* f	0e			
8481 * nff	* f	1e			
8482 * alp	* f	1.0000e+00e			
8483 * vl	* f	0.0000e+00e			
8484 * vv	* f	0.0000e+00e			
8485 * tl	* f	5.4211e+02e			
8486 * tv	* f	5.4212e+02e			
8487 * p	* f	5.4158e+06e			
8488 * pa	* f	0.0000e+00e			
8489 * qppp	* f	0.0000e+00e			
8490 * matid	*	9e			
8491 * tw	* f	5.4211e+02e			
8492 * conc	* f	0.0000e+00e			
8493 *					
8494 *	side-cell arrays				
8495 * dx	*	4.2405e+00e			
8496 * vol	*	8.7129e-01e			
8497 * fa	* f	2.0547e-01e			
8498 * kf	*	1.0000e-10	0.0000e+00e		
8499 * rk	*	1.0000e-10	0.0000e+00e		
8500 * grav	* f	0.0000e+00e			
8501 * hd	* f	2.9530e-01e			
8502 * icflg	* f	0e			
8503 * nff	* f	1e			
8504 * alp	*	1.0000e+00e			
8505 * vl	* f	0.0000e+00e			
8506 * vv	* f	0.0000e+00e			
8507 * tl	*	5.4211e+02e			
8508 * tv	*	5.4212e+02e			
8509 * p	*	5.4158e+06e			
8510 * pa	*	0.0000e+00e			
8511 * qppp	*	0.0000e+00e			
8512 * matid	*	9e			


```

8513 * tw      *      5.4211e+02e
8514 * conc    *      0.0000e+00e
8515 *
8516 *****
8517 *****      type          num          id          ctitle
8518 valve          432          432 $432$ steam-dump valve a (bank
8519 *      ncells          nodes          jun1          jun2          epsw
8520          1          1          432          434          0.0000e+00
8521 *      ichf          iconc          ivty          ivps          nvtb2
8522          1          1          1          2          0
8523 *      ivtr          ivsv          nvtb1          nvsv          nvrfr
8524          0          -4342          0          0          0
8525 *      iqp3tr          iqp3sv          nqp3tb          nqp3sv          nqp3rf
8526          0          0          0          0          0
8527 *      ivtrov          ivtyov
8528          0          0
8529 *      rvmx          rvov          fminov          fmaxov
8530          3.3330e-01          0.0000e+00          0.0000e+00          1.0000e+00
8531 *      radin          th          hout1          houtv          tout1
8532          1.4765e-01          1.4270e-02          0.0000e+00          0.0000e+00          3.0000e+02
8533 *      toutv          avlve          hvlve          favlve          xpos
8534          3.0000e+02          1.3698e-01          2.9530e-01          0.0000e+00          0.0000e+00
8535 *      qp3in          qp3off          rqp3mx          qp3scl
8536          0.0000e+00          0.0000e+00          0.0000e+00          1.0000e+00
8537 *
8538 *      main-cell arrays (combined 2 12-inch lines)
8539 * dx      *      4.2405e+00e
8540 * vol     *      5.8086e-01e
8541 * fa      * f      1.3698e-01e
8542 * kfacs  * f      0.0000e+00e
8543 * rkfac   * f      0.0000e+00e
8544 * grav    * f      0.0000e+00e
8545 * hd      * f      2.9530e-01e
8546 * icflg   * f          0e
8547 * nff     * f          1e
8548 * alp     *      1.0000e+00e
8549 * vl      * f      0.0000e+00e
8550 * vv      * f      0.0000e+00e
8551 * tl      *      5.4211e+02e
8552 * tv      *      5.4212e+02e
8553 * p       *      5.4158e+06e
8554 * pa      *      0.0000e+00e
8555 * qppp    *      0.0000e+00e
8556 * matid   *          9e
8557 * tw      *      5.4211e+02e
8558 * conc    *      0.0000e+00e
8559 *
8560 *****
8561 *****      type          num          id          ctitle
8562 break          434          434 $434$ condenser a boundary

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8563 *      jun1      ibty      isat      ioff
8564      434          0          3
8565 *      dxin      volin      alpin      tin      pin
8566      4.2405e+00  5.8086e-01  1.0000e+00  3.1106e+02  6.7731e+03
8567 *      pain      concin      rbmx      poff      belv
8568      0.0000e+00  0.0000e+00  1.0000e+20  0.0000e+00  0.0000e+00
8569 *
8570 *****
8571 *****      type      num      id      ctitle
8572 valve      436      436 $436$ steam-dump valve b (bank
8573 *      ncells      nodes      jun1      jun2      epsw
8574      1          1      436      438      0.0000e+00
8575 *      ichf      iconc      ivty      ivps      nvth2
8576      1          1          1          2          0
8577 *      ivtr      ivsv      nvth1      nvsv      nvrf
8578      0          -4340      0          0          0
8579 *      iqp3tr      iqp3sv      nqp3tb      nqp3sv      nqp3rf
8580      0          0          0          0          0
8581 *      ivtrov      ivtyov
8582      0          0
8583 *      rvmx      rvov      fminov      fmaxov
8584      3.3330e-01  0.0000e+00  0.0000e+00  1.0000e+00
8585 *      radin      th      hout1      houtv      tout1
8586      1.4765e-01  1.4270e-02  0.0000e+00  0.0000e+00  3.0000e+02
8587 *      toutv      avlve      hvlve      favlve      xpos
8588      3.0000e+02  2.0547e-01  2.9530e-01  0.0000e+00  0.0000e+00
8589 *      qp3in      qp3off      rqp3mx      qp3scl
8590      0.0000e+00  0.0000e+00  0.0000e+00  1.0000e+00
8591 *
8592 *      main-cell arrays (combined 3 12-inch lines)
8593 * dx      *      4.2405e+00e
8594 * vol      *      8.7129e-01e
8595 * fa      * f      2.0547e-01e
8596 * kfacs      * f      0.0000e+00e
8597 * rkfac      * f      0.0000e+00e
8598 * grav      * f      0.0000e+00e
8599 * hd      * f      2.9530e-01e
8600 * icflg      * f      0e
8601 * nff      * f      1e
8602 * alp      *      1.0000e+00e
8603 * vl      * f      0.0000e+00e
8604 * vv      * f      0.0000e+00e
8605 * tl      *      5.4211e+02e
8606 * tv      *      5.4212e+02e
8607 * p      *      5.4158e+06e
8608 * pa      *      0.0000e+00e
8609 * qppp      *      0.0000e+00e
8610 * matid      *      9e
8611 * tw      *      5.4211e+02e
8612 * conc      *      0.0000e+00e

```

```

8613 *
8614 *****
8615 *****      type          num          id          ctitle
8616 break                438          438 $438$ condenser b boundary
8617 *          jun1          ibty          isat          ioff
8618          438              0              3              1
8619 *          dxin          volin          alpin          tin          pin
8620          4.2405e+00      8.7129e-01      1.0000e+00      3.1106e+02      6.7731e+03
8621 *          pain          concin          rbmx          poff          belv
8622          0.0000e+00      0.0000e+00      1.0000e+20      0.0000e+00      0.0000e+00
8623 *
8624 *****
8625 *****      type          num          id          ctitle
8626 break                576          576 $576$ mfw-1 pressure boundary
8627 *          jun1          ibty          isat          ioff
8628          150              0              0              0
8629 *          dxin          volin          alpin          tin          pin
8630          1.0000e+00      1.0000e+00      0.0000e+00      4.8870e+02      7.0000e+06
8631 *          pain          concin          rbmx          poff          belv
8632          0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8633 *
8634 *****
8635 *****      type          num          id          ctitle
8636 break                578          578 $578$ mfw-2 pressure boundary
8637 *          jun1          ibty          isat          ioff
8638          350              0              0              0
8639 *          dxin          volin          alpin          tin          pin
8640          1.0000e+00      1.0000e+00      0.0000e+00      4.8870e+02      7.0000e+06
8641 *          pain          concin          rbmx          poff          belv
8642          0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00      0.0000e+00
8643 *
8644 *****
8645 *****      type          num          id          ctitle
8646 rod                900          900 $900$ reactor-core fuel rods
8647 *          ncrx          ncrz          ittc          iext          mld
8648          6              4              0              0              0
8649 *          nopowr          nrldr          modez          liqlev          iaxcnd
8650          0              0              0              1              1
8651 *          idbci          idbco          hdri          hdro          irftr2
8652          0              2              0.0000e+00      0.0000e+00      98
8653 *          nrods          nodes          irftr          zmax          snelv
8654          12             8              9997          200          1.7000e+04
8655 *          dtxht(1)          dtxht(2)          dznhht          gapo          nhist
8656          3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00
8657 *          irpwty          ndgx          ndhx          nrts          nhist
8658          4              6              10            0
8659 *          irpwtr          irpwsv          nrpwtr          nrpwsv          nrpwrfrf
8660          10             1              -4            0
8661 *          izpwtr          izpwsv          nzpwtr          nzpwsv          nzpwrfrf
8662          0              1              1              0

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```

graph LR
    128 --> ncrx
    128 --> ncrz
    128 --> hdro
    130 --> ncrx
    135 --> nrldr
    139 --> idbco
    140 --> idbci
    132 --> ndgx
    133 --> ndhx
    137 --> gapo
    138 --> zmax
    138 --> irftr2
    131 --> nrpwrfrf
    134 --> nzpwrfrf

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8663 *	nmwrx	nfcil	nfcil		
8664	1	1	1		
8665 *	nzpwz	nzpwz	nfbpwt		
8666	131 0	134 0	0		
8667 *	react	tneut	rpwoff	rrpwmix	rpwscl
8668	0.0000e+00	1.6250e-05	-1.0000e+20	1.0000e+20	1.0000e+00
8669 *	rpowri	zpwini	zpwoff	rzpwmix	
8670	2.3000e+09	1.0000e+00	-1.0000e+20	1.0000e+20	
8671 *	extsou	132 pldr	pdrat	fucrac	
8672	0.0000e+00	0.0000e+00	1.3280e+00	5.0000e-01	
8673 *					
8674 * nhcomo* f		1e	139		
8675 * nhcelo*		-3	3	4	5 141 6
8676 * nhcelo*		7e			
8677 * z *	3.0004e+00	3.9148e+00	4.8292e+00	5.7436e+00	6.6580e+00
8678 * z * e					
8679 * grav * f	1.0000e+00e				139 5
8680 * idrod *	1				
8681 * idrod *	6e	130 2	3	4	
8682 * rdx * f	5.3380e+03e				
8683 * radrd *	0.0000e+00	1.1319e-03	2.2638e-03	3.3957e-03	4.5275e-03
8684 * radrd *	4.6228e-03	5.0038e-03	5.3848e-03e		
8685 * matrd * r04	1		3r02	2e	136
8686 * nfax * f	138 5e	140			
8687 * rftn * f	5.5910e+02e		139		
8688 * rftn * f	5.5910e+02e				
8689 * rftn * f	5.5910e+02e				
8690 * rftn * f	5.5910e+02e				
8691 * rftn * f	5.5910e+02e				
8692 * rftn * f	5.5910e+02e				
8693 * rftn * f	5.5910e+02e				
8694 * rftn * f	5.5910e+02e				
8695 * rftn * f	5.5910e+02e				
8696 * rftn * f	5.5910e+02e				
8697 * rftn * f	5.5910e+02e				
8698 * rftn * f	5.5910e+02e				
8699 * rdpwr * r05	1.0000e+00r03	0.0000e+00e			
8700 * cpowr * f	1.0000e+00e				
8701 * rpkf * f	1.6780e+00e				
8702 * zpwtb *	0.0000e+00	9.0000e-01	1.5460e+00	1.6570e+00	1.5220e+00
8703 * zpwtb *	9.2600e-01e				
8704 * rpwtb *	1.0000e+00	0.0000e+00	1.6000e+00	-8.4000e-03	2.0000e+00
8705 * rpwtb *	-3.2500e-02	2.2000e+00	-3.5000e-02e		
8706 * beta *	1.6900e-04	8.3200e-04	2.6400e-03	1.2200e-03	1.3800e-03
8707 * beta *	2.4700e-04e				
8708 * lamda *	3.8700e+00	1.4000e+00	3.1100e-01	1.1500e-01	3.1700e-02
8709 * lamda *	133 1.2700e-02e				
8710 * cdgn *	6.1809e+09	8.4114e+10	1.2015e+12	1.5015e+12	6.1616e+12
8711 * cdgn *	2.7528e+12e				
8712 * lamdh *	1.7720e+00	5.7740e-01	6.7430e-02	6.2140e-03	4.7390e-04

8713	*	lamdh	*	4.8100e-05	5.3440e-06	5.7260e-07	1.0360e-07	2.9590e-08	
8714	*	lamdh	*	7.5850e-10e					
8715	*	edh	*	2.9900e-03	8.2500e-03	1.5500e-02	1.9350e-02	1.1650e-02	
8716	*	edh	*	133 6.4500e-03	2.3100e-03	1.6400e-03	8.5000e-04	4.3000e-04	
8717	*	edh	*	5.7000e-04e					
8718	*	cdhn	*	3.8809e+06	3.2863e+07	5.2870e+08	7.1621e+09	5.6541e+10	
8719	*	cdhn	*	3.0842e+11	9.9420e+11	6.5875e+12	1.8871e+13	3.3423e+13	
8720	*	cdhn	*	1.7284e+15e					
8721	*	fpuo2	* f	0.0000e+00e					
8722	*	ftd	* f	9.4000e-01e					
8723	*	gmix	*	1.0000e+00r06	0.0000e+00	1.0000e+00r06	0.0000e+00	1.0000e+00	
8724	*	gmix	* r06	0.0000e+00	1.0000e+00r06	0.0000e+00	1.0000e+00r06	0.0000e+00	
8725	*	gmix	*	1.0000e+00r06	0.0000e+00e				
8726	*	gmles	* f	0.0000e+00e					
8727	*	pgapt	* f	1.0000e+07e					
8728	*	plvol	* f	0.0000e+00e					
8729	*	pslen	* f	0.0000e+00e					
8730	*	clenn	* f	0.0000e+00e					
8731	*	burn	* f	1.0127e+04e					
8732	*	burn	* f	1.0127e+04e					
8733	*	burn	* f	1.0127e+04e					
8734	*	burn	* f	1.0127e+04e					
8735	*	burn	* f	1.0127e+04e					
8736	*	burn	* f	1.0127e+04e					
8737	*	burn	* f	1.0127e+04e					
8738	*	burn	* f	1.0127e+04e					
8739	*	burn	* f	1.0127e+04e					
8740	*	burn	* f	1.0127e+04e					
8741	*	burn	* f	1.0127e+04e					
8742	*	burn	* f	1.0127e+04e					
8743	*								
8744	*****								
8745	*****	type		num	id	ctitle			
8746	slab			901	901	\$901\$ level 1, rings 1-2			
8747	*	ncrx		ncrz	ittc	iext	mld		
8748		12	143	1	0	0	0		
8749	*	nopowr		nridr	modez	liqlev	iaxcnd		
8750		1	142	1	1	0	0		
8751	*	idbci		idbco	hdri	hdro			
8752		0	143	2	0.0000e+00	0.0000e+00			
8753	*	width		patch					
8754		1.3930e+01		0					
8755	*	nrods		nodes	irftr	nzmax	irftr2		
8756		12		5	0	5	0		
8757	*	dtxht(1)		dtxht(2)	dznht	hgapo	shelv		
8758		3.0000e+00		1.0000e+01	5.0000e-03	0.0000e+00	0.0000e+00		
8759	*								
8760	*	nhcomo*	f	1e					
8761	*	nhcelo*		-1					
8762	*	dz	*	1.7526e+00e					

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8763 * grav *      1.0000e+00e
8764 * idrod *      1      2      3      4      5
8765 * idrod *      6      7      8      9     10
8766 * idrod *      11     12e
8767 * rdx * r06 9.5133e-02r06 7.1534e-02e
8768 * radrd *      0.0000e+00  9.2910e-02  1.8582e-01  2.7873e-01  3.6916e-01
8769 * radrd * e
8770 * matrdrd * f      9e
8771 * nfax *      1e
8772 * rftn * f  5.5910e+02e
8773 * rftn * f  5.5910e+02e
8774 * rftn * f  5.5910e+02e
8775 * rftn * f  5.5910e+02e
8776 * rftn * f  5.5910e+02e
8777 * rftn * f  5.5910e+02e
8778 * rftn * f  5.5910e+02e
8779 * rftn * f  5.5910e+02e
8780 * rftn * f  5.5910e+02e
8781 * rftn * f  5.5910e+02e
8782 * rftn * f  5.5910e+02e
8783 * rftn * f  5.5910e+02e
8784 *
8785 *****
8786 ***** type      num      id      ctitle
8787 slab      902      902 $902$ level 2, ring 1
8788 *      ncrx      ncrz      ittc      iext      mld
8789      6      1      0      0      0
8790 *      nopowr      nrldr      modez      liqlev      iaxcnd
8791      1      1      1      0      0
8792 *      idbci      idbco      hdri      hdro
8793      0      2      0.0000e+00  0.0000e+00
8794 *      width      ipatch
8795      2.4818e+00      0
8796 *      nrods      nodes      irftr      nzmax      irftr2
8797      6      5      0      5      0
8798 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
8799      3.0000e+00      1.0000e+01  5.0000e-03  0.0000e+00  0.0000e+00
8800 *
8801 * nhcomo* f      1e
8802 * nhcelo*      -2      2      3e
8803 * dz *      1.2478e+00e
8804 * grav *      1.0000e+00e
8805 * idrod *      1      2      3      4      5
8806 * idrod *      6e
8807 * rdx * f  1.0000e+00e
8808 * radrd *      0.0000e+00  2.9643e-02  5.9285e-02  8.8928e-02  1.1857e-01
8809 * radrd * e
8810 * matrdrd * f      6e
8811 * nfax *      1e

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8812 * rftn * f 5.5910e+02e
8813 * rftn * f 5.5910e+02e
8814 * rftn * f 5.5910e+02e
8815 * rftn * f 5.5910e+02e
8816 * rftn * f 5.5910e+02e
8817 * rftn * f 5.5910e+02e
8818 *
8819 *****
8820 *****      type          num          id          ctitle
8821 slab                903          903 $903$ levels 2-7, ring 2
8822 *          ncrx          ncrz          ittc          iext          mld
8823          6              6              0              0              0
8824 *          nopowr          nridr          modez          liqlev          iaxcnd
8825          1              1              1              0              1
8826 *          idbci          idbco          hdri          hdro
8827          0              2      0.0000e+00      0.0000e+00
8828 *          width          ipatch
8829      3.1576e+00          0
8830 *          nrods          nodes          irftr          nzmax          irftr2
8831          6              5              0              13              0
8832 *          dtxht(1)      dtxht(2)      dznht          hgapo          shelv
8833      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
8834 *
8835 * nhcomo* f          1e
8836 * nhcelo*          -2              2              3              4              5
8837 * nhcelo*          6              7              8e
8838 * dz *          8.1726e-01r04 9.1440e-01      6.6380e-01e
8839 * grav * f 1.0000e+00e
8840 * idrod *          7              8              9              10              11
8841 * idrod *          12e
8842 * rdx * f 1.0000e+00e
8843 * radrd *          0.0000e+00      6.5570e-02      1.3114e-01      1.9671e-01      2.5260e-01
8844 * radrd * e
8845 * matrd * f          9e
8846 * nfax * f          1e
8847 * rftn * f 5.5910e+02e
8848 * rftn * f 5.5910e+02e
8849 * rftn * f 5.5910e+02e
8850 * rftn * f 5.5910e+02e
8851 * rftn * f 5.5910e+02e
8852 * rftn * f 5.5910e+02e
8853 *
8854 *****
8855 *****      type          num          id          ctitle
8856 slab                904          904 $904$ levels 3-6, ring 1
8857 *          ncrx          ncrz          ittc          iext          mld
8858          6              4              0              0              0
8859 *          nopowr          nridr          modez          liqlev          iaxcnd
8860          1              1              1              0              0

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8861 *      idbci      idbco      hdri      hdro
8862      0      2      0.0000e+00      0.0000e+00
8863 *      width      ipatch
8864      3.2240e+00      0
8865 *      nrods      nodes      irftr      nzmax      irftr2
8866      6      5      0      20      0
8867 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
8868      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
8869 *
8870 * nhcomo* f      1e
8871 * nhcelo*      -3      3      4      5      6
8872 * nhcelo*      7e
8873 * dz * f      9.1440e-01e
8874 * grav * f      1.0000e+00e
8875 * idrod *      1      2      3      4      5
8876 * idrod *      6e
8877 * rdx * f      1.0000e+00e
8878 * radrd *      0.0000e+00      7.6200e-03      1.5240e-02      2.2860e-02      3.0480e-02
8879 * radrd * e
8880 * matrd * f      6e
8881 * nfax * f      1e
8882 * rftn * f      5.5910e+02e
8883 * rftn * f      5.5910e+02e
8884 * rftn * f      5.5910e+02e
8885 * rftn * f      5.5910e+02e
8886 * rftn * f      5.5910e+02e
8887 * rftn * f      5.5910e+02e
8888 *
8889 *****
8890 *****      type      num      id      ctitle
8891 slab      905      905 $905$ levels 7-11, ring 1
8892 *      ncrx      ncrz      ittc      iext      mld
8893      6      5      0      0      0
8894 *      nopowr      nridr      modez      liqlev      iaxcnd
8895      1      1      1      0      1
8896 *      idbci      idbco      hdri      hdro
8897      0      2      0.0000e+00      0.0000e+00
8898 *      width      ipatch
8899      7.3000e+00      0
8900 *      nrods      nodes      irftr      nzmax      irftr2
8901      6      5      0      11      0
8902 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
8903      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
8904 *
8905 * nhcomo* f      1e
8906 * nhcelo*      -7      7      8      9      10
8907 * nhcelo*      11      11e
8908 * dz *      1.16022e00      8.5685e-01      8.3227e-01      8.3225e-01      2.5928e-01
8909 * dz * e
8910 * grav * f      1.0000e+00e

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8911 * idrod *          1          2          3          4          5
8912 * idrod *          6e
8913 * rdx * f    1.0000e+00e
8914 * radrd *      0.0000e+00    7.6200e-03    1.5240e-02    2.2860e-02    3.0480e-02
8915 * radrd * e
8916 * matrd * f          6e
8917 * nfax * f          1e
8918 * rftn * f    5.5910e+02e
8919 * rftn * f    5.5910e+02e
8920 * rftn * f    5.5910e+02e
8921 * rftn * f    5.5910e+02e
8922 * rftn * f    5.5910e+02e
8923 * rftn * f    5.5910e+02e
8924 *
8925 *****
8926 *****      type          num          id          ctitle
8927 slab          906          906 $906$ level 8, ring 2
8928 *          ncrx          ncrz          ittc          iext          mld
8929          6          1          0          0          0
8930 *          nopowr          nrldr          modez          liqlev          iaxcnd
8931          1          1          1          0          0
8932 *          idbci          idbco          hdri          hdro
8933          0          2    0.0000e+00    0.0000e+00
8934 *          width          ipatch
8935    1.46517e01          0
8936 *          nrods          nodes          irftr          nzmax          irftr2
8937          6          5          0          5          0
8938 *          dtxht(1)          dtxht(2)          dznht          hgapo          shelv
8939    3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
8940 *
8941 * nhcomo* f          1e
8942 * nhcelo*          -8          8          9e
8943 * dz *    8.5725e-01e
8944 * grav *    1.0000e+00e
8945 * idrod *          7          8          9          10          11
8946 * idrod *          12e
8947 * rdx *    1.4320e-01    1.9013e-01    1.4320e-01    1.9013e-01    1.4320e-01
8948 * rdx *    1.9013e-01e
8949 * radrd *      0.0000e+00    7.6200e-02    1.5240e-01    2.2860e-01    3.0480e-01
8950 * radrd * e
8951 * matrd * f          9e
8952 * nfax * f          1e
8953 * rftn * f    5.5910e+02e
8954 * rftn * f    5.5910e+02e
8955 * rftn * f    5.5910e+02e
8956 * rftn * f    5.5910e+02e
8957 * rftn * f    5.5910e+02e
8958 * rftn * f    5.5910e+02e
8959 *
8960 *****

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id	ctitle	num	type
8961	907 \$907\$ level 9, ring 2	907	slab
8962			
8963			
8964			
8965			
8966			
8967			
8968			
8969			
8970			
8971			
8972			
8973			
8974			
8975			
8976			
8977			
8978			
8979			
8980			
8981			
8982			
8983			
8984			
8985			
8986			
8987			
8988			
8989			
8990			
8991			
8992			
8993			
8994			
8995	908 \$908\$ levels 10-11, ring 2	908	slab
8996			
8997			
8998			
8999			
9000			
9001			
9002			
9003			
9004			
9005			
9006			
9007			
9008			
9009			
9010			

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9011 * nhcelo*          -10          10          11          12e
9012 * dz      *      8.3264e-01  8.0814e-01e
9013 * grav    * f 1.0000e+00e
9014 * idrod   *      7          8          9          10          11
9015 * idrod   *      12e
9016 * rdx     * f 1.0000e+00e
9017 * radrd   *      0.0000e+00  1.1255e-01  2.2509e-01  3.3764e-01  4.5019e-01
9018 * radrd   * e
9019 * matrd   * f      9e
9020 * nfax    * f      1e
9021 * rftn    * f 5.5910e+02e
9022 * rftn    * f 5.5910e+02e
9023 * rftn    * f 5.5910e+02e
9024 * rftn    * f 5.5910e+02e
9025 * rftn    * f 5.5910e+02e
9026 * rftn    * f 5.5910e+02e
9027 *
9028 *****
9029 *****      type          num          id          ctitle
9030 slab              909          909 $909$ level 12, ring 1
9031 *      ncrx          ncrz          ittc          iext          mld
9032      6              1              0              0              0
9033 *      nopowr          nridr          modez          liqlev          iaxcnd
9034      1              1              1              0              0
9035 *      idbci          idbco          hdri          hdro
9036      0              2      0.0000e+00  0.0000e+00
9037 *      width          ipatch
9038      1.8967e+00          0
9039 *      nrods          nodes          irftr          nzmax          irftr2
9040      6              5              0              5              0
9041 *      dtxht(1)      dtxht(2)      dznht          hgapo          shelv
9042      3.0000e+00  1.0000e+01  5.0000e-03  0.0000e+00  0.0000e+00
9043 *
9044 * nhcomo* f      1e
9045 * nhcelo*          -12          12          13e
9046 * dz      *      9.3345e-01e
9047 * grav    *      1.0000e+00e
9048 * idrod   *      1          2          3          4          5
9049 * idrod   *      6e
9050 * rdx     * f 1.0000e+00e
9051 * radrd   *      0.0000e+00  5.7857e-02  1.1571e-01  1.7357e-01  2.3143e-01
9052 * radrd   * e
9053 * matrd   * f      9e
9054 * nfax    * f      1e
9055 * rftn    * f 5.5910e+02e
9056 * rftn    * f 5.5910e+02e
9057 * rftn    * f 5.5910e+02e
9058 * rftn    * f 5.5910e+02e
9059 * rftn    * f 5.5910e+02e
9060 * rftn    * f 5.5910e+02e

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← 146

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9061 *
9062 *****
9063 *****      type          num          id          ctitle
9064 rod          910          910 $910$ st-gen-1 tube bundle
9065 *          ncrx          ncrz          ittc          iext          mld
9066          1 ← 144 → 14          0          0          0 ← 146
9067 *          nopowr          nridr          modez          liqlev          iaxcnd
9068          1          0          1          0          1
9069 *          idbci          idbco          hdri          hdro
9070          2          2          1.9680e-02          2.2220e-02
9071 *          nrods          nodes          irftr          nzmax          irftr2
9072          1          3          0          15          0
9073 *          dtxht(1)          dtxht(2)          dznht          hgapo          shelv
9074          3.0000e+00          1.0000e+01          5.0000e-03          0.0000e+00          0.0000e+00
9075 *
9076 * nhcomi* f          12e
9077 * nhceli*          -3          3          4          5          6
9078 * nhceli*          7          8          9          10          11
9079 * nhceli*          12          13          14          15          16
9080 * nhceli*          17e
9081 * nhcomo* f          100e
9082 * nhcelo*          -1          1          2          3          4
9083 * nhcelo*          5          6          7          -7          -6
9084 * nhcelo*          -5          -4          -3          -2          -1
9085 * nhcelo*          -1e
9086 * dz * f          1.3320e+00e
9087 * grav * r07          1.0000e+00r07-1.0000e+00e
9088 * rdx *          3.1022e+03e
9089 * radrd *          9.8400e-03          1.0475e-02          1.1110e-02e
9090 * matrdr * f          12e
9091 * nfax * f          0e
9092 * rftn * f          5.4211e+02e
9093 *
9094 *****
9095 *****      type          num          id          ctitle
9096 rod          920          920 $920$ st-gen-2 tube bundle
9097 *          ncrx          ncrz          ittc          iext          mld
9098          1 ← 144 → 14          0          0          0 ← 146
9099 *          nopowr          nridr          modez          liqlev          iaxcnd
9100          1          0          1          0          1
9101 *          idbci          idbco          hdri          hdro
9102          2          2          1.9680e-02          2.2220e-02
9103 *          nrods          nodes          irftr          nzmax          irftr2
9104          1          3          0          15          0
9105 *          dtxht(1)          dtxht(2)          dznht          hgapo          shelv
9106          3.0000e+00          1.0000e+01          5.0000e-03          0.0000e+00          0.0000e+00
9107 *
9108 * nhcomi* f          22e
9109 * nhceli*          -3          3          4          5          6
9110 * nhceli*          7          8          9          10          11

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9111 * nhceli*          12          13          14          15          16
9112 * nhceli*          17e
9113 * nhcomo* f        200e
9114 * nhcelo*          -1          1          2          3          4
9115 * nhcelo*          5          6          7          -7         -6
9116 * nhcelo*          -5         -4         -3         -2         -1
9117 * nhcelo*          -1e
9118 * dz      * f      1.3320e+00e
9119 * grav    * r07 1.0000e+00r07-1.0000e+00e
9120 * rdx     *        3.1022e+03e
9121 * radrd  *        9.8400e-03    1.0475e-02    1.1110e-02e
9122 * matrd  * f        12e
9123 * nfax   * f        0e
9124 * rftn   * f      5.4211e+02e
9125 *
9126 *****
9127 *****      type          num          id          ctitle
9128 rod              930          930 $930$ st-gen-3 tube bundle
9129 *              ncrx          ncrz          ittc          iext          mld
9130      1 ← 144 → 14              0              0              0 ← 146
9131 *              nopowr          nrldr          modez          liqlev          iaxcnd
9132      1              0              1              0              1
9133 *              idbci          idbco          hdri          hdro
9134      2              2      1.9680e-02    2.2220e-02
9135 *              nrods          nodes          irftr          nzmax          irftr2
9136      1              3              0              15              0
9137 *      dtxht(1)      dtxht(2)      dznht          hgapo          shelv
9138      3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
9139 *
9140 * nhcomi* f        32e
9141 * nhceli*          -3          3          4          5          6
9142 * nhceli*          7          8          9         10         11
9143 * nhceli*          12         13         14         15         16
9144 * nhceli*          17e
9145 * nhcomo* f        300e
9146 * nhcelo*          -1          1          2          3          4
9147 * nhcelo*          5          6          7          -7         -6
9148 * nhcelo*          -5         -4         -3         -2         -1
9149 * nhcelo*          -1e
9150 * dz      * f      1.3320e+00e
9151 * grav    * r07 1.0000e+00r07-1.0000e+00e
9152 * rdx     *        3.1022e+03e
9153 * radrd  *        9.8400e-03    1.0475e-02    1.1110e-02e
9154 * matrd  * f        12e
9155 * nfax   * f        0e
9156 * rftn   * f      5.4211e+02e
9157 *
9158 *****
9159 *****      type          num          id          ctitle
9160 slab              931          931 $931$ st-gen-1,2,3 wrapper

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9161 *	ncrx	ncrz	ittc	iext	mld	
9162	3	12	0	0	1	
9163 *	nopowr	nridr	modez	liqlev	iaxcnd	
9164	1	0	1	0	1	
9165 *	idbci	idbco	hdri	hdro		
9166	2	2	2.9642e+00	2.9832e+00		
9167 *	width	ipatch				
9168	9.34215e00	0				
9169 *	nrods	nodes	irftr	nzmax	irftr2	
9170	3	3	0	25	0	
9171 *	dtxht(1)	dtxht(2)	dznht	hgapo	shelv	
9172	3.0000e+00	1.0000e+01	5.0000e-03	0.0000e+00	0.0000e+00	
9173 *						
9174 * nhcomi* r08		100r06	105e			
9175 * nhceli*		-1	1	2	3	4
9176 * nhceli*		5	6	7	1	2
9177 * nhceli*		2	2	3	4e	
9178 * nhcomo* f		190e				
9179 * nhcelo*		12	-12	-11	-10	-9
9180 * nhcelo*		-8	-7	-6	-5	-4
9181 * nhcelo*		-3	-2	-1	-1e	
9182 * nhcomi* r08		200r06	205e			
9183 * nhceli*		-1	1	2	3	4
9184 * nhceli*		5	6	7	1	2
9185 * nhceli*		2	2	3	4e	
9186 * nhcomo* f		290e				
9187 * nhcelo*		12	-12	-11	-10	-9
9188 * nhcelo*		-8	-7	-6	-5	-4
9189 * nhcelo*		-3	-2	-1	-1e	
9190 * nhcomi* r08		300r06	305e			
9191 * nhceli*		-1	1	2	3	4
9192 * nhceli*		5	6	7	1	2
9193 * nhceli*		2	2	3	4e	
9194 * nhcomo* f		390e				
9195 * nhcelo*		12	-12	-11	-10	-9
9196 * nhcelo*		-8	-7	-6	-5	-4
9197 * nhcelo*		-3	-2	-1	-1e	
9198 * dz *		1.0272e+00r05	1.3320e+00	1.39399e00	1.46717e00r03	5.1689e-01
9199 * dz *		1.44969e00e				
9200 * grav * f		1.0000e+00e				
9201 * rdx * f		1.0000e+00e				
9202 * radrd *		0.0000e+00	4.7625e-03	9.5250e-03e		
9203 * matrd * f		9e				
9204 * nfax * f		0e				
9205 * rftn * f		5.4211e+02e				
9206 * rftn * f		5.4211e+02e				
9207 * rftn * f		5.4211e+02e				
9208 *						
9209 *	*****					

id	ctitle	num	type	id	ctitle	num	type
9210	*****	932	rod	932	\$932\$ st-gen-1,2,3 1.o.shell	932	rod
9211	ncrx	ncrz	ittc	iext	mld	932	rod
9212	3	6	0	0	2	932	rod
9213	nopowr	nridr	modez	liqlev	iaxcnd	932	rod
9214	1	0	1	0	1	932	rod
9215	idbci	idbco	hdri	hdro		932	rod
9216	2	1	3.0924e+00	0.0000e+00		932	rod
9217	tlo	tvo	hlo	hvo		932	rod
9218	3.0000e+02	3.0000e+02	0.0000e+00	0.0000e+00		932	rod
9219	nrods	nodes	irftr	nzmax	irftr2	932	rod
9220	3	3	0	8	0	932	rod
9221	dtxht(1)	dtxht(2)	dznht	hgapo	shelv	932	rod
9222	3.0000e+00	1.0000e+01	5.0000e-03	0.0000e+00	0.0000e+00	932	rod
9223	*****					932	rod
9224	nhcomi* f	190e				932	rod
9225	nhceli*	12	-12	-11	-10	932	rod
9226	nhceli*	-8	-7	-7e		932	rod
9227	nhcomi* f	290e				932	rod
9228	nhceli*	12	-12	-11	-10	932	rod
9229	nhceli*	-8	-7	-7e		932	rod
9230	nhcomi* f	390e				932	rod
9231	nhceli*	12	-12	-11	-10	932	rod
9232	nhceli*	-8	-7	-7e		932	rod
9233	dz	* f	1.3320e+00e			932	rod
9234	grav	* f	1.0000e+00e			932	rod
9235	rdx	* f	1.0000e+00e			932	rod
9236	radrd	* f	1.5462e+00	1.5795e+00	1.6127e+00e	932	rod
9237	matrd	* f	9e			932	rod
9238	nfax	* f	0e			932	rod
9239	rftn	* f	5.4211e+02e			932	rod
9240	rftn	* f	5.4211e+02e			932	rod
9241	rftn	* f	5.4211e+02e			932	rod
9242	*****					932	rod
9243	*****					932	rod
9244	*****					932	rod
9245	*****					932	rod
9246	*****					932	rod
9247	*****					932	rod
9248	*****					932	rod
9249	*****					932	rod
9250	*****					932	rod
9251	*****					932	rod
9252	*****					932	rod
9253	*****					932	rod
9254	*****					932	rod
9255	*****					932	rod
9256	*****					932	rod
9257	*****					932	rod
9258	*****					932	rod
9259	*****					932	rod

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9260 * nhcomi* r07      190r03      105e
9261 * nhceli*          6          -6          -5          -4          -3
9262 * nhceli*         -2          -1           8          12          12
9263 * nhceli* e
9264 * nhcomi* r07      290r03      205e
9265 * nhceli*          6          -6          -5          -4          -3
9266 * nhceli*         -2          -1           8          12          12
9267 * nhceli* e
9268 * nhcomi* r07      390r03      305e
9269 * nhceli*          6          -6          -5          -4          -3
9270 * nhceli*         -2          -1           8          12          12
9271 * nhceli* e
9272 * dz      *      1.17032e00      1.21665e00r03 3.8900e-01      1.0910e+00      1.2430e+00
9273 * dz      *      1.5763e+00e
9274 * grav    * f      1.0000e+00e
9275 * rdx     * f      1.0000e+00e
9276 * radrd   *      2.0193e+00      2.0637e+00      2.1082e+00e
9277 * matrdr * f          9e
9278 * nfax    * f          0e
9279 * rftn    * f      5.4211e+02e
9280 * rftn    * f      5.4211e+02e
9281 * rftn    * f      5.4211e+02e
9282 *
9283 *****
9284 *****      type      num      id      ctitle
9285 rod          934          934 $934$ st-gen-1,2,3 i.t.sheet
9286 *      ncrx      ncrz      ittc      iext      mld
9287          3          1          0          0          4
9288 *      nopowr      nrldr      modez      liqlev      iaxcnd
9289          1          0          1          0          0
9290 *      idbci      idbco      hdri      hdro
9291          2          2      3.9360e-02      5.2720e-02
9292 *      nrods      nodes      irftr      nzmax      irftr2
9293          3          3          0          8          0
9294 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
9295      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
9296 *
9297 * nhcomi* f          12e
9298 * nhceli*          -3          3          3e
9299 * nhcomo* f          12e
9300 * nhcelo*          -2          2          2e
9301 * nhcomi* f          22e
9302 * nhceli*          -3          3          3e
9303 * nhcomo* f          22e
9304 * nhcelo*          -2          2          2e
9305 * nhcomi* f          32e
9306 * nhceli*          -3          3          3e
9307 * nhcomo* f          32e
9308 * nhcelo*          -2          2          2e
9309 * dz      * f      1.0000e+00e

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9310 * grav * f 0.0000e+00e
9311 * rdx * f 8.9767e+02e
9312 * radrd * 1.9680e-02 2.3020e-02 2.6360e-02e
9313 * matrd * f 9e
9314 * nfax * f 0e
9315 * rftn * f 5.4211e+02e
9316 * rftn * f 5.4211e+02e
9317 * rftn * f 5.4211e+02e
9318 *
9319 *****
9320 ***** type num id ctitle
9321 rod 935 935 $935$ st-gen-1,2,3 o.t.sheet
9322 * ncrx ncrz ittc iext mld
9323 * 3 1 0 0 5
9324 * nopowr nridr modez liqlev iaxcnd
9325 * 1 0 1 0 0
9326 * idbci idbco hdri hdro
9327 * 2 2 3.9360e-02 5.2720e-02
9328 * nrods nodes irftr nzmax irftr2
9329 * 3 3 0 8 0
9330 * dtxht(1) dtxht(2) dznht hgapo shelv
9331 * 3.0000e+00 1.0000e+01 5.0000e-03 0.0000e+00 0.0000e+00
9332 *
9333 * nhcomi* f 12e
9334 * nhceli* 16 -16 -16e
9335 * nhcomo* f 12e
9336 * nhcelo* 17 -17 -17e
9337 * nhcomi* f 22e
9338 * nhceli* 16 -16 -16e
9339 * nhcomo* f 22e
9340 * nhcelo* 17 -17 -17e
9341 * nhcomi* f 32e
9342 * nhceli* 16 -16 -16e
9343 * nhcomo* f 32e
9344 * nhcelo* 17 -17 -17e
9345 * dz * f 1.0000e+00e
9346 * grav * f 0.0000e+00e
9347 * rdx * f 8.9767e+02e
9348 * radrd * 1.9680e-02 2.3020e-02 2.6360e-02e
9349 * matrd * f 9e
9350 * nfax * f 0e
9351 * rftn * f 5.4211e+02e
9352 * rftn * f 5.4211e+02e
9353 * rftn * f 5.4211e+02e
9354 *
9355 *****
9356 ***** type num id ctitle
9357 rod 936 936 $936$ st-gen-1,2,3 i.plenum
9358 * ncrx ncrz ittc iext mld
9359 * 3 1 0 0 6

```

```

9360 *      nopowr      nridr      modez      liqlev      iaxcnd
9361      1      0      1      0      0
9362 *      idbci      idbco      hdri      hdro
9363      2      1      3.0090e+00      0.0000e+00
9364 *      tlo      tvo      hlo      hvo
9365      3.0000e+02      3.0000e+02      0.0000e+00      0.0000e+00
9366 *      nrods      nodes      irftr      nzmax      irftr2
9367      3      3      0      8      0
9368 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
9369      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
9370 *
9371 * nhcomi* f      12e
9372 * nhceli*      -1      1      1e
9373 * nhcomi* f      22e
9374 * nhceli*      -1      1      1e
9375 * nhcomi* f      32e
9376 * nhceli*      -1      1      1e
9377 * dz * f      7.5182e-01e
9378 * grav * f      1.0000e+00e
9379 * rdx * f      1.0000e+00e
9380 * radrd *      1.5045e+00      1.6203e+00      1.7361e+00e
9381 * matrd * f      9e
9382 * nfax * f      0e
9383 * rftn * f      5.4211e+02e
9384 * rftn * f      5.4211e+02e
9385 * rftn * f      5.4211e+02e
9386 *
9387 *****
9388 ***** type      num      id      ctitle
9389 rod      937      937 $937$ st-gen-1,2,3 o.plenum
9390 *      ncrx      ncrz      ittc      iext      mld
9391      3      1      0      0      7
9392 *      nopowr      nridr      modez      liqlev      iaxcnd
9393      1      0      1      0      0
9394 *      idbci      idbco      hdri      hdro
9395      2      1      3.0090e+00      0.0000e+00
9396 *      tlo      tvo      hlo      hvo
9397      3.0000e+02      3.0000e+02      0.0000e+00      0.0000e+00
9398 *      nrods      nodes      irftr      nzmax      irftr2
9399      3      3      0      3      0
9400 *      dtxht(1)      dtxht(2)      dznht      hgapo      shelv
9401      3.0000e+00      1.0000e+01      5.0000e-03      0.0000e+00      0.0000e+00
9402 *
9403 * nhcomi* f      12e
9404 * nhceli*      18      -18      -18e
9405 * nhcomi* f      22e
9406 * nhceli*      18      -18      -18e
9407 * nhcomi* f      32e
9408 * nhceli*      18      -18      -18e
9409 * dz * f      7.5182e-01e

```

```

9410 * grav * f 1.0000e+00e
9411 * rdx * f 1.0000e+00e
9412 * radrd * 1.5045e+00 1.6203e+00 1.7361e+00e
9413 * matrd * f 9e
9414 * nfax * f 0e
9415 * rftn * f 5.4211e+02e
9416 * rftn * f 5.4211e+02e
9417 * rftn * f 5.4211e+02e
9418 *
9419 *****
9420 ***** type num id ctitle
9421 rod 938 938 $938$ st-gen-1,2,3 sec.dryer
9422 * ncrx ncrz ittc iext mld
9423 3 2 0 0 8
9424 * nopowr nrldr modez liqlev iaxcnd
9425 1 0 1 0 1
9426 * idbci idbco hdri hdro
9427 2 2 6.0960e+00 6.1087e+00
9428 * nrods nodes irftr nzmax irftr2
9429 3 3 0 8 0
9430 * dtxht(1) dtxht(2) dznht hgapo shelv
9431 3.0000e+00 1.0000e+01 5.0000e-03 0.0000e+00 0.0000e+00
9432 *
9433 * nhcomi* f 105e
9434 * nhceli* -9 9 10 10e
9435 * nhcomo* f 105e
9436 * nhcelo* -6 6 6 6e
9437 * nhcomi* f 205e
9438 * nhceli* -9 9 10 10e
9439 * nhcomo* f 205e
9440 * nhcelo* -6 6 6 6e
9441 * nhcomi* f 305e
9442 * nhceli* -9 9 10 10e
9443 * nhcomo* f 305e
9444 * nhcelo* -6 6 6 6e
9445 * dz * f 5.7542e+00e
9446 * grav * f 0.0000e+00e
9447 * rdx * f 1.0000e+00e
9448 * radrd * 3.0480e+00 3.0512e+00 3.0543e+00e
9449 * matrd * f 9e
9450 * nfax * f 0e
9451 * rftn * f 5.4211e+02e
9452 * rftn * f 5.4211e+02e
9453 * rftn * f 5.4211e+02e
9454 *
9455 end
9456 *
9457 *****

```

```

9458 * time-step data *
9459 *****
9460 *
9461 *      dtmin      dtmax      tend      rtwfp      powerc
9462 *      1.0000e-03  1.0000e-01  1.0000e+01  1.0000e+01  1.0000e+20
9463 *      edint      gfint      dmpint      sedint
9464 *      1.0100e+01  5.0000e-01  1.0100e+01  1.0100e+01
9465 *
9466 *      dtmin      dtmax      tend      rtwfp      powerc
9467 *      1.0000e-03  2.0000e-01  1.0000e+02  3.0000e+00  1.0000e+20
9468 *      edint      gfint      dmpint      sedint
9469 *      9.0200e+01  1.0000e+00  9.0200e+01  9.0200e+01
9470 *
9471 *      dtmin      dtmax      tend      rtwfp      powerc
9472 *      1.0000e-03  3.0000e-01  2.0000e+02  1.0000e+00  1.0000e+20
9473 *      edint      gfint      dmpint      sedint
9474 *      1.0030e+02  2.0000e+00  1.0030e+02  1.0030e+02
9475 *
9476 *      endflag
9477 *      -1.0000e+00

```

Annotations:

- Box 83 points to the value 1.0000e-01 in the first row.
- Box 147 points to the value 1.0000e+20 in the first row.
- Box 148 points to the value 1.0100e+01 in the second row.
- Box 137 points to the value 1.0000e+00 in the third row.
- Box 149 points to the value -1.0000e+00 in the last row.