PWR SBLOCA Transient Exercise

Objectives

- Create a TRACE restart input file that will run a 3-inch cold leg small break LOCA transient simulation.
- Submit and run the first 50 seconds of the simulation and evaluate the results to determine if the transient is proceeding as expected.
- Resubmit and run 1500 s of the transient and evaluate the simulation results.

Overview of a Small Break LOCA

The following is a generalized description of a small break transient. During a small break transient in a PWR, the primary system depressurizes as coolant is ejected out the break. Coolant in the primary system begins to flash as the system depressurizes.

The pressurizer loses its liquid inventory causing several things to happen. For a time, makeup flow, if available, will attempt to recover the liquid inventory in the pressurizer. The pressurizer heaters will cycle on to attempt to control the system pressure to its steady state value. Eventually, the level in the pressurizer declines below the pressurizer heater shutoff level and power to the heaters is terminated.

The loss of pressure and coolant inventory on the primary side results in a reactor trip. The steam generator feedwater and steam systems are isolated and the secondary side pressure increases. The secondary side pressure excursion is limited by pressure relief components, such as power operated relief and safety relief valves.

A continuing decline of the pressurizer pressure causes a safety injection actuation signal (SIAS). The makeup flow is terminated and the emergency core cooling systems (ECCS) are activated (HPI, LPI and Accumulators) and flows from these systems begin at various pressure setpoints. The liquid inventory in the vessel may decline below the top of the core and a core heatup may be initiated. Coolant from the

ECCS initiates a refill of the primary system and core. During the refill process the fuel rods are cooled and the core heatup is negated. ECCS continues for the long term, leading to stable reactor conditions.

This exercise is intended to provide some experience in setting up a transient restart model, executing a cold leg small break LOCA transient calculation and examining the results of the simulation. The previous exercises with the PWR model were provided to set the model up to run a steady-state calculation in preparation for running a 3-inch cold leg break calculation (small break loss-of-coolant accident – SBLOCA). A SJC VALVE component and a BREAK component were added to the steady-state model to represent the 3-inch cold leg break. A 1000 second steady-state calculation was made to provide steady initial conditions for the transient restart calculation.

Transient Assumptions

In reactor safety analysis, assumptions are made about the operation and/or availability of various safety grade equipment in the power plant to assure the integrity of the reactor core. These assumptions may or may not reflect the actual response of the power plant during a postulated accident whether it is automatic or operator induced. For example, a degraded ECCS capability may be assumed.

The following assumptions are made about the small break LOCA for this exercise:

- Makeup and letdown are assumed isolated at the initiation of the break.
- The pressurizer spray and heater functionality become inoperable at the initiation of the break.
- No credit is given for operation of the steam dump valves.
- No credit is given for operation of the main steam line PORVs.
- A loss of offsite power coincident with the reactor trip is assumed. The loss of offsite power will:

    a. Trip the reactor coolant pumps

b. Trip the main feedwater

c. Trip the turbine stop valve

- Limited diesel generator capability degrades the emergency core cooling system (HPI and LPI) capability.

Key Controlled Components

The following table presents key controlled components in the PWR model and the associated trips or control blocks.

Key Controlled Components	Associated Trips/Control Blocks
Reactor Power: POWER 999	Trip 10
Reactor Coolant Pumps: PUMP 115, 215 and 315	Trip 22
Pressurizer Spray: FILL 328 and 360	Control Block 434
Makeup: FILL 260	Control Block 415
Letdown: FILL 160	Control Block 416
High Pressure Injection: FILL 150, 250 and 350	Trip 21 and Signal Variables 171, 271 and 371
Low Pressure Injection: FILL 154, 254 and 354	Trip 23 and Signal Variables 171, 271 and 371
Main Feedwater Regulating Valves: VALVE 410, 420 and 430	Trip 422 and Control Blocks 1013, 2013 and 3013
Steam Driven Auxiliary Feedwater: FILL 412, 433 and 432	Trip 28 and Control Blocks 1005, 2005 and 3005
Motor Driven Auxiliary Feedwater:	Trip 26 and Control Blocks 1005, 2005

FILL 415, 425 and 435	and 3005
Main Steam Line Isolation Valves: VALVE 512, 522 and 532	Trip 24
Steam Line PORVs: VALVE 515, 525 and 535	Control Blocks 1162, 2162 and 3162
Steam Line Safety Relief Valves: FILL 518, 528 and 538	Signal Variables 1121, 2121 and 3121
Steam Dump Valves: VALVE 560 and 570	Control Blocks 4340 and 4342
Turbine Control Valve: VALVE 550	Control Block 511
Turbine Stop Valve: VALVE 552	Trip 18

Overview of Steps

1. Set up a SBLOCA Transient Restart File.

A) Create a SNAP restart editing model.

B) Make necessary input changes to initiate the SBLOCA

2. Run the First 50 Seconds of the SBLOCA.

A) Create a restart Job Stream

B) Submit the restart calculation

3. Evaluate the Results of the 50 Second Calculation.

4. Execute a 1500 Second Calculation.

5. Evaluate the Results

This exercise assumes that a 1000 s steady-state calculation has been made. The following transient calculations will be restarts off the end of the 1000 s steady-state calculation. If the steady-state calculation has not been done, then it must be done at this time.

Step 1. Set up a SBLOCA Transient Restart File.

Most of the work to set up the 3-inch small break LOCA has already been done in the steady-state model. The transient restart file will be small with very few changes needed to the model. The setup of the restart file follows:

1. Close all Model Editor files that are open.

2. Locate and open the transient PWR model with the SNAP Model Editor:

A) Go to the Day4/Afternoon/PWR_Tran1 folder and double click on the PWR-TR-Init.med file. The SNAP Model Editor should open with the details of the PWR model. This is the same model as the final PWR steady-state model used in the Morning exercise.

The "Exercise Key" included in the workbook may be useful to help locate the various parts of the SNAP Model Editor that are referred to in this exercise.

Step 1.A) Create a SNAP restart editing model.

1. In the Navigation Window, locate and click on Cases [0] . Right-click and select New. A new input dialog box will appear: Cases [1] Restart Case . This step opens the Model Editor to create a restart file. Restart file information is needed in the Properties Window.

2. In the Properties Window:

A) Enter "3-inch Cold Leg SBLOCA" in the Component Name box (without the quote marks). This is the name that will identify the calculation.

B) Change the Editing Mode to Graphical

C) Expand the Restart Model box. SNAP makes a copy of the original file and places it in a restart editing mode. Note the new Editing Restart Case tab in the Navigation Window and the red dot on the base model:

D) The restart file is now ready to be created. Any changes made to the PWR model in the restart edit mode will become a separate input file.

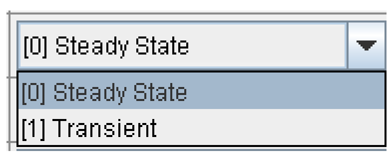
Step 1.B) Make necessary input changes to initiate the SBLOCA

1. Change the calculation indicator from Steady-State to Transient.

> In the Steady-State mode TRIPs are not evaluated unless the trip number is preceded by a negative sign. With the transient option selected, TRIPs are now evalusted.

A) Locate and click on "Model Options" in the Navigator Window.

B) In the Properties Window locate the "Transient Calculation" box, arrow down and select "[1] Transient".



> At the bottom of the View Window are several tabs that identify various parts of the PWR model including the hydro components, the complete control system, heat structures and various subsets of the control system. Breaking a large model out into sub sections can facilitate finding components a little easier. The following steps will refer to these tabs in making the restart file.

2. Activate the small break trip. The steady-state model was setup to include a break in the Loop 1 cold leg (SJC VALVE [805] and BREAK [806] components). The break valve is setup to open when TRIP 2 is turned on.

A) Click on the "Control System" tab at the bottom of the View Window.

B) Scroll up and over to the upper left-hand corner of the View Window. Locate and click on TRIP 2.

C) In the Properties Window, expand the "Setpoint Data" box.

D) TRIP 2 is a type 2 trip and uses time as its input signal. When time is greater than or equal to the setpoint value for setpoint 2, then the trip is turned on

E) It is assumed the break is opened at the beginning of the transient. Modify the setpoint value for setpoint 2 from 1.0E6 to 0.0, then close the setpoint value window.

> The following steps will set up the restart model to be consistent with the transient assumptions described above.

3. **Disable makeup, letdown and pressurizer spray**. The assumption was made that makeup (FILL 260) and letdown (FILL 160) and the pressurizer spray (FILL 328) capabilities are isolated at the time of the break. Locate and click on the "Prizer Controls" tab at the bottom of the View Window. This view shows the control system that operates the makeup and letdown flows and the pressurizer spray flow. Control Block (CB) 415 is the input signal for the makeup flow, CB 416 is the input signal for the letdown flow and CB 434 is the input signal for the pressurizer spray. To disable the functionality of these CBs do the following:

A) Click on CB 415 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

B) Click on CB 416 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

C) Click on CB 434 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0

4. **Disable the steam dump capability**. The steam dump valves (VALVE 560 and VALVE 570) are used to control the primary side average temperature during a transient situation. It is assumed that no credit is taken for the operation of these valves and therefore they must be disabled at the initiation of the break. Locate and click on the "”Steam Dump Control" tab at the bottom of the View Window. CB 4342 and CB 4340 are input signals to the steam dump valves. The functionality of these Cbs are disabled as follows.

   A) Click on CB 4342 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

   B) Click on CB 4340 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

5. **Disable the main steam line PORVs**. If the secondary side is isolated (i.e. feedwater and steam line valves are closed) the power-operated relief valves (PORVs) open if the secondary side pressure exceeds a setpoint pressure (which is calculated based on the value of the system average temperature error). The secondary system is further relieved if the pressure exceeds the safety relief valve (SRV) opening setpoint pressure. In the transient assumptions, the PORVs (VALVEs 515, 525 and 535) are inoperable. Locate and click on the "PORV/SRV Controls" tab at the bottom of the View Window. CB 1162, CB 2162 and CB 3162 are input signals for the three PORVs. The functionality of these CBs are disabled as follows.

   A) Click on CB 1162 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

   B) Click on CB 2162 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

   C) Click on CB 3162 in the View Window. In the Properties Window, locate and change the value in the "Gain" box from 1.0 to 0.0.

6. **Loss of offsite power coincidental with reactor trip**. The transient assumptions include a loss of offsite power at the time of the reactor trip (TRIP 10). The loss of offsite power will trip the reactor coolant pumps (PUMPs 115, 215 and 315), trip the main feedwater regulating valves (FILLs 410, 420 and 430), and trip the turbine stop

valve (VALVE 552). In order to affect the functions of these components the reactor trip will be added into their control logic.

A) Locate and click on the “RC Pump Trip” tab at the bottom of the View window. TRIP 22 trips the pumps. This trip is a trip controlled trip (TRIP Control 220), meaning that the output of one or more trips are evaluated and the outcome determines if the trip is on or off

   a) Click on Trip Control 220 in the View Window. In the Properties Window, locate the “Trips” box and click on the select button.

   b) In the popup window, locate and click on Trip 10 in the Available column and move it over to the Selected column by clicking on the greater than button.

   c) Click on the OK button.

B) Locate and click on the “Turbine Stop Trip” tab at the bottom of the View Window. TRIP 18 closes the turbine stop valve. This trip is a trip controlled trip (TRIP Control 160).

   a) Click on Trip Control 160 in the View Window. In the Properties Window, locate the “Trips” box and click on the select button.

   b) In the popup window, locate and click on Trip 10 in the Available column and move it over to the Selected column by clicking on the greater than button.

   c) Click on the OK button.

C) Locate and click on the “Control System” tab at the bottom of the View Window. Locate the Main Feedwater Regulating Valve Trip logic in the View Window (slide the horizontal slider bar all the way to the left-hand side then scroll down until the trip logic is shown). TRIP 422 closes the main feedwater valves. This trip is a trip controlled trip (TRIP Control 400).

   a) Click on Trip Control 400 in the View Window. In the Properties Window, locate the "Trips" box and click on the select button.

b) In the popup window, locate and click on Trip 10 in the Available column and move it over to the Selected column by clicking on the greater than > button.

c) Click on the OK button.

7. **Limited diesel generator capability degrades the emergency core cooling system**. It is assumed that not all of the diesel generators are working and the capability of the high pressure injection (HPI) system and low pressure injection (LPI) system are degraded. Only half of the expected ECC flow is assumed. This degradation limits the cooling capability of the plant under a transient situation. The degraded HPI and LPI capability is already in the model and no additional changes are needed.

The changes to the restart model to initiate the break and apply the transient assumptions are complete. The next step will initiate a 50 second calculation to test the restart model.

Step 2. Run the First 50 Seconds of the SBLOCA.

In this step, a short transient calculation will be run, the progression of the transient examined and any modifications made if needed.

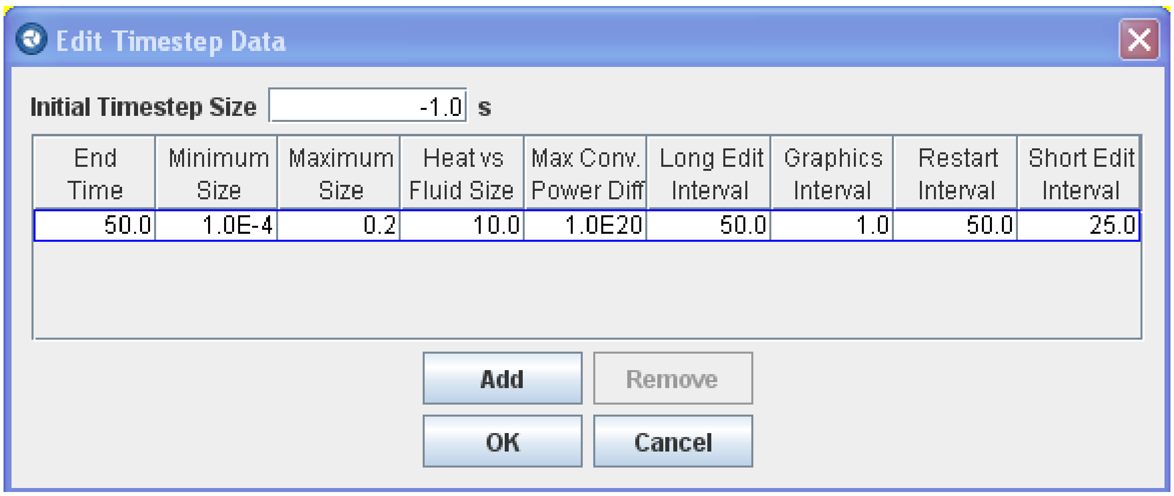
When running a transient calculation it is good practice to run short preliminary calculations to assure the transient is proceeding down the path that is expected. Generally, most of the action (Trips) will take place during the initial phase of the transient event sequence.

1. Set up the restart model to stop when 50 seconds of transient time is achieved.

A) Click on "Model Options" in the Navigator Window.

B) In the Properties Window, locate the "Timestep Data" box and expand the box.

C) Modify the timestep data to agree with the following figure. The calculation will end at 50 seconds, be run at a maximum timestep size of 0.2 seconds, and take plot points every second.

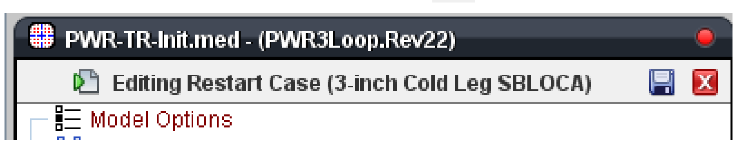


End Time	Minimum Size	Maximum Size	Heat vs Fluid Size	Max Conv. Power Diff	Long Edit Interval	Graphics Interval	Restart Interval	Short Edit Interval
50.0	1.0E-4	0.2	10.0	1.0E20	50.0	1.0	50.0	25.0

D) Click the OK button.

2. Save the restart file. All of the changes needed to make a 50 second calculation are completed. The restart file is saved as part of the steady-state model.

A) In the Navigation Window, click on the save ICON in the Editing Restart Case Tab.



Clicking on the save button saves and closes the restart editing window. The restart file can be opened at anytime by clicking on the restart file in the Cases folder in the Navigation Window and then expanding the Restart Model box in the Properties Window.

STEP 2.A) CREATE A RESTART JOB STREAM

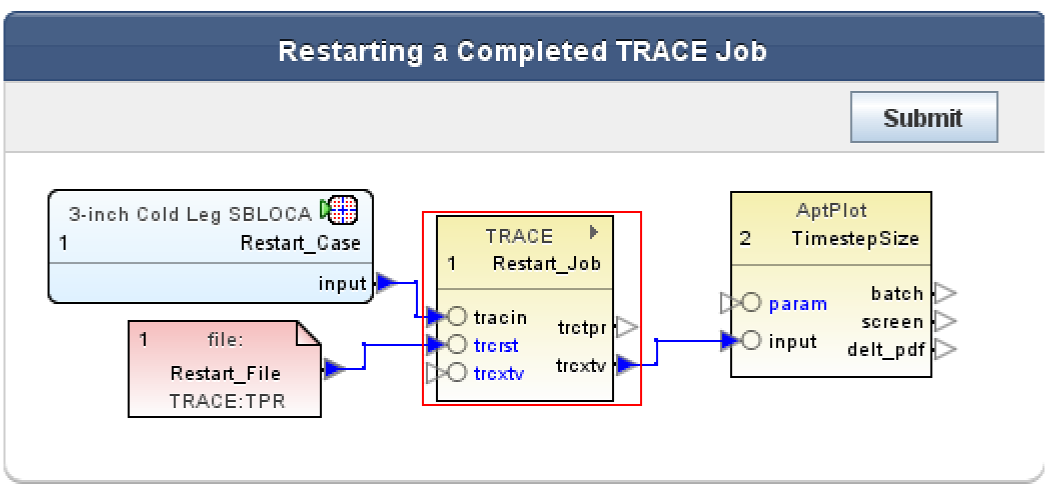
This step will create the Job Stream that will run the restart file from the end of the steady-state calculation made earlier.

1. In the Navigation Window, locate and right-click on "Job Streams".

2. In the pop dialog box select New.

3. In the popup window click on "Basic Stream" then click on the Next button at the bottom of the window.

4. Click on the "A Restart of a Completed TRACE Job" then click on the Finish bottom at the bottom of the window. A new tab will appear at the bottom of the View Window with a view of the restart Job Stream. The new Job Stream data can also be viewed in the Navigation Window under the Job Streams Folder.



5. In the View Window click on the "TRACE Restart_Job" box. In the Properties Window:

A) Locate the "View in Job Status" box and click the Yes button.

B) Locate the Animation Model box and check mark the box. Click on the select  button and navigate to the Day4/Morning/PWR5_Steady-State folder and select the PWR-Anim.med file.

C) Locate the "Open Animation" box and click on the "Immediately" button. This will open the animation file when the restart job is submitted.

D) Locate the "Start Paused" box and click on the On button.

E) Locate the "Demultiplex Plot File" box and click on the "Yes" button.

6. This step will connect the restart input file to the TPR file created in the PWR steady-state calculation made earlier. In the View Window click on the "file: Restart_File TRACE: TPR" box.

A) In the Properties Window, locate the "File" box.

B) On the left-hand side of the box click on the down arrow and select "Calculation Server. In the popup window, open the execute folder (left-hand side of the window).

C) Locate and open the "PWR_SS_Stream-Final" folder.

D) Click on the PWR_SS_Basecase sub folder

E) In the right-hand column, locate and click on the "PWR_SS_Basecase.tpr" file then click on the Select button at the bottom of the window.

7. The Job Stream is now complete and ready to be submitted for the calculation.

A) In the toolbar at the top of the View Window, lock the view by clicking on the padlock ICON .

B) In the View Window, Click on the Submit button.

The job is submitted and should be running

8. If not already up and functioning, Load the PWR animation file, PWR-Anim.med, located in the Day4/Morning/PWR5_Steady-State folder and connect the animation to the data source.

A) Select the PWR-TR data source (the job currently running or just ran). Connect the data source to the animation and click the play button. Note at the bottom of the animation View Window there are several Tabs. The System View Tab shows the transient response for all of the hydraulic components. The Transient Plots Tab shows time history plots for key parameters.

Step 3. Evaluate the Results of the 50 Second Calculation.

When the 50 s transient calculation is finished do the following.

1. Examine the calculated results using any or all of the available tools.

A) The animation views,

B) AptPlot,

C) Message file,

D) Output file

2. Determine if the transient is proceeding as expected by answering the following questions.

A) Does the primary pressure decline? (examine pressurizer plot variable pn-326A01)

B) Does the reactor power trip? (examine reactor trip plot variable tp10 and power plot variable rpower-999)

C) Do the RC Pumps trip and coast down and does the loop flow decline? (examine pump plot variables omegan-115, omegan-215 and omegan-315 and cold leg mass flow plot variables rmvm-120A01, rmvm-220A01 and rmvm-320A01)

D) Does HPI initiate? (examine HPI FILL component plot variables fxmass-150, fxmass-250 and fxmass-350)

E) Does the core respond as expected (level, flow, etc.)? (examine vessel core inlet mass flow plot variable cimfr-10, vessel core outlet mass flow plot variable comfr-10, core liquid volume fraction plot variable corelq-10, core level plot variable sv5 [signal variable 5], power component maximum average rod temperature plot variable tramax-999)

F) Is the steam generator secondary side isolated? Did the secondary side pressure increase or decrease? Did the main feedwater regulating valves close? Did the turbine stop valve close? (examine steam dome pressure plot variables pn-180A13, pn-280A13 and pn-380A13; main feed regulating valve area plot variables area-410, area-420 and area-430; turbine stop valve area plot variable area-552)

3. If the transient response is not as expected, determine the cause and fix the problem.

Discussion of 50 s transient results:

An examination of the 50 s transient simulation shows that the primary pressure declined as expected. The declining pressure indicates that the break opened as planned.

A look at the reactor trip (trip 10) showed that the trip became true at about 14 s. The reactor trip signaled an insertion of the control rods and the core power began to decay as expected.

Coincident with the reactor trip was a loss of offsite power that deactivated the reactor coolant pumps. An examination of the pump speed showed that the pumps were tripped and began to coast down as expected. With the coast down of the reactor coolant pumps, the loop flow rate also declined as expected.

The signal to turn on ECCS was activated and HPI flow commenced at about 37 s.

An examination of the core region of the reactor vessel showed the core inlet and outlet flows declined as expected due to the reactor coolant pump trip. The rod temperatures also declined upon receipt of the reactor trip that initiated the core power decay. As the system depressurized, flashing occurred in the system beginning in the hottest regions. An examination of the core liquid volume fraction showed a slight vapor formation near the end of the 50 s transient, indicating that two-phase conditions were beginning to be established in the core. The core level (signal variable 5) response shows a decline near the end of the 50 s transient.

An examination of the steam generator secondary side pressure showed that the pressure initially declined and then began to increase at about 20 s. The increase in the pressure indicates that the normal flow through the steam lines was blocked. The examination of the main feedwater regulating valve areas showed that feedwater was terminated at the time of reactor trip which was expected. However an examination of the turbine stop valve area showed that the stop valve did not close as expected (loss of offsite power at the time of reactor trip was assumed and that should have closed the turbine stop valve). Thus the steam lines were being blocked by some other means. A further examination showed that the turbine control valve closed at about 20 s, thus isolating the steam generators and resulting in the pressure excursion. Since reactor trip occurred at about 14 s the turbine stop valve should have closed at about the same time resulting in an earlier increase in the secondary pressure.

An examination of the turbine stop valve trip (trip 18: plot variable tp18) showed that the trip never turned on even though the reactor trip logic was included in the trip controller (trip control 160) for the turbine stop valve trip (trip 18).

Examine the input for TRIP 18

1. Open the restart input file in the Model Editor

A) In the Navigator Window Locate and click on the 3-inch Cold Leg SBLOCA sub folder under the Cases folder.

B) In the Properties Window, expand the "Restart Model" box. This puts the restart input file into an editing mode.

2. Locate and click on the "Turbine Stop Trip" tab in the View Window.

3. Click on TRIP 18 in the View Window.

4. In the Properties Window, expand the "Setpoint Data" box.

5. Trip 18 is a type 2 trip. As such the trip will be turned on when the input signal to the trip exceeds the setpoint value for setpoint number 2.

6. The setpoint 2 input value is 10. A reactor trip signal will send an action signal to close the turbine stop valve. When the reactor trip is turned on (i.e. the reactor power is tripped), the trip signal is 1. Since the reactor trip is part of trip controller 160 (the input signal to trip 18), the output of trip controller 160 is also 1 when the reactor trip is on. Because setpoint 2 is set at 10, trip 18 will never be turned on, thus the turbine stop valve will always remain open. To remedy the problem, setpoint 2 input of trip 18 needs to be set to a value less than 1 but greater than 0.

Step 4. Execute a 1500 Second Calculation.

Now that the transient model has been checked out and initial problems fixed, a more lengthy transient calculation can be run.

1. In the Navigator Window locate and click on "Model Options".
2. In the Properties Window locate and expand the "Timestep Data" box.
3. Modify the end time to 1500.0 seconds.
4. Save the Restart input file as was done earlier.
5. Resubmit the transient calculation by locking the view and clicking on the submit button.

As the transient proceeds, use the animation and AptPlot tools to examine the transient response of the simulation. The animation shows time history plots for several key parameters (click on "Transient Plots" tab at the bottom of the View Window in the animation).

A. System pressures (primary pressure: cb2, secondary pressures: cb3, cb5 and cb6),

B. HPSI flow rates,

C. Peak rod cladding temperatures (maximum average rod temperature:

tramax-999 and hot rod maximum temperature:trhmax-999),

D. LPSI flow rates,

E. Loop flow rates,

F. Accumulator flow rates,

G. Reactor coolant pump speeds,

H. Core power,

I. Main feedwater flows,

J. Auxiliary feedwater flows,

K. Total break and ECCS flow rates (break flow:bxmass-191, total ECCS flow: cb8) and core level.

Other calculated parameters that may be of interest, that can be plotted using AptPlot include:

A. Steam line safety valve flow rates (bxmass-518, bxmass-528 and bxmass-538).

B. Heat transfer rate across the steam generator U-tubes (tpowi-910, tpowi-920 and tpowi-930).

C. Hot leg fluid temperatures (tln-100A02, tln-200A02, tln-300A02, tvn-100A02, tvn-200A02, tvn-300A02).

D. Cold leg fluid temperatures (tln-120A04, tln-220A04, tln-320A04, tvn-120A04, tvn-220A04, tvn-320A04).

E. Loop seal void fractions (alpn-110A03 through alpn-110A08, alpn-210A03 through alpn-210A08, alpn-310A03 through alpn-310A08).

F. Vessel downcomer level (sv4) versus core level (sv5).

G. Pressurizer level (sv4241)

Discussion of 1500 s transient results:

At the initiation of the break, the primary and secondary pressures declined. At the reactor trip, the steam generator secondary side was isolated and the secondary pressure increased to the safety valve pressure setpoint. Energy was removed from the primary system through the cold leg break and through the steam generators. At about 500 s, two-phase flow at the break was observed resulting is a higher energy removal rate and the primary depressurization rate increased. The primary pressure declined below the secondary pressure causing the secondary side to become a heat source to the primary. Both the primary pressure and secondary pressure declined throughout the remainder of the transient.

The core level declined as a result of coolant ejected from the system through the break. HPI flow was initiated but was too small to keep up with the break flow rate. At about 500 s, the core level rapidly declined then rapidly increased as the loop seals were cleared of liquid and a new balance of liquid mass was established throughout the system. The break flow declined as a result of two-phase conditions at the break. Boiling of the coolant in the core resulted in a further decline in the core level. As the level declined the fuel rods experienced a temperature excursion.

Accumulator flow was established when the primary pressure declined below the accumulator pressure setpoint. The combination of accumulator flow and HPI flow overwhelmed the break flow and a refill of the reactor vessel and reflood of the core commenced. As coolant from the ECCS reflooded the core, the fuel rod temperature excursion was mitigated and the rods quenched.

At the end of the transient, the system was in a stable cooling mode.

Additional Exercise – Examine the Effects of Break Size on the Peak Cladding Temperature

Object: Examine the effect of break size on the peak cladding temperature.

Rerun the transient calculation for a break size of 6 inches (0.1524 m) and 12 inches (0.3048 m).

1. Open the restart file.
2. Locate VALVE 805 (Break VALVE).
3. Modify the valve area and hydraulic diameter in the "Component Geometry" input box in the VALVE Properties Window.
4. Modify the "Valve Flow Area" and the "Valve Hydro Diameter" also located in the Properties Window.
5. Save the restart model.
6. Rerun the calculation.
   A) Before submitting the calculation, click on the Submit button in the View Window of the "External_File_Restart" tab.
   B) In the Properties Window change the "Name" of the Job Stream to "Run-6-inch"
   C) Lock the View Window and click on the submit button.
7. Examine the results and compare the peak cladding temperatures.