Beaver Valley RELAP5 PTS Analysis

David Bessette, USNRC

Robert Beaton, ISL, Inc.

Beaver Valley T/H Analysis

- Model received from Westinghouse was developed from the HB Robinson plant model.
- Model needed modifications/corrections to run a null transient (maintain quasi-steady conditions).
- Trip setpoints used by Westinghouse were licensing values. Best-Estimate plant setpoint values are used (obtained from current Tech Specs).

Beaver Valley T/H Analysis

- Transient runs (such as reactor trip/turbine trip) were made to “shake down” the model. Corrections were made based on the results of these runs.
- Control variables were added to compute quantities of interest to PTS analysis (i.e., minimum downcomer temperature, etc.)

Sump Recirculation

- ECCS water injection switches from RWST to sump recirculation when RWST volume drops to 287,000 gallons
- Is potentially important to PTS risk predictions since ECC injection temperature will increase from 50°F to 124°F at switchover
- Assumptions
  - constant sump temperature of 124°F
  - containment sprays come on between 365 sec (for 1.0" SBLOCA) to 302 sec (for 22" SBLOCA)

Beaver Valley T/H Analysis

- List of transients was based on input from NRC, Sandia and SAIC
- Events selected to identify runs that provide broad coverage of possible PTS sequences.
- There are also some runs that we would expect to be relatively benign (however, as we have seen we cannot simply assume that they are not of concern).

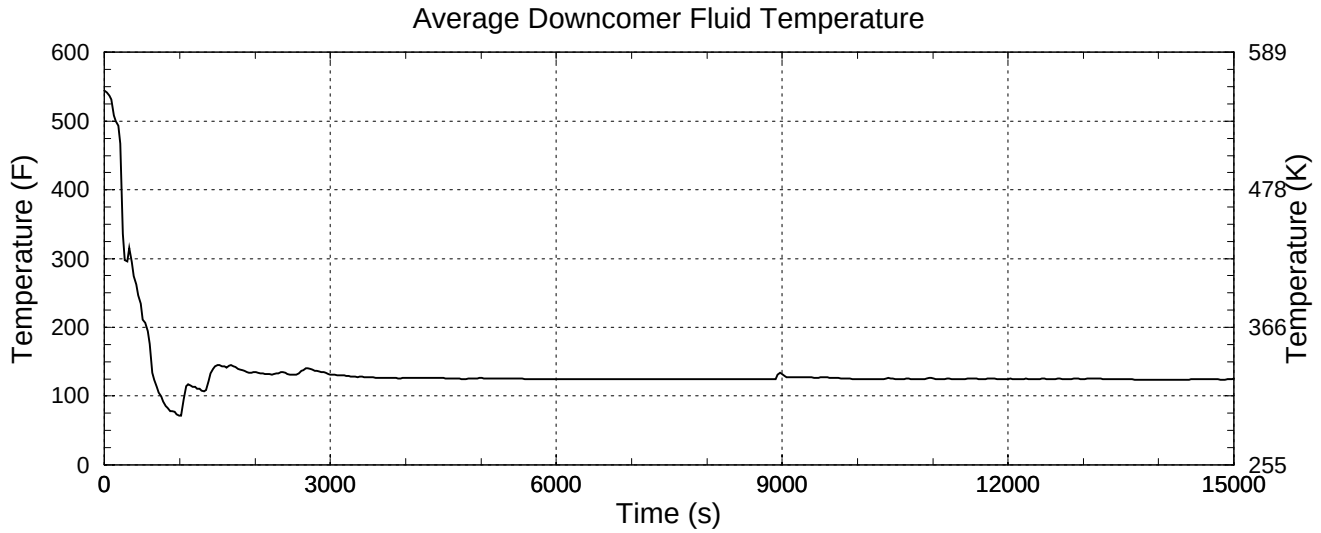
Beaver Valley T/H Analysis

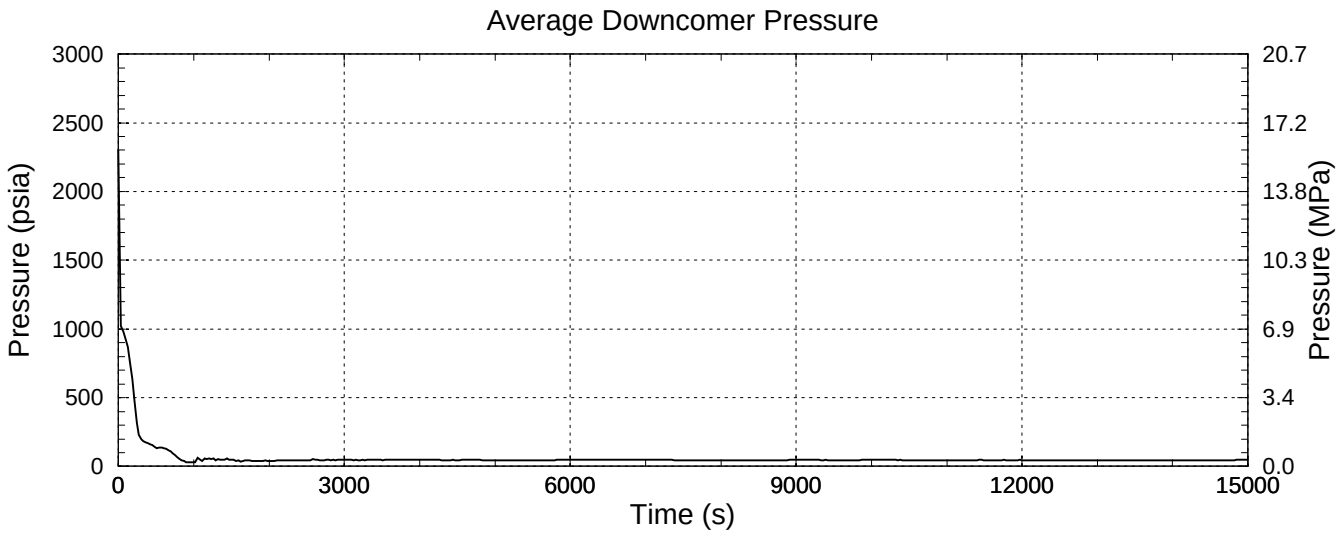
- Preliminary Transient Events Include:
  - LOCA Spectrum (1.0 inch through 8.0 inch)
  - Reactor Trip w/Stuck Open Primary Relief Valve (PORV, SRV)
  - Reactor Trip w/Stuck Open Secondary Side Valves (1, 2, and 3 stuck valves)
  - Main Steam Line Break
  - Steam Generator Tube Rupture

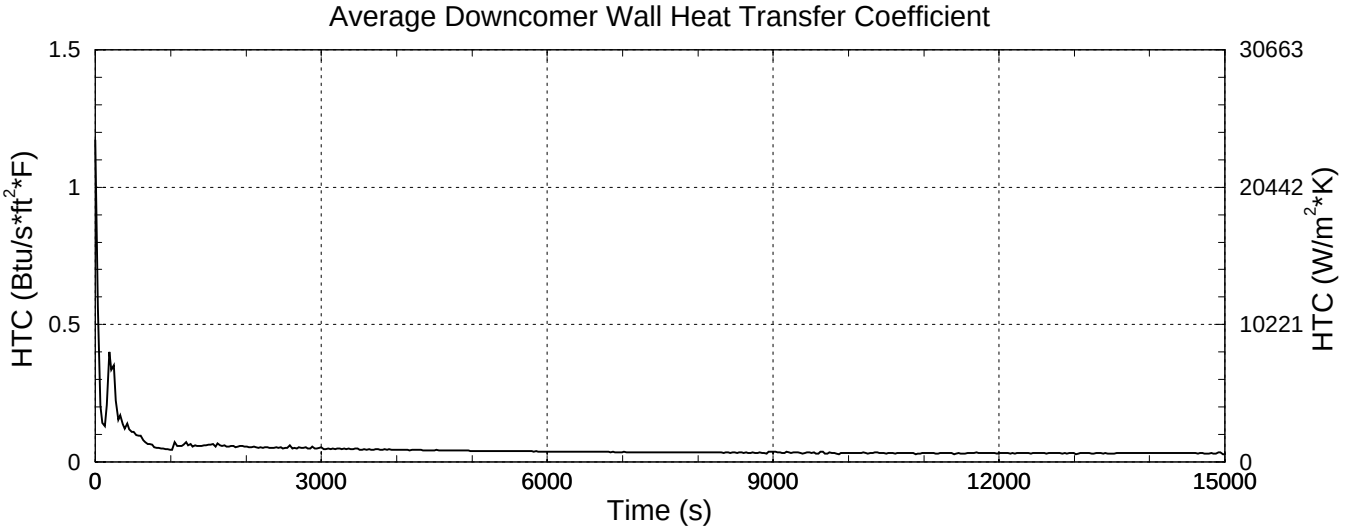
Beaver Valley T/H Analysis

- Average Downcomer Fluid Temperature, Pressure and Downcomer Wall Heat Transfer Coefficient are passed to FAVOR
- Preliminary FAVOR results indicate medium LOCAs dominate RPV failure
- FAVOR analysis of other plants indicates that stuck pressurizer relief valves which reclose are significant risk contributors

BV PTS − 8.0 inch Surge Line Break (Case 007)

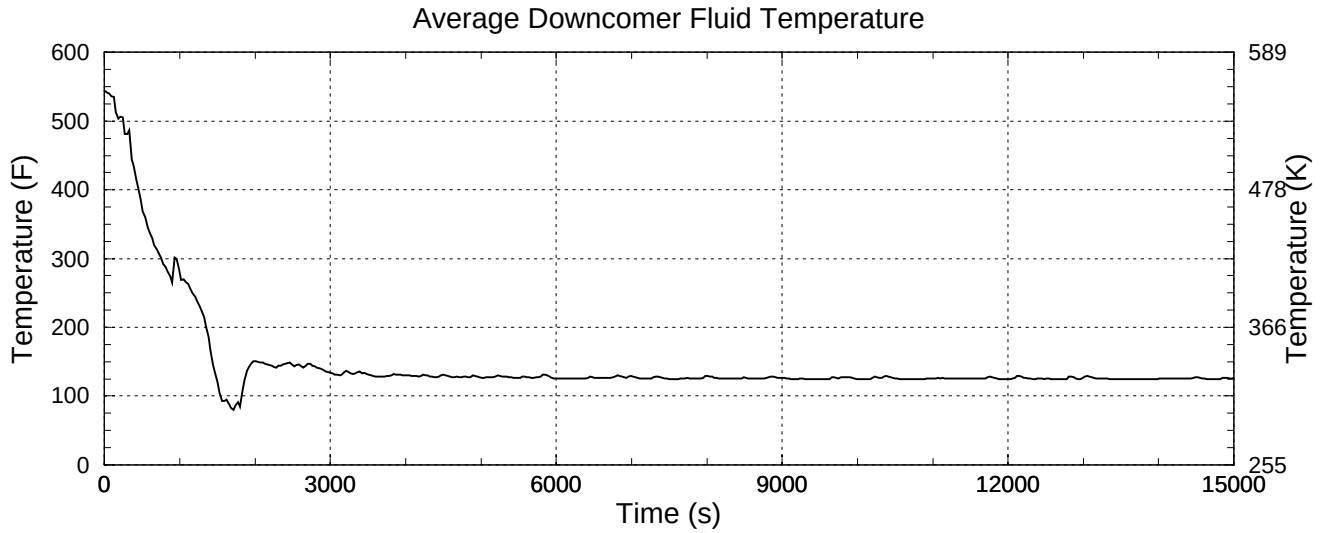


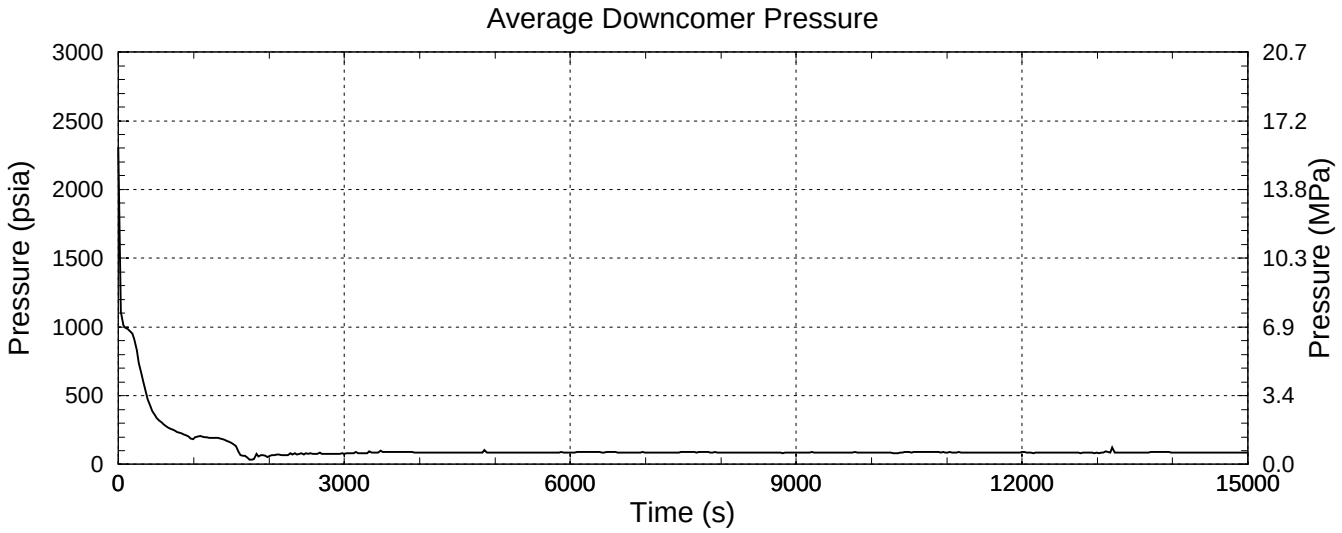


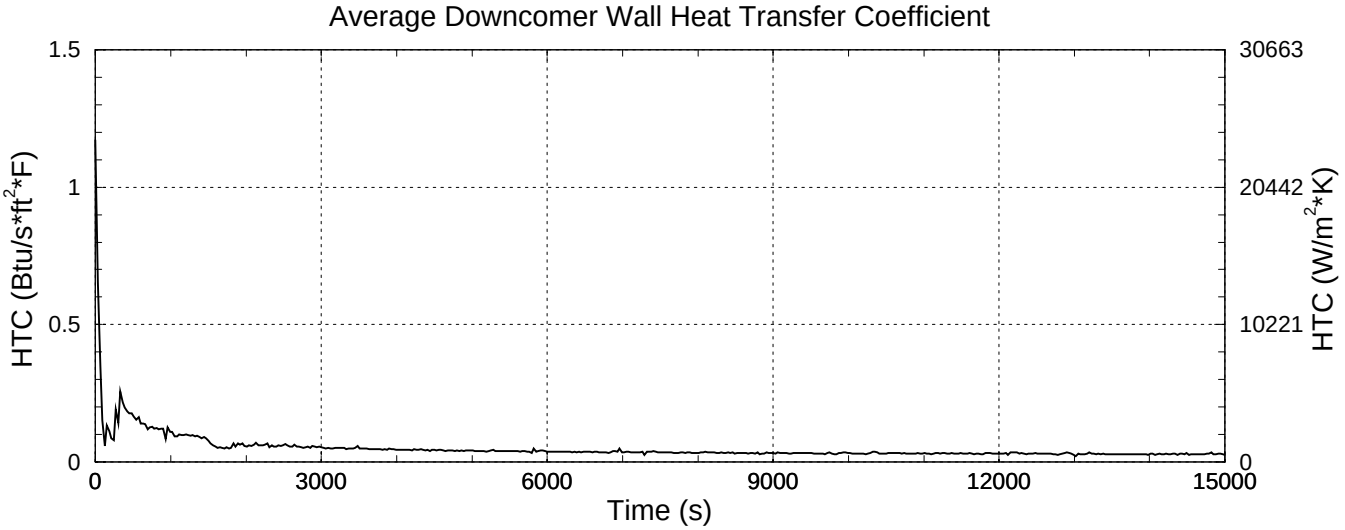


Wed May 8 11:04:17 2002

BV PTS − 5.657 inch Surge Line Break (Case 006)

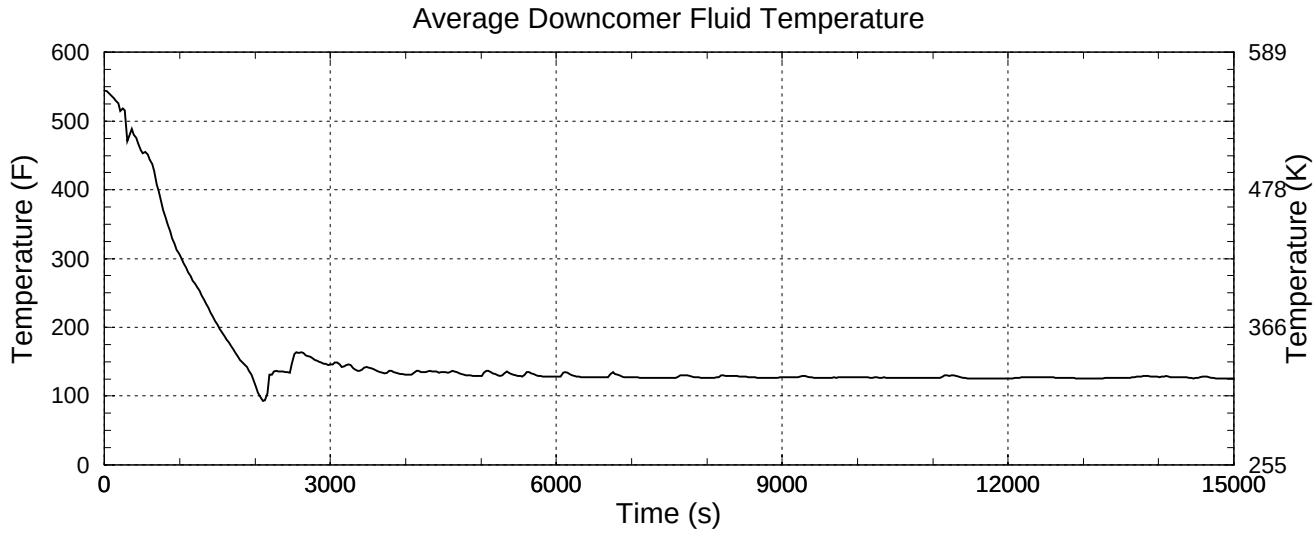


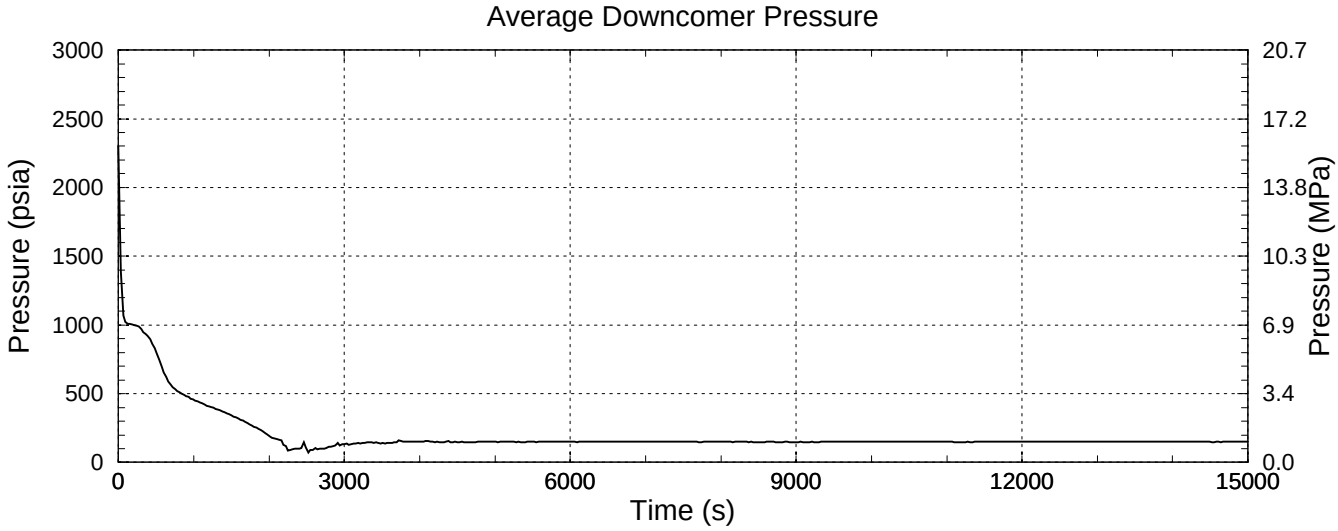


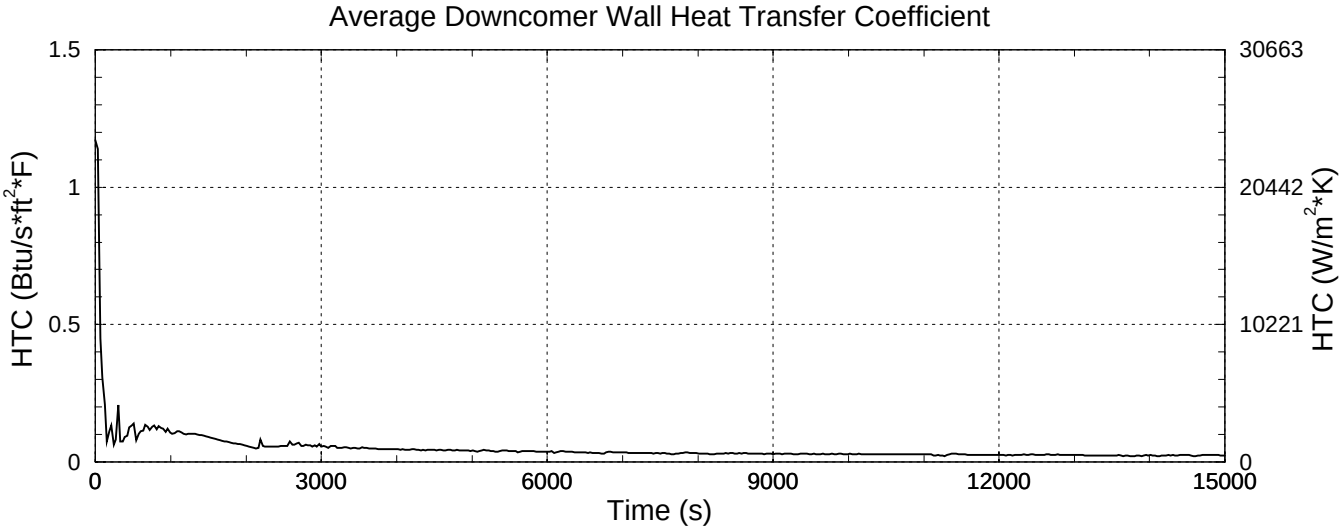


Wed May 8 11:04:17 2002

BV PTS − 4.0 inch Surge Line Break (Case 005)

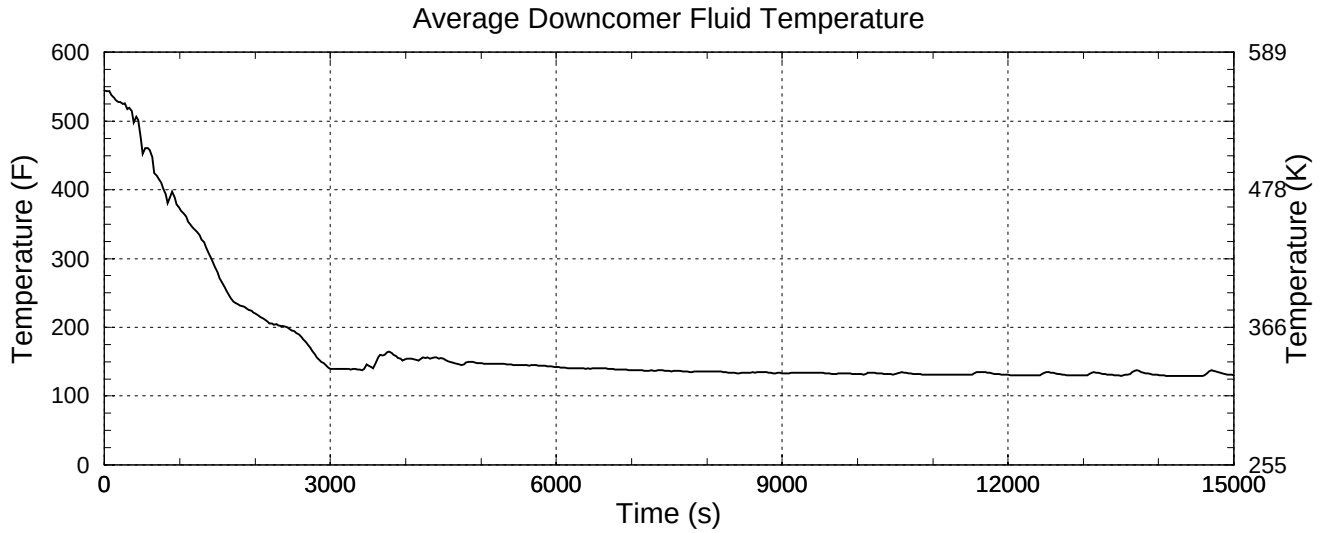


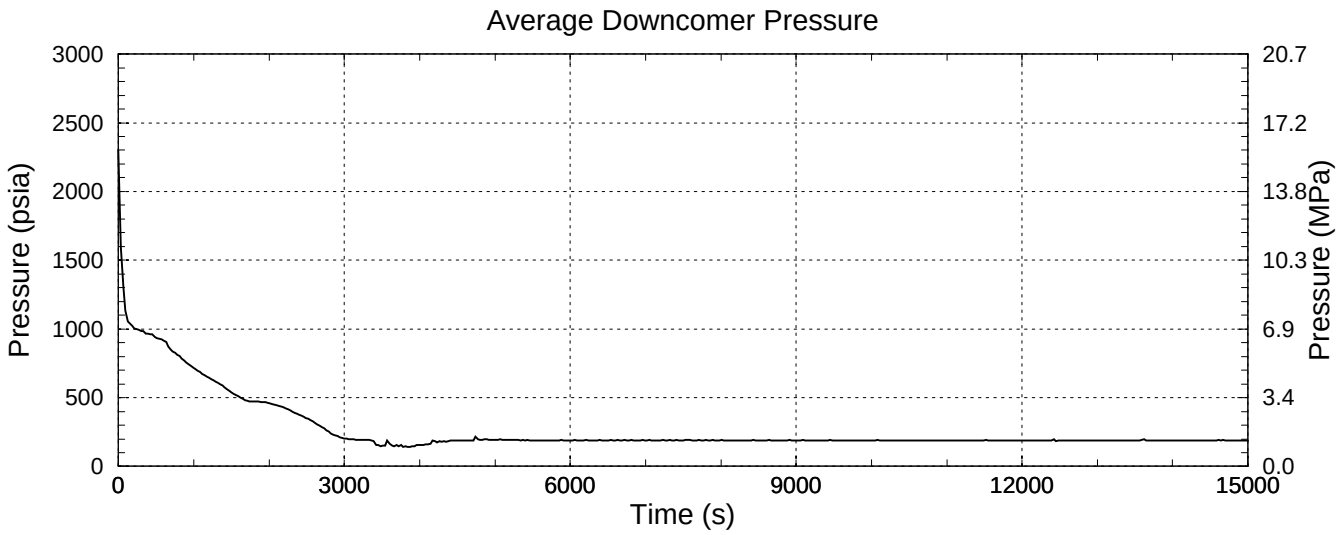


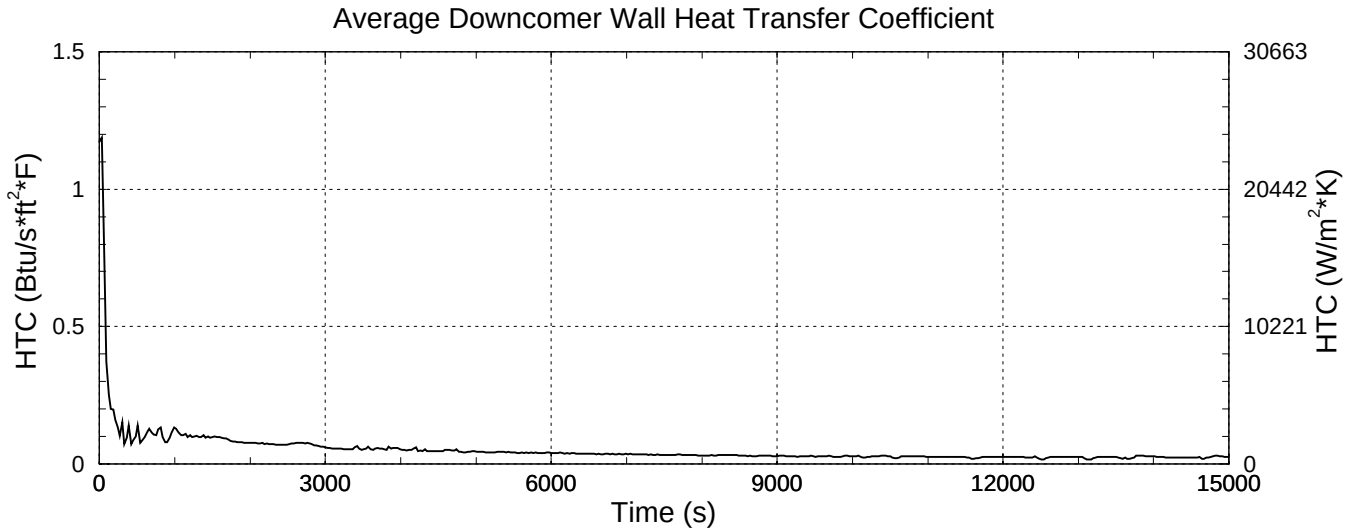


Wed May 8 11:04:17 2002

BV PTS − 2.828 inch Surge Line Break (Case 004)

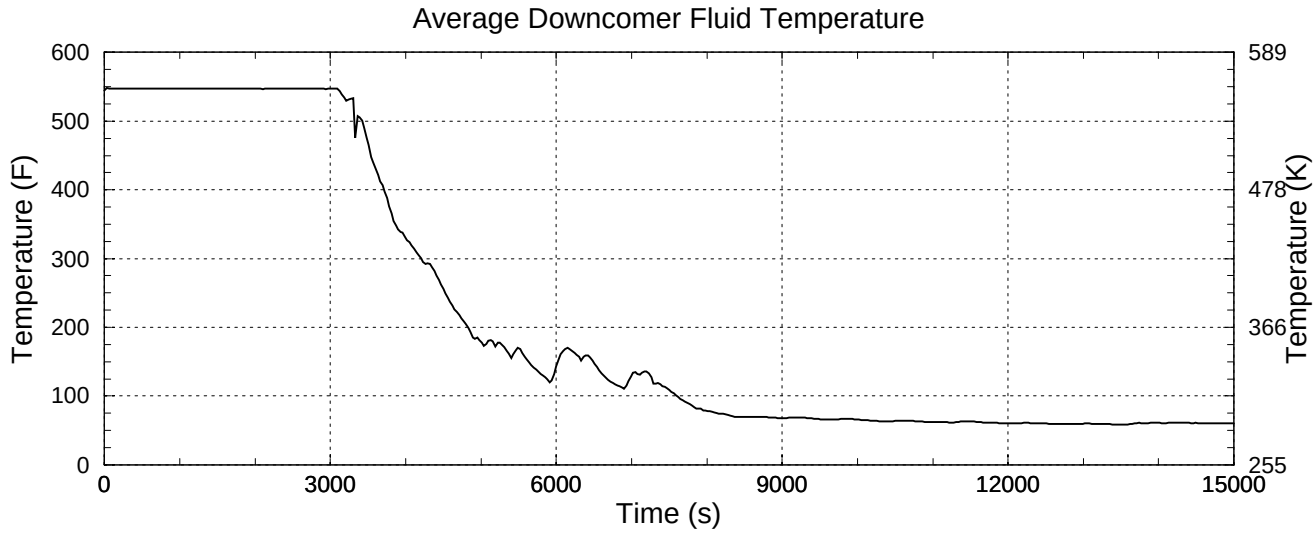


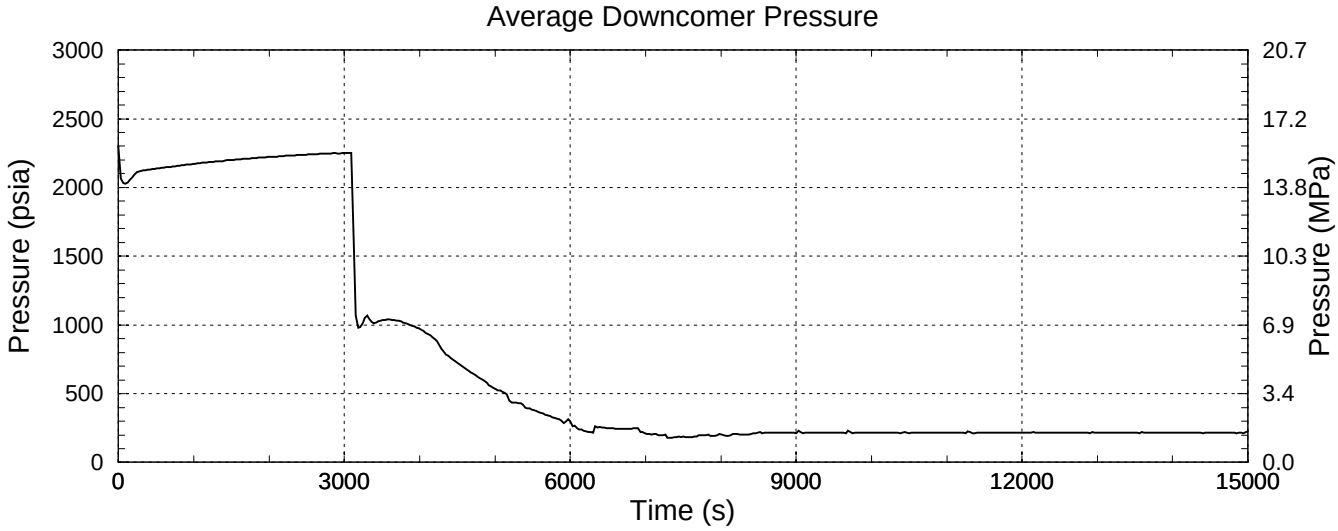


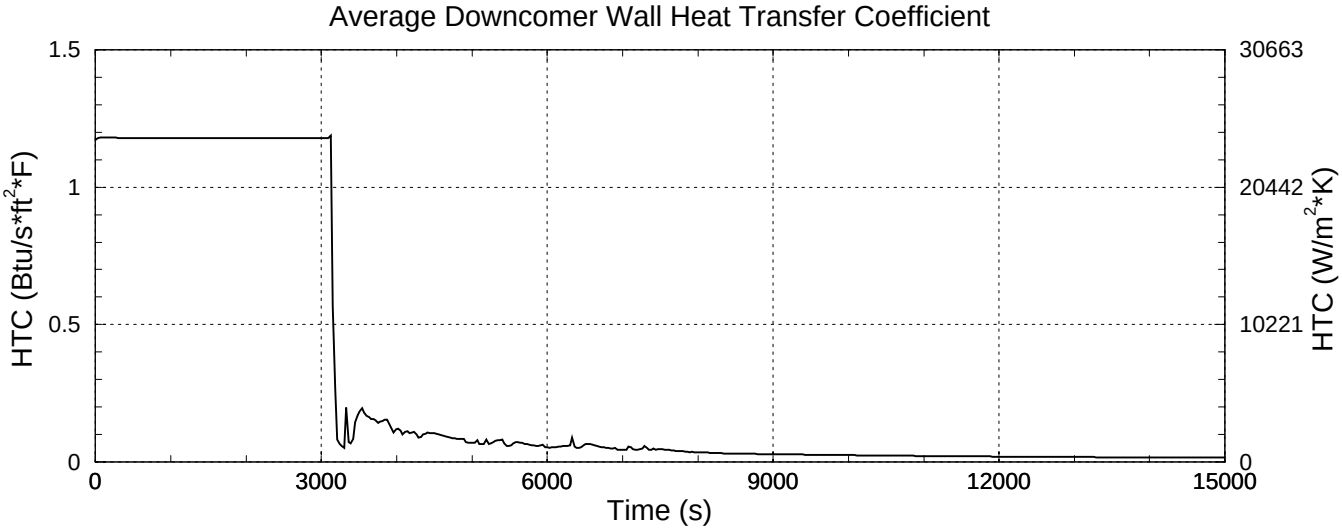


Wed May 8 11:04:17 2002

BV PTS − RTT w/Feed and Bleed (Case 031)

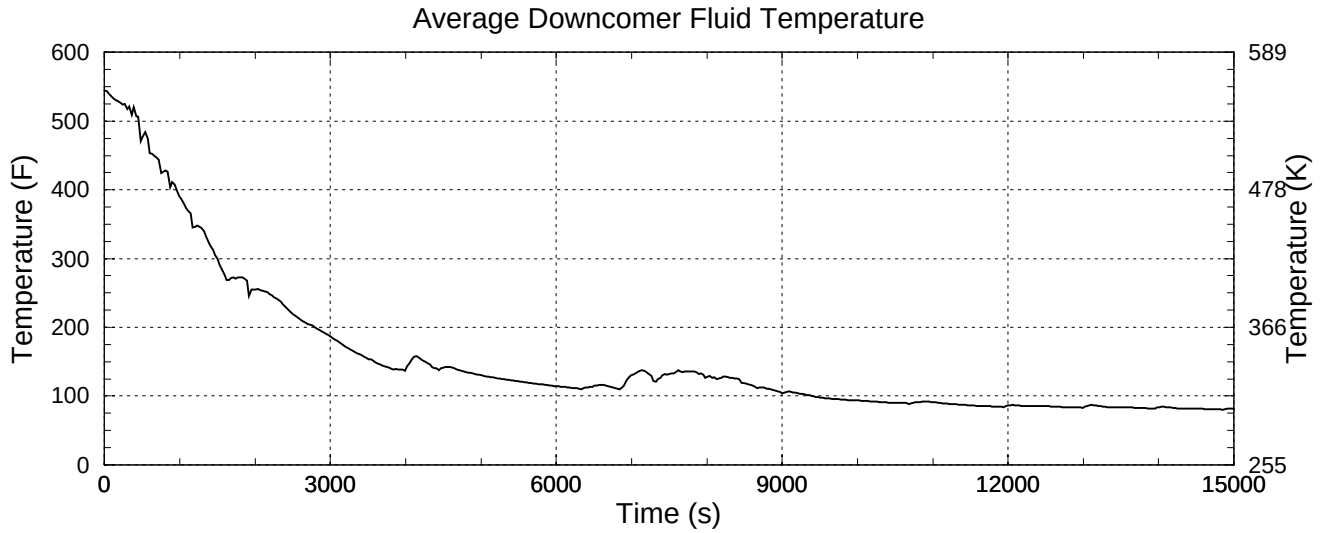


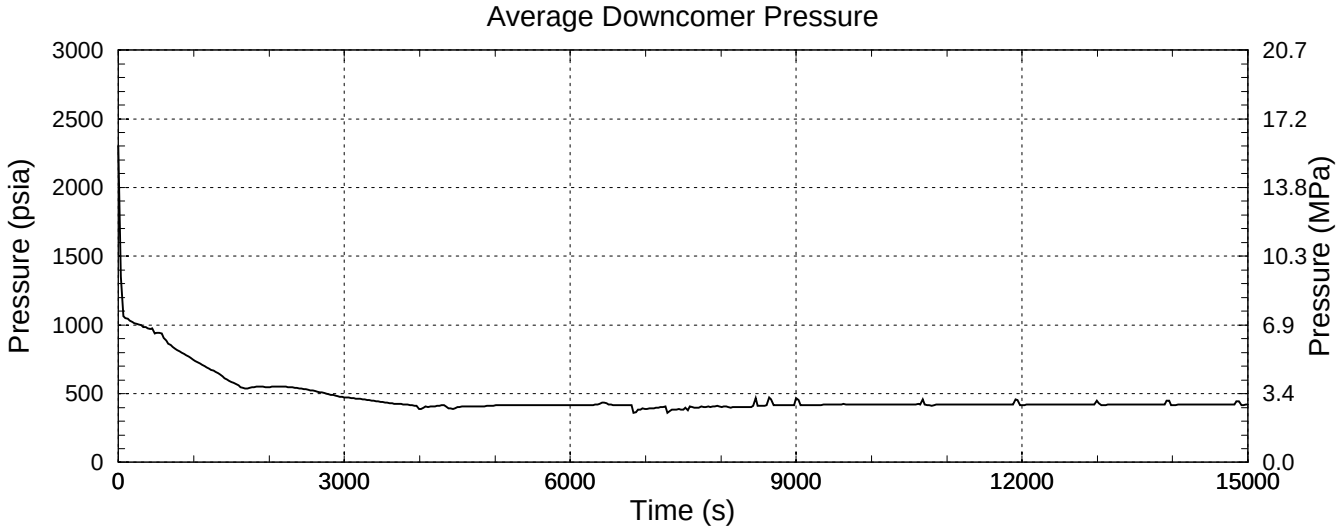


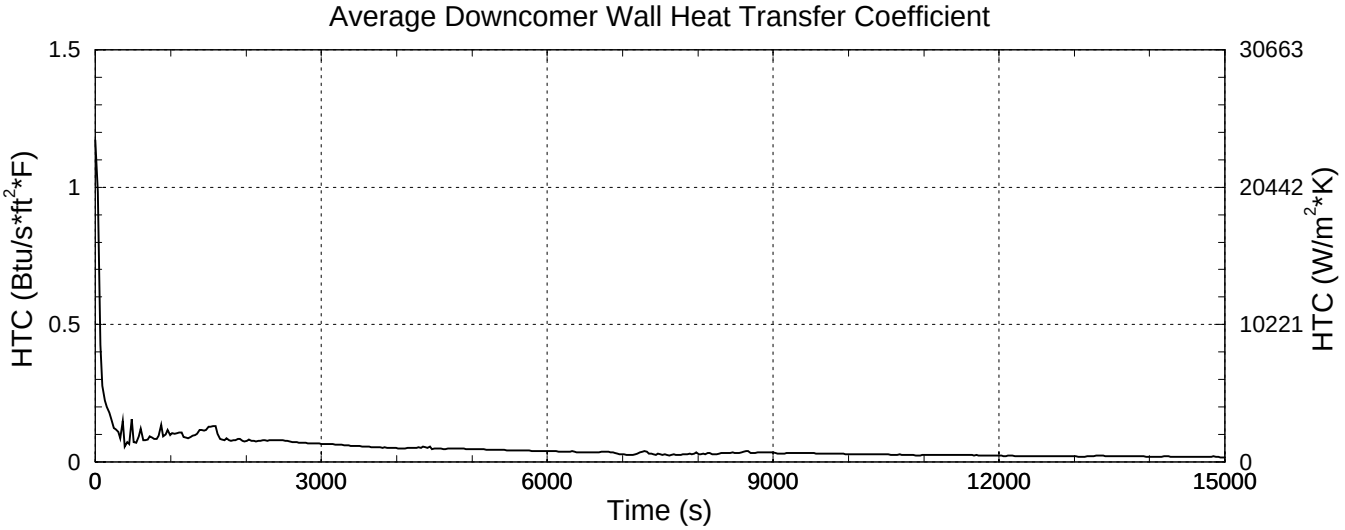


Wed May 8 11:04:17 2002

BV PTS − RTT w/2 Stuck Open Pressurizer SRVs (Case 034)

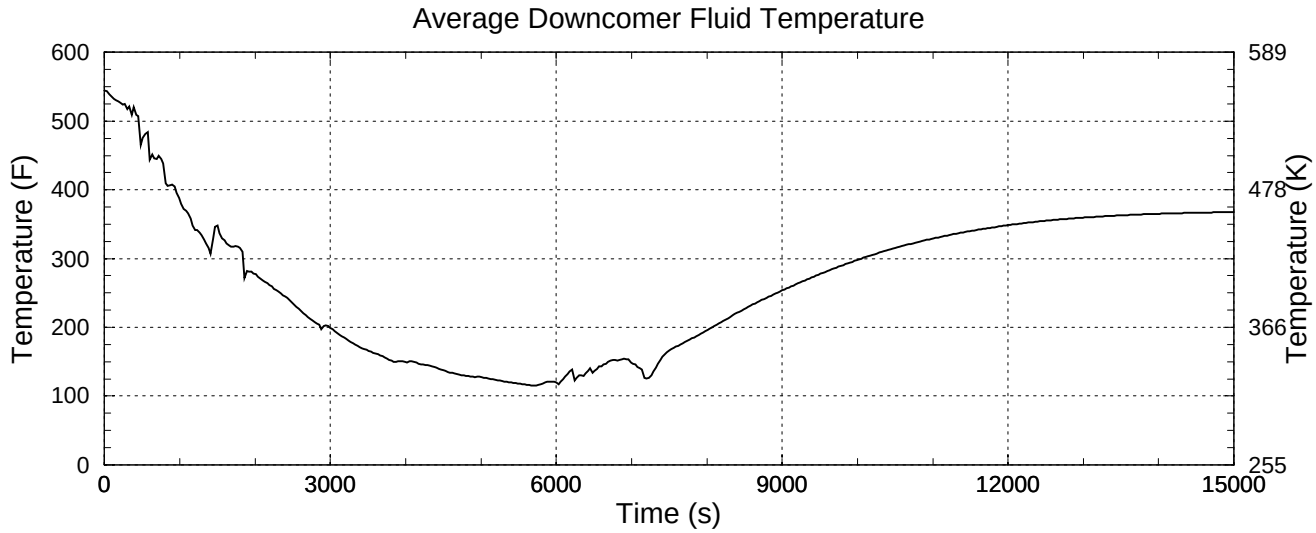


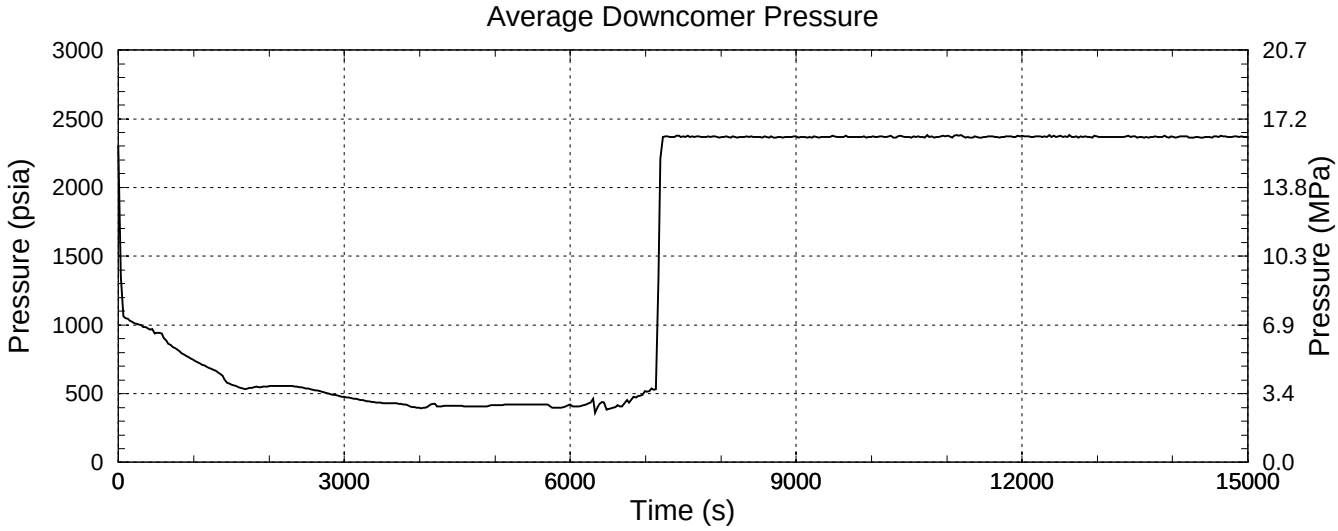


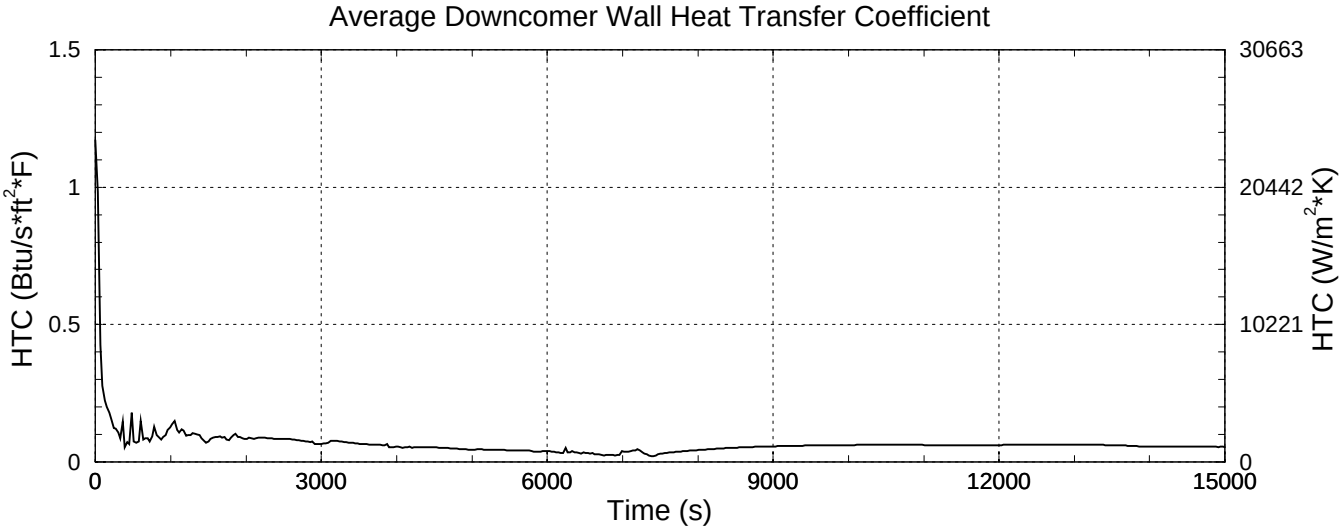


Wed May 8 11:04:17 2002

BV PTS − RTT w/2 Stuck Open Pzr SRV's which reclose (Case 062)







Wed May 8 11:04:18 2002

Beaver Valley T/H Analysis

- Additional Transient Events to be Simulated
  - Larger LOCA's (up to 22" hot leg breaks)
  - Stuck valves which reclose after system depressurized
  - Events which start from Hot Zero Power
  - Others based on PRA?