APPENDIX T

CODE-DATA COMPARISON FOR CCTF RUN 54 WITH NEWRFD = 1

This appendix presents the calculation results for the reflood option newrfd=1. The set of plots presented is the same as presented in the main body of the report for the reflood option newrfd=3. The TRAC-PF1/MOD2 developmental assessment calculations used the TRAC grid-spacer model. We have run CCTF Run 54 calculations both with and without the grid-spacer model. We have determined that the grid-spacer model should not be used because it results in excessive and nonphysical heat-transfer processes in the upper portions of the core. Therefore, the base-case assessment results for CCTF Run 54 do not use the TRAC grid-spacer model (see Sec. 5.3-10 for details). For reference purposes, the figure numbers for the two reflood options are listed below.

newrfd=1	newrfd=3	newrfd=1	newrfd=3
T-1	5.3-13	T-17	5.3-29
T-2	5.3-14	T-18	5.3-30
T-3	5.3-15	T-19	5.3-31
T-4	5.3-16	T-20	5.3-32
T-5	5.3-17	T-21	5.3-33
T-6	5.3-18	T-22	5.3-34
T-7	5.3-19	T-23	5.3-35
T-8	5.3-20	T-24	5.3-36
T-9	5.3-21	T-25	5.3-37
T-10	5.3-22	T-26	5.3-38
T-11	5.3-23	T-27	5.3-39
T-12	5.3-24	T-28	5.3-40
T-13	5.3-25	T-29	5.3-41
T-14	5.3-26	T-30	5.3-42
T-15	5.3-27	T-31	5.3-43
T-16	5.3-28	T-32	5.3-44

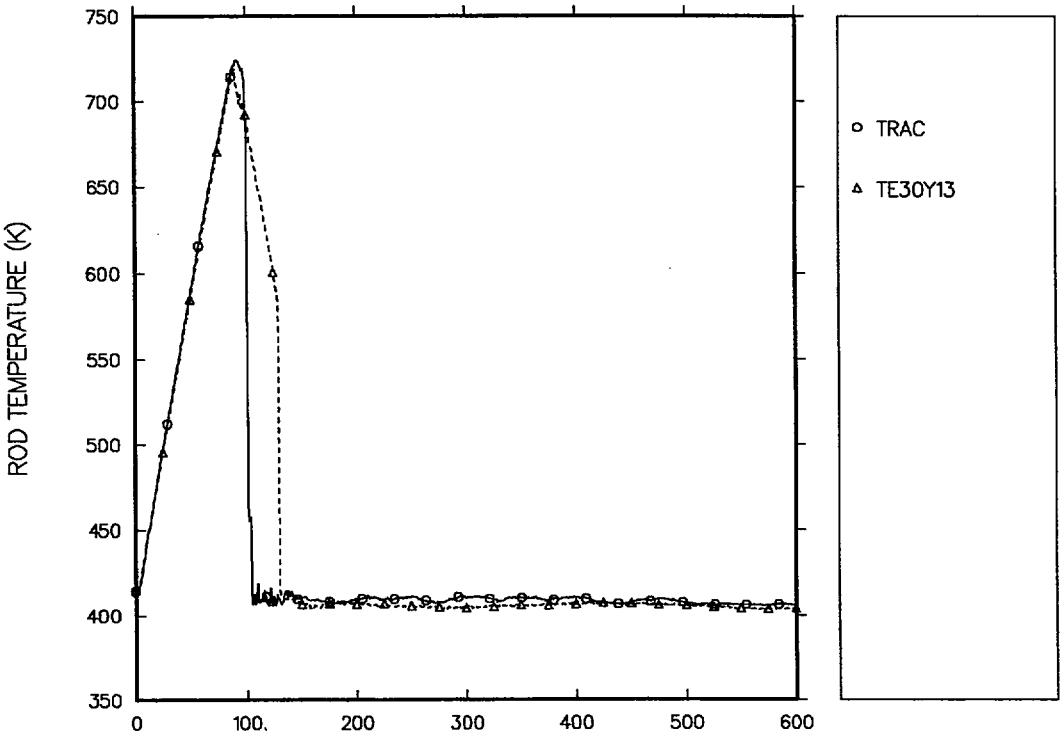

Fig. T-1. Calculated and measured cladding temperatures for the hot rod at the 2.480-m elevation.

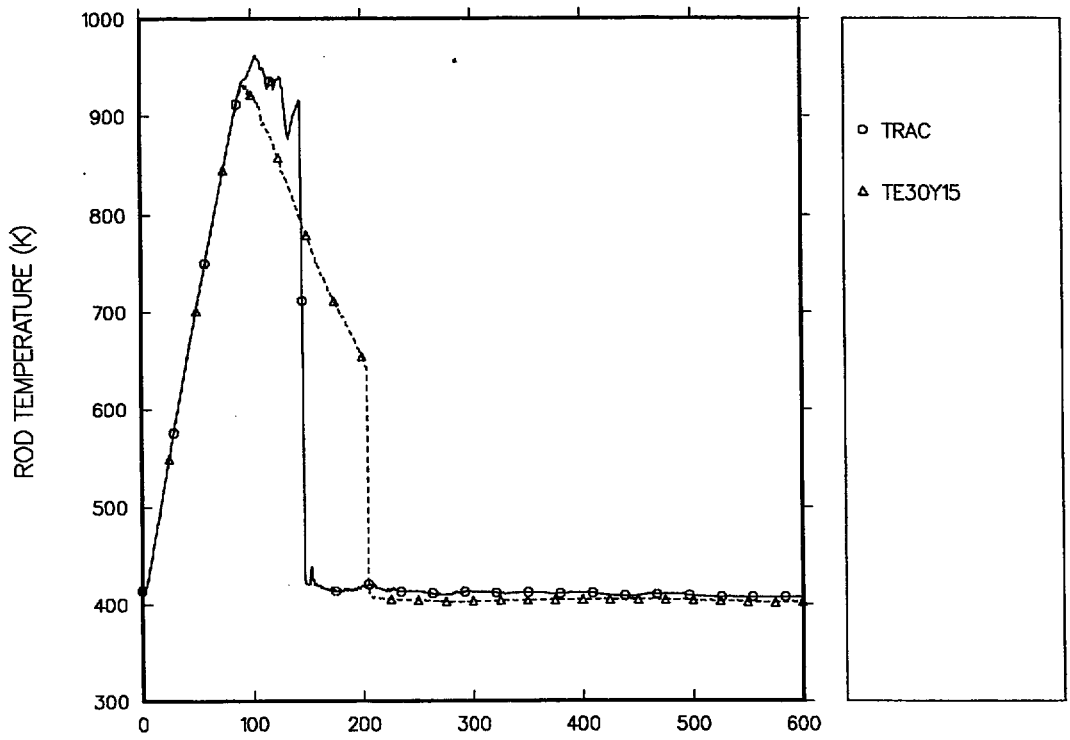

Fig. T-2. Calculated and measured cladding temperatures for the hot rod at the 3.115 -m elevation.

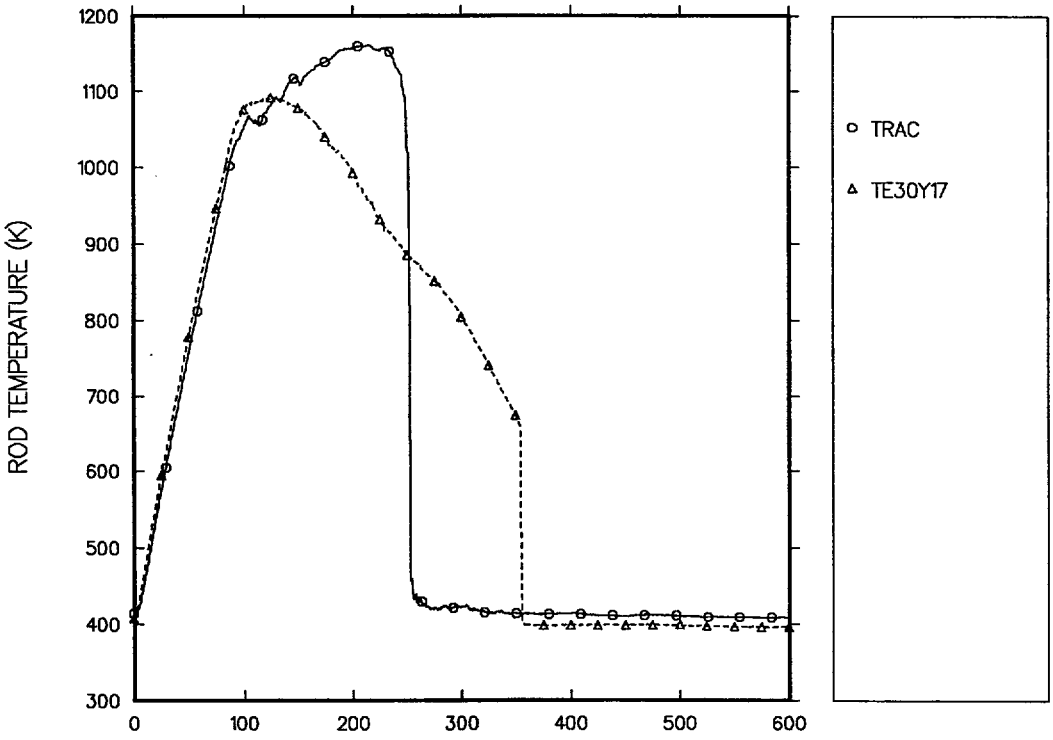

Fig. T-3. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation.

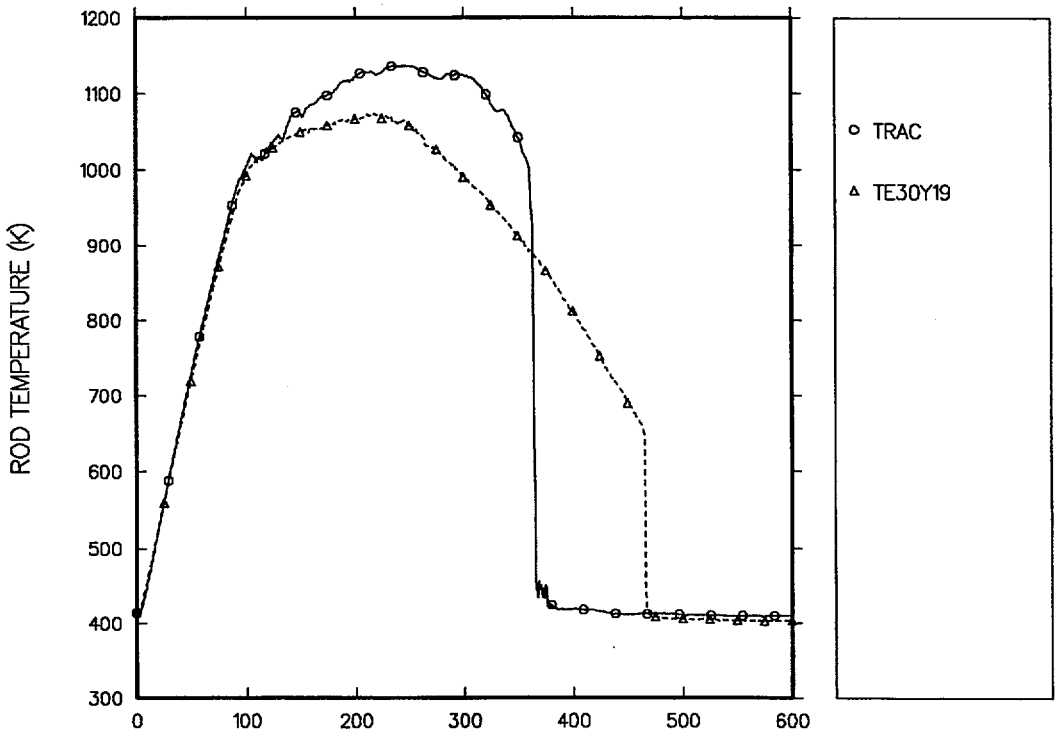

Fig. T-4. Cladding temperatures for the hot rod at the 4.540-m elevation.

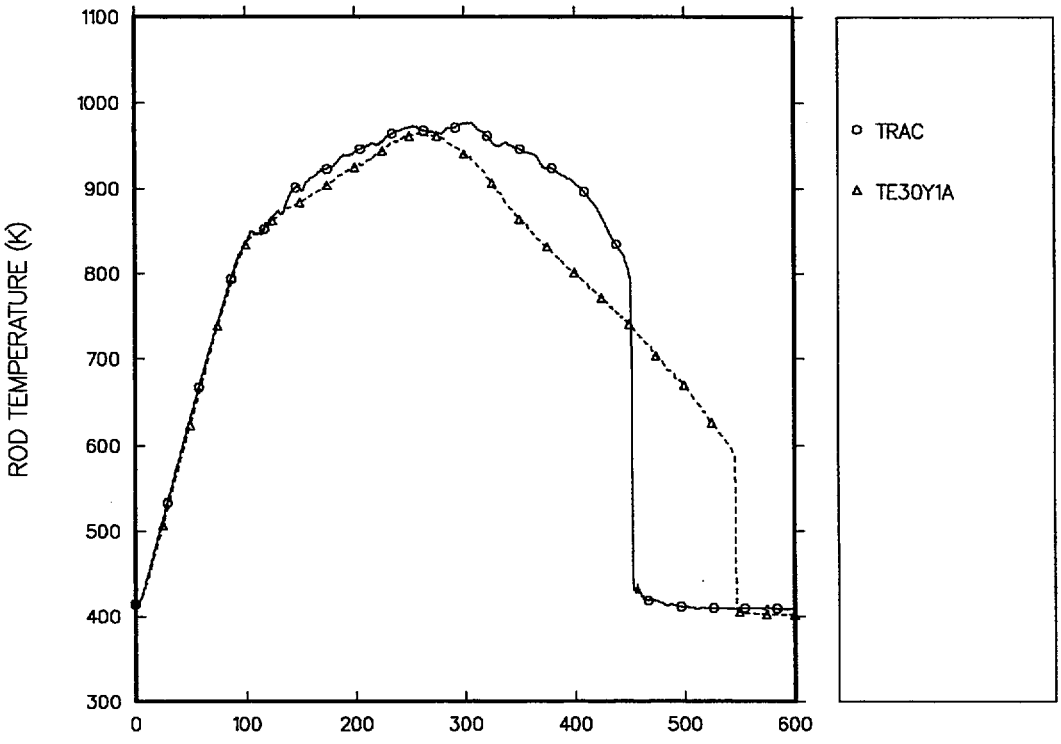

Fig. T-5. Cladding temperatures for the hot rod at the 5.150-m elevation.

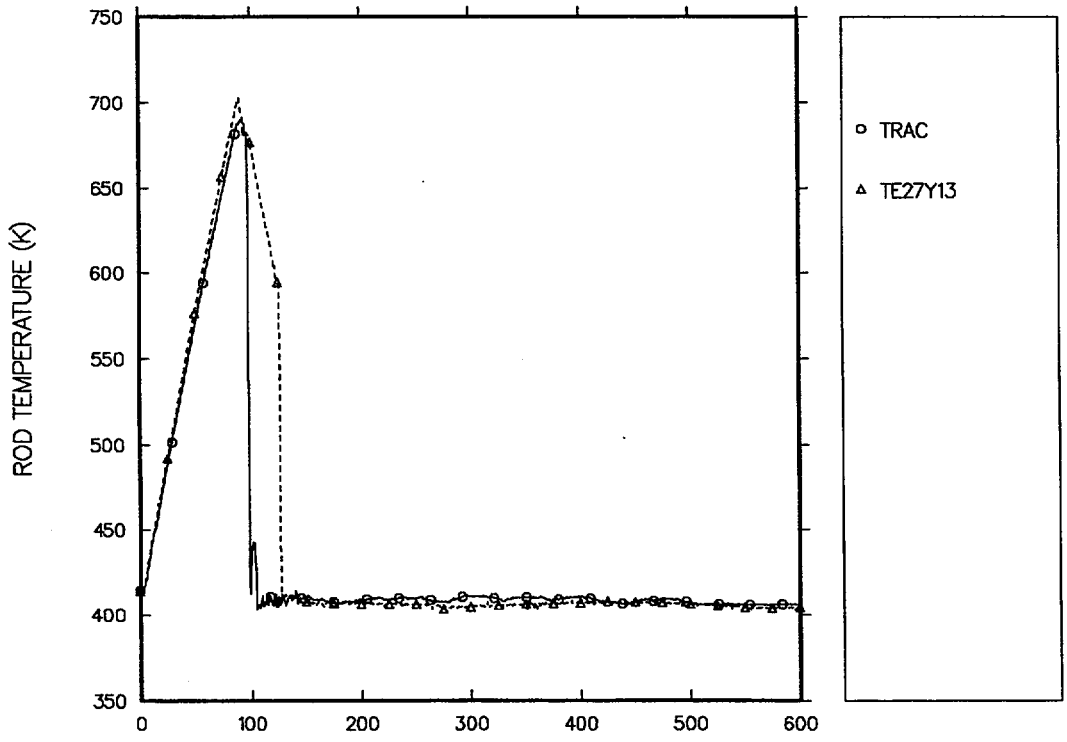

Fig. T-6. Cladding temperatures for the intermediate-powered rod at the 2.480-m elevation.

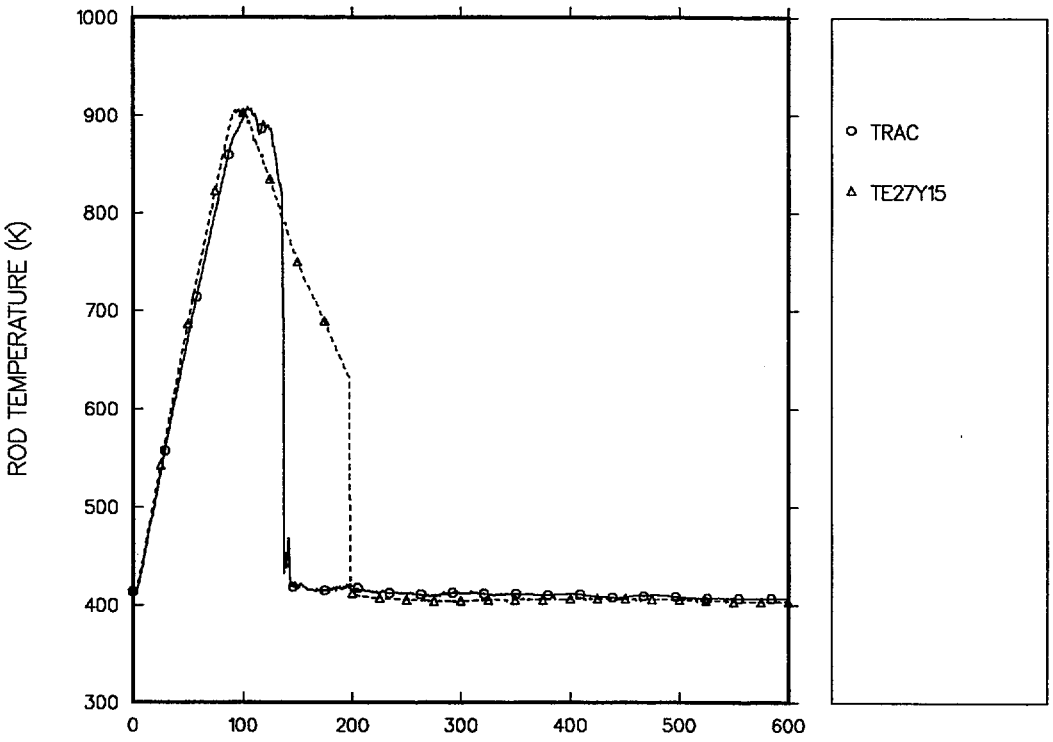

Fig. T-7. Cladding temperatures for the intermediate-powered rod at the 3.115-m elevation.

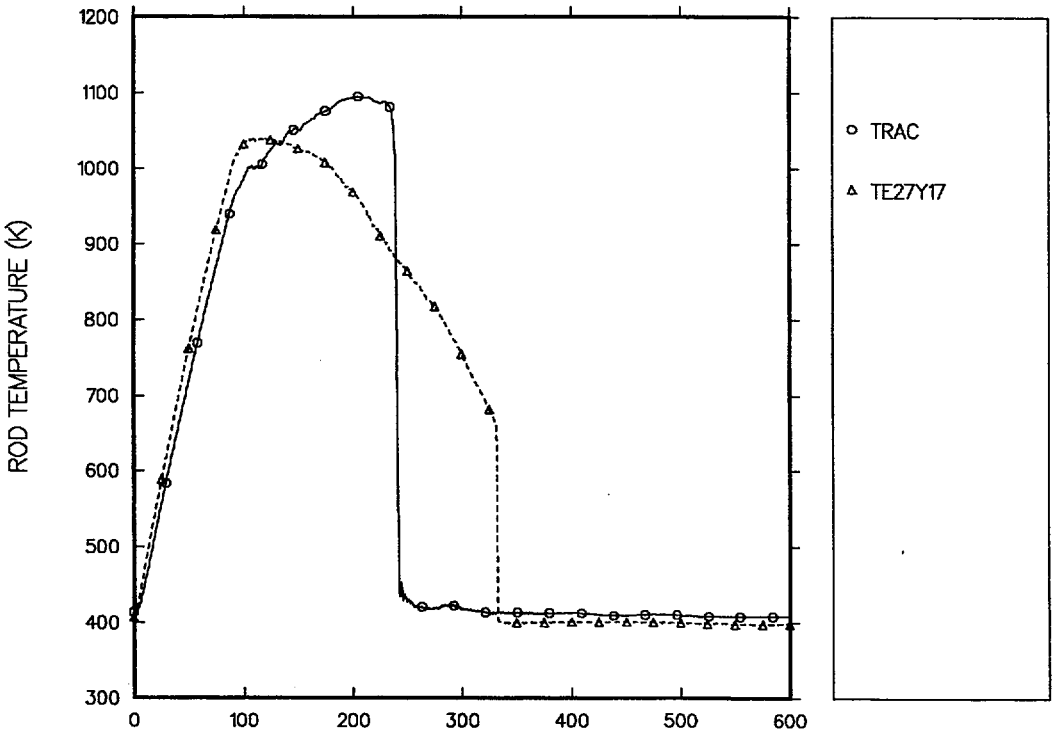

Fig. T-8. Cladding temperatures for the intermediate-powered rod at the core midplane.

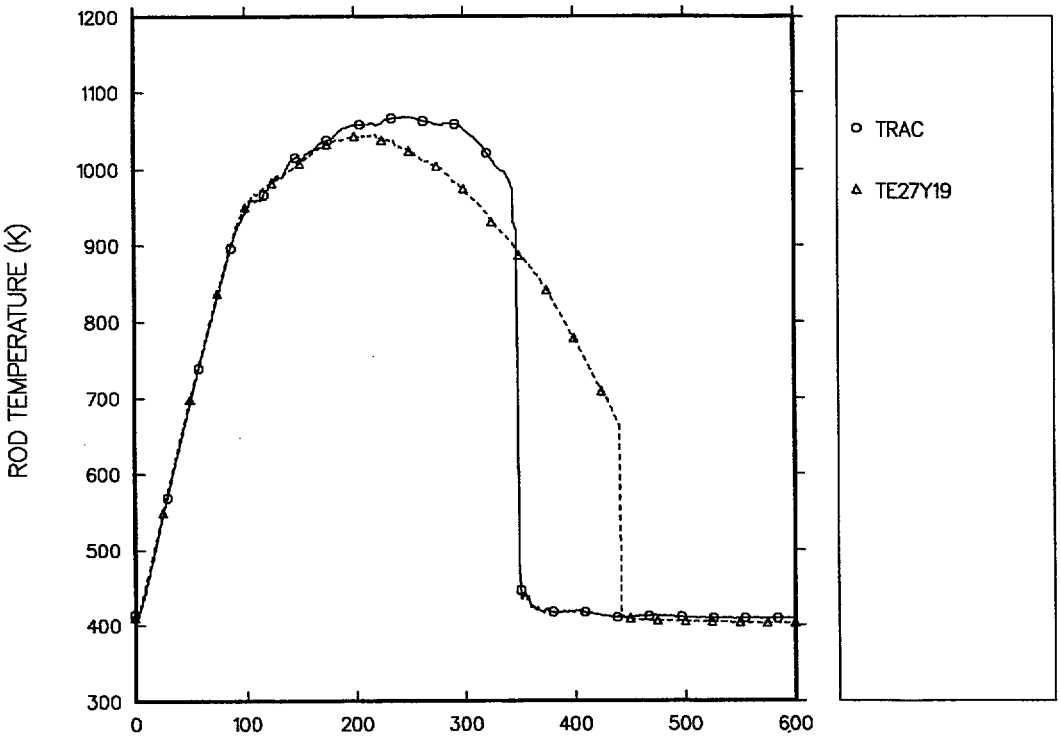

Fig. T-9. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 4.540-m elevation.

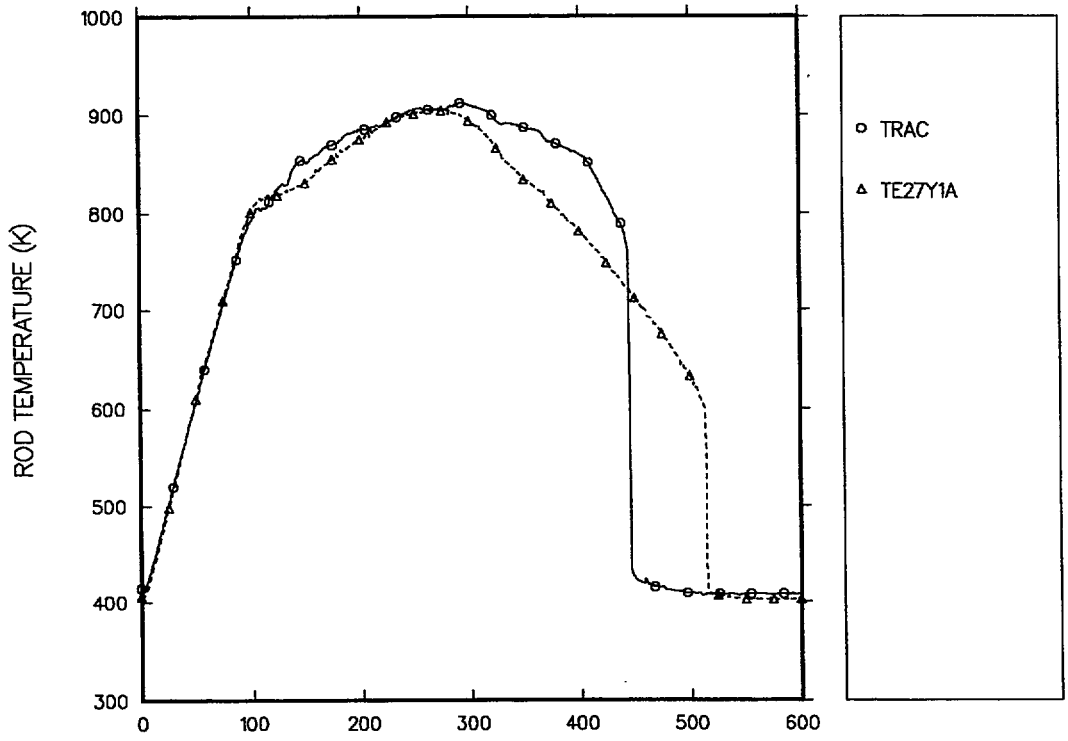

Fig. T-10. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 5.150-m elevation.

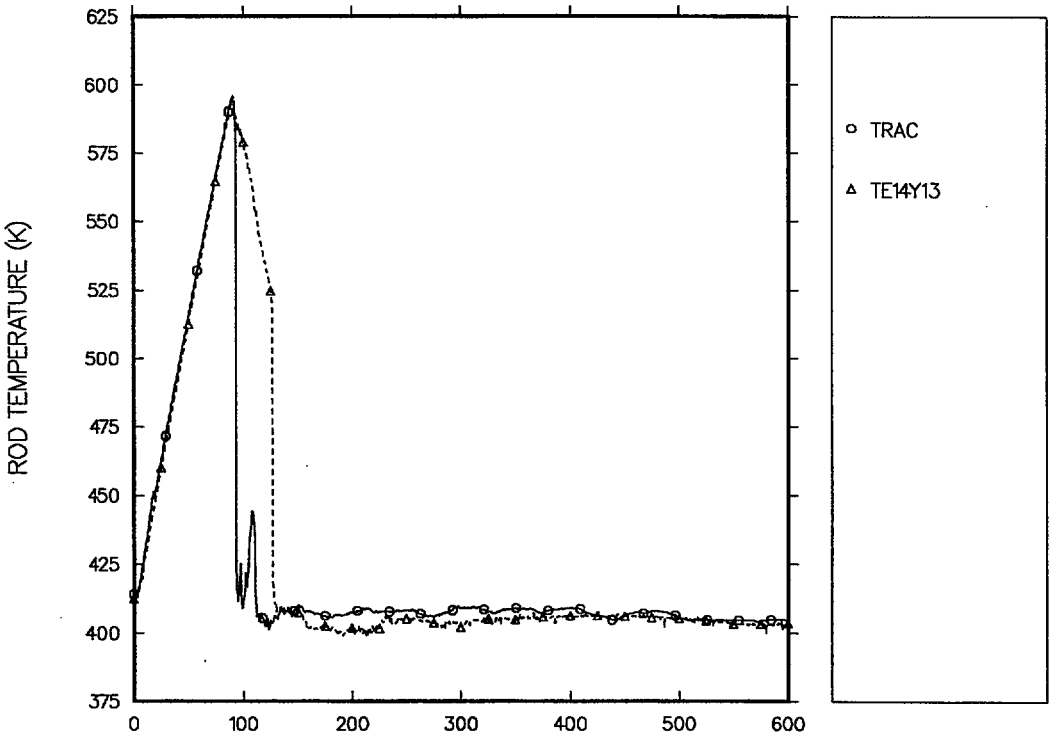

Fig. T-11. Cladding temperatures for the low-powered rod at the 2.480-m elevation.

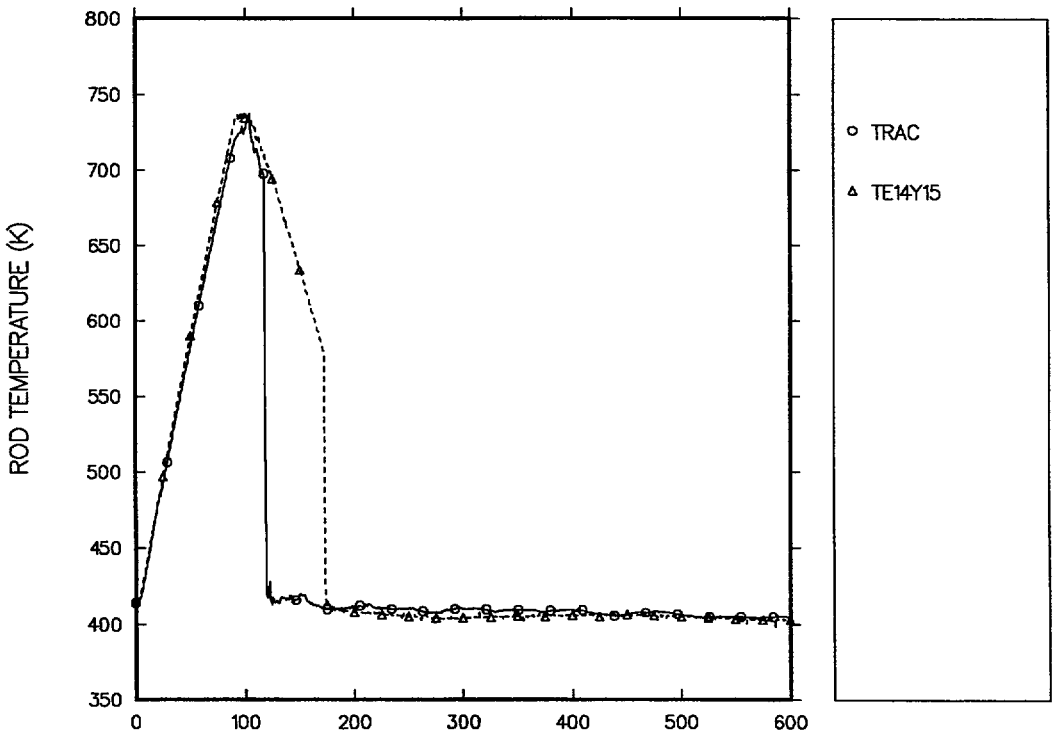

Fig. T-12. Cladding temperatures for the low-powered rod at the 3.115-m elevation.

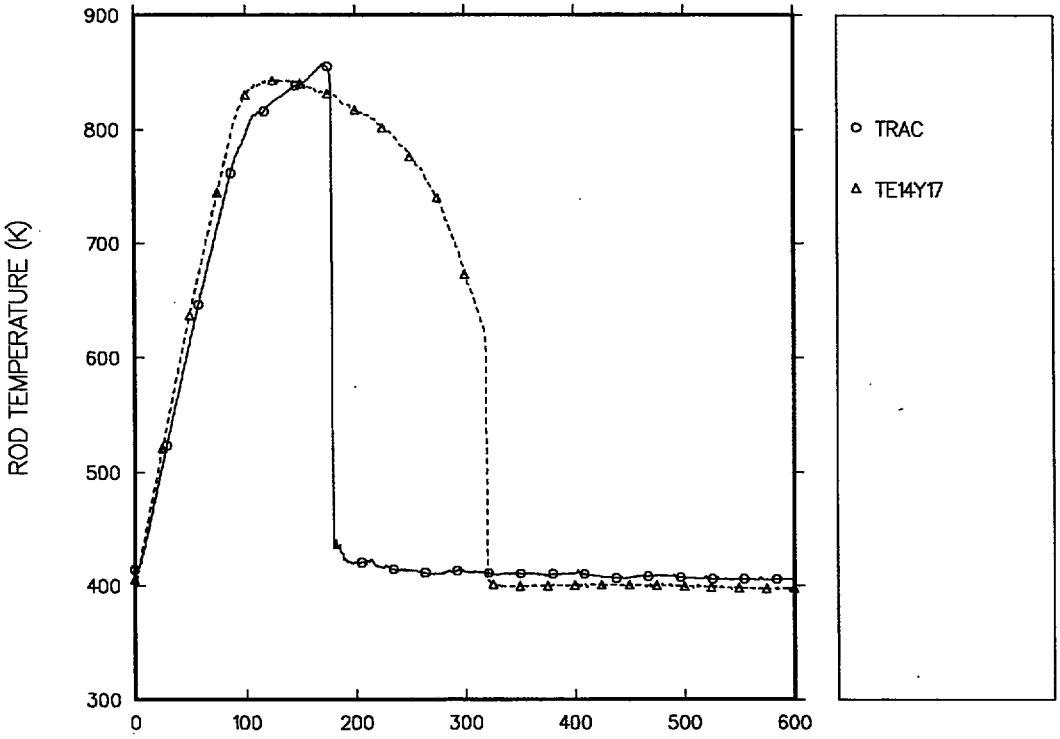

Fig. T-13. Cladding temperatures for the low-powered rod at the core midplane.

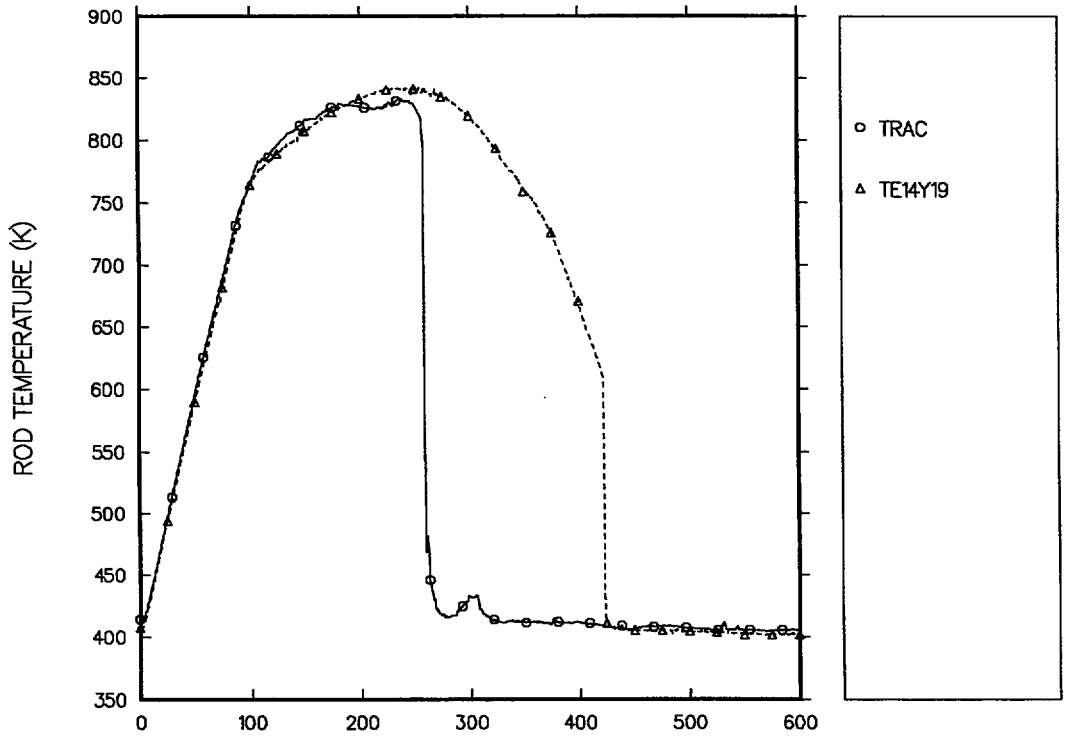

Fig. T-14. Cladding temperatures for the low-powered rod at the 4.540-m elevation.

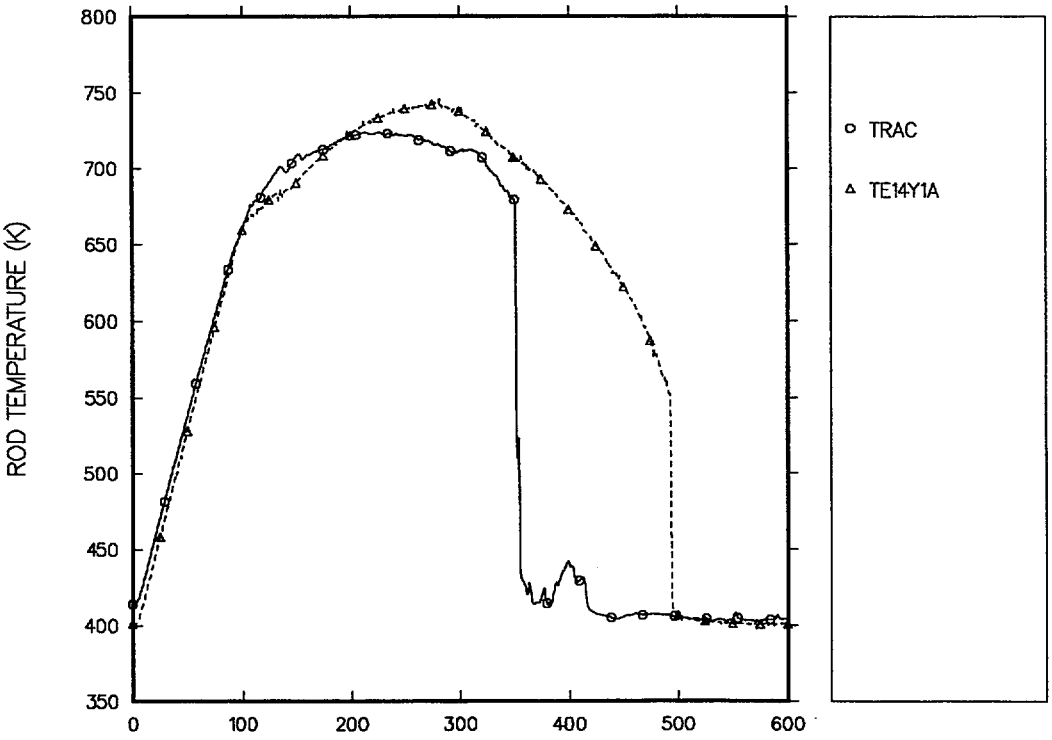

Fig. T-15. Comparison of calculated and measured cladding temperatures for the low-powered rod at the 5.150-m elevation.

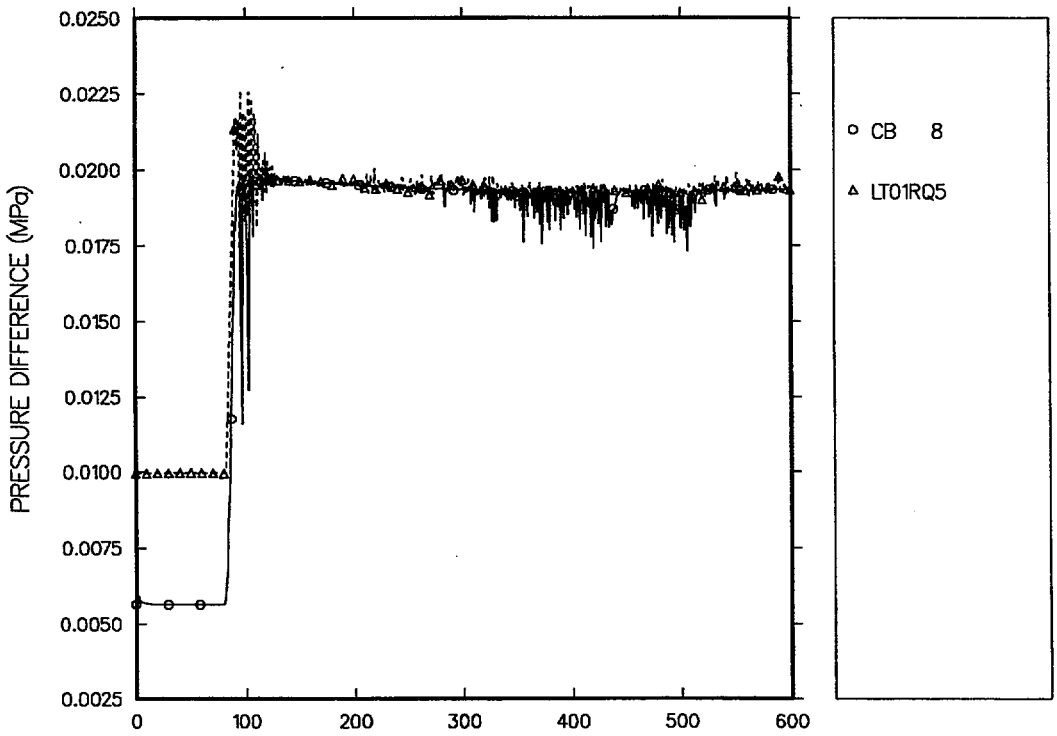

Fig. T-16. Calculated and measured pressure vessel differential pressure: lower plenum.

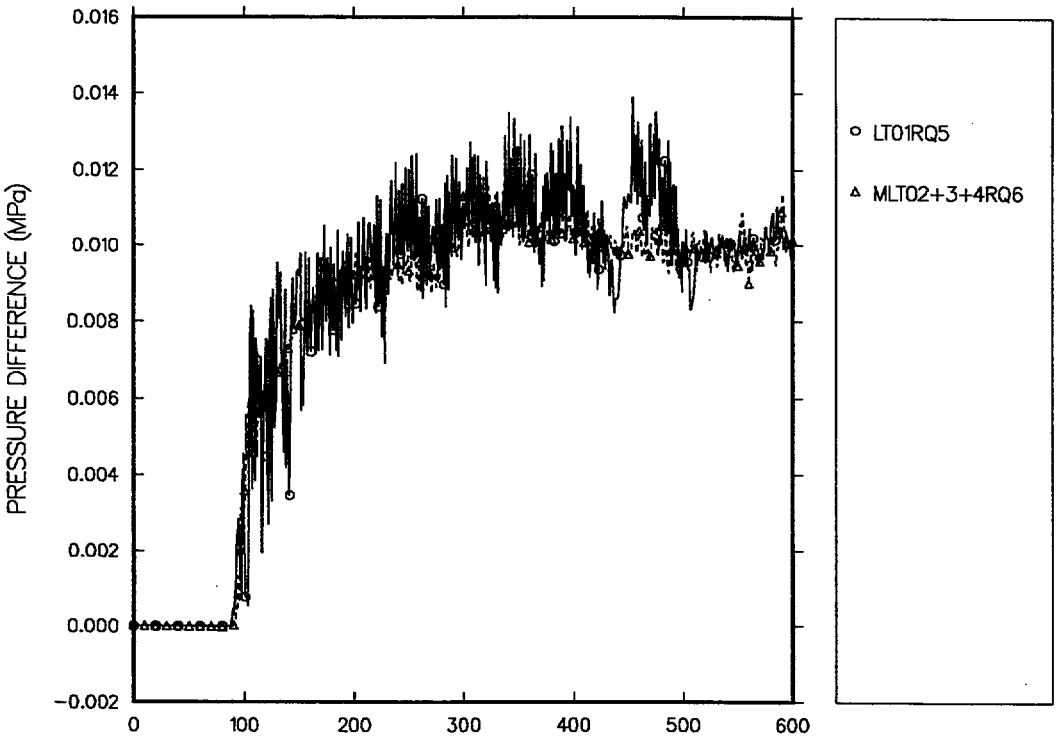

Fig. T-17. Calculated and measured pressure vessel differential pressure: lower half of the core.

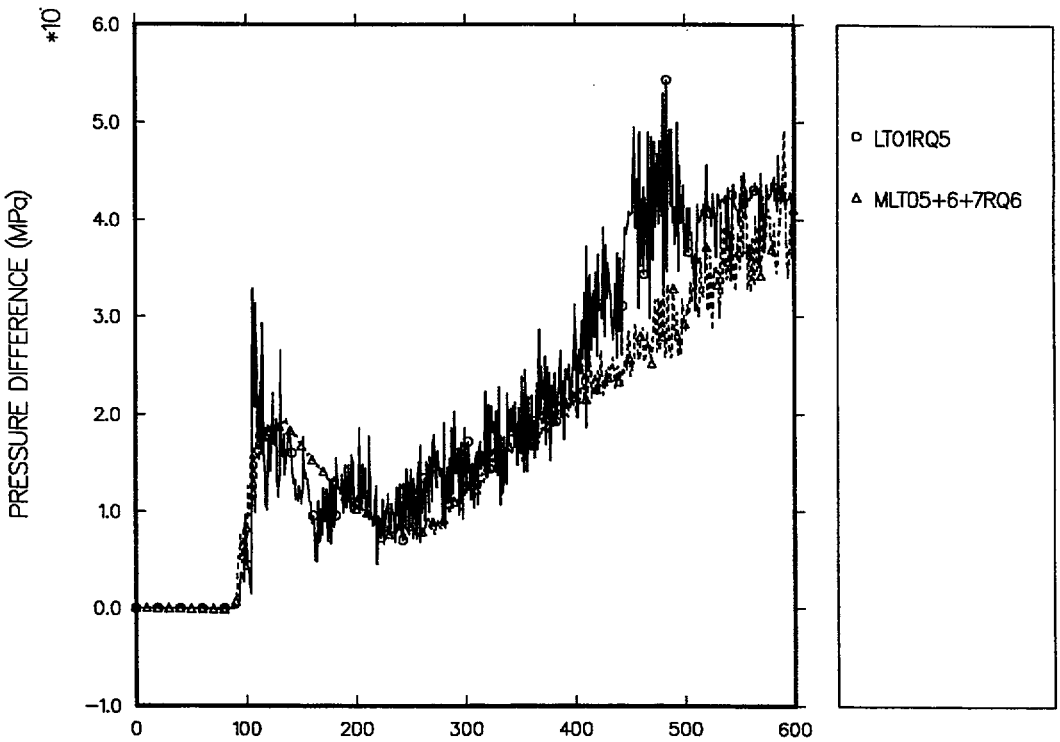

Fig. T-18. Calculated and measured pressure vessel differential pressure: upper half of the core.

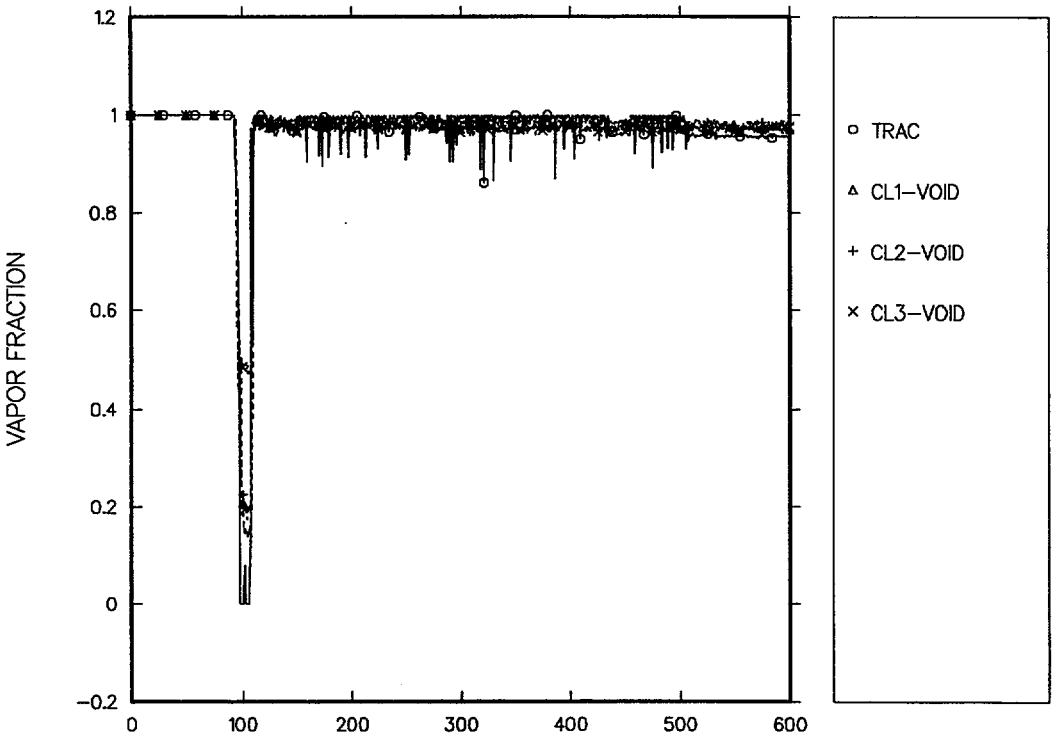

Fig. T-19. Calculated and measured cold-leg, spool-piece void fraction.

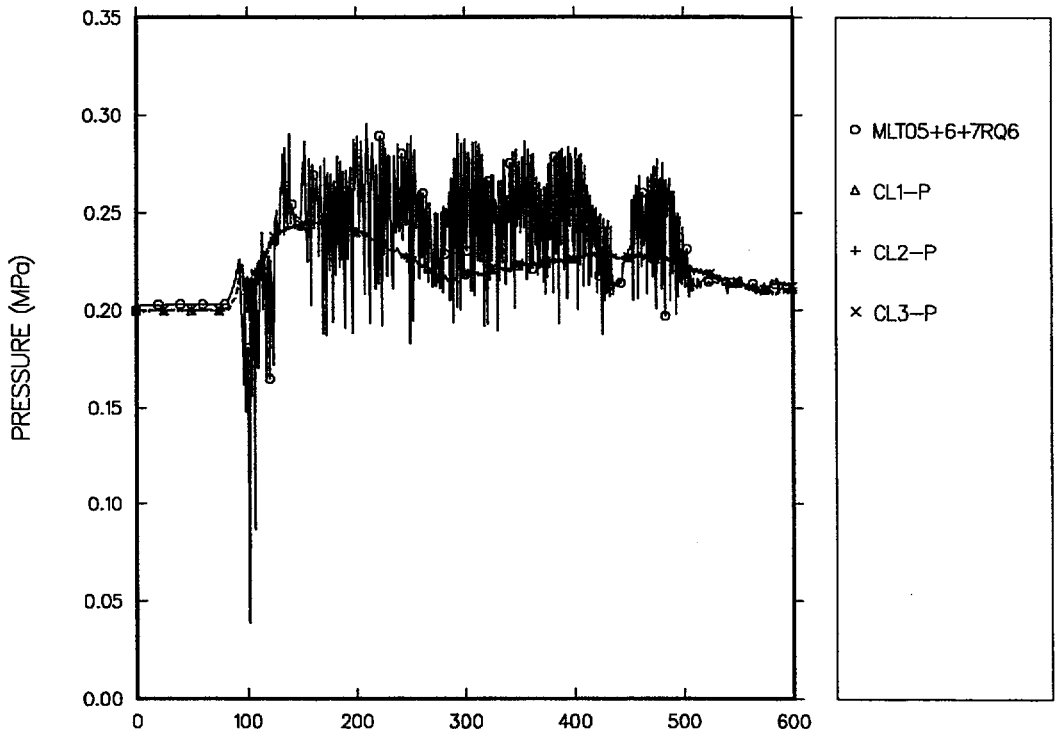

Fig. T-20. Calculated and measured cold-leg, spool-piece pressure.

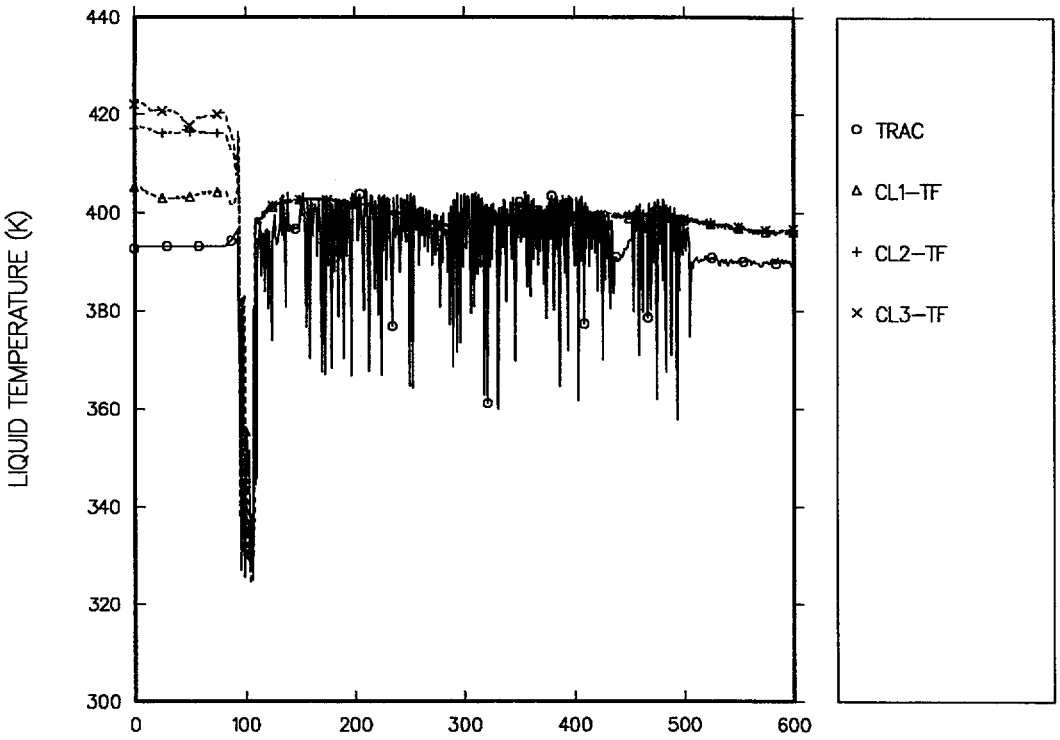

Fig. T-21. Calculated and measured cold-leg, spool-piece fluid temperature.

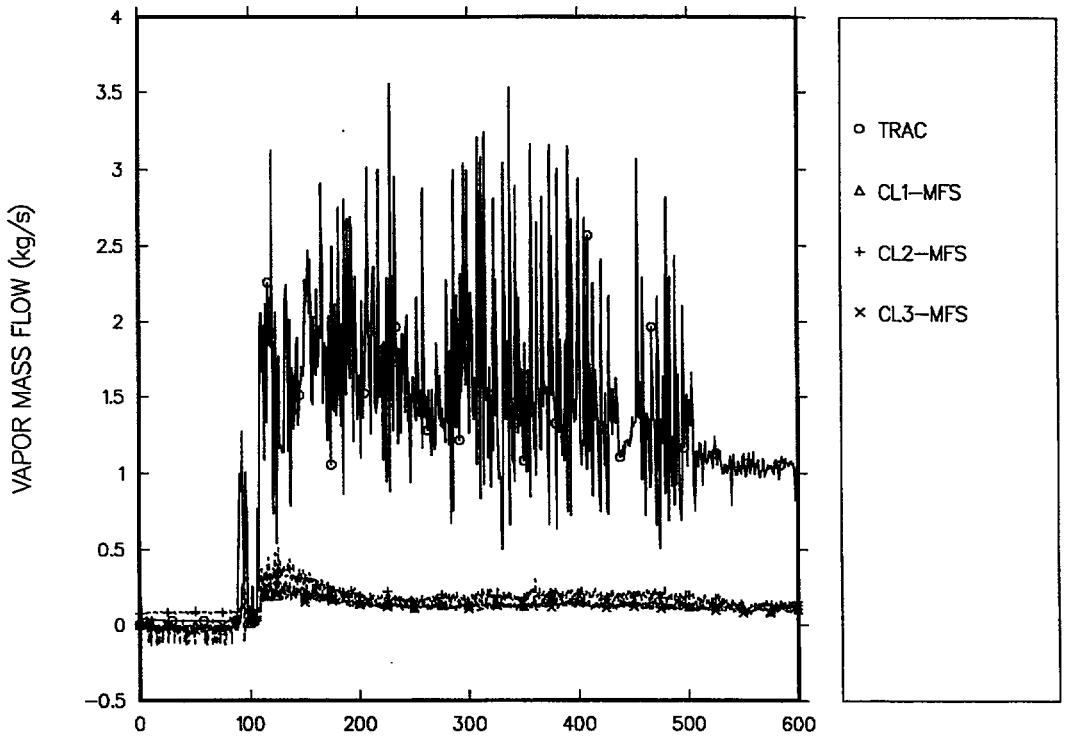

Fig. T-22. Calculated and measured cold-leg, spool-piece, steam mass flow rate.

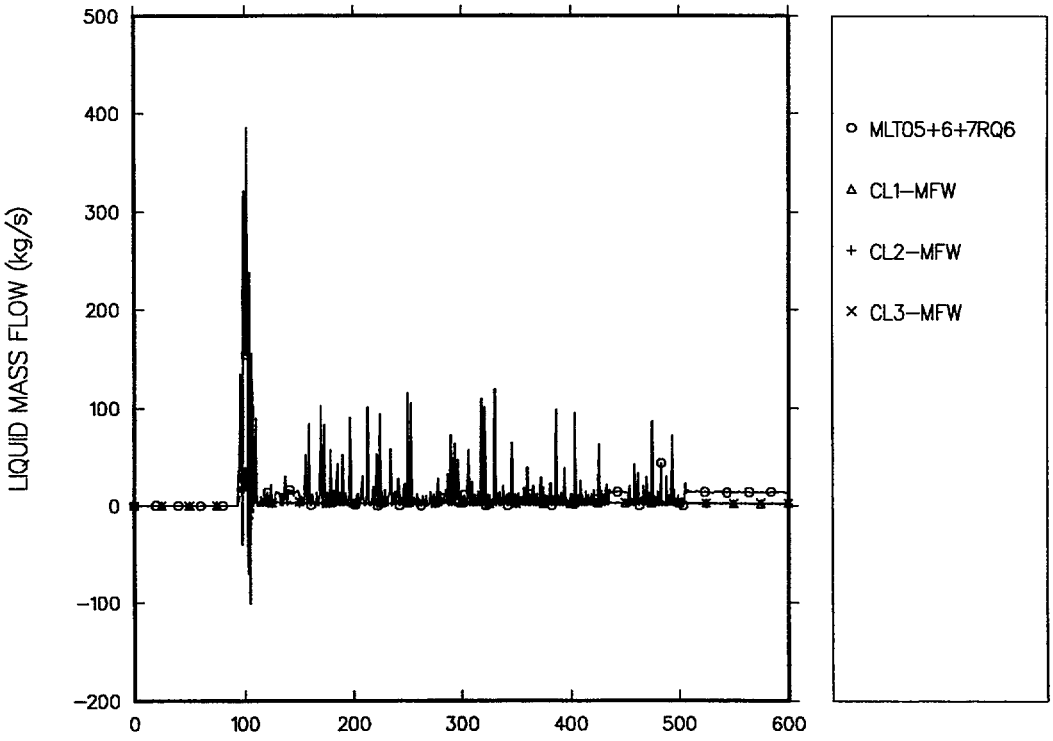

Fig. T-23. Calculated and measured cold-leg, spool-piece, liquid mass flow rate.

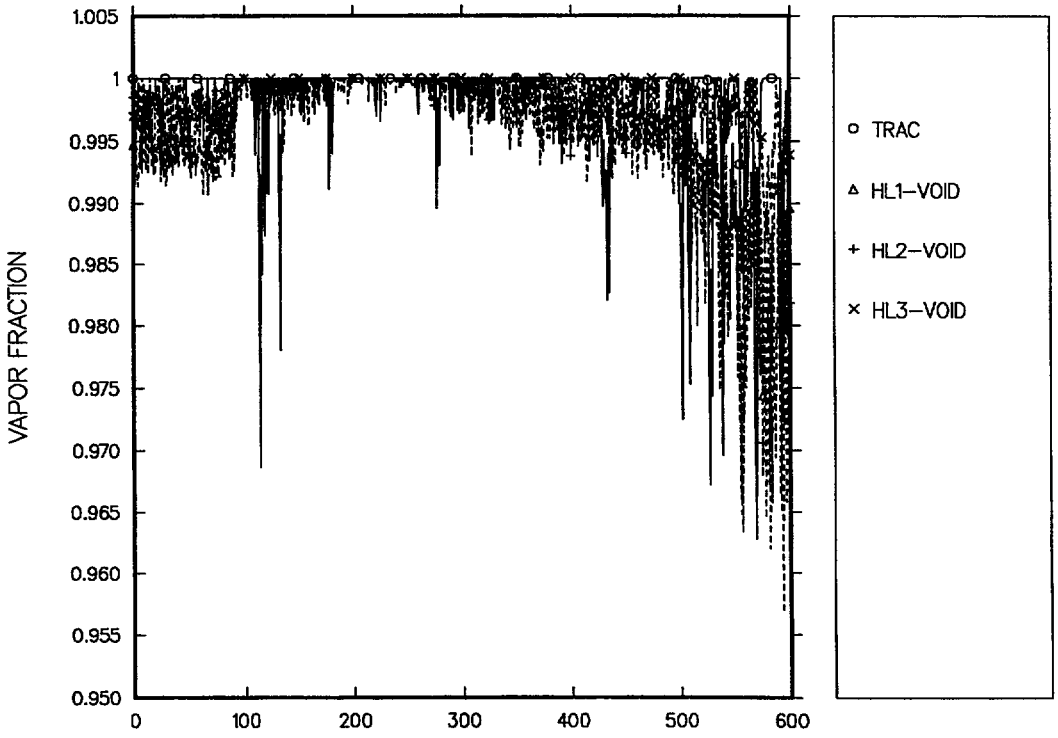

Fig. T-24. Calculated and measured hot-leg, spool-piece void fraction.

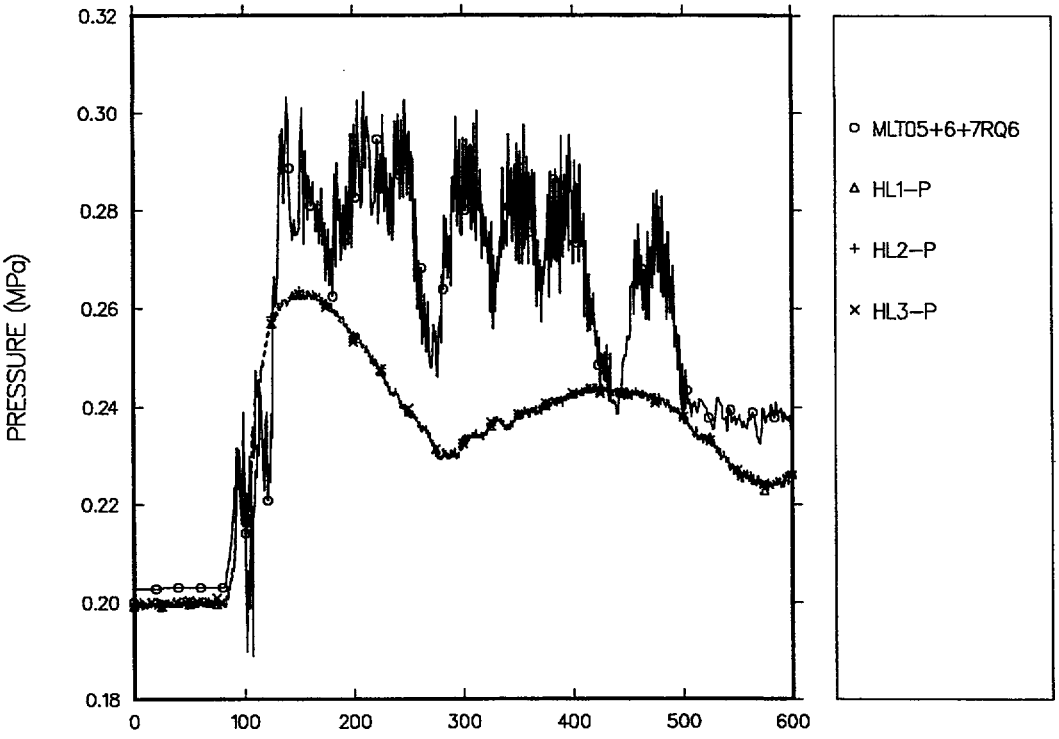

Fig. T-25. Calculated and measured hot-leg, spool-piece pressure.

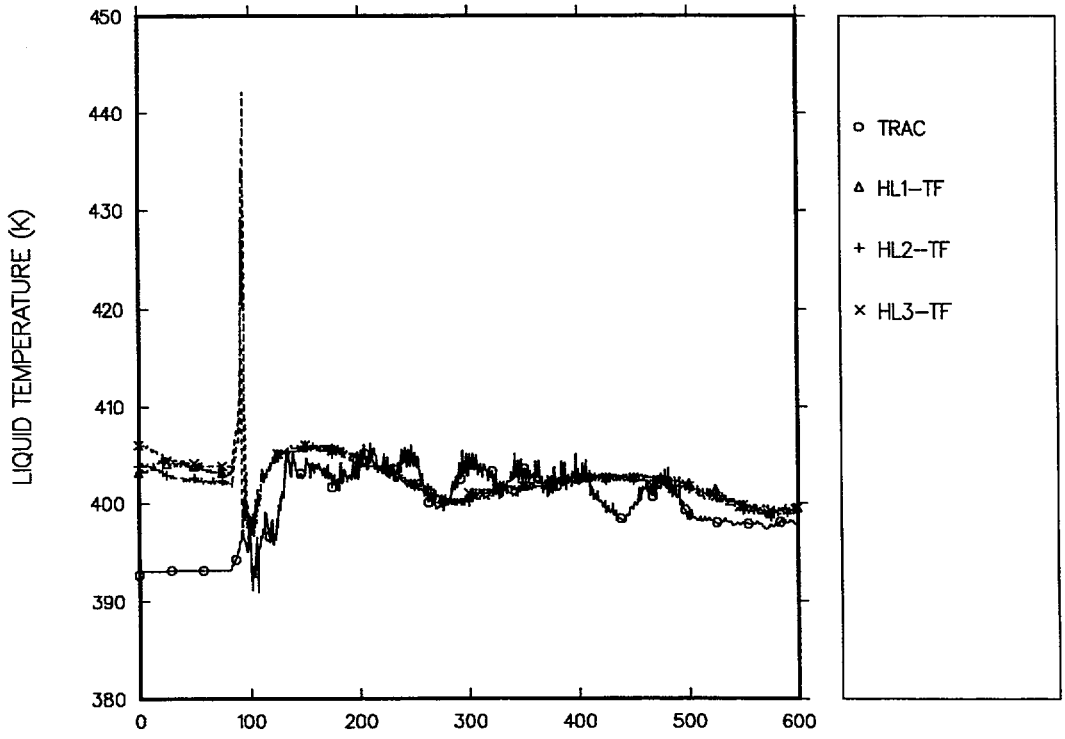

Fig. T-26. Calculated and measured hot-leg, spool-piece fluid temperature.

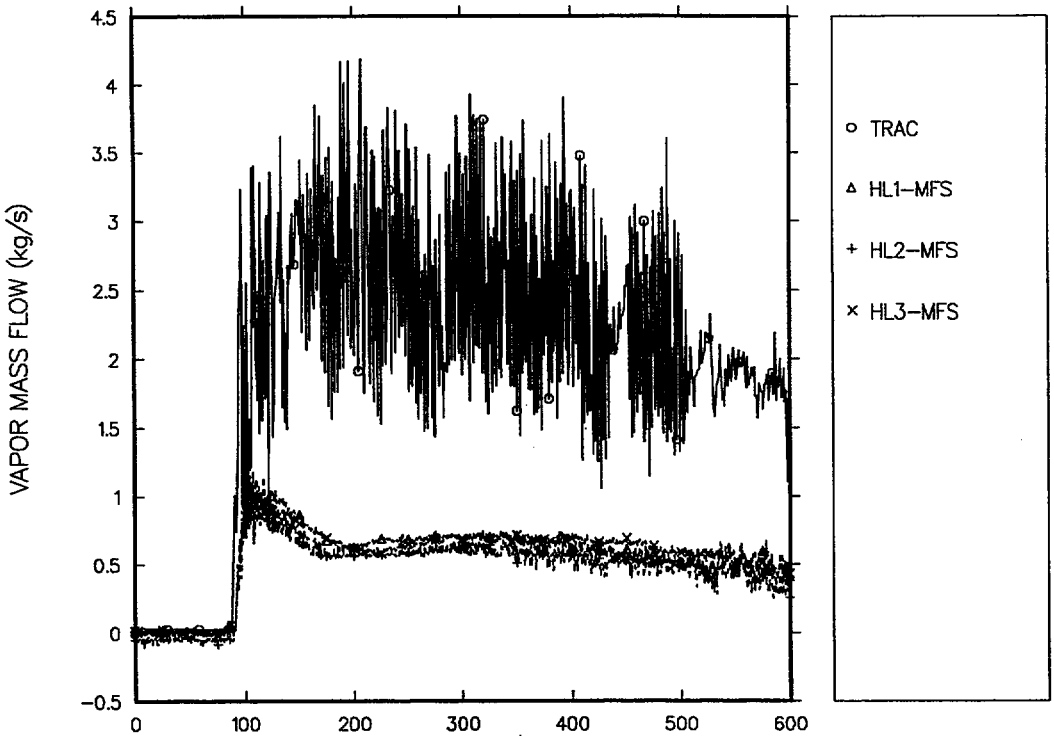

Fig. T-27. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

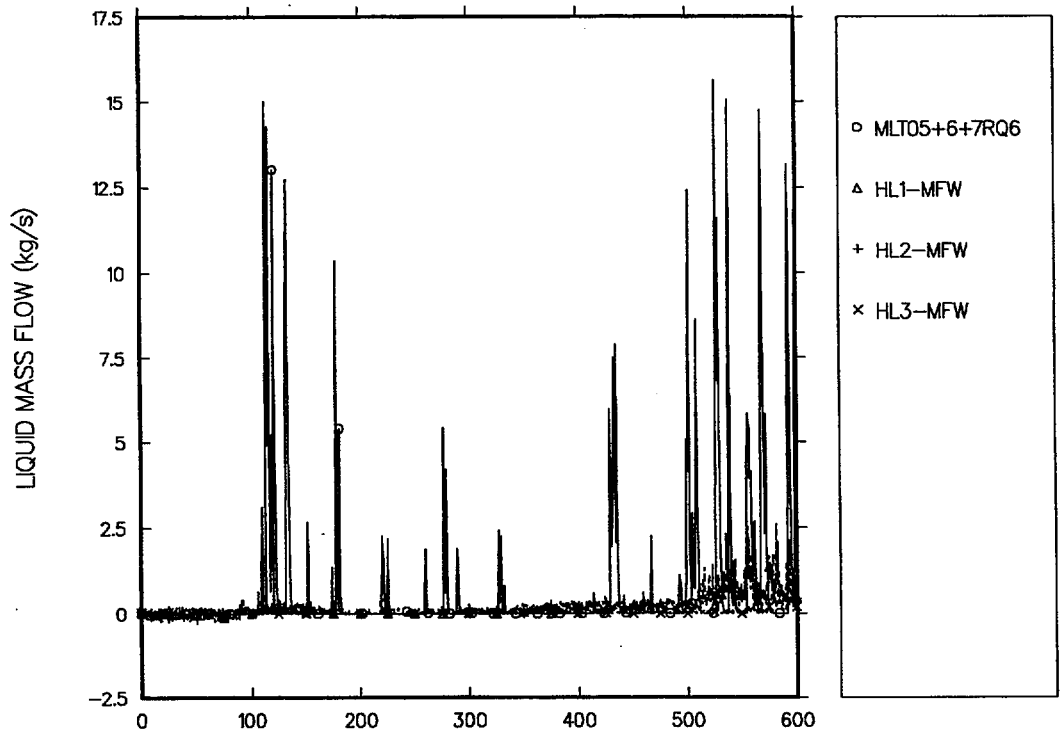

Fig. T-28. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

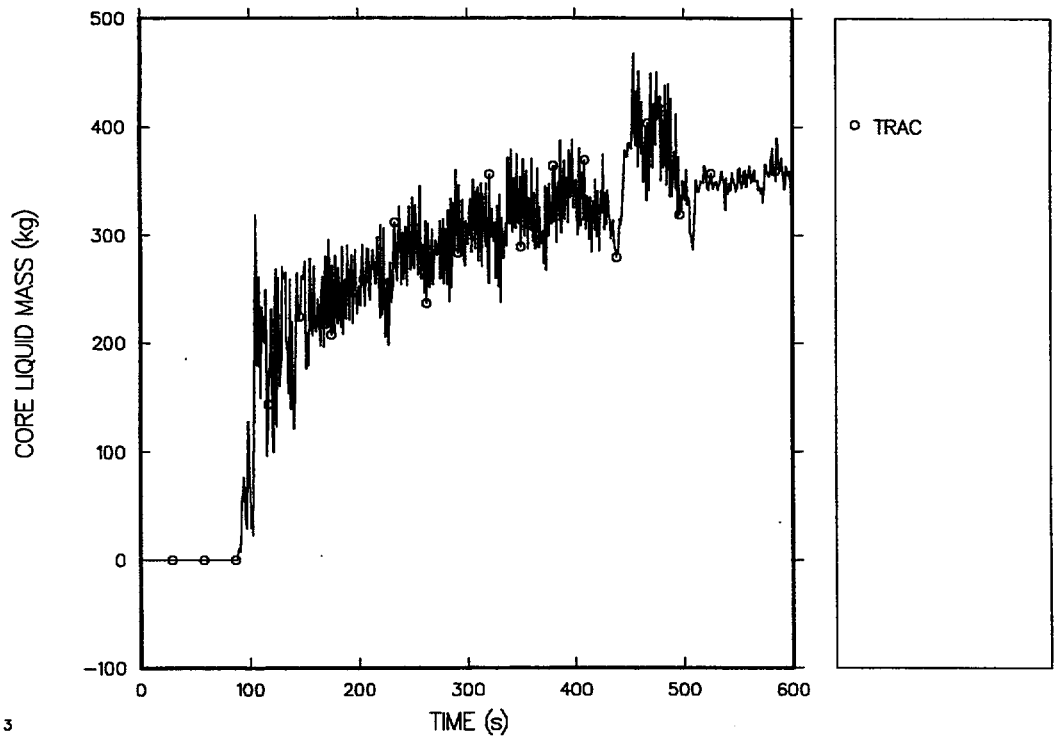

Fig. T-29. Calculated core liquid mass.

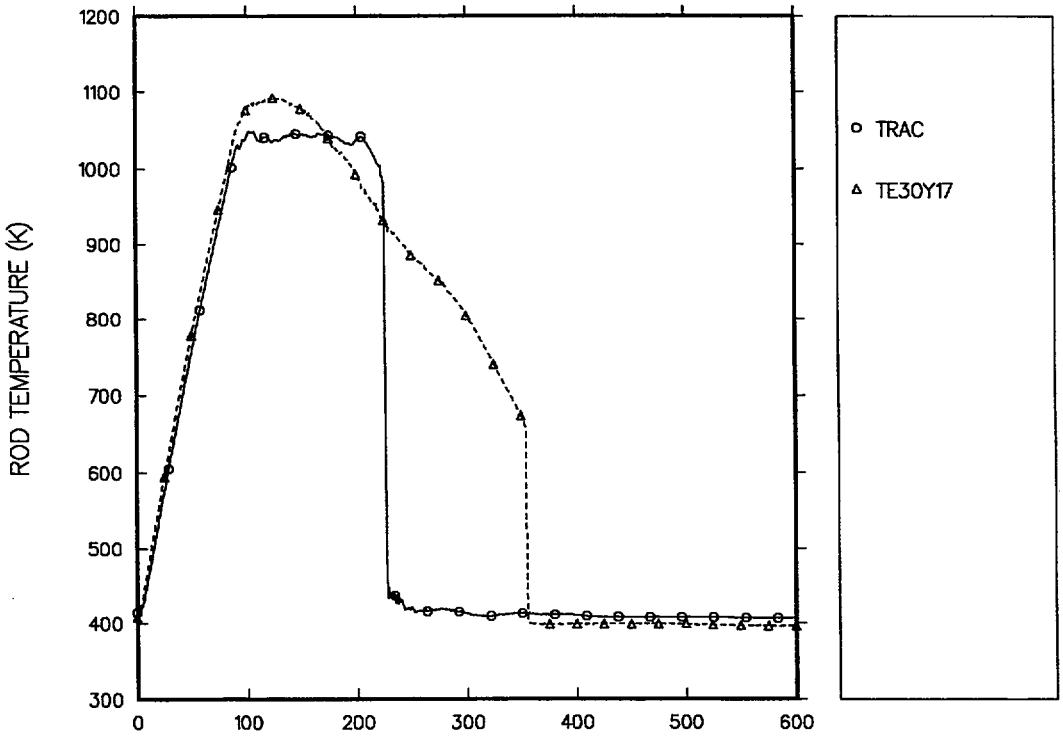

Fig. T-30. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation (with grid-spacer model).

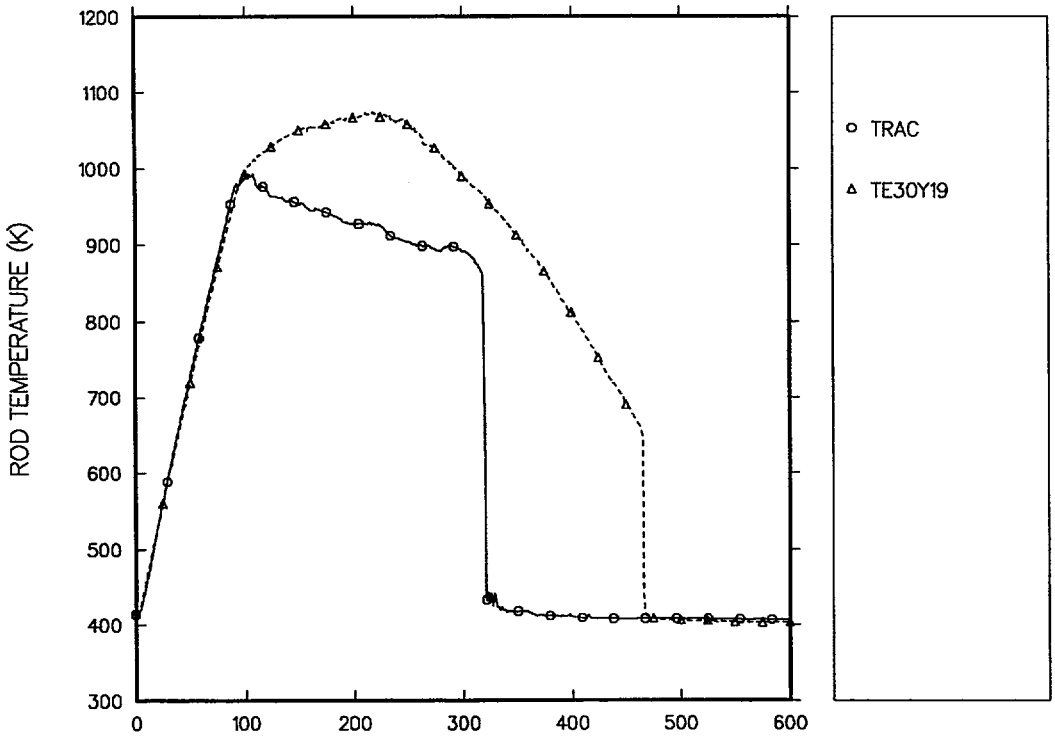

Fig. T-31. Cladding temperatures for the hot rod at the 4.540-m elevation (with grid-spacer model).

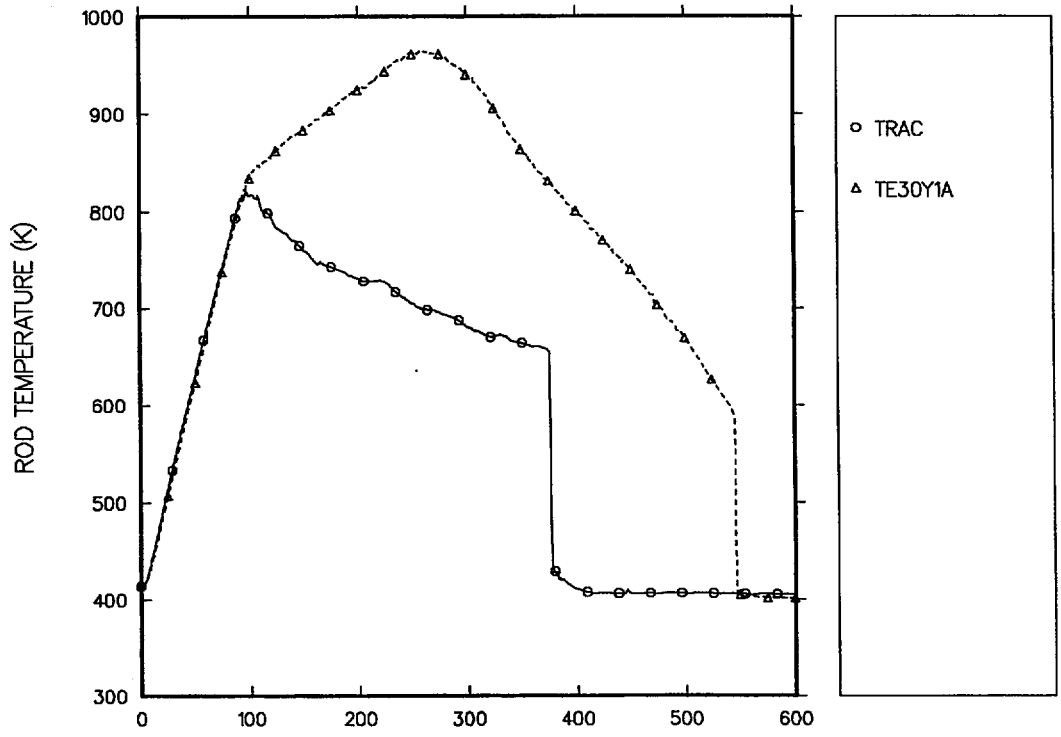

Fig. T-32. Cladding temperatures for the hot rod at the 5.150-m elevation (with grid-spacer model).

APPENDIX U

SCTF RUN 719 INPUT LISTING

```
free format
*
*************
* main data *
*************
*       numtcr          ieos          inopt          nmat
             33             0              1             4
      --- SCTF run 719 trac-pf1/mod2 deck---
  Updated 10/20/00 by J. F. Lime for the following corrections
  (1)  The 17-step axial power shape was modeled
  (2)  Counter-current flow limitation modeling was reinstated.
       It had been modeled in the MOD1 input but was taken out when
       converted to MOD2 because early versions of MOD2 did not
       model CCFL in the vessel component.
  (3)  The liquid additive loss coefficient in the vessel was corrected
       to match the vapor additive loss coefficient.
   Adapted from
   sctf/run703/harmony/august 18,1987/pf1mod1(14.2)/posttest analysis
         12/4/81 - new vessel, vessel s/w sep., revised system
                   rechecked hl valve, p vs t break, real rod ics
                   redone u.p. heat slab areas and masses, pf1 conversion
         3/12/82 - revision to correct some areas and hds; remove
                   gap from rod model; test facility power decay curve;
                   revised baffle representation.
         5/15/82 - revision to correct flow area in cl ecc;remove
                   blockage plate from bottom of downcomer; add in extra
                   volume from vent line discovered on april 1982 trip
                   to facility.
         9/16/82 - revision to shut off choking model in pf1 code;
                   revise baffle to model flow restrictions as added
                   friction (k=2) rather than reduced flow areas.
         12/6/86 - revision by Joel Gilbert to convert model from Core-II
                   to core-III.  Audit notebook developed for conversion.
                   component 3 noding reduced by Brent Boyack.
         8/18/87 - Modified by Steve Harmony to reflect JAERI numbering
                   convention for upper plenum injection lines 1-4
         9/17/87 - Modified by Steve Harmony with minor corrections
                   suggested by F. Araya of JAERI.
         2/18/88 - Converted to TRAC-PF1/MOD2 input deck for Run 719
                   by C. P. Booker.*
*
*****************
* namelist data *
*****************
*
 &inopts
   iadded=10, icflow=2, imfr=3, nlt=18, nhtstr=47, newrfd=3,
   nrslv=1, iblaus=1,
 &end
*
*        dstep          timet
              -1   0.0000e+00
*       stdyst         transi          ncomp           njun           ipak
              0              1             79             41              1
*         epso           epss
    1.0000e-04   1.0000e-04
*       oitmax         sitmax         isolut         ncontr        nccfl
             15             20              0              0            1
*         ntsv           ntcb           ntcf           ntrp           ntcp
              2              0              0              2              1
*
************************
* component-number data *
************************
* iorder array *
    1s * VESSEL - pressure vessel comp. 12X15 2d slab.
    2s * PIPE - hot leg.
    3s * VALVE - broken cold leg (separator side).
    4s * VALVE - broken cold leg (pressure vessel side).
    6s * VESSEL - steam-water separator component.
    8s * TEE - cl ecc, intact cold leg, pump simulator component.
   12s * FILL - cold leg ecc fill component.
   13s * BREAK - separator-side cold leg break CT2.
   14s * BREAK - pv-side cold leg break CT1.
   20s * PIPE - support column bundle 1.
   22s * PIPE - support column bundle 6.
   24s * PIPE - support column bundle 7.
   26s * PIPE - support column bundle 3.
   28s * PIPE - support column bundle 5.
   30s * PIPE - pipe for lower plenum fill.
   31s * FILL - lower plenum ecc fill component.
   50s * TEE - injection piping at pressure vessel side.
   51s * FILL - ucsp injection line 4 (bundles 1 & 2).
   52s * TEE - injection piping at pressure vessel side (inj. 3).
   53s * FILL - ucsp injection line 3 (bundles 3 & 4).
```

```
 54s * TEE - injection piping at pressure vessel side (inj. 2).
 55s * FILL - ucsp injection line 2 (bundles 5 & 6).
 56s * TEE - injection piping at pressure vessel side (inj. 1).
 57s * FILL - ucsp injection line 1 (bundles 7 & 8).
101s * PIPE - injection pipe for ecc4 thru upper plenum.
103s * PIPE - injection pipe for ecc3 thru upper plenum.
105s * PIPE - injection pipe for ecc2 thru upper plenum.
107s * PIPE - injection pipe for ecc1 thru upper plenum.
111s * PIPE - injection pipe for ecc1 thru upper plenum.
113s * FILL - ecc3 thru upper plenum (bundles 3 & 4).
115s * FILL - ecc2 thru upper plenum (bundles 5 & 6).
117s * FILL - ecc1 thru upper plenum (bundles 7 & 8).
908s * SLAB - for S/W Sep. Level 1, cells 1 & 2.
907s * SLAB - for S/W Sep. Level 2, cells 1 & 2.
906s * SLAB - for S/W Sep. Level 3, cell 1.
909s * SLAB - for S/W Sep. Level 3, cell 2.
905s * SLAB - for S/W Sep. Level 4, cells 1 & 2.
991s * ROD - rods in pressure vessel.
 989 s  * slab level 1, cells 1-11
 985 s  * slab level 1, cell 12
 984 s  * slab level 2, cell 1
 983 s  * slab level 2, cells 2-8
 982 s  * slab level 2, cells 9-12
 978 s  * slab level 3, cells 1-8
 977 s  * slab level 3, cells 9-10
 975 s  * slab level 3, cell 11
 974 s  * slab level 3, cell 12
 973 s  * slab level 4-9, cells 1-8
 972 s  * slab level 4, cells 9-10
 970 s  * slab level 4, cell 11
 969 s  * slab level 4, cell 12
 967 s  * slab levels 5-8, cells 9-10
 965 s  * slab levels 5-8, cell 11
 964 s  * slab levels 5-8, cell 12
 947 s  * slab level 9, cells 9-10
 945 s  * slab level 9, cell 11
 944 s  * slab level 9, cell 12
 943 s  * slab level 10, cells 1 and 3
 942 s  * slab level 10, cell 2
 941 s  * slab level 10, cells 4, 5, and 8
 940 s  * slab level 10, cell 6
 939 s  * slab level 10, cell 7
 938 s  * slab level 10, cell 9
 937 s  * slab level 10, cell 10
 936 s  * slab level 11, cells 1 and 6
 935 s  * slab level 11, cells 2 and 4
 934 s  * slab level 11, cells 3 and 5
 933 s  * slab level 11, cell 7
 910 s  * slab level 11, cell 8
 932 s  * slab level 11, cell 9 and 10
 930 s  * slab level 12, cells 1-8
 929 s  * slab level 12, cells 9 and 10
 927 s  * slab level 12, cells 11 and 12
 926 s  * slab level 13, cells 1-8
 925 s  * slab level 13, cells 9-12
 922 s  * slab level 14, cells 1,3,5-7
 921 s  * slab level 14, cells 2,4,8
 920 s  * slab level 14, cells 9-12
 917 e  * slab level 15, cells 1-12
*
*******************************
*    ccfl input parameters    *
*******************************
*
*  ccfl is bankoff correlation for upper tie plate
*
* cbeta *    -1.00 e
* ccflm *     0.0 e
* ccflc *     0.0 e
* nholes      tp      gamma      diah     ctrans
  137     0.02        0.37      0.012       0.0  *upper tie plate
*
****************************
* material-properties data *
****************************
*
* matb  *
            55s * nichrome
            58s * aluminum oxide
            59s * magnesium oxide
            60e * inconel 600
* ptbln * r02          7             6             5e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
*     --T--         --rho--       --cpw--       --cw--        --emis--
*       (k)          (kg/m3)       (j/kg/k)      (w/m/k)
* Material no. 55 --- Nichrome
    3.0000e+02    8.3500e+03    4.4487e+02    1.2337e+01    1.0000e+00
    5.0000e+02    8.3500e+03    4.9042e+02    1.5834e+01    1.0000e+00
    7.0000e+02    8.3500e+03    5.3948e+02    1.9331e+01    1.0000e+00
    9.0000e+02    8.3500e+03    5.8987e+02    2.2828e+01    1.0000e+00
    1.1000e+03    8.3500e+03    6.3939e+02    2.6324e+01    1.0000e+00
```

```
    1.3000e+03    8.3500e+03    6.8588e+02    2.9821e+01    1.0000e+00e
    1.5000e+03    8.3500e+03    7.8189e+02    3.3318e+01    1.0000e+00e
* Material no. 58 --- Aluminum Oxide
    3.0000e+02    3.8000e+03    8.4970e+02    3.5870e+01    1.0000e+00
    5.0000e+02    3.8000e+03    9.6550e+02    2.0173e+01    1.0000e+00
    7.0000e+02    3.8000e+03    1.0813e+03    1.2529e+01    1.0000e+00
    9.0000e+02    3.8000e+03    1.1971e+03    8.9514e+00    1.0000e+00
    1.1000e+03    3.8000e+03    1.3129e+03    7.1615e+00    1.0000e+00
    1.3000e+03    3.8000e+03    1.4287e+03    6.1228e+00    1.0000e+00e
    1.5000e+03    3.8000e+03    1.5445e+03    5.0841e+00    1.0000e+00e
* Material no. 59 --- Magnesium Oxide
    3.0000e+02    2.6500e+03    9.9800e+02    1.6300e+00    1.0000e+00
    6.0000e+02    2.6500e+03    1.0920e+03    1.4200e+00    1.0000e+00
    9.0000e+02    2.6500e+03    1.1850e+03    1.2100e+00    1.0000e+00
    1.2000e+03    2.6500e+03    1.2350e+03    1.0000e+00    1.0000e+00
    1.3000e+03    2.6500e+03    1.2790e+03    9.3000e-01    1.0000e+00e
    1.5000e+03    2.6500e+03    1.3670e+03    7.9000e-01    1.0000e+00e
* Material no. 60 --- Inconel 600
    3.0000e+02    8.4103e+03    4.4029e+02    1.4340e+01    8.4000e-01
    6.0000e+02    8.2925e+03    5.0636e+02    1.9331e+01    8.4000e-01
    9.0000e+02    8.1747e+03    5.7242e+02    2.4322e+01    8.4000e-01
    1.2000e+03    8.0569e+03    6.3839e+02    2.9314e+01    8.4000e-01e
    1.5000e+03    7.9391e+03    7.0436e+02    3.4306e+01    8.4000e-01e
*
*************************
* control-parameter data *
*************************
*
* signal variables
*          idsv          isvn          ilcn          icn1          icn2
* time *    101             0             0             0             0
* Tfuel *   102            25           991          1004          8009
*
* trips
*          ntse          ntct          ntsf          ntdp          ntsd
             0             0             0             0             0
*
* trip to start-up fine mesh.
*          idtp          isrt          iset          itst          idsg
             1001             2             0             1           101
*       setp(1)       setp(2)
    1.0000e-02    1.1000e-02
*       dtsp(1)       dtsp(2)
    0.0000e+00    0.0000e+00
*       ifsp(1)       ifsp(2)
             0             0
*
* trip to initiate reflood calculation.
*          idtp          isrt          iset          itst          idsg
             1002             2             0             1           101
*       setp(1)       setp(2)
    1.0000e-02    0.011
*       dtsp(1)       dtsp(2)
    0.0000e+00    0.0000e+00
*       ifsp(1)       ifsp(2)
             0             0
*
******************
* component data *
******************
*********************************************************************
* Cold Leg Fill (zero for run 719)
*********************************************************************
*          type           num            id         ctitle
fill           12      12 $12$ cold leg ecc
*          jun1          ifty          ioff
              9             1             1
*        twtold          rfmx         concin          felv
    0.0000e+00    1.0000e+30    0.0000e+00    0.0000e+00
*          dxin          volin          alpin          vlin          tlin
    3.3100e-01    1.7000e-02    0.0000e+00    0.0000e+00    3.9300e+02
*           pin          pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*********************************************************************
* Lower Plenum Ecc Fill
*********************************************************************
*          type           num            id         ctitle
fill           31      31 $31$ lower plenum ecc
*          jun1          ifty          ioff
              31             6             0
*          iftr          ifsv          nftb          nfsv          nfrf
              0           101            27             0             0
*        twtold          rfmx         concin          felv
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*          dxin          volin          alpin          vlin          tlin
    5.0000e-01    8.0500e-03    0.0000e+00    0.0000e+00    3.9080e+02
*           pin          pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* Scale factor: VMSCL=1/area = 1/0.0161
*          vmscl          vvscl
    6.2112e+01    6.2112e+01
*          tlscl          tvscl          pscl          pascl         conscl
```

```
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft01as
* vmtb  * r02 0.0000e+00    1.1400e+02    0.0000e+00    1.1500e+02    2.8210e-02
* vmtb  *     1.1600e+02    4.6220e-02    1.1700e+02    3.9780e-02    1.1800e+02
* vmtb  *     3.8080e-02    1.2000e+02    3.9490e-02    1.2400e+02    3.7960e-02
* vmtb  *     1.2600e+02    3.8190e-02    1.2800e+02    3.6000e-02    1.2900e+02
* vmtb  *     3.6400e-02    1.3000e+02    3.4650e-02    1.3100e+02    3.5220e-02
* vmtb  *     1.3300e+02    3.0790e-02    1.4400e+02    1.4110e-02    1.4700e+02
* vmtb  *     1.1990e-02    1.5100e+02    1.2580e-02    1.7200e+02    1.0000e-02
* vmtb  *     2.2300e+02    4.4860e-03    2.5100e+02    4.1740e-03    3.4500e+02
* vmtb  *     4.2000e-03    3.8000e+02    4.3000e-03    4.3500e+02    4.2000e-03
* vmtb  *     5.3000e+02    4.3900e-03    5.6000e+02    4.2500e-03    6.0000e+02
* vmtb  *     4.3000e-03    1.0000e+03    4.3000e-03e
* vvtb  * r02 0.0000e+00    1.1400e+02    0.0000e+00    1.1500e+02    0.0000e+00
* vvtb  *     1.1600e+02    0.0000e+00    1.1700e+02    0.0000e+00    1.1800e+02
* vvtb  *     0.0000e+00    1.2000e+02    0.0000e+00    1.2400e+02    0.0000e+00
* vvtb  *     1.2600e+02    0.0000e+00    1.2800e+02    0.0000e+00    1.2900e+02
* vvtb  *     0.0000e+00    1.3000e+02    0.0000e+00    1.3100e+02    0.0000e+00
* vvtb  *     1.3300e+02    0.0000e+00    1.4400e+02    0.0000e+00    1.4700e+02
* vvtb  *     0.0000e+00    1.5100e+02    0.0000e+00    1.7200e+02    0.0000e+00
* vvtb  *     2.2300e+02    0.0000e+00    2.5100e+02    0.0000e+00    3.4500e+02
* vvtb  *     0.0000e+00    3.8000e+02    0.0000e+00    4.3500e+02    0.0000e+00
* vvtb  *     5.3000e+02    0.0000e+00    5.6000e+02    0.0000e+00    6.0000e+02
* vvtb  *     0.0000e+00    1.0000e+03    0.0000e+00e
* tag te06aws
* tltb  *     0.0000e+00    3.9080e+02    1.1400e+02    3.8990e+02    1.1500e+02
* tltb  *     3.8810e+02    1.1600e+02    3.0770e+02    1.1700e+02    3.0080e+02
* tltb  *     1.1800e+02    2.9500e+02    1.2000e+02    3.1200e+02    1.2400e+02
* tltb  *     3.4830e+02    1.2600e+02    3.5190e+02    1.2800e+02    3.5730e+02
* tltb  *     1.2900e+02    3.5970e+02    1.3000e+02    3.6160e+02    1.3100e+02
* tltb  *     3.6350e+02    1.3300e+02    3.6620e+02    1.4400e+02    3.7280e+02
* tltb  *     1.4700e+02    3.7340e+02    1.5100e+02    3.7400e+02    1.7200e+02
* tltb  *     3.7380e+02    2.2300e+02    3.6080e+02    2.5100e+02    3.5580e+02
* tltb  *     3.4500e+02    3.7240e+02    3.8000e+02    3.7630e+02    4.3500e+02
* tltb  *     3.7950e+02    5.3000e+02    3.8120e+02    5.6000e+02    3.8010e+02
* tltb  *     6.0000e+02    3.8040e+02    1.0000e+03    3.8040e+02e
* Set vapor temp. to saturation
* tvtb  *     0.0000e+00    3.9366e+02    1.1400e+02    3.9400e+02    1.1500e+02
* tvtb  *     3.9366e+02    1.1600e+02    3.9400e+02    1.1700e+02    3.9366e+02
* tvtb  *     1.1800e+02    3.9400e+02    1.2000e+02    3.9366e+02    1.2400e+02
* tvtb  *     3.9400e+02    1.2600e+02    3.9366e+02    1.2800e+02    3.9400e+02
* tvtb  *     1.2900e+02    3.9366e+02    1.3000e+02    3.9400e+02    1.3100e+02
* tvtb  *     3.9366e+02    1.3300e+02    3.9400e+02    1.4400e+02    3.9366e+02
* tvtb  *     1.4700e+02    3.9400e+02    1.5100e+02    3.9366e+02    1.7200e+02
* tvtb  *     3.9400e+02    2.2300e+02    3.9366e+02    2.5100e+02    3.9400e+02
* tvtb  *     3.4500e+02    3.9366e+02    3.8000e+02    3.9400e+02    4.3500e+02
* tvtb  *     3.9366e+02    5.3000e+02    3.9400e+02    5.6000e+02    3.9366e+02
* tvtb  *     6.0000e+02    3.9400e+02    1.0000e+03    3.9366e+02e
* alptb * r02 0.0000e+00    1.1400e+02    0.0000e+00    1.1500e+02    0.0000e+00
* alptb *     1.1600e+02    0.0000e+00    1.1700e+02    0.0000e+00    1.1800e+02
* alptb *     0.0000e+00    1.2000e+02    0.0000e+00    1.2400e+02    0.0000e+00
* alptb *     1.2600e+02    0.0000e+00    1.2800e+02    0.0000e+00    1.2900e+02
* alptb *     0.0000e+00    1.3000e+02    0.0000e+00    1.3100e+02    0.0000e+00
* alptb *     1.3300e+02    0.0000e+00    1.4400e+02    0.0000e+00    1.4700e+02
* alptb *     0.0000e+00    1.5100e+02    0.0000e+00    1.7200e+02    0.0000e+00
* alptb *     2.2300e+02    0.0000e+00    2.5100e+02    0.0000e+00    3.4500e+02
* alptb *     0.0000e+00    3.8000e+02    0.0000e+00    4.3500e+02    0.0000e+00
* alptb *     5.3000e+02    0.0000e+00    5.6000e+02    0.0000e+00    6.0000e+02
* alptb *     0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    2.0180e+05    1.1400e+02    2.0180e+05    1.1500e+02
* ptb   *     2.0180e+05    1.1600e+02    2.0180e+05    1.1700e+02    2.0180e+05
* ptb   *     1.1800e+02    2.0180e+05    1.2000e+02    2.0180e+05    1.2400e+02
* ptb   *     2.0180e+05    1.2600e+02    2.0180e+05    1.2800e+02    2.0180e+05
* ptb   *     1.2900e+02    2.0180e+05    1.3000e+02    2.0180e+05    1.3100e+02
* ptb   *     2.0180e+05    1.3300e+02    2.0180e+05    1.4400e+02    2.0180e+05
* ptb   *     1.4700e+02    2.0180e+05    1.5100e+02    2.0180e+05    1.7200e+02
* ptb   *     2.0180e+05    2.2300e+02    2.0180e+05    2.5100e+02    2.0180e+05
* ptb   *     3.4500e+02    2.0180e+05    3.8000e+02    2.0180e+05    4.3500e+02
* ptb   *     2.0180e+05    5.3000e+02    2.0180e+05    5.6000e+02    2.0180e+05
* ptb   *     6.0000e+02    2.0180e+05    1.0000e+03    2.0180e+05e
* patb  * r02 0.0000e+00    1.1400e+02    0.0000e+00    1.1500e+02    0.0000e+00
* patb  *     1.1600e+02    0.0000e+00    1.1700e+02    0.0000e+00    1.1800e+02
* patb  *     0.0000e+00    1.2000e+02    0.0000e+00    1.2400e+02    0.0000e+00
* patb  *     1.2600e+02    0.0000e+00    1.2800e+02    0.0000e+00    1.2900e+02
* patb  *     0.0000e+00    1.3000e+02    0.0000e+00    1.3100e+02    0.0000e+00
* patb  *     1.3300e+02    0.0000e+00    1.4400e+02    0.0000e+00    1.4700e+02
* patb  *     0.0000e+00    1.5100e+02    0.0000e+00    1.7200e+02    0.0000e+00
* patb  *     2.2300e+02    0.0000e+00    2.5100e+02    0.0000e+00    3.4500e+02
* patb  *     0.0000e+00    3.8000e+02    0.0000e+00    4.3500e+02    0.0000e+00
* patb  *     5.3000e+02    0.0000e+00    5.6000e+02    0.0000e+00    6.0000e+02
* patb  *     0.0000e+00    1.0000e+03    0.0000e+00e
************************************************************
* Pipe for Lower Plenum Fill comp. 31
************************************************************
*         type          num           id        ctitle
pipe          30      30 $30$ acc and lpci
*       ncells        nodes          jun1          jun2          epsw
              1            0            30            31    1.0000e-05
*         ichf        iconc          iacc          ipow
              1            0             0             0
*        radin           th         houtl         houtv         toutl
```

```
    7.1600e-02    1.1000e-02    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv
    0.0000e+00
*
* dx    *     5.0000e-01e
* vol   *     8.0500e-03e
* fa    * f   1.6100e-02e
* fric  * f   0.0000e+00e
* grav  * f   0.0000e+00e
* hd    * f   1.4320e-01e
* icflg * f           0e
* nff   * -1          1e
* lccfl *      f 0 e
* alp   *     0.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     3.9100e+02e
* tv    *     3.9300e+02e
* p     *     2.0180e+05e
* pa    *     0.0000e+00e
*****************************************************************
* UCSP injection line 4 (bundles 1 & 2) (zero for run 719)
*****************************************************************
*         type           num           id        ctitle
fill           51      51 $51$ ucsp inj (1 and 2)
*         jun1          ifty          ioff
              51             6             0
*         iftr          ifsv          nftb          nfsv          nfrf
                0           101             2             0             0
*       twtold          rfmx        concin          felv
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin          vlin          tlin
    3.9600e-01    1.9400e-03    0.0000e+00    0.0000e+00    3.9300e+02
*          pin          pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No UCSP injection into bundles 1 and 2 for Run 719
* Scale factor: VMSCL=1/area
*         vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl         pscl         pascl        conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft05us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te05uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* UCSP injeciton line 3 (bundles 3 & 4) (zero for run 719)
*****************************************************************
*         type           num           id        ctitle
fill           53      53 $53$ ucsp inj (3 and 4)
*         jun1          ifty          ioff
              53             6             0
*         iftr          ifsv          nftb          nfsv          nfrf
                0           101             2             0             0
*       twtold          rfmx        concin          felv
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin          vlin          tlin
    3.9600e-01    1.9400e-03    0.0000e+00    0.0000e+00    3.9300e+02
*          pin          pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No UCSP injection into bundles 3 and 4 for Run 719
* Scale factor: VMSCL=1/area
*         vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl         pscl         pascl        conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft04us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te04uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* UCSP injection line 2 (bundles 5 & 6) (zero for run 719)
*****************************************************************
*         type           num           id        ctitle
fill           55      55 $55$ ucsp inj (5 and 6)
*         jun1          ifty          ioff
              55             6             0
*         iftr          ifsv          nftb          nfsv          nfrf
                0           101             2             0             0
*       twtold          rfmx        concin          felv
```

```
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin          vlin          tlin
    3.9600e-01    1.9400e-03    0.0000e+00    0.0000e+00    3.9300e+02
*          pin          pain        flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No UCSP injection into bundles 5 and 6 for Run 719
* Scale factor: VMSCL=1/area
*         vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl          pscl         pascl         conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft03us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te03uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* UCSP injection line 1 (bundles 7 & 8) (zero for run 719)
*****************************************************************
*         type           num            id        ctitle
fill          57      57 $57$ ucsp inj (7 and 8)
*         jun1          ifty          ioff
              57             6             0
*         iftr          ifsv          nftb          nfsv          nfrf
                0           101             2             0             0
*       twtold          rfmx         concin          felv
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin          vlin          tlin
    3.9600e-01    1.9400e-03    0.0000e+00    0.0000e+00    3.8240e+02
*          pin          pain        flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No UCSP injection into bundles 7 and 8 for Run 719
* Scale factor: VMSCL=1/area
*         vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl          pscl         pascl         conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft02us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te02uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* Injection piping at pressure vessel side (inj. 4)
*****************************************************************
*         type           num            id        ctitle
tee           50      50 $50$ inj 4 to vessel piping - 3/20/
*        jcell          nodes          ichf          cost          epsw
                2             0             1            0.   1.0000e-05
*       iconc1         ncell1          jun1          jun2          ipow1
                0             3            41            42              0
*       radin1            th1        houtl1        houtv1        toutl1
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv1
    0.0000e+00
*       iconc2         ncell2          jun3          ipow2
                0             1            51              0
*       radin2            th2        houtl2        houtv2        toutl2
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv2
    0.0000e+00
*
* dx    *     1.3850e+00    2.3000e-01    1.3850e+00e
* vol   *     6.9610e-03    1.1560e-03    6.9610e-03e
* fa    * f   5.0266e-03e
* fric  *     4.9500e-02r02 6.0000e-01    4.9500e-02e
* grav  * f   0.0000e+00e
* hd    * f   8.0000e-02e
* icflg * f             0e
* nff   *            -1r02          1             -1e
* lccfl *      f 0 e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   3.9300e+02e
* tv    * f   3.9300e+02e
* p     * f   2.0180e+05e
* pa    * f   0.0000e+00e
*
* dx    *     1.4850e+00e
* vol   *     7.4640e-03e
* fa    * f   5.0270e-03e
```

```
* fric  *     6.7500e-02    3.6400e-02e
* grav  * f   0.0000e+00e
* hd    * f   8.0000e-02e
* icflg * f           0e
* nff   * f           1e
* lccfl *     f 0 e
* alp   *     1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     3.9300e+02e
* tv    *     3.9300e+02e
* p     *     2.0180e+05e
* pa    *     0.0000e+00e
************************************************************
* Injection piping at pressure vessel side (inj. 3)
************************************************************
*         type          num           id        ctitle
tee            52      52 $52$ inj 3 to vessel piping - 3/20/
*        jcell         nodes         ichf         cost         epsw
               2             0            1           0.   1.0000e-05
*       iconc1        ncell1         jun1         jun2         ipow1
               0             3           43           44             0
*       radin1           th1       houtl1       houtv1       toutl1
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv1
    0.0000e+00
*       iconc2        ncell2         jun3         ipow2
               0             1           53            0
*       radin2           th2       houtl2       houtv2       toutl2
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv2
    0.0000e+00
*
* dx    *     1.3850e+00    2.3000e-01    1.3850e+00e
* vol   *     6.9610e-03    1.1560e-03    6.9610e-03e
* fa    * f   5.0266e-03e
* fric  *     4.9500e-02r02 6.0000e-01    4.9500e-02e
* grav  * f   0.0000e+00e
* hd    * f   8.0000e-02e
* icflg * f           0e
* nff   *           -1r02          1            -1e
* lccfl *     f 0 e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   3.9300e+02e
* tv    * f   3.9300e+02e
* p     * f   2.0180e+05e
* pa    * f   0.0000e+00e
*
* dx    *     1.4850e+00e
* vol   *     7.4640e-03e
* fa    * f   5.0270e-03e
* fric  *     6.7500e-02    3.6400e-02e
* grav  * f   0.0000e+00e
* hd    * f   8.0000e-02e
* icflg * f           0e
* nff   * f           1e
* lccfl *     f 0 e
* alp   *     1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     3.9300e+02e
* tv    *     3.9300e+02e
* p     *     2.0180e+05e
* pa    *     0.0000e+00e
************************************************************
* Injection piping at pressure vessel side (inj. 2)
************************************************************
*         type          num           id        ctitle
tee            54      54 $54$ inj 2 to vessel piping - 3/20/
*        jcell         nodes         ichf         cost         epsw
               2             0            1           0.   1.0000e-05
*       iconc1        ncell1         jun1         jun2         ipow1
               0             3           45           46             0
*       radin1           th1       houtl1       houtv1       toutl1
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv1
    0.0000e+00
*       iconc2        ncell2         jun3         ipow2
               0             1           55            0
*       radin2           th2       houtl2       houtv2       toutl2
    4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv2
    0.0000e+00
*
* dx    *     1.3850e+00    2.3000e-01    1.3850e+00e
* vol   *     6.9610e-03    1.1560e-03    6.9610e-03e
* fa    * f   5.0266e-03e
* fric  *     4.9500e-02r02 6.0000e-01    4.9500e-02e
* grav  * f   0.0000e+00e
* hd    * f   8.0000e-02e
```

```
638  * icflg * f            0e
639  * nff   *            -1r02          1            -1e
640  * lccfl *      f 0 e
641  * alp   * f   1.0000e+00e
642  * vl    * f   0.0000e+00e
643  * vv    * f   0.0000e+00e
644  * tl    * f   3.9300e+02e
645  * tv    * f   3.9300e+02e
646  * p     * f   2.0180e+05e
647  * pa    * f   0.0000e+00e
648  *
649  * dx    *     1.4850e+00e
650  * vol   *     7.4640e-03e
651  * fa    * f   5.0270e-03e
652  * fric  *     6.7500e-02    3.6400e-02e
653  * grav  * f   0.0000e+00e
654  * hd    * f   8.0000e-02e
655  * icflg * f            0e
656  * nff   * f            1e
657  * lccfl *      f 0 e
658  * alp   *     1.0000e+00e
659  * vl    * f   0.0000e+00e
660  * vv    * f   0.0000e+00e
661  * tl    *     3.9300e+02e
662  * tv    *     3.9300e+02e
663  * p     *     2.0180e+05e
664  * pa    *     0.0000e+00e
665  ****************************************************************
666  * Injection piping at pressure vessel side (inj. 1)
667  ****************************************************************
668  *         type            num            id        ctitle
669  tee              56      56 $56$ inj 1 to vessel piping - 3/20/
670  *        jcell           nodes          ichf          cost          epsw
671                2               0             1            0.   1.0000e-05
672  *       iconc1          ncell1          jun1          jun2          ipow1
673                0               3            47            48              0
674  *       radin1             th1        houtl1        houtv1        toutl1
675      4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
676  *       toutv1
677      0.0000e+00
678  *       iconc2          ncell2          jun3          ipow2
679                0               1            57              0
680  *       radin2             th2        houtl2        houtv2        toutl2
681      4.0000e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
682  *       toutv2
683      0.0000e+00
684  *
685  * dx    *     1.3850e+00    2.3000e-01    1.3850e+00e
686  * vol   *     6.9610e-03    1.1560e-03    6.9610e-03e
687  * fa    * f   5.0266e-03e
688  * fric  *     4.9500e-02r02 6.0000e-01    4.9500e-02e
689  * grav  * f   0.0000e+00e
690  * hd    * f   8.0000e-02e
691  * icflg * f            0e
692  * nff   *            -1r02          1            -1e
693  * lccfl *      f 0 e
694  * alp   * f   1.0000e+00e
695  * vl    * f   0.0000e+00e
696  * vv    * f   0.0000e+00e
697  * tl    * f   3.9300e+02e
698  * tv    * f   3.9300e+02e
699  * p     * f   2.0180e+05e
700  * pa    * f   0.0000e+00e
701  *
702  * dx    *     1.4850e+00e
703  * vol   *     7.4640e-03e
704  * fa    * f   5.0270e-03e
705  * fric  *     6.7500e-02    3.6400e-02e
706  * grav  * f   0.0000e+00e
707  * hd    * f   8.0000e-02e
708  * icflg * f            0e
709  * nff   * f            1e
710  * lccfl *      f 0 e
711  * alp   *     1.0000e+00e
712  * vl    * f   0.0000e+00e
713  * vv    * f   0.0000e+00e
714  * tl    *     3.9300e+02e
715  * tv    *     3.9300e+02e
716  * p     *     2.0180e+05e
717  * pa    *     0.0000e+00e
718  ****************************************************************
719  * ecc4 thru upper plenum (bundles 1 & 2) (zero for run 719)
720  ****************************************************************
721  *         type            num            id        ctitle
722  fill             111      111 $111$ ecc4 through upper plenum
723  *         jun1           ifty          ioff
724                111              6             1
725  *         iftr           ifsv          nftb          nfsv          nfrf
726                0             101             2             0             0
727  *       twtold          rfmx         concin          felv
728      0.0000e+00    1.0000e+30    0.0000e+00    0.0000e+00
729  *         dxin          volin          alpin          vlin          tlin
```

```
    8.7400e-01    1.7000e-03    0.0000e+00    0.0000e+00    3.1200e+02
*         pin           pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No ECC injection into bundles 1 and 2 for Run 719
* Scale factor: VMSCL=1/area
*        vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl          pscl         pascl         conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft06us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te06uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* Injection pipe for ecc4 thru upper pleunum
*****************************************************************
*         type           num            id        ctitle
pipe          101      101 $101$ ecc4 inj pipe, upper plenum
*       ncells         nodes          jun1          jun2          epsw
              2             0           111           101    1.0000e-05
*         ichf         iconc          iacc          ipow
              1             0             0             0
*        radin            th         houtl         houtv         toutl
    2.5250e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*        toutv
    0.0000e+00
*
* dx    *     8.7400e-01    1.5000e-01e
* vol   *     1.7000e-03    3.0000e-04e
* fa    * f   2.0000e-03e
* fric  * f   1.0000e-02e
* grav  * f  -1.0000e+00e
* hd    * r02 5.0500e-02    9.1500e-04e
* icflg * f            0e
* nff   * r02 1       -1e
* lccfl *      f 0 e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   3.9300e+02e
* tv    * f   3.9300e+02e
* p     * f   2.0180e+05e
* pa    * f   0.0000e+00e
*****************************************************************
* ecc3 thru upper plenum (bundles 3 & 4)
*****************************************************************
*         type           num            id        ctitle
fill          113      113 $113$ ecc3 through upper plenum
*         jun1          ifty          ioff
              113             6             1
*         iftr          ifsv          nftb          nfsv          nfrf
                0           101             2             0             0
*       twtold          rfmx         concin          felv
    0.0000e+00    1.0000e+30    0.0000e+00    0.0000e+00
*         dxin          volin          alpin          vlin          tlin
    8.7400e-01    1.7000e-03    0.0000e+00    0.0000e+00    3.1200e+02
*         pin           pain         flowin          vvin          tvin
    2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
* No ECC injection into bundles 3 and 4 for Run 719
* Scale factor: VMSCL=1/area
*        vmscl         vvscl
    0.0000e+00    0.0000e+00
*        tlscl         tvscl          pscl         pascl         conscl
    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
* input value is volumetric flow rate, q.
* tag ft07us
* vmtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* vvtb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* tag te07uws
* tltb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* tvtb  *     0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
* alptb *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
* ptb   *     0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
* patb  *     0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
*****************************************************************
* Injection pipe for ecc3 thru upper plenum
*****************************************************************
*         type           num            id        ctitle
pipe          103      103 $103$ ecc3 inj pipe, upper plenum
*       ncells         nodes          jun1          jun2          epsw
              2             0           113           103    1.0000e-05
*         ichf         iconc          iacc          ipow
              1             0             0             0
*        radin            th         houtl         houtv         toutl
    2.5250e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*        toutv
```

```
822     0.0000e+00
823  *
824  * dx    *      8.7400e-01    1.5000e-01e
825  * vol   *      1.7000e-03    3.0000e-04e
826  * fa    * f    2.0000e-03e
827  * fric  * f    1.0000e-02e
828  * grav  * f   -1.0000e+00e
829  * hd    * r02  5.0500e-02    9.1500e-04e
830  * icflg * f             0e
831  * nff   * r02  1        -1e
832  * lccfl *       f 0 e
833  * alp   * f    1.0000e+00e
834  * vl    * f    0.0000e+00e
835  * vv    * f    0.0000e+00e
836  * tl    * f    3.9300e+02e
837  * tv    * f    3.9300e+02e
838  * p     * f    2.0180e+05e
839  * pa    * f    0.0000e+00e
840  ****************************************************************
841  * ecc2 thru upper plenum (bundles 5 & 6) (zero for run 719)
842  ****************************************************************
843  *         type           num           id        ctitle
844  fill             115      115 $115$ ecc2 through upper plenum
845  *         junl           ifty          ioff
846               115             6             1
847  *         iftr           ifsv          nftb          nfsv          nfrf
848                 0            101             2             0             0
849  *       twtold           rfmx         concin          felv
850     0.0000e+00    1.0000e+30    0.0000e+00    0.0000e+00
851  *         dxin           volin         alpin          vlin          tlin
852     8.7400e-01    1.7000e-03    0.0000e+00    0.0000e+00    3.1200e+02
853  *          pin           pain         flowin          vvin          tvin
854     2.0180e+05    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
855  * No ECC injection into bundles 5 and 6 for Run 719
856  * Scale factor: VMSCL=1/area
857  *         vmscl          vvscl
858     0.0000e+00    0.0000e+00
859  *         tlscl          tvscl          pscl          pascl         conscl
860     1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    0.0000e+00
861  * input value is volumetric flow rate, q.
862  * tag ft08us
863  * vmtb  *      0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
864  * vvtb  *      0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
865  * tag te08uws
866  * tltb  *      0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
867  * tvtb  *      0.0000e+00    3.8700e+02    1.0000e+03    3.8700e+02e
868  * alptb *      0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
869  * ptb   *      0.0000e+00    6.0000e+05    1.0000e+03    6.0000e+05e
870  * patb  *      0.0000e+00    0.0000e+00    1.0000e+03    0.0000e+00e
871  ****************************************************************
872  * Injection pipe for ecc2 thru upper plenum
873  ****************************************************************
874  *         type           num           id        ctitle
875  pipe             105      105 $105$ ecc2 inj pipe, upper plenum
876  *       ncells          nodes          junl          junz          epsw
877                 2             0           115           105    1.0000e-05
878  *         ichf          iconc          iacc          ipow
879                 1             0             0             0
880  *        radin             th         houtl         houtv         toutl
881     2.5250e-02    5.0000e-03    0.0000e+00    0.0000e+00    0.0000e+00
882  *        toutv
883     0.0000e+00
884  *
885  * dx    *      8.7400e-01    1.5000e-01e
886  * vol   *      1.7000e-03    3.0000e-04e
887  * fa    * f    2.0000e-03e
888  * fric  * f    1.0000e-02e
889  * grav  * f   -1.0000e+00e
890  * hd    * r02  5.0500e-02    9.1500e-04e
891  * icflg * f             0e
892  * nff   * r02  1        -1e
893  * lccfl *       f 0 e
894  * alp   * f    1.0000e+00e
895  * vl    * f    0.0000e+00e
896  * vv    * f    0.0000e+00e
897  * tl    * f    3.9300e+02e
898  * tv    * f    3.9300e+02e
899  * p     * f    2.0180e+05e
900  * pa    * f    0.0000e+00e
901  ****************************************************************
902  * ecc1 thru upper plenum (bundles 7 & 8) (zero for run 719)
903  ****************************************************************
904  *         type           num           id        ctitle
905  fill             117      117 $117$ ecc1 through upper plenum
906  *         junl           ifty          ioff
907               117             6             1
908  *         iftr           ifsv          nftb          nfsv          nfrf
909                 0            101             2             0             0
910  *       twtold           rfmx         concin          felv
911     0.0000e+00    1.0000e+30    0.0000e+00    0.0000e+00
912  *         dxin           volin         alpin          vlin          tlin
913     8.7400e-01    1.7000e-03    0.0000e+00    0.0000e+00    3.1200e+02
```

```
914  *          pin           pain          flowin           vvin           tvin
915      2.0180e+05     0.0000e+00     0.0000e+00     0.0000e+00     0.0000e+00
916  * No ECC injection into bundles 7 and 8 for Run 719
917  * Scale factor: VMSCL=1/area
918  *         vmscl          vvscl
919      0.0000e+00     0.0000e+00
920  *         tlscl          tvscl          pscl          pascl          conscl
921      1.0000e+00     1.0000e+00     1.0000e+00     1.0000e+00     0.0000e+00
922  * input value is volumetric flow rate, q.
923  * tag ft09us
924  * vmtb  *      0.0000e+00     0.0000e+00     1.0000e+03     0.0000e+00e
925  * vvtb  *      0.0000e+00     0.0000e+00     1.0000e+03     0.0000e+00e
926  * tag te09uws
927  * tltb  *      0.0000e+00     3.8700e+02     1.0000e+03     3.8700e+02e
928  * tvtb  *      0.0000e+00     3.8700e+02     1.0000e+03     3.8700e+02e
929  * alptb *      0.0000e+00     0.0000e+00     1.0000e+03     0.0000e+00e
930  * ptb   *      0.0000e+00     6.0000e+05     1.0000e+03     6.0000e+05e
931  * patb  *      0.0000e+00     0.0000e+00     1.0000e+03     0.0000e+00e
932  ************************************************************
933  * Injection pipe for ecc1 thru upper plenum
934  ************************************************************
935  *         type           num            id         ctitle
936  pipe            107      107 $107$ ecc1 inj pipe, upper plenum
937  *        ncells         nodes          jun1          jun2          epsw
938                2             0           117           107     1.0000e-05
939  *          ichf          iconc          iacc          ipow
940                1             0             0             0
941  *         radin             th         houtl         houtv         toutl
942      2.5250e-02     5.0000e-03     0.0000e+00     0.0000e+00     0.0000e+00
943  *         toutv
944      0.0000e+00
945  *
946  * dx    *      8.7400e-01     1.5000e-01e
947  * vol   *      1.7000e-03     3.0000e-04e
948  * fa    * f    2.0000e-03e
949  * fric  * f    1.0000e-02e
950  * grav  * f   -1.0000e+00e
951  * hd    * r02  5.0500e-02     9.1500e-04e
952  * icflg * f             0e
953  * nff   * r02  1        -1e
954  * lccfl *       f 0 e
955  * alp   * f    1.0000e+00e
956  * vl    * f    0.0000e+00e
957  * vv    * f    0.0000e+00e
958  * tl    * f    3.9300e+02e
959  * tv    * f    3.9300e+02e
960  * p     * f    2.0180e+05e
961  * pa    * f    0.0000e+00e
962  ************************************************************
963  * separator-side cold leg break -- CT2
964  ************************************************************
965  *         type           num            id         ctitle
966  break            13      13 $13$ cold leg break, s/w sep side
967  *         jun1          ibty          isat          ioff
968                2             1             3             0
969  *         ibtr          ibsv          nbtb          nbsv          nbrf
970                0           101            30             0             0
971  *         dxin          volin         alpin           tin           pin
972      8.5000e-01     5.9300e-02     1.0000e+00     3.9300e+02     2.0180e+05
973  *         pain         concin          rhmx          poff          belv
974      0.0000e+00     0.0000e+00     1.0000e+05     0.0000e+00     0.0000e+00
975  *         pscl          tlscl          tvscl          pascl          conscl
976      1.0000e+00     1.0000e+00     1.0000e+00     1.0000e+00     1.0000e+00
977  * ptb   *      0.0000e+00     2.0180e+05     2.4000e+01     2.0310e+05     3.7000e+01
978  * ptb   *      2.0310e+05     4.4000e+01     2.0340e+05     9.9000e+01     2.0340e+05
979  * ptb   *      1.0400e+02     2.0370e+05     1.1700e+02     2.0370e+05     1.2100e+02
980  * ptb   *      2.0400e+05     1.2900e+02     2.1890e+05     1.4000e+02     2.2560e+05
981  * ptb   *      1.4500e+02     2.2700e+05     1.4700e+02     2.2700e+05     1.5800e+02
982  * ptb   *      2.2240e+05     1.7900e+02     2.0980e+05     1.9000e+02     2.0480e+05
983  * ptb   *      2.1500e+02     1.9690e+05     2.2500e+02     1.9510e+05     2.3800e+02
984  * ptb   *      1.9390e+05     2.5500e+02     1.9390e+05     3.0500e+02     1.9600e+05
985  * ptb   *      3.1500e+02     1.9600e+05     3.1900e+02     1.9630e+05     4.0700e+02
986  * ptb   *      1.9630e+05     4.1000e+02     1.9600e+05     4.5600e+02     1.9600e+05
987  * ptb   *      4.6000e+02     1.9630e+05     4.9900e+02     1.9630e+05     5.6200e+02
988  * ptb   *      1.9420e+05     5.9700e+02     1.9510e+05     1.0000e+03     1.9510e+05
989  e
990  ************************************************************
991  * pv-side cold leg break -- CT1
992  ************************************************************
993  *         type           num            id         ctitle
994  break            14      14 $14$ cold leg break, pv side
995  *         jun1          ibty          isat          ioff
996                4             1             3             0
997  *         ibtr          ibsv          nbtb          nbsv          nbrf
998                0           101            27             0             0
999  *         dxin          volin         alpin           tin           pin
1000     11.700e+00     81.600e+00     1.0000e+00     3.9300e+02     2.0180e+05
1001 *         pain         concin          rhmx          poff          belv
1002     0.0000e+00     0.0000e+00     1.0000e+05     0.0000e+00     0.0000e+00
1003 *         pscl          tlscl          tvscl          pascl          conscl
1004     1.0000e+00     1.0000e+00     1.0000e+00     1.0000e+00     1.0000e+00
1005 * ptb   *      0.0000e+00     2.0180e+05     1.1000e+01     2.0280e+05     3.0000e+01
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1006  * ptb   *     2.0340e+05    3.2000e+01    2.0350e+05    3.3000e+01    2.0370e+05
1007  * ptb   *     5.5000e+01    2.0400e+05    1.1400e+02    2.0400e+05    1.2100e+02
1008  * ptb   *     2.0470e+05    1.3000e+02    2.2060e+05    1.3700e+02    2.2560e+05
1009  * ptb   *     1.4400e+02    2.2900e+05    1.4800e+02    2.2950e+05    1.5700e+02
1010  * ptb   *     2.2590e+05    1.8900e+02    2.1000e+05    2.0300e+02    2.0500e+05
1011  * ptb   *     2.2300e+02    2.0000e+05    2.4100e+02    1.9780e+05    2.6300e+02
1012  * ptb   *     1.9780e+05    3.0300e+02    1.9970e+05    3.1900e+02    2.0000e+05
1013  * ptb   *     3.5100e+02    2.0000e+05    4.3300e+02    1.9880e+05    4.9800e+02
1014  * ptb   *     1.9880e+05    5.5200e+02    1.9570e+05    5.8300e+02    1.9570e+05
1015  * ptb   *     6.0000e+02    1.9630e+05    1.0000e+03    1.9630e+05e
1016  ************************************************************
1017  * broken cold leg (pv side) to CT1
1018  ************************************************************
1019  *         type           num           id        ctitle
1020  valve            4       4 $4$ bcl(pv side) to ct1 - 7/7/81
1021  *        ncells         nodes          jun1          jun2          epsw
1022                6             1             3             4    1.0000e-05
1023  *         ichf         iconc          ivty          ivps         nvtb2
1024                1             0             0             4             0
1025  *         ivtr          ivsv         nvtb1          nvsv          nvrf
1026                0             0             0             0             0
1027  *        iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
1028                0             0             0             0             0
1029  *        ivtrov        ivtyov
1030                0             0
1031  *          rvmx          rvov         fminov         fmaxov
1032     0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1033  *         radin            th         houtl         houtv         toutl
1034     7.7500e-02    7.1000e-03    0.0000e+00    0.0000e+00    2.9000e+02
1035  *         toutv         avlve         hvlve         favlve          xpos
1036     2.9000e+02    1.7910e-02    1.5100e-01    1.0000e+00    1.0000e+00
1037  *         qp3in         qp3off        rqp3mx         qp3scl
1038     0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1039  *
1040  * dx    *     7.2200e-01    4.4800e-01    2.6100e+00    6.6000e-01    3.2200e+00
1041  * dx    *     1.1700e+01e
1042  * vol   *     1.3300e-02    8.0200e-03    4.6740e-02    4.6030e-02    2.2458e-01
1043  * vol   *     8.1603e-01e
1044  * fa    * r02 1.8400e-02r02 1.7910e-02r03 6.9750e-02e
1045  * fric  * r 2 0.0097 r 2 0.06123  0.0393 r 2 0.1e
1046  * grav  * r04 0.0000e+00   -8.2990e-01   -2.1580e-01    0.0000e+00e
1047  * hd    * r02 1.1600e-01r02 1.5100e-01r03 2.9800e-01e
1048  * icflg * r03          0             2r03           0e
1049  * nff   *             -1r03           1            -1             1            -1
1050  * nff   *              e
1051  * lccfl *       f 0 e
1052  * alp   * f   1.0000e+00e
1053  * vl    * f   0.0000e+00e
1054  * vv    * f   0.0000e+00e
1055  * tl    * f   3.9300e+02e
1056  * tv    * f   3.9300e+02e
1057  * p     * f   2.0180e+05e
1058  * pa    * f   0.0000e+00e
1059  * qppp  * f   0.0000e+00e
1060  * matid *              6e
1061  * tw    * f   3.9300e+02e
1062  ************************************************************
1063  * broken cold leg (separator side) to CT2
1064  ************************************************************
1065  *         type           num           id        ctitle
1066  valve            3       3 $3$ bcl(sep side) to ct2 - 7/20/81
1067  *        ncells         nodes          jun1          jun2          epsw
1068                8             1             1             2    1.0000e-05
1069  *         ichf         iconc          ivty          ivps         nvtb2
1070                1             0             0             4             0
1071  *         ivtr          ivsv         nvtb1          nvsv          nvrf
1072                0             0             0             0             0
1073  *        iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
1074                0             0             0             0             0
1075  *        ivtrov        ivtyov
1076                0             0
1077  *          rvmx          rvov         fminov         fmaxov
1078     0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1079  *         radin            th         houtl         houtv         toutl
1080     7.5500e-02    7.1000e-03    0.0000e+00    0.0000e+00    2.9000e+02
1081  *         toutv         avlve         hvlve         favlve          xpos
1082     2.9000e+02    1.7910e-02    1.5100e-01    1.0000e+00    1.0000e+00
1083  *         qp3in         qp3off        rqp3mx         qp3scl
1084     0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1085  *
1086  * dx    *     7.7500e-01r02 1.2610e+00    1.6210e+00    1.1500e+00    3.2200e+00
1087  * dx    *     4.6000e+00    8.5000e-01e
1088  * vol   *     1.3880e-02r02 2.2580e-02    2.9030e-02    8.0210e-02    2.2460e-01
1089  * vol   *     3.2085e-01    5.9290e-02e
1090  * fa    * r03 1.7910e-02    5.9000e-03    1.7910e-02r04 6.9750e-02e
1091  * fric  * f   0.0000e+00e
1092  * grav  * r05 0.0000e+00   -7.5973e-01   -3.9898e-01r02 0.0000e+00e
1093  * hd    * r03 1.5100e-01    8.6400e-02    1.5100e-01r04 2.9800e-01e
1094  * icflg * r03          0             2r05           0e
1095  * nff   *             -1r02           1r03         -1r02          1            -1
1096  * nff   *               e
1097  * lccfl *       f 0 e
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```
* alp    * f   1.0000e+00e
* vl     * f   0.0000e+00e
* vv     * f   0.0000e+00e
* tl     * f   3.9300e+02e
* tv     * f   3.9300e+02e
* p      * f   2.0180e+05e
* pa     * f   0.0000e+00e
* qppp   * f   0.0000e+00e
* matid *              6e
* tw     * f   3.9300e+02e
*****************************************************************
* hot leg component
*****************************************************************
*         type          num          id        ctitle
pipe           2       2 $2$ hot leg - 7/7/81
*       ncells        nodes         jun1         jun2         epsw
              4            1           12            5    1.0000e-05
*         ichf        iconc         iacc         ipow
              1            0            0            0
*       iqp3tr       iqp3sv       nqp3tb       nqp3sv       nqp3rf
              0            0            0            0            0
*        radin           th        houtl        houtv        toutl
    1.6220e-01    1.0300e-02    0.0000e+00    0.0000e+00    0.0000e+00
*        toutv
    0.0000e+00
*         qp3in        qp3off        rqp3mx        qp3scl
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx     *     5.5050e-01    1.5240e+00    7.6000e-01    1.4450e+00e
* vol    *     4.5700e-02    1.2650e-01    6.3100e-02    1.1990e-01e
* fa     * f   8.3000e-02e
* fric   * f   0.0000e+00e
* grav   * r03 0.0000e+00    4.2120e-01    6.2880e-01e
* hd     * f   2.0670e-01e
* icflg * f            0e
* nff    *           -1r03          1           -1e
* lccfl *      f 0 e
* alp    * f   1.0000e+00e
* vl     * f   0.0000e+00e
* vv     * f   0.0000e+00e
* tl     * f   3.9300e+02e
* tv     * f   3.9300e+02e
* p      * f   2.0180e+05e
* pa     * f   0.0000e+00e
* qppp   * f   0.0000e+00e
* matid *              6e
* tw     * f   3.9300e+02e
*****************************************************************
* Support Column bundle 3
*****************************************************************
*         type          num          id        ctitle
pipe          26       26 $26$ support column
*       ncells        nodes         jun1         jun2         epsw
              4            1           26           27    1.0000e-05
*         ichf        iconc         iacc         ipow
              1            0            0            0
*       iqp3tr       iqp3sv       nqp3tb       nqp3sv       nqp3rf
              0            0            0            0            0
*        radin           th        houtl        houtv        toutl
    8.8400e-02    1.2000e-02    0.0000e+00    0.0000e+00    0.0000e+00
*        toutv
    0.0000e+00
*         qp3in        qp3off        rqp3mx        qp3scl
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx     *     3.3900e-01    4.8500e-01    7.3700e-01    4.3700e-01e
* vol    *     1.4560e-02    1.9900e-02    1.8100e-02    1.0700e-02e
* fa     *     1.4500e-02r03 2.4600e-02    7.5000e-03e       *rfat*
* fric   *     2.7190e-02    0.0000e+00    1.7570e-01    1.8290e-01    7.5800e-02
e
* grav   * f   1.0000e+00e
* hd     *     2.5400e-01r03 3.0000e-02    6.9000e-02e
* icflg * f            0e
* nff    *           -1r03          1          -1e
* lccfl *      f 0 e
* alp    * f   1.0000e+00e
* vl     * f   0.0000e+00e
* vv     * f   0.0000e+00e
* tl     * f   3.9300e+02e
* tv     * f   3.9300e+02e
* p      * f   2.0180e+05e
* pa     * f   0.0000e+00e
* qppp   * f   0.0000e+00e
* matid *              6e
* tw     * f   3.9300e+02e
*****************************************************************
* Support Column bundle 5
*****************************************************************
*         type          num          id        ctitle
pipe          28       28 $28$ support column
*       ncells        nodes         jun1         jun2         epsw
              4            1           28           29    1.0000e-05
```

```
1190  *         ichf          iconc          iacc          ipow
1191                1              0             0             0
1192  *       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
1193                0              0             0             0             0
1194  *        radin             th         houtl         houtv         toutl
1195      8.8400e-02    1.2000e-02    0.0000e+00    0.0000e+00    0.0000e+00
1196  *        toutv
1197      0.0000e+00
1198  *        qp3in        qp3off        rqp3mx        qp3scl
1199      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1200  *
1201  * dx    *     3.3900e-01    4.8500e-01    7.3700e-01    4.3700e-01e
1202  * vol   *     1.4560e-02    1.9900e-02    1.8100e-02    1.0700e-02e
1203  * fa    *     1.4500e-02r03 2.4600e-02    7.5000e-03e       *rfat*
1204  * fric  *     2.7190e-02    0.0000e+00    1.7570e-01    1.8290e-01    7.5800e-02
1205  e
1206  * grav  * f   1.0000e+00e
1207  * hd    *     2.5400e-01r03 3.0000e-02    6.9000e-02e
1208  * icflg * f           0e
1209  * nff   *          -1r03          1          -1e
1210  * lccfl *      f 0 e
1211  * alp   * f   1.0000e+00e
1212  * vl    * f   0.0000e+00e
1213  * vv    * f   0.0000e+00e
1214  * tl    * f   3.9300e+02e
1215  * tv    * f   3.9300e+02e
1216  * p     * f   2.0180e+05e
1217  * pa    * f   0.0000e+00e
1218  * qppp  * f   0.0000e+00e
1219  * matid *             6e
1220  * tw    * f   3.9300e+02e
1221  ****************************************************************
1222  * Support Column bundle 1
1223  ****************************************************************
1224  *          type           num           id        ctitle
1225  pipe           20      20 $20$ support column
1226  *        ncells         nodes          jun1          jun2          epsw
1227                3             1            20            21    1.0000e-05
1228  *         ichf         iconc          iacc          ipow
1229                1             0             0             0
1230  *       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
1231                0             0             0             0             0
1232  *        radin             th         houtl         houtv         toutl
1233      8.8400e-02    1.2000e-02    0.0000e+00    0.0000e+00    0.0000e+00
1234  *        toutv
1235      0.0000e+00
1236  *        qp3in        qp3off        rqp3mx        qp3scl
1237      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1238  *
1239  * dx    *     4.8500e-01    7.3700e-01    4.3700e-01e
1240  * vol   *     1.1910e-02    1.8090e-02    1.0730e-02e
1241  * fa    *     1.4500e-02r02 2.4600e-02    7.1270e-03e
1242  * fric  *     2.7000e-02    1.7570e-01    1.8290e-01    7.5800e-02e
1243  * grav  * f   1.0000e+00e
1244  * hd    *     3.2000e-02r02 3.0000e-02    6.9000e-02e
1245  * icflg * f           0e
1246  * nff   *          -1r02          1          -1e
1247  * lccfl *      f 0 e
1248  * alp   * f   1.0000e+00e
1249  * vl    * f   0.0000e+00e
1250  * vv    * f   0.0000e+00e
1251  * tl    * f   3.9300e+02e
1252  * tv    * f   3.9300e+02e
1253  * p     * f   2.0180e+05e
1254  * pa    * f   0.0000e+00e
1255  * qppp  * f   0.0000e+00e
1256  * matid *             6e
1257  * tw    * f   3.9300e+02e
1258  ****************************************************************
1259  * Support Column bundle 6
1260  ****************************************************************
1261  *          type           num           id        ctitle
1262  pipe           22      22 $22$ support column
1263  *        ncells         nodes          jun1          jun2          epsw
1264                3             1            22            23    1.0000e-05
1265  *         ichf         iconc          iacc          ipow
1266                1             0             0             0
1267  *       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
1268                0             0             0             0             0
1269  *        radin             th         houtl         houtv         toutl
1270      8.8400e-02    1.2000e-02    0.0000e+00    0.0000e+00    0.0000e+00
1271  *        toutv
1272      0.0000e+00
1273  *        qp3in        qp3off        rqp3mx        qp3scl
1274      0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1275  *
1276  * dx    *     4.8500e-01    7.3700e-01    4.3700e-01e
1277  * vol   *     1.1910e-02    1.8090e-02    1.0730e-02e
1278  * fa    *     1.4500e-02r02 2.4600e-02    7.4780e-03e
1279  * fric  *     2.7000e-02    1.7570e-01    1.8290e-01    7.5800e-02e
1280  * grav  * f   1.0000e+00e
1281  * hd    *     3.2000e-02r02 3.0000e-02    6.9000e-02e
```

```
* icflg * f            0e
* nff   *           -1r02          1          -1e
* lccfl *      f 0 e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   3.9300e+02e
* tv    * f   3.9300e+02e
* p     * f   2.0180e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *              6e
* tw    * f   3.9300e+02e
*****************************************************************
* Support Column bundle 7
*****************************************************************
*         type           num           id        ctitle
pipe          24      24 $24$ support column
*       ncells         nodes          jun1          jun2          epsw
              3             1            24            25    1.0000e-05
*         ichf         iconc         iacc         ipow
              1             0            0            0
*       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
              0             0            0            0             0
*        radin            th         houtl         houtv         toutl
    8.8400e-02    1.2000e-02    0.0000e+00    0.0000e+00    0.0000e+00
*        toutv
    0.0000e+00
*         qp3in        qp3off        rqp3mx        qp3scl
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx    *     4.8500e-01    7.3700e-01    4.3700e-01e
* vol   *     1.1910e-02    1.8090e-02    1.0730e-02e
* fa    *     1.4500e-02r02 2.4600e-02    7.4780e-03e
* fric  *     2.7000e-02    1.7570e-01    1.8290e-01    7.5800e-02e
* grav  * f   1.0000e+00e
* hd    *     3.2000e-02r02 3.0000e-02    6.9000e-02e
* icflg * f            0e
* nff   *           -1r02          1          -1e
* lccfl *      f 0 e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   3.9300e+02e
* tv    * f   3.9300e+02e
* p     * f   2.0180e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *              6e
* tw    * f   3.9300e+02e
*****************************************************************
* cl ecc, intact cl, pump simulator
*****************************************************************
*         type           num           id        ctitle
tee           8       8 $8$ intact cold leg - 7/7/81
*        jcell         nodes         ichf          cost          epsw
              7             1            1        0.7071    1.0000e-05
*       iconc1        ncell1         jun1          jun2          ipow1
              0             8            7             8             0
*       iqptr1        iqpsv1       nqptb1        nqpsv1        nqprf1
              0             0            0             0             0
*       radin1           th1       houtl1        houtv1        toutl1
    1.4900e-01    6.9700e-02    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv1
    0.0000e+00
*        qpin1        qpoff1        rqpmx1        qpscl1
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*       iconc2        ncell2         jun3         ipow2
              0             2            9             0
*       iqptr2        iqpsv2       nqptb2        nqpsv2        nqprf2
              0             0            0             0             0
*       radin2           th2       houtl2        houtv2        toutl2
    4.0800e-02    5.2000e-03    0.0000e+00    0.0000e+00    0.0000e+00
*       toutv2
    0.0000e+00
*        qpin2        qpoff2        rqpmx2        qpscl2
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx    *     4.2420e+00    3.0999e+00    3.1405e+00    1.4095e+00    3.1405e+00
* dx    *     6.2650e-01    1.2530e+00    2.2035e+00e
* vol   *     2.9570e-01    2.1600e-01    2.1890e-01    9.8200e-02    6.7000e-01
* vol   *     4.3700e-02    8.7300e-02    1.5360e-01e
* intact cl orifice and pump simulator orifice directly simulated.
* fa    *     6.9700e-02    2.5400e-02r03 6.9700e-02    2.3700e-02r03 6.9700e-02
e
* fric  * f   0.0000e+00e
* grav  * r02 0.0000e+00   -5.0330e-01   -6.9020e-01    8.0900e-01    5.8400e-01
* grav  *     2.1280e-01r02 0.0000e+00e
* intact cl orifice and pump simulator orifice directly simulated.
* hd    *     2.9800e-01    1.7990e-01r03 2.9800e-01    1.7370e-01r03 2.9800e-01
e
* icflg * f            0e
```

```
1374  * nff    * r03          -1r01          1r03          -1             1             -1
1375  * nff    *                e
1376  * lccfl *       f 0 e
1377  * alp    * f    1.0000e+00e
1378  * vl     * f    0.0000e+00e
1379  * vv     * f    0.0000e+00e
1380  * tl     * f    3.9300e+02e
1381  * tv     * f    3.9300e+02e
1382  * p      * f    2.0180e+05e
1383  * pa     * f    0.0000e+00e
1384  * qppp   * f    0.0000e+00e
1385  * matid *                6e
1386  * tw     * f    3.9300e+02e
1387  *
1388  * dx     * f    1.6550e+00e
1389  * vol    * f    8.5000e-03e
1390  * fa     * f    5.1360e-03e
1391  * fric   * f    0.0000e+00e
1392  * grav   * f    0.0000e+00e
1393  * hd     * f    8.1500e-02e
1394  * icflg * f             0e
1395  * nff    * -1 f             1e
1396  * lccfl *       f 0 e
1397  * alp    * f    1.0000e+00e
1398  * vl     * f    0.0000e+00e
1399  * vv     * f    0.0000e+00e
1400  * tl     * f    3.9300e+02e
1401  * tv     * f    3.9300e+02e
1402  * p      * f    2.0180e+05e
1403  * pa     * f    0.0000e+00e
1404  * qppp   * f    0.0000e+00e
1405  * matid *                6e
1406  * tw     * f    3.9300e+02e
1407  ****************************************************************
1408  * Steam-water separator component
1409  ****************************************************************
1410  *          type            num             id          ctitle
1411  vessel             6       6 $6$ steam-water separator - 7/7/81
1412  *          nasx           nrsx           ntsx           ncsr          ivssbf
1413                4              1              2              3               0
1414  *          idcu           idcl           idcr           icru           icrl
1415                0              0              0              0               0
1416  *          icrr          ilcsp          iucsp          iuhp           iconc
1417                0              0              0              0               0
1418  *         igeom           nvent          nvvtb          nsgrid
1419                0              0              0              0
1420  *         shelv           epsw
1421     0.0000e+00          1.0000e-05
1422  * z      *      9.5000e-01    3.3300e+00    5.0600e+00    5.9600e+00e
1423  * rad    *      6.0000e-01e
1424  * th     *      3.1416e+00    6.2832e+00e
1425  * funh    *  f 1.0 e
1426  * nhsca  *  f  0 e
1427  *
1428  *            gc           gytc           gxrc           gzc
1429  *           0.0             0.0            0.0            0.0
1430  *
1431  *         lisrl          lisrc          lisrf          ljuns
1432                2              1              3              7
1433                2              2              3              1
1434                3              1              3              5
1435  * level   1
1436  * cfzl-t* f    0.0000e+00e
1437  * cfzl-z* f    0.0000e+00e
1438  * cfzl-r* f    0.0000e+00e
1439  * cfzv-t* f    0.0000e+00e
1440  * cfzv-z* f    0.0000e+00e
1441  * cfzv-r* f    0.0000e+00e
1442  * lccfl *       f 0 e
1443  * vol    * f    9.7367e-01e
1444  * fa-t   * f    9.7367e-01e       *rfat*
1445  * fa-z   * f    1.0000e+00e
1446  * fa-r   * f    0.0000e+00e
1447  * hd-t   * f    1.1990e+00e
1448  * hd-z   * f    1.1990e+00e
1449  * hd-r   * f    1.1990e+00e
1450  * alpn   * f    9.2460e-01e
1451  * vvn-t  * f    0.0000e+00e
1452  * vvn-z  * f    0.0000e+00e
1453  * vvn-r  * f    0.0000e+00e
1454  * vln-t  * f    0.0000e+00e
1455  * vln-z  * f    0.0000e+00e
1456  * vln-r  * f    0.0000e+00e
1457  * tvn    * f    3.9300e+02e
1458  * tln    * f    3.9100e+02e
1459  * pn     * f    2.0180e+05e
1460  * pan    * f    0.0000e+00e
1461  * level   2 - icl connected to cell 1, bcl connected to cell 2.
1462  * cfzl-t* f    0.0000e+00e
1463  * cfzl-z* f    0.0000e+00e
1464  * cfzl-r* f    0.0000e+00e
1465  * cfzv-t* f    0.0000e+00e
```

```
1466  * cfzv-z* f   0.0000e+00
1467  * cfzv-r* f   0.0000e+00
1468  * lccfl *      f 0 e
1469  * vol   * f   1.0000e+00
1470  * fa-t  * f   1.0000e+00
1471  * fa-z  *     0.0000e+00    1.0000e+00
1472  * fa-r  * f   0.0000e+00
1473  * hd-t  * f   1.1990e+00
1474  * hd-z  *     0.0000e+00    1.1990e+00
1475  * hd-r  * f   1.1990e+00
1476  * alpn  * f   1.0000e+00
1477  * vvn-t * f   0.0000e+00
1478  * vvn-z * f   0.0000e+00
1479  * vvn-r * f   0.0000e+00
1480  * vln-t * f   0.0000e+00
1481  * vln-z * f   0.0000e+00
1482  * vln-r * f   0.0000e+00
1483  * tvn   * f   3.9300e+02
1484  * tln   * f   3.9300e+02
1485  * pn    * f   2.0180e+05
1486  * pan   * f   0.0000e+00
1487  * level   3 -  cell 1 inlet pleunum -- hl connection.
1488  * cfzl-t* f   0.0000e+00
1489  * cfzl-z*     0.0000e+00    0.0000e+00
1490  * cfzl-r* f   0.0000e+00
1491  * cfzv-t* f   0.0000e+00
1492  * cfzv-z* f   0.0000e+00
1493  * cfzv-r* f   0.0000e+00
1494  * lccfl *      f 0 e
1495  * vol   * f   1.0000e+00
1496  * fa-t  * f   0.0000e+00
1497  * fa-z  *     3.4484e-01    1.0000e+00
1498  * fa-r  * f   0.0000e+00
1499  * hd-t  * f   1.1990e+00
1500  * hd-z  *     1.5690e-01    9.0950e-01e
1501  * hd-r  * f   1.1990e+00
1502  * alpn  * f   1.0000e+00
1503  * vvn-t * f   0.0000e+00
1504  * vvn-z * f   0.0000e+00
1505  * vvn-r * f   0.0000e+00
1506  * vln-t * f   0.0000e+00
1507  * vln-z * f   0.0000e+00
1508  * vln-r * f   0.0000e+00
1509  * tvn   * f   3.9300e+02
1510  * tln   * f   3.9300e+02
1511  * pn    * f   2.0180e+05
1512  * pan   * f   0.0000e+00
1513  * level   4
1514  * cfzl-t* f   0.0000e+00
1515  * cfzl-z* f   0.0000e+00
1516  * cfzl-r* f   0.0000e+00
1517  * cfzv-t* f   0.0000e+00
1518  * cfzv-z* f   0.0000e+00
1519  * cfzv-r* f   0.0000e+00
1520  * lccfl *      f 0 e
1521  * vol   * f   9.7220e-01e
1522  * fa-t  * f   9.7220e-01e       *rfat*
1523  * fa-z  * f   0.0000e+00
1524  * fa-r  * f   0.0000e+00
1525  * hd-t  * f   0.0000e+00
1526  * hd-z  * f   0.0000e+00
1527  * hd-r  * f   0.0000e+00
1528  * alpn  * f   1.0000e+00
1529  * vvn-t * f   0.0000e+00
1530  * vvn-z * f   0.0000e+00
1531  * vvn-r * f   0.0000e+00
1532  * vln-t * f   0.0000e+00
1533  * vln-z * f   0.0000e+00
1534  * vln-r * f   0.0000e+00
1535  * tvn   * f   3.9300e+02
1536  * tln   * f   3.9300e+02
1537  * pn    * f   2.0180e+05
1538  * pan   * f   0.0000e+00
1539  ****************************************************************
1540  * Pressure vessel component -- 12X15 2d slab
1541  ****************************************************************
1542  *          type          num          id        ctitle
1543  vessel          1       1 $1$ 2d slab - 12x15 -10/24/86
1544  *          nasx          nrsx          ntsx          ncsr         ivssbf
1545                 15            12             1            26              0
1546  *          idcu          idcl          idcr          icru          icrl
1547                 14             1            10             9              3
1548  *          icrr         ilcsp         iucsp          iuhp         iconc
1549                  8             3            10            14              0
1550  *         igeom          nvent          nvvtb          nsgrid
1551                  1             0              0             0 * 6 *
1552  *         shelv          epsw
1553      0.0000e+00          1.0000e-05
1554  * z     *     5.0200e-01    1.4330e+00    1.7190e+00    1.9595e+00    2.6245e+00
1555  * z     *     3.2895e+00    3.9545e+00    4.6195e+00    5.3320e+00    5.7480e+00
1556  * z     *     6.3370e+00    6.8220e+00    7.5590e+00    7.9960e+00    8.6570e+00
1557  e
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```
1558  * rad   *     2.3000e-01    4.6000e-01    6.9000e-01    9.2000e-01    1.1500e+00
1559  * rad   *     1.3800e+00    1.6100e+00    1.8400e+00    2.0170e+00    2.3340e+00
1560  * rad   *     2.6770e+00    3.0200e+00e
1561  * th    *     2.3000e-01e
1562  * funh   *  f 0.1 e
1563  * nhsca  *  f  991 e
1564  *
1565  *           gc          gytc          gxrc          gzc
1566  *           0.0           0.0           0.0           0.0
1567  *
1568  * zsgrid  1.779 2.394 3.059 3.724 4.389s
1569  * zsgrid  5.054 e
1570  *         lisrl         lisrc         lisrf         ljuns
1571              13            10             3            12
1572              12            12             1             3
1573              12            11             1             8
1574               1            10             1            30
1575              11             1             1            41
1576              11             2             1            42
1577              11             3             1            43
1578              11             4             1            44
1579              11             5             1            45
1580              11             6             1            46
1581              11             7             1            47
1582              11             8             1            48
1583              14             1             2           101
1584              14             3             2           103
1585              14             5             2           105
1586              14             7             2           107
1587              11             1             2            20
1588              11             3             2            26
1589              11             5             2            28
1590              11             6             2            22
1591              11             7             2            24
1592              15             1            -2            21
1593              15             3            -2            27
1594              15             5            -2            29
1595              15             6            -2            23
1596              15             7            -2            25
1597  * level   1 - bottom level in lower plenum.
1598  * cfzl-t* f   0.0000e+00e
1599  * cfzl-z* f   1.0000e+00e
1600  * cfzl-r* f   1.0000e+00e
1601  * cfzv-t* f   0.0000e+00e
1602  * cfzv-z* f   1.0000e+00e
1603  * cfzv-r* f   1.0000e+00e
1604  * lccfl *      f 0 e
1605  * vol   * r10 1.9464e+00    1.5825e+00    8.4200e-01e
1606  * fa-t  * f   0.0000e+00e
1607  * fa-z  * r10 1.0000e+00r02 1.0000e+00e
1608  * fa-r  * r10 1.0000e+00    1.0000e+00    0.0000e+00e
1609  * hd-t  *     4.5760e-01r10 7.0400e-01    3.2000e-01e
1610  * hd-z  *     4.5760e-01r10 7.0400e-01    3.2000e-01e
1611  * hd-r  *     4.5760e-01r10 7.0400e-01    3.2000e-01e
1612  * alpn  * f   0.0000e+00e
1613  * vvn-t * f   0.0000e+00e
1614  * vvn-z * f   0.0000e+00e
1615  * vvn-r * f   0.0000e+00e
1616  * vln-t * f   0.0000e+00e
1617  * vln-z * f   0.0000e+00e
1618  * vln-r * f   0.0000e+00e
1619  * tvn   * f   3.9300e+02e
1620  * tln   * f   3.9100e+02e
1621  * pn    * f   2.0180e+05e
1622  * pan   * f   0.0000e+00e
1623  * level   2 - second level in lower plenum.
1624  * cfzl-t* f   0.0000e+00e
1625  * cfzl-z* f   1.0000e+00e
1626  * cfzl-r* f   1.0000e+00e
1627  * cfzv-t* f   0.0000e+00e
1628  * cfzv-z* f   1.0000e+00e
1629  * cfzv-r* f   1.0000e+00e
1630  * lccfl *      f 0 e
1631  * vol   * r10 1.3206e+00r02 1.0870e+00e
1632  * fa-t  * f   0.0000e+00e
1633  * fa-z  * r08 8.5079e-01r02 0.0000e+00r02 1.0000e+00e
1634  * fa-r  * r09 1.0000e+00    0.0000e+00    1.0000e+00    0.0000e+00e
1635  * hd-t  *     3.1000e-01r10 4.6000e-01    3.2000e-01e
1636  * hd-z  *     3.1000e-01r10 4.6000e-01    3.2000e-01e
1637  * hd-r  *     3.1000e-01r10 4.6000e-01    3.2000e-01e
1638  * alpn  * f   2.5510e-01e
1639  * vvn-t * f   0.0000e+00e
1640  * vvn-z * f   0.0000e+00e
1641  * vvn-r * f   0.0000e+00e
1642  * vln-t * f   0.0000e+00e
1643  * vln-z * f   0.0000e+00e
1644  * vln-r * f   0.0000e+00e
1645  * tvn   * f   3.9300e+02e
1646  * tln   * f   3.9100e+02e
1647  * pn    * f   2.0180e+05e
1648  * pan   * f   0.0000e+00e
1649  * level   3 - top level in lower plenum.
```

```
1650  * cfzl-t* f   0.0000e+00e
1651  * cfzl-z* f   0.0100e+00e
1652  * cfzl-r* r07 1.0000e+00    1.0609e+00r04 1.0000e+00e
1653  * cfzv-t* f   0.0000e+00e
1654  * cfzv-z* f   0.0100e+00e
1655  * cfzv-r* r07 1.0000e+00    1.0609e+00r04 1.0000e+00e
1656  * lccfl *      f 0 e
1657  * vol   * r10 1.0757e+00r02 1.0870e+00e
1658  * fa-t  * f   0.0000e+00e
1659  * fa-z  * r08 5.0000e-01r04 1.0000e+00e
1660  * fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
1661  * hd-t  *     1.8662e-01r07 2.7650e-01r02 4.5589e-01    4.3656e-01    3.6853e-01
1662  e
1663  * hd-z  *     1.8662e-01r07 2.7650e-01r02 4.5589e-01    4.3656e-01    3.6853e-01
1664  e
1665  * hd-r  *     1.8662e-01r07 2.7650e-01r02 4.5589e-01    4.3656e-01    3.6853e-01
1666  e
1667  * alpn  * f   1.0000e+00e
1668  * vvn-t * f   0.0000e+00e
1669  * vvn-z * f   0.0000e+00e
1670  * vvn-r * f   0.0000e+00e
1671  * vln-t * f   0.0000e+00e
1672  * vln-z * f   0.0000e+00e
1673  * vln-r * f   0.0000e+00e
1674  * tvn   * f   3.9300e+02e
1675  * tln   * f   3.9300e+02e
1676  * pn    * f   2.0180e+05e
1677  * pan   * f   0.0000e+00e
1678  * level   4 - bottom level in core.
1679  * cfzl-t* f   0.0000e+00e
1680  * cfzl-z*     2.4106e-04r06 2.4708e-04    2.4106e-04    6.6027e-04r03 0.0000e+00
1681  e
1682  * cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 1.0000e+00e
1683  * cfzv-t* f   0.0000e+00e
1684  * cfzv-z*     2.4106e-04r06 2.4708e-04    2.4106e-04    6.6027e-04r03 0.0000e+00
1685  e
1686  * cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
1687  * lccfl *      f 0 e
1688  * vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
1689  * fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
1690  * fa-z  * r08 5.4008e-01r02 0.9139 r02 1.0 e
1691  * fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
1692  * hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1693  e
1694  * hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1695  e
1696  * hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1697  e
1698  * alpn  * f   1.0000e+00e
1699  * vvn-t * f   0.0000e+00e
1700  * vvn-z * f   0.0000e+00e
1701  * vvn-r * f   0.0000e+00e
1702  * vln-t * f   0.0000e+00e
1703  * vln-z * f   0.0000e+00e
1704  * vln-r * f   0.0000e+00e
1705  * tvn   * f   3.9300e+02e
1706  * tln   * f   3.9300e+02e
1707  * pn    * f   2.0180e+05e
1708  * pan   * f   0.0000e+00e
1709  * level   5 - second level in core.
1710  * cfzl-t* f   0.0000e+00e
1711  * cfzl-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
1712  e
1713  * cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
1714  * cfzv-t* f   0.0000e+00e
1715  * cfzv-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
1716  e
1717  * cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
1718  * lccfl *      f 0 e
1719  * vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
1720  * fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
1721  * fa-z  * r08 5.4008e-01r02 9.1390e-01r02 1.0000e+00e        *rfat*
1722  * fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
1723  * hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1724  e
1725  * hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1726  e
1727  * hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1728  e
1729  * alpn  * f   1.0000e+00e
1730  * vvn-t * f   0.0000e+00e
1731  * vvn-z * f   0.0000e+00e
1732  * vvn-r * f   0.0000e+00e
1733  * vln-t * f   0.0000e+00e
1734  * vln-z * f   0.0000e+00e
1735  * vln-r * f   0.0000e+00e
1736  * tvn   * f   3.9300e+02e
1737  * tln   * f   3.9300e+02e
1738  * pn    * f   2.0180e+05e
1739  * pan   * f   0.0000e+00e
1740  * level   6 - third level in core.
1741  * cfzl-t* f   0.0000e+00e
```

```
* cfzl-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
e
* cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* cfzv-t* f   0.0000e+00e
* cfzv-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
e
* cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* lccfl *      f 0 e
* vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
* fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
* fa-z  * r08 5.4008e-01r02 9.1390e-01r02 1.0000e+00e        *rfat*
* fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
* hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   3.9300e+02e
* tln   * f   3.9300e+02e
* pn    * f   2.0180e+05e
* pan   * f   0.0000e+00e
* level   7 - fourth level in core.
* cfzl-t* f   0.0000e+00e
* cfzl-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
e
* cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* cfzv-t* f   0.0000e+00e
* cfzv-z*     1.6448e-04r06 1.6859e-04    1.6448e-04    4.5060e-04r03 0.0000e+00
e
* cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* lccfl *      f 0 e
* vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
* fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
* fa-z  * r08 5.4008e-01r02 9.1390e-01r02 1.0000e+00e        *rfat*
* fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
* hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   3.9300e+02e
* tln   * f   3.9300e+02e
* pn    * f   2.0180e+05e
* pan   * f   0.0000e+00e
* level   8 - fifth level in core.
* cfzl-t* f   0.0000e+00e
* cfzl-z*     1.5378e-04r06 1.5762e-04    1.5378e-04    4.2124e-04r03 0.0000e+00
e
* cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* cfzv-t* f   0.0000e+00e
* cfzv-z*     1.5378e-04r06 1.5762e-04    1.5378e-04    4.2124e-04r03 0.0000e+00
e
* cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
* lccfl *      f 0 e
* vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
* fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
* fa-z  * r08 5.4008e-01r02 9.1390e-01r02 1.0000e+00e        *rfat*
* fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
* hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   3.9300e+02e
* tln   * f   3.9300e+02e
* pn    * f   2.0180e+05e
* pan   * f   0.0000e+00e
* level   9 - top level in core (has UCSP flow restriction).
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1834  * cfzl-t* f   0.0000e+00e
1835  * cfzl-z*     2.0266e-04r06 2.0772e-04    2.0266e-04    5.5507e-04r03 0.0000e+00
1836  e
1837  * cfzl-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
1838  * cfzv-t* f   0.0000e+00e
1839  * cfzv-z*     2.0266e-04r06 2.0772e-04    2.0266e-04    5.5507e-04r03 0.0000e+00
1840  e
1841  * cfzv-r*     1.6720e-01r06 1.7137e-01    1.6720e-01r04 0.0000e+00e
1842  * lccfl *      f 0 e
1843  * vol   * r08 8.3280e-01r02 9.1390e-01r02 1.0000e+00e
1844  * fa-t  * r08 2.5175e-01r02 0.0000e+00r02 1.0000e+00e
1845  * fa-z  * r08 5.2195e-01r02 9.1390e-01r02 1.0000e+00e        *rfat*
1846  * fa-r  * r07 2.5175e-01r03 0.0000e+00    1.0000e+00    0.0000e+00e
1847  * hd-t  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1848  e
1849  * hd-z  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1850  e
1851  * hd-r  *     1.2020e-02r06 1.2320e-02    1.2020e-02r02 1.4980e-02r02 0.0039e-01
1852  e
1853  * alpn  * f   1.0000e+00e
1854  * vvn-t * f   0.0000e+00e
1855  * vvn-z * f   0.0000e+00e
1856  * vvn-r * f   0.0000e+00e
1857  * vln-t * f   0.0000e+00e
1858  * vln-z * f   0.0000e+00e
1859  * vln-r * f   0.0000e+00e
1860  * tvn   * f   3.9300e+02e
1861  * tln   * f   3.9300e+02e
1862  * pn    * f   2.0180e+05e
1863  * pan   * f   0.0000e+00e
1864  * level  10 - first level of upper plenum.
1865  * cfzl-t* f   0.0000e+00e
1866  * cfzl-z* r08 6.1521e-04r04 0.0000e+00e
1867  * cfzl-r* r08 5.9200e-02r04 0.0000e+00e
1868  * cfzv-t* f   0.0000e+00e
1869  * cfzv-z* r08 6.1521e-04r04 0.0000e+00e
1870  * cfzv-r* r08 5.9200e-02r04 0.0000e+00e
1871  * lccfl * r8 1  f 0 e
1872  * vol   * r08 8.5430e-01r02 1.0783e+00    1.0870e+00    1.0000e+00e
1873  * fa-t  *     1.4915e-01    9.9565e-01    1.4915e-01    9.9565e-01    1.4915e-01
1874  * fa-t  *     1.4480e-01    1.4915e-01    9.9783e-01    0.0000e+00r03 1.0000e+00
1875  e
1876  * fa-z  * r08 3.7000e-01r02 0.0000e+00r02 1.0000e+00e
1877  * fa-r  * r07 1.1750e-01r03 0.0000e+00r02 1.0000e+00e
1878  * hd-t  *     3.9370e-02    6.0750e-02    5.8720e-02    6.0750e-02    5.8720e-02
1879  * hd-t  *     5.2870e-02    5.8720e-02    6.5100e-02r02 3.6294e-01r02 2.4408e-01
1880  e
1881  * hd-z  * r08 1.1840e-02r02 3.6294e-01r02 2.4408e-01e
1882  * hd-r  * r08 1.1840e-02r02 3.6294e-01r02 2.4408e-01e
1883  * alpn  * f   1.0000e+00e
1884  * vvn-t * f   0.0000e+00e
1885  * vvn-z * f   0.0000e+00e
1886  * vvn-r * f   0.0000e+00e
1887  * vln-t * f   0.0000e+00e
1888  * vln-z * f   0.0000e+00e
1889  * vln-r * f   0.0000e+00e
1890  * tvn   * f   3.9300e+02e
1891  * tln   * f   3.9300e+02e
1892  * pn    * f   2.0180e+05e
1893  * pan   * f   0.0000e+00e
1894  * level  11 - second level of upper plenum.
1895  * cfzl-t* f   0.0000e+00e
1896  * cfzl-z*     4.4386e-04    1.8400e-04    3.8870e-04    1.8400e-04    3.8870e-04
1897  * cfzl-z*     4.4386e-04    3.4976e-04    1.8400e-04r04 0.0000e+00e
1898  * cfzl-r*     2.9647e-02    4.1400e-02    3.6920e-01    4.1400e-02    6.2690e-01
1899  * cfzl-r*     2.9647e-02    8.6219e-03    4.1400e-02r02 0.0000e+00    1.7378e-01
1900  * cfzl-r*     0.0000e+00e
1901  * cfzv-t* f   0.0000e+00e
1902  * cfzv-z*     4.4386e-04    1.8400e-04    3.8870e-04    1.8400e-04  3.8870e-04
1903  * cfzv-z*     4.4386e-04    3.4976e-04    1.8400e-04r04 0.0000e+00e
1904  * cfzv-r*     2.9647e-02    4.1400e-02    3.6920e-01    4.1400e-02    6.2690e-01
1905  * cfzv-r*     2.9647e-02    8.6219e-03    4.1400e-02r02 0.0000e+00    1.7378e-01
1906  * cfzv-r*     0.0000e+00e
1907  * lccfl *      f 0 e
1908  * vol   *     8.9000e-01    9.8110e-01    3.9000e-01    9.8110e-01    3.9000e-01
1909  * vol   *     8.8580e-01    8.0690e-01    9.8110e-01r02 1.0000e+00    1.0870e+00
1910  * vol   *     1.0000e+00e
1911  * fa-t  * f   0.0000e+00e
1912  * fa-z  *     4.2627e-01    0.9811e+00    0.0000e+00    0.9811e+00    0.0000e+00
1913  * fa-z  * r02 4.2627e-01r01 0.9811e+00r04 1.0000e+00e        *rfat*
1914  * fa-r  *     6.8370e-01    8.5550e-01    1.9160e-01    8.5550e-01    1.9160e-01
1915  * fa-r  *     6.8370e-01    3.1520e-01    8.5550e-01r04 1.0000e+00e
1916  * hd-t  * f   0.0000e+00e
1917  * hd-z  *     1.0042e-01    4.6000e-01    0.0000e+00    4.6000e-01    0.0000e+00
1918  * hd-z  * r02 1.0042e-01r02 4.6000e-01    2.1400e-01r02 2.4408e-01e
1919  * hd-r  *     2.8022e-01    4.6000e-01    1.8201e-01    4.6000e-01    1.8201e+01
1920  * hd-r  *     2.8022e-01    8.2270e-02r03 4.6000e-01r02 2.4408e-01e
1921  * alpn  * f   1.0000e+00e
1922  * vvn-t * f   0.0000e+00e
1923  * vvn-z * f   0.0000e+00e
1924  * vvn-r * f   0.0000e+00e
1925  * vln-t * f   0.0000e+00e
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1926  * vln-z * f   0.0000e+00
1927  * vln-r * f   0.0000e+00
1928  * tvn   * f   3.9300e+02e
1929  * tln   * f   3.9300e+02e
1930  * pn    * f   2.0180e+05e
1931  * pan   * f   0.0000e+00
1932  * level  12 - third level of upper plenum.
1933  * cfzl-t* f   0.0000e+00
1934  * cfzl-z* f   0.0100e+00
1935  * cfzl-r*     7.9664e-03    2.0055e-02    7.9664e-03    2.0055e-02r03 7.9664e-03
1936  * cfzl-r*     2.0055e-02r02 0.0000e+00    1.7378e-01    0.0000e+00e
1937  * cfzv-t* f   0.0000e+00
1938  * cfzv-z* f   0.0000e+00
1939  * cfzv-r*     7.9664e-03    2.0055e-02    7.9664e-03    2.0055e-02r03 7.9664e-03
1940  * cfzv-r*     2.0055e-02r02 0.0000e+00    1.7378e-01    0.0000e+00e
1941  * lccfl *      f 0 e
1942  * vol   *     4.2616e-01    1.0000e+00    4.2616e-01    1.0000e+00r03 4.2616e-01
1943  * vol   * r03 1.0000e+00    1.3669e+00    1.0000e+00e
1944  * fa-t  * f   0.0000e+00
1945  * fa-z  *     4.2629e-01    1.0000e+00    4.2629e-01    1.0000e+00r03 4.2629e-01
1946  * fa-z  * r03 1.0000e+00r02 2.3478e-01e
1947  * fa-r  *     3.9561e-01    1.0000e+00    3.9561e-01    1.0000e+00r03 3.9561e-01
1948  * fa-r  * r05 1.0000e+00e
1949  * hd-t  * f   0.0000e+00
1950  * hd-z  *     1.0042e-01    4.6000e-01    1.3498e-01    4.6000e-01r03 1.3498e-01
1951  * hd-z  * r02 4.6000e-01    2.1400e-01r02 5.1955e-02e
1952  * hd-r  *     1.8322e-01    4.6124e-01    1.8322e-01    4.6124e-01r03 1.8322e-01
1953  * hd-r  * r03 4.6124e-01r02 2.4408e-01e
1954  * alpn  * f   1.0000e+00e
1955  * vvn-t * f   0.0000e+00e
1956  * vvn-z * f   0.0000e+00e
1957  * vvn-r * f   0.0000e+00e
1958  * vln-t * f   0.0000e+00e
1959  * vln-z * f   0.0000e+00e
1960  * vln-r * f   0.0000e+00e
1961  * tvn   * f   3.9300e+02e
1962  * tln   * f   3.9300e+02e
1963  * pn    * f   2.0180e+05e
1964  * pan   * f   0.0000e+00
1965  * level  13 - fourth level of upper plenum.
1966  * cfzl-t* f   0.0000e+00
1967  * cfzl-z* f   0.0100e+00
1968  * cfzl-r*     7.9138e-03    2.0001e-02    7.9138e-03    2.0001e-02r03 7.9138e-03
1969  * cfzl-r*     2.0001e-02r02 0.0000e+00    3.0160e-02    0.0000e+00e
1970  * cfzv-t* f   0.0000e+00
1971  * cfzv-z* f   0.0000e+00
1972  * cfzv-r*     7.9138e-03    2.0001e-02    7.9138e-03    2.0001e-02r03 7.9138e-03
1973  * cfzv-r*     2.0001e-02r02 0.0000e+00    3.0160e-02    0.0000e+00e
1974  * lccfl *      f 0 e
1975  * vol   *     4.2616e-01    1.0000e+00    4.2616e-01    1.0000e+00r03 4.2616e-01
1976  * vol   * r03 1.0000e+00r02 1.9092e-01e
1977  * fa-t  * f   0.0000e+00
1978  * fa-z  *     4.2629e-01    1.0000e+00    4.2629e-01    1.0000e+00r03 4.2629e-01
1979  * fa-z  * r03 1.0000e+00r02 2.3478e-01e
1980  * fa-r  *     3.9561e-01    1.0000e+00    3.9561e-01    1.0000e+00r03 3.9561e-01
1981  * fa-r  * r03 1.0000e+00r02 1.9092e-01e
1982  * hd-t  * f   0.0000e+00
1983  * hd-z  *     1.0042e-01    4.6000e-01    1.3498e-01    4.6000e-01r03 1.3498e-01
1984  * hd-z  * r02 4.6000e-01    2.1400e-01r02 5.1955e-02e
1985  * hd-r  *     1.8201e-01    4.6000e-01    1.8201e-01    4.6000e-01r03 1.8201e-01
1986  * hd-r  * r03 4.6000e-01r02 4.2359e-02e
1987  * alpn  * f   1.0000e+00e
1988  * vvn-t * f   0.0000e+00e
1989  * vvn-z * f   0.0000e+00e
1990  * vvn-r * f   0.0000e+00e
1991  * vln-t * f   0.0000e+00e
1992  * vln-z * f   0.0000e+00e
1993  * vln-r * f   0.0000e+00e
1994  * tvn   * f   3.9300e+02e
1995  * tln   * f   3.9300e+02e
1996  * pn    * f   2.0180e+05e
1997  * pan   * f   0.0000e+00
1998  * level  14 - fifth level of upper plenum.
1999  * cfzl-t* f   0.0000e+00
2000  * cfzl-z* f   0.0000e+00
2001  * cfzl-r*     6.2650e-03    1.5834e-02    6.2650e-03    1.5834e-02r03 6.2650e-03
2002  * cfzl-r*     1.5834e-02r04 0.0100e+00e
2003  * cfzv-t* f   0.0000e+00
2004  * cfzv-z* f   0.0000e+00
2005  * cfzv-r*     6.2650e-04    1.5834e-04    6.2650e-04    1.5834e-04r03 6.2650e-03
2006  * cfzv-r*     1.5834e-04r04 0.0000e+00e
2007  * lccfl *      f 0 e
2008  * vol   *     4.2616e-01    1.0000e+00    4.2616e-01    1.0000e+00r03 4.2616e-01
2009  * vol   * r03 1.0000e+00    1.3669e+00    1.0000e+00e
2010  * fa-t  * f   0.0000e+00
2011  * fa-z  * f   0.0000e+00e
2012  * fa-r  *     3.9561e-01    1.0000e+00    3.9561e-01    1.0000e+00r03 3.9561e-01
2013  * fa-r  * r05 1.0000e+00e
2014  * hd-t  * f   0.0000e+00e
2015  * hd-z  *     1.0042e-01    4.6000e-01    1.3498e-01    4.6000e-01r03 1.3498e-01
2016  * hd-z  * r02 4.6000e-01    2.1400e-01r02 2.4408e-01e
2017  * hd-r  *     1.4409e-01    3.6417e-01    1.4409e-01    3.6417e-01r03 1.4409e-01
```

```
* hd-r  * r03 3.6417e-01r02 2.4408e-01e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   3.9300e+02e
* tln   * f   3.9300e+02e
* pn    * f   2.0180e+05e
* pan   * f   0.0000e+00e
* level  15 - upper head.
* cfzl-t* f   0.0000e+00e
* cfzl-z* f   0.0000e+00e
* cfzl-r* f   0.0000e+00e
* cfzv-t* f   0.0000e+00e
* cfzv-z* f   0.0000e+00e
* cfzv-r* f   0.0000e+00e
* lccfl *     f 0 e
* vol   * f   1.8731e+00e
* fa-t  * f   1.0000e+00e
* fa-z  * f   1.0000e+00e
* fa-r  * f   1.0000e+00e
* hd-t  * r08 2.3000e-01r02 2.9970e-01r02 2.4408e-01e
* hd-z  * r08 2.3000e-01r02 2.9970e-01r02 2.4408e-01e
* hd-r  * r08 2.3000e-01r02 2.9970e-01r02 2.4408e-01e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   3.9300e+02e
* tln   * f   3.9300e+02e
* pn    * f   2.0180e+05e
* pan   * f   0.0000e+00e
*****************************************************************
* Rods in pressure vessel
*****************************************************************
*******   type          num           id        ctitle
rod           991      991 $991$ fuel rod component
*         ncrx          ncrz         ittc
                8             6
*       nopowr         nridr        modez        liqlev        iaxcnd
                0             0            0             1             1
*        idbci         idbco
                0             2
*        nrods         nodes          irftr          nzmax  irftr2
                8             7         1001            250   1002
*     dtxht(1)      dtxht(2)         dznht         hgapo,         shelv
    5.0000e+00    2.0000e+01    5.0000e-03    5.0000e+04    0.0000e+00
*       irpwty         ndgx         ndhx         nrts         nhist
                6             0            0            10            0
*       irpwtr        irpwsv       nrpwtb       nrpwsv       nrpwrf
                0           101           29            0            0
*       izpwtr        izpwsv       nzpwtb       nzpwsv       nzpwrf
                0           101            1            0            0
*        nmwrx         nfci         nfcil
                0             0            0
*        nzpwz         nzpwi        nfbpwt
               18            -1            0
*        react         tneut        rpwoff        rrpwmx        rpwscl
    0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+30    1.0000e+00
*       rpowri         zpwin        zpwoff        rzpwmx
    1.0000e-20    0.0000e+00    0.0000e+00    1.0000e+30
*       extsou         pldr         pdrat        fucrac
    0.0000e+00    0.0000e+00    1.3360e+00    0.0000e+00
*       nhcomo
f             1e
*       nhcelo
               -4s
                4s
                5s
                6s
                7s
                8s
                9s
               10e
*               z
    1.7190e+00s
    1.9595e+00s
    2.6245e+00s
    3.2895e+00s
    3.9545e+00s
    4.6195e+00s
    5.3320e+00e
*         grav
f         1.0e
* rdx   * f   2.3600e+02e
* radrd *     0.0000e+00    2.6000e-03    3.1000e-03    4.1500e-03    4.3500e-03
```

```
2110  * radrd *     4.8500e-03    5.3500e-03e
2111  * matrd *           59           55r02         59r02         60e
2112  * nfax  * f          3e
2113  * rftn  * f   3.9230e+02e
2114  * rftn  * f   3.9230e+02e
2115  * rftn  * f   3.9230e+02e
2116  * rftn  * f   3.9230e+02e
2117  * rftn  * f   3.9230e+02e
2118  * rftn  * f   3.9230e+02e
2119  * rftn  * f   3.9230e+02e
2120  * rftn  * f   3.9230e+02e
2121  * rdpwr *     0.0000e+00r02 1.0000e+00r04 0.0000e+00e
2122  * cpowr *     1.3600e+00    1.2000e+00    1.1000e+00    1.0000e+00    9.1000e-01
2123  * cpowr *     8.6000e-01    8.1000e-01    7.6000e-01e
2124  * 17-step axial power profile elevations
2125  * zpwzt *  1.719  1.924  2.129  2.334  2.554 s
2126  * zpwzt *  2.774  2.994  3.214  3.434  3.664 s
2127  * zpwzt *  3.884  4.104  4.324  4.544  4.764 s
2128  * zpwzt *  4.969  5.174  5.332 e
2129  * 17-step axial power profile
2130  * first value is table independent value
2131  * zpwtb *  0.0 s
2132  * zpwtb *  0.379  0.5786  0.771  0.95  1.1 s
2133  * zpwtb *  1.229  1.321  1.3786  1.4  1.3786 s
2134  * zpwtb *  1.321  1.229  1.1  0.95  0.771 s
2135  * zpwtb *  0.5786  0.379  0.0 e
2136  * rpwtb * r02 0.0000e+00    1.0000e+00    1.1975e+06    2.0000e+00    5.1116e+06
2137  * rpwtb *     3.0000e+00    6.4028e+06    4.0000e+00    6.5519e+06    8.0000e+00
2138  * rpwtb *     7.0190e+06    1.5000e+01    7.1056e+06    1.2200e+02    7.1056e+06
2139  * rpwtb *     1.4000e+02    6.6896e+06    1.5400e+02    6.4547e+06    1.5500e+02
2140  * rpwtb *     6.4667e+06    1.5600e+02    6.4483e+06    1.7500e+02    6.1814e+06
2141  * rpwtb *     2.0000e+02    5.9493e+06    2.2600e+02    5.7462e+06    2.2800e+02
2142  * rpwtb *     5.7427e+06    2.4000e+02    5.7150e+06    2.4100e+02    5.7143e+06
2143  * rpwtb *     2.6300e+02    5.5468e+06    2.6400e+02    5.4516e+06    2.6500e+02
2144  * rpwtb *     5.5546e+06    2.6900e+02    5.4928e+06    2.7000e+02    5.4879e+06
2145  * rpwtb *     2.7500e+02    5.4488e+06    3.2500e+02    5.1336e+06    4.0000e+02
2146  * rpwtb *     4.7808e+06    5.0000e+02    4.4550e+06    6.0000e+02    4.2087e+06
2147  * rpwtb *     1.0000e+03    3.2234e+06e
2148  * fpuo2 * f   0.0000e+00e
2149  * ftd   * f   9.0000e-01e
2150  * gmix  * f   0.0000e+00e
2151  * gmles * f   0.0000e+00e
2152  * pgapt * f   0.0000e+00e
2153  * plvol * f   0.0000e+00e
2154  * pslen * f   0.0000e+00e
2155  * clenn * f   0.0000e+00e
2156  * burn  * f   0.0000e+00e
2157  * burn  * f   0.0000e+00e
2158  * burn  * f   0.0000e+00e
2159  * burn  * f   0.0000e+00e
2160  * burn  * f   0.0000e+00e
2161  * burn  * f   0.0000e+00e
2162  * burn  * f   0.0000e+00e
2163  * burn  * f   0.0000e+00e
2164  *
2165  ****************************************************************
2166  * Slab for PV Level 1, cells 1 - 11
2167  ****************************************************************
2168  *     type          num          id     ctitle
2169  slab      989      989  $989$ slab level 1, cells 1-11
2170  *         ncrx          ncrz
2171                11             1
2172  *       nopowr         nridr         modez        liqlev        iaxcnd
2173                1             1             1             0             0
2174  *        idbci          idco
2175                0             2
2176  *        width         ipatch
2177      8.24003          0
2178  *        nrods         nodes         irftr         nzmax   irftr2
2179                11             1             0             5     0
2180  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
2181      3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   0.0000e+00
2182  * nhcomo *   f           1e
2183  * nhcelo *              -1             1             2e
2184  * dz *    f   5.0200e-01e
2185  * grav *  f   1.0000e+00e
2186  * idrod *  1     2       3       4       5s
2187               6       7       8 s
2188               9       10       11  e
2189  * rdx *  0.137075  r7 0.081469  0.062615  0.112172  0.117855 e
2190  * radrd *  f  1.0500e-01e
2191  * matrd *   f          6e
2192  * nfax *  f          1e
2193  * rftn *  f    3.910e+02e
2194  * rftn *  f    3.910e+02e
2195  * rftn *  f    3.910e+02e
2196  * rftn *  f    3.910e+02e
2197  * rftn *  f    3.910e+02e
2198  * rftn *  f    3.910e+02e
2199  * rftn *  f    3.910e+02e
2200  * rftn *  f    3.910e+02e
2201  * rftn *  f    3.910e+02e
```

```
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
*
*****************************************************************
* Slab for PV Level 1, cell 12
*****************************************************************
*     type           num           id     ctitle
slab      985      985  $985$ slab level 1, cell 12
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width          ipatch
     1.0313e+00          0
*        nrods         nodes         irftr         nzmax   irftr2
              1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   0.0000e+00
* nhcomo *   f            1e
* nhcelo *                -1             1             2e
* dz *    f   5.0200e-01e
* grav *  f   1.0000e+00e
* idrod *               12e
* rdx *   f   1.0000e+00e
* radrd *  f  1.4868e-01e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.910e+02e
*
*****************************************************************
* Slab for PV Level 2, cell 1
*****************************************************************
*     type           num           id     ctitle
slab      984      984  $984$ slab level 2, cell 1
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width          ipatch
     3.2331e+00          0
*        nrods         nodes         irftr         nzmax   irftr2
              1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.0200e-01
* nhcomo *   f            1e
* nhcelo *               -2             2             3e
* dz *    f   9.3100e-01e
* grav *  f   1.0000e+00e
* idrod *              1e
* rdx *   f   1.0000e+00e
* radrd *  f  1.0345e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.910e+02e
*****************************************************************
* Slab for PV Level 2, cells 2 - 8
*****************************************************************
*     type           num           id     ctitle
slab      983      983  $983$ slab level 2, cells 2-8
*         ncrx          ncrz
              7             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width          ipatch
     2.9001e+00          0
*        nrods         nodes         irftr         nzmax   irftr2
              7             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.0200e-01
* nhcomo *   f            1e
* nhcelo *               -2             2             3e
* dz *    f   9.3100e-01e
* grav *  f   1.0000e+00e
* idrod *              2             3             4             5s
                       6             7             8e
* rdx *   f   1.0000e+00e
* radrd *  f  8.3740e-03e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
* rftn *  f    3.910e+02e
```

```
2294  ****************************************************************
2295  * Slab for PV Level 2, cells 9 - 12
2296  ****************************************************************
2297  *     type           num            id     ctitle
2298  slab      982       982  $982$ slab level 2, cells 9-12
2299  *          ncrx           ncrz
2300                4              1
2301  *        nopowr          nridr          modez         liqlev         iaxcnd
2302                1              1              1              0              0
2303  *         idbci          idco
2304                0              2
2305  *         width          ipatch
2306      1.19012           0
2307  *         nrods          nodes          irftr          nzmax   irftr2
2308                4              1              0              5    0
2309  *     dtxht(1)       dtxht(2)         dznht          hgapo     shelv
2310     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   5.0200e-01
2311  * nhcomo *    f             1e
2312  * nhcelo *                  -2              2             3e
2313  * dz *     f   9.3100e-01e
2314  * grav *   f   1.0000e+00e
2315  * idrod *     9   10   11   12 e
2316  * rdx *  0.14720  0.26363  0.25090  0.33827 e
2317  * radrd *  f  1.0250e-01e
2318  * matrd *    f           6e
2319  * nfax *   f             1e
2320  * rftn *   f    3.910e+02e
2321  * rftn *   f    3.910e+02e
2322  * rftn *   f    3.910e+02e
2323  * rftn *   f    3.910e+02e
2324  *
2325  ****************************************************************
2326  * Slab for PV Level 3, cells 1 - 8
2327  ****************************************************************
2328  *     type           num            id     ctitle
2329  slab      978       978  $978$ slab level 3, cells 1-8
2330  *          ncrx           ncrz
2331                8              1
2332  *        nopowr          nridr          modez         liqlev         iaxcnd
2333                1              1              1              0              0
2334  *         idbci          idco
2335                0              2
2336  *         width          ipatch
2337      1.0105e+01           0
2338  *         nrods          nodes          irftr          nzmax   irftr2
2339                8              1              0              5    0
2340  *     dtxht(1)       dtxht(2)         dznht          hgapo     shelv
2341     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   1.4330e+00
2342  * nhcomo *    f             1e
2343  * nhcelo *                  -3              3             4e
2344  * dz *     f   2.8600e-01e
2345  * grav *   f   1.0000e+00e
2346  * idrod *                    1              2              3              4s
2347                               5              6              7              8e
2348  * rdx *    f   1.0000e+00e
2349  * radrd *  f  2.2968e-03e
2350  * matrd *    f           6e
2351  * nfax *   f             1e
2352  * rftn *   f    3.930e+02e
2353  * rftn *   f    3.930e+02e
2354  * rftn *   f    3.930e+02e
2355  * rftn *   f    3.930e+02e
2356  * rftn *   f    3.930e+02e
2357  * rftn *   f    3.930e+02e
2358  * rftn *   f    3.930e+02e
2359  * rftn *   f    3.930e+02e
2360  ****************************************************************
2361  * Slab for PV Level 3, cells 9 and 10
2362  ****************************************************************
2363  *     type           num            id     ctitle
2364  slab      977       977  $977$ slab level 3, cells 9-10
2365  *          ncrx           ncrz
2366                2              1
2367  *        nopowr          nridr          modez         liqlev         iaxcnd
2368                1              1              1              0              0
2369  *         idbci          idco
2370                0              2
2371  *         width          ipatch
2372      1.26832           0
2373  *         nrods          nodes          irftr          nzmax   irftr2
2374                2              1              0              5    0
2375  *     dtxht(1)       dtxht(2)         dznht          hgapo     shelv
2376     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   1.4330e+00
2377  * nhcomo *    f             1e
2378  * nhcelo *                  -3              3             4e
2379  * dz *     f   2.8600e-01e
2380  * grav *   f   1.0000e+00e
2381  * idrod *     9   10 e
2382  * rdx *  0.35830  0.64170 e
2383  * radrd *  f  7.9786e-02e
2384  * matrd *    f           6e
2385  * nfax *   f             1e
```

```
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 3, cell 11
*****************************************************************
*     type          num          id     ctitle
slab      975      975  $975$ slab level 3, cell 11
*         ncrx          ncrz
               1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
*        idbci          idco
               0             2
*        width          ipatch
    7.5524e-01             0
*         nrods         nodes         irftr         nzmax   irftr2
               1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.4330e+00
* nhcomo *   f            1e
* nhcelo *                -3             3             4e
* dz *    f   2.8600e-01e
* grav *  f   1.0000e+00e
* idrod *             11e
* rdx *   f   1.0000e+00e
* radrd *  f  7.1480e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 3, cell 12
*****************************************************************
*     type          num          id     ctitle
slab      974      974  $974$ slab level 3, cell 12
*         ncrx          ncrz
               1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
*        idbci          idco
               0             2
*        width          ipatch
    7.5524e-01             0
*         nrods         nodes         irftr         nzmax   irftr2
               1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.4330e+00
* nhcomo *   f            1e
* nhcelo *                -3             3             4e
* dz *    f   2.8600e-01e
* grav *  f   1.0000e+00e
* idrod *             12e
* rdx *   f   1.0000e+00e
* radrd *  f  1.0000e-01e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Levels 4 - 9, cells 1 - 8
*****************************************************************
*     type          num          id     ctitle
slab      973      973  $973$ slab level 4-9, cells 1-8
*         ncrx          ncrz
               8             6
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
*        idbci          idco
               0             2
*        width          ipatch
    8.6861e-01             0
*         nrods         nodes         irftr         nzmax   irftr2
               8             1             0            13     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.7190e+00
* nhcomo *   f            1e
* nhcelo *     -4     4     5     6     7 s
* nhcelo *      8     9     10 e
* dz *   0.2405  r4 0.6650  0.7125 e
* grav *  f   1.0000e+00e
* idrod *              1             2             3             4s
                       5             6             7             8e
* rdx *   f   1.0000e+00e
* radrd *  f  2.0500e-03e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
```

```
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 4, cells 9 and 10
*****************************************************************
*     type           num            id     ctitle
slab      972      972  $972$ slab level 4, cells 9-10
*         ncrx           ncrz
              2              1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1              1             1             0             0
*        idbci          idco
              0              2
*        width          ipatch
    1.40167           0
*        nrods         nodes         irftr         nzmax   irftr2
              2              1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.7190e+00
* nhcomo *   f             1e
* nhcelo *                -4             4             5e
* dz *    f   2.4050e-01e
* grav *  f   1.0000e+00e
* idrod *    9    10 e
* rdx *   f   1.0000e+00e
* radrd *  f  6.6764e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 4, cell 11
*****************************************************************
*     type           num            id     ctitle
slab      970      970  $970$ slab level 4, cell 11
*         ncrx           ncrz
              1              1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1              1             1             0             0
*        idbci          idco
              0              2
*        width          ipatch
    7.4345e-01           0
*        nrods         nodes         irftr         nzmax   irftr2
              1              1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.7190e+00
* nhcomo *   f             1e
* nhcelo *                -4             4             5e
* dz *    f   2.4050e-01e
* grav *  f   1.0000e+00e
* idrod *              11e
* rdx *   f   1.0000e+00e
* radrd *  f  6.8990e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*****************************************************************
* Slab for PV Level 4, cell 12
*****************************************************************
*     type           num            id     ctitle
slab      969      969  $969$ slab level 4, cell 12
*         ncrx           ncrz
              1              1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1              1             1             0             0
*        idbci          idco
              0              2
*        width          ipatch
    7.4345e-01           0
*        nrods         nodes         irftr         nzmax   irftr2
              1              1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.7190e+00
* nhcomo *   f             1e
* nhcelo *                -4             4             5e
* dz *    f   2.4050e-01e
* grav *  f   1.0000e+00e
* idrod *              12e
* rdx *   f   1.0000e+00e
* radrd *  f  9.6548e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Levels 5-8, cells 9 and 10
*****************************************************************
*     type           num            id     ctitle
```

```
slab      967      967  $967$ slab levels 5-8, cells 9-10
*         ncrx           ncrz
             2              4
*       nopowr         nridr         modez        liqlev        iaxcnd
             1              1             1             0             0
*        idbci          idco
             0              2
*        width          ipatch
   1.24692          0
*        nrods         nodes         irftr         nzmax   irftr2
             2              1             0             9     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.9595e+00
* nhcomo *   f           1e
* nhcelo *       -5      5      6     7      8 s
* nhcelo *        9 e
* dz *    f   6.6500e-01e
* grav *  f   1.0000e+00e
* idrod *    9     10 e
* rdx *   f   1.0000e+00e
* radrd *  f  6.7240e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Levels 5-8, cell 11
*****************************************************************
*     type           num           id     ctitle
slab      965      965  $965$ slab levels 5-8, cell 11
*         ncrx           ncrz
             1              4
*       nopowr         nridr         modez        liqlev        iaxcnd
             1              1             1             0             0
*        idbci          idco
             0              2
*        width          ipatch
   7.1015e-01          0
*        nrods         nodes         irftr         nzmax   irftr2
             1              1             0            13     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.9595e+00
* nhcomo *   f           1e
* nhcelo *       -5      5      6     7      8 s
* nhcelo *        9 e
* dz *    f   6.6500e-01e
* grav *  f   1.0000e+00e
* idrod *            11e
* rdx *   f   1.0000e+00e
* radrd *  f  7.1306e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Levels 5-8, cell 12
*****************************************************************
*     type           num           id     ctitle
slab      964      964  $964$ slab levels 5-8, cell 12
*         ncrx           ncrz
             1              4
*       nopowr         nridr         modez        liqlev        iaxcnd
             1              1             1             0             0
*        idbci          idco
             0              2
*        width          ipatch
   7.1015e-01          0
*        nrods         nodes         irftr         nzmax   irftr2
             1              1             0            15     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   1.9595e+00
* nhcomo *   f           1e
* nhcelo *       -5      5      6     7      8 s
* nhcelo *        9 e
* dz *    f   6.6500e-01e
* grav *  f   1.0000e+00e
* idrod *           12e
* rdx *   f   1.0000e+00e
* radrd *  f  9.9760e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 9, cells 9 and 10
*****************************************************************
*     type           num           id     ctitle
slab      947      947  $947$ slab level 9, cells 9-10
*         ncrx           ncrz
             2              1
*       nopowr         nridr         modez        liqlev        iaxcnd
```

```
2662              1              1              1              0              0
2663  *         idbci           idco
2664                0              2
2665  *         width          ipatch
2666      1.45165          0
2667  *          nrods          nodes          irftr          nzmax   irftr2
2668                2              1              0              5     0
2669  *      dtxht(1)       dtxht(2)          dznht          hgapo     shelv
2670     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   4.6195e+00
2671  * nhcomo *    f             1e
2672  * nhcelo *                  -9              9             10e
2673  * dz *     f   7.1250e-01e
2674  * grav *   f   1.0000e+00e
2675  * idrod *     9     10 e
2676  * rdx *   0.35831  0.64169 e
2677  * radrd *   f  6.7970e-02e
2678  * matrd *    f           6e
2679  * nfax *   f             1e
2680  * rftn *   f    3.930e+02e
2681  * rftn *   f    3.930e+02e
2682  *
2683  ****************************************************************
2684  * Slab for PV Level 9, cell 11
2685  ****************************************************************
2686  *     type           num            id     ctitle
2687  slab       945       945  $945$ slab level 9, cell 11
2688  *          ncrx           ncrz
2689                1              1
2690  *        nopowr          nridr          modez         liqlev         iaxcnd
2691                1              1              1              0              0
2692  *         idbci           idco
2693                0              2
2694  *         width          ipatch
2695      7.5663e-01          0
2696  *          nrods          nodes          irftr          nzmax   irftr2
2697                1              1              0              5     0
2698  *      dtxht(1)       dtxht(2)          dznht          hgapo     shelv
2699     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   4.6195e+00
2700  * nhcomo *    f             1e
2701  * nhcelo *                  -9              9             10e
2702  * dz *     f   7.1250e-01e
2703  * grav *   f   1.0000e+00e
2704  * idrod *              11e
2705  * rdx *    f   1.0000e+00e
2706  * radrd *   f  7.1472e-02e
2707  * matrd *    f           6e
2708  * nfax *   f             1e
2709  * rftn *   f    3.930e+02e
2710  *
2711  ****************************************************************
2712  * Slab for PV Level 9, cell 12
2713  ****************************************************************
2714  *     type           num            id     ctitle
2715  slab       944       944  $944$ slab level 9, cell 12
2716  *          ncrx           ncrz
2717                1              1
2718  *        nopowr          nridr          modez         liqlev         iaxcnd
2719                1              1              1              0              0
2720  *         idbci           idco
2721                0              2
2722  *         width          ipatch
2723      7.5663e-01          0
2724  *          nrods          nodes          irftr          nzmax   irftr2
2725                1              1              0              5     0
2726  *      dtxht(1)       dtxht(2)          dznht          hgapo     shelv
2727     3.0000e+00     1.0000e+01     0.0000e+00     0.0000e+00   4.6195e+00
2728  * nhcomo *    f             1e
2729  * nhcelo *                  -9              9             10e
2730  * dz *     f   7.1250e-01e
2731  * grav *   f   1.0000e+00e
2732  * idrod *             12e
2733  * rdx *    f   1.0000e+00e
2734  * radrd *   f  9.9996e-02e
2735  * matrd *    f           6e
2736  * nfax *   f             1e
2737  * rftn *   f    3.930e+02e
2738  *
2739  ****************************************************************
2740  * Slab for PV Level 10, cells 1 & 3
2741  ****************************************************************
2742  *     type           num            id     ctitle
2743  slab       943       943  $943$ slab level 10, cells 1 and 3
2744  *          ncrx           ncrz
2745                2              1
2746  *        nopowr          nridr          modez         liqlev         iaxcnd
2747                1              1              1              0              0
2748  *         idbci           idco
2749                0              2
2750  *         width          ipatch
2751      7.6418e-01          0
2752  *          nrods          nodes          irftr          nzmax   irftr2
2753                2              1              0              5     0
```

```
*     dtxht(1)      dtxht(2)        dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f           1e
* nhcelo *              -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *              1             3e
* rdx *   f   1.0000e+00e
* radrd *  f  1.0237e-02e
* matrd *   f          6e
* nfax *  f           1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 10, cell 2
*****************************************************************
*     type          num          id     ctitle
slab      942      942  $942$ slab level 10, cell 2
*         ncrx          ncrz
             1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*        idbci          idco
             0             2
*        width         ipatch
    4.7813e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
             1             1             0             5     0
*     dtxht(1)      dtxht(2)        dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f           1e
* nhcelo *              -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *              2e
* rdx *   f   1.0000e+00e
* radrd *  f  1.4115e-02e
* matrd *   f          6e
* nfax *  f           1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 10, cells 4, 5, & 8
*****************************************************************
*     type          num          id     ctitle
slab      941      941  $941$ slab level 10, cells 4, 5, and 8
*         ncrx          ncrz
             3             1
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*        idbci          idco
             0             2
*        width         ipatch
    4.8173e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
             3             1             0             5     0
*     dtxht(1)      dtxht(2)        dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f           1e
* nhcelo *              -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *              4             5             8e
* rdx *   f   1.0000e+00e
* radrd *  f  1.4459e-02e
* matrd *   f          6e
* nfax *  f           1e
* rftn *  f    3.930e+02e
*
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*****************************************************************
* Slab for PV Level 10, cell 6
*****************************************************************
*     type          num          id     ctitle
slab      940      940  $940$ slab level 10, cell 6
*         ncrx          ncrz
             1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*        idbci          idco
             0             2
*        width         ipatch
    4.7813e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
             1             1             0             5     0
*     dtxht(1)      dtxht(2)        dznht         hgapo     shelv
   3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f           1e
* nhcelo *              -10            10            11e
* dz *    f   4.1600e-01e
```

```
* grav *  f   1.0000e+00e
* idrod *                6e
* rdx *   f   1.0000e+00e
* radrd *  f  1.4115e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 10, cell 7
*****************************************************************
*     type           num          id     ctitle
slab      939      939  $939$ slab level 10, cell 7
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
     6.0337e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
              1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f            1e
* nhcelo *               -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *               7e
* rdx *   f   1.0000e+00e
* radrd *  f  1.2600e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 10, cell 9
*****************************************************************
*     type           num          id     ctitle
slab      938      938  $938$ slab level 10, cell 9
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
     3.2332e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
              1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f            1e
* nhcelo *               -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *               9e
* rdx *   f   1.0000e+00e
* radrd *  f  5.9994e-03e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 10, cell 10
*****************************************************************
*     type           num          id     ctitle
slab      937      937  $937$ slab level 10, cell 10
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
     6.0377e-01             0
*        nrods         nodes         irftr         nzmax   irftr2
              1             1             0             5     0
*     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.3320e+00
* nhcomo *   f            1e
* nhcelo *               -10            10            11e
* dz *    f   4.1600e-01e
* grav *  f   1.0000e+00e
* idrod *               10e
* rdx *   f   1.0000e+00e
* radrd *  f  5.9994e-03e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
```

```
2938  ****************************************************************
2939  * Slab for PV Level 11, cells 1 & 6
2940  ****************************************************************
2941  *     type          num          id     ctitle
2942  slab      936      936  $936$ slab level 11, cells 1 and 6
2943  *         ncrx          ncrz
2944                2             1
2945  *       nopowr         nridr         modez        liqlev        iaxcnd
2946                1             1             1             0             0
2947  *        idbci          idco
2948                0             2
2949  *        width         ipatch
2950      1.7029e-01             0
2951  *        nrods         nodes         irftr         nzmax   irftr2
2952                2             1             0             5     0
2953  *     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
2954     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
2955  * nhcomo *   f           1e
2956  * nhcelo *              -11            11            12e
2957  * dz *    f   5.8900e-01e
2958  * grav *  f   1.0000e+00e
2959  * idrod *               1             6e
2960  * rdx *   f   1.0000e+00e
2961  * radrd *  f  1.4300e-02e
2962  * matrd *   f           6e
2963  * nfax *  f            1e
2964  * rftn *  f    3.930e+02e
2965  * rftn *  f    3.930e+02e
2966  *
2967  ****************************************************************
2968  * Slab for PV Level 11, cells 2 & 4
2969  ****************************************************************
2970  *     type          num          id     ctitle
2971  slab      935      935  $935$ slab level 11, cells 2 and 4
2972  *         ncrx          ncrz
2973                2             1
2974  *       nopowr         nridr         modez        liqlev        iaxcnd
2975                1             1             1             0             0
2976  *        idbci          idco
2977                0             2
2978  *        width         ipatch
2979     3.3277e-02             0
2980  *        nrods         nodes         irftr         nzmax   irftr2
2981                2             1             0             5     0
2982  *     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
2983     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
2984  * nhcomo *   f           1e
2985  * nhcelo *              -11            11            12e
2986  * dz *    f   5.8900e-01e
2987  * grav *  f   1.0000e+00e
2988  * idrod *               2             4e
2989  * rdx *   f   1.0000e+00e
2990  * radrd *  f  3.0000e-02e
2991  * matrd *   f           6e
2992  * nfax *  f            1e
2993  * rftn *  f    3.930e+02e
2994  * rftn *  f    3.930e+02e
2995  *
2996  ****************************************************************
2997  * Slab for PV Level 11, cells 3, & 5
2998  ****************************************************************
2999  *     type          num          id     ctitle
3000  slab      934      934  $934$ slab level 11, cells 3 and 5
3001  *         ncrx          ncrz
3002                2             1
3003  *       nopowr         nridr         modez        liqlev        iaxcnd
3004                1             1             1             0             0
3005  *        idbci          idco
3006                0             2
3007  *        width         ipatch
3008      8.6944e-01             0
3009  *        nrods         nodes         irftr         nzmax   irftr2
3010                2             1             0             5     0
3011  *     dtxht(1)      dtxht(2)         dznht         hgapo     shelv
3012     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
3013  * nhcomo *   f           1e
3014  * nhcelo *              -11            11            12e
3015  *    dz *    f   5.8900e-01e
3016  * grav *  f   1.0000e+00e
3017  * idrod *               3             5e
3018  * rdx *   f   1.0000e+00e
3019  * radrd *  f  6.2000e-02e
3020  * matrd *   f           6e
3021  * nfax *  f            1e
3022  * rftn *  f    3.930e+02e
3023  * rftn *  f    3.930e+02e
3024  *
3025  ****************************************************************
3026  * Slab for PV Level 11, cell 7
3027  ****************************************************************
3028  *     type          num          id     ctitle
3029  slab      933      933  $933$ slab level 11, cell 7
```

```
3030  *         ncrx          ncrz
3031                1             1
3032  *       nopowr         nridr         modez        liqlev        iaxcnd
3033                1             1             1             0             0
3034  *        idbci          idco
3035                0             2
3036  *        width         ipatch
3037     7.8217e-01             0
3038  *        nrods         nodes         irftr         nzmax   irftr2
3039                1             1             0             5     0
3040  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3041     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
3042  * nhcomo *   f            1e
3043  * nhcelo *                -11            11            12e
3044  * dz *    f   5.8900e-01e
3045  * grav *  f   1.0000e+00e
3046  * idrod *              7e
3047  * rdx *   f   1.0000e+00e
3048  * radrd *  f  8.2000e-03e
3049  * matrd *   f           6e
3050  * nfax *  f            1e
3051  * rftn *  f    3.930e+02e
3052  *
3053  ****************************************************************
3054  * Slab for PV Level 11, cell 8
3055  ****************************************************************
3056  *     type          num          id     ctitle
3057  slab      910      910  $910$ slab level 11, cell 8
3058  *         ncrx          ncrz
3059                1             1
3060  *       nopowr         nridr         modez        liqlev        iaxcnd
3061                1             1             1             0             0
3062  *        idbci          idco
3063                0             2
3064  *        width         ipatch
3065     3.3277e-02             0
3066  *        nrods         nodes         irftr         nzmax   irftr2
3067                1             1             0             5     0
3068  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3069     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
3070  * nhcomo *   f            1e
3071  * nhcelo *                -11            11            12e
3072  * dz *    f   5.8900e-01e
3073  * grav *  f   1.0000e+00e
3074  * idrod *              8e
3075  * rdx *   f   1.0000e+00e
3076  * radrd *  f  3.0000e-02e
3077  * matrd *   f           6e
3078  * nfax *  f            1e
3079  * rftn *  f    3.930e+02e
3080  *
3081  ****************************************************************
3082  * Slab for PV Level 11, cells 9 and 10
3083  ****************************************************************
3084  *     type          num          id     ctitle
3085  slab      932      932  $932$ slab level 11, cell 9 and 10
3086  *         ncrx          ncrz
3087                2             1
3088  *       nopowr         nridr         modez        liqlev        iaxcnd
3089                1             1             1             0             0
3090  *        idbci          idco
3091                0             2
3092  *        width         ipatch
3093     0.229883             0
3094  *        nrods         nodes         irftr         nzmax   irftr2
3095                2             1             0             5     0
3096  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3097     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.7480e+00
3098  * nhcomo *   f            1e
3099  * nhcelo *                -11            11            12e
3100  * dz *    f   5.8900e-01e
3101  * grav *  f   1.0000e+00e
3102  * idrod *    9     10 e
3103  * rdx *  0.358195  0.641805 e
3104  * radrd *  f  4.7730e-01e
3105  * matrd *   f           6e
3106  * nfax *  f            1e
3107  * rftn *  f    3.930e+02e
3108  * rftn *  f    3.930e+02e
3109  *
3110  *
3111  ****************************************************************
3112  * Slab for PV Level 12, cells 1 - 8
3113  ****************************************************************
3114  *     type          num          id     ctitle
3115  slab      930      930  $930$ slab level 12, cells 1-8
3116  *         ncrx          ncrz
3117                8             1
3118  *       nopowr         nridr         modez        liqlev        iaxcnd
3119                1             1             1             0             0
3120  *        idbci          idco
3121                0             2
```

```
*        width          ipatch
    4.3668e-01          0
*        nrods          nodes         irftr         nzmax   irftr2
               8              1             0             5     0
*     dtxht(1)       dtxht(2)       dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   6.3370e+00
* nhcomo *   f            1e
* nhcelo *                -12            12            13e
* dz *    f   4.8500e-01e
* grav *  f   1.0000e+00e
* idrod *                 1             2             3             4s
                          5             6             7             8e
* rdx *   f   1.0000e+00e
* radrd *  f  1.2000e-02e
* matrd *   f           6e
* nfax *  f             1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 12, cells 9 and 10
*****************************************************************
*     type           num           id     ctitle
slab      929      929  $929$ slab level 12, cells 9 and 10
*         ncrx          ncrz
               2             1
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
*        idbci          idco
               0             2
*        width          ipatch
    0.12002          0
*        nrods          nodes         irftr         nzmax   irftr2
               2             1             0             5     0
*     dtxht(1)       dtxht(2)       dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   6.3370e+00
* nhcomo *   f            1e
* nhcelo *                -12            12            13e
* dz *    f   4.8500e-01e
* grav *  f   1.0000e+00e
* idrod *   9    10 e
* rdx *  0.35836  0.64164 e
* radrd *  f  5.9994e-03e
* matrd *   f           6e
* nfax *  f             1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 12, cell 11 & 12
*****************************************************************
*     type           num           id     ctitle
slab      927      927  $927$ slab level 12, cells 11 and 12
*         ncrx          ncrz
               2             1
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
*        idbci          idco
               0             2
*        width          ipatch
    3.1699e-01          0
*        nrods          nodes         irftr         nzmax   irftr2
               2             1             0             5     0
*     dtxht(1)       dtxht(2)       dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   6.3370e+00
* nhcomo *   f            1e
* nhcelo *                -12            12            13e
* dz *    f   4.8500e-01e
* grav *  f   1.0000e+00e
* idrod *                 11            12e
* rdx *   f   1.0000e+00e
* radrd *  f  5.9998e-03e
* matrd *   f           6e
* nfax *  f             1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 13, cells 1 - 8
*****************************************************************
*     type           num           id     ctitle
slab      926      926  $926$ slab level 13, cells 1-8
*         ncrx          ncrz
               7             1
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             1             1             0             0
```

```
*        idbci          idco
             0             2
*        width          ipatch
    4.3668e-01          0
*        nrods         nodes         irftr         nzmax   irftr2
             7             1             0             5     0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   6.8220e+00
* nhcomo *   f            1e
* nhcelo *                -13            13            14e
* dz *    f   7.3700e-01e
* grav *  f   1.0000e+00e
* idrod *              1             2             3             4s
                       5             6             7e
* rdx *   f   1.0000e+00e
* radrd *  f  1.2000e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 13, cells 9-12
*****************************************************************
*     type           num            id     ctitle
slab      925      925  $925$ slab level 13, cells 9-12
*         ncrx          ncrz
             4             1
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*        idbci          idco
             0             2
*        width          ipatch
    0.754014          0
*        nrods         nodes         irftr         nzmax   irftr2
             4             1             0             5     0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   6.8220e+00
* nhcomo *   f            1e
* nhcelo *                -13            13            14e
* dz *    f   7.3700e-01e
* grav *  f   1.0000e+00e
* idrod *     9    10    11    12 e
* rdx *  0.05702  0.10214  0.42042  0.42042 e
* radrd *  f  5.9994e-03e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 14, cells 1, 3, 5 - 7
*****************************************************************
*     type           num            id     ctitle
slab      922      922  $922$ slab level 14, cells 1,3,5-7
*         ncrx          ncrz
             5             1
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*        idbci          idco
             0             2
*        width          ipatch
    4.3668e-01          0
*        nrods         nodes         irftr         nzmax   irftr2
             5             1             0             5     0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   7.5590e+00
* nhcomo *   f            1e
* nhcelo *                -14            14            15e
* dz *    f   4.3700e-01e
* grav *  f   1.0000e+00e
* idrod *              1             3             5             6s
                       7e
* rdx *   f   1.0000e+00e
* radrd *  f  1.2000e-02e
* matrd *   f           6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for PV Level 14, cells 2, 4, & 8
```

```
3306  ****************************************************************
3307  *     type           num           id     ctitle
3308  slab      921       921  $921$ slab level 14, cells 2,4,8
3309  *         ncrx          ncrz
3310                3             1
3311  *       nopowr         nridr         modez        liqlev        iaxcnd
3312                1             1             1             0             0
3313  *        idbci          idco
3314                0             2
3315  *        width         ipatch
3316      1.9481e+00             0
3317  *         nrods         nodes         irftr         nzmax   irftr2
3318                3             1             0             5     0
3319  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3320     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   7.5590e+00
3321  * nhcomo *   f            1e
3322  * nhcelo *               -14            14            15e
3323  * dz *    f   4.3700e-01e
3324  * grav *  f   1.0000e+00e
3325  * idrod *              2             4             8e
3326  * rdx *   f   1.0000e+00e
3327  * radrd *  f  3.0000e-02e
3328  * matrd *   f           6e
3329  * nfax *  f            1e
3330  * rftn *  f    3.930e+02e
3331  * rftn *  f    3.930e+02e
3332  * rftn *  f    3.930e+02e
3333  *
3334  ****************************************************************
3335  * Slab for PV Level 14, cells 9-12
3336  ****************************************************************
3337  *     type           num           id     ctitle
3338  slab      920       920  $920$ slab level 14, cells 9-12
3339  *         ncrx          ncrz
3340                4             1
3341  *       nopowr         nridr         modez        liqlev        iaxcnd
3342                1             1             1             0             0
3343  *        idbci          idco
3344                0             2
3345  *        width         ipatch
3346      0.7540          0
3347  *         nrods         nodes         irftr         nzmax   irftr2
3348                4             1             0             5     0
3349  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3350     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   7.5590e+00
3351  * nhcomo *   f            1e
3352  * nhcelo *               -14            14            15e
3353  * dz *    f   4.3700e-01e
3354  * grav *  f   1.0000e+00e
3355  * idrod *   9   10   11   12 e
3356  * rdx *  0.05703  0.10213  0.42042  0.42042 e
3357  * radrd *  f  5.9994e-03e
3358  * matrd *   f           6e
3359  * nfax *  f            1e
3360  * rftn *  f    3.930e+02e
3361  * rftn *  f    3.930e+02e
3362  * rftn *  f    3.930e+02e
3363  * rftn *  f    3.930e+02e
3364  *
3365  ****************************************************************
3366  * Slab for PV Level 15, cells 1-12
3367  ****************************************************************
3368  *     type           num           id     ctitle
3369  slab      917       917  $917$ slab level 15, cells 1-12
3370  *         ncrx          ncrz
3371               12             1
3372  *       nopowr         nridr         modez        liqlev        iaxcnd
3373                1             1             1             0             0
3374  *        idbci          idco
3375                0             2
3376  *        width         ipatch
3377      8.43332          0
3378  *         nrods         nodes         irftr         nzmax   irftr2
3379               12             1             0             5     0
3380  *     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
3381     3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   7.9960e+00
3382  * nhcomo *   f            1e
3383  * nhcelo *               -15            15            16e
3384  * dz *    f   6.6100e-01e
3385  * grav *  f   1.0000e+00e
3386  * idrod *   1   2   3   4   5 s
3387  * idrod *   6   7   8   9   10 s
3388  * idrod *   11   12 e
3389  * rdx *  0.09605  r7 0.06732  r2 0.12587  0.07611  0.10486 e
3390  * radrd *  f  9.7072e-02e
3391  * matrd *   f           6e
3392  * nfax *  f            1e
3393  * rftn *  f    3.930e+02e
3394  * rftn *  f    3.930e+02e
3395  * rftn *  f    3.930e+02e
3396  * rftn *  f    3.930e+02e
3397  * rftn *  f    3.930e+02e
```

```
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for S/W Sep. Level 1, cells 1 & 2
*****************************************************************
*     type          num          id     ctitle
slab      908      908  $908$ slab level 1, cells 1-2
*         ncrx          ncrz
              2             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
    2.4802e+00             0
*        nrods         nodes         irftr         nzmax     irftr2
              2             1             0             5          0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   0.0000e+00
* nhcomo *   f             6e
* nhcelo *                -1             1             2e
* dz *    f   9.5000e-01e
* grav *  f   1.0000e+00e
* idrod *               1             2e
* rdx *   f   1.0000e+00e
* radrd *     8.0000e-03e
* matrd *               6e
* nfax *  f             1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for S/W Sep. Level 2, cells 1 & 2
*****************************************************************
*     type          num          id     ctitle
slab      907      907  $907$ slab level 2, cells 1-2
*         ncrx          ncrz
              2             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
    9.9000e-01             0
*        nrods         nodes         irftr         nzmax     irftr2
              2             1             0             5          0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   9.5000e-01
* nhcomo *   f             6e
* nhcelo *                -2             2             3e
* dz *    f   2.3800e+00e
* grav *  f   1.0000e+00e
* idrod *               1             2e
* rdx *   f   1.0000e+00e
* radrd *     8.0000e-03e
* matrd *               6e
* nfax *  f             1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for S/W Sep. Level 3, cell 1
*****************************************************************
*     type          num          id     ctitle
slab      906      906  $906$ slab level 3, cells 1
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
    1.6888e+00             0
*        nrods         nodes         irftr         nzmax     irftr2
              1             1             0             5          0
*     dtxht(1)      dtxht(2)      dznht         hgapo     shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   3.3300e+00
* nhcomo *   f             6e
* nhcelo *                -3             3             4e
* dz *    f   1.7300e+00e
* grav *  f   1.0000e+00e
* idrod *               1e
* rdx *   f   1.0000e+00e
* radrd *     8.0000e-03e
* matrd *               6e
* nfax *  f             1e
```

```
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for S/W Sep. Level 3, cell 2
*****************************************************************
*     type          num           id     ctitle
slab      909      909  $909$ slab level 3, cell 2
*         ncrx          ncrz
              1             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
    1.0896e+00             0
*         nrods         nodes         irftr         nzmax     irftr2
              1             1             0             5          0
*     dtxht(1)      dtxht(2)         dznht         hgapo      shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   3.3300e+00
* nhcomo *   f             6e
* nhcelo *                -3             3             4e
* dz *    f   1.7300e+00e
* grav *  f   1.0000e+00e
* idrod *              2e
* rdx *   f   1.0000e+00e
* radrd *     8.0000e-03e
* matrd *              6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
*
*****************************************************************
* Slab for S/W Sep. Level 4, cells 1 & 2
*****************************************************************
*     type          num           id     ctitle
slab      905      905  $905$ slab level 4, cells 1-2
*         ncrx          ncrz
              2             1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*        idbci          idco
              0             2
*        width         ipatch
    2.6180e+00             0
*         nrods         nodes         irftr         nzmax     irftr2
              2             1             0             5          0
*     dtxht(1)      dtxht(2)         dznht         hgapo      shelv
    3.0000e+00    1.0000e+01    0.0000e+00    0.0000e+00   5.0600e+00
* nhcomo *   f             6e
* nhcelo *                -4             4             5e
* dz *    f   9.0000e-01e
* grav *  f   1.0000e+00e
* idrod *              1             2e
* rdx *   f   1.0000e+00e
* radrd *     8.0000e-03e
* matrd *              6e
* nfax *  f            1e
* rftn *  f    3.930e+02e
* rftn *  f    3.930e+02e
*
end
*
******************
* time-step data *
******************
*
*        dtmin         dtmax          tend         rtwfp
    1.0000e-06    1.0000e-01   500.000e+00    1.0000e+01
*         edint         gfint         dmpint        sedint
    5.0000e+01    1.0000e+00    5.0000e+01    5.0000e+01
*
*       endflag
   -1.0000e+04
```

APPENDIX V

EFFECT OF INSULATION MATERIAL PROPERTIES ON HEATER-ROD CLADDING TEMPERATURES

A sensitivity study was performed to determine the effect of different insulation material properties on the heater-rod cladding temperatures. The reason for this study is that the SCTF heater rods has two different insulation materials between the nichrome heating element and the outer cladding as shown in Fig. 5.4-3. Boron nitrate (BN) is used in the center region of the rod while magnesium oxide (MgO) is used in the upper and lower regions of the rod. TRAC can only model one insulation material for the entire length of the heater rod as shown in Fig. 5.4-7. To determine the effect of the insulation material properties on cladding temperature, we performed three sensitivity calculations. Case 1 assumed magnesium oxide for the entire heater rod length. Case 2 assumed boron nitride for the entire heater rod length. Both Cases 1 and 2 used the incorrect six-step axial power shape. Case 3 assumed magnesium oxide but with the correct 17-step axial power shape. We calculated the cladding temperatures for the first 120 s of the test, which is the heatup period of the test. The calculated temperatures are compared to the measured temperature at each of the 10 thermocouple locations along the heater rod as shown in Fig. 5.4.-6. Figures V-1 through V-10 present the calculated and measured temperatures for rod bundle 2 and Figs. V-11 through V-20 present the calculated and measured temperatures for rod bundle 8. These comparision plots show that the insulation material had a minor effect on the calculated temperatures and that the axial power shape had a greater effect.

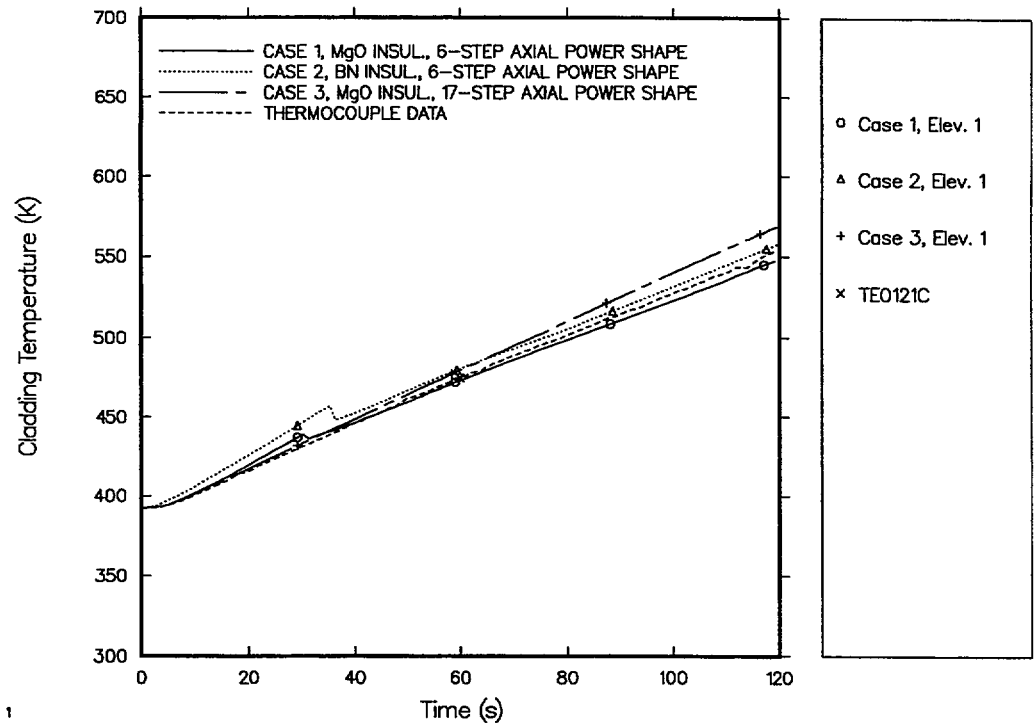


Fig. V-1. Calculated and measured cladding temperatures at level 1 for rod bundle 2.

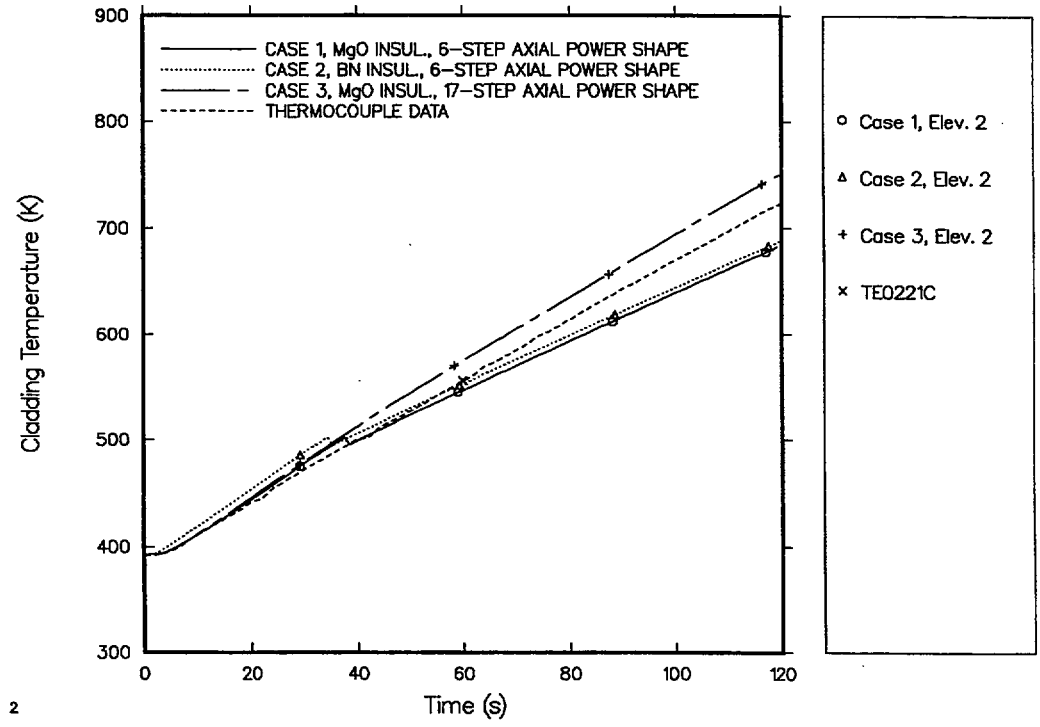
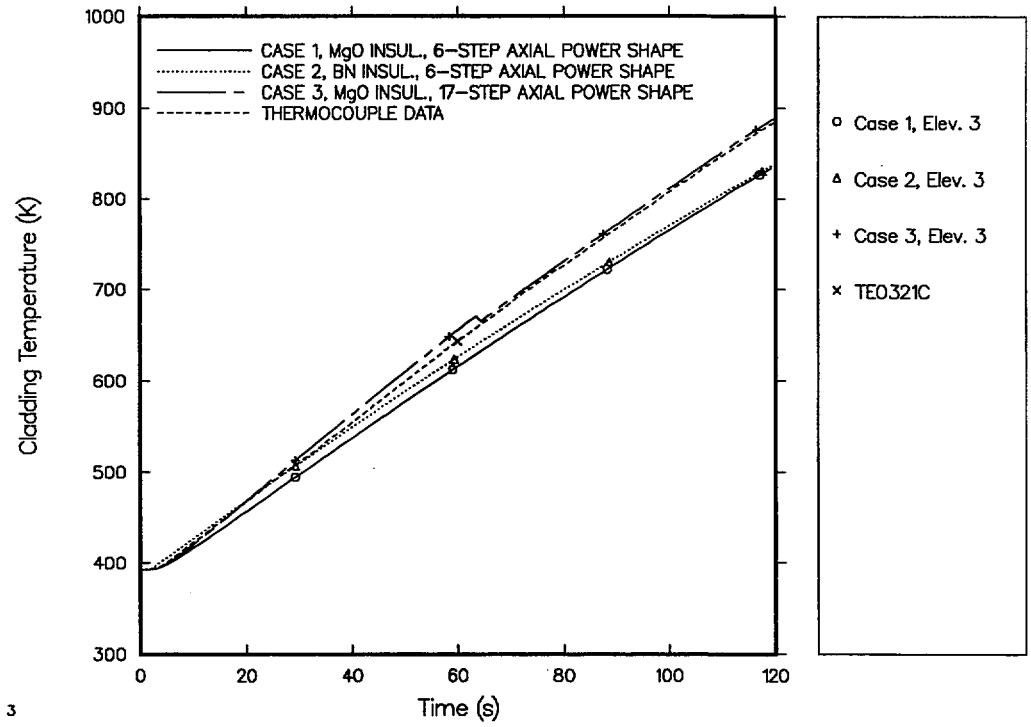
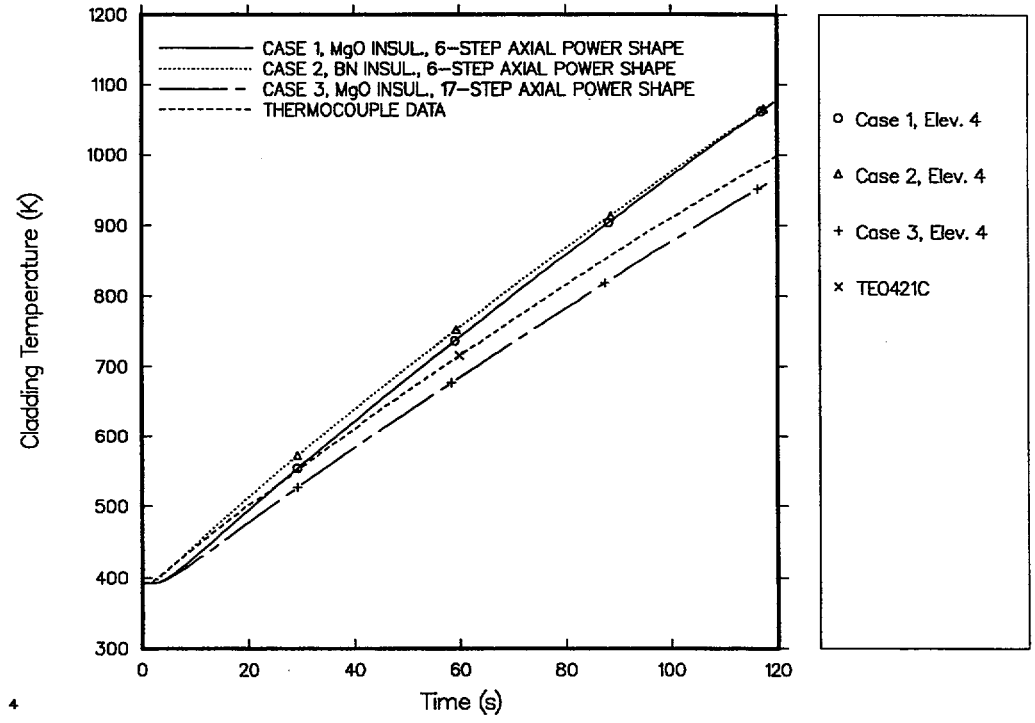


Fig. V-2. Calculated and measured cladding temperatures at level 2 for rod bundle 2.



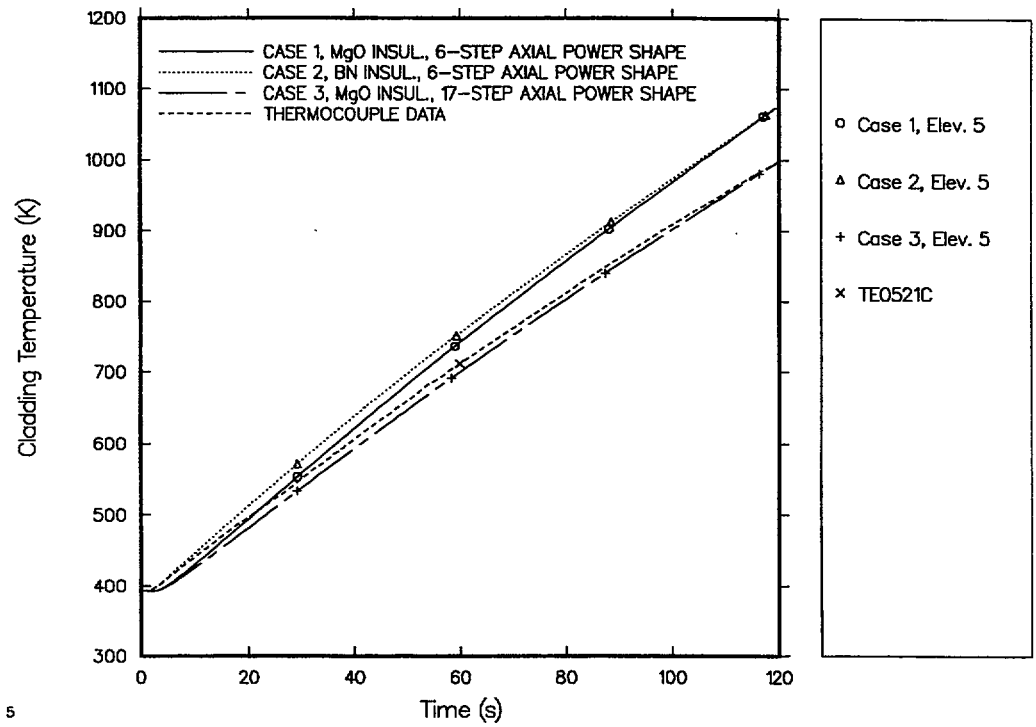
3

Fig. V-3. Calculated and measured cladding temperatures at level 3 for rod bundle 2.



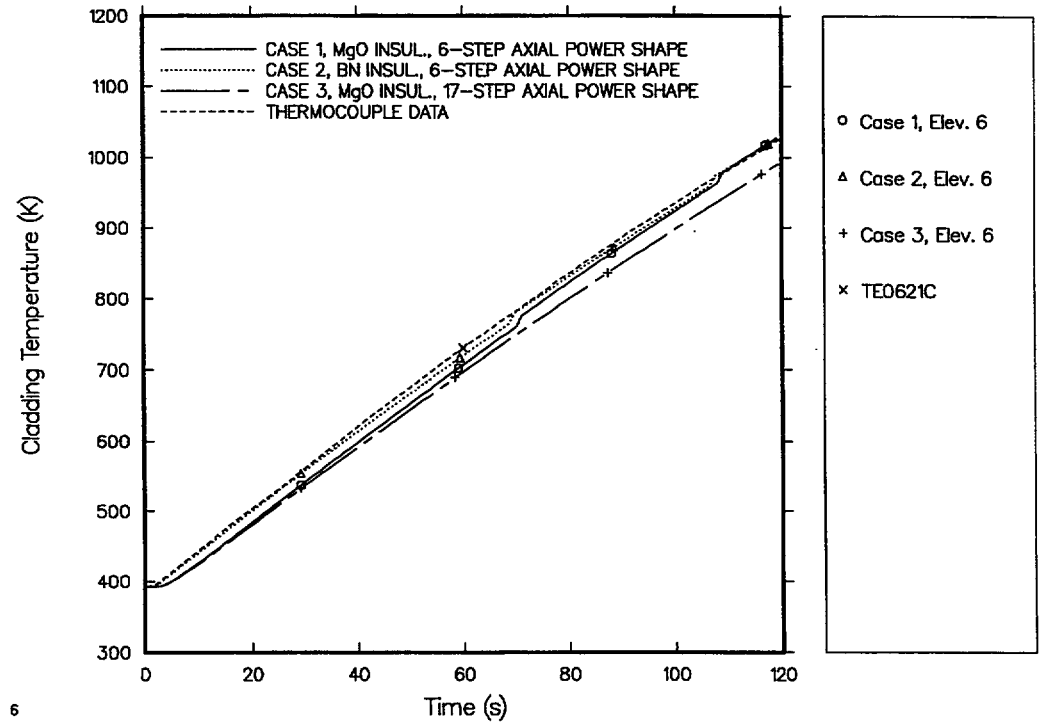
4

Fig. V-4. Calculated and measured cladding temperatures at level 4 for rod bundle 2.



5

Fig. V-5. Calculated and measured cladding temperatures at level 5 for rod bundle 2.



6

Fig. V-6. Calculated and measured cladding temperatures at level 6 for rod bundle 2.

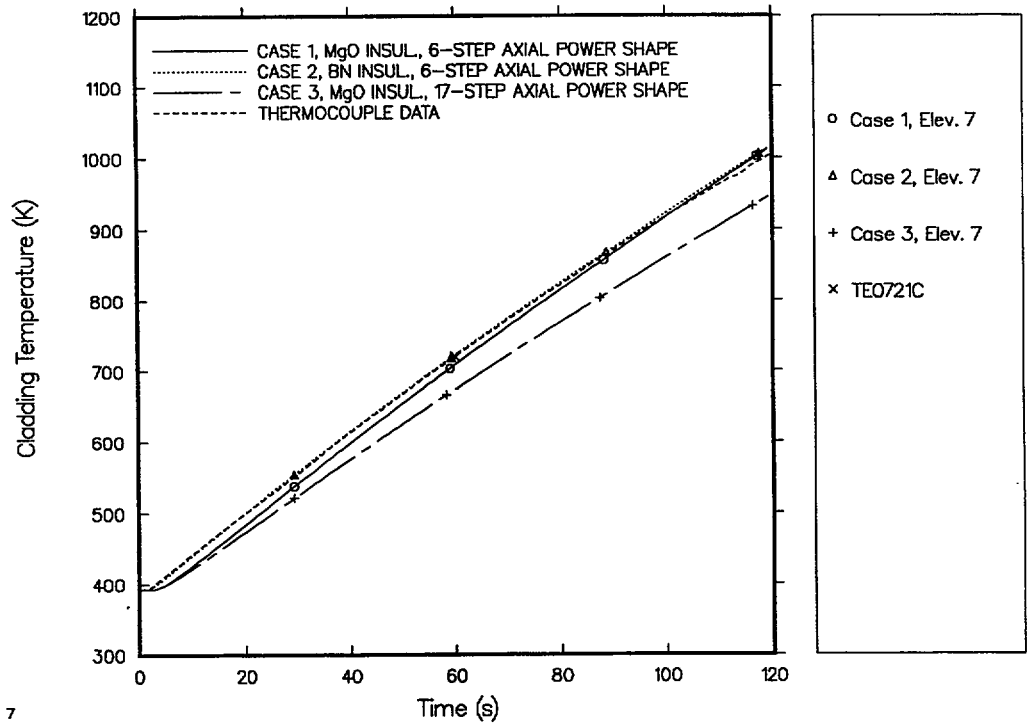


Fig. V-7. Calculated and measured cladding temperatures at level 7 for rod bundle 2.

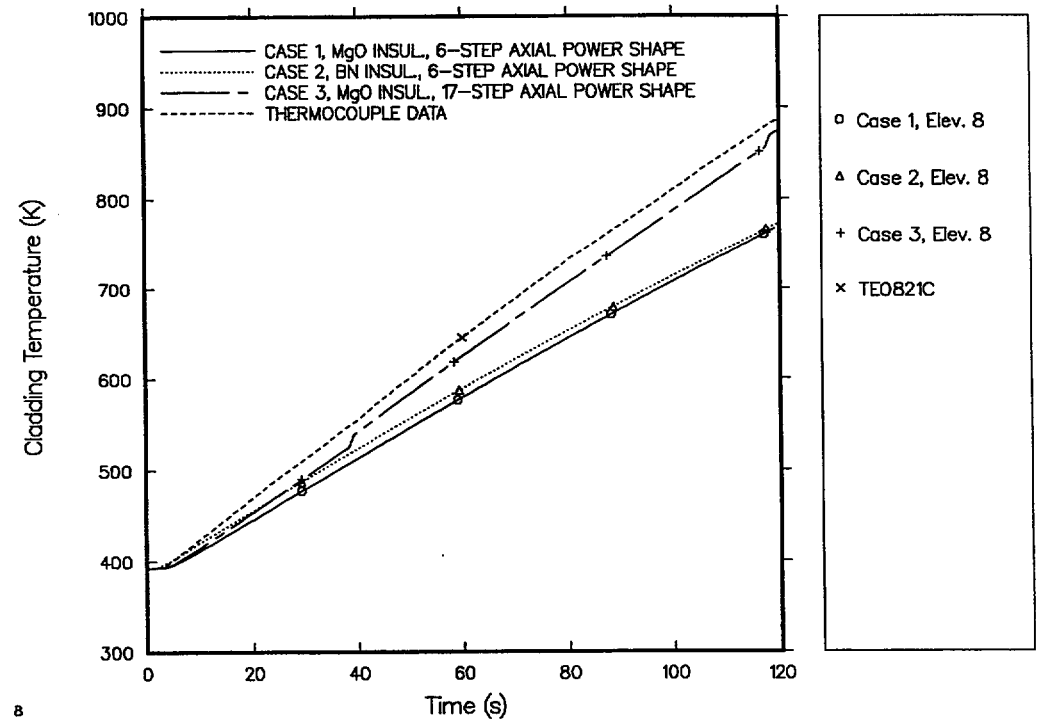
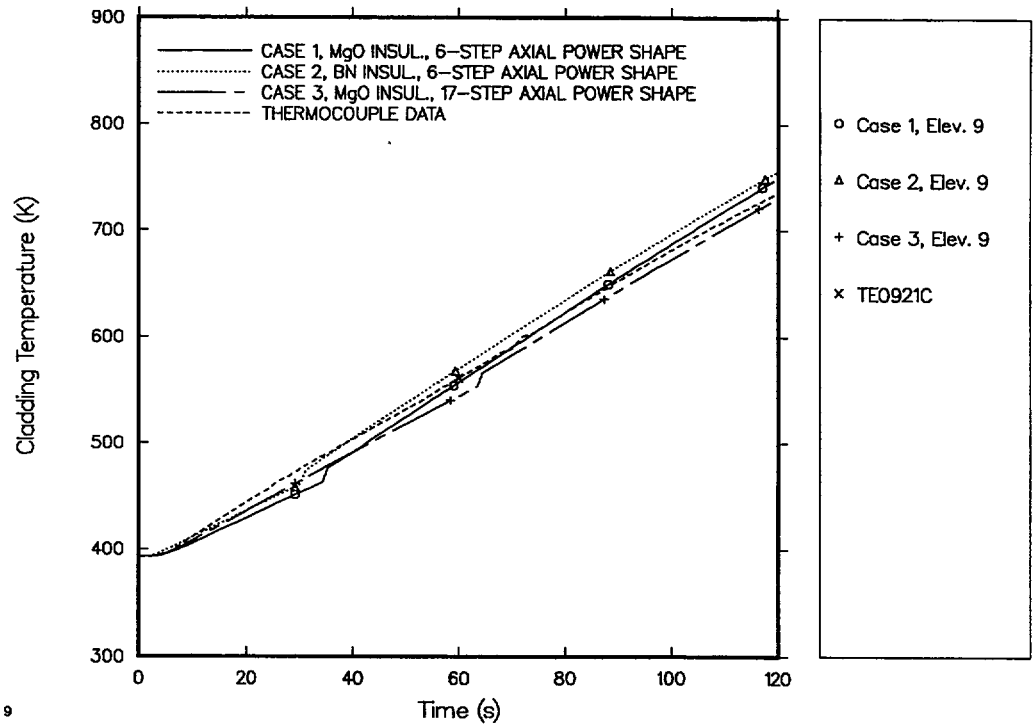
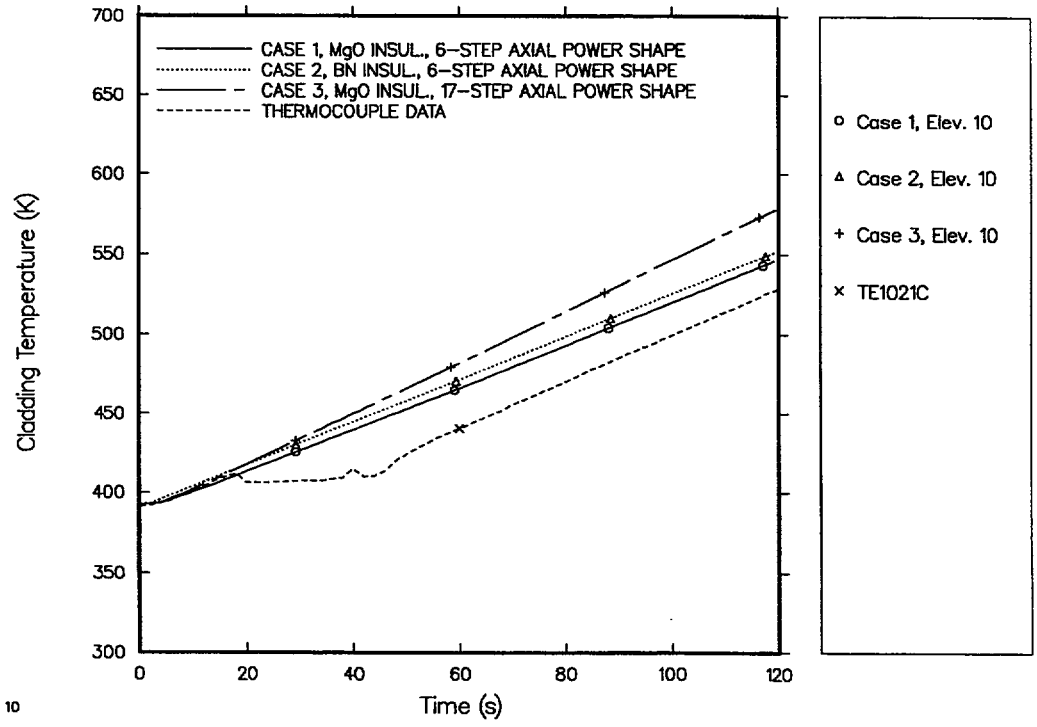


Fig. V-8. Calculated and measured cladding temperatures at level 8 for rod bundle 2.



9

Fig. V-9. Calculated and measured cladding temperatures at level 9 for rod bundle 2.



10

Fig. V-10. Calculated and measured cladding temperatures at level 10 for rod bundle 2.

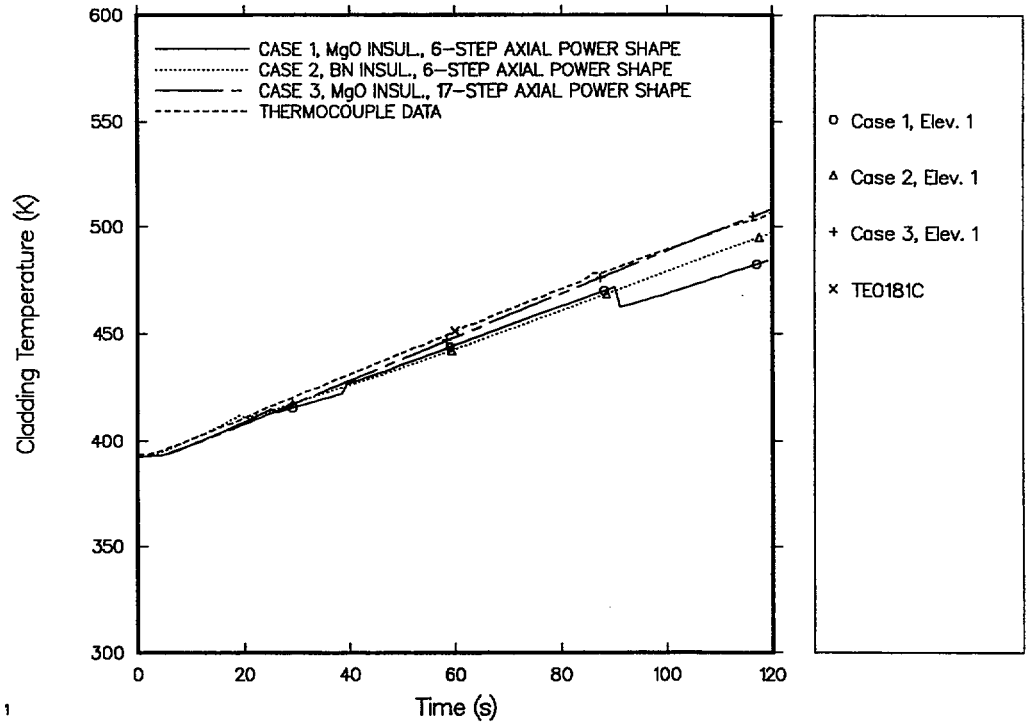


Fig. V-11. Calculated and measured cladding temperatures at level 1 for rod bundle 8.

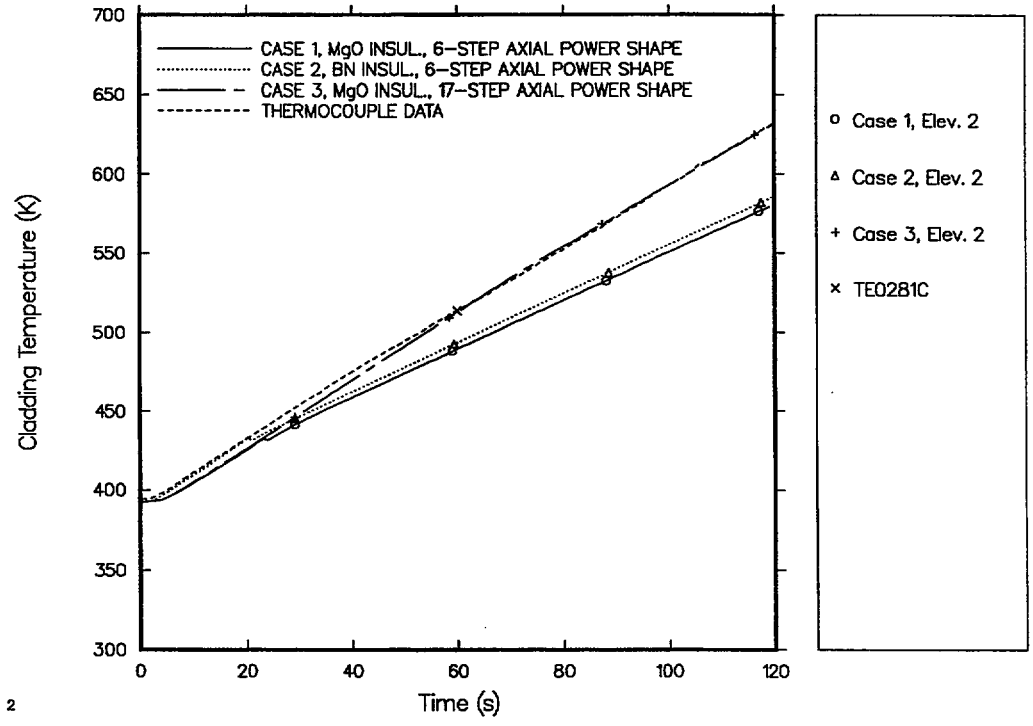


Fig. V-12. Calculated and measured cladding temperatures at level 2 for rod bundle 8.

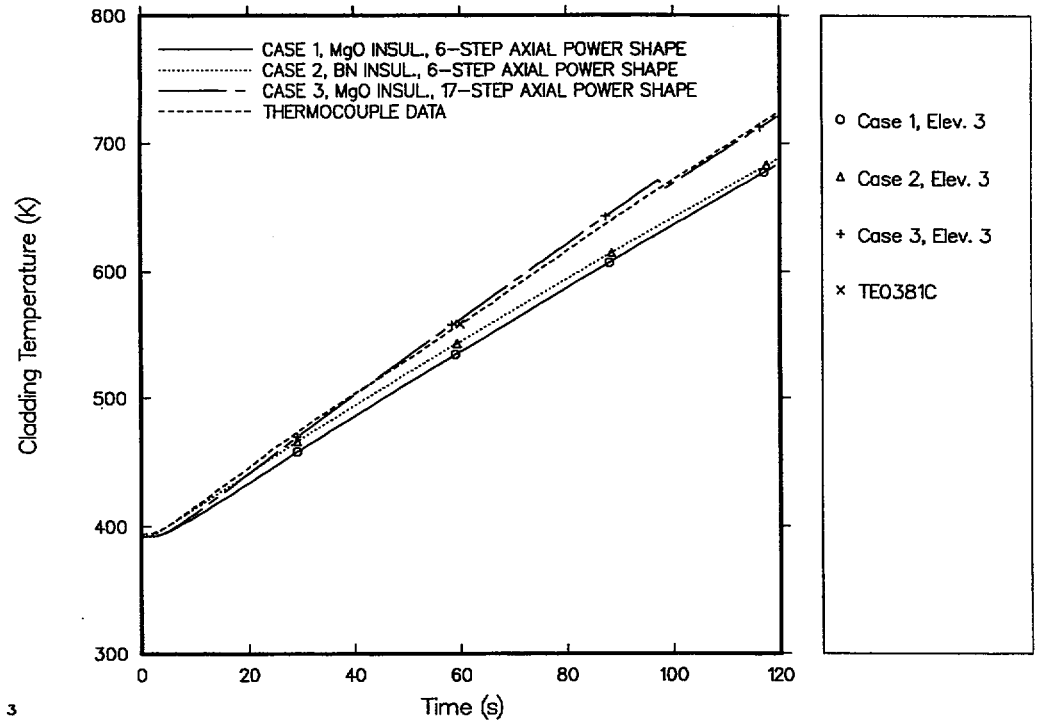


Fig. V-13. Calculated and measured cladding temperatures at level 3 for rod bundle 8.

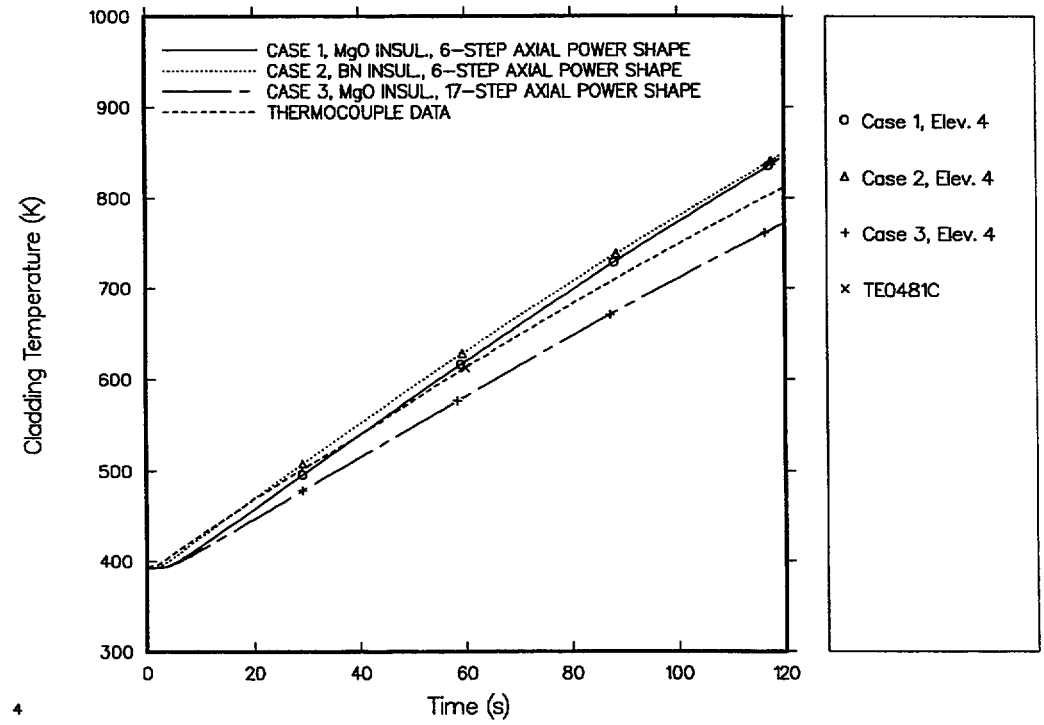
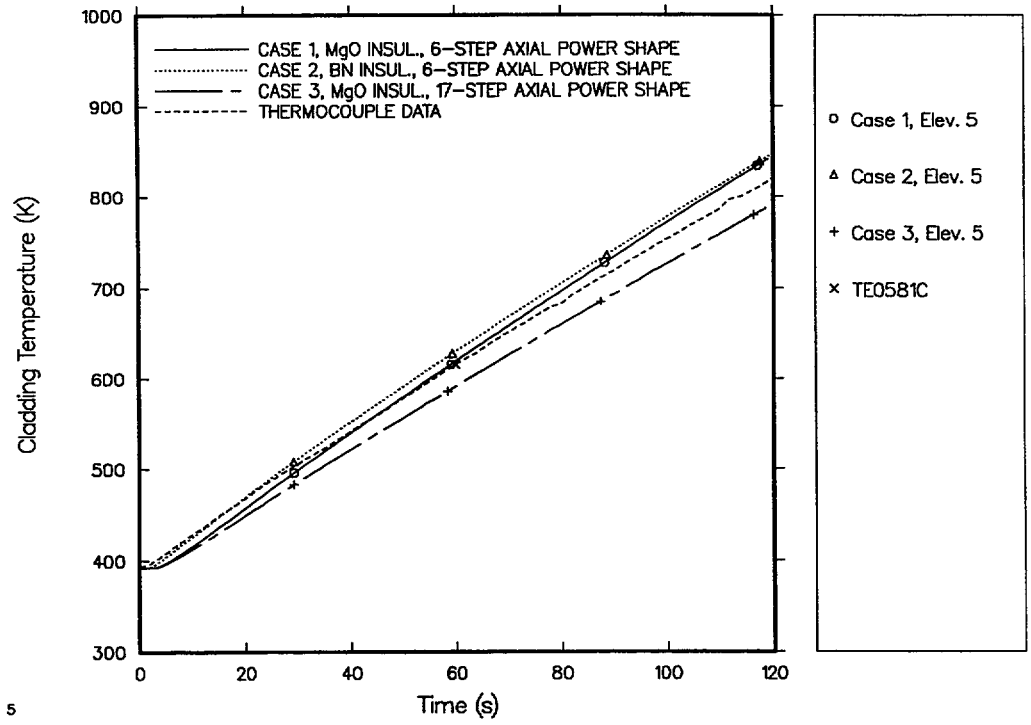
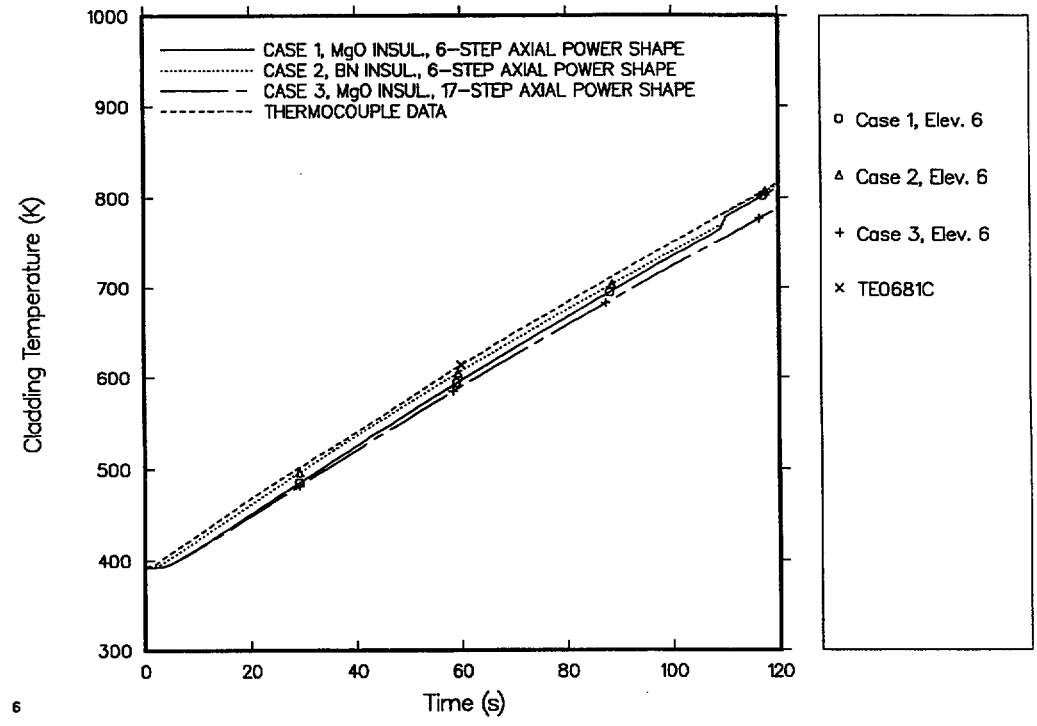


Fig. V-14. Calculated and measured cladding temperatures at level 4 for rod bundle 8.



5

Fig. V-15. Calculated and measured cladding temperatures at level 5 for rod bundle 8.



6

Fig. V-16. Calculated and measured cladding temperatures at level 6 for rod bundle 8.

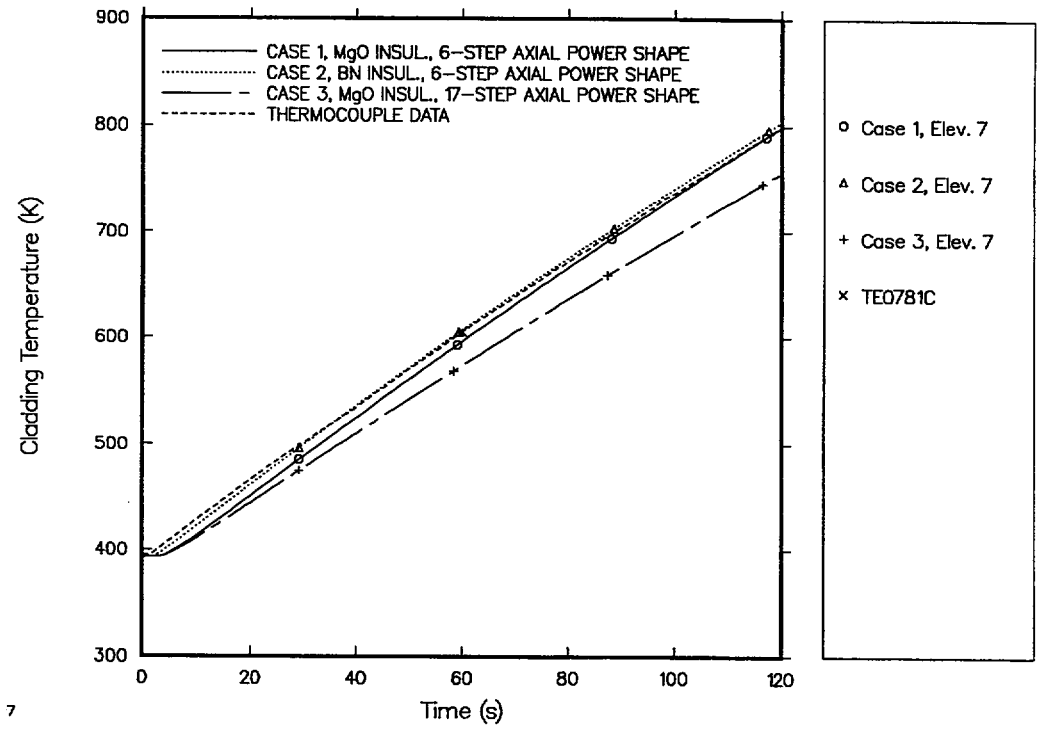


Fig. V-17. Calculated and measured cladding temperatures at level 7 for rod bundle 8.

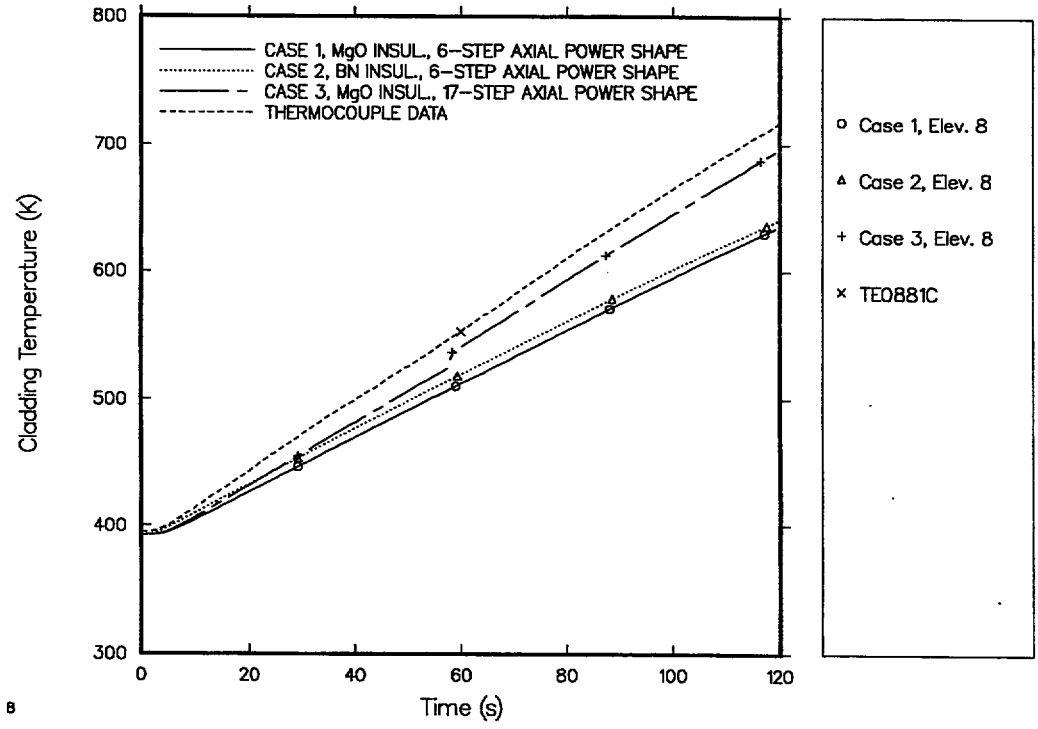


Fig. V-18. Calculated and measured cladding temperatures at level 8 for rod bundle 8.

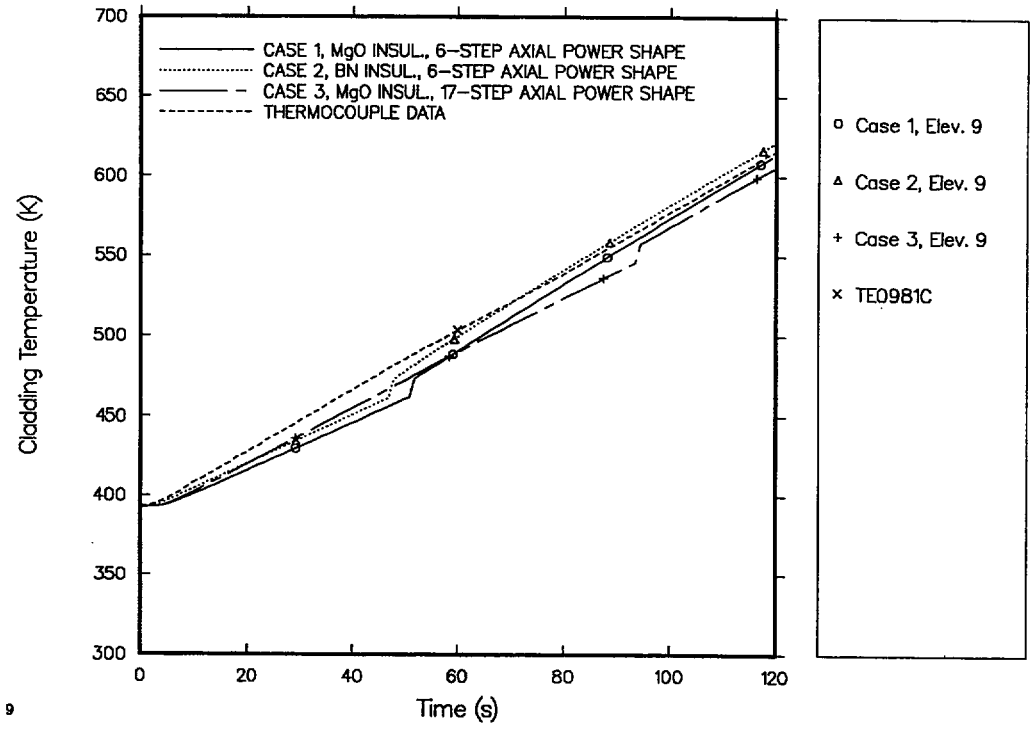


Fig. V-19. Calculated and measured cladding temperatures at level 9 for rod bundle 8.

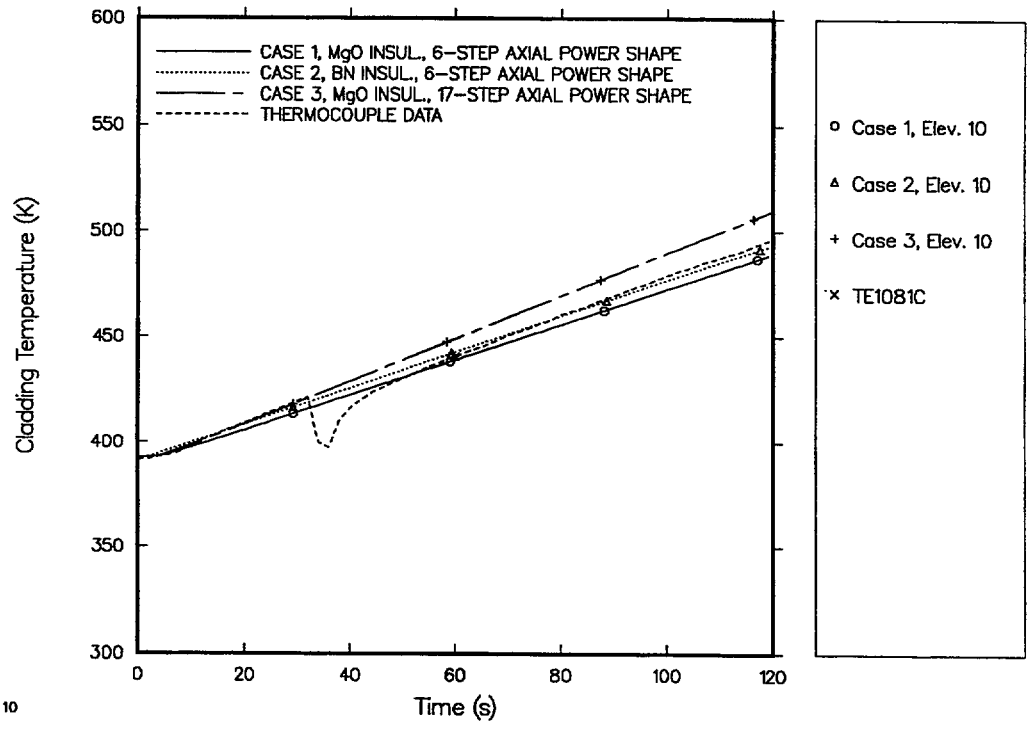


Fig. V-20. Calculated and measured cladding temperatures at level 10 for rod bundle 8.

APPENDIX W

RENODED CCTF RUN 14 INPUT LISTING

```
free format
*
*************
* main data *
*************
*
*       numtcr          ieos          inopt          nmat
             20             0              1             4
CCTF Core I Test C1-5 (Run 14)
*
revised by j. f. lime, october 1999
(1) fill component mass flow modified to reflect measured
    mass flow entering the lower plenum.
(2) renoded core into 6 axial levels for sensitivity study
*
cctf run 14 core separate calculation
jaeri recommendation used for some heater rod material properties
vessel noding:
   one radial rings
   one azimuthal zones
   12 axial levels
        one level in lower plenum
        6 levels in core
        5 levels in upper plenum
system noding:
    a break component --- upper plenum boundary condition
    a fill component  --- core inlet conditions
*******************************************************************************
*
*****************
* namelist data *
*****************
*
 &inopts
   nhtstr=3, iadded=20, ithd=1, nrslv=1, newrfd=3, imfr=3,
    nsend=2,
 &end
*
*        dstep         timet
             0    0.0000e+00
*       stdyst        transi         ncomp          njun          ipak
             0             1             8             4             1
*         epso          epss
    1.0000e-04    1.0000e-04
*       oitmax        sitmax        isolut        ncontr        nccfl
            10            10             0             0             0
*         ntsv          ntcb          ntcf          ntrp          ntcp
             1             5           200             2             1
*
*************************
* component-number data *
*************************
*
* iorder*              1             2             3             4             5
* iorder*              6             7          100e
*
*****************************
* material-properties data *
*****************************
*
* matb  *             55            58            59           60e
* ptbln * r02          8             7            6e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    8.3500e+03    4.4490e+02    1.2340e+01    1.0000e+00
    5.0000e+02    8.3500e+03    4.9040e+02    1.5830e+01    1.0000e+00
    7.0000e+02    8.3500e+03    5.3950e+02    1.9330e+01    1.0000e+00
    9.0000e+02    8.3500e+03    5.8890e+02    2.2830e+01    1.0000e+00
    1.1000e+03    8.3500e+03    6.3940e+02    2.6320e+01    1.0000e+00
    1.3000e+03    8.3500e+03    6.8590e+02    2.9820e+01    1.0000e+00
    2.0000e+03    8.3500e+03    8.6440e+02    4.2070e+01    1.0000e+00
    2.5000e+03    8.3500e+03    8.6440e+02    4.2070e+01    1.0000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    3.8000e+03    8.4970e+02    3.5870e+01    1.0000e+00
```

```
     5.0000e+02    3.8000e+03    9.6550e+02    2.0170e+01    1.0000e+00
     7.0000e+02    3.8000e+03    1.0810e+03    1.2530e+01    1.0000e+00
     9.0000e+02    3.8000e+03    1.1970e+03    8.9510e+00    1.0000e+00
     1.1000e+03    3.8000e+03    1.3130e+03    7.1620e+00    1.0000e+00
     1.3000e+03    3.8000e+03    1.4290e+03    6.1230e+00    1.0000e+00
     2.0000e+03    3.8000e+03    1.8350e+03    2.4870e+00    1.0000e+00
     2.5000e+03    3.8000e+03    1.8350e+03    2.4870e+00    1.0000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
     3.0000e+02    2.8000e+03    9.8640e+01    1.6300e+00    1.0000e+00
     6.0000e+02    2.8000e+03    1.1360e+03    1.4200e+00    1.0000e+00
     9.0000e+02    2.8000e+03    1.2850e+03    1.2100e+00    1.0000e+00
     1.2000e+03    2.8000e+03    1.4350e+03    1.0000e+00    1.0000e+00
     1.5000e+03    2.8000e+03    1.8000e+03    7.9000e-01    1.1000e+00
     2.0000e+03    2.8000e+03    2.0000e+03    4.9000e-01    1.1000e+00
     2.5000e+03    2.8000e+03    2.0000e+03    4.9000e-01    1.1000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
     3.0000e+02    8.4100e+03    4.4030e+02    1.4340e+01    8.4000e-01
     6.0000e+02    8.2930e+03    5.0640e+02    1.9330e+01    8.4000e-01
     9.0000e+02    8.1750e+03    5.7240e+02    2.4320e+01    8.4000e-01
     1.2000e+03    8.0570e+03    6.3840e+02    2.9310e+01    8.4000e-01
     2.0000e+03    7.7420e+03    8.1440e+02    4.2610e+01    8.4000e-01
     2.5000e+03    7.7420e+03    8.1440e+02    4.2610e+01    8.4000e-01
e
*
**************************
* control-parameter data *
**************************
*
*
* signal variables
*         idsv          isvn          ilcn          icn1          icn2
            101             0             0             0             0
*
*  control blocks
*
*  idcb  icbn      funct     icb1      icb2      icb3
*        cbgain    cbxmin    cbxmax    cbcon1    cbcon2
*
*       constant 1.0
  -1    9         *const*
        1.0       1.0       1.0       1.0       0.0
*
*       constant 0.0
  -2    9         *const*
        1.0       0.0       0.0       0.0       0.0
*
*       constant pressure
  -3    9         *const*
        1.0       3.0e05    3.0e05    3.0e05    0.0
*
*       table lookup of mass flow vs time
  -4    101       *table*   101       64
        1.0       -100.0    100.0     0.0       0.0
      5.300e+01     0.0 s
      5.800e+01     9.000e+00 s
      6.300e+01     1.612e+01 s
      6.805e+01     1.565e+01 s
      7.067e+01     1.186e+01 s
      7.239e+01     9.095e+00 s
      7.600e+01     6.500e+00 s
      8.059e+01     5.172e+00 s
      1.017e+02     5.158e+00 s
      1.057e+02     5.837e+00 s
      1.238e+02     5.825e+00 s
      1.409e+02     6.495e+00 s
      1.649e+02     4.547e+00 s
      1.790e+02     5.674e+00 s
      1.850e+02     5.215e+00 s
      1.901e+02     5.666e+00 s
      1.990e+02     4.864e+00 s
      2.031e+02     5.998e+00 s
      2.161e+02     4.625e+00 s
      2.221e+02     3.712e+00 s
      2.312e+02     5.411e+00 s
      2.380e+02     5.188e+00 s
      2.481e+02     6.209e+00 s
      2.531e+02     5.167e+00 s
      2.549e+02     3.785e+00 s
      2.590e+02     3.780e+00 s
```

```
       2.642e+02       6.186e+00 s
       2.673e+02       6.182e+00 s
       2.710e+02       3.763e+00 s
       2.740e+02       3.759e+00 s
       2.804e+02       6.394e+00 s
       2.834e+02       6.390e+00 s
       2.872e+02       4.086e+00 s
       2.901e+02       3.852e+00 s
       2.952e+02       4.534e+00 s
       3.004e+02       5.677e+00 s
       3.084e+02       5.551e+00 s
       3.144e+02       4.738e+00 s
       3.213e+02       3.923e+00 s
       3.295e+02       4.602e+00 s
       3.346e+02       5.170e+00 s
       3.425e+02       4.699e+00 s
       3.487e+02       5.725e+00 s
       3.537e+02       5.258e+00 s
       3.566e+02       4.679e+00 s
       3.628e+02       5.706e+00 s
       3.687e+02       4.203e+00 s
       3.746e+02       3.045e+00 s
       3.870e+02       6.822e+00 s
       3.948e+02       3.707e+00 s
       4.008e+02       3.699e+00 s
       4.050e+02       5.188e+00 s
       4.101e+02       5.985e+00 s
       4.201e+02       5.052e+00 s
       4.279e+02       3.432e+00 s
       4.361e+02       5.030e+00 s
       4.433e+02       6.284e+00 s
       4.503e+02       5.240e+00 s
       4.533e+02       5.466e+00 s
       4.631e+02       2.808e+00 s
       4.744e+02       4.977e+00 s
       4.813e+02       3.473e+00 s
       4.907e+02       6.909e+00 s
       4.991e+02       1.069e+01 e
*
*        table lookup of liquid temperature vs time
  -5     101       *table*   101       18
         1.0       300.0     500.0     0.0       0.0
  0.0000e+00    3.9400e+02    5.3000e+01    3.9400e+02    6.8000e+01 s
  3.7000e+02    7.5000e+01    3.8000e+02    8.8000e+01    3.8050e+02 s
  9.7000e+01    3.8200e+02    1.4000e+02    3.7700e+02    1.5000e+02 s
  3.7800e+02    1.8500e+02    3.8300e+02    1.9300e+02    3.8300e+02 s
  2.2100e+02    3.8680e+02    3.0000e+02    3.9400e+02    5.0000e+02 s
  3.9940e+02    6.5000e+02    3.9940e+02    6.6800e+02    3.9860e+02 s
  6.8700e+02    3.9520e+02    8.2400e+02    3.9000e+02    1.0000e+03 s
  3.9000e+02 e
*
* trips
*         ntse          ntct          ntsf          ntdp          ntsd
             0             0             0             0             0
*
*         idtp          isrt          iset          itst          idsg
             1001             2             0             1           101
*      setp(1)       setp(2)
    6.2500e+01    6.2510e+01
*      dtsp(1)       dtsp(2)
    0.0000e+00    0.0000e+00
*      ifsp(1)       ifsp(2)
             0             0
*
*         idtp          isrt          iset          itst          idsg
             1002             2             0             1           101
*      setp(1)       setp(2)
  0.0   1.0e-06
*      dtsp(1)       dtsp(2)
    0.0000e+00    0.0000e+00
*      ifsp(1)       ifsp(2)
             0             0
*
******************
* component data *
******************
*
*******   type          num           id        ctitle
vessel           3       3 $3$ vessel
*         nasx          nrsx          ntsx          ncsr        ivssbf
            12             1             1             2             0
*         idcu          idcl          idcr          icru          icrl
             0             0             0            19             1
```

```
243  *          icrr          ilcsp          iucsp           iuhp          iconc
244                1              1             19             24              0
245  *         igeom          nvent          nvvtb         nsgrid
246                1              0              0            *6* 0
247  *         shelv           epsw
248      0.0000e+00    0.0000e+00
249  * z      *      2.0000e-01    8.1000e-01 s
250  * z      *      1.4200e+00    2.0300e+00 s
251  * z      *      2.6400e+00 s
252  * z      *      3.2500e+00    3.8600e+00    3.9800e+00 s
253  * z      *      4.2170e+00    4.7170e+00    5.5370e+00    6.7470e+00e
254  * rad    *      6.6644e-01e
255  * th     *      6.6644e-01e
256  * funh   *      1.0000e-01e
257  * nhsca  *               6e
258  * zsgrid    8.3000e-01    1.4750e+00    2.1400e+00    2.8050e+00s
259  * zsgrid    3.4600e+00   3.8780e+00e
260  *
261  *         lisrl          lisrc          lisrf          ljuns
262                11             1              3              3
263                 1             1              3              2
264  *
265  * level   1
266  *
267  * cfzl-t*      0.0000e+00
268  * cfzl-z*     -0.0001    e
269  * cfzl-r*      0.0000e+00
270  * cfzv-t*      0.0000e+00
271  * cfzv-z*      0.0000e+00
272  * cfzv-r*      0.0000e+00
273  * vol    *     1.2637e-01e
274  * fa-t   *     0.0000e+00e
275  * fa-z   *     1.2637e-01e
276  * fa-r   *     0.0000e+00e
277  * hd-t   *     1.0000e+00e
278  * hd-z   *     6.5000e-03e
279  * hd-r   *     0.0000e+00e
280  * alpn   *     1.0000e+00e
281  * vvn-t  *     0.0000e+00e
282  * vvn-z  *     0.0000e+00e
283  * vvn-r  *     0.0000e+00e
284  * vln-t  *     0.0000e+00e
285  * vln-z  *     0.0000e+00e
286  * vln-r  *     0.0000e+00e
287  * tvn    *     3.9300e+02e
288  * tln    *     3.9100e+02e
289  * pn     *     1.9680e+05e
290  * pan    *     0.0000e+00e
291  *
292  * level   2
293  *
294  * cfzl-t*      0.0000e+00
295  * cfzl-z*      7.3500e-02e
296  * cfzl-r*      0.0000e+00
297  * cfzv-t*      0.0000e+00
298  * cfzv-z*      7.3500e-02e
299  * cfzv-r*      0.0000e+00
300  * vol    *     5.8472e-01e
301  * fa-t   *     0.0000e+00e
302  * fa-z   *     5.8472e-01e
303  * fa-r   *     0.0000e+00e
304  * hd-t   *     6.3440e-03e
305  * hd-z   *     1.3531e-02e
306  * hd-r   *     0.0000e+00e
307  * alpn   *     1.0000e+00e
308  * vvn-t  *     0.0000e+00e
309  * vvn-z  *     0.0000e+00e
310  * vvn-r  *     0.0000e+00e
311  * vln-t  *     0.0000e+00e
312  * vln-z  *     0.0000e+00e
313  * vln-r  *     0.0000e+00e
314  * tvn    *     3.9300e+02e
315  * tln    *     3.9300e+02e
316  * pn     *     1.9680e+05e
317  * pan    *     0.0000e+00e
318  *
319  * level   3
320  *
321  * cfzl-t*      0.0000e+00
322  * cfzl-z*      7.3500e-02e
323  * cfzl-r*      0.0000e+00e
324  * cfzv-t*      0.0000e+00e
325  * cfzv-z*      7.3500e-02e
```

```
 * cfzv-r*     0.0000e+00e
 * vol   *     5.8472e-01e
 * fa-t  *     0.0000e+00e
 * fa-z  *     5.8472e-01e
 * fa-r  *     0.0000e+00e
 * hd-t  *     6.3440e-03e
 * hd-z  *     1.3531e-02e
 * hd-r  *     0.0000e+00e
 * alpn  *     1.0000e+00e
 * vvn-t *     0.0000e+00e
 * vvn-z *     0.0000e+00e
 * vvn-r *     0.0000e+00e
 * vln-t *     0.0000e+00e
 * vln-z *     0.0000e+00e
 * vln-r *     0.0000e+00e
 * tvn   *     3.9300e+02e
 * tln   *     3.9300e+02e
 * pn    *     1.9680e+05e
 * pan   *     0.0000e+00e
 *
 * level   4
 *
 * cfzl-t*     0.0000e+00e
 * cfzl-z*     7.3500e-02e
 * cfzl-r*     0.0000e+00e
 * cfzv-t*     0.0000e+00e
 * cfzv-z*     7.3500e-02e
 * cfzv-r*     0.0000e+00e
 * vol   *     5.8472e-01e
 * fa-t  *     0.0000e+00e
 * fa-z  *     5.8472e-01e
 * fa-r  *     0.0000e+00e
 * hd-t  *     6.3440e-03e
 * hd-z  *     1.3531e-02e
 * hd-r  *     0.0000e+00e
 * alpn  *     1.0000e+00e
 * vvn-t *     0.0000e+00e
 * vvn-z *     0.0000e+00e
 * vvn-r *     0.0000e+00e
 * vln-t *     0.0000e+00e
 * vln-z *     0.0000e+00e
 * vln-r *     0.0000e+00e
 * tvn   *     3.9300e+02e
 * tln   *     3.9300e+02e
 * pn    *     1.9680e+05e
 * pan   *     0.0000e+00e
 *
 * level   5
 *
 * cfzl-t*     0.0000e+00e
 * cfzl-z*     7.3500e-02e
 * cfzl-r*     0.0000e+00e
 * cfzv-t*     0.0000e+00e
 * cfzv-z*     7.3500e-02e
 * cfzv-r*     0.0000e+00e
 * vol   *     5.8472e-01e
 * fa-t  *     0.0000e+00e
 * fa-z  *     5.8472e-01e
 * fa-r  *     0.0000e+00e
 * hd-t  *     6.3440e-03e
 * hd-z  *     1.3531e-02e
 * hd-r  *     0.0000e+00e
 * alpn  *     1.0000e+00e
 * vvn-t *     0.0000e+00e
 * vvn-z *     0.0000e+00e
 * vvn-r *     0.0000e+00e
 * vln-t *     0.0000e+00e
 * vln-z *     0.0000e+00e
 * vln-r *     0.0000e+00e
 * tvn   *     3.9300e+02e
 * tln   *     3.9300e+02e
 * pn    *     1.9680e+05e
 * pan   *     0.0000e+00e
 *
 * level   6
 *
 * cfzl-t*     0.0000e+00e
 * cfzl-z*     7.3500e-02e
 * cfzl-r*     0.0000e+00e
 * cfzv-t*     0.0000e+00e
 * cfzv-z*     7.3500e-02e
 * cfzv-r*     0.0000e+00e
 * vol   *     5.8472e-01e
```

```
409  * fa-t  *      0.0000e+00e
410  * fa-z  *      5.8472e-01e
411  * fa-r  *      0.0000e+00e
412  * hd-t  *      6.3440e-03e
413  * hd-z  *      1.3531e-02e
414  * hd-r  *      0.0000e+00e
415  * alpn  *      1.0000e+00e
416  * vvn-t *      0.0000e+00e
417  * vvn-z *      0.0000e+00e
418  * vvn-r *      0.0000e+00e
419  * vln-t *      0.0000e+00e
420  * vln-z *      0.0000e+00e
421  * vln-r *      0.0000e+00e
422  * tvn   *      3.9300e+02e
423  * tln   *      3.9300e+02e
424  * pn    *      1.9680e+05e
425  * pan   *      0.0000e+00e
426  *
427  * level   7
428  *
429  * cfzl-t*      0.0000e+00e
430  * cfzl-z*      7.3500e-02e
431  * cfzl-r*      0.0000e+00e
432  * cfzv-t*      0.0000e+00e
433  * cfzv-z*      7.3500e-02e
434  * cfzv-r*      0.0000e+00e
435  * vol   *      5.8472e-01e
436  * fa-t  *      0.0000e+00e
437  * fa-z  *      5.8472e-01e
438  * fa-r  *      0.0000e+00e
439  * hd-t  *      6.3440e-03e
440  * hd-z  *      1.3531e-02e
441  * hd-r  *      0.0000e+00e
442  * alpn  *      1.0000e+00e
443  * vvn-t *      0.0000e+00e
444  * vvn-z *      0.0000e+00e
445  * vvn-r *      0.0000e+00e
446  * vln-t *      0.0000e+00e
447  * vln-z *      0.0000e+00e
448  * vln-r *      0.0000e+00e
449  * tvn   *      3.9300e+02e
450  * tln   *      3.9300e+02e
451  * pn    *      1.9680e+05e
452  * pan   *      0.0000e+00e
453  *
454  * level  8
455  *
456  * cfzl-t*      0.0000e+00e
457  * cfzl-z*      6.2300e-02e
458  * cfzl-r*      0.0000e+00e
459  * cfzv-t*      0.0000e+00e
460  * cfzv-z*      6.2300e-02e
461  * cfzv-r*      0.0000e+00e
462  * vol   *      5.8472e-01e
463  * fa-t  *      0.0000e+00e
464  * fa-z  *      5.8472e-01e
465  * fa-r  *      0.0000e+00e
466  * hd-t  *      6.3440e-03e
467  * hd-z  *      1.3531e-02e
468  * hd-r  *      0.0000e+00e
469  * alpn  *      1.0000e+00e
470  * vvn-t *      0.0000e+00e
471  * vvn-z *      0.0000e+00e
472  * vvn-r *      0.0000e+00e
473  * vln-t *      0.0000e+00e
474  * vln-z *      0.0000e+00e
475  * vln-r *      0.0000e+00e
476  * tvn   *      3.9300e+02e
477  * tln   *      3.9300e+02e
478  * pn    *      1.9680e+05e
479  * pan   *      0.0000e+00e
480  *
481  * level  9
482  *
483  * cfzl-t*      0.0000e+00e
484  * cfzl-z*      0.0000e+00e
485  * cfzl-r*      0.0000e+00e
486  * cfzv-t*      0.0000e+00e
487  * cfzv-z*      0.0000e+00e
488  * cfzv-r*      0.0000e+00e
489  * vol   *      1.2900e+00e
490  * fa-t  *      0.0000e+00e
491  * fa-z  *      3.5930e-01e
```

```
492  * fa-r  *     0.0000e+00e
493  * hd-t  *     2.8150e-01e
494  * hd-z  *     8.2855e-02e
495  * hd-r  *     0.0000e+00e
496  * alpn  *     1.0000e+00e
497  * vvn-t *     0.0000e+00e
498  * vvn-z *     0.0000e+00e
499  * vvn-r *     0.0000e+00e
500  * vln-t *     0.0000e+00e
501  * vln-z *     0.0000e+00e
502  * vln-r *     0.0000e+00e
503  * tvn   *     3.9300e+02e
504  * tln   *     3.9300e+02e
505  * pn    *     1.9680e+05e
506  * pan   *     0.0000e+00e
507  *
508  * level  10
509  *
510  * cfzl-t*     0.0000e+00e
511  * cfzl-z*     0.0000e+00e
512  * cfzl-r*     0.0000e+00e
513  * cfzv-t*     0.0000e+00e
514  * cfzv-z*     0.0000e+00e
515  * cfzv-r*     0.0000e+00e
516  * vol   *     1.2681e+00e
517  * fa-t  *     0.0000e+00e
518  * fa-z  *     1.2681e+00e
519  * fa-r  *     0.0000e+00e
520  * hd-t  *     7.2090e-02e
521  * hd-z  *     1.7809e-01e
522  * hd-r  *     0.0000e+00e
523  * alpn  *     1.0000e+00e
524  * vvn-t *     0.0000e+00e
525  * vvn-z *     0.0000e+00e
526  * vvn-r *     0.0000e+00e
527  * vln-t *     0.0000e+00e
528  * vln-z *     0.0000e+00e
529  * vln-r *     0.0000e+00e
530  * tvn   *     3.9300e+02e
531  * tln   *     3.9300e+02e
532  * pn    *     1.9680e+05e
533  * pan   *     0.0000e+00e
534  *
535  * level  11
536  *
537  * cfzl-t*     0.0000e+00e
538  * cfzl-z*     0.0000e+00e
539  * cfzl-r*     0.0000e+00e
540  * cfzv-t*     0.0000e+00e
541  * cfzv-z*     0.0000e+00e
542  * cfzv-r*     0.0000e+00e
543  * vol   *     1.2681e+00e
544  * fa-t  *     0.0000e+00e
545  * fa-z  *     1.2681e+00e
546  * fa-r  *     0.0000e+00e
547  * hd-t  *     7.2090e-02e
548  * hd-z  *     1.7809e-01e
549  * hd-r  *     0.0000e+00e
550  * alpn  *     1.0000e+00e
551  * vvn-t *     0.0000e+00e
552  * vvn-z *     0.0000e+00e
553  * vvn-r *     0.0000e+00e
554  * vln-t *     0.0000e+00e
555  * vln-z *     0.0000e+00e
556  * vln-r *     0.0000e+00e
557  * tvn   *     3.9300e+02e
558  * tln   *     3.9300e+02e
559  * pn    *     1.9680e+05e
560  * pan   *     0.0000e+00e
561  *
562  * level  12
563  *
564  * cfzl-t*     0.0000e+00e
565  * cfzl-z*     0.0000e+00e
566  * cfzl-r*     0.0000e+00e
567  * cfzv-t*     0.0000e+00e
568  * cfzv-z*     0.0000e+00e
569  * cfzv-r*     0.0000e+00e
570  * vol   *     1.4407e+00e
571  * fa-t  *     0.0000e+00e
572  * fa-z  *     1.4407e+00e
573  * fa-r  *     0.0000e+00e
574  * hd-t  *     7.2090e-02e
```

```
575  * hd-z  *     1.1844e+00
576  * hd-r  *     0.0000e+00
577  * alpn  *     1.0000e+00
578  * vvn-t *     0.0000e+00
579  * vvn-z *     0.0000e+00
580  * vvn-r *     0.0000e+00
581  * vln-t *     0.0000e+00
582  * vln-z *     0.0000e+00
583  * vln-r *     0.0000e+00
584  * tvn   *     3.9300e+02
585  * tln   *     3.9300e+02
586  * pn    *     1.9680e+05
587  * pan   *     0.0000e+00
588  *
589  *******   type           num            id        ctitle
590  pipe            2       2 $2$ pipe connection to lower plen.
591  *       ncells         nodes          jun1          jun2          epsw
592                1             0             1             2    0.0000e+00
593  *         ichf         iconc          iacc          ipow
594                0             0             0             0
595  *        radin            th         houtl         houtv         toutl
596      7.7600e-02    1.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
597  *        toutv
598      2.9300e+02
599  *
600  * dx    *     2.0000e-01e
601  * vol   *     8.8820e-02e
602  * fa    * f   4.4410e-01e
603  * fric  * f   0.0000e+00e
604  * grav  * f   0.0000e+00e
605  * hd    * f   1.5520e-01e
606  * nff   * f          -1e
607  * alp   *     0.6000e+00e
608  * vl    * f   0.0000e+00e
609  * vv    * f   0.0000e+00e
610  * tl    *     3.9100e+02e
611  * tv    *     3.9100e+02e
612  * p     *     1.9680e+05e
613  * pa    *     0.0000e+00e
614  *
615  *******   type           num            id        ctitle
616  fill            1       1 $1$ core inlet conditions
617  *         jun1          ifty          ioff
618                1            10             0
619  *         iftr          ifsv          nftb          nfsv          nfrf
620             1002           101             0             0             0
621  *       twtold          rfmx         concin          felv
622      9.0000e-01    1.0000e+20    0.0000e+00    0.0000e+00
623  *         dxin         volin         alpin         vlin          tlin
624      1.0000e-01    1.8900e-04    0.0000e+00    0.0000e+00    3.9400e+02
625  *          pin          pain         flowin         vvin          tvin
626      3.0000e+05    0.0000e+00    0.0000e+00    0.0000e+00    3.9400e+02
627  *  fill signal variables or control blocks
628  *  mliq  mvap      tliq      tvap      alp
629    -4     -2        -5        -5        -2
630  *  p     pa
631    -3     -2
632  *
633  *******   type           num            id        ctitle
634  break           5       5 $5$ break-up pressure
635  *         jun1          ibty          isat          ioff
636                4             1             3             0
637  *         ibtr          ibsv          nbtb          nbsv          nbrf
638                0           101            20             0             0
639  *         dxin         volin         alpin           tin           pin
640      1.0000e+00    4.4410e+01    1.0000e+00    3.9300e+02    1.9700e+05
641  *         pain         concin          rbmx          poff          belv
642      0.0000e+00    0.0000e+00    1.0000e+06    0.0000e+00    0.0000e+00
643  *         pscl         tlscl         tvscl         pascl         conscl
644      1.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
645  * ptb   *     0.0000e+00    1.9680e+05    5.2000e+01    1.9680e+05    6.3000e+01
646  * ptb   *     2.0120e+05    6.9000e+01    2.2400e+05    8.1000e+01    2.3060e+05
647  * ptb   *     2.3600e+02    2.6320e+05    2.7500e+02    2.6450e+05    3.0000e+02
648  * ptb   *     2.6000e+05    3.5000e+02    2.5630e+05    4.1400e+02    2.5500e+05
649  * ptb   *     4.8000e+02    2.5690e+05    5.1100e+02    2.5500e+05    5.6300e+02
650  * ptb   *     2.4380e+05    6.0000e+02    2.4940e+05    6.5000e+02    2.4940e+05
651  * ptb   *     6.6300e+02    2.1810e+05    6.8300e+02    1.9650e+05    7.0000e+02
652  * ptb   *     1.9500e+05    7.4100e+02    1.7670e+05    1.0000e+03    1.8690e+05
653  * ptb   * e
654  *
655  *******   type           num            id        ctitle
656  pipe            4       4 $4$ pipe connecting up to break
657  *       ncells         nodes          jun1          jun2          epsw
```

```
658                1              0              3              4    0.0000e+00
659  *           ichf          iconc           iacc           ipow
660                0              0              0              0
661  *          radin             th          houtl          houtv          toutl
662      7.7600e-02    1.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
663  *          toutv
664      2.9300e+02
665  *
666  * dx     *     1.0000e+00
667  * vol    *     4.4410e-01
668  * fa     * f   4.4410e-01
669  * fric   * f   0.0000e+00
670  * grav   * f   0.0000e+00
671  * hd     * f   1.5520e-01
672  * nff    * f          -1e
673  * alp    *     1.0000e+00
674  * vl     * f   0.0000e+00
675  * vv     * f   0.0000e+00
676  * tl     *     3.9300e+02
677  * tv     *     3.9300e+02
678  * p      *     1.9680e+05
679  * pa     *     0.0000e+00
680  *
681  *******   type           num            id        ctitle
682  rod             6       6 $6$ heated rod
683  *           ncrx          ncrz
684                1             6
685  *         nopowr         nridr         modez         liqlev         iaxcnd
686                0             0             0             *1* 0           1
687  *          idbci         idbco          hdri          hdro
688                0             2    0.0000e+00    1.3650e-02  *0.01069*
689  *          nrods         nodes         irftr         nzmax         irftr2
690             1           6        *1001* 1002    250           1001
691  *      dtxht(1)      dtxht(2)         dznht         hgapo          shelv
692      2.5000e+00    1.0000e+01    1.0000e-03    1.0000e+10    2.0000e-01
693  *        irpwty          ndgx          ndhx          nrts          nhist
694                7             0             0            10              0
695  *        irpwtr         irpwsv        nrpwtb        nrpwsv        nrpwrf
696             *1001* 1002     101            15             0             0
697  *        izpwtr         izpwsv        nzpwtb        nzpwsv        nzpwrf
698                0           101             1             0             0
699  *         nmwrx          nfci          nfcil
700                0             0             0
701  *         nzpwz         nzpwi         nfbpwt
702               36             1             0
703  *         react         tneut         rpwoff         rrpwmx         rpwscl
704      0.0000e+00    1.6250e-05    0.0000e+00    1.0000e+30    1.0000e+00
705  *        rpowri          zpwin         zpwoff         rzpwmx
706      9.3600e+06    0.0000e+00    0.0000e+00  *-1.0000e+20*  0.0
707  *        extsou          pldr          pdrat         fucrac
708      0.0000e+00    0.0000e+00    1.3364e+00    1.0000e+00
709  *
710  * nhcomo* f            3e
711  * nhcelo*              1             2             3             4             5
712  * nhcelo*              6             7             8 e
713  * z      *     2.0000e-01    8.1000e-01 s
714  * z      *     1.4200e+00    2.0300e+00 s
715  * z      *     2.6400e+00 s
716  * z      *     3.2500e+00    3.8600e+00e
717  * grav   * f   1.0000e+00
718  * rdx    *     1.8240e+03e
719  * radrd  *     0.0000e+00    2.7000e-03    3.3000e-03    4.3500e-03    4.8500e-03
720  * radrd  *     5.3500e-03e
721  * matrd  *             58            55            59r02         60e
722  * nfax   * f            1e
723  * rftn   * f 3.9100e+02 e
724  * rdpwr  *     0.0000e+00r02 1.0000e+00r03 0.0000e+00e
725  * cpowr  *     1.0000e+00e
726  * zpwzt array (new)
727   0.2s
728  0.2001s
729  0.455s
730  0.45501s
731  0.705s
732  0.70501s
733  0.915s
734  0.91501s
735  1.115s
736  1.11501s
737  1.315s
738  1.31501s
739  1.525s
740  1.52501s
```

```
741  1.725s
742  1.72501s
743  1.925s
744  1.92501s
745  2.135s
746  2.13501s
747  2.335s
748  2.33501s
749  2.535s
750  2.53501s
751  2.745s
752  2.74501s
753  2.945s
754  2.94501s
755  3.145s
756  3.14501s
757  3.355s
758  3.35501s
759  3.605s
760  3.60501s
761  3.85999s
762  3.86e
763  * zpwtb array (new)
764  r02 0.0s
765  r02 0.275s
766  r02 0.568s
767  r02 0.815s
768  r02 1.011s
769  r02 1.176s
770  r02 1.312s
771  r02 1.412s
772  r02 1.471s
773  r02 1.492s
774  r02 1.471s
775  r02 1.412s
776  r02 1.312s
777  r02 1.176s
778  r02 1.011s
779  r02 0.815s
780  r02 0.568s
781  r02 0.275s
782  0.0 e
783  * rpwtb * r02 0.0000e+00    5.0000e+00    9.3600e+06    6.3000e+01    9.3600e+06
784  * rpwtb *     7.3000e+01    8.9100e+06    8.8000e+01    8.4500e+06    1.0800e+02
785  * rpwtb *     8.0200e+06    1.3300e+02    7.6400e+06    1.6300e+02    7.3100e+06
786  * rpwtb *     2.2300e+02    6.8200e+06    2.8300e+02    6.2200e+06    3.8300e+02
787  * rpwtb *     5.8100e+06    4.8300e+02    5.4300e+06    6.3300e+02    5.0600e+06
788  * rpwtb *     8.3300e+02    4.6600e+06    1.0330e+03    4.3900e+06e
789  * fpuo2 *     0.0000e+00e
790  * ftd   *     1.0000e+00e
791  * gmix  * f   0.0000e+00e
792  * gmles *     0.0000e+00e
793  * pgapt *     0.0000e+00e
794  * plvol *     0.0000e+00e
795  * pslen *     0.0000e+00e
796  * clenn *     0.0000e+00e
797  * burn  * f   0.0000e+00e
798  *
799  *******   type           num            id        ctitle
800  slab            7       7 $7$ downcomer heat structure
801  *         ncrx          ncrz
802                1             7
803  *       nopowr         nridr         modez        liqlev        iaxcnd
804                1             0             0             0             1
805  *        idbci         idbco          hdri          hdro
806                0             2    0.0000e+00    1.3650e-02
807  *        width        ipatch
808      7.6000e+00             0
809  *        nrods         nodes         irftr         nzmax
810                1             5          1001           200
811  *     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
812      2.5000e+00    1.0000e+01    1.0000e-03    1.0000e+10    2.0000e-01
813  *
814  * nhcomo* f            3e
815  * nhcelo*              1             2             3             4             5
816  * nhcelo*              6             7             8             9 e
817  * z     *     2.0000e-01    8.1000e-01 s
818  * z     *     1.4200e+00    2.0300e+00 s
819  * z     *     2.6400e+00 s
820  * z     *     3.2500e+00    3.8600e+00    3.9800e+00 e
821  * grav  * f   1.0000e+00e
822  * rdx   *     1.0000e+00e
823  * radrd *     0.0000e+00    2.0000e-03    4.0000e-03    5.5000e-03    6.9000e-03
```

```
* radrd * e
* matrd * f            6e
* nfax  * f            1e
* rftn  * f 3.9300e+02 e
*
*******   type           num           id        ctitle
slab           100       100 $100$ lower plenum slab
*         ncrx           ncrz
              1              1
*       nopowr         nridr         modez        liqlev        iaxcnd
              1              0             1             0             0
*        idbci         idbco          hdri          hdro
              2              0    1.3650e-02    0.0000e+00
*        width        ipatch
     2.8400e+02              0
*        nrods         nodes         irftr         nzmax
              1              4             0             3
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
     3.0000e+00    1.0000e+01    1.0000e-01    1.0000e+10    0.0000e+00
*
* nhcomi* f            3e
* nhceli* r02          1             2e
* dz    *     2.0000e-01e
* grav  *     1.0000e+00e
* rdx   *     1.0000e+00e
* radrd *     9.1770e+00    9.1784e+00    9.1799e+00    9.1813e+00e
* matrd * f            6e
* nfax  *              1e
* rftn  * f   3.9100e+02e
*
end
*
*****************************************************************************
*                          time step data                                   *
*****************************************************************************
*
*           dtmin          dtmax          tend           rtwfp
            1.0e-6         0.020          5.0           10.0
*           edint          gfint          dmpint         sedint
            5.0           0.5             5.0       5.0
*                                                                           *
*           dtmin          dtmax          tend           rtwfp
            1.0e-6         0.050          50.0          10.0
*           edint          gfint          dmpint         sedint
            45.0           0.5             45.0       45.0
*                                                                           *
*           dtmin          dtmax          tend           rtwfp
            1.0e-6         0.050          100.0          10.0
*           edint          gfint          dmpint         sedint
            50.0           0.5             50.0       50.0
*                                                                           *
*           dtmin          dtmax          tend           rtwfp
            1.0e-6         0.100          450.0       10.0
*           edint          gfint          dmpint         sedint
            50.0           0.5            50.0    50.0
*                                                                           *
*      endflag
   -1.0000e+00
```

APPENDIX X

CODE-DATA COMPARISON FOR CCTF RUN 14 FOR THE RENODED CCTF INPUT MODELWITH NEWRFD=3

This appendix presents the calculation results for the renoded CCTF input model for the reflood option newrfd=3, without and with grid spacers modeled. These calculations can be compared to the finely noded CCTF input model calculations that are presented in the main body of the report.

Without Grid Spacers		With Grid Spacers	
Coarsely noded model	Finely noded model	Coarsely noded model	Finely noded model
X-1	4.7-8	X-16	4.7-23
X-2	4.7-9	X-17	4.7-24
X-3	4.7-10	X-18	4.7-25
X-4	4.7-11	X-19	4.7-26
X-5	4.7-12	X-20	4.7-27
X-6	4.7-13	X-21	4.7-28
X-7	4.7-14	X-22	4.7-29
X-8	4.7-15	X-23	4.7-30
X-9	4.7-16	X-24	4.7-31
X-10	4.7-17	X-25	4.7-32
X-11	4.7-18	X-26	4.7-33
X-12	4.7-19	X-27	4.7-34
X-13	4.7-20	X-28	4.7-35
X-14	4.7-21	X-29	4.7-36
X-15	4.7-22	X-30	4.7-37

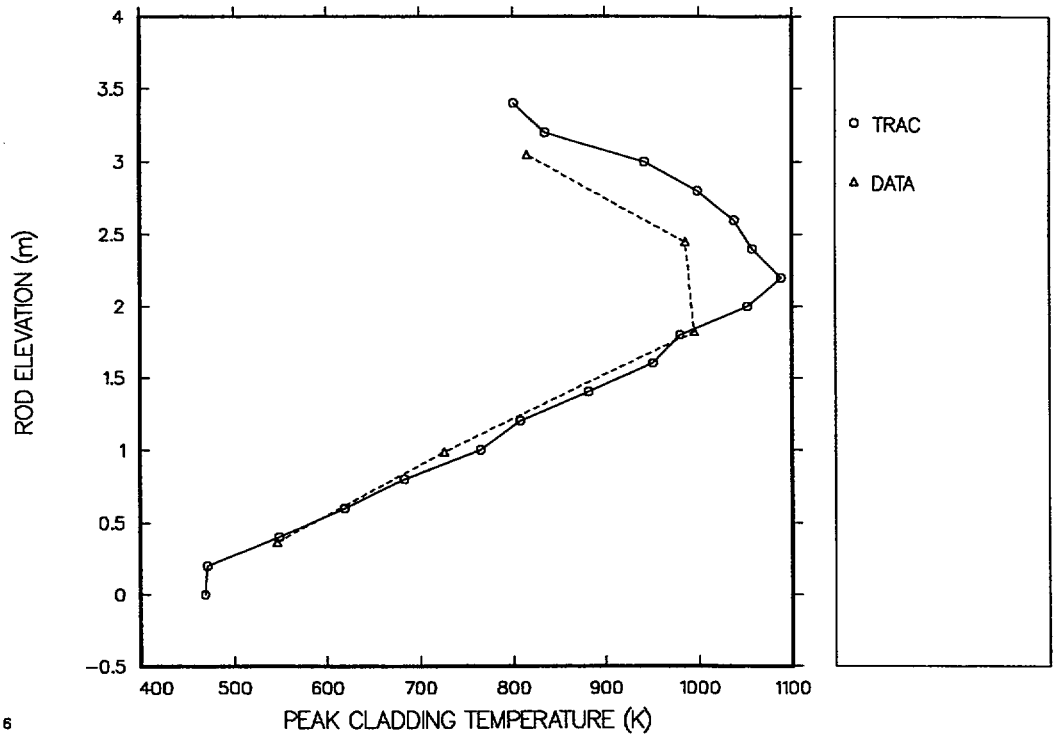


Fig. X-1. Comparison of predicted and measured PCTs (experimental data from Ref. 4.7-7).

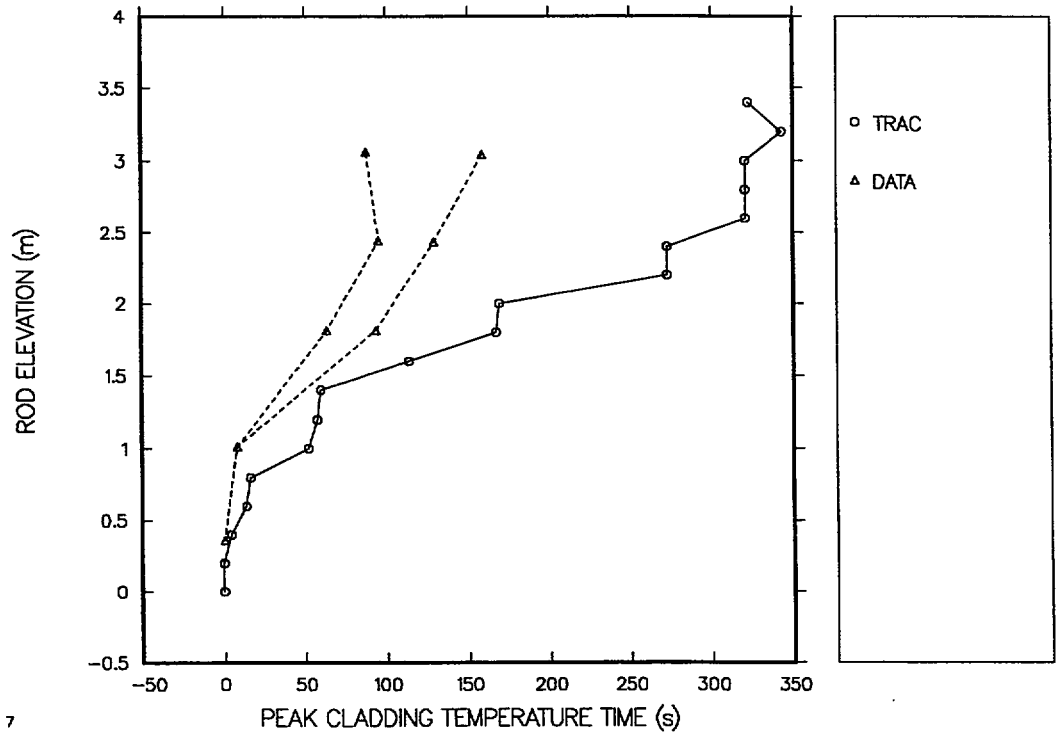


Fig. X-2. Comparison of predicted and measured PCT times (experimental data from Ref. 4.7-7).

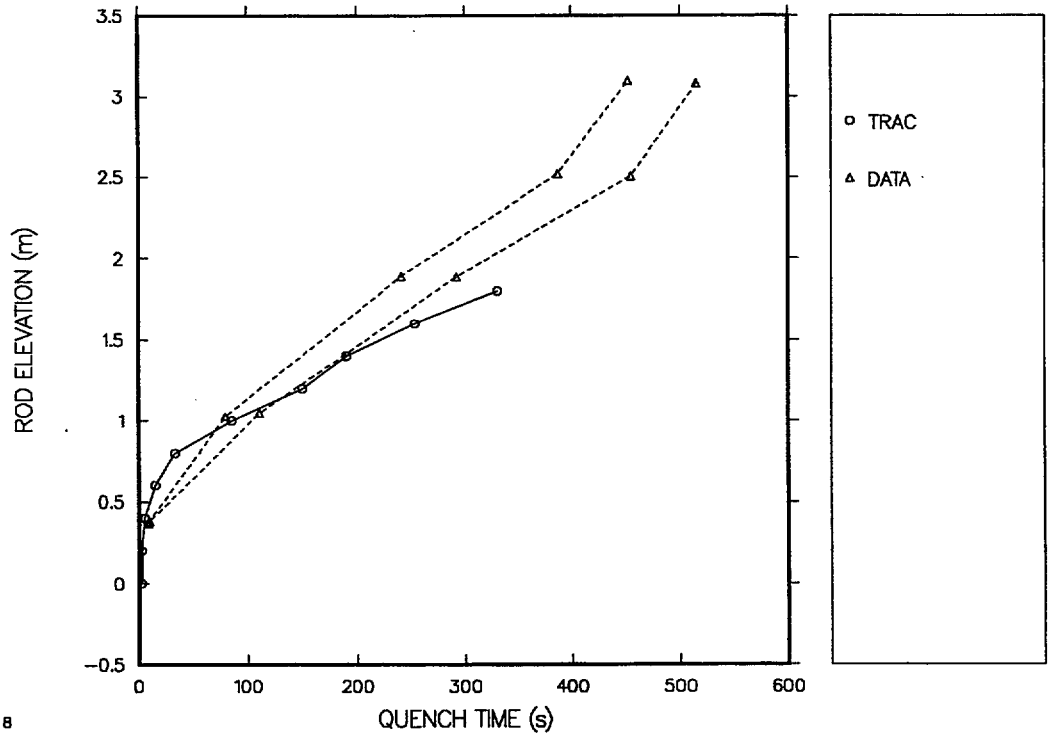


Fig. X-3. Comparison of predicted and measured quench times (experimental data from Ref. 4.7-7).

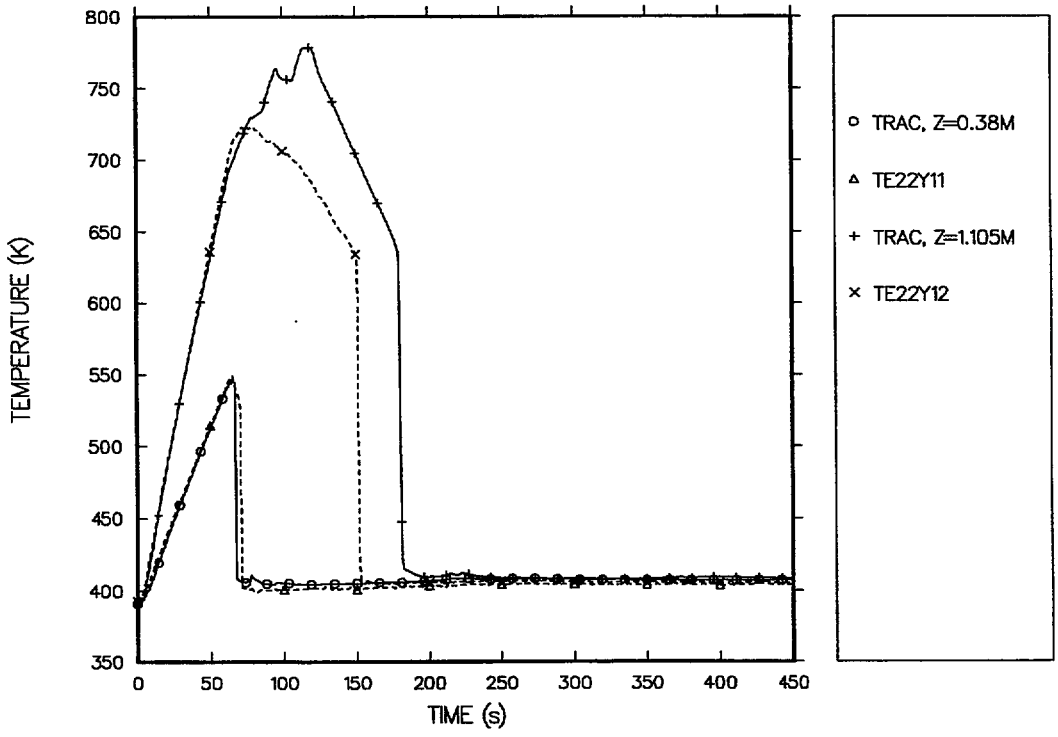


Fig. X-4. CCTF-14 run: Wall-temperature histories at 0.38- and 1.105-m elevations.

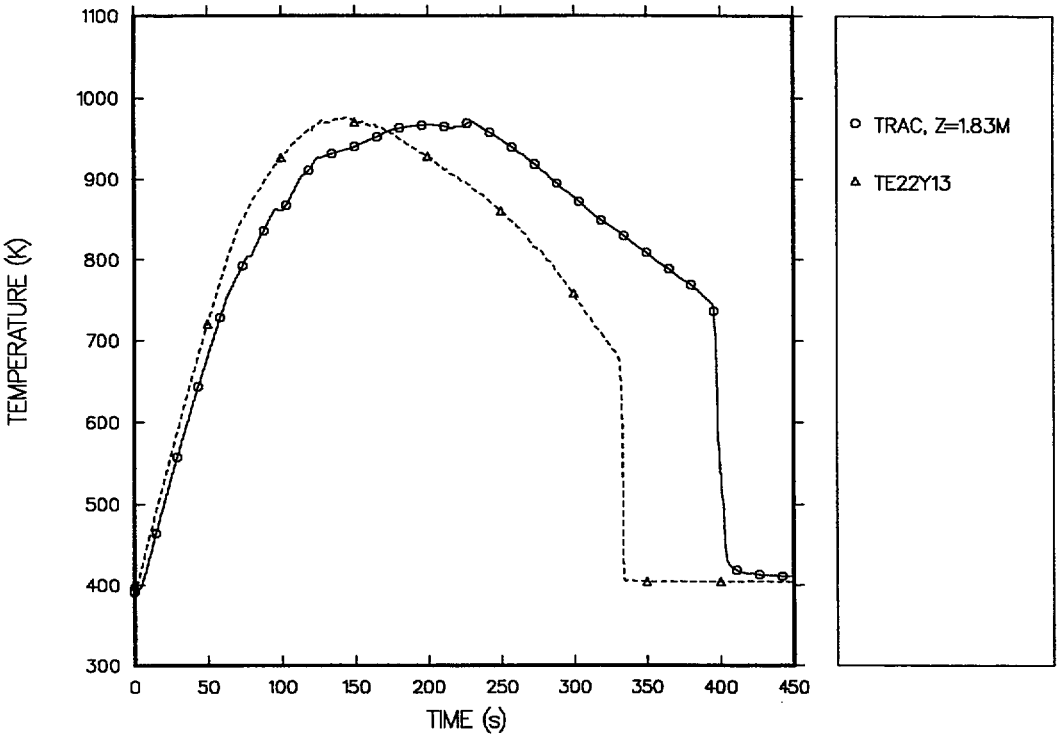


Fig. X-5. CCTF-14 run: Wall-temperature histories at 1.83-m elevations.

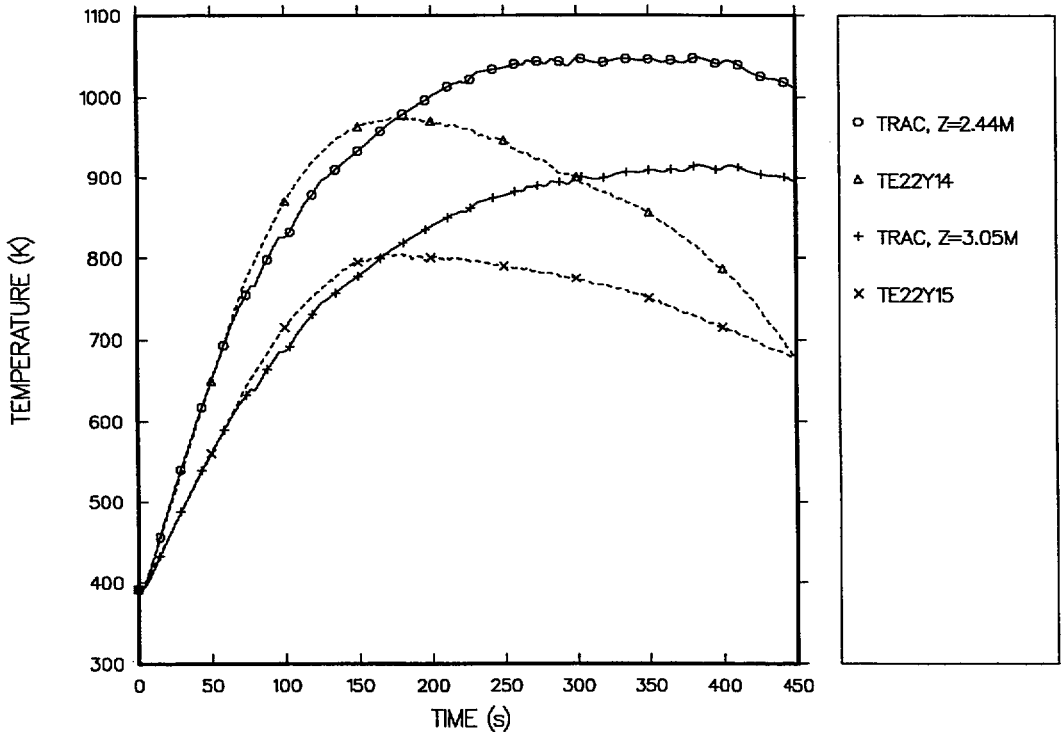


Fig. X-6. CCTF-14 run: Wall-temperature histories at 2.44- and 3.05-m elevations.

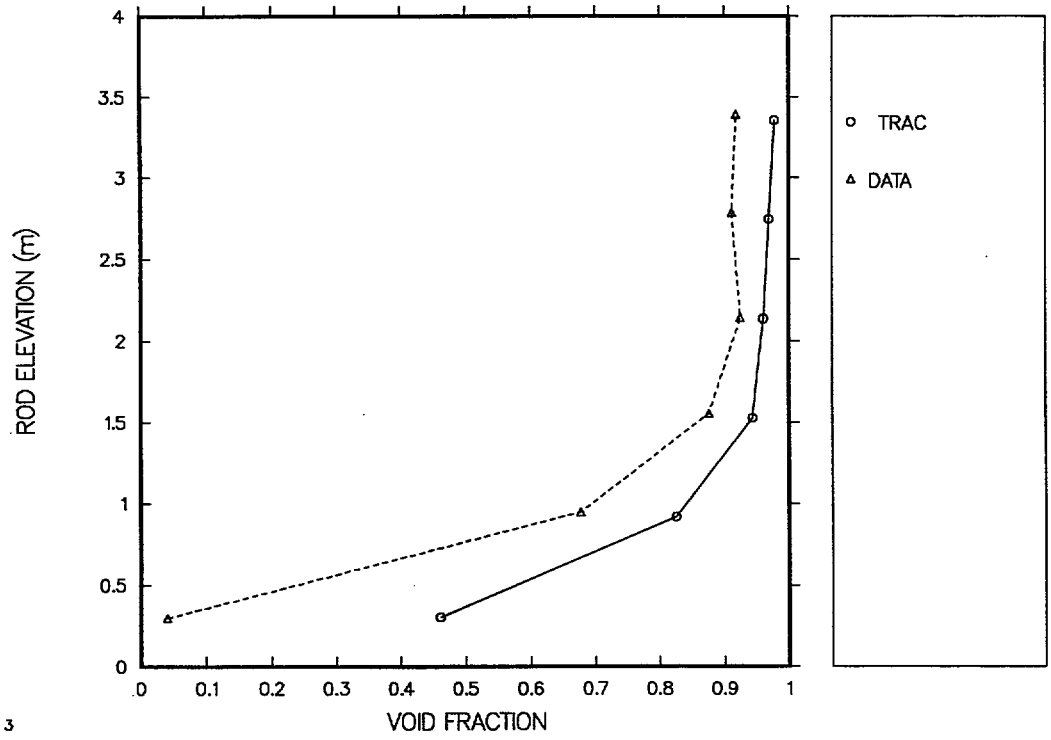


Fig. X-7. Comparison of predicted and measured core-axial void-fraction profiles at 37 s (experimental data from Ref. 4.7-7).

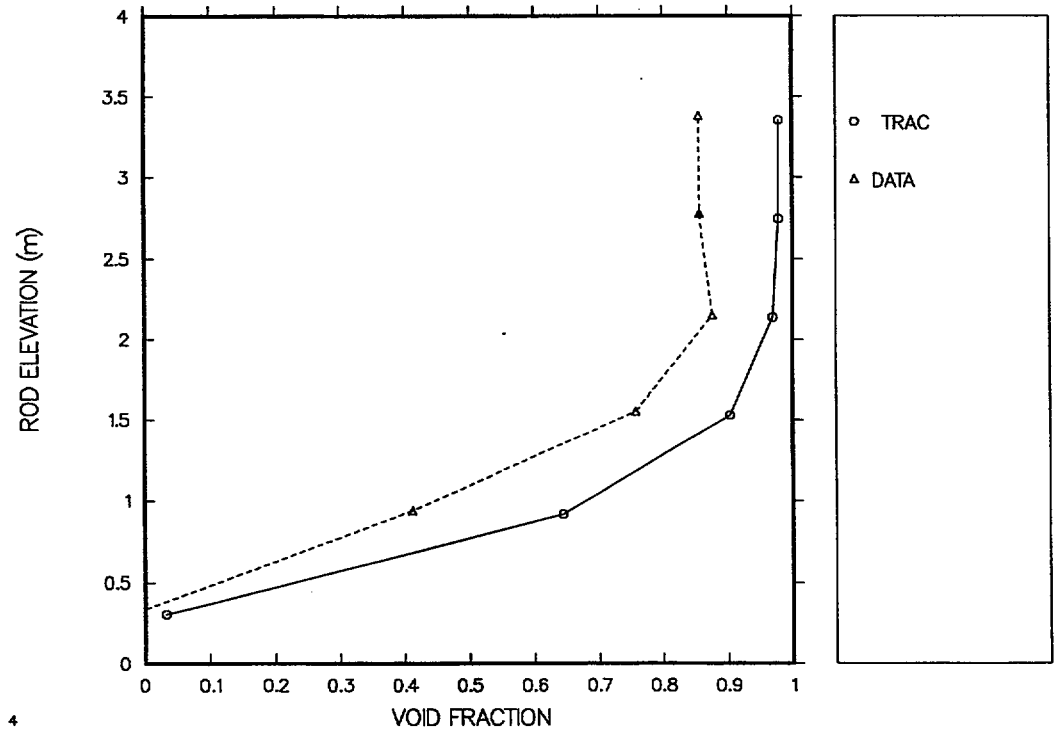


Fig. X-8. Comparison of predicted and measured core-axial void-fraction profiles at 137 s (experimental data from Ref. 4.7-7).

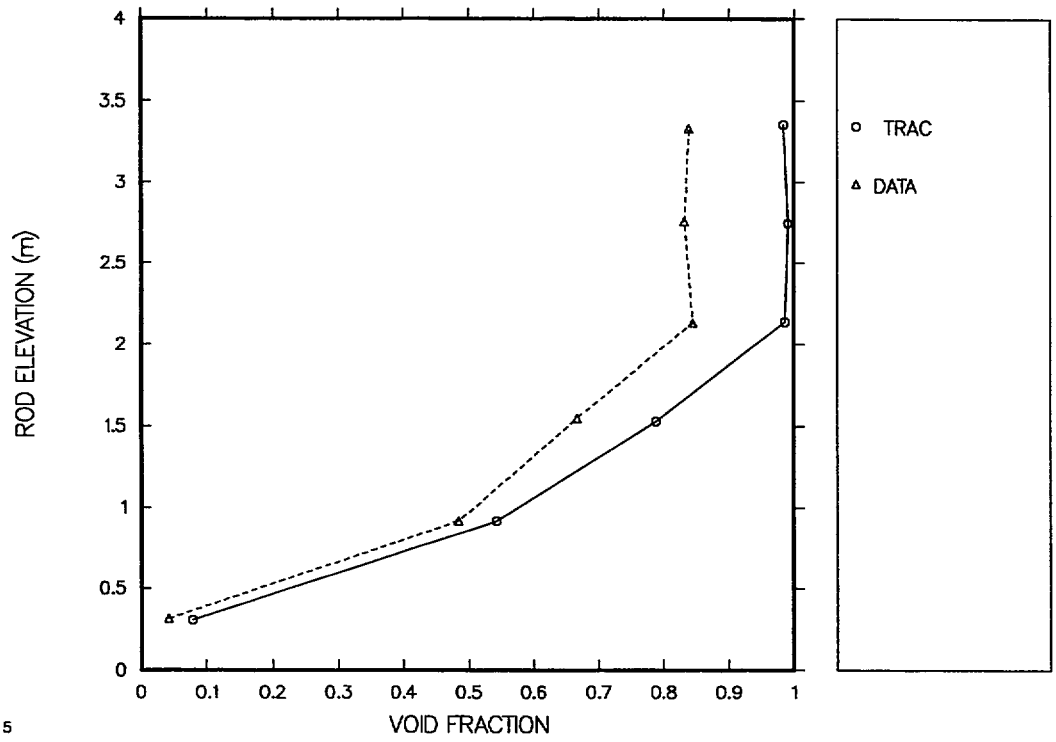


Fig. X-9. Comparison of predicted and measured core-axial void-fraction profiles at 237 s (experimental data from Ref. 4.7-7).

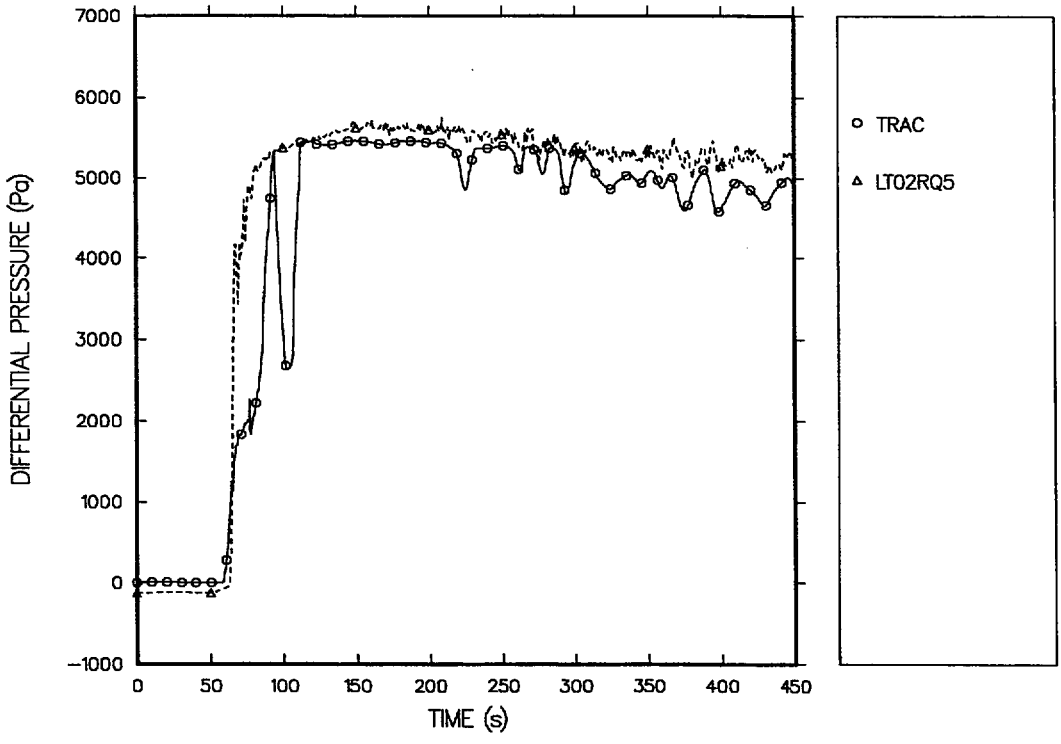


Fig. X-10. CCTF-14 run: Core ΔP history between the 0.0- and 0.61-m elevations.

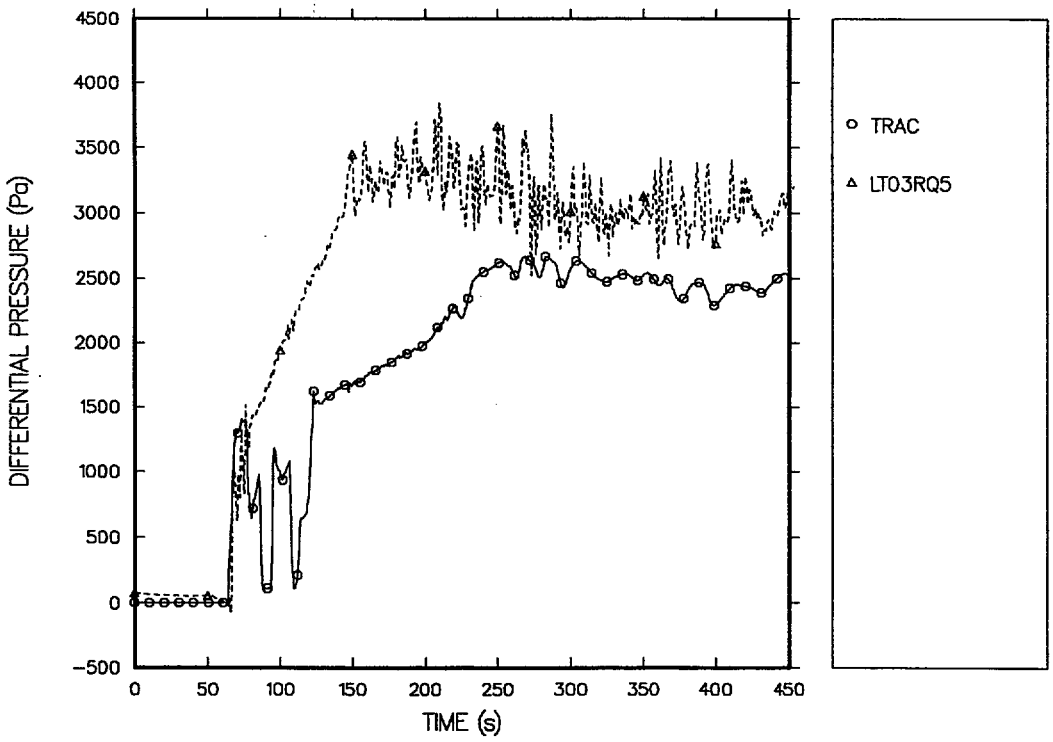


Fig. X-11. CCTF-14 run: Core ΔP history between the 0.61- and 1.22-m elevations.

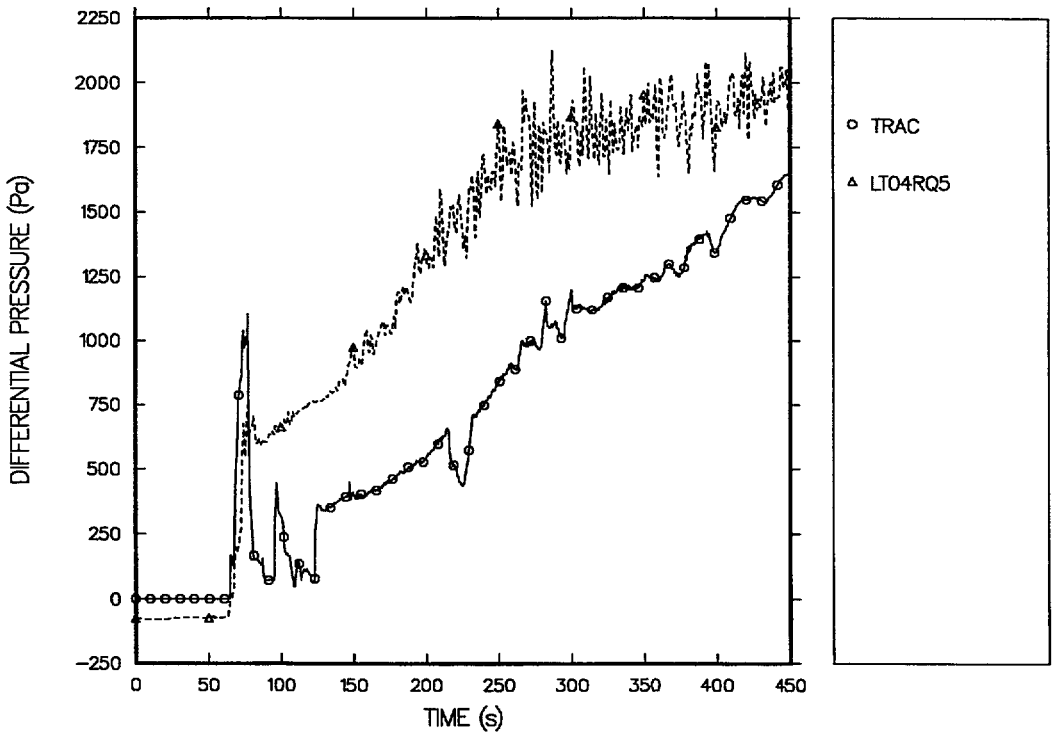


Fig. X-12. CCTF-14 run: Core ΔP history between the 1.22- and 1.83-m elevations.

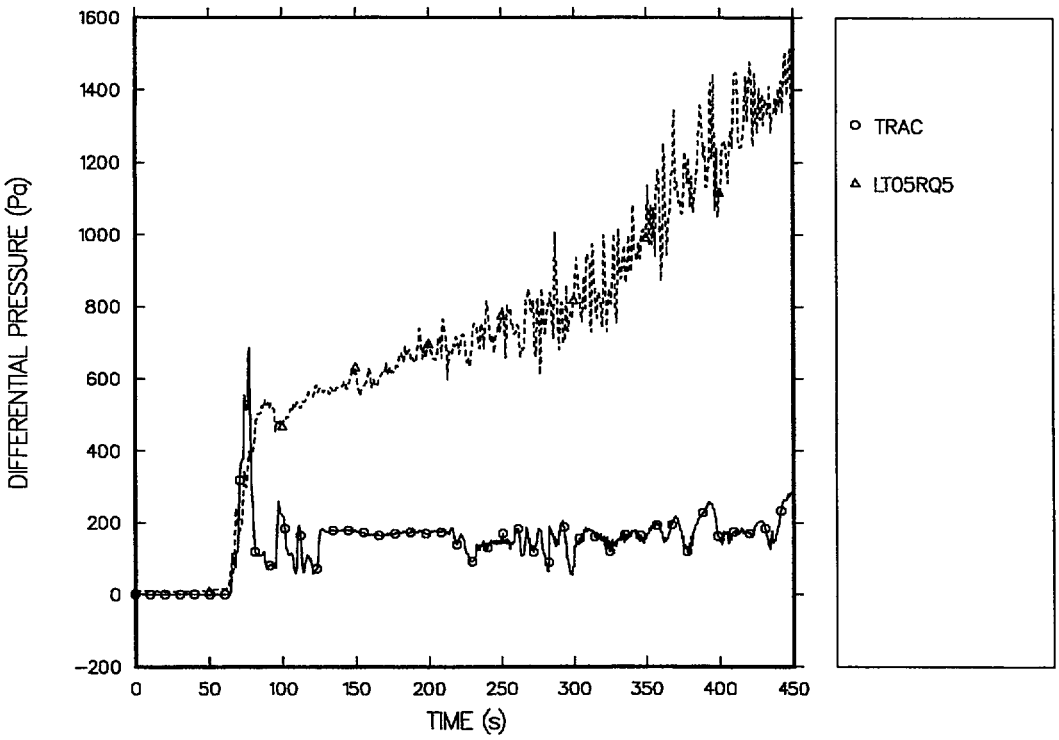


Fig. X-13. CCTF-14 run: Core ΔP history between the 1.83- and 2.44-m elevations.

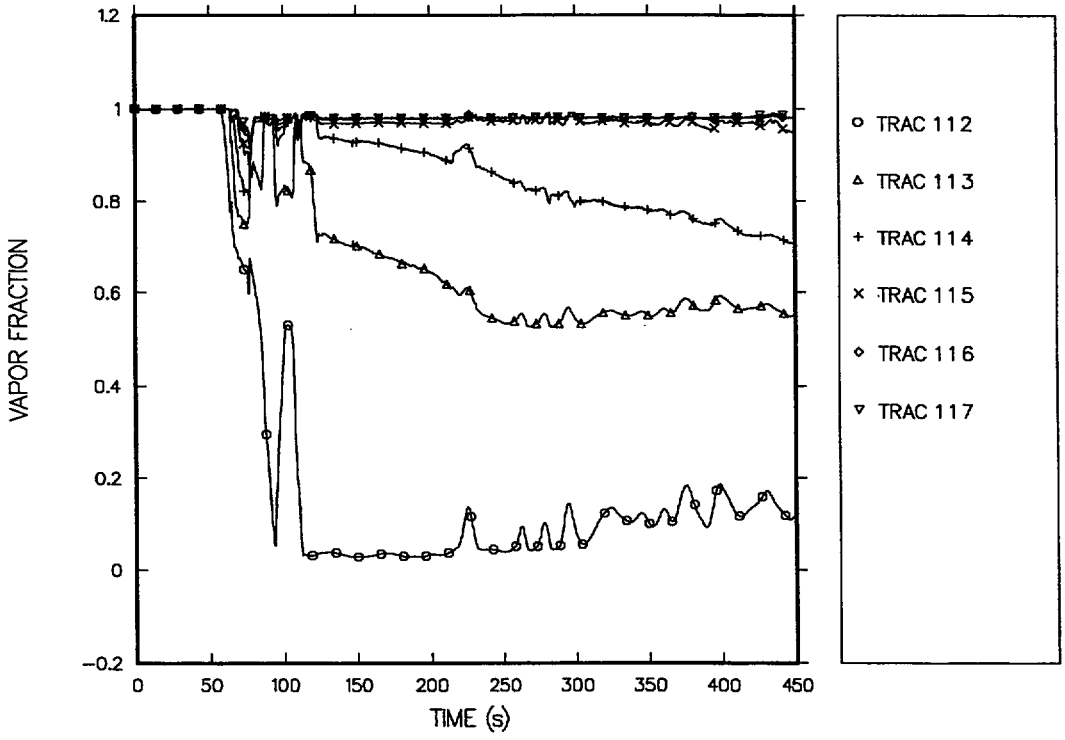


Fig. X-14. CCTF-14 run: Predicted void-fraction histories within the core.

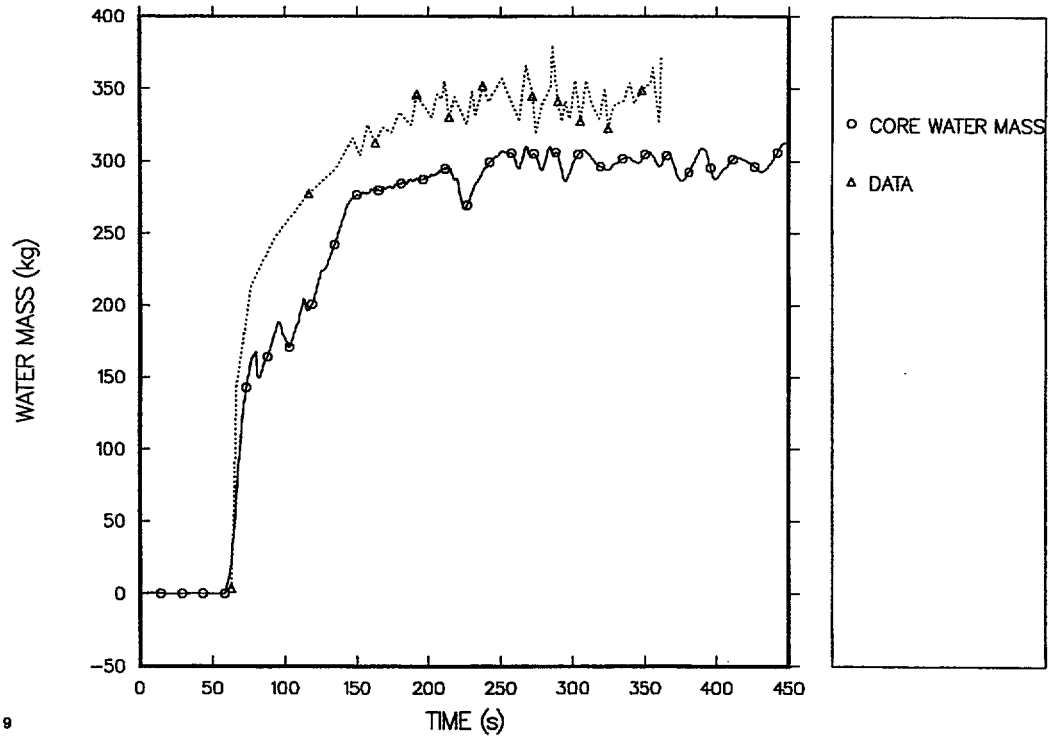


Fig. X-15. CCTF-14 run: Comparison of predicted and measured core mass.

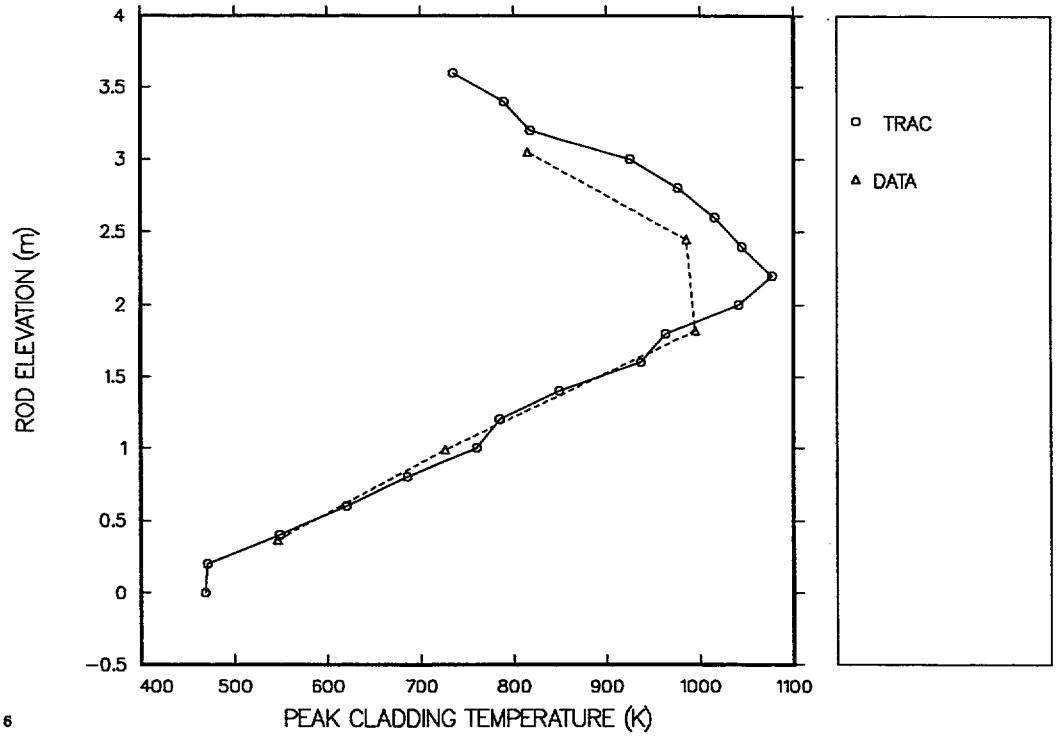


Fig. X-16. Comparison of predicted and measured PCTs with the grid-spacer model (experimental data from Ref. 4.7-7).

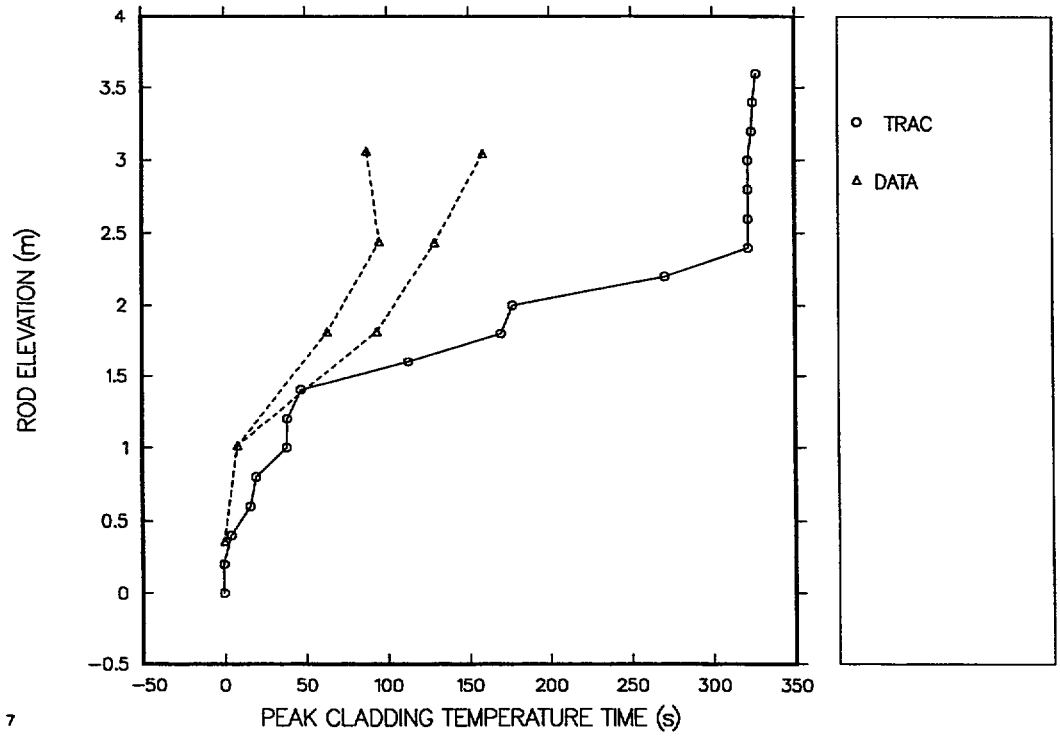


Fig. X-17. Comparison of predicted and measured PCT times with the grid-spacer model (experimental data from Ref. 4.7-7).

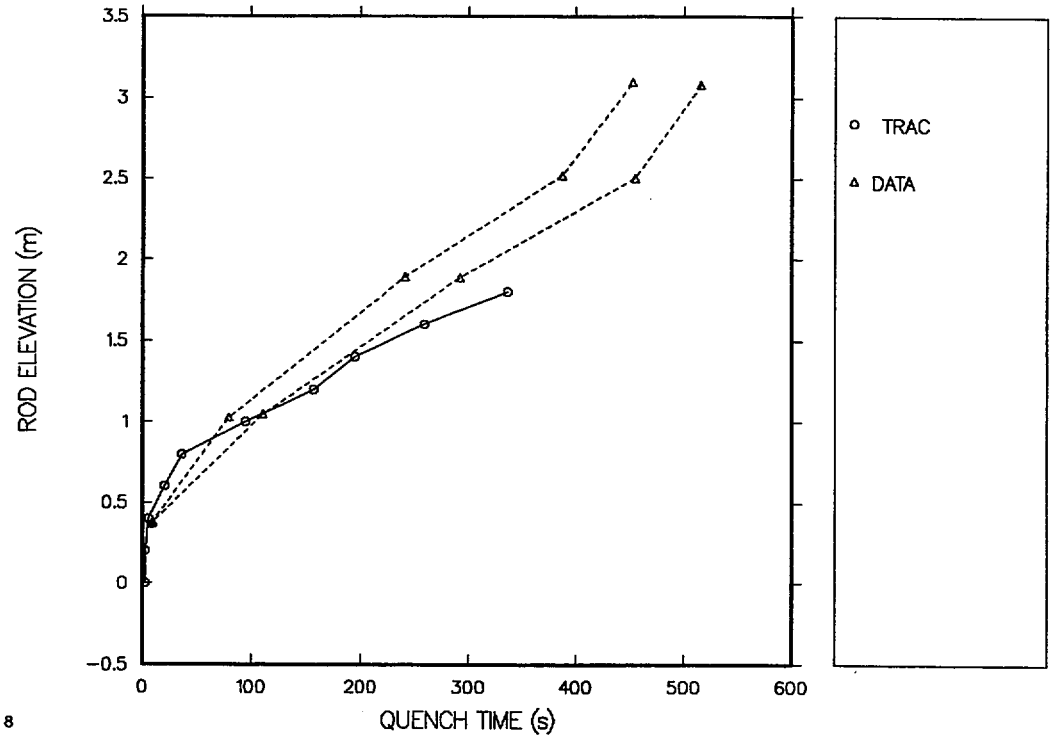


Fig. X-18. Comparison of predicted and measured quench times with the grid-spacer model (experimental data from Ref. 4.7-7).

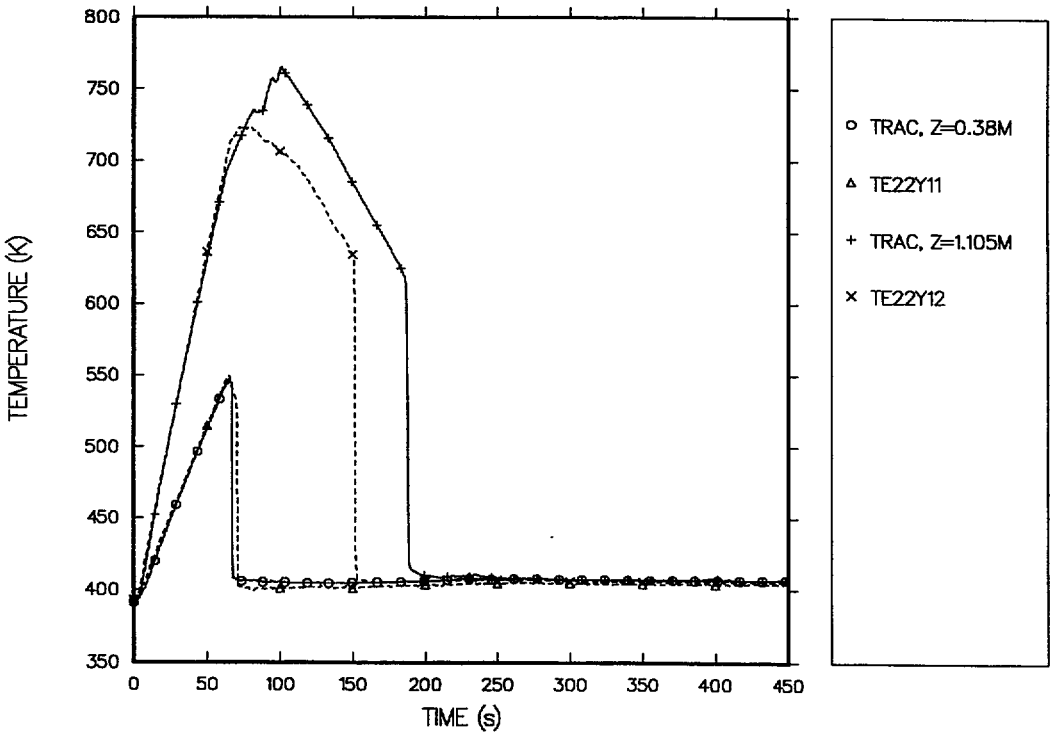


Fig. X-19. CCTF-14 run: Wall-temperature histories at 0.38- and 1.105-m elevations with the grid-spacer model.

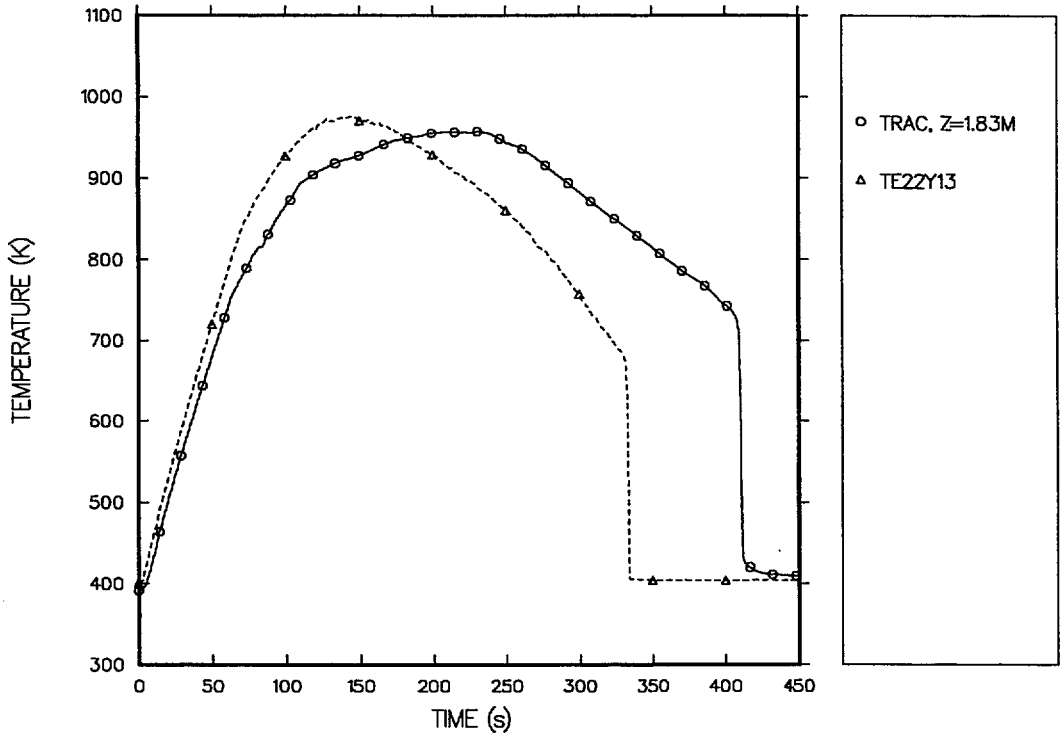


Fig. X-20. CCTF-14 run: Wall-temperature histories at 1.83-m elevations with the grid-spacer model.

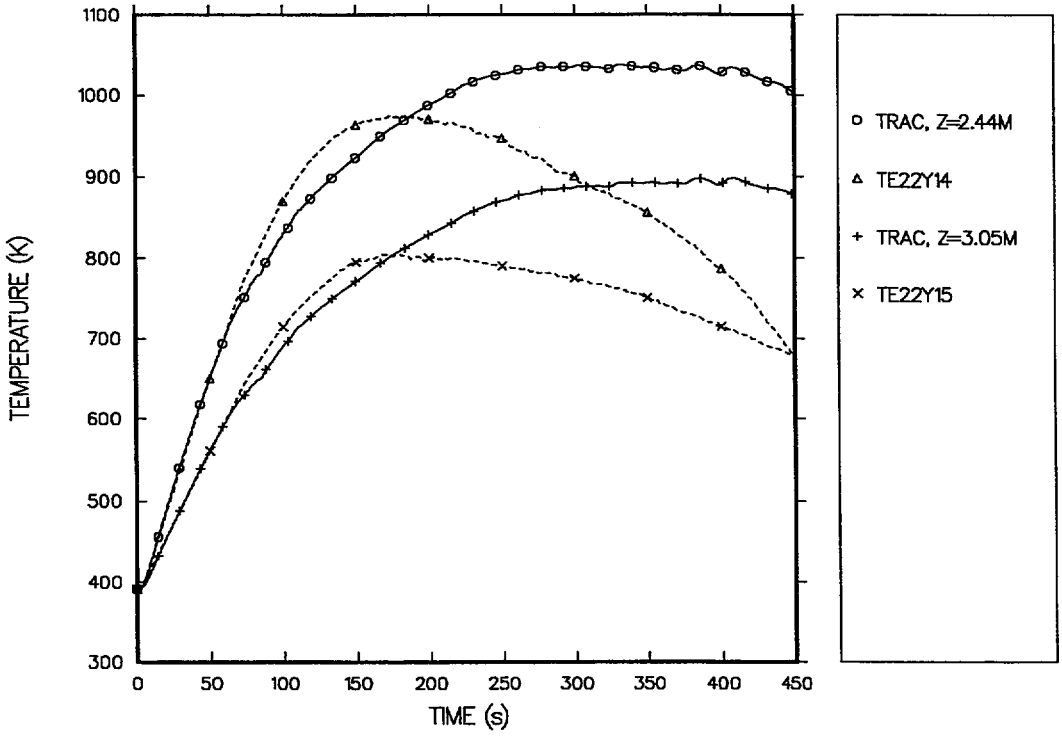


Fig. X-21. CCTF-14 run: Wall-temperature histories at 2.44- and 3.05-m elevations with the grid-spacer model.

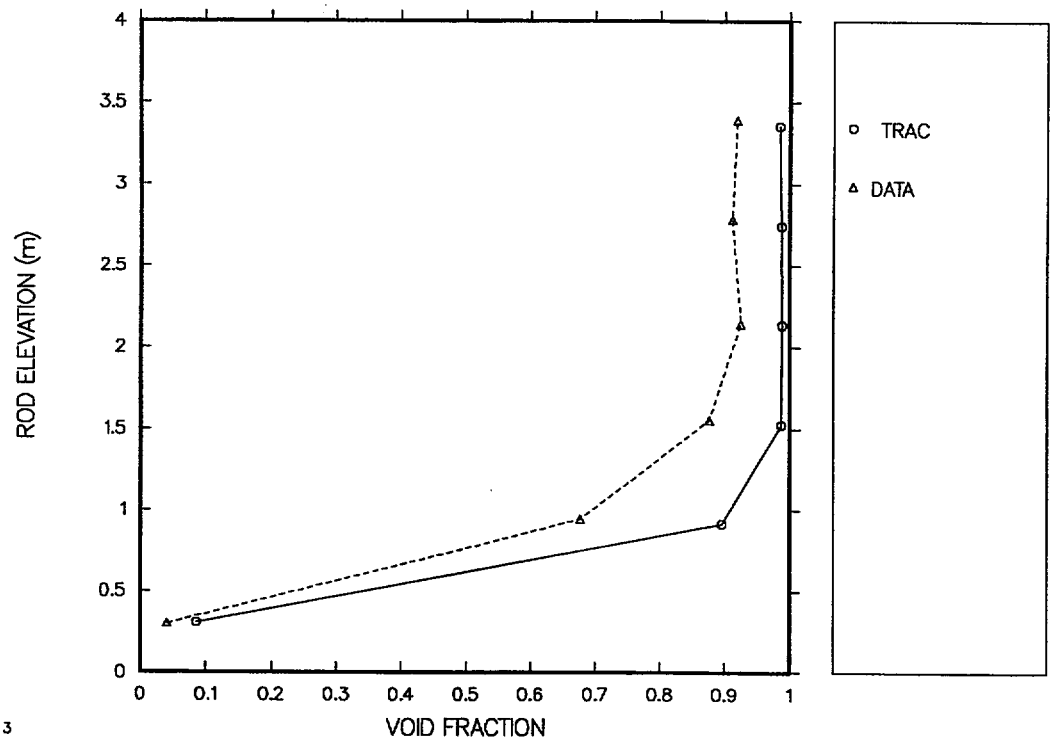


Fig. X-22. Comparison of predicted and measured core-axial void-fraction profiles at 37 s with the grid-spacer model (experimental data from Ref. 4.7-7).

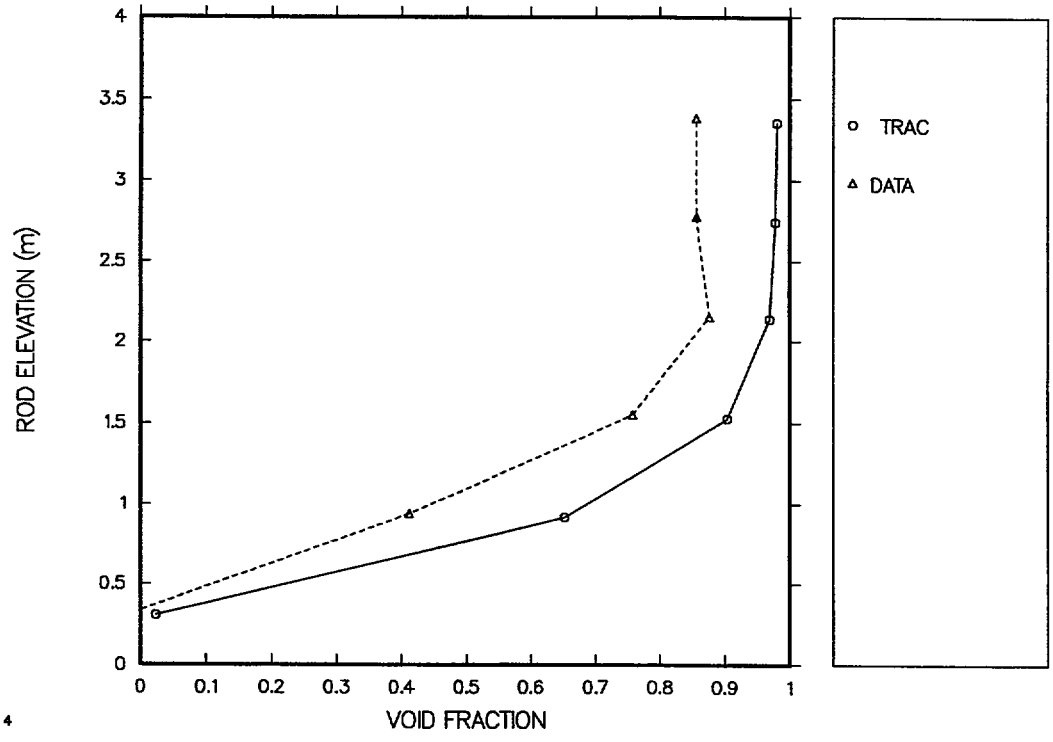


Fig. X-23. Comparison of predicted and measured core-axial void-fraction profiles at 137 s with the grid-spacer model (experimental data from Ref. 4.7-7).

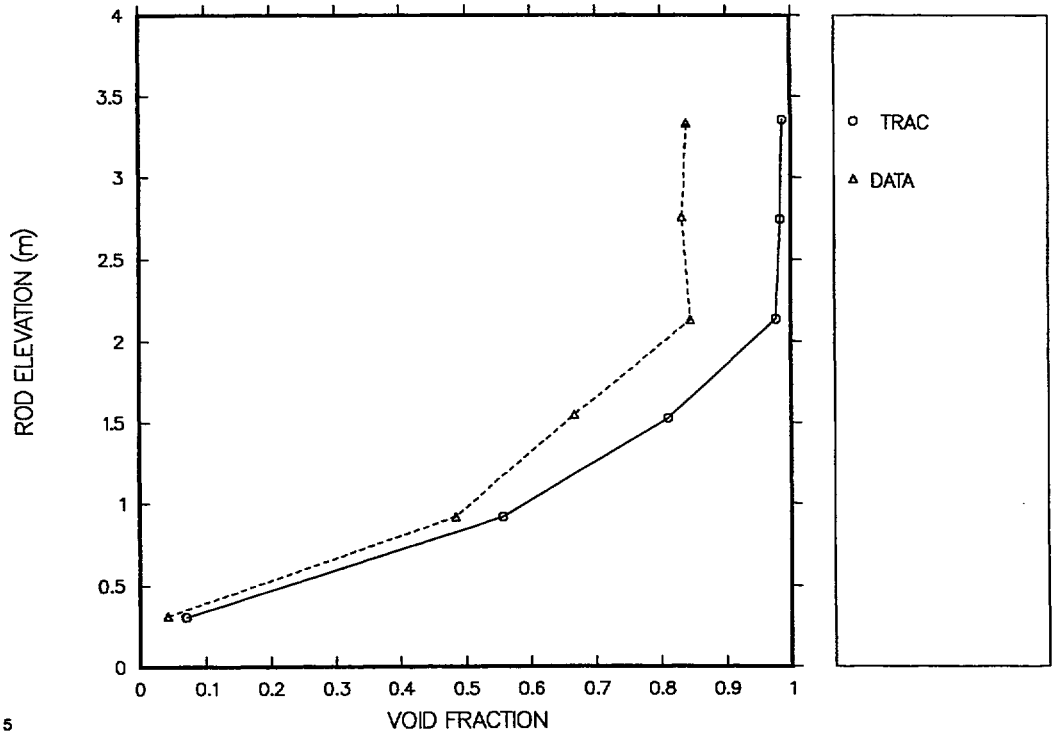


Fig. X-24. Comparison of predicted and measured core-axial void-fraction profiles at 237 s with the grid-spacer model (experimental data from Ref. 4.7-7).

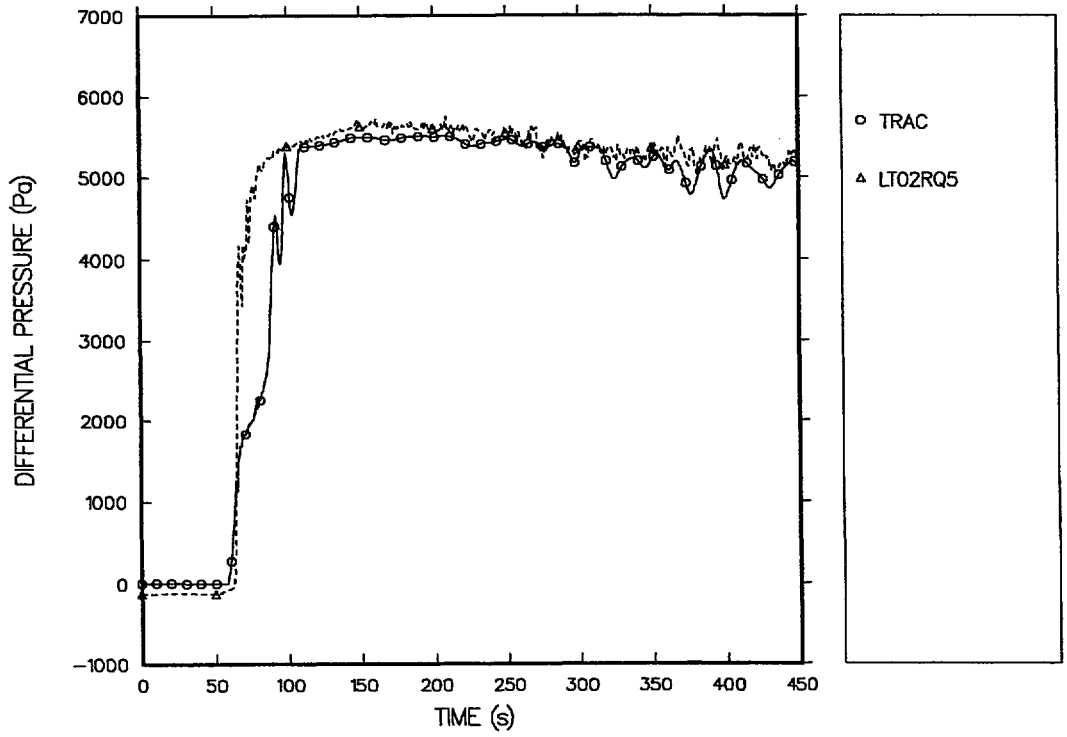


Fig. X-25. CCTF-14 run: Core-ΔP history between the 0.0- and 0.61-m elevations with the grid-spacer model.

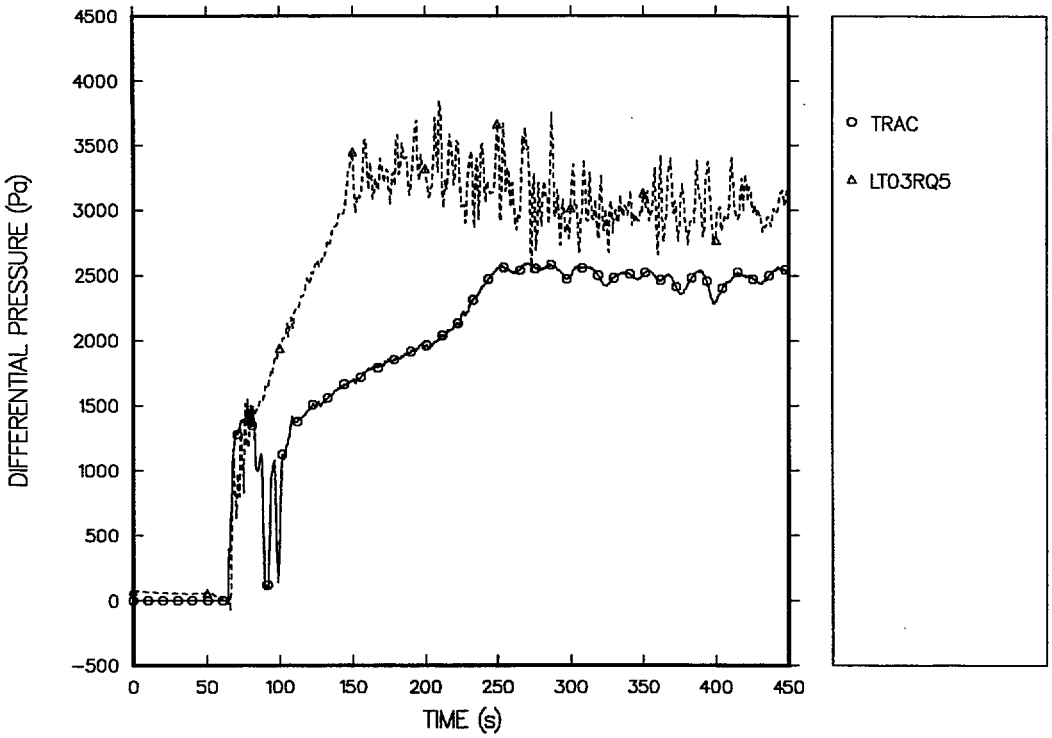


Fig. X-26. CCTF-14 run: Core-ΔP history between the 0.61- and 1.22-m elevations with the grid-spacer model.

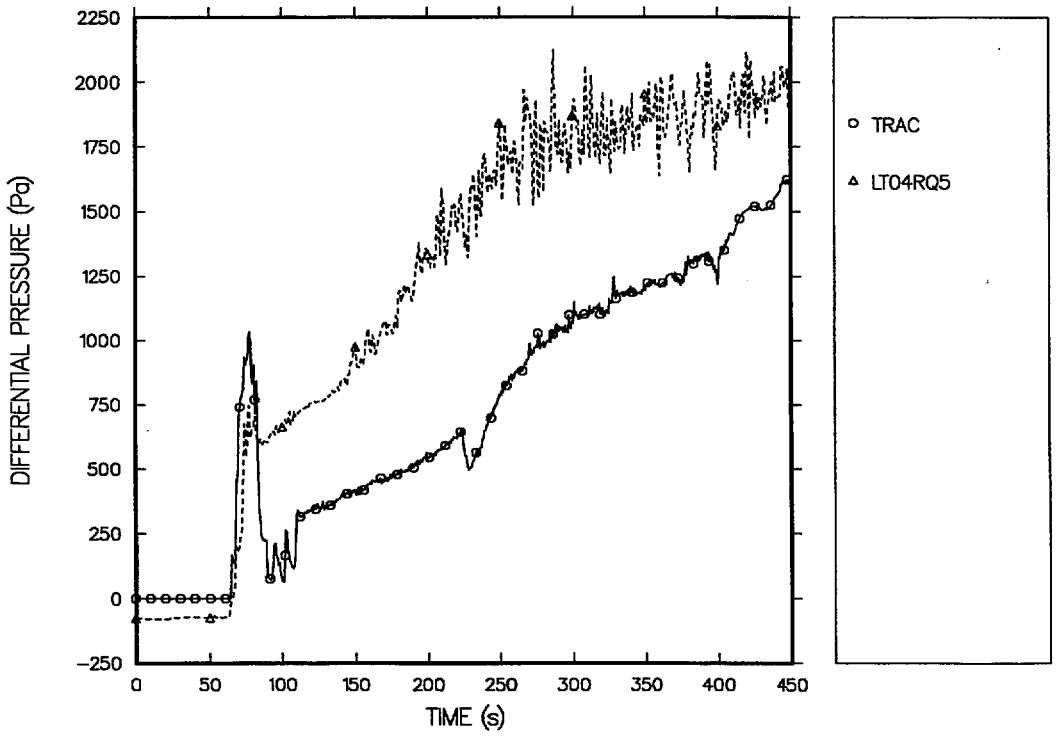


Fig. X-27. CCTF-14 run: Core-ΔP history between the 1.22- and 1.83-m elevations with the grid-spacer model.

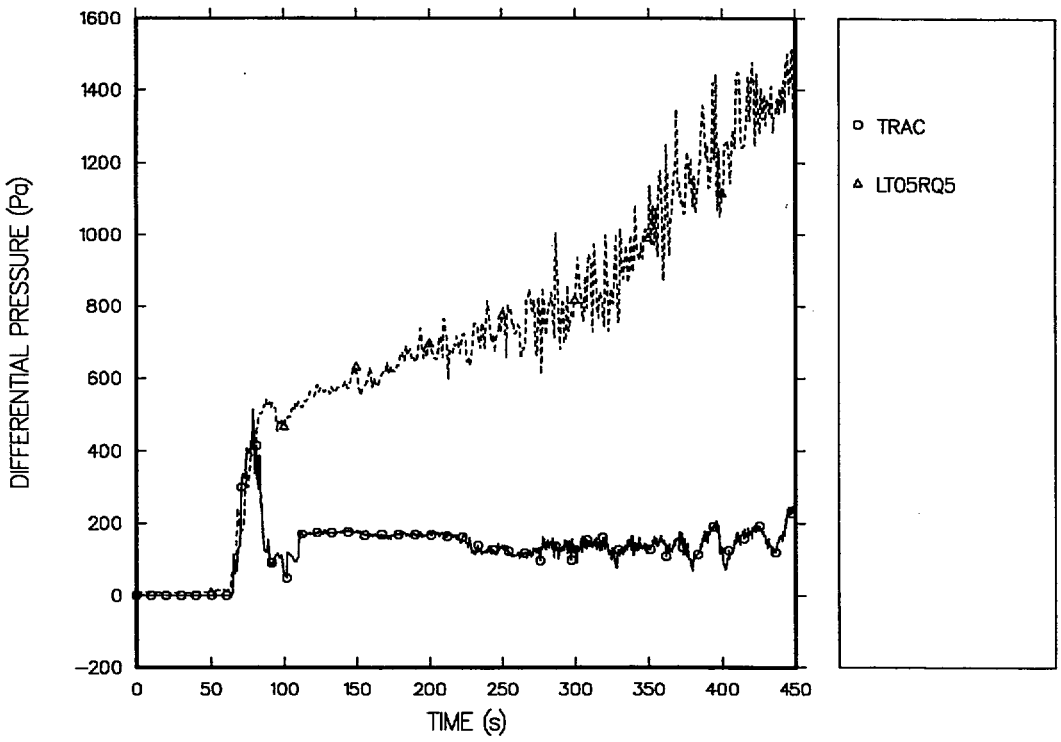


Fig. X-28. CCTF-14 run: Core-ΔP history between the 1.83- and 2.44-m elevations with the grid-spacer model.

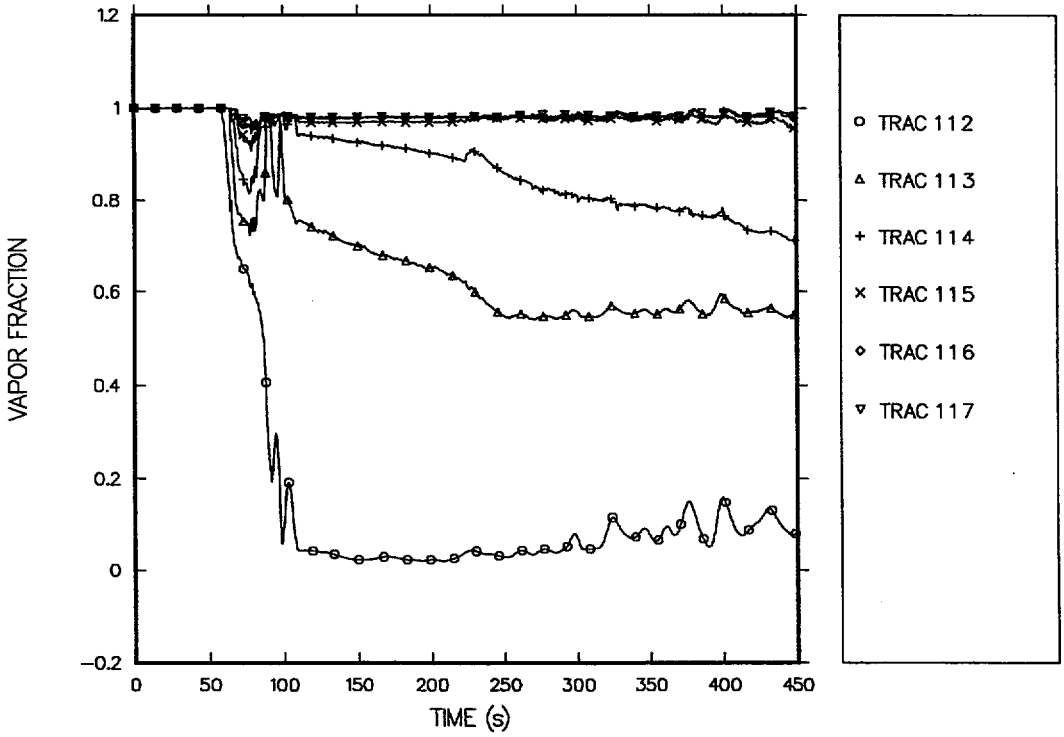


Fig. X-29. CCTF-14 run: Predicted void-fraction histories within the core with the grid-spacer model.

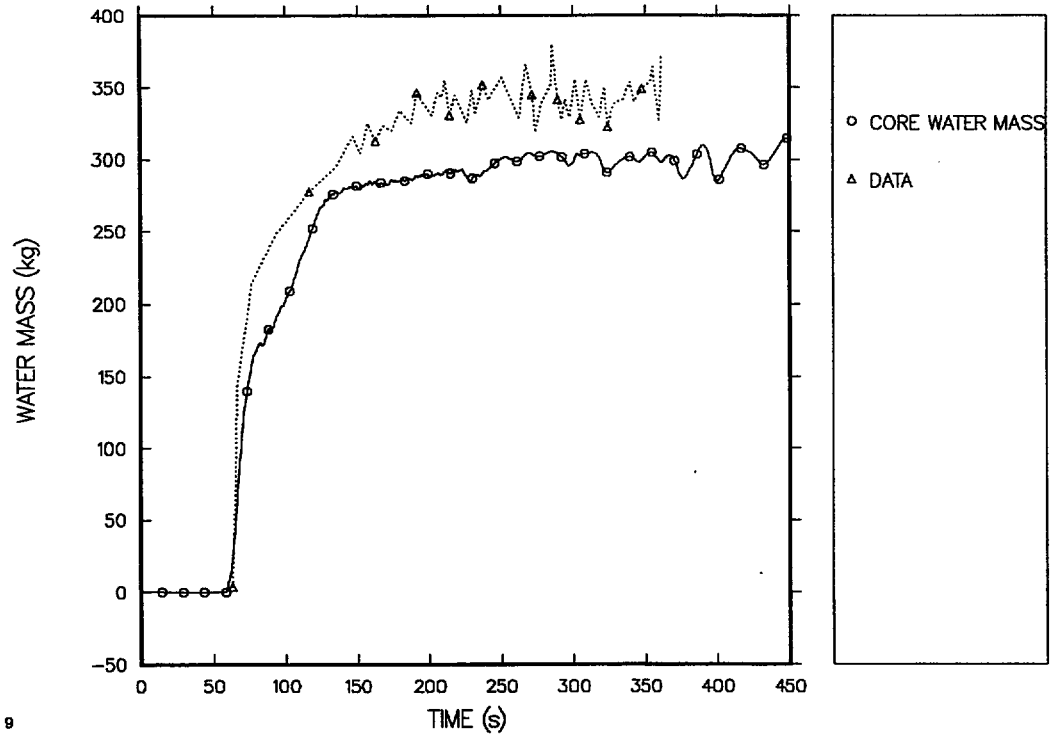


Fig. X-30. CCTF-14 run: Comparison of predicted and measured core mass with the grid-spacer model.

APPENDIX Y

CODE-DATA COMPARISON FOR CCTF RUN 14 FOR THE RENODED CCTF INPUT MODELWITH NEWRFD=1

This appendix presents the calculation results for the renoded CCTF input model for the reflood option newrfd=1, without and with grid spacers modeled. The same set of plots that is presented in Appendix X for the reflood option newrfd=3 is also presented for the reflood option newrfd=1. For reference purposes, the figure numbers for the two reflood options are listed below.

Without Grid Spacers		With Grid Spacers	
newrfd=1	newrfd=3	newrfd=1	newrfd=3
Y-1	X-1	Y-16	X-16
Y-2	X-2	Y-17	X-17
Y-3	X-3	Y-18	X-18
Y-4	X-4	Y-19	X-19
Y-5	X-5	Y-20	X-20
Y-6	X-6	Y-21	X-21
Y-7	X-7	Y-22	X-22
Y-8	X-8	Y-23	X-23
Y-9	X-9	Y-24	X-24
Y-10	X-10	Y-25	X-25
Y-11	X-11	Y-26	X-26
Y-12	X-12	Y-27	X-27
Y-13	X-13	Y-28	X-28
Y-14	X-14	Y-29	X-29
Y-15	X-15	Y-30	X-30

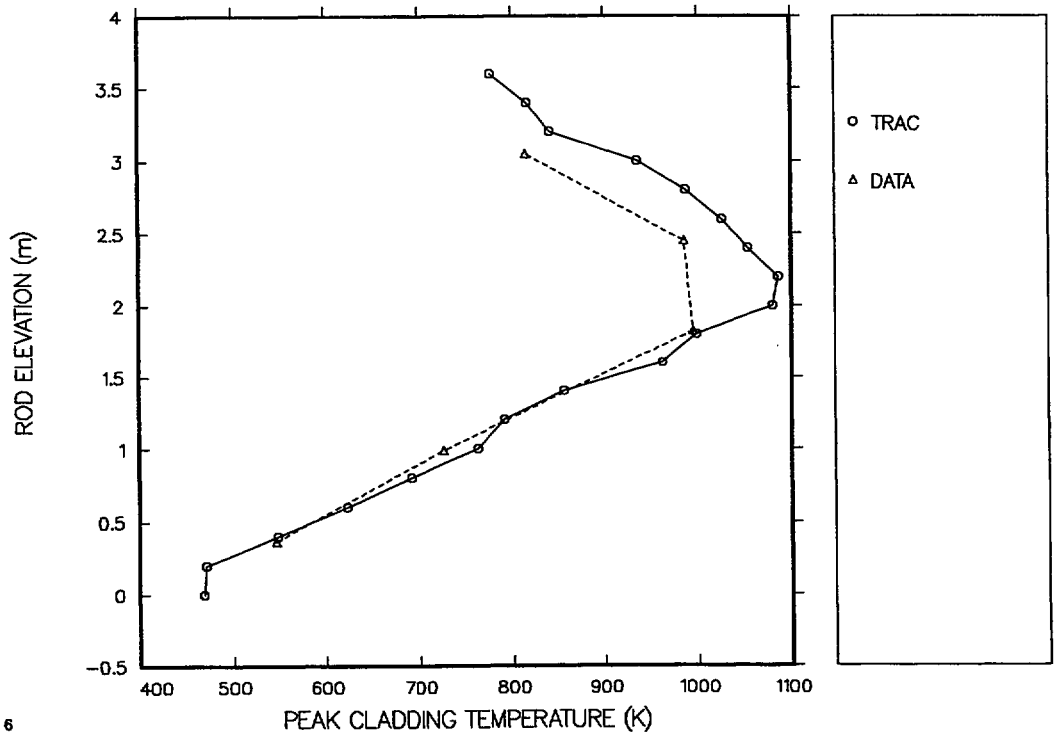


Fig. Y-1. Comparison of predicted and measured PCTs (experimental data from Ref. 4.7-7).

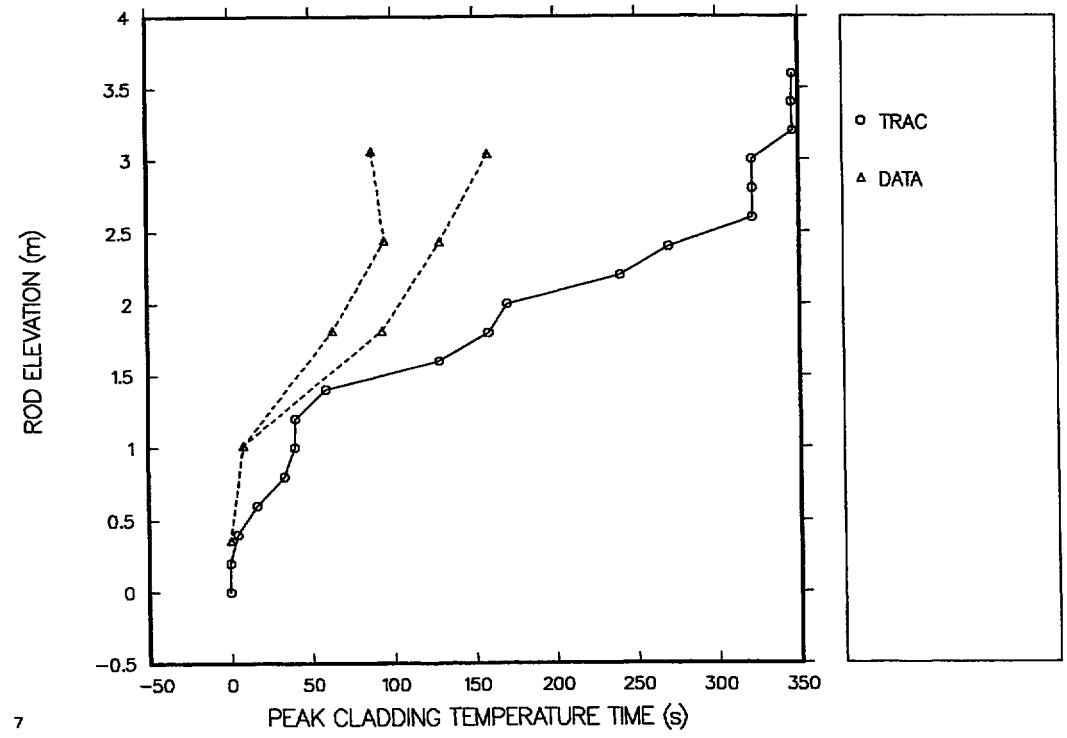


Fig. Y-2. Comparison of predicted and measured PCT times (experimental data from Ref. 4.7-7).

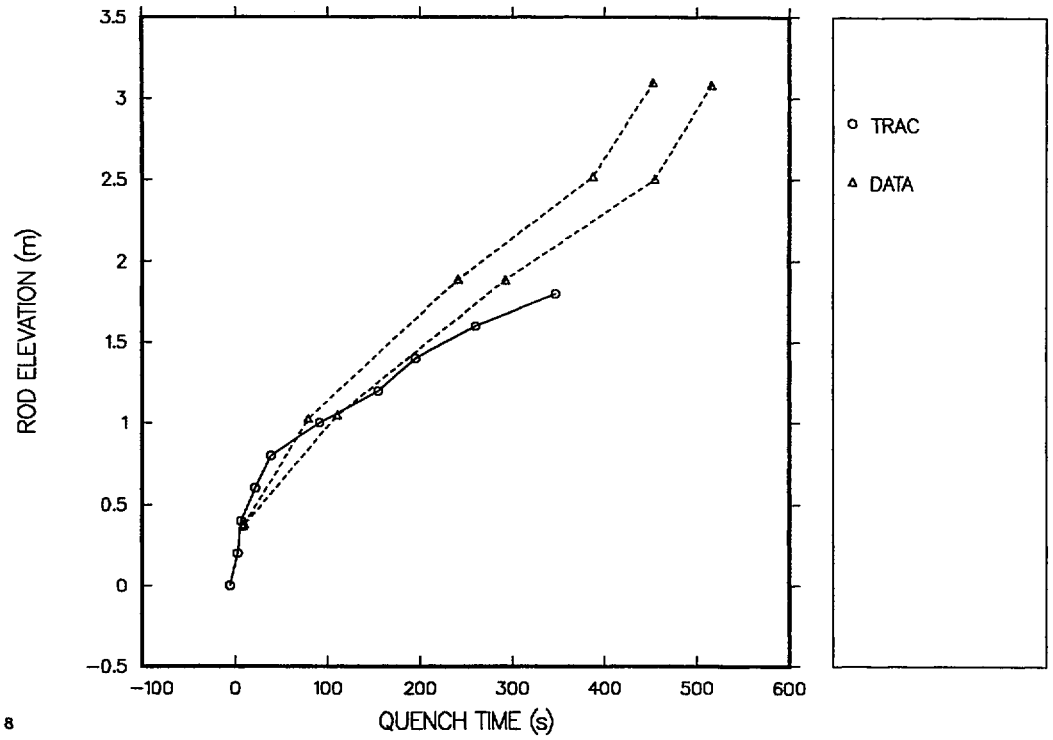


Fig. Y-3. Comparison of predicted and measured quench times (experimental data from Ref. 4.7-7).

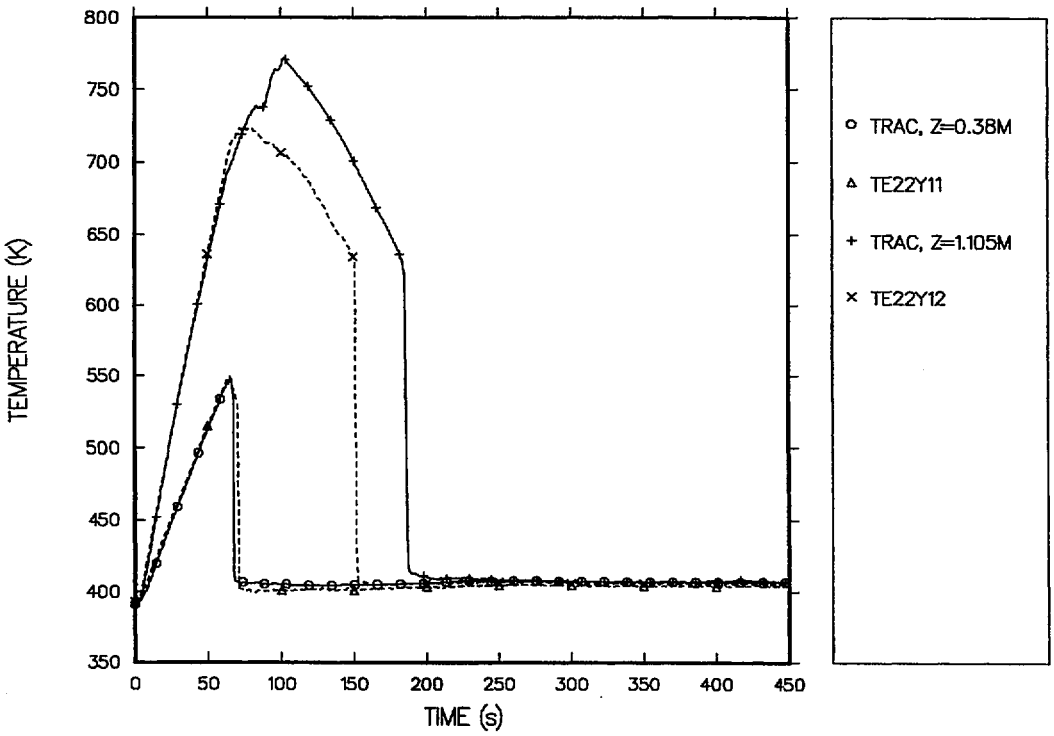


Fig. Y-4. CCTF-14 run: Wall-temperature histories at 0.38- and 1.105-m elevations.

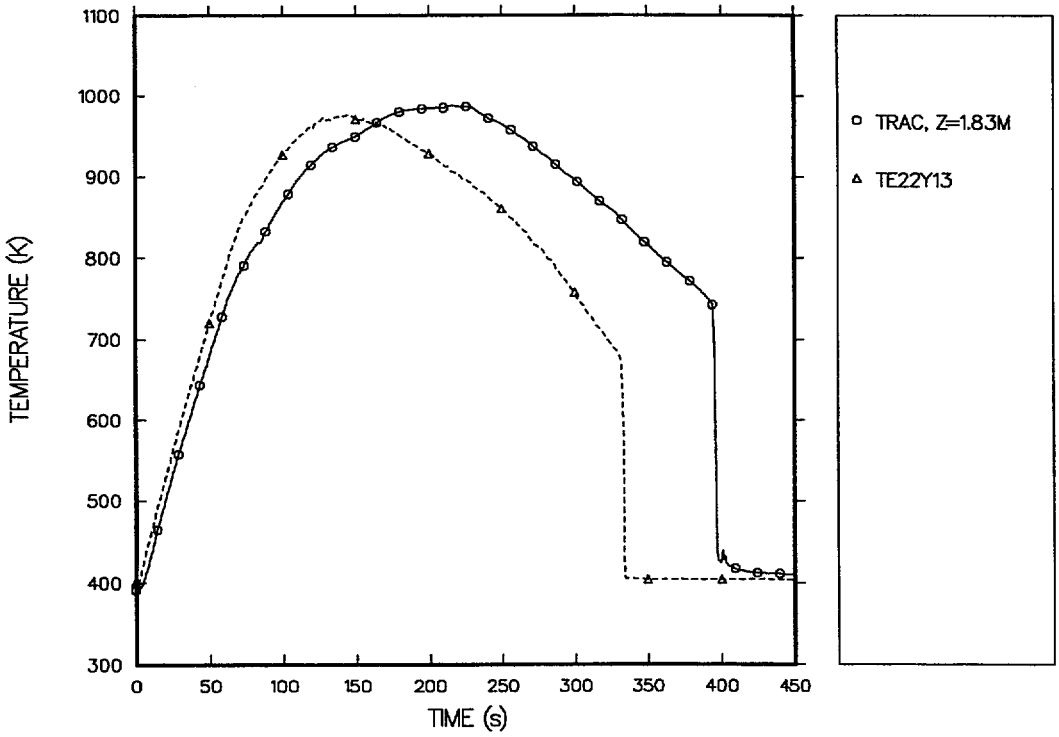


Fig. Y-5. CCTF-14 run: Wall-temperature histories at 1.83-m elevations.

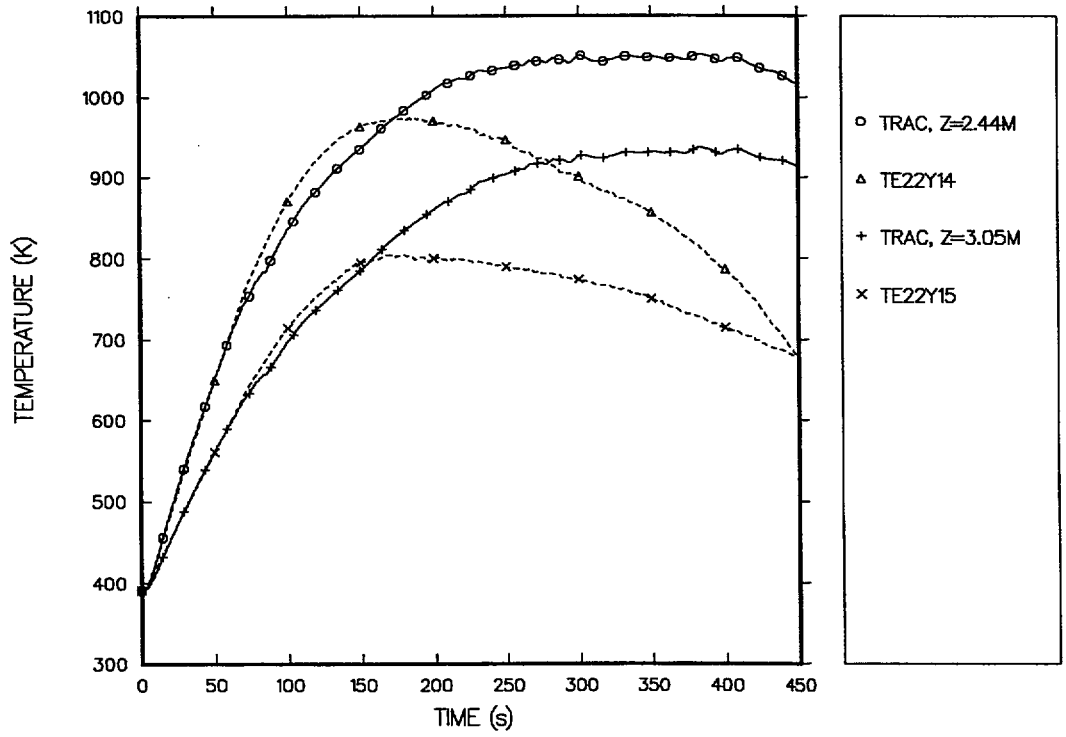


Fig. Y-6. CCTF-14 run: Wall-temperature histories at 2.44- and 3.05-m elevations.

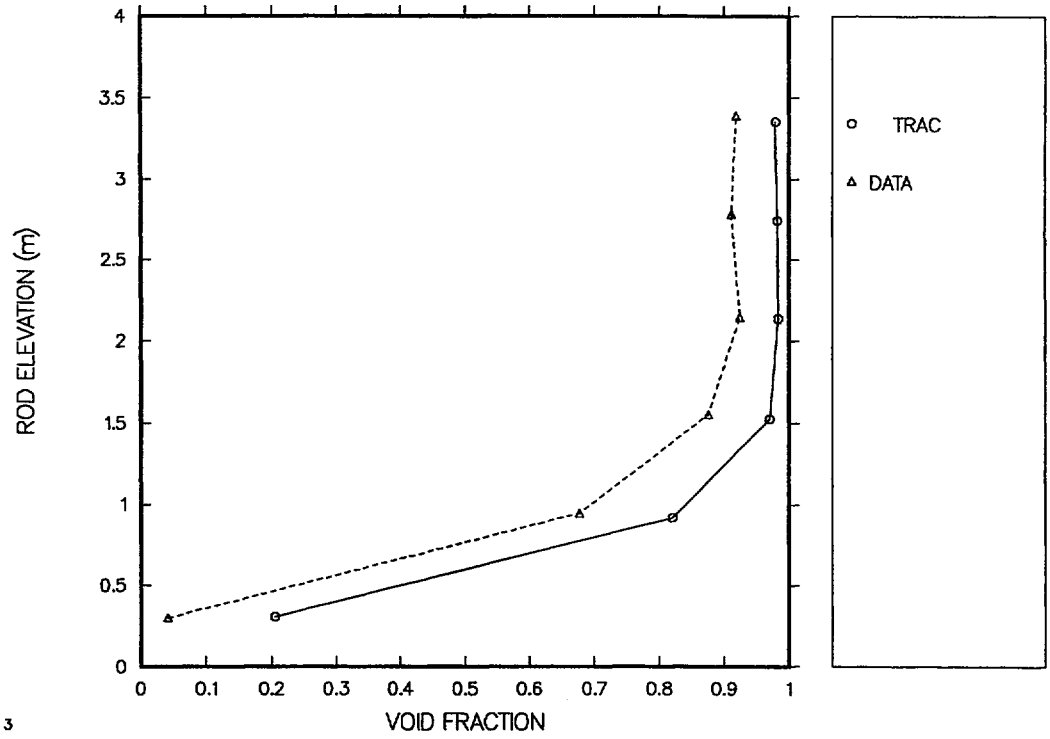


Fig. Y-7. Comparison of predicted and measured core-axial void-fraction profiles at 37 s (experimental data from Ref. 4.7-7).

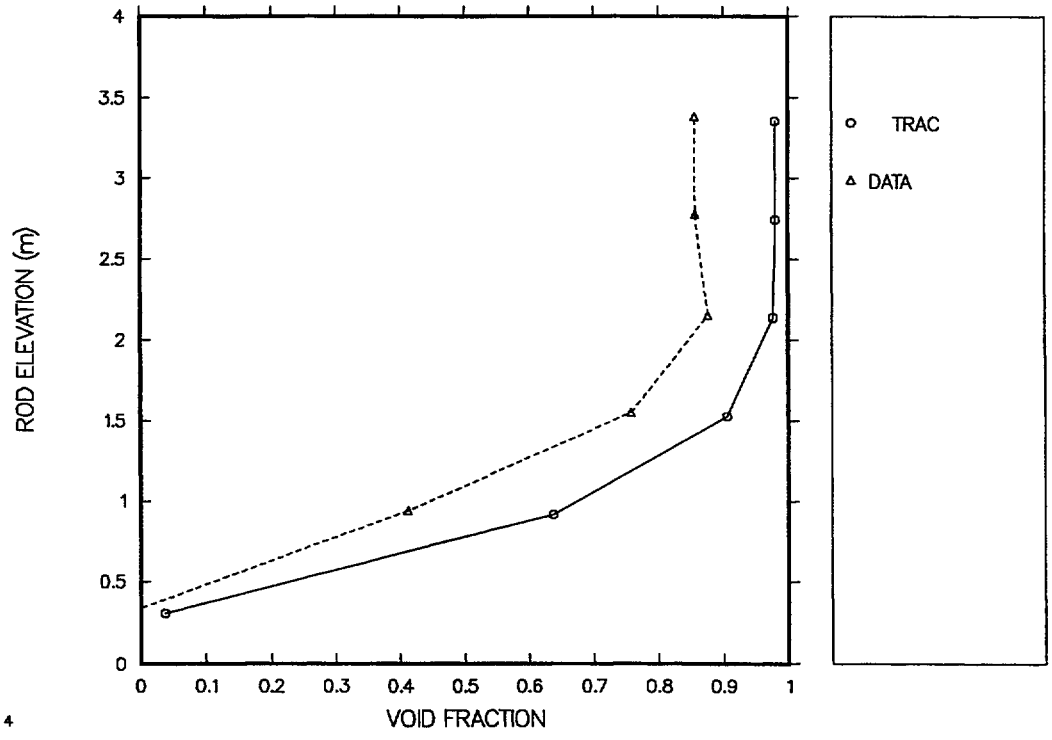


Fig. Y-8. Comparison of predicted and measured core-axial void-fraction profiles at 137 s (experimental data from Ref. 4.7-7).

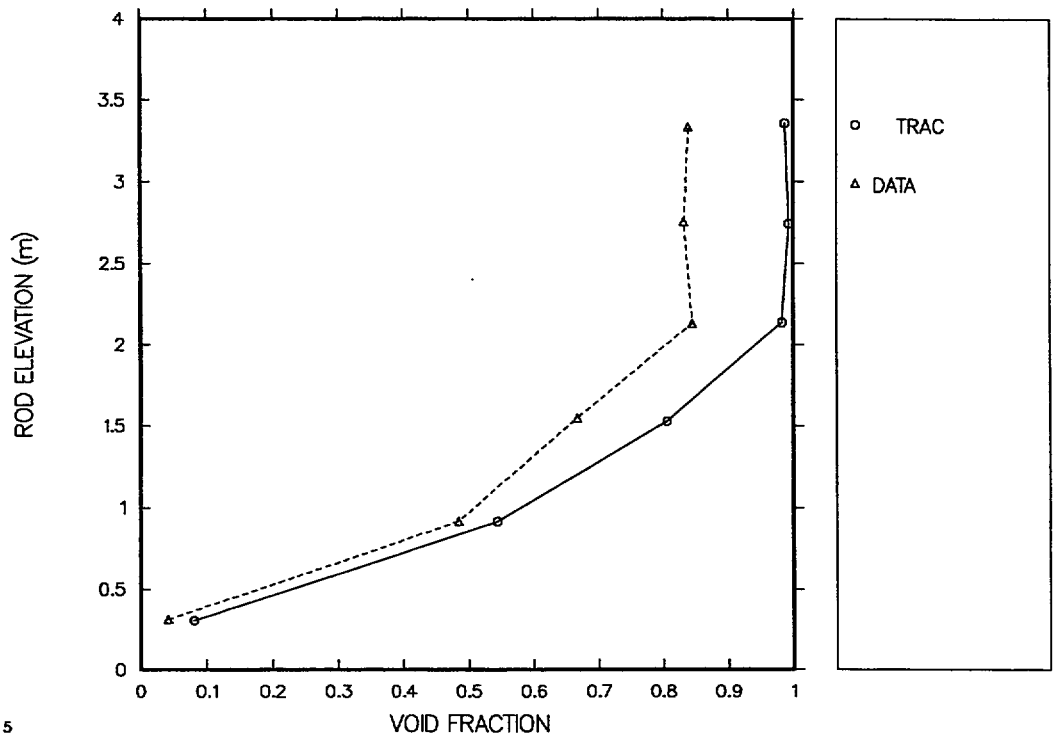


Fig. Y-9. Comparison of predicted and measured core-axial void-fraction profiles at 237 s (experimental data from Ref. 4.7-7).

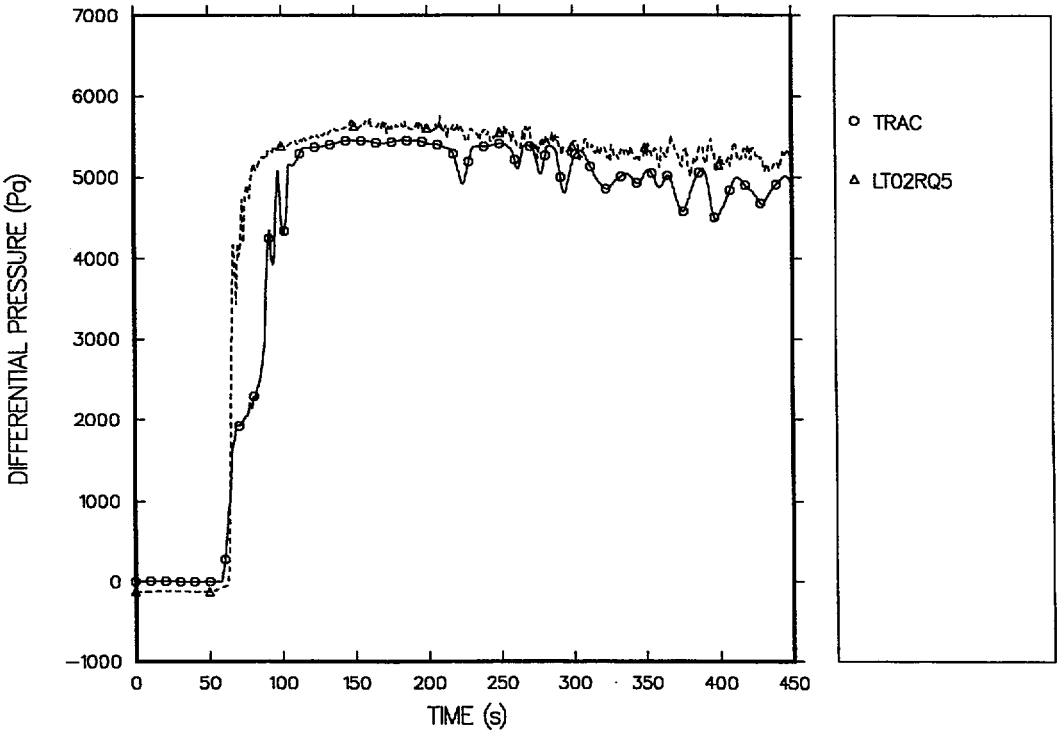


Fig. Y-10. CCTF-14 run: Core ΔP history between the 0.0- and 0.61-m elevations.

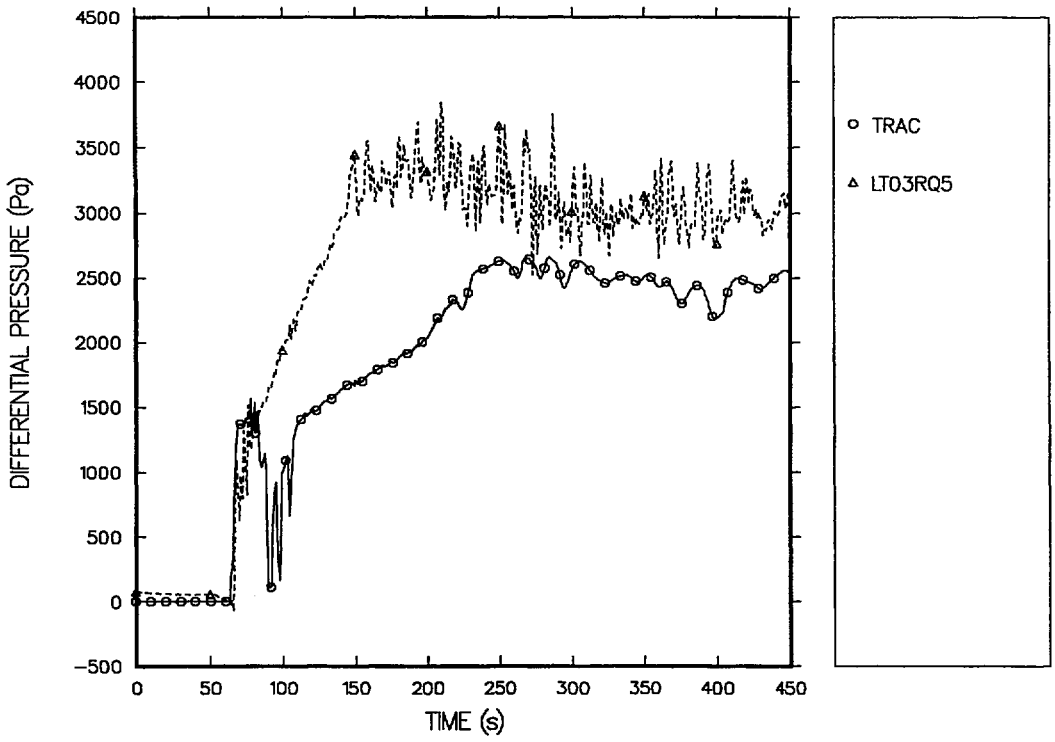


Fig. Y-11. CCTF-14 run: Core ΔP history between the 0.61- and 1.22-m elevations.

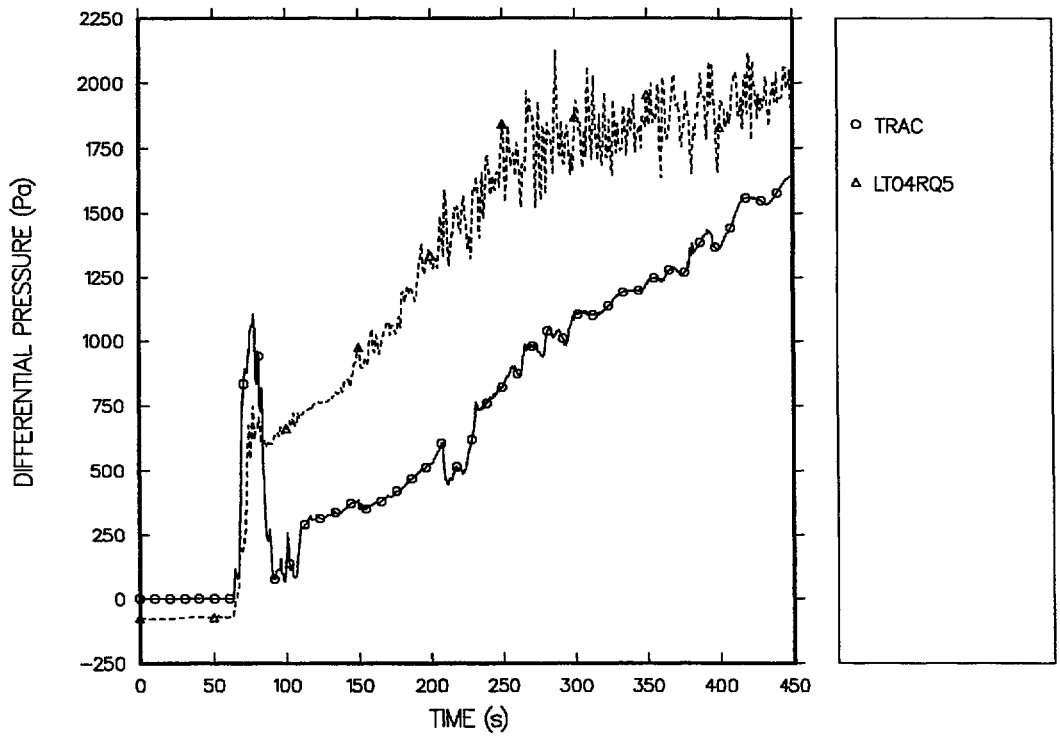


Fig. Y-12. CCTF-14 run: Core ΔP history between the 1.22- and 1.83-m elevations.

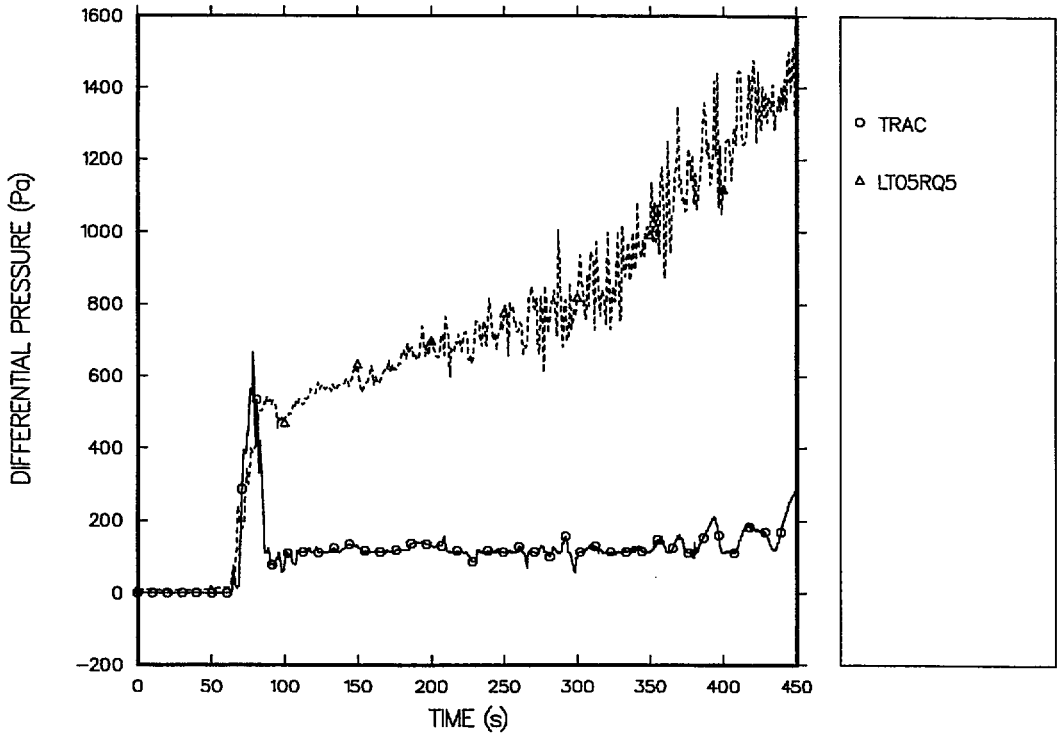


Fig. Y-13. CCTF-14 run: Core ΔP history between the 1.83- and 2.44-m elevations.

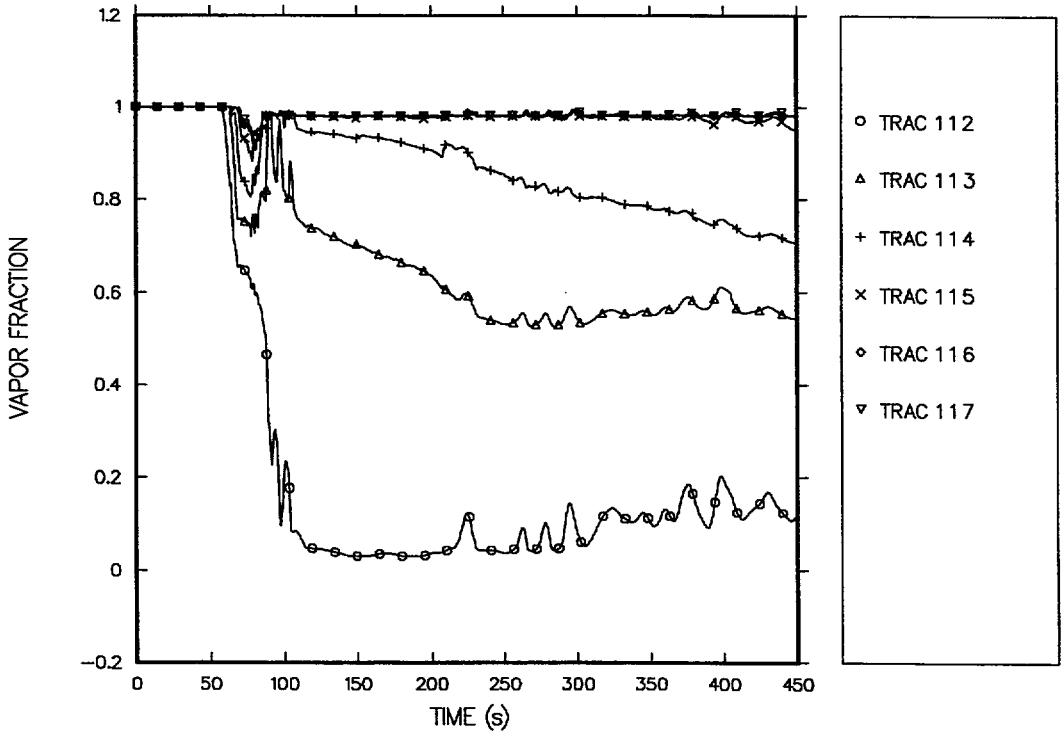


Fig. Y-14. CCTF-14 run: Predicted void-fraction histories within the core.

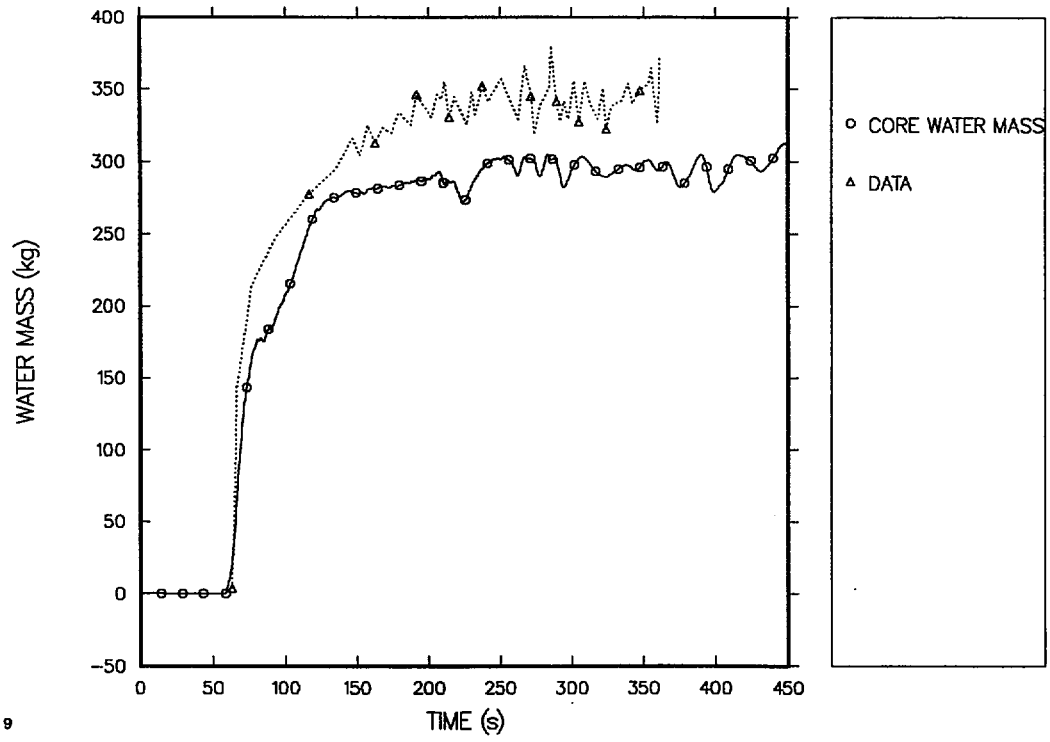


Fig. Y-15. CCTF-14 run: Comparison of predicted and measured core mass.

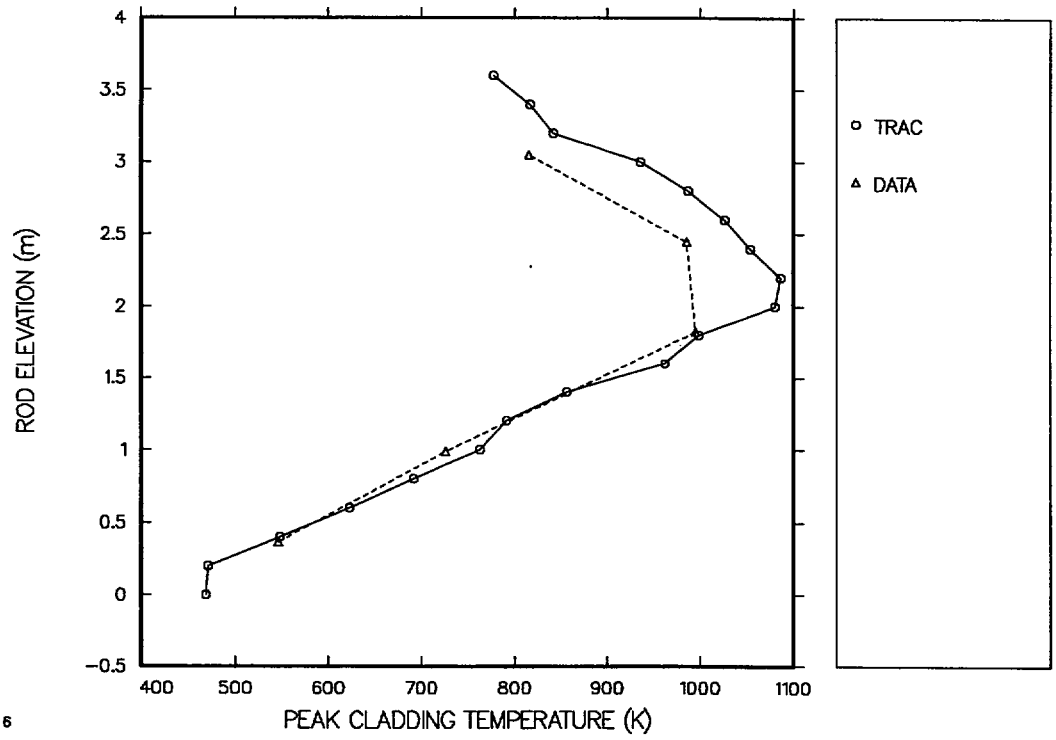


Fig. Y-16. Comparison of predicted and measured PCTs with the grid-spacer model (experimental data from Ref. 4.7-7).

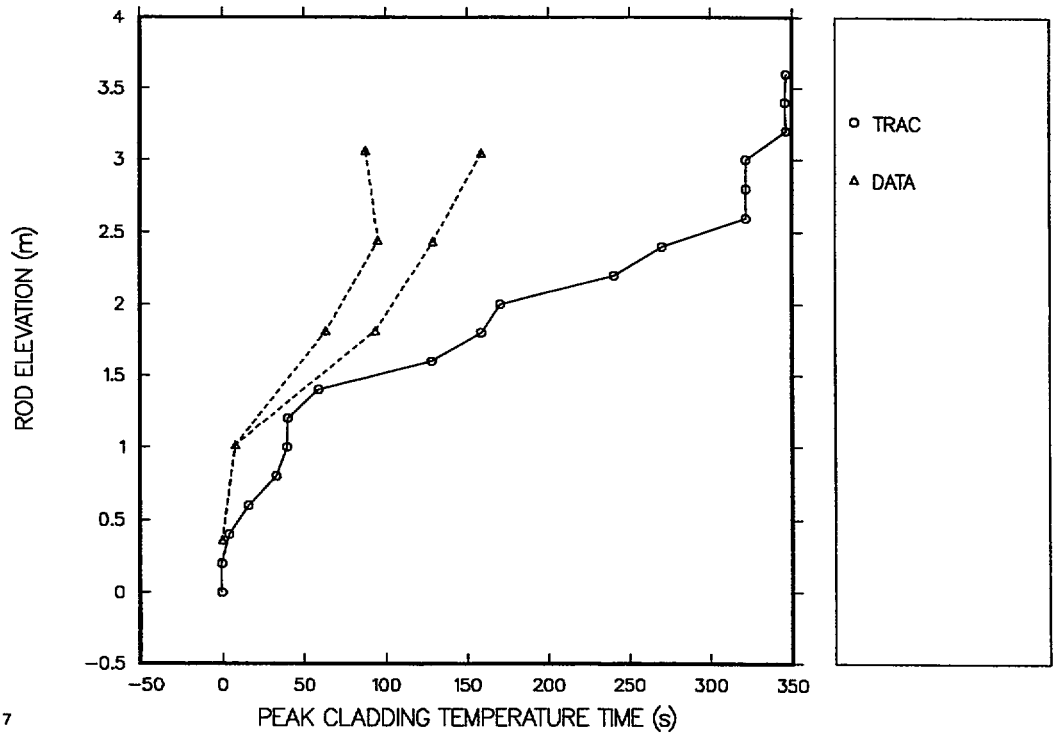


Fig. Y-17. Comparison of predicted and measured PCT times with the grid-spacer model (experimental data from Ref. 4.7-7).

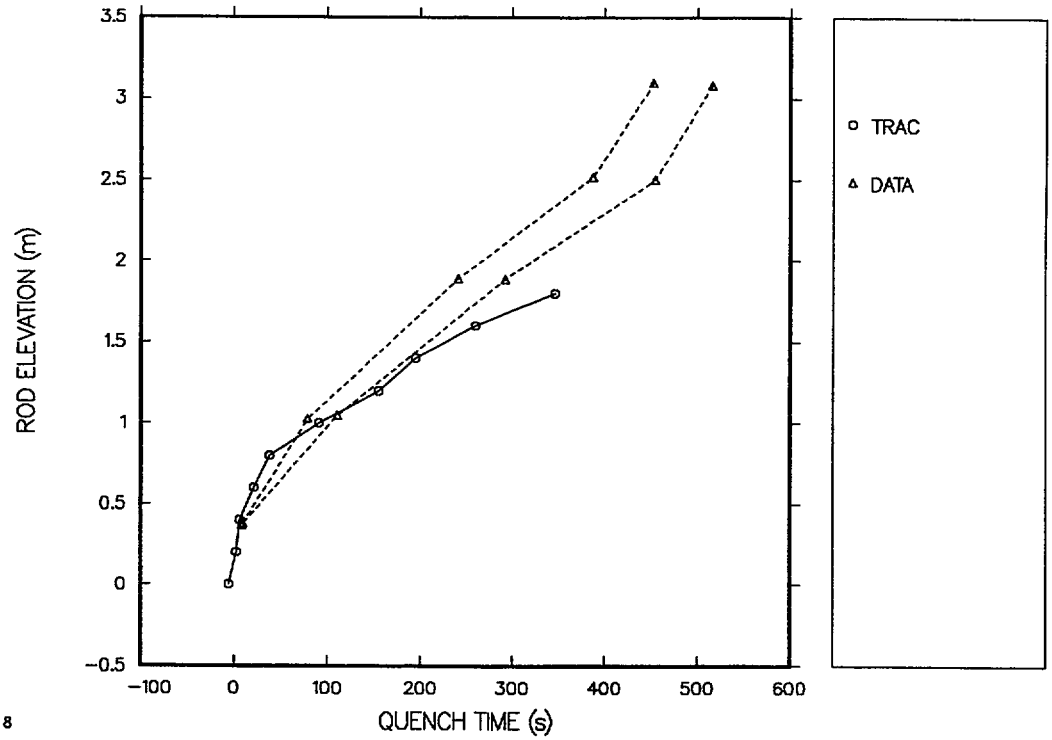


Fig. Y-18. Comparison of predicted and measured quench times with the grid-spacer model (experimental data from Ref. 4.7-7).

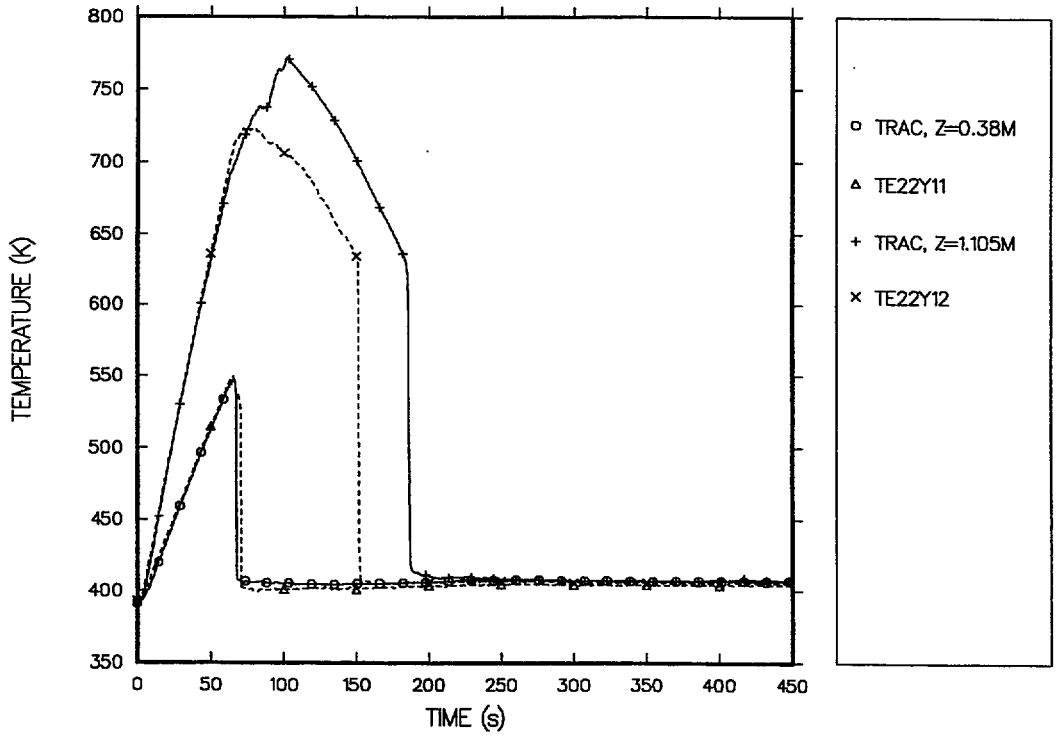


Fig. Y-19. CCTF-14 run: Wall-temperature histories at 0.38- and 1.105-m elevations with the grid-spacer model.

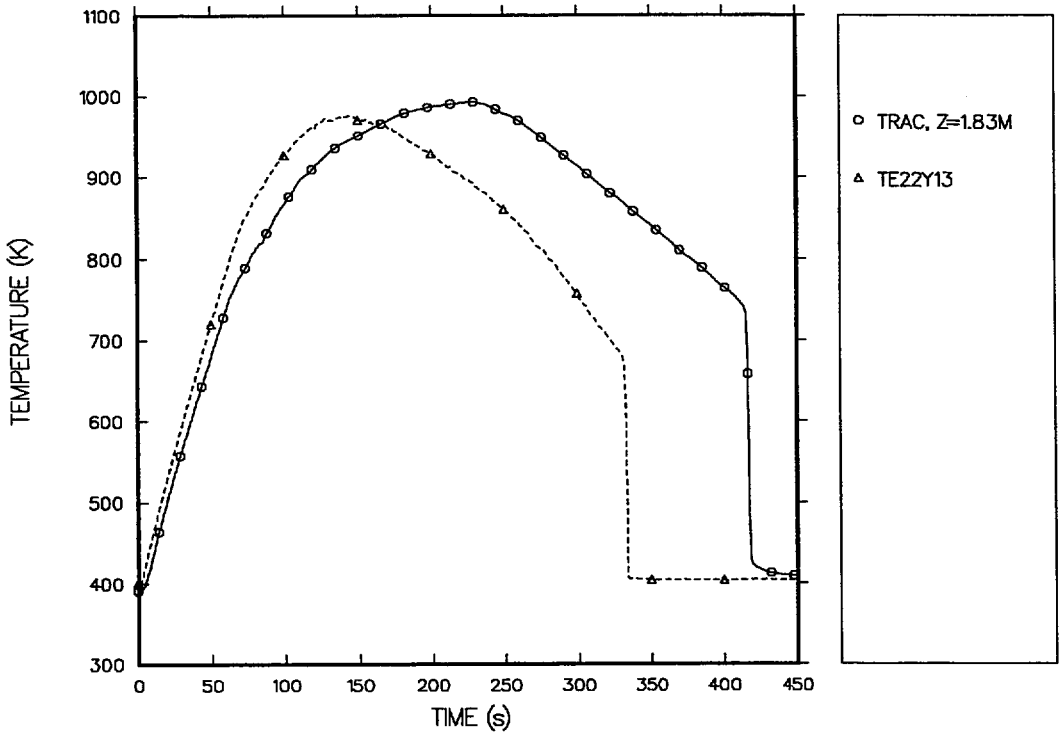


Fig. Y-20. CCTF-14 run: Wall-temperature histories at 1.83-m elevations with the grid-spacer model.

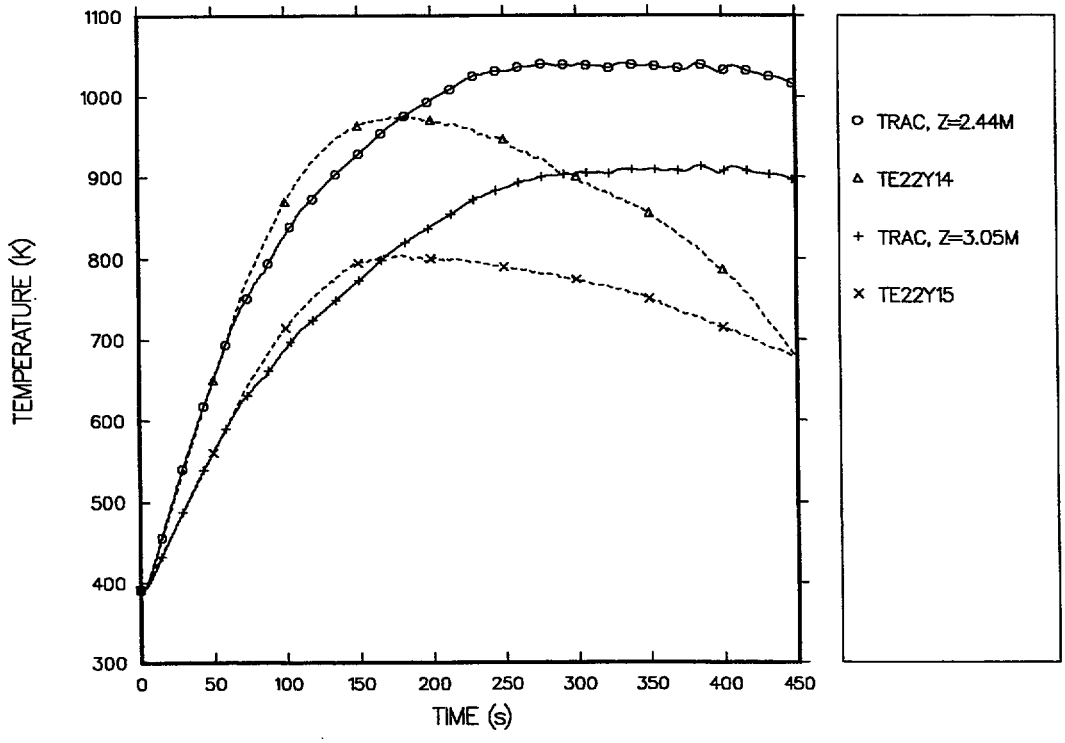


Fig. Y-21. CCTF-14 run: Wall-temperature histories at 2.44- and 3.05-m elevations with the grid-spacer model.

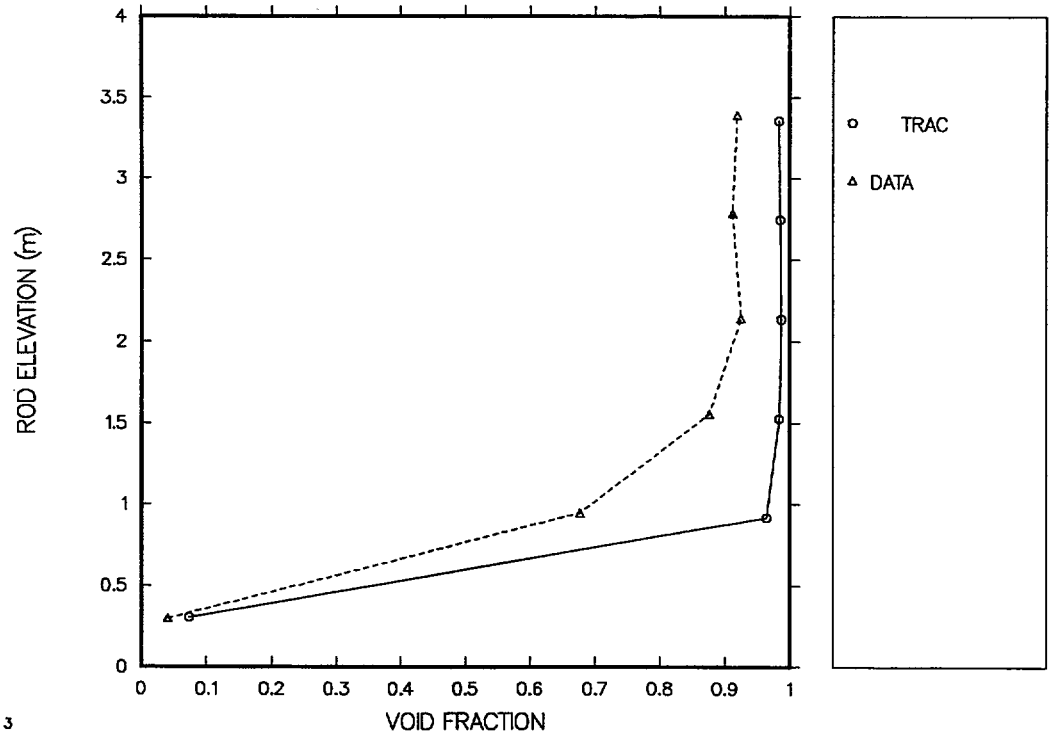


Fig. Y-22. Comparison of predicted and measured core-axial void-fraction profiles at 37 s with the grid-spacer model (experimental data from Ref. 4.7-7).

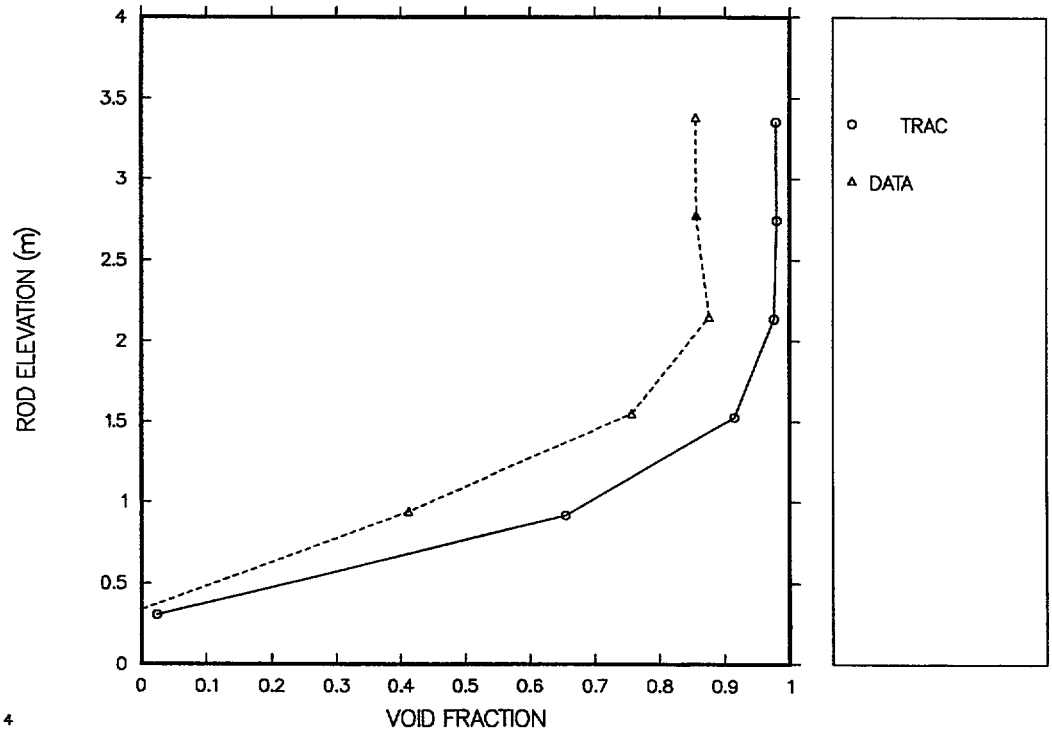


Fig. Y-23. Comparison of predicted and measured core-axial void-fraction profiles at 137 s with the grid-spacer model (experimental data from Ref. 4.7-7).

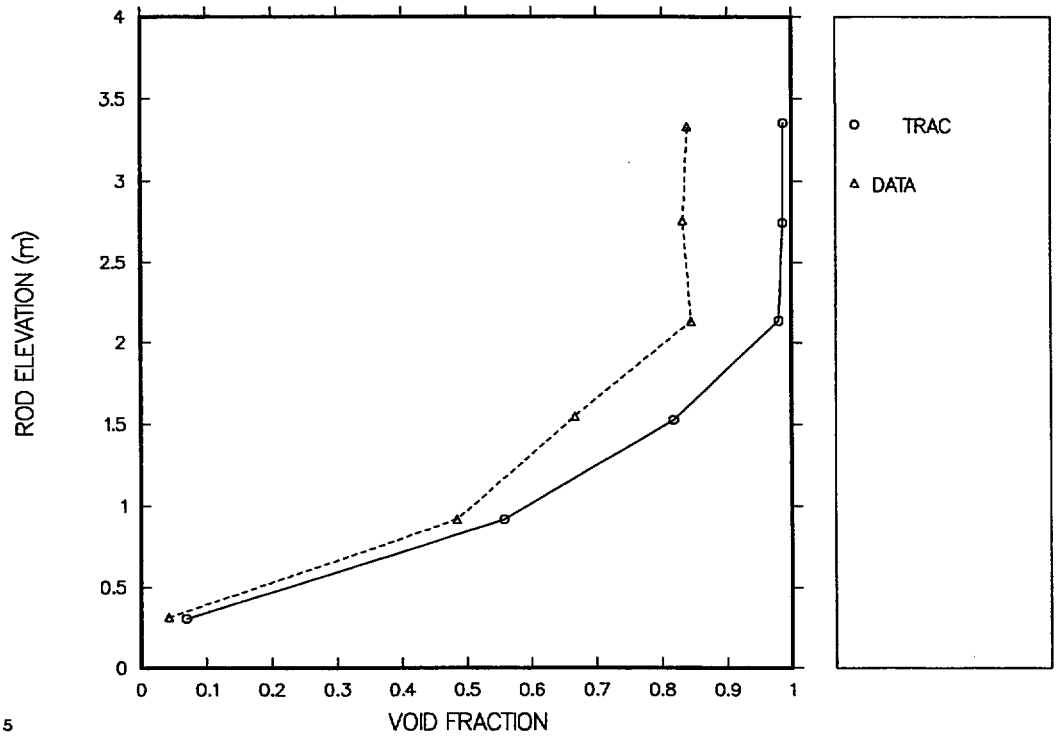


Fig. Y-24. Comparison of predicted and measured core-axial void-fraction profiles at 237 s with the grid-spacer model (experimental data from Ref. 4.7-7).

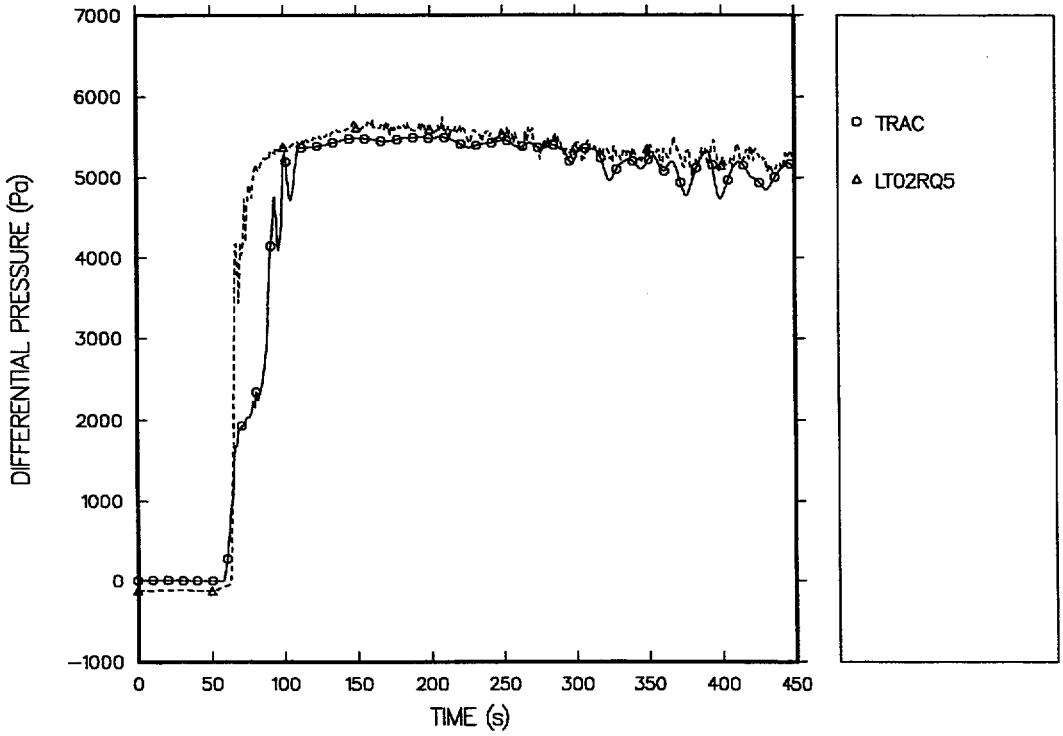


Fig. Y-25. CCTF-14 run: Core-ΔP history between the 0.0- and 0.61-m elevations with the grid-spacer model.

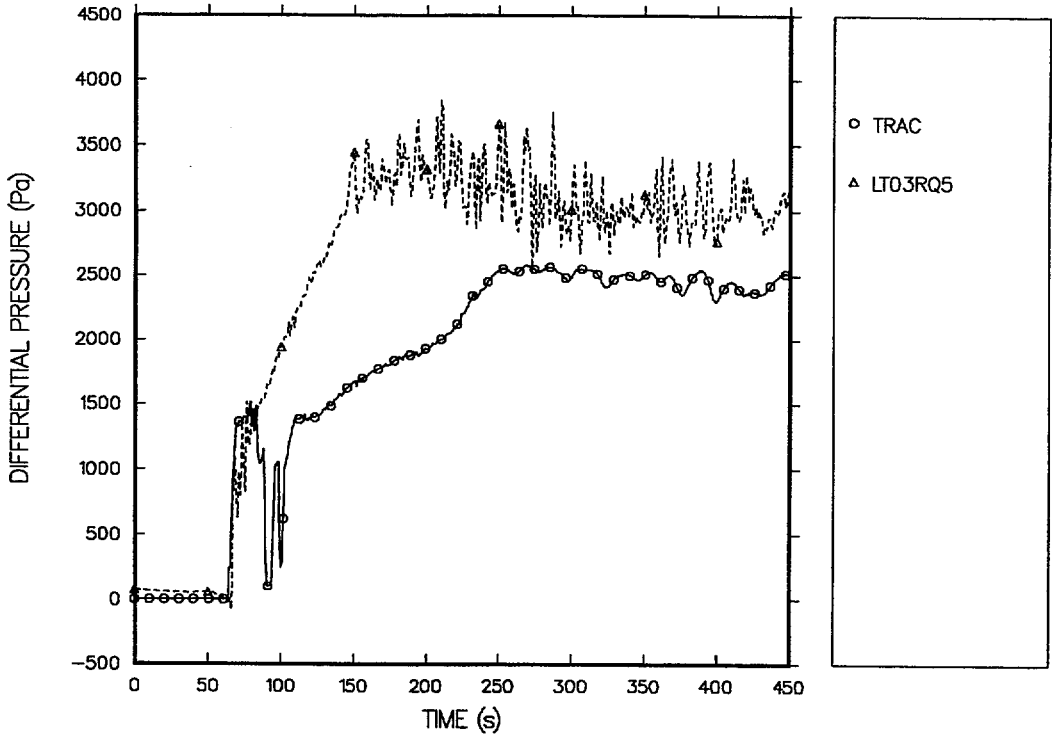


Fig. Y-26. CCTF-14 run: Core-ΔP history between the 0.61- and 1.22-m elevations with the grid-spacer model.

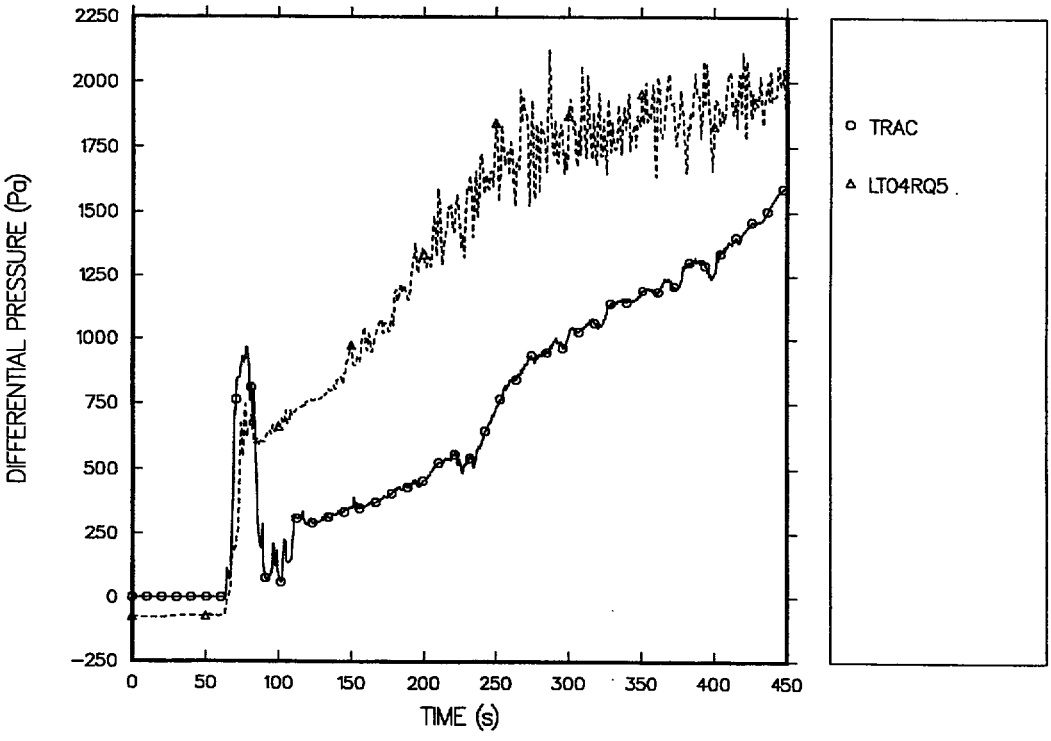


Fig. Y-27. CCTF-14 run: Core-ΔP history between the 1.22- and 1.83-m elevations with the grid-spacer model.

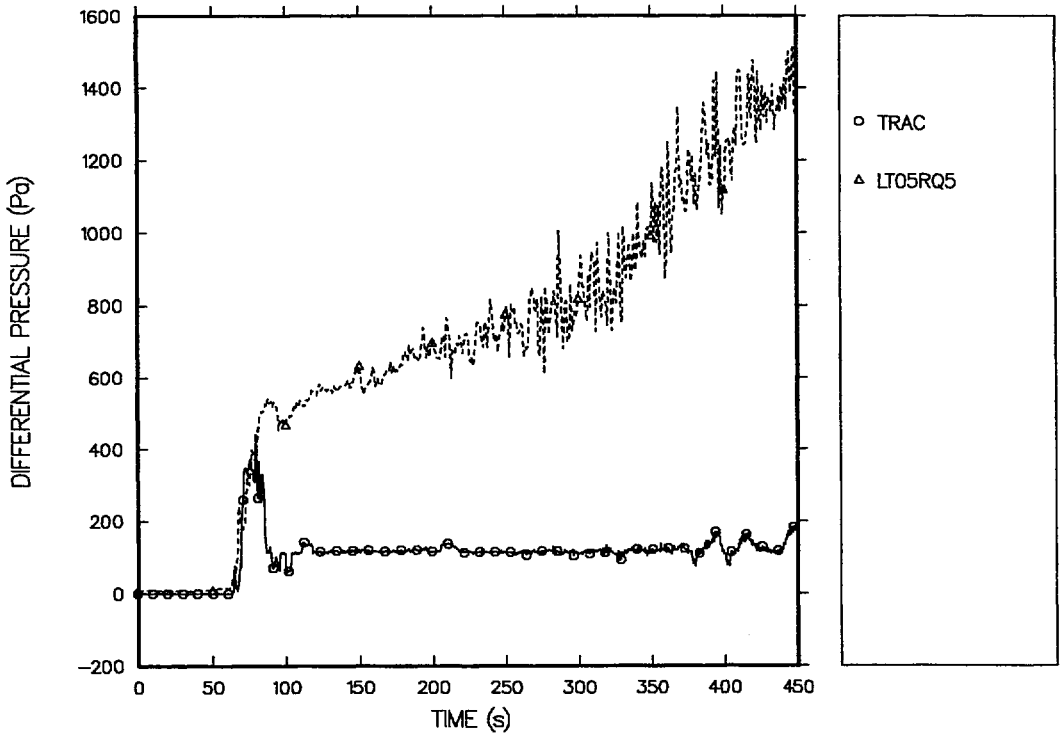


Fig. Y-28. CCTF-14 run: Core-ΔP history between the 1.83- and 2.44-m elevations with the grid-spacer model.

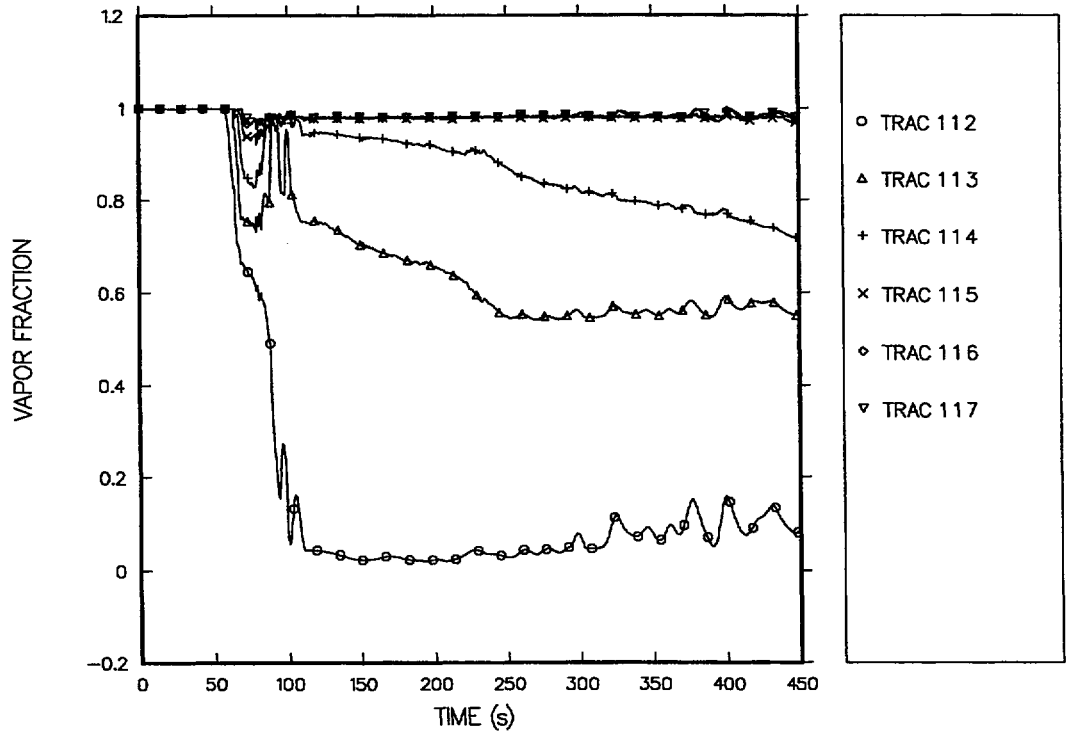


Fig. Y-29. CCTF-14 run: Predicted void-fraction histories within the core with the grid-spacer model.

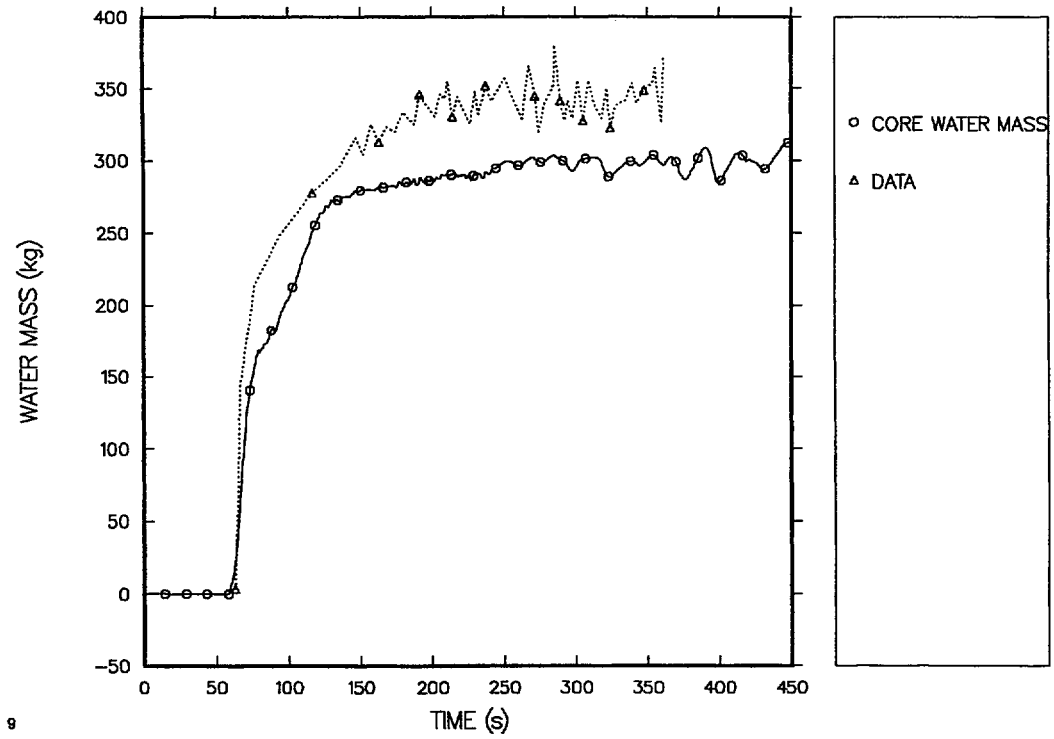


Fig. Y-30. CCTF-14 run: Comparison of predicted and measured core mass with the grid-spacer model.

APPENDIX Z

RENODED CCTF RUN 54 INPUT LISTING

The renoded CCTF-54 input model generally required one or more transient restarts after the first transient calculation to complete the calculation. A second transient restart input listing starts on p. Z-44.

```
free format
*
*************
* main data *
*************
*
*     numtcr       ieos      inopt       nmat
        150          0         1          4
Renoded CCTF-54 Input Model  By J. F. Lime Oct 1999
The 7-level core model of the corrected CCTF-54 input model
was renoded into 17 levels.  The 17 levels match the 17-step
axial power profile.
*
Corrected CCTF-54 Input Model   By J. F. Lime Oct 1999
Two corrections were made to the CCTF-54 input model:
(1) The azimuthal noding was corrected from 180/180 degrees to 90/270 degrees
to matched the intact loop noding. The three intact loops were modeled as one
combined intact loop. Therefore, the azimuthal noding of the vessel should
match how the intact loops were modeled.
(2) The axial power shape was corrected to model the 17-step axial-power profile
of the actual heater rod. The previous CCTF-54 model had a coarsely-noded
7-level axial-power shape.
*
cctf run54 developmental assessment calculation
trac-pf1 mod2 version 5.0
this model was developed by running the trac input deck from
/cctf/run54/tracin through gocvrt.  the following changes were
made to the original model.
a)  the junction flow areas were adjusted to take care of the following
    error messages:
 the junction flow area 1.6604e-01 of component   3 is greater than the vol/dx
 flow area 8.8885e-02 of the cell across the junction and 1.5532e-01 of cell  1

 the junction flow area 4.9812e-01 of component   8 is greater than the vol/dx
 flow area 4.6593e-01 of the cell across the junction and 2.6665e-01 of cell 12

 the azmuthal flow area 1.0797e-01 of vessel   1 interface (r= 3,t= 1,z= 1) is
 greater than the cell vol/rdt flow areas 8.3137e-02 and 8.3137e-02 on each side

 the azmuthal flow area 1.0797e-01 of vessel   1 interface (r= 3,t= 2,z= 1) is
 greater than the cell vol/rdt flow areas 8.3137e-02 and 8.3137e-02 on each side

 the azmuthal flow area 1.5189e-01 of vessel   1 interface (r= 4,t= 1,z= 1) is
 greater than the cell vol/rdt flow areas 1.3670e-01 and 1.3670e-01 on each side

 the azmuthal flow area 1.5189e-01 of vessel   1 interface (r= 4,t= 2,z= 1) is
 greater than the cell vol/rdt flow areas 1.3670e-01 and 1.3670e-01 on each side

 the   axial  flow area 2.6140e-02 of vessel   1 interface (r= 1,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 2.1173e-02 and 1.8559e-02 on each side

 the   axial  flow area 2.6140e-02 of vessel   1 interface (r= 1,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 2.1173e-02 and 1.8559e-02 on each side

 the   axial  flow area 7.8419e-02 of vessel   1 interface (r= 2,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 6.3519e-02 and 5.5678e-02 on each side

 the   axial  flow area 7.8419e-02 of vessel   1 interface (r= 2,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 6.3519e-02 and 5.5677e-02 on each side

 the   axial  flow area 1.1751e-01 of vessel   1 interface (r= 3,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 9.8712e-02 and 8.3435e-02 on each side

 the   axial  flow area 1.1751e-01 of vessel   1 interface (r= 3,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 9.8712e-02 and 8.3435e-02 on each side

 b)  the hydraulic diameter of the first and last junctions of the
     steam generator secondary were set to a non-zero value (even though
     the flow area is zero) to get the code to run.

c)  the nff's were all set to -1
   to cause an automatic calculation of
   abrupt expansion/contraction additive form losses.

d)  the new reflood model was turned on (namelist newrfd=1 was added)
    and added funh, nhsca, and zsgrid arrays.
```

```
77
78  e)  the time step sizes were increased.
79
80  f)  the rod axial power shape was adjusted to take advantage of mod2's
81      ability to input an exact power distribution.  this involved
82      reworking the zpwzt and zpwtb arrays.  the number of coarse mesh
83      nodes went from 7 to 19, the maximum number of fine mesh cells went
84      from 100 to 200, and the dtxht criterial was reduced.
85
86  g)  the rod power history was expanded from 10 points to over 1200 points
87      (based on experimental data) to better match the input power.
88
89  h)  the temperatures everywhere except the lower plenum and fills were
90      changed from 393.0 to 414.2 (the average of the te30yxx thermocouple
91      data from the test) to better match the initial fluid and wall temps.
92
93  i)  took out the bump in the cold leg ecc fill liquid temperature table
94
95  j) extended the material property tables in case the code wants to
96     calculate temperatures in excess of 1200 k.
97
98  k) added namelist variable nosets=2 to cause the code to calculate the
99     sets3d equation every time step.
100
101 l) increase the maximum time step size beyond 84 seconds.
102
103 m) set all of the vessel cfzl-z's to negative numbers to get an automatic
104    calculation of abrupt expansion/contraction form losses.
105
106 n) the rod nodalization was set back the way it originally was (7 coarse
107    meshes with a 1-to-1 relationship with the hydro cells).  the
108    integration option was also set back the way it originally was as well.
109
110 o) to damp the loop oscillations, all the roughness numbers were
111    changed from 0.0 to 4.5720e-05
112
113 p) the heat conductor temperatures in the reactor vessel, ring 4 were set
114    from 4.142e+02 to 4.680e+02 for levels 2 and above.  the inner rings
115    were changed from 4.142e+02 to 4.230e+02.  this is consistent with the
116    initial conditions in the data report, page 31 table 3.1
117
118 q) the maximum time step size was reduced to avoid the water hammer in
119    the downcomer soon after cold leg injection begins.
120
121 r) added 30 heat slabs to represent the core barrel
122
123 s) moved the location of the ring 3-ring 4 boundary from inside the core
124    barrel to outside of the core barrel.  the vessel rad(3), vol, fa-t,
125    fa-z, hd-t and hd-z arrays were recomputed.  this was done to eliminate
126    vol and fa values greater than 1.0
127
128 t) the radial cfzl-r in level 1 was set to a small negative number to
129    cause form loss computation.
130
131 u) set idcu=idcl=idcr=0 to turn off special downcomer models
132
133 v) set the dtxht(1), dtxht(2), dznht, and nzmax parameters back to the
134    old mod1 values, and took out the core barrel heat slabs to make the
135    calculation directly comparable to the original MOD1 calculation.
136
137
138
139  ---======
140
141 the original comment cards are as follows:
142
143 cctf run 54 posttest analysis with trac-pf1(mod 1) ver 11.8 (8/24/84)
144   * * * * *  revised loop components  * * * * *
145 jaeri recommendations used for some heater rod material properties.
146 new vapor loss coefficients in vessel core
147 new radial loss coefficients in levels 4 - 10
148 akimotos noding for combined and broken cold legs
149 vessel noding:
150    four radial rings
151    two azimuthal zones
152    sixteen axial levels
153       three levels in lower plenum
154       seven levels in core
155       six levels in upper plenum
156 system noding:
157    three intact loops lumped into one loop
158    cold leg between vessel and break is modeled without the expansion
159 *
160 *****************
161 * namelist data *
162 *****************
163 *
164  &inopts
165   nrslv=1,iadded=10,nhtstr=24,newrfd=3,
166  iblaus=1, imfr=3,
167  &end
168 *
```

```
*        dstep          timet
             0     0.0000e+00
*       stdyst         transi          ncomp           njun           ipak
             0              1             43             17              1
*         epso           epss
    1.0000e-04     1.0000e-04
*       oitmax         sitmax         isolut         ncontr
            10             10              0              0
*         ntsv           ntcb           ntcf           ntrp           ntcp
             9              8              0              3              1
*
*************************
* component-number data *
*************************
*
* iorder*              1              2              3              4              5
* iorder*              6              7              8             11             12
* iorder*             13             14             15             16             17
* iorder*             18             19             25             28s
            999            998            997            996            995
            994           993s
            974           973s
            918            917            916           915s
            914            913            912            911            910
            909            908           907s
784s
670 669e
*
*
*****************************
* material-properties data *
*****************************
*
* matb  *              55             58             59             60e
* ptbln * r02           7r02           5e
*
*   prptb(1,i)     prptb(2,i)     prptb(3,i)     prptb(4,i)     prptb(5,i)
    3.0000e+02     8.3500e+03     4.4487e+02     1.2337e+01     1.0000e+00
    5.0000e+02     8.3500e+03     4.9042e+02     1.5834e+01     1.0000e+00
    7.0000e+02     8.3500e+03     5.3948e+02     1.9331e+01     1.0000e+00
    9.0000e+02     8.3500e+03     5.8987e+02     2.2828e+01     1.0000e+00
    1.1000e+03     8.3500e+03     6.3939e+02     2.6324e+01     1.0000e+00
    1.3000e+03     8.3500e+03     6.8588e+02     2.9821e+01     1.0000e+00
    2.0000e+03     8.3500e+03     6.8588e+02     2.9821e+01     1.0000e+00
e
*
*   prptb(1,i)     prptb(2,i)     prptb(3,i)     prptb(4,i)     prptb(5,i)
    3.0000e+02     3.8000e+03     8.4970e+02     3.5870e+01     1.0000e+00
    5.0000e+02     3.8000e+03     9.6550e+02     2.0173e+01     1.0000e+00
    7.0000e+02     3.8000e+03     1.0813e+03     1.2529e+01     1.0000e+00
    9.0000e+02     3.8000e+03     1.1971e+03     8.9514e+00     1.0000e+00
    1.1000e+03     3.8000e+03     1.3129e+03     7.1615e+00     1.0000e+00
    1.3000e+03     3.8000e+03     1.4287e+03     6.1228e+00     1.0000e+00
    2.0000e+03     3.8000e+03     1.4287e+03     6.1228e+00     1.0000e+00
e
*
*   prptb(1,i)     prptb(2,i)     prptb(3,i)     prptb(4,i)     prptb(5,i)
    3.0000e+02     2.8000e+03     9.8640e+02     1.6300e+00     1.0000e+00
    6.0000e+02     2.8000e+03     1.1358e+03     1.4200e+00     1.0000e+00
    9.0000e+02     2.8000e+03     1.2852e+03     1.2100e+00     1.0000e+00
    1.3000e+03     2.8000e+03     1.4844e+03     9.3000e-01     1.0000e+00
    2.0000e+03     2.8000e+03     1.4844e+03     9.3000e-01     1.0000e+00
e
*
*   prptb(1,i)     prptb(2,i)     prptb(3,i)     prptb(4,i)     prptb(5,i)
    3.0000e+02     8.4103e+03     4.4029e+02     1.4340e+01     8.4000e-01
    6.0000e+02     8.2925e+03     5.0636e+02     1.9331e+01     8.4000e-01
    9.0000e+02     8.1747e+03     5.7242e+02     2.4322e+01     8.4000e-01
    1.2000e+03     8.0569e+03     6.3839e+02     2.9314e+01     8.4000e-01
   2.0000e+03     8.0569e+03     6.3839e+02     2.9314e+01     8.4000e-01
e
*
*
*************************
* control-parameter data *
*************************
*
*
* signal variables
*     idsv      isvn      ilcn      icn1      icn2
       101         0         0         0         0 * problem time
       102         0         1         0         0 * time-step size
       103        27         1      1001     -8001 * lower-plenum level-1 vap. vol. fr.
       104        27         1      1002     -6003 * lower-plenum levels 2 and 3 vap. vol. fr.
       105        27         1      7002     -8026 * downcomer vap. vol. fr.
       106        27         1      1004     -6020 * core vap. vol. fr.
       107        27         1      1021     -6026 * upper-plenum vap. vol. fr.
       108        75         1      1001     -8001 * lower-plenum level-1 liquid density
       109        76         1      1002     -6003 * lower-plenum levels 2 and 3 liquid density
*
* control blocks
*  idcb      icbn      icb1      icb2      icb3
```

```
*            cbgain     cbxmin     cbxmax     cbcon1     cbcon2
*
*            constant number 1
   -1        9          *const*
             1.0        1.0        1.0        1.0
*
*            weighted lower-plenum vapor volume fraction
   -2        59         *wsum*     103        104
             1.0        0.0        1.0        0.5396     0.4604
*
*            lower-plenum liquid volume fraction
   -3        54         *subtr*    -1         -2
             0.0        0.0        0.0        0.0        0.0
*
*            downcomer liquid volume fraction
   -4        54         *subtr*    -1         105
             0.0        0.0        0.0        0.0        0.0
*
*            core liquid volume fraction
   -5        54         *subtr*    -1         106
             0.0        0.0        0.0        0.0        0.0
*
*            upper plenum liquid volume fraction
   -6        54         *subtr*    -1         107
             0.0        0.0        0.0        0.0        0.0
*
*            weighted lower-plenum liquid density
   -7        59         *wsum*     108        109
             1.0        0.0        1.0e20     0.5396     0.4604
*
*            lower plenum delta-p=2.0594e-05 x rholiq x liquid volume fraction
   -8        39         *multi*    -7         -3
        2.0594e-05     -1.0e20     1.0e20     0.0        0.0
*
* trips
*          ntse          ntct          ntsf          ntdp          ntsd
             0             0             0             3             0
*          idtp          isrt          iset          itst          idsg
           1001             2             0             1           101
*       setp(1)       setp(2)
     8.3999e+01    8.4000e+01
*       dtsp(1)       dtsp(2)
     0.0000e+00    0.0000e+00
*       ifsp(1)       ifsp(2)
             0             0
*          idtp          isrt          iset          itst          idsg
           1002             2             1             1           101
*       setp(1)       setp(2)
     0.0000e+00    0.0000e+00
*       dtsp(1)       dtsp(2)
     0.0000e+00    0.0000e+00
*       ifsp(1)       ifsp(2)
             0             0
*          idtp          isrt          iset          itst          idsg
           1003             2             0             1           101
*       setp(1)       setp(2)
     0.0000e+00    0.0000e+00
*       dtsp(1)       dtsp(2)
     0.0000e+00    0.0000e+00
*       ifsp(1)       ifsp(2)
             0             0
*          ndmp
             3
*        idmp()
           1001          1002          1003
*
******************
* component data *
******************
*
*******   type           num           id        ctitle
vessel           1        1 $1$ cctf reactor vessel
*          nasx          nrsx          ntsx          ncsr        ivssbf
             26             4             2             5             0
*          idcu          idcl          idcr          icru          icrl
             26             1             3            20             3
*          icrr         ilcsp         iucsp          iuhp         iconc
              3             0             0             0             0
*         igeom         nvent         nvvtb       nsgrid
              0             0             0         *6* 0
*         shelv          epsw
     0.0000e+00    4.5720e-05
* z       *      9.1500e-01    1.9000e+00 s
* z       *   2.100  2.355  2.605  2.815  3.015 s
* z       *   3.215  3.425  3.625  3.825  4.035 s
* z       *   4.235  4.435  4.645  4.845  5.045 s
* z       *   5.255  5.505  5.760 s
* z       *      6.0000e+00    6.2400e+00    6.5000e+00    6.9600e+00    7.4000e+00
* z       *      8.6470e+00e
* rad     *      1.2900e-01    2.5800e-01    4.8050e-01    5.4200e-01e
* th      *     90.0    360.0 e
* funh    * r2 0.11948214 r2 0.15865495 s
```

```
353  * funh   * r2 0.20909698 r2 1.0 e
354  * nhsca * f 999 e
355  * zsgrid   2.670 3.335 4.000 s
356  * zsgrid   4.665 5.330 5.758 e
357  *         lisrl          lisrc          lisrf          ljuns
358               25              7              3              1
359               25              5              3              2
360               25              8              3              3
361               25              6              3              4
362                1              7              3              5
363  *
364  * level   1
365  *
366  * cfzl-t* f   -1.0000e-04e
367  * cfzl-z* f   -1.0000e-04e
368  * cfzl-r* f -1.0000e-04e
369  * cfzv-t* f   0.0000e-04e
370  * cfzv-z* f   0.0000e-04e
371  * cfzv-r* f   0.0000e-04e
372  * vol    * r04 7.4000e-01r02 8.0254e-01r02 1.0000e+00e
373  * fa-t   * r04 4.0000e-01r02 8.0342e-01r02 1.0000e+00e
374  * fa-z   * r04 4.2000e-01r02 3.4356e-01r02 1.0000e+00e
375  * fa-r   * r04 4.0000e-01r02 5.9471e-01r02 0.0000e+00e
376  * hd-t   * r04 2.2800e-02r02 0.39676 r02 0.119e
377  * hd-z   * r04 1.3000e-02r02 2.8800e-02r02 0.123e
378  * hd-r   * r04 2.2800e-02r02 0.4855r02 0.0000e+00e
379  * alpn   * f   0.0000e+00e
380  * vvn-t * f   0.0000e+00e
381  * vvn-z * f   0.0000e+00e
382  * vvn-r * f   0.0000e+00e
383  * vln-t * f   0.0000e+00e
384  * vln-z * f   0.0000e+00e
385  * vln-r * f   0.0000e+00e
386  * tvn    * f   3.9300e+02e
387  * tln    * f   3.9300e+02e
388  * pn     * f   2.0000e+05e
389  * pan    * f   0.0000e+00e
390  *
391  * level   2
392  *
393  * cfzl-t* f   -1.0000e-04e
394  * cfzl-z* f   -1.0000e-04e
395  * cfzl-r* f   0.0000e-04e
396  * cfzv-t* f   0.0000e-04e
397  * cfzv-z* f   0.0000e-04e
398  * cfzv-r* f   0.0000e-04e
399  * vol    * r04 7.4000e-01r02 7.3602e-01r02 1.0000e+00e
400  * fa-t   * r04 4.0000e-01r02 2.4692e-01 r02 1.0000e+00e
401  * fa-z   * r04 5.9000e-01r02 6.7592e-01r02 1.0000e+00e
402  * fa-r   * r04 4.0000e-01r04 0.0000e+00e
403  * hd-t   * r04 2.2800e-02r02 2.4060e-01r02 0.123e+00e
404  * hd-z   * r04 1.3000e-02r02 4.6000e-02r02 1.2300e-01e
405  * hd-r   * r04 2.2800e-02r04 0.0000e+00e
406  * alpn   * f   1.0000e+00e
407  * vvn-t * f   0.0000e+00e
408  * vvn-z * f   0.0000e+00e
409  * vvn-r * f   0.0000e+00e
410  * vln-t * f   0.0000e+00e
411  * vln-z * f   0.0000e+00e
412  * vln-r * f   0.0000e+00e
413  * tvn    * f   4.1420e+02e
414  * tln    * f   4.1420e+02e
415  * pn     * f   2.0000e+05e
416  * pan    * f   0.0000e+00e
417  *
418  * level   3
419  *
420  * cfzl-t* f   -1.0000e-04e
421  * cfzl-z* r04 -1.1102e-01r02 -1.2189e-01r02 -1.0000e-04e
422  * cfzl-r* f   0.0000e-04e
423  * cfzv-t* f   0.0000e-04e
424  * cfzv-z* r04 4.4407e-01r02 4.8756e-01r02 0.0000e-04e
425  * cfzv-r* f   0.0000e-04e
426  * vol    * r04 5.9000e-01r02 0.45738r02 1.0000e+00e
427  * fa-t   * r04 2.5000e-01r02 0.24692 r02 1.0 e
428  * fa-z   * r02 1.1400e-01r02 1.1460e-01r02 0.04944r02 1.00e
429  * fa-r   * r04 2.5000e-01r04 0.0000e+00e
430  * hd-t   * r04 1.4400e-02r02 2.4060e-01r02 0.123e
431  * hd-z   * r04 1.2460e-02r02 1.3680e-02r02 1.2300e-01e
432  * hd-r   * r04 1.4400e-02r04 0.0000e+00e
433  * alpn   * f   1.0000e+00e
434  * vvn-t * f   0.0000e+00e
435  * vvn-z * f   0.0000e+00e
436  * vvn-r * f   0.0000e+00e
437  * vln-t * f   0.0000e+00e
438  * vln-z * f   0.0000e+00e
439  * vln-r * f   0.0000e+00e
440  * tvn    * f   4.1420e+02e
441  * tln    * f   4.1420e+02e
442  * pn     * f   2.0000e+05e
443  * pan    * f   0.0000e+00e
444  *
```

```
445  * level   4
446  * cfzl-t* f   -1.0000e-04e
447  * cfzl-z* f   -1.0000e-04e
448  * cfzl-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
449  * cfzv-t* f   0.0000e-04e
450  * cfzv-z* f   0.0000e-04e
451  * cfzv-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
452  * vol    * r04 5.3000e-01r02 0.26161 r02 1.0e
453  * fa-t   * r04 2.5000e-01r02 0.09312 r02 1.0e
454  * fa-z   * r04 5.3000e-01r02 0.26161 r02 1.0e
455  * fa-r   * r04 2.5000e-01r04 0.0000e+00e
456  * hd-t   * r06 6.3000e-03r02 1.2300e-01e
457  * hd-z   * r04 1.2460e-02r02 1.3680e-02r02 0.123e
458  * hd-r   * r04 6.3000e-03r04 0.0000e+00e
459  * alpn   * f   1.0000e+00e
460  * vvn-t  * f   0.0000e+00e
461  * vvn-z  * f   0.0000e+00e
462  * vvn-r  * f   0.0000e+00e
463  * vln-t  * f   0.0000e+00e
464  * vln-z  * f   0.0000e+00e
465  * vln-r  * f   0.0000e+00e
466  * tvn    * f   4.1420e+02e
467  * tln    * f   4.1420e+02e
468  * pn     * f   2.0000e+05e
469  * pan    * f   0.0000e+00e
470  *
471  * level   5
472  *
473  * cfzl-t* f   -1.0000e-04e
474  * cfzl-z* r04 -2.4509e-02r02 -2.6909e-02r02 -1.0000e-04e
475  * cfzl-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
476  * cfzv-t* f   0.0000e-04e
477  * cfzv-z* r04 2.4509e-02r02 2.6909e-02r02 0.0000e-04e
478  * cfzv-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
479  * vol    * r04 5.3000e-01r02 0.26161 r02 1.0e
480  * fa-t   * r04 2.5000e-01r02 0.09312 r02 1.0e
481  * fa-z   * r04 5.3000e-01r02 0.26161 r02 1.0e
482  * fa-r   * r04 2.5000e-01r04 0.0000e+00e
483  * hd-t   * r06 6.3000e-03r02 1.2300e-01e
484  * hd-z   * r04 1.2460e-02r02 1.3680e-02r02 0.123e
485  * hd-r   * r04 6.3000e-03r04 0.0000e+00e
486  * alpn   * f   1.0000e+00e
487  * vvn-t  * f   0.0000e+00e
488  * vvn-z  * f   0.0000e+00e
489  * vvn-r  * f   0.0000e+00e
490  * vln-t  * f   0.0000e+00e
491  * vln-z  * f   0.0000e+00e
492  * vln-r  * f   0.0000e+00e
493  * tvn    * f   4.1420e+02e
494  * tln    * f   4.1420e+02e
495  * pn     * f   2.0000e+05e
496  * pan    * f   0.0000e+00e
497  *
498  * level  6
499  *
500  repeat level 5
501  *
502  * level  7
503  *
504  repeat level 5
505  *
506  * level  8
507  *
508  repeat level 5
509  *
510  * level  9
511  *
512  repeat level 5
513  *
514  * level  10
515  *
516  repeat level 5
517  *
518  * level  11
519  *
520  repeat level 5
521  *
522  * level  12
523  *
524  repeat level 5
525  *
526  * level  13
527  *
528  repeat level 5
529  *
530  * level  14
531  *
532  repeat level 5
533  *
534  * level  15
535  *
536  repeat level 5
```

```
*
* level  16
*
repeat level 5
*
* level  17
*
repeat level 5
*
* level  18
*
repeat level 5
*
* level  19
*
repeat level 5
*
* level  20
*
* cfzl-t* f   -1.0000e-04e
* cfzl-z* r04 -5.7191e-02r02 -6.2791e-02r02 -1.0000e-04e
* cfzl-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
* cfzv-t* f   0.0000e-04e
* cfzv-z* r04 5.7191e-02r02 6.2791e-02r02 0.0000e-04e
* cfzv-r* r04 8.7633e-02r02 1.3910e+01r02 0.0000e-04e
* vol   * r04 5.3000e-01r02 0.26161 r02 1.0e
* fa-t  * r04 2.5000e-01r02 0.09312 r02 1.0e
* fa-z  * r04 5.3000e-01r02 0.26161 r02 1.0e
* fa-r  * r04 2.5000e-01r04 0.0000e+00e
* hd-t  * r06 6.3000e-03r02 1.2300e-01e
* hd-z  * r04 1.2460e-02r02 1.3680e-02r02 0.123e
* hd-r  * r04 6.3000e-03r04 0.0000e+00e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   4.1420e+02e
* tln   * f   4.1420e+02e
* pn    * f   2.0000e+05e
* pan   * f   0.0000e+00e
*
* level  21
*
* cfzl-t* f   -1.0000e-04e
* cfzl-z* r04 -6.2300e-02r02 -6.8400e-02r02 -1.0000e-04e
* cfzl-r* f   0.0000e-04e
* cfzv-t* f   0.0000e-04e
* cfzv-z* r04 6.2300e-02r02 6.8400e-02r02 0.0000e-04e
* cfzv-r* f   0.0000e-04e
* vol   * r04 8.1000e-01r02 0.37998 r02 1.0e
* fa-t  * r04 6.2000e-01r02 0.32647 r02 1.0e
* fa-z  * r04 8.1000e-01r02 0.37998 r02 1.0e
* fa-r  * r04 6.2000e-01r04 0.0000e+00e
* hd-t  * r06 6.3000e-03r02 0.123e
* hd-z  * r04 1.2460e-02r02 1.3680e-02r02 0.123e
* hd-r  * r04 6.3000e-03r04 0.0000e+00e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   4.1420e+02e
* tln   * f   4.1420e+02e
* pn    * f   2.0000e+05e
* pan   * f   0.0000e+00e
*
* level  22
*
* cfzl-t* f   -1.0000e-04e
* cfzl-z* f   -1.0000e-04e
* cfzl-r* f   0.0000e-04e
* cfzv-t* f   0.0000e-04e
* cfzv-z* f   0.0000e-04e
* cfzv-r* f   0.0000e-04e
* vol   * r04 7.1000e-01r02 0.3208 r02 1.0e
* fa-t  * r04 5.0000e-01r02 0.29465 r02 1.0 e
* fa-z  * r02 3.8180e-01r02 3.3700e-01r02 1.6499e-01r02 1.00e
* fa-r  * r04 5.0000e-01r04 0.0000e+00e
* hd-t  * r06 1.2800e-02r02 0.123e
* hd-z  * r06 1.2800e-02r02 0.123e
* hd-r  * r04 1.2800e-02r04 0.0000e+00e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
```

```
629  * vln-r * f   0.0000e+00e
630  * tvn   * f   4.1420e+02e
631  * tln   * f   4.1420e+02e
632  * pn    * f   2.0000e+05e
633  * pan   * f   0.0000e+00e
634  *
635  * level  23
636  *
637  * cfzl-t* f   -1.0000e-04e
638  * cfzl-z* f   -1.0000e-04e
639  * cfzl-r* f   0.0000e-04e
640  * cfzv-t* f   0.0000e-04e
641  * cfzv-z* f   0.0000e-04e
642  * cfzv-r* f   0.0000e-04e
643  * vol   * r02 9.2900e-01r02 9.1000e-01r02 0.67137r02 1.0e
644  * fa-t  * r04 9.0000e-01r02 4.4845e-01r02 1.00e
645  * fa-z  * r02 9.2900e-01r02 6.5000e-01r02 3.9774e-01r02 1.00e
646  * fa-r  * r04 7.9000e-01r04 0.0000e+00e
647  * hd-t  * r06 2.5000e-01r02 0.123e
648  * hd-z  * r02 6.1500e-01r02 2.3780e-01r02 2.1260e-01r02 0.123e
649  * hd-r  * r04 2.5000e-01r04 0.0000e+00e
650  * alpn  * f   1.0000e+00e
651  * vvn-t * f   0.0000e+00e
652  * vvn-z * f   0.0000e+00e
653  * vvn-r * f   0.0000e+00e
654  * vln-t * f   0.0000e+00e
655  * vln-z * f   0.0000e+00e
656  * vln-r * f   0.0000e+00e
657  * tvn   * f   4.1420e+02e
658  * tln   * f   4.1420e+02e
659  * pn    * f   2.0000e+05e
660  * pan   * f   0.0000e+00e
661  *
662  * level  24
663  *
664  * cfzl-t* f   -1.0000e-04e
665  * cfzl-z* f   -1.0000e-04e
666  * cfzl-r* f   0.0000e-04e
667  * cfzv-t* f   0.0000e-04e
668  * cfzv-z* f   0.0000e-04e
669  * cfzv-r* f   0.0000e-04e
670  * vol   * r02 9.2900e-01r02 9.2000e-01r02 0.67137r02 1.0 e
671  * fa-t  * r04 6.0000e-01r02 0.45375 r02 1.00e
672  * fa-z  * r02 9.2900e-01r02 9.1000e-01r02 0.3686 r02 1.0 e
673  * fa-r  * r04 6.0000e-01r04 0.0000e+00e
674  * hd-t  * r06 2.5000e-01r02 0.123e
675  * hd-z  * r02 6.1500e-01r02 2.3780e-01r02 2.1260e-01r02 0.123e
676  * hd-r  * r04 2.5000e-01r04 0.0000e+00e
677  * alpn  * f   1.0000e+00e
678  * vvn-t * f   0.0000e+00e
679  * vvn-z * f   0.0000e+00e
680  * vvn-r * f   0.0000e+00e
681  * vln-t * f   0.0000e+00e
682  * vln-z * f   0.0000e+00e
683  * vln-r * f   0.0000e+00e
684  * tvn   * f   4.1420e+02e
685  * tln   * f   4.1420e+02e
686  * pn    * f   2.0000e+05e
687  * pan   * f   0.0000e+00e
688  *
689  * level  25
690  *
691  * cfzl-t* f   -1.0000e-04e
692  * cfzl-z* f   -1.0000e-04e
693  * cfzl-r* f   0.0000e-04e
694  * cfzv-t* f   0.0000e-04e
695  * cfzv-z* f   0.0000e-04e
696  * cfzv-r* f   0.0000e-04e
697  * vol   * r02 9.2900e-01r02 9.2000e-01r02 0.67137r02 1.0 e
698  * fa-t  * r04 6.0000e-01r02 0.45375 r02 1.00e
699  * fa-z  * r02 9.2900e-01r02 9.2000e-01r02 0.3686 r02 1.0 e
700  * fa-r  * r04 6.0000e-01r04 0.0000e+00e
701  * hd-t  * r06 2.5000e-01r02 0.123e
702  * hd-z  * r02 6.1500e-01r02 2.3780e-01r02 2.1260e-01r02 0.123e
703  * hd-r  * r04 2.5000e-01r04 0.0000e+00e
704  * alpn  * f   1.0000e+00e
705  * vvn-t * f   0.0000e+00e
706  * vvn-z * f   0.0000e+00e
707  * vvn-r * f   0.0000e+00e
708  * vln-t * f   0.0000e+00e
709  * vln-z * f   0.0000e+00e
710  * vln-r * f   0.0000e+00e
711  * tvn   * f   4.1420e+02e
712  * tln   * f   4.1420e+02e
713  * pn    * f   2.0000e+05e
714  * pan   * f   0.0000e+00e
715  *
716  * level  26
717  *
718  * cfzl-t* f   -1.0000e-04e
719  * cfzl-z* f   -1.0000e-04e
720  * cfzl-r* f   0.0000e-04e
```

```
* cfzv-t* f   0.0000e-04e
* cfzv-z* f   0.0000e-04e
* cfzv-r* f   0.0000e-04e
* vol   * r02 9.2900e-01r02 9.2000e-01r02 0.67137r02 1.0 e
* fa-t  * r04 6.0000e-01r02 0.45375 r02 1.00e
* fa-z  * r02 9.2900e-01r02 9.2000e-01r02 0.3686 r02 1.0 e
* fa-r  * r04 6.0000e-01r04 0.0000e+00e
* hd-t  * r06 2.5000e-01r02 0.123e
* hd-z  * r02 6.1500e-01r02 2.3780e-01r02 2.1260e-01r02 0.123e
* hd-r  * r04 2.5000e-01r04 0.0000e+00e
* alpn  * f   1.0000e+00e
* vvn-t * f   0.0000e+00e
* vvn-z * f   0.0000e+00e
* vvn-r * f   0.0000e+00e
* vln-t * f   0.0000e+00e
* vln-z * f   0.0000e+00e
* vln-r * f   0.0000e+00e
* tvn   * f   4.1420e+02e
* tln   * f   4.1420e+02e
* pn    * f   2.0000e+05e
* pan   * f   0.0000e+00e
*
*******   type          num           id        ctitle
tee            6       6 $6$ cold leg--combined loop
*         jcell        nodes         ichf         cost         epsw
             18            2            1   7.0700e-01   4.5720e-05
*        iconc1        ncell1         jun1         jun2         ipow1
               0           22           12            3             0
*        iqptr1        iqpsv1       nqptb1       nqpsv1       nqprf1
               0             0            0            0             0
*        radin1          th1        hout11       houtv1       tout11
    3.0200e-01   1.0000e-02   0.0000e+00   0.0000e+00   2.9300e+02
*        toutv1
    2.9300e+02
*         qpin1        qpoff1       rqpmx1       qpscl1
    0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00
*        iconc2        ncell2         jun3         ipow2
               0             1           11            0
*        iqptr2        iqpsv2       nqptb2       nqpsv2       nqprf2
               0             0            0            0             0
*        radin2          th2        hout12       houtv2       tout12
    4.0700e-02   4.0000e-03   0.0000e+00   0.0000e+00   2.9300e+02
*        toutv2
    2.9300e+02
*         qpin2        qpoff2       rqpmx2       qpscl2
    0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00
*
* dx    *     3.0000e-01   2.1650e-01   2.1310e-01   9.9140e-01   1.8866e+00
* dx    *     2.1400e+00   2.2800e+00   9.4000e-01   9.0000e-01   3.2900e-01
* dx    *     2.7500e-01   2.5200e-01   5.2400e-01   2.6000e-01   4.4000e-01
* dx    * r02 6.8500e-01   8.0000e-01r03 8.5730e-01   8.0000e-01e
* vol   *     1.3978e-01   1.7177e-01   8.7117e-02   5.6265e-02   1.0707e-01
* vol   *     1.2145e-01   1.2940e-01   5.3349e-02   5.1078e-02   3.0387e-02
* vol   *     5.6388e-02   2.2821e-02   4.7454e-02   2.8650e-01   2.4972e-02
* vol   * r02 3.8868e-02   4.5402e-02r03 4.8654e-02   4.5402e-02e
* fa    *     4.659e-01   4.3413e-01   3.4821e-01r07 5.6760e-02   2.1265e-02
* fa    * r03 9.0561e-02r09 5.6760e-02e
* fric  * r10 0.0000e+00   2.1500e-01r06       0.0r02       .001 f   0.0000e+00e
* grav  * r03-1.0000e+00  -7.6604e-01r02-1.0000e+00r02 0.0000e+00r06 1.0000e+00
* grav  * r09 0.0000e+00e
* hd    *     3.9570e-01   3.6880e-01   3.2940e-01r07 1.5520e-01   9.5000e-02
* hd    * r03 4.7340e-02r09 1.5520e-01e
* nff   * r17         -1r02          1 f          -1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   4.1420e+02e
* tv    * f   4.1420e+02e
* p     * f   2.0000e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *             6e
* tw    * f   4.1420e+02e
*
* dx    *     1.0000e+00e
* vol   *     5.2050e-03e
* fa    * f   5.2050e-03e
* fric  *         .001 f   0.0000e+00e
* grav  * f   7.0700e-01e
* hd    * f   4.7000e-02e
* nff   *             1            -1e
* alp   *     1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     4.1420e+02e
* tv    *     4.1420e+02e
* p     *     2.0000e+05e
* pa    *     0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *             6e
* tw    * f   3.6250e+02e
*
```

```
*******   type          num           id        ctitle
pipe            7       7 $7$ hot leg--combined loop
*       ncells        nodes         jun1         jun2         epsw
              3            2            4           13   4.5720e-05
*         ichf        iconc         iacc         ipow
              1            0            0            0
*       iqp3tr        iqp3sv       nqp3tb       nqp3sv       nqp3rf
              0            0            0            0            0
*        radin           th        houtl        houtv        toutl
    2.3280e-01   5.0000e-03   0.0000e+00   0.0000e+00   2.9300e+02
*        toutv
    2.9300e+02
*        qp3in       qp3off       rqp3mx       qp3scl
    0.0000e+00   0.0000e+00   0.0000e+00   0.0000e+00
*
* dx    *     3.3810e+00    2.4860e+00    7.9800e-01
* vol   *     1.9190e-01    1.4110e-01    2.9700e-01
* fa    * r03 5.6750e-02    3.7240e-01e
* fric  * f   0.0000e+00e
* grav  * r02 0.0000e+00    7.6600e-01    1.0000e+00e
* hd    * r03 1.5520e-01    4.7960e-01e
* nff   * f           -1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   4.1420e+02e
* tv    * f   4.1420e+02e
* p     * f   2.0000e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *              6e
* tw    * f   4.1420e+02e
*
*******   type          num           id        ctitle
pipe            8       8   $8$ ilsg primary
*
*       ncells        nodes         jun1         jun2         epsw
              12           0           13           12    4.5720e-5
*
*         ichf        iconc         iacc         ipow
              1            0            0            0
*
*        radin           th        houtl        houtv        toutl
    9.8000e-03   2.9000e-03          0.0          0.0        300.0
*
*        toutv        powin       powoff       rpowmx       powscl
        300.0           0.           0.           0.           1.
*
* dx    *     7.9800e-01r02 5.0000e-01    1.5240e+00r04 2.5240e+00    1.5240e+00
* dx    * r02 5.0000e-01    7.9800e-01e
* vol   *     2.9700e-01r02 7.1500e-02    2.1780e-01r04 3.6090e-01    2.1780e-01
* vol   * r02 7.1500e-02    2.1279e-01e
* fa    *     3.7240e-01r11 1.4300e-01    4.659e-01e
* fric  * f   0.0000e+00e
* grav  * r06 1.0000e+00    0.0000e+00r06-1.0000e+00e
* hd    *     4.7960e-01r11 1.9600e-02    3.9570e-01e
* nff   * f           -1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   4.1420e+02e
* tv    * f   4.1420e+02e
* p     * f   2.0000e+05e
* pa    * f   0.0000e+00e
*
*******   type          num           id        ctitle
pipe           28      28   $28$ ilsg secondary
*
*       ncells        nodes         jun1         jun2         epsw
              5            0           16           17    4.5720e-5
*
*         ichf        iconc         iacc         ipow
              1            0            0            0
*
*        radin           th        houtl        houtv        toutl
           0.           0.          0.0          0.0        300.0
*
*        toutv        powin       powoff       rpowmx       powscl
        300.0           0.           0.           0.           1.
*
* dx    * r02 5.0000e-01    1.5240e+00    2.5240e+00    2.7510e+00e
* vol   *     1.7940e+00    5.9400e-01    1.8060e+00    2.9920e+00    3.3150e+00
e
* fa    *     0.0000e+00r04 1.1853e+00    0.0000e+00e
* fric  * f   0.0000e+00e
* grav  * f   1.0000e+00e
* hd    *f  1.0240e-01 e
* nff   * f           -1e
* alp   * r04 0.0000e+00    2.5400e-01e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     4.8000e+02    5.2500e+02r03 5.4000e+02e
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```
* tv    *     4.8000e+02    5.2500e+02r03 5.4000e+02
* p     *     5.2500e+06    5.2400e+06    5.2300e+06    5.2200e+06    5.2100e+06
e
* pa    * f   0.0000e+00
*
*******   type          num           id       ctitle
pipe            2       2 $2$ broken cold leg-vessel side
*       ncells         nodes          jun1          jun2          epsw
              6             3             1             7    4.5720e-05
*         ichf         iconc         iacc          ipow
              1             0             0             0
*       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
              0             0             0             0             0
*        radin            th         houtl         houtv         toutl
    1.3000e-01    5.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
*        toutv
    2.9300e+02
*        qp3in        qp3off        rqp3mx        qp3scl
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx    * r02 1.3700e+00    9.7000e-01r02 1.7600e+00    2.0000e+00e
* vol   * r02 2.5850e-02    7.1340e-02r02 1.2940e-01    1.4710e-01e
* fa    * r03 1.8870e-02r04 7.3540e-02e
* fric  * r02 0.0000e+00    9.0000e-02r02 2.0000e-02r02 1.0000e-02e
* grav  * r03 0.0000e+00   -7.5000e-01   -1.0000e+00   -5.5000e-01    0.0000e+00
e
* hd    * r03 1.5500e-01r04 3.0600e-01e
* nff   * f          -1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   4.1420e+02e
* tv    * f   4.1420e+02e
* p     * f   2.0000e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid * f          6e
* tw    * f   4.1420e+02e
*
*******   type          num           id       ctitle
pipe            3       3 $3$ broken cold leg-st gen side
*       ncells         nodes          jun1          jun2          epsw
             21             2             9             8    4.5720e-05
*         ichf         iconc         iacc          ipow
              1             0             0             0
*       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
              0             0             0             0             0
*        radin            th         houtl         houtv         toutl
    1.0100e-01    9.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
*        toutv
    2.9300e+02
*        qp3in        qp3off        rqp3mx        qp3scl
    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
* dx    *     3.0000e-01    2.1650e-01    2.1310e-01    9.9140e-01    1.8866e+00
* dx    *     2.1400e+00    2.2800e+00    9.4000e-01    9.0000e-01    3.2900e-01
* dx    *     2.7500e-01    2.5200e-01    5.2400e-01    2.6000e-01    4.4000e-01
* dx    * r02 6.8500e-01    8.0000e-01    8.8990e-01    3.5250e+00    2.1500e+00
e
* vol   *     4.6595e-02    5.7256e-02    2.9039e-02    1.8755e-02    3.5691e-02
* vol   *     4.0484e-02    4.3133e-02    1.7783e-02    1.7026e-02    1.0129e-02
* vol   *     1.8796e-02    7.6070e-03    1.5818e-02    9.5500e-02    8.3240e-03
* vol   * r02 1.2956e-02    1.5134e-02    1.6837e-02    6.6690e-02    1.4990e-01
e
* fa    *     1.5532e-01    1.4471e-01    1.1607e-01r07 1.8920e-02    7.0882e-03
* fa    * r03 3.0187e-02r07 1.8920e-02    6.9700e-02e
* fric  * r10 0.0000e+00    2.1500e-01r11 0.0000e+00e
* grav  * r03-1.0000e+00   -7.6604e-01r02-1.0000e+00r02 0.0000e+00r06 1.0000e+00
* grav  * r06 0.0000e+00    4.5820e-01    0.0000e+00e
* hd    *     3.9570e-01    3.6880e-01    3.2940e-01r07 1.5520e-01    9.5000e-02
* hd    * r03 4.7340e-02r07 1.5520e-01    2.9790e-01e
* nff   * f          -1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   4.1420e+02e
* tv    * f   4.1420e+02e
* p     * f   2.0000e+05e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000e+00e
* matid *            6e
* tw    * f   4.1420e+02e
*
*******   type          num           id       ctitle
pipe            4       4 $4$ hot leg--broken loop
*       ncells         nodes          jun1          jun2          epsw
              3             2             2            10    4.5720e-05
*         ichf         iconc         iacc          ipow
              1             0             0             0
*       iqp3tr        iqp3sv        nqp3tb        nqp3sv        nqp3rf
              0             0             0             0             0
*        radin            th         houtl         houtv         toutl
```

```
997      7.7600e-02    5.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
998  *        toutv
999      2.9300e+02
1000 *        qp3in         qp3off         rqp3mx         qp3scl
1001     0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
1002 *
1003 * dx    *      3.3810e+00    2.4860e+00    7.9800e-01e
1004 * vol   *      6.3960e-02    4.7030e-02    9.9000e-02e
1005 * fa    * r03 1.8920e-02    1.2410e-01e
1006 * fric  * f   0.0000e+00e
1007 * grav  * r02 0.0000e+00    7.6600e-01    1.0000e+00e
1008 * hd    * r03 1.5520e-01    4.7960e-01e
1009 * nff   * f           -1e
1010 * alp   * f   1.0000e+00e
1011 * vl    * f   0.0000e+00e
1012 * vv    * f   0.0000e+00e
1013 * tl    * f   4.1420e+02e
1014 * tv    * f   4.1420e+02e
1015 * p     * f   2.0000e+05e
1016 * pa    * f   0.0000e+00e
1017 * qppp  * f   0.0000e+00e
1018 * matid *             6e
1019 * tw    * f   4.1420e+02e
1020 *
1021 *******   type          num           id        ctitle
1022 pipe            5       5   $5$ blsg primary
1023 *
1024 *       ncells         nodes          jun1          jun2          epsw
1025              12             0            10             9     4.5720e-5
1026 *
1027 *         ichf         iconc          iacc          ipow
1028              1             0             0             0
1029 *
1030 *        radin            th         houtl         houtv         toutl
1031     9.8000e-03    2.9000e-03           0.0           0.0         300.0
1032 *
1033 *        toutv         powin        powoff        rpowmx        powscl
1034         300.0            0.            0.            0.            1.
1035 *
1036 * dx    *      7.9800e-01r02 5.0000e-01    1.5240e+00r04 2.5240e+00    1.5240e+00
1037 * dx    * r02 5.0000e-01    7.9800e-01e
1038 * vol   *      9.9000e-02r02 2.3800e-02    7.2600e-02r04 1.2030e-01    7.2600e-02
1039 * vol   * r02 2.3800e-02    7.0930e-02e
1040 * fa    *      1.2410e-01r11 4.7670e-02    1.5532e-01e
1041 * fric  * f   0.0000e+00e
1042 * grav  * r06 1.0000e+00    0.0000e+00r06-1.0000e+00e
1043 * hd    *      4.7960e-01r11 1.9600e-02    3.9570e-01e
1044 * nff   * f           -1e
1045 * alp   * f   1.0000e+00e
1046 * vl    * f   0.0000e+00e
1047 * vv    * f   0.0000e+00e
1048 * tl    * f   4.1420e+02e
1049 * tv    * f   4.1420e+02e
1050 * p     * f   2.0000e+05e
1051 * pa    * f   0.0000e+00e
1052 *
1053 *******   type          num           id        ctitle
1054 pipe           25      25   $25$ blsg secondary
1055 *
1056 *       ncells         nodes          jun1          jun2          epsw
1057              5             0            14            15     4.5720e-5
1058 *
1059 *         ichf         iconc          iacc          ipow
1060              1             0             0             0
1061 *
1062 *        radin            th         houtl         houtv         toutl
1063              0.            0.           0.0           0.0         300.0
1064 *
1065 *        toutv         powin        powoff        rpowmx        powscl
1066         300.0            0.            0.            0.            1.
1067 *
1068 * dx    * r02 5.0000e-01    1.5240e+00    2.5240e+00    2.7510e+00e
1069 * vol   *      5.9800e-01    1.9800e-01    6.0200e-01    9.9720e-01    1.1050e+00
1070 e
1071 * fa    *      0.0000e+00r04 3.9510e-01    0.0000e+00e
1072 * fric  * f   0.0000e+00e
1073 * grav  * f   1.0000e+00e
1074 * hd    *f 1.0240e-01e
1075 * nff   * f           -1e
1076 * alp   * r04 0.0000e+00    2.5400e-01e
1077 * vl    * f   0.0000e+00e
1078 * vv    * f   0.0000e+00e
1079 * tl    *      4.8400e+02    5.2200e+02r03 5.4000e+02e
1080 * tv    *      4.8400e+02    5.2200e+02r03 5.4000e+02e
1081 * p     *      5.2500e+06    5.2400e+06    5.2300e+06    5.2200e+06    5.2100e+06
1082 e
1083 * pa    * f   0.0000e+00e
1084 *
1085 *******   type          num           id        ctitle
1086 pipe           11       11 $11$ lower plenum ecc pipe
1087 *       ncells         nodes          jun1          jun2          epsw
1088              1             0             5             6    4.5720e-05
```

```
*        ichf         iconc          iacc          ipow
             0             0             0             0
*       radin            th         houtl         houtv         toutl
   7.7600e-02    1.0000e-03    0.0000e+00    0.0000e+00    2.9300e+02
*       toutv
   2.9300e+02
*
* dx    *     1.0000e-01e
* vol   *     1.8900e-03e
* fa    * f   1.8900e-02e
* fric  * f   0.0000e+00e
* grav  * f   0.0000e+00e
* hd    * f   1.5200e-01e
* nff   * f          -1e
* alp   *     0.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *     4.1420e+02e
* tv    *     4.1420e+02e
* p     *     2.0000e+05e
* pa    *     0.0000e+00e
*
******   type          num           id       ctitle
fill           12      12 $12$ lower plenum ecc fill
*        junl         ifty         ioff
             6            9            0
*        iftr         ifsv         nftb         nfsv         nfrf
             1003          101            7            0            0
*      twtold         rfmx       concin        felv
   0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*        dxin         volin        alpin         vlin         tlin
   1.0000e-01    1.8900e-02    0.0000e+00    0.0000e+00    4.1420e+02
*         pin          pain        flowin         vvin         tvin
   2.0000e+05    0.0000e+00    0.0000e+00    0.0000e+00    4.1420e+02
*       vmscl        vvscl
   1.0000e+00    1.0000e+00
*       tlscl        tvscl         pscl         pascl        conscl
   1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00
*
* vmtb  * r02 0.0000e+00    8.0000e+01    0.0000e+00    8.4000e+01    4.8681e+00
* vmtb  *     9.1000e+01    5.5105e+00    9.4000e+01    5.0868e+00    9.9000e+01
* vmtb  *     0.0000e+00    6.0000e+02    0.0000e+00e
* vvtb  * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* vvtb  *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* vvtb  *     0.0000e+00    6.0000e+02    0.0000e+00e
* tltb  *     0.0000e+00    3.9300e+02    8.0000e+01    3.9300e+02    8.8200e+01
* tltb  *     3.9300e+02    8.8500e+01    3.1000e+02    1.6000e+02    3.1000e+02
* tltb  *     2.0000e+02    3.1000e+02    6.0000e+02    3.1000e+02e
* tvtb  *     0.0000e+00    4.1420e+02    5.0000e+01    4.1420e+02    1.0000e+02
* tvtb  *     4.1420e+02    1.5000e+02    4.1420e+02    2.0000e+02    4.1420e+02
* tvtb  *     3.0000e+02    4.1420e+02    6.0000e+02    4.1420e+02e
* alptb * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* alptb *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* alptb *     0.0000e+00    6.0000e+02    0.0000e+00e
* ptb   *     0.0000e+00    2.0000e+05    5.0000e+01    2.0000e+05    1.0000e+02
* ptb   *     2.0000e+05    1.5000e+02    2.0000e+05    2.0000e+02    2.0000e+05
* ptb   *     3.0000e+02    2.0000e+05    6.0000e+02    2.0000e+05e
* patb  * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* patb  *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* patb  *     0.0000e+00    6.0000e+02    0.0000e+00e
*
******   type          num           id       ctitle
fill           13      13 $13$ cold leg ecc fill
*        junl         ifty         ioff
             11           9            0
*        iftr         ifsv         nftb         nfsv         nfrf
             1003          101            8            0            0
*      twtold         rfmx       concin        felv
   0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*        dxin         volin        alpin         vlin         tlin
   1.0000e+00    5.2050e-03    0.0000e+00    0.0000e+00    3.8300e+02
*         pin          pain        flowin         vvin         tvin
   2.0000e+05    0.0000e+00    0.0000e+00    0.0000e+00    4.1420e+02
*       vmscl        vvscl
   1.0000e+00    1.0000e+00
*       tlscl        tvscl         pscl         pascl        conscl
   1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00    1.0000e+00
*
* vmtb  * r02 0.0000e+00    9.2000e+01    0.0000e+00    9.6000e+01    1.3660e+01
* vmtb  *     9.9000e+01    1.6442e+01    1.0400e+02    1.6473e+01    1.0900e+02
* vmtb  *     3.1820e+00    1.2100e+00    2.1810e+00    6.0000e+02    2.1864e+00
e
* vvtb  * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* vvtb  *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* vvtb  *     0.0000e+00    5.0000e+02    0.0000e+00    6.0000e+02    0.0000e+00
e
* tltb  *     0.0000e+00    3.8700e+02    8.1000e+01    3.8700e+02    9.2000e+01
* tltb  *     3.8700e+02    9.5000e+01    3.1000e+02    9.6000e+01    3.0900e+02
* tltb  *     1.0700e+02    3.0800e+02    1.2300e+02    3.1100e+02    6.0000e+02
* tltb  *     3.1100e+02e
* tvtb  *     0.0000e+00    4.1420e+02    5.0000e+01    4.1420e+02    1.0000e+02
* tvtb  *     4.1420e+02    1.5000e+02    4.1420e+02    2.0000e+02    4.1420e+02
```

```
* tvtb  *     3.0000e+02    4.1420e+02    5.0000e+02    4.1420e+02    6.0000e+02
* tvtb  *     4.1420e+02e
* alptb * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* alptb *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* alptb *     0.0000e+00    5.0000e+02    0.0000e+00    6.0000e+02    0.0000e+00
e
* ptb   *     0.0000e+00    2.0000e+05    5.0000e+01    2.0000e+05    1.0000e+02
* ptb   *     2.0000e+05    1.5000e+02    2.0000e+05    2.0000e+02    2.0000e+05
* ptb   *     3.0000e+02    2.0000e+05    5.0000e+02    2.0000e+05    6.0000e+02
* ptb   *     2.0000e+05e
* patb  * r02 0.0000e+00    5.0000e+01    0.0000e+00    1.0000e+02    0.0000e+00
* patb  *     1.5000e+02    0.0000e+00    2.0000e+02    0.0000e+00    3.0000e+02
* patb  *     0.0000e+00    5.0000e+02    0.0000e+00    6.0000e+02    0.0000e+00
e
*
*******   type          num           id       ctitle
break          14      14 $14$ cold leg break-vessel side
*         jun1          ibty          isat          ioff
                7             1             3             1
*         ibtr          ibsv          nbtb          nbsv          nbrf
                0           101            23             0             0
*         dxin          volin         alpin          tin           pin
     1.6670e+00    3.1500e-02    1.0000e+00    4.1420e+02    2.0000e+05
*         pain          concin        rhmx          poff          belv
     0.0000e+00    0.0000e+00    1.5000e+05    0.0000e+00    0.0000e+00
*         pscl          tlscl         tvscl         pascl         conscl
     1.0000e+00    1.0000e-06    1.0000e+00    1.0000e+00    1.0000e+00
* ptb   *     0.0000e+00    2.0280e+05    2.6000e+01    2.0280e+05    2.7000e+01
* ptb   *     2.0310e+05    8.2000e+01    2.0310e+05    9.4000e+01    2.2080e+05
* ptb   *     9.6000e+01    2.2390e+05    1.0400e+02    2.0700e+05    1.0800e+02
* ptb   *     2.1100e+05    1.1400e+02    2.0920e+05    1.2700e+02    2.2060e+05
* ptb   *     1.8500e+02    2.0550e+05    2.2000e+02    2.0280e+05    2.5600e+02
* ptb   *     2.0180e+05    3.0200e+02    2.0280e+05    3.3200e+02    2.0460e+05
* ptb   *     3.6500e+02    2.0490e+05    3.9100e+02    2.0460e+05    4.8000e+02
* ptb   *     2.0370e+05    5.0400e+02    2.0430e+05    5.3600e+02    2.0280e+05
* ptb   *     5.5400e+02    2.0120e+05    5.7000e+02    2.0240e+05    6.0000e+02
* ptb   *     2.0340e+05e
*
*******   type          num           id       ctitle
break          15      15 $15$ cold leg break-st gen side
*         jun1          ibty          isat          ioff
                8             1             3             1
*         ibtr          ibsv          nbtb          nbsv          nbrf
                0           101            23             0             0
*         dxin          volin         alpin          tin           pin
     2.1500e+00    1.4990e-01    1.0000e+00    4.1420e+02    2.0000e+05
*         pain          concin        rhmx          poff          belv
     0.0000e+00    0.0000e+00    1.5000e+05    0.0000e+00    0.0000e+00
*         pscl          tlscl         tvscl         pascl         conscl
     1.0000e+00    1.0000e-06    1.0000e+00    1.0000e+00    1.0000e+00
* ptb   *     0.0000e+00    2.0280e+05    2.6000e+01    2.0280e+05    2.7000e+01
* ptb   *     2.0310e+05    8.2000e+01    2.0310e+05    9.4000e+01    2.2080e+05
* ptb   *     9.6000e+01    2.2390e+05    1.0400e+02    2.0700e+05    1.0800e+02
* ptb   *     2.1100e+05    1.1400e+02    2.0920e+05    1.2700e+02    2.2060e+05
* ptb   *     1.8500e+02    2.0550e+05    2.2000e+02    2.0280e+05    2.5600e+02
* ptb   *     2.0180e+05    3.0200e+02    2.0280e+05    3.3200e+02    2.0460e+05
* ptb   *     3.6500e+02    2.0490e+05    3.9100e+02    2.0460e+05    4.8000e+02
* ptb   *     2.0370e+05    5.0400e+02    2.0430e+05    5.3600e+02    2.0280e+05
* ptb   *     5.5400e+02    2.0120e+05    5.7000e+02    2.0240e+05    6.0000e+02
* ptb   *     2.0340e+05e
*
*******   type          num           id       ctitle
fill           18      18 $18$ st. gen. sec.-combined loop
*         jun1          ifty          ioff
               16             1             0
*       twtold          rfmx          concin        felv
     0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin         vlin          tlin
     2.5240e+00    2.9916e+00    0.0000e+00    0.0000e+00    5.4000e+02
*          pin          pain          flowin        vvin          tvin
     5.2500e+06    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
*******   type          num           id       ctitle
fill           19      19 $19$ st. gen. sec.-combined loop
*         jun1          ifty          ioff
               17             1             0
*       twtold          rfmx          concin        felv
     0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin         vlin          tlin
     2.7510e+00    3.3153e+00    0.0000e+00    0.0000e+00    5.4000e+02
*          pin          pain          flowin        vvin          tvin
     5.2500e+06    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
*******   type          num           id       ctitle
fill           16      16 $16$ st. gen. sec.-broken loop
*         jun1          ifty          ioff
               14             1             0
*       twtold          rfmx          concin        felv
     0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin          volin         alpin         vlin          tlin
     2.5240e+00    9.9720e-01    0.0000e+00    0.0000e+00    5.4000e+02
*          pin          pain          flowin        vvin          tvin
```

```
    5.2500e+06    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
*******   type           num           id        ctitle
fill              17      17 $17$ st. gen. sec.-broken loop
*         jun1           ifty          ioff
                15             1             0
*       twtold           rfmx         concin          felv
    0.0000e+00    1.0000e+05    0.0000e+00    0.0000e+00
*         dxin           volin         alpin          vlin          tlin
    2.7510e+00    1.1051e+00    0.0000e+00    0.0000e+00    5.4000e+02
*          pin           pain         flowin          vvin          tvin
    5.2500e+06    0.0000e+00    0.0000e+00    0.0000e+00    0.0000e+00
*
*     type           num           id     ctitle
*     type           num           id     ctitle
 rod          999          999 $999$ fuel rod component
*         ncrx          ncrz
                6            17                                          * card 2
*       nopowr         nridr         modez         liqlev        iaxcnd
                0             0             0              1             1 * card 3
*        idbci         idbco          hdri          hdro
                0             2    0.0000e+00    1.3650e-02
*        nrods         nodes         irftr         nzmax        irftr2
                6             6          1002           250          1002
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
    2.5000e+00    1.0000e+01    1.0000e-03    1.0000e+10    2.1000e+00
*       irpwty         ndgx          ndhx          nrts          nhist
                7             0             0            10             0 * card 11
*       irpwtr        irpwsv        nrpwtb        nrpwsv        nrpwrf
             1002           101         -1201             0             0 * card 14
*       izpwtr        izpwsv        nzpwtb        nzpwsv        nzpwrf
             1002           101             1             0             0 * card 15
*        nmwrx          nfci         nfcil
                0             0             0                           * card 16
*        nzpwz         nzpwi         nfbpwt
               18            -1             0                           * card 17
*        react         tneut         rpwoff        rrpwmx        rpwscl
    0.0000e+00    0.0000e+00    0.0000e+00    1.0000e+30    1.0000e+00 * card 18
*       rpowri         zpwin         zpwoff         rzpwmx
    2.5713e+03    0.0000e+00    0.0000e+00    1.0000e+09                * card 19
*       extsou          pldr          pdrat         fucrac
    0.0000e+00    0.0000e+00    1.3364e+00    1.0000e+00                * card 20
*       nhcomo
f          1e
* nhcelo *  -4  4  5  6  7 s
* nhcelo *  8  9  10  11  12 s
* nhcelo *  13  14  15  16  17 s
* nhcelo *  18  19  20  21 e
* z    *  2.100  2.355  2.605  2.815  3.015 s
* z    *  3.215  3.425  3.625  3.825  4.035 s
* z    *  4.235  4.435  4.645  4.845  5.045 s
* z    *  5.255  5.505  5.760 s
* grav *  f         1.0e
*  rdx *  57.0  171.0  171.0  513.0 s
*  rdx *  228.0  684.0 e
* radrd *     0.0000e+00    2.7000e-03    3.3000e-03    4.3500e-03    4.8500e-03
* radrd *     5.3500e-03e
* matrd *              58            55           59r02          60e
* nfax  * f             1e
* rftn  * f 414.2 e
* rftn  * f 414.2 e
* rftn  * f 414.2 e
* rftn  * f 414.2 e
* rftn  * f 414.2 e
* rftn  * f 414.2 e
* rdpwr *     0.0000e+00    7.0980e-01    1.0000e+00r03 0.0000e+00e
* cpowr * r02 1.3600e+00r02 1.2000e+00r02 7.6000e-01e
* rpkf    f 1.      e
* zpwzt *
  2.1 s
  2.355 s
  2.605 s
  2.815 s
  3.015 s
  3.215 s
  3.425 s
  3.625 s
  3.825 s
  4.035 s
  4.235 s
  4.435 s
  4.645 s
  4.845 s
  5.045 s
  5.255 s
  5.505 s
  5.76 e
* zpwtb *
    0.0 s
  0.406 s
  0.651 s
  0.854 s
```

```
1.01 s
1.15 s
1.26 s
1.34 s
1.38 s
1.4 s
1.38 s
1.34 s
1.26 s
1.15 s
1.01 s
0.854 s
0.651 s
0.406 s
 0.0 e
*
* rpwtb computed from experimental data by summing
* data channels wt01m, wt02m, . . . wt09m
*
 0.e+00 2.5713e+03 s
 5.e-01 5.9609e+03 s
 1.e+00 1.64843e+05 s
 1.5e+00 1.51367e+06 s
 2.e+00 4.0619e+06 s
 2.5e+00 6.7131e+06 s
 3.e+00 8.343e+06 s
 3.5e+00 8.7462e+06 s
 4.e+00 8.6925e+06 s
 4.5e+00 8.6017e+06 s
 5.e+00 8.6903e+06 s
 5.5e+00 8.931e+06 s
 6.e+00 9.1316e+06 s
 6.5e+00 9.202e+06 s
 7.e+00 9.2066e+06 s
 7.5e+00 9.2016e+06 s
 8.e+00 9.2215e+06 s
 8.5e+00 9.2696e+06 s
 9.e+00 9.3102e+06 s
 9.5e+00 9.3192e+06 s
 1.e+01 9.313e+06 s
 1.05e+01 9.3117e+06 s
 1.1e+01 9.3278e+06 s
 1.15e+01 9.3434e+06 s
 1.2e+01 9.3462e+06 s
 1.25e+01 9.3429e+06 s
 1.3e+01 9.3417e+06 s
 1.35e+01 9.3424e+06 s
 1.4e+01 9.3451e+06 s
 1.45e+01 9.3482e+06 s
 1.5e+01 9.3494e+06 s
 1.55e+01 9.3465e+06 s
 1.6e+01 9.3409e+06 s
 1.65e+01 9.3431e+06 s
 1.7e+01 9.3483e+06 s
 1.75e+01 9.3507e+06 s
 1.8e+01 9.3517e+06 s
 1.85e+01 9.3491e+06 s
 1.9e+01 9.3463e+06 s
 1.95e+01 9.3479e+06 s
 2.e+01 9.3518e+06 s
 2.05e+01 9.3537e+06 s
 2.1e+01 9.3525e+06 s
 2.15e+01 9.3503e+06 s
 2.2e+01 9.3544e+06 s
 2.25e+01 9.3547e+06 s
 2.3e+01 9.3506e+06 s
 2.35e+01 9.3484e+06 s
 2.4e+01 9.3469e+06 s
 2.45e+01 9.3472e+06 s
 2.5e+01 9.3471e+06 s
 2.55e+01 9.3503e+06 s
 2.6e+01 9.3527e+06 s
 2.65e+01 9.35e+06 s
 2.7e+01 9.3473e+06 s
 2.75e+01 9.3485e+06 s
 2.8e+01 9.3499e+06 s
 2.85e+01 9.3503e+06 s
 2.9e+01 9.348e+06 s
 2.95e+01 9.349e+06 s
 3.e+01 9.3508e+06 s
 3.05e+01 9.3705e+06 s
 3.1e+01 9.4026e+06 s
 3.15e+01 9.4152e+06 s
 3.2e+01 9.3908e+06 s
 3.25e+01 9.368e+06 s
 3.3e+01 9.3592e+06 s
 3.35e+01 9.3635e+06 s
 3.4e+01 9.3635e+06 s
 3.45e+01 9.358e+06 s
 3.5e+01 9.3551e+06 s
 3.55e+01 9.3541e+06 s
 3.6e+01 9.356e+06 s
```

```
1457   3.65e+01 9.3548e+06 s
1458   3.7e+01 9.3527e+06 s
1459   3.75e+01 9.3529e+06 s
1460   3.8e+01 9.3519e+06 s
1461   3.85e+01 9.3498e+06 s
1462   3.9e+01 9.3496e+06 s
1463   3.95e+01 9.3493e+06 s
1464   4.e+01 9.3495e+06 s
1465   4.05e+01 9.3502e+06 s
1466   4.1e+01 9.3508e+06 s
1467   4.15e+01 9.3502e+06 s
1468   4.2e+01 9.3495e+06 s
1469   4.25e+01 9.3508e+06 s
1470   4.3e+01 9.3512e+06 s
1471   4.35e+01 9.3496e+06 s
1472   4.4e+01 9.3475e+06 s
1473   4.45e+01 9.3488e+06 s
1474   4.5e+01 9.3503e+06 s
1475   4.55e+01 9.3492e+06 s
1476   4.6e+01 9.3461e+06 s
1477   4.65e+01 9.3463e+06 s
1478   4.7e+01 9.3491e+06 s
1479   4.75e+01 9.3491e+06 s
1480   4.8e+01 9.3479e+06 s
1481   4.85e+01 9.3487e+06 s
1482   4.9e+01 9.3493e+06 s
1483   4.95e+01 9.3493e+06 s
1484   5.e+01 9.3512e+06 s
1485   5.05e+01 9.3528e+06 s
1486   5.1e+01 9.3532e+06 s
1487   5.15e+01 9.3503e+06 s
1488   5.2e+01 9.3493e+06 s
1489   5.25e+01 9.3493e+06 s
1490   5.3e+01 9.3507e+06 s
1491   5.35e+01 9.3516e+06 s
1492   5.4e+01 9.3517e+06 s
1493   5.45e+01 9.3508e+06 s
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1496   5.6e+01 9.3502e+06 s
1497   5.65e+01 9.3499e+06 s
1498   5.7e+01 9.3529e+06 s
1499   5.75e+01 9.3518e+06 s
1500   5.8e+01 9.3497e+06 s
1501   5.85e+01 9.3496e+06 s
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1503   5.95e+01 9.3506e+06 s
1504   6.e+01 9.3534e+06 s
1505   6.05e+01 9.3552e+06 s
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1510   6.3e+01 9.3518e+06 s
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1545   8.05e+01 9.3543e+06 s
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1547   8.15e+01 9.3533e+06 s
1548   8.2e+01 9.353e+06 s
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1931 2.735e+02 5.6114e+06 s
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2379   4.975e+02 4.6414e+06 s
2380   4.98e+02 4.6412e+06 s
2381   4.985e+02 4.6424e+06 s
2382   4.99e+02 4.6435e+06 s
2383   4.995e+02 4.6447e+06 s
2384   5.e+02 4.6456e+06 s
2385   5.005e+02 4.6442e+06 s
2386   5.01e+02 4.6426e+06 s
2387   5.015e+02 4.6403e+06 s
2388   5.02e+02 4.6323e+06 s
2389   5.025e+02 4.6208e+06 s
2390   5.03e+02 4.613e+06 s
2391   5.035e+02 4.6122e+06 s
2392   5.04e+02 4.6136e+06 s
2393   5.045e+02 4.6146e+06 s
2394   5.05e+02 4.6156e+06 s
2395   5.055e+02 4.6157e+06 s
2396   5.06e+02 4.6143e+06 s
2397   5.065e+02 4.6125e+06 s
2398   5.07e+02 4.6123e+06 s
2399   5.075e+02 4.6127e+06 s
2400   5.08e+02 4.6124e+06 s
2401   5.085e+02 4.6114e+06 s
2402   5.09e+02 4.6106e+06 s
2403   5.095e+02 4.6099e+06 s
2404   5.1e+02 4.6087e+06 s
2405   5.105e+02 4.6089e+06 s
2406   5.11e+02 4.6098e+06 s
2407   5.115e+02 4.6086e+06 s
2408   5.12e+02 4.6012e+06 s
2409   5.125e+02 4.5889e+06 s
2410   5.13e+02 4.5803e+06 s
2411   5.135e+02 4.5793e+06 s
2412   5.14e+02 4.5811e+06 s
2413   5.145e+02 4.5812e+06 s
2414   5.15e+02 4.5802e+06 s
2415   5.155e+02 4.5811e+06 s
2416   5.16e+02 4.5828e+06 s
2417   5.165e+02 4.5823e+06 s
2418   5.17e+02 4.5813e+06 s
2419   5.175e+02 4.5812e+06 s
2420   5.18e+02 4.5813e+06 s
2421   5.185e+02 4.5813e+06 s
2422   5.19e+02 4.5813e+06 s
2423   5.195e+02 4.581e+06 s
2424   5.2e+02 4.581e+06 s
2425   5.205e+02 4.5817e+06 s
2426   5.21e+02 4.5822e+06 s
2427   5.215e+02 4.5817e+06 s
2428   5.22e+02 4.5811e+06 s
2429   5.225e+02 4.5771e+06 s
2430   5.23e+02 4.5711e+06 s
2431   5.235e+02 4.5671e+06 s
2432   5.24e+02 4.5661e+06 s
2433   5.245e+02 4.5659e+06 s
2434   5.25e+02 4.5649e+06 s
2435   5.255e+02 4.5639e+06 s
2436   5.26e+02 4.5633e+06 s
2437   5.265e+02 4.5634e+06 s
2438   5.27e+02 4.5629e+06 s
2439   5.275e+02 4.5577e+06 s
2440   5.28e+02 4.5502e+06 s
2441   5.285e+02 4.5468e+06 s
2442   5.29e+02 4.5459e+06 s
2443   5.295e+02 4.5474e+06 s
2444   5.3e+02 4.5475e+06 s
2445   5.305e+02 4.5474e+06 s
2446   5.31e+02 4.5484e+06 s
2447   5.315e+02 4.5499e+06 s
2448   5.32e+02 4.5497e+06 s
2449   5.325e+02 4.5449e+06 s
2450   5.33e+02 4.5386e+06 s
2451   5.335e+02 4.5358e+06 s
2452   5.34e+02 4.5358e+06 s
2453   5.345e+02 4.5369e+06 s
2454   5.35e+02 4.5375e+06 s
2455   5.355e+02 4.5371e+06 s
2456   5.36e+02 4.5366e+06 s
2457   5.365e+02 4.5365e+06 s
2458   5.37e+02 4.5367e+06 s
2459   5.375e+02 4.5368e+06 s
2460   5.38e+02 4.5359e+06 s
2461   5.385e+02 4.5347e+06 s
2462   5.39e+02 4.5335e+06 s
2463   5.395e+02 4.5323e+06 s
2464   5.4e+02 4.5308e+06 s
2465   5.405e+02 4.5299e+06 s
2466   5.41e+02 4.5299e+06 s
2467   5.415e+02 4.5302e+06 s
2468   5.42e+02 4.53e+06 s
```

2469 5.425e+02 4.5217e+06 s
2470 5.43e+02 4.5088e+06 s
2471 5.435e+02 4.5003e+06 s
2472 5.44e+02 4.4984e+06 s
2473 5.445e+02 4.4993e+06 s
2474 5.45e+02 4.5011e+06 s
2475 5.455e+02 4.5024e+06 s
2476 5.46e+02 4.5018e+06 s
2477 5.465e+02 4.5014e+06 s
2478 5.47e+02 4.5017e+06 s
2479 5.475e+02 4.4988e+06 s
2480 5.48e+02 4.4937e+06 s
2481 5.485e+02 4.4899e+06 s
2482 5.49e+02 4.4894e+06 s
2483 5.495e+02 4.4914e+06 s
2484 5.5e+02 4.4937e+06 s
2485 5.505e+02 4.4966e+06 s
2486 5.51e+02 4.4969e+06 s
2487 5.515e+02 4.4947e+06 s
2488 5.52e+02 4.4933e+06 s
2489 5.525e+02 4.4927e+06 s
2490 5.53e+02 4.4921e+06 s
2491 5.535e+02 4.4918e+06 s
2492 5.54e+02 4.4919e+06 s
2493 5.545e+02 4.4918e+06 s
2494 5.55e+02 4.4913e+06 s
2495 5.555e+02 4.4915e+06 s
2496 5.56e+02 4.4919e+06 s
2497 5.565e+02 4.4915e+06 s
2498 5.57e+02 4.4904e+06 s
2499 5.575e+02 4.4847e+06 s
2500 5.58e+02 4.4767e+06 s
2501 5.585e+02 4.4719e+06 s
2502 5.59e+02 4.4693e+06 s
2503 5.595e+02 4.469e+06 s
2504 5.6e+02 4.47e+06 s
2505 5.605e+02 4.4716e+06 s
2506 5.61e+02 4.4712e+06 s
2507 5.615e+02 4.4693e+06 s
2508 5.62e+02 4.4679e+06 s
2509 5.625e+02 4.4646e+06 s
2510 5.63e+02 4.4603e+06 s
2511 5.635e+02 4.4578e+06 s
2512 5.64e+02 4.4569e+06 s
2513 5.645e+02 4.4564e+06 s
2514 5.65e+02 4.4559e+06 s
2515 5.655e+02 4.4562e+06 s
2516 5.66e+02 4.4575e+06 s
2517 5.665e+02 4.4592e+06 s
2518 5.67e+02 4.4602e+06 s
2519 5.675e+02 4.46e+06 s
2520 5.68e+02 4.4591e+06 s
2521 5.685e+02 4.4581e+06 s
2522 5.69e+02 4.458e+06 s
2523 5.695e+02 4.458e+06 s
2524 5.7e+02 4.4581e+06 s
2525 5.705e+02 4.4577e+06 s
2526 5.71e+02 4.4582e+06 s
2527 5.715e+02 4.4598e+06 s
2528 5.72e+02 4.4601e+06 s
2529 5.725e+02 4.4556e+06 s
2530 5.73e+02 4.449e+06 s
2531 5.735e+02 4.4458e+06 s
2532 5.74e+02 4.4453e+06 s
2533 5.745e+02 4.446e+06 s
2534 5.75e+02 4.4467e+06 s
2535 5.755e+02 4.4467e+06 s
2536 5.76e+02 4.4455e+06 s
2537 5.765e+02 4.4446e+06 s
2538 5.77e+02 4.4449e+06 s
2539 5.775e+02 4.4414e+06 s
2540 5.78e+02 4.4331e+06 s
2541 5.785e+02 4.4259e+06 s
2542 5.79e+02 4.4231e+06 s
2543 5.795e+02 4.4237e+06 s
2544 5.8e+02 4.4247e+06 s
2545 5.805e+02 4.4262e+06 s
2546 5.81e+02 4.4262e+06 s
2547 5.815e+02 4.4251e+06 s
2548 5.82e+02 4.4236e+06 s
2549 5.825e+02 4.4202e+06 s
2550 5.83e+02 4.4148e+06 s
2551 5.835e+02 4.4116e+06 s
2552 5.84e+02 4.4114e+06 s
2553 5.845e+02 4.4118e+06 s
2554 5.85e+02 4.4124e+06 s
2555 5.855e+02 4.4132e+06 s
2556 5.86e+02 4.4137e+06 s
2557 5.865e+02 4.413e+06 s
2558 5.87e+02 4.4123e+06 s
2559 5.875e+02 4.4126e+06 s
2560 5.88e+02 4.4127e+06 s

```
2561   5.885e+02 4.4119e+06 s
2562   5.89e+02 4.4114e+06 s
2563   5.895e+02 4.412e+06 s
2564   5.9e+02 4.4132e+06 s
2565   5.905e+02 4.4143e+06 s
2566   5.91e+02 4.415e+06 s
2567   5.915e+02 4.4147e+06 s
2568   5.92e+02 4.412e+06 s
2569   5.925e+02 4.4013e+06 s
2570   5.93e+02 4.3881e+06 s
2571   5.935e+02 4.3801e+06 s
2572   5.94e+02 4.3766e+06 s
2573   5.945e+02 4.3782e+06 s
2574   5.95e+02 4.3811e+06 s
2575   5.955e+02 4.3815e+06 s
2576   5.96e+02 4.3804e+06 s
2577   5.965e+02 4.3801e+06 s
2578   5.97e+02 4.3796e+06 s
2579   5.975e+02 4.3785e+06 s
2580   5.98e+02 4.3786e+06 s
2581   5.985e+02 4.38e+06 s
2582   5.99e+02 4.3804e+06 s
2583   5.995e+02 4.3794e+06 s
2584   6.e+02 4.3786e+06 e
2585  * fpuo2 * f   0.0000e+00e
2586  * ftd   * f   1.0000e+00e
2587  * gmix  * f   0.0000e+00e
2588  * gmles * f   0.0000e+00e
2589  * pgapt * f   0.0000e+00e
2590  * plvol * f   0.0000e+00e
2591  * pslen * f   0.0000e+00e
2592  * clenn * f   0.0000e+00e
2593  * burn  * f   0.0000e+00e
2594  * burn  * f   0.0000e+00e
2595  * burn  * f   0.0000e+00e
2596  * burn  * f   0.0000e+00e
2597  * burn  * f   0.0000e+00e
2598  * burn  * f   0.0000e+00e
2599  *     type          num          id     ctitle
2600  slab            998        998  $998$ lev 1 ring 1-3 slabs
2601  *
2602  *         ncrx          ncrz
2603               6             1
2604  *
2605  *       nopowr          nridr         modez         liqlev         iaxcnd
2606               1             1             1              0              0
2607  *
2608  *        idbci         idbco
2609               0             2
2610  *
2611  *        width
2612             1.0929
2613  *
2614  *        nrods         nodes         irftr         nzmax        irftr2
2615               6             4             0             5             0
2616  *
2617  *     dtxht(1)      dtxht(2)         dznht         hgapo          shelv
2618               5.           25.          .002            0.            0.
2619  *
2620  *       nhcomo
2621  f            1e
2622  *
2623  *       nhcelo             +             +             +             +
2624              -1             1            2e
2625  *
2626  *           dz             +             +             +             +
2627            .915e
2628  *
2629  *         grav
2630  f   1.0000E+00e
2631  *
2632  *        idrod             +             +             +             +
2633               1             2             3             4             5
2634              6e
2635  *
2636  *  rdx  *  1.088  3.264  5.266  15.798 s
2637  *  rdx  *  5.266  15.798 e
2638  *
2639  *        radrd
2640              0.0          .002         .0035         .0043e
2641  *
2642  *        matrd
2643  f            6e
2644  *
2645  *         nfax
2646  f            1e
2647  *
2648  *         rftn
2649  f         393.e
2650  f         393.e
2651  f         393.e
2652  f         393.e
```

```
f         393.e
f         393.e
*
*     type          num           id     ctitle
slab             997        997  $997$ lev 1 ring 4 slabs
*
*         ncrx          ncrz
              2             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*
*        idbci         idbco
              0             2
*
*        width
         1.0929
*
*        nrods         nodes         irftr         nzmax        irftr2
              2             4             0             5             0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              5.           25.          .002            0.            0.
*
*       nhcomo
f             1e
*
*       nhcelo             +             +             +             +
             -1             1            2e
*
*           dz             +             +             +             +
           .915e
*
*         grav
f   1.0000E+00e
*
*        idrod             +             +             +             +
              7            8e
*
*  rdx  *  2.07  6.21 e
*
*        radrd
              0.0           .04           .08           .09e
*
*        matrd
r 2           9             6e
*
*         nfax
f             1e
*
*         rftn
f         393.e
f         393.e
*
*
*     type          num           id     ctitle
slab             996        996  $996$ lev 2 ring 1-3 slabs
*
*         ncrx          ncrz
              6             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*
*        idbci         idbco
              0             2
*
*        width
         1.0152
*
*        nrods         nodes         irftr         nzmax        irftr2
              6             4             0             5             0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              5.           25.          .002            0.            0.
*
*       nhcomo
f             1e
*
*       nhcelo             +             +             +             +
             -2             2            3e
*
*           dz             +             +             +             +
           .985e
*
*         grav
f   1.0000E+00e
*
*        idrod             +             +             +             +
              1             2             3             4             5
             6e
*
```

```
2745  *  rdx  *  1.17  3.51  5.67  17.01 s
2746  *  rdx  *  7.36  11.04 e
2747  *
2748  *        radrd
2749              0.0          .002          .0035          .0043e
2750  *
2751  *        matrd
2752  f             6e
2753  *
2754  *         nfax
2755  f             1e
2756  *
2757  *         rftn
2758  f          393.e
2759  f          393.e
2760  f          393.e
2761  f          393.e
2762  f          393.e
2763  f          393.e
2764  *
2765  *     type            num             id     ctitle
2766  slab              995         995  $995$ lev 2 ring 4 slabs
2767  *
2768  *          ncrx           ncrz
2769                2              1
2770  *
2771  *       nopowr          nridr          modez         liqlev         iaxcnd
2772                1              1              1              0              0
2773  *
2774  *        idbci          idbco
2775                0              2
2776  *
2777  *        width
2778             1.0152
2779  *
2780  *        nrods          nodes          irftr          nzmax        irftr2
2781                2              4              0              5             0
2782  *
2783  *     dtxht(1)       dtxht(2)          dznht          hgapo          shelv
2784                5.            25.           .002             0.             0.
2785  *
2786  *       nhcomo
2787  f             1e
2788  *
2789  *       nhcelo              +              +              +              +
2790                -2             2             3e
2791  *
2792  *           dz              +              +              +              +
2793             .985e
2794  *
2795  *         grav
2796  f   1.0000E+00e
2797  *
2798  *        idrod              +              +              +              +
2799                7             8e
2800  *
2801  *  rdx  *  0.79  2.37 e
2802  *
2803  *        radrd
2804              0.0           .04           .08           .09e
2805  *
2806  *        matrd
2807  r 2           9             6e
2808  *
2809  *         nfax
2810  f             1e
2811  *
2812  *         rftn
2813  f          393.e
2814  f          393.e
2815  *
2816  *
2817  *     type            num             id     ctitle
2818  slab              994         994  $994$ lev 3 ring 1-3 slabs
2819  *
2820  *          ncrx           ncrz
2821                6              1
2822  *
2823  *       nopowr          nridr          modez         liqlev         iaxcnd
2824                1              1              1              0              0
2825  *
2826  *        idbci          idbco
2827                0              2
2828  *
2829  *        width
2830             5.0000
2831  *
2832  *        nrods          nodes          irftr          nzmax        irftr2
2833                6              4              0              5             0
2834  *
2835  *     dtxht(1)       dtxht(2)          dznht          hgapo          shelv
2836                5.            25.           .002             0.             0.
```

```
*
*       nhcomo
f            1e
*
*       nhcelo              +              +              +              +
                -3              3              4e
*
*           dz              +              +              +              +
             .200e
*
*         grav
f   1.0000E+00e
*
*       idrod               +              +              +              +
                1              2              3              4              5
                6e
*
*  rdx  *  0.33  0.99  1.608  4.824 s
*  rdx  *  1.91  5.73 e
*
*       radrd
              0.0          .002         .0035         .0043e
*
*       matrd
f            6e
*
*        nfax
f            1e
*
*        rftn
f         393.e
f         393.e
f         393.e
f         393.e
f         393.e
f         393.e
*
*     type           num            id     ctitle
slab             993         993  $993$ lev 3 ring 4 slabs
*
*         ncrx          ncrz
                2             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
                1             1             1             0             0
*
*        idbci         idbco
                0             2
*
*        width
             5.0000
*
*        nrods         nodes         irftr         nzmax        irftr2
                2             4          0             5          0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              5.           25.          .002            0.            0.
*
*       nhcomo
f            1e
*
*       nhcelo              +              +              +              +
                -3              3              4e
*
*           dz              +              +              +              +
             .200e
*
*         grav
f   1.0000E+00e
*
*       idrod               +              +              +              +
                7              8e
*
*  rdx  *  0.16  0.48 e
*
*       radrd
              0.0           .04           .08           .09e
*
*       matrd
r 2             9              6e
*
*        nfax
f            1e
*
*        rftn
f         393.e
f         393.e
*
*     type           num            id     ctitle
slab             974         974  $974$ lev 4-17 ring 1-3 slabs
*
*         ncrx          ncrz
```

```
2929                6             17
2930  *
2931  *         nopowr          nridr          modez         liqlev         iaxcnd
2932                1              1              1              0              1
2933  *
2934  *          idbci          idbco
2935                0              2
2936  *
2937  *          width
2938              1.6393
2939  *
2940  *          nrods          nodes          irftr          nzmax         irftr2
2941                6              4              0             35              0
2942  *
2943  *       dtxht(1)       dtxht(2)         dznht          hgapo          shelv
2944               5.             25.           .002             0.            2.1
2945  *
2946  *         nhcomo
2947  f              1e
2948  *
2949  * nhcelo *  -4  4  5  6  7 s
2950  * nhcelo *  8  9  10  11  12 s
2951  * nhcelo *  13  14  15  16  17 s
2952  * nhcelo *  18  19  20  21 e
2953  *
2954  *  dz  *  0.255  0.250  0.210  0.200  0.200 s
2955  *  dz  *  0.210  0.200  0.200  0.210  0.200 s
2956  *  dz  *  0.200  0.210  0.200  0.200  0.210 s
2957  *  dz  *  0.250  0.255 e
2958  *
2959  *           grav
2960  f    1.0000E+00e
2961  *
2962  *         idrod              +              +              +              +
2963                1              2              3              4              5
2964                6e
2965  *
2966  *  rdx  *  0.1586  0.4758  0.6612  1.9836 s
2967  *  rdx  *  1.235  3.705 e
2968  *
2969  *         radrd
2970              0.0           .002          .0035          .0043e
2971  *
2972  *         matrd
2973  f              6e
2974  *
2975  *          nfax
2976  f              1e
2977  *
2978  *          rftn
2979  f          393.e
2980  f          393.e
2981  f          393.e
2982  f          393.e
2983  f          393.e
2984  f          393.e
2985  *
2986  *
2987  *      type           num            id     ctitle
2988  slab              973          973  $973$ lev 4-20 ring 4 slabs
2989  *
2990  *           ncrx           ncrz
2991                2             17
2992  *
2993  *         nopowr          nridr          modez         liqlev         iaxcnd
2994                1              1              1              0              1
2995  *
2996  *          idbci          idbco
2997                0              2
2998  *
2999  *          width
3000              1.6393
3001  *
3002  *          nrods          nodes          irftr          nzmax         irftr2
3003                2              4              0             35              0
3004  *
3005  *       dtxht(1)       dtxht(2)         dznht          hgapo          shelv
3006               5.             25.           .002             0.            2.1
3007  *
3008  *         nhcomo
3009  f              1e
3010  *
3011  * nhcelo *  -4  4  5  6  7 s
3012  * nhcelo *  8  9  10  11  12 s
3013  * nhcelo *  13  14  15  16  17 s
3014  * nhcelo *  18  19  20  21 e
3015  *
3016  *  dz  *  0.255  0.250  0.210  0.200  0.200 s
3017  *  dz  *  0.210  0.200  0.200  0.210  0.200 s
3018  *  dz  *  0.200  0.210  0.200  0.200  0.210 s
3019  *  dz  *  0.250  0.255 e
3020  *
```

```
3021  *         grav
3022  f   1.0000E+00e
3023  *
3024  *        idrod             +             +             +             +
3025                 7            8e
3026  *
3027  *  rdx  *  0.519  1.557 e
3028  *
3029  *        radrd
3030                0.0          .04           .08           .09e
3031  *
3032  *        matrd
3033  r 2           9            6e
3034  *
3035  *         nfax
3036  f             1e
3037  *
3038  *         rftn
3039  f         393.e
3040  f         393.e
3041  *
3042  *     type           num           id     ctitle
3043  slab             918         918  $918$ lev 21 ring 1-3 slabs
3044  *
3045  *         ncrx          ncrz
3046                6            1
3047  *
3048  *       nopowr         nridr         modez        liqlev        iaxcnd
3049                1            1             1             0             0
3050  *
3051  *        idbci         idbco
3052                0            2
3053  *
3054  *        width
3055               4.1667
3056  *
3057  *         nrods         nodes         irftr         nzmax        irftr2
3058                6            4             0             5             0
3059  *
3060  *     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
3061                5.           25.          .002            0.            0.
3062  *
3063  *       nhcomo
3064  f             1e
3065  *
3066  *       nhcelo             +             +             +             +
3067                -21          21            22e
3068  *
3069  *           dz             +             +             +             +
3070              .240e
3071  *
3072  *         grav
3073  f   1.0000E+00e
3074  *
3075  *        idrod             +             +             +             +
3076                1            2             3             4             5
3077                6e
3078  *
3079  *  rdx  *  0.2  0.6  0.965  2.895 s
3080  *  rdx  *  1.192  3.576 e
3081  *
3082  *        radrd
3083                0.0          .002          .0035         .0043e
3084  *
3085  *        matrd
3086  f             6e
3087  *
3088  *         nfax
3089  f             1e
3090  *
3091  *         rftn
3092  f         393.e
3093  f         393.e
3094  f         393.e
3095  f         393.e
3096  f         393.e
3097  f         393.e
3098  *
3099  *     type           num           id     ctitle
3100  slab             917         917  $917$ lev 21 ring 4 slabs
3101  *
3102  *         ncrx          ncrz
3103                2            1
3104  *
3105  *       nopowr         nridr         modez        liqlev        iaxcnd
3106                1            1             1             0             0
3107  *
3108  *        idbci         idbco
3109                0            2
3110  *
3111  *        width
3112               4.1667
```

```
3113  *
3114  *        nrods          nodes          irftr          nzmax        irftr2
3115                2              4              0              5             0
3116  *
3117  *     dtxht(1)       dtxht(2)          dznht          hgapo          shelv
3118                5.            25.           .002             0.             0.
3119  *
3120  *       nhcomo
3121  f            1e
3122  *
3123  *       nhcelo              +              +              +              +
3124               -21            21            22e
3125  *
3126  *           dz              +              +              +              +
3127             .240e
3128  *
3129  *         grav
3130  f    1.0000E+00e
3131  *
3132  *        idrod              +              +              +              +
3133                7             8e
3134  *
3135  *  rdx  *  0.204  0.612 e
3136  *
3137  *        radrd
3138              0.0           .04           .08           .09e
3139  *
3140  *        matrd
3141  r 2           9             6e
3142  *
3143  *         nfax
3144  f            1e
3145  *
3146  *         rftn
3147  f         393.e
3148  f         393.e
3149  *
3150  *
3151  *     type           num            id     ctitle
3152  slab            916        916  $916$ lev 22 ring 1-3 slabs
3153  *
3154  *         ncrx           ncrz
3155                6              1
3156  *
3157  *       nopowr          nridr          modez         liqlev         iaxcnd
3158                1              1              1              0              0
3159  *
3160  *        idbci          idbco
3161                0              2
3162  *
3163  *        width
3164            4.1667
3165  *
3166  *        nrods          nodes          irftr          nzmax        irftr2
3167                6              4              0              5             0
3168  *
3169  *     dtxht(1)       dtxht(2)          dznht          hgapo          shelv
3170                5.            25.           .002             0.             0.
3171  *
3172  *       nhcomo
3173  f            1e
3174  *
3175  *       nhcelo              +              +              +              +
3176               -22            22            23e
3177  *
3178  *           dz              +              +              +              +
3179             .240e
3180  *
3181  *         grav
3182  f    1.0000E+00e
3183  *
3184  *        idrod              +              +              +              +
3185                1              2              3              4              5
3186               6e
3187  *
3188  *  rdx  *  0.0369  0.1107  0.1474  0.4422 s
3189  *  rdx  *  0.374  1.122 e
3190  *
3191  *        radrd
3192              0.0           .002          .0035          .0043e
3193  *
3194  *        matrd
3195  f            6e
3196  *
3197  *         nfax
3198  f            1e
3199  *
3200  *         rftn
3201  f         393.e
3202  f         393.e
3203  f         393.e
3204  f         393.e
```

```
f         393.e
f         393.e
*
*     type          num          id     ctitle
slab            915        915  $915$ lev 22 ring 4 slabs
*
*         ncrx          ncrz
              2             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*
*        idbci         idbco
              0             2
*
*        width
         4.1667
*
*        nrods         nodes         irftr         nzmax        irftr2
              2             4             0             5             0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              5.           25.          .002            0.            0.
*
*       nhcomo
             1e
f
*
*       nhcelo             +             +             +             +
             -22            22           23e
*
*           dz             +             +             +             +
           .240e
*
*         grav
f   1.0000E+00e
*
*        idrod             +             +             +             +
              7            8e
*
*  rdx  *  0.204  0.612 e
*
*        radrd
            0.0           .04           .08           .09e
*
*        matrd
r 2           9            6e
*
*         nfax
f            1e
*
*         rftn
f         393.e
f         393.e
*
*
*     type          num          id     ctitle
slab            914        914  $914$ lev 23 ring 1-3 slabs
*
*         ncrx          ncrz
              6             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
              1             1             1             0             0
*
*        idbci         idbco
              0             2
*
*        width
         3.8462
*
*        nrods         nodes         irftr         nzmax        irftr2
              6             4             0             5             0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              5.           25.          .002            0.            0.
*
*       nhcomo
             1e
f
*
*       nhcelo             +             +             +             +
             -23            23           24e
*
*           dz             +             +             +             +
           .260e
*
*         grav
f   1.0000E+00e
*
*        idrod             +             +             +             +
              1             2             3             4             5
             6e
*
```

```
3297  *  rdx  *  0.0195  0.0585  0.156  0.468 s
3298  *  rdx  *  0.44  1.32 e
3299  *
3300  *        radrd
3301             0.0          .002         .0035         .0043e
3302  *
3303  *        matrd
3304  f             6e
3305  *
3306  *         nfax
3307  f             1e
3308  *
3309  *         rftn
3310  f         393.e
3311  f         393.e
3312  f         393.e
3313  f         393.e
3314  f         393.e
3315  f         393.e
3316  *
3317  *     type           num           id     ctitle
3318  slab             913         913  $913$ lev 23 ring 4 slabs
3319  *
3320  *         ncrx          ncrz
3321               2             1
3322  *
3323  *       nopowr          nridr         modez        liqlev        iaxcnd
3324               1             1             1             0             0
3325  *
3326  *        idbci         idbco
3327               0             2
3328  *
3329  *        width
3330            3.8462
3331  *
3332  *        nrods         nodes         irftr         nzmax        irftr2
3333               2             4             0             5             0
3334  *
3335  *     dtxht(1)      dtxht(2)         dznht         hgapo          shelv
3336               5.           25.          .002            0.            0.
3337  *
3338  *       nhcomo
3339  f             1e
3340  *
3341  *       nhcelo             +             +             +             +
3342                -23           23           24e
3343  *
3344  *           dz             +             +             +             +
3345             .260e
3346  *
3347  *         grav
3348  f    1.0000E+00e
3349  *
3350  *        idrod             +             +             +             +
3351               7            8e
3352  *
3353  *  rdx  *  0.221  0.663 e
3354  *
3355  *        radrd
3356             0.0           .04           .08           .09e
3357  *
3358  *        matrd
3359  r 2           9            6e
3360  *
3361  *         nfax
3362  f             1e
3363  *
3364  *         rftn
3365  f         393.e
3366  f         393.e
3367  *
3368  *     type           num           id     ctitle
3369  slab             912         912  $912$ lev 24 ring 1-3 slabs
3370  *
3371  *         ncrx          ncrz
3372               6             1
3373  *
3374  *       nopowr          nridr         modez        liqlev        iaxcnd
3375               1             1             1             0             0
3376  *
3377  *        idbci         idbco
3378               0             2
3379  *
3380  *        width
3381            2.1739
3382  *
3383  *        nrods         nodes         irftr         nzmax        irftr2
3384               6             4             0             5             0
3385  *
3386  *     dtxht(1)      dtxht(2)         dznht         hgapo          shelv
3387               5.           25.          .002            0.            0.
3388  *
```

```
*       nhcomo
f          1e
*
*       nhcelo            +            +            +            +
           -24           24           25e
*
*          dz             +            +            +            +
          .460e
*
*        grav
f   1.0000E+00e
*
*       idrod              +            +            +            +
             1            2            3            4            5
             6e
*
*  rdx  *  0.04  0.12  0.2636  0.7908 s
*  rdx  *  0.667  2.001 e
*
*       radrd
          0.0          .002         .0035        .0043e
*
*       matrd
f          6e
*
*        nfax
f          1e
*
*        rftn
f        393.e
f        393.e
f        393.e
f        393.e
f        393.e
f        393.e
*
*     type           num           id     ctitle
slab             911         911  $911$ lev 24 ring 4 slabs
*
*         ncrx          ncrz
             2             1
*
*       nopowr         nridr         modez        liqlev        iaxcnd
             1             1             1             0             0
*
*        idbci         idbco
             0             2
*
*       width
        2.1739
*
*        nrods         nodes         irftr         nzmax        irftr2
             2             4             0             5             0
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
             5.           25.          .002            0.            0.
*
*       nhcomo
f          1e
*
*       nhcelo            +            +            +            +
           -24           24           25e
*
*          dz             +            +            +            +
          .460e
*
*        grav
f   1.0000E+00e
*
*       idrod              +            +            +            +
             7            8e
*
*  rdx  *  0.3916  1.1748 e
*
*       radrd
          0.0          .04          .08          .09e
*
*       matrd
r 2          9            6e
*
*        nfax
f          1e
*
*        rftn
f        393.e
f        393.e
*
*
*     type           num           id     ctitle
slab             910         910  $910$ lev 25 ring 1-3 slabs
*
*         ncrx          ncrz
```

```
3481                6             1
3482  *
3483  *         nopowr          nridr          modez         liqlev         iaxcnd
3484                1              1              1              0              0
3485  *
3486  *          idbci          idbco
3487                0              2
3488  *
3489  *          width
3490             2.2727
3491  *
3492  *          nrods          nodes          irftr          nzmax         irftr2
3493                6              4              0              5              0
3494  *
3495  *       dtxht(1)       dtxht(2)         dznht          hgapo          shelv
3496                5.            25.           .002             0.             0.
3497  *
3498  *         nhcomo
3499  f             1e
3500  *
3501  *         nhcelo              +              +              +              +
3502                -25            25             26e
3503  *
3504  *             dz              +              +              +              +
3505              .440e
3506  *
3507  *           grav
3508  f    1.0000E+00e
3509  *
3510  *          idrod              +              +              +              +
3511                1              2              3              4              5
3512                6e
3513  *
3514  *  rdx  *  0.06575  0.19725  0.2636  0.7908 s
3515  *  rdx  *  0.667  2.001 e
3516  *
3517  *          radrd
3518              0.0           .002          .0035          .0043e
3519  *
3520  *          matrd
3521  f             6e
3522  *
3523  *           nfax
3524  f             1e
3525  *
3526  *           rftn
3527  f          393.e
3528  f          393.e
3529  f          393.e
3530  f          393.e
3531  f          393.e
3532  f          393.e
3533  *
3534  *       type            num             id      ctitle
3535  slab              909          909  $909$ lev 25 ring 4 slabs
3536  *
3537  *           ncrx           ncrz
3538                2              1
3539  *
3540  *         nopowr          nridr          modez         liqlev         iaxcnd
3541                1              1              1              0              0
3542  *
3543  *          idbci          idbco
3544                0              2
3545  *
3546  *          width
3547             2.2727
3548  *
3549  *          nrods          nodes          irftr          nzmax         irftr2
3550                2              4              0              5              0
3551  *
3552  *       dtxht(1)       dtxht(2)         dznht          hgapo          shelv
3553                5.            25.           .002             0.             0.
3554  *
3555  *         nhcomo
3556  f             1e
3557  *
3558  *         nhcelo              +              +              +              +
3559                -25            25             26e
3560  *
3561  *             dz              +              +              +              +
3562              .440e
3563  *
3564  *           grav
3565  f    1.0000E+00e
3566  *
3567  *          idrod              +              +              +              +
3568                7              8e
3569  *
3570  *  rdx  *  0.3916  1.1748 e
3571  *
3572  *          radrd
```

```
3573            0.0           .04           .08           .09e
3574  *
3575  *        matrd
3576  r 2          9             6e
3577  *
3578  *         nfax
3579  f           1e
3580  *
3581  *         rftn
3582  f         393.e
3583  f         393.e
3584  *
3585  *
3586  *     type           num           id     ctitle
3587  slab             908         908  $908$ lev 26 ring 1-3 slabs
3588  *
3589  *         ncrx          ncrz
3590              6             1
3591  *
3592  *       nopowr         nridr         modez        liqlev        iaxcnd
3593              1             1             1             0             0
3594  *
3595  *        idbci         idbco
3596              0             2
3597  *
3598  *        width
3599             .8019
3600  *
3601  *        nrods         nodes         irftr         nzmax        irftr2
3602              6             4             0             5             0
3603  *
3604  *     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
3605              5.           25.           .002            0.            0.
3606  *
3607  *       nhcomo
3608  f           1e
3609  *
3610  *       nhcelo             +             +             +             +
3611             -26            26            26e
3612  *
3613  *           dz             +             +             +             +
3614           1.247e
3615  *
3616  *         grav
3617  f   1.0000E+00e
3618  *
3619  *        idrod             +             +             +             +
3620              1             2             3             4             5
3621              6e
3622  *
3623  *  rdx  *  0.17825  0.53475  0.7146  2.1438 s
3624  *  rdx  *  1.808  5.424 e
3625  *
3626  *        radrd
3627            0.0          .002          .0035         .0043e
3628  *
3629  *        matrd
3630  f           6e
3631  *
3632  *         nfax
3633  f           1e
3634  *
3635  *         rftn
3636  f         393.e
3637  f         393.e
3638  f         393.e
3639  f         393.e
3640  f         393.e
3641  f         393.e
3642  *
3643  *     type           num           id     ctitle
3644  slab             907         907  $907$ lev 26 ring 4 slabs
3645  *
3646  *         ncrx          ncrz
3647              2             1
3648  *
3649  *       nopowr         nridr         modez        liqlev        iaxcnd
3650              1             1             1             0             0
3651  *
3652  *        idbci         idbco
3653              0             2
3654  *
3655  *        width
3656             .8019
3657  *
3658  *        nrods         nodes         irftr         nzmax        irftr2
3659              2             4             0             5             0
3660  *
3661  *     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
3662              5.           25.           .002            0.            0.
3663  *
3664  *       nhcomo
```

```
f            1e
*
*       nhcelo              +              +              +              +
              -26            26            26e
*
*         dz                +              +              +              +
            1.247e
*
*        grav
f   1.0000E+00e
*
*       idrod               +              +              +              +
               7             8e
*
*  rdx  *  1.062  3.186 e
*
*       radrd
             0.0           .04           .08           .09e
*
*       matrd
r 2            9             6e
*
*        nfax
f              1e
*
*        rftn
f           393.e
f           393.e
*
* start of core barrel heat slabs
*
*     type           num           id     ctitle
slab              784        784 $784$ lev 2-26 ring 4 cb slabs
*
*         ncrx          ncrz
               2            25
*
*       nopowr         nridr         modez        liqlev        iaxcnd
               1             2             1             0             1
*
*        idbci         idbco
               2             2
*
*        width
            1.4844
*
*        nrods         nodes         irftr         nzmax
               2             5             0            51
*
*     dtxht(1)      dtxht(2)         dznht         hgapo         shelv
              3.            1.          .002            0.          .915
*
*       nhcomi
f              1e
*
*       nhceli              +              +              +              +
              -2             2             3             4             5
               6             7             8             9            10
              11            12            13            14            15
              16            17            18            19            20
              21            22            23            24            25
              26            26 e
*
*
*       nhcomo
f              1e
*
*       nhcelo              +              +              +              +
              -2             2             3             4             5
               6             7             8             9            10
              11            12            13            14            15
              16            17            18            19            20
              21            22            23            24            25
              26            26 e
*
*         dz                +              +              +              +
            .985           .200  s
*  dz  *  0.255  0.250  0.210  0.200  0.200 s
*  dz  *  0.210  0.200  0.200  0.210  0.200 s
*  dz  *  0.200  0.210  0.200  0.200  0.210 s
*  dz  *  0.250  0.255 s
    .240 s
             .240          .260          .460          .440         1.247e
*
*        grav
f   1.0000E+00e
*
*       idrod               +              +              +              +
               5             6e
*
*       idrodo              +              +              +              +
               7             8e
```

```
*
*  rdx  *  0.5  1.5 e
*
*         radrd              +              +              +              +
            0.0           .002           .008           .014           .016e
*
*         matrd
f             6e
*
*          nfax
f             1e
*
*          rftn
f          423.e
f          423.e
*
* end of core barrel heat slabs
*
*          type           num            id        ctitle
rod                 670         670    $670$ ilsg tubes
*
*          ncrx          ncrz          ittc                                cd 2
             1            10             0
*
*        nopowr          nridr         modez        liqlev        iaxcnd   cd 3
             1             0             1             0             0
*
*         idbci          idbco          hdri          hdro                cd 4
             2             2          .0196          .0254
*
*         nrods          nodes         irftr         nzmax                cd 9
             1             3             0           100
*
*      dtxht(1)       dtxht(2)         dznht         hgapo         shelv   cd 10
             3.            10.         5.e-3          6.e4            0.
*
*        nhcomi
f             8e
*
*        nhceli
             -2s
              2s
              3s
              4s
              5s
              6s
              7s
              8s
              9s
             10s
             11s
             12e
*
*        nhcomo
f            28e
*
*        nhcelo
             -1s
              1s
              2s
              3s
              4s
              5s
             -5s
             -4s
             -3s
             -2s
             -1s
             -1e
*        +              +              +              +              +
* dz     * r02 5.0000e-01    1.5240e+00r04 2.5240e+00    1.5240e+00s
* dz     * r02 5.0000e-01e
* grav   * r04          1.          .7071        -.7071r04        -1.e
*  rdx   *           474.e
* radrd  *          .0098         .01125          .0127e
* matrd  * r02          6e
* nfax   * r10          3e
*        +              +              +              +              +
* rftn   * r03 4.1420e+02r03 4.8000e+02r03 5.2500e+02r12 5.4000e+02s
* rftn   * r03 5.2500e+02r03 4.8000e+02r03 4.1420e+02r03 4.1420e+02e
*
*          type           num            id        ctitle
rod                 669         669    $669$ blsg tubes
*
*          ncrx          ncrz          ittc                                cd 2
             1            10             0
*
*        nopowr          nridr         modez        liqlev        iaxcnd   cd 3
             1             0             1             0             0
*
*         idbci          idbco          hdri          hdro                cd 4
             2             2          .0196          .0254
```

```
*
*       nrods         nodes         irftr         nzmax                 cd 9
              1             3             0           100
*
*    dtxht(1)      dtxht(2)         dznht         hgapo         shelv   cd 10
             3.           10.         5.e-3          6.e4            0.
*
*       nhcomi
f            5e
*
*       nhceli
            -2s
             2s
             3s
             4s
             5s
             6s
             7s
             8s
             9s
            10s
            11s
            12e
*
*       nhcomo
f            25e
*
*       nhcelo
            -1s
             1s
             2s
             3s
             4s
             5s
            -5s
            -4s
            -3s
            -2s
            -1s
            -1e
*       +             +             +             +             +
* dz    * r02 5.0000e-01    1.5240e+00r04 2.5240e+00    1.5240e+00s
* dz    * r02 5.0000e-01e
* grav  * r04          1.          .7071        -.7071r04        -1.e
*  rdx  *           158.e
* radrd *          .0098        .01125         .0127e
* matrd * r02          6e
* nfax  * r10          3e
*       +             +             +             +             +
* rftn  * r03 4.1420e+02r03 4.8400e+02r03 5.2200e+02r12 5.4000e+02s
* rftn  * r03 5.2200e+02r03 4.8400e+02r03 4.1420e+02r03 4.1420e+02e
*
end
*
******************
* time-step data *
******************
*
*       dtmin         dtmax         tend          rtwfp
    1.0000e-06    2.0000e-02    8.0000e+01    0.0000e+00
*       edint         gfint         dmpint        sedint
    4.0000e+01    1.0000e+00    4.0000e+01    4.0000e+01
*
*       dtmin         dtmax         tend          rtwfp
    1.0000e-06    5.0000e-03    1.0000e+02    0.0000e+00
*       edint         gfint         dmpint        sedint
    2.0000e+01    1.0000e+00    2.0000e+01    2.0000e+01
*
*       dtmin         dtmax         tend          rtwfp
    1.0000e-06    5.0000e-03    2.0000e+02    0.0000e+00
*       edint         gfint         dmpint        sedint
    2.5000e+01    1.0000e+00    2.5000e+01    2.5000e+01
*
*       dtmin         dtmax         tend          rtwfp
    1.0000e-06    1.0000e-02    4.0000e+02    0.0000e+00
*       edint         gfint         dmpint        sedint
    5.0000e+01    1.0000e+00    5.0000e+01    5.0000e+01
*
*       dtmin         dtmax         tend          rtwfp
    1.0000e-06    2.0000e-02    6.0000e+02    0.0000e+00
*       edint         gfint         dmpint        sedint
    1.0000e+02    1.0000e+00    1.0000e+02    1.0000e+02
*
*       dtmin         dtmax         tend          rtwfp
*     endflag
   -1.0000e+00
```

RENODED CCTF RUN 54 TRANSIENT-RESTART INPUT LISTING

```
free format
*
*************
* main data *
*************
*
*     numtcr       ieos      inopt       nmat
        150          0         1          4
Renoded CCTF-54 Input Model  By J. F. Lime Oct 1999
The 7-level core model of the corrected CCTF-54 input model
was renoded into 17 levels.  The 17 levels match the 17-step
axial power profile.
*
Corrected CCTF-54 Input Model   By J. F. Lime Oct 1999
Two corrections were made to the CCTF-54 input model:
(1) The azimuthal noding was corrected from 180/180 degrees to 90/270 degrees
to matched the intact loop noding. The three intact loops were modeled as one
combined intact loop. Therefore, the azimuthal noding of the vessel should
match how the intact loops were modeled.
(2) The axial power shape was corrected to model the 17-step axial-power profile
of the actual heater rod. The previous CCTF-54 model had a coarsely-noded
7-level axial-power shape.
*
cctf run54 developmental assessment calculation
trac-pf1 mod2 version 5.0
this model was developed by running the trac input deck from
/cctf/run54/tracin through gocvrt.  the following changes were
made to the original model.
a)  the junction flow areas were adjusted to take care of the following
    error messages:
 the junction flow area 1.6604e-01 of component   3 is greater than the vol/dx
 flow area 8.8885e-02 of the cell across the junction and 1.5532e-01 of cell  1

 the junction flow area 4.9812e-01 of component   8 is greater than the vol/dx
 flow area 4.6593e-01 of the cell across the junction and 2.6665e-01 of cell 12

 the azmuthal flow area 1.0797e-01 of vessel   1 interface (r= 3,t= 1,z= 1) is
 greater than the cell vol/rdt flow areas 8.3137e-02 and 8.3137e-02 on each side

 the azmuthal flow area 1.0797e-01 of vessel   1 interface (r= 3,t= 2,z= 1) is
 greater than the cell vol/rdt flow areas 8.3137e-02 and 8.3137e-02 on each side

 the azmuthal flow area 1.5189e-01 of vessel   1 interface (r= 4,t= 1,z= 1) is
 greater than the cell vol/rdt flow areas 1.3670e-01 and 1.3670e-01 on each side

 the azmuthal flow area 1.5189e-01 of vessel   1 interface (r= 4,t= 2,z= 1) is
 greater than the cell vol/rdt flow areas 1.3670e-01 and 1.3670e-01 on each side

 the   axial  flow area 2.6140e-02 of vessel   1 interface (r= 1,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 2.1173e-02 and 1.8559e-02 on each side

 the   axial  flow area 2.6140e-02 of vessel   1 interface (r= 1,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 2.1173e-02 and 1.8559e-02 on each side

 the   axial  flow area 7.8419e-02 of vessel   1 interface (r= 2,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 6.3519e-02 and 5.5678e-02 on each side

 the   axial  flow area 7.8419e-02 of vessel   1 interface (r= 2,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 6.3519e-02 and 5.5677e-02 on each side

 the   axial  flow area 1.1751e-01 of vessel   1 interface (r= 3,t= 1,z=11) is
 greater than the cell vol/dz  flow areas 9.8712e-02 and 8.3435e-02 on each side

 the   axial  flow area 1.1751e-01 of vessel   1 interface (r= 3,t= 2,z=11) is
 greater than the cell vol/dz  flow areas 9.8712e-02 and 8.3435e-02 on each side

 b)  the hydraulic diameter of the first and last junctions of the
     steam generator secondary were set to a non-zero value (even though
     the flow area is zero) to get the code to run.

c)  the nff's were all set to -1
    to cause an automatic calculation of
    abrupt expansion/contraction additive form losses.

d)  the new reflood model was turned on (namelist newrfd=1 was added)
    and added funh, nhsca, and zsgrid arrays.

e)  the time step sizes were increased.

f)  the rod axial power shape was adjusted to take advantage of mod2's
    ability to input an exact power distribution.  this involved
    reworking the zpwzt and zpwtb arrays.  the number of coarse mesh
    nodes went from 7 to 19, the maximum number of fine mesh cells went
    from 100 to 200, and the dtxht criterial was reduced.

g)  the rod power history was expanded from 10 points to over 1200 points
    (based on experimental data) to better match the input power.

```

```
h)  the temperatures everywhere except the lower plenum and fills were
    changed from 393.0 to 414.2 (the average of the te30yxx thermocouple
    data from the test) to better match the initial fluid and wall temps.

i)  took out the bump in the cold leg ecc fill liquid temperature table

j) extended the material property tables in case the code wants to
   calculate temperatures in excess of 1200 k.

k) added namelist variable nosets=2 to cause the code to calculate the
   sets3d equation every time step.

l) increase the maximum time step size beyond 84 seconds.

m) set all of the vessel cfzl-z's to negative numbers to get an automatic
   calculation of abrupt expansion/contraction form losses.

n) the rod nodalization was set back the way it originally was (7 coarse
   meshes with a 1-to-1 relationship with the hydro cells).  the
   integration option was also set back the way it originally was as well.

o) to damp the loop oscillations, all the roughness numbers were
   changed from 0.0 to 4.5720e-05

p) the heat conductor temperatures in the reactor vessel, ring 4 were set
   from 4.142e+02 to 4.680e+02 for levels 2 and above.  the inner rings
   were changed from 4.142e+02 to 4.230e+02.  this is consistent with the
   initial conditions in the data report, page 31 table 3.1

q) the maximum time step size was reduced to avoid the water hammer in
   the downcomer soon after cold leg injection begins.

r) added 30 heat slabs to represent the core barrel

s) moved the location of the ring 3-ring 4 boundary from inside the core
   barrel to outside of the core barrel.  the vessel rad(3), vol, fa-t,
   fa-z, hd-t and hd-z arrays were recomputed.  this was done to eliminate
   vol and fa values greater than 1.0

t) the radial cfzl-r in level 1 was set to a small negative number to
   cause form loss computation.

u) set idcu=idcl=idcr=0 to turn off special downcomer models

v) set the dtxht(1), dtxht(2), dznht, and nzmax parameters back to the
   old mod1 values, and took out the core barrel heat slabs to make the
   calculation directly comparable to the original MOD1 calculation.



 ---===---

the original comment cards are as follows:

cctf run 54 posttest analysis with trac-pf1(mod 1) ver 11.8 (8/24/84)
  * * * * *  revised loop components  * * * * *
jaeri recommendations used for some heater rod material properties.
new vapor loss coefficients in vessel core
new radial loss coefficients in levels 4 - 10
akimotos noding for combined and broken cold legs
vessel noding:
   four radial rings
   two azimuthal zones
   sixteen axial levels
      three levels in lower plenum
      seven levels in core
      six levels in upper plenum
system noding:
   three intact loops lumped into one loop
   cold leg between vessel and break is modeled without the expansion
*
*****************
* namelist data *
*****************
*
 &inopts
  nrslv=1,iadded=10,nhtstr=24,newrfd=3, imfr=3,
 iblaus=1,
 &end
*
*        dstep          timet
          4241    80.015229
*       stdyst         transi          ncomp           njun           ipak
               0              1             43             17              1
*         epso           epss
    1.0000e-04     1.0000e-04
*       oitmax         sitmax        isolut         ncontr
              10             10             0              0
*         ntsv           ntcb          ntcf           ntrp           ntcp
               9              8             0              3              1
*
************************
```

```
* component-number data *
*************************
*
* iorder*              1            2            3            4            5
* iorder*              6            7            8           11           12
* iorder*             13           14           15           16           17
* iorder*             18           19           25           28s
           999          998          997          996          995
           994          993s
           974          973s
           918          917          916          915s
           914          913          912          911          910
           909          908          907s
784s
670 669e
*
*
*****************************
* material-properties data *
*****************************
*
* matb  *             55           58           59           60e
* ptbln * r02          7r02         5e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    8.3500e+03    4.4487e+02    1.2337e+01    1.0000e+00
    5.0000e+02    8.3500e+03    4.9042e+02    1.5834e+01    1.0000e+00
    7.0000e+02    8.3500e+03    5.3948e+02    1.9331e+01    1.0000e+00
    9.0000e+02    8.3500e+03    5.8987e+02    2.2828e+01    1.0000e+00
    1.1000e+03    8.3500e+03    6.3939e+02    2.6324e+01    1.0000e+00
    1.3000e+03    8.3500e+03    6.8588e+02    2.9821e+01    1.0000e+00
    2.0000e+03    8.3500e+03    6.8588e+02    2.9821e+01    1.0000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    3.8000e+03    8.4970e+02    3.5870e+01    1.0000e+00
    5.0000e+02    3.8000e+03    9.6550e+02    2.0173e+01    1.0000e+00
    7.0000e+02    3.8000e+03    1.0813e+03    1.2529e+01    1.0000e+00
    9.0000e+02    3.8000e+03    1.1971e+03    8.9514e+00    1.0000e+00
    1.1000e+03    3.8000e+03    1.3129e+03    7.1615e+00    1.0000e+00
    1.3000e+03    3.8000e+03    1.4287e+03    6.1228e+00    1.0000e+00
    2.0000e+03    3.8000e+03    1.4287e+03    6.1228e+00    1.0000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    2.8000e+03    9.8640e+02    1.6300e+00    1.0000e+00
    6.0000e+02    2.8000e+03    1.1358e+03    1.4200e+00    1.0000e+00
    9.0000e+02    2.8000e+03    1.2852e+03    1.2100e+00    1.0000e+00
    1.3000e+03    2.8000e+03    1.4844e+03    9.3000e-01    1.0000e+00
    2.0000e+03    2.8000e+03    1.4844e+03    9.3000e-01    1.0000e+00
e
*
*   prptb(1,i)    prptb(2,i)    prptb(3,i)    prptb(4,i)    prptb(5,i)
    3.0000e+02    8.4103e+03    4.4029e+02    1.4340e+01    8.4000e-01
    6.0000e+02    8.2925e+03    5.0636e+02    1.9331e+01    8.4000e-01
    9.0000e+02    8.1747e+03    5.7242e+02    2.4322e+01    8.4000e-01
    1.2000e+03    8.0569e+03    6.3839e+02    2.9314e+01    8.4000e-01
   2.0000e+03    8.0569e+03    6.3839e+02    2.9314e+01    8.4000e-01
e
*
*
**************************
* control-parameter data *
**************************
*
*
* signal variables
*     idsv      isvn      ilcn      icn1      icn2
 0
*
* control blocks
*  idcb      icbn      icb1      icb2      icb3
*            cbgain    cbxmin    cbxmax    cbcon1    cbcon2
*
 0
*
* trips
*         ntse          ntct          ntsf          ntdp          ntsd
              0             0             0             3             0
*
 0
*         ndmp
 0
*             3
*       idmp()
          1001          1002          1003
*
******************
* component data *
******************
*
end
```

```
*
******************
* time-step data *
******************
*
*        dtmin          dtmax          tend          rtwfp
     1.0000e-06     5.0000e-03     1.0000e+02     0.0000e+00
*        edint          gfint         dmpint         sedint
     1.0000e+01     1.0000e+00     1.0000e+01     1.0000e+01
*
*        dtmin          dtmax          tend          rtwfp
     1.0000e-06     5.0000e-03     2.0000e+02     0.0000e+00
*        edint          gfint         dmpint         sedint
     2.5000e+01     1.0000e+00     2.5000e+01     2.5000e+01
*
*        dtmin          dtmax          tend          rtwfp
     1.0000e-06     1.0000e-02     4.0000e+02     0.0000e+00
*        edint          gfint         dmpint         sedint
     5.0000e+01     1.0000e+00     5.0000e+01     5.0000e+01
*
*        dtmin          dtmax          tend          rtwfp
     1.0000e-06     2.0000e-02     6.0000e+02     0.0000e+00
*        edint          gfint         dmpint         sedint
     1.0000e+02     1.0000e+00     1.0000e+02     1.0000e+02
*
*        dtmin          dtmax          tend          rtwfp
*     endflag
    -1.0000e+00
```

APPENDIX AA

CODE-DATA COMPARISON FOR CCTF RUN 54 WITH RENODED CORE WITH NEWRFD=3

This appendix presents the calculation results for CCTF Run 54 with the core renoded from 7 axial levels to 17 axial levels, with the reflood option newrfd=3. The set of plots presented is the same as presented in the main body of the report for the 7-level core model. For reference purposes, the figure numbers for the two sets of calculations are listed below.

21-level core	7-level core	21-level core	7-level core
AA-1	5.3-13	AA-17	5.3-29
AA-2	5.3-14	AA-18	5.3-30
AA-3	5.3-15	AA-19	5.3-31
AA-4	5.3-16	AA-20	5.3-32
AA-5	5.3-17	AA-21	5.3-33
AA-6	5.3-18	AA-22	5.3-34
AA-7	5.3-19	AA-23	5.3-35
AA-8	5.3-20	AA-24	5.3-36
AA-9	5.3-21	AA-25	5.3-37
AA-10	5.3-22	AA-26	5.3-38
AA-11	5.3-23	AA-27	5.3-39
AA-12	5.3-24	AA-28	5.3-40
AA-13	5.3-25	AA-29	5.3-41
AA-14	5.3-26	AA-30	5.3-42
AA-15	5.3-27	AA-31	5.3-43
AA-16	5.3-28	AA-32	5.3-44

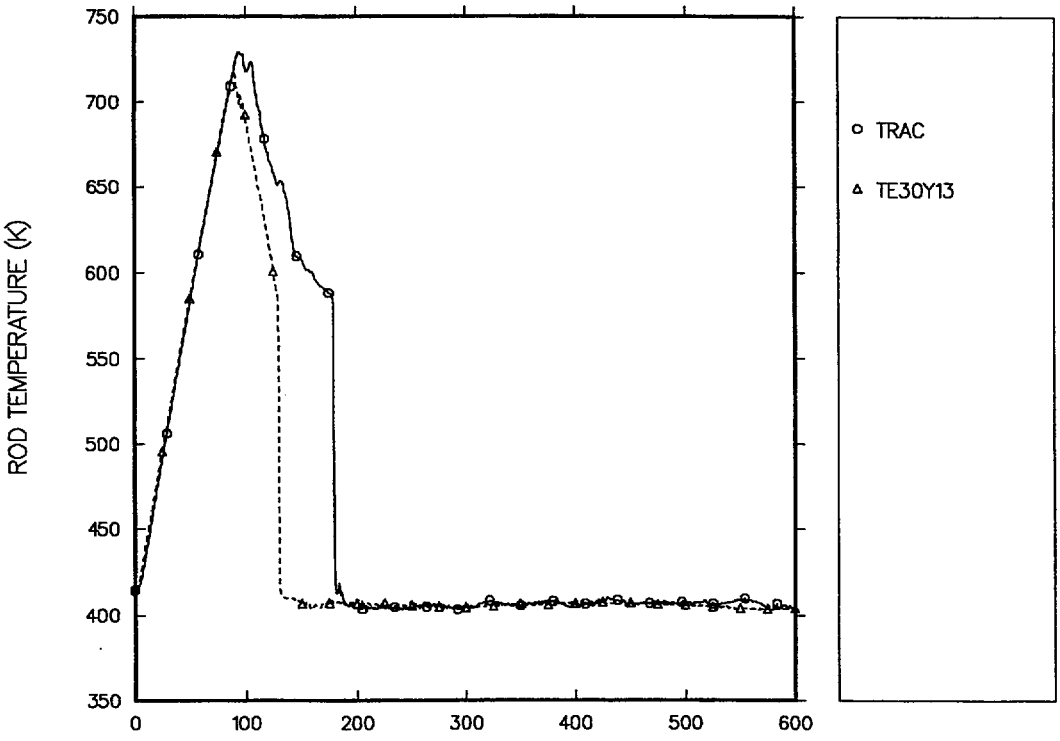

Fig. AA-1. Calculated and measured cladding temperatures for the hot rod at the 2.480-m elevation.

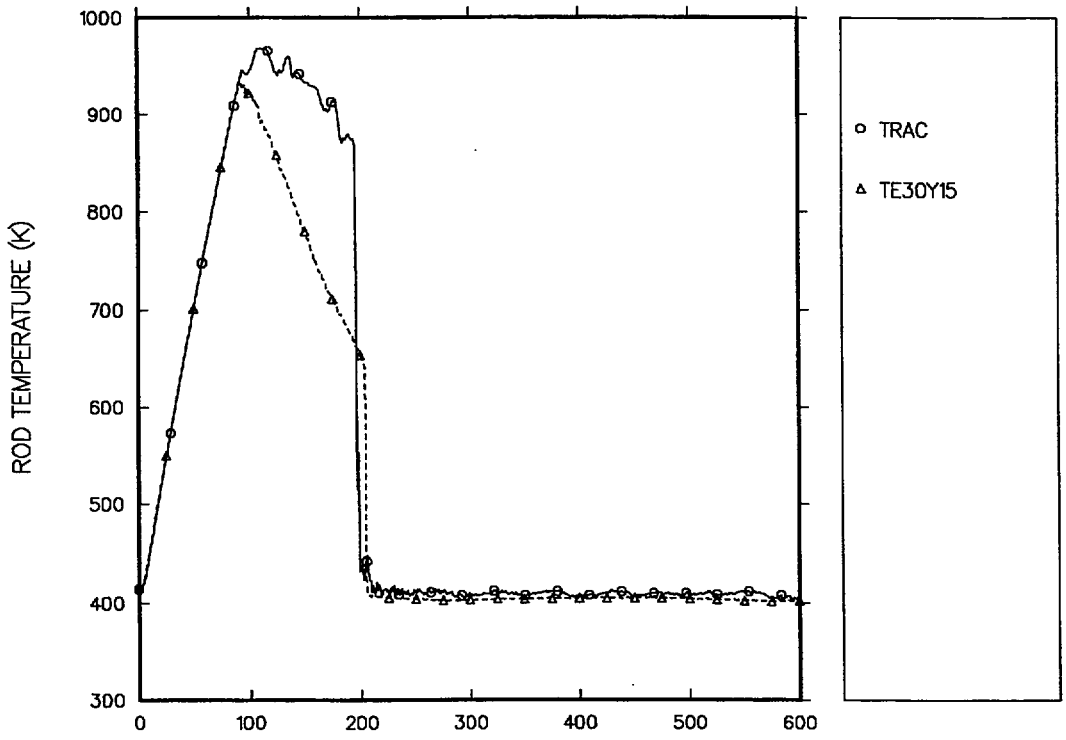

Fig. AA-2. Calculated and measured cladding temperatures for the hot rod at the 3.115-m elevation.

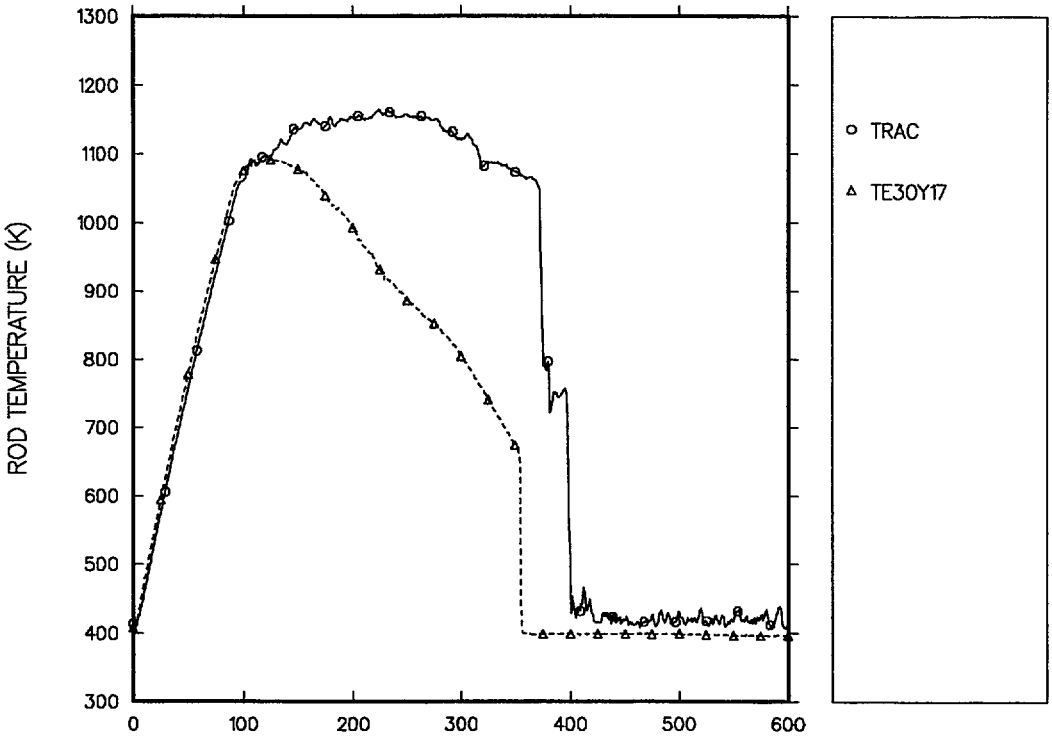

Fig. AA-3. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation.

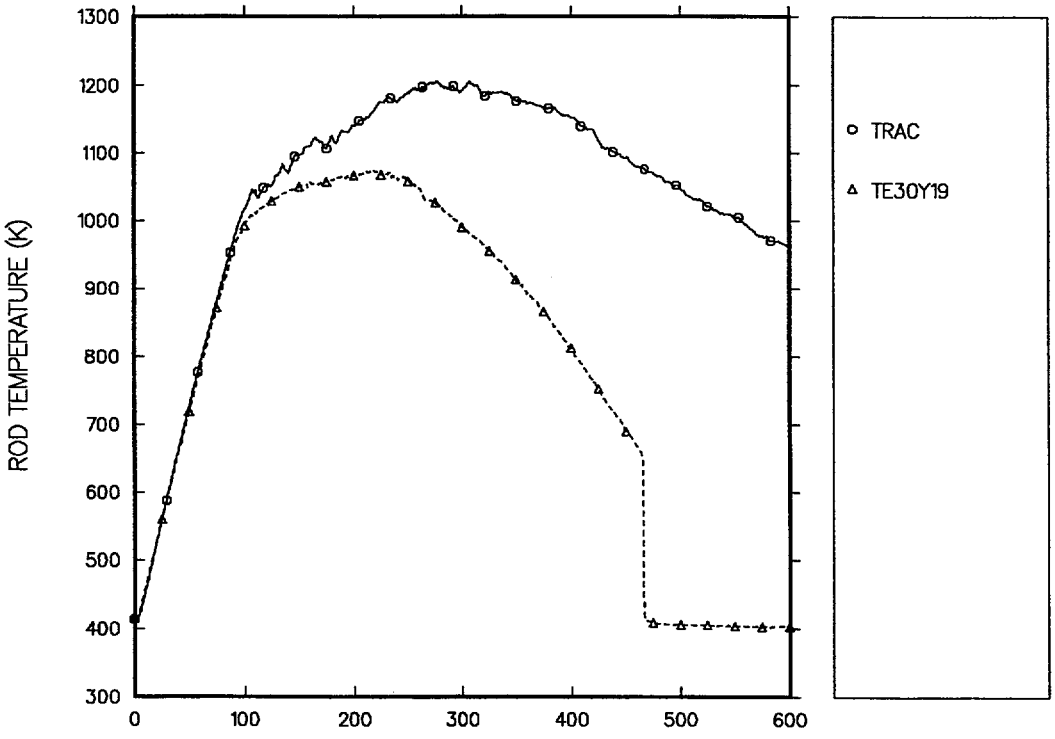

Fig. AA-4. Cladding temperatures for the hot rod at the 4.540-m elevation.

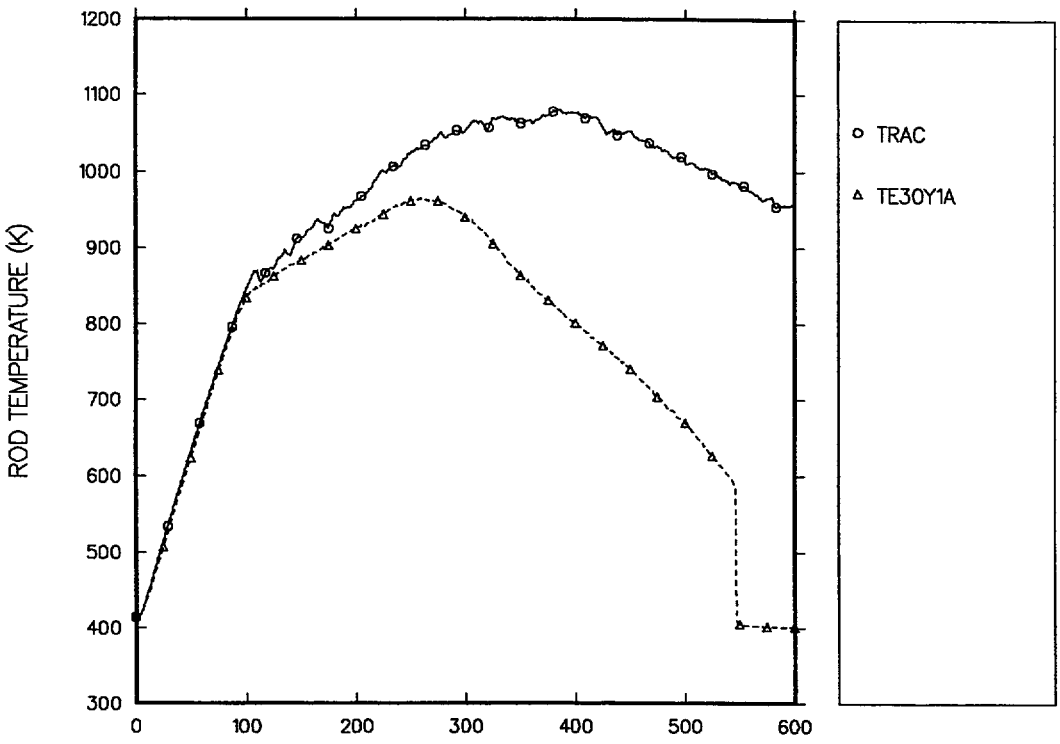

Fig. AA-5. Cladding temperatures for the hot rod at the 5.150-m elevation.

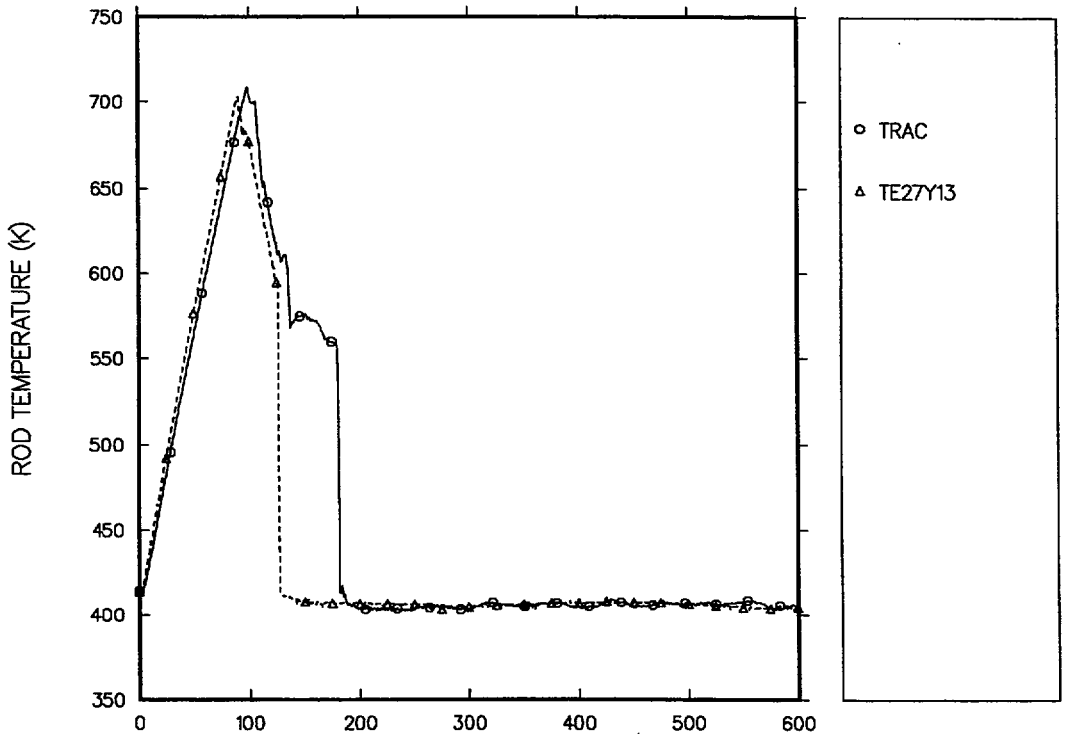

Fig. AA-6. Cladding temperatures for the intermediate-powered rod at the 2.480-m elevation.

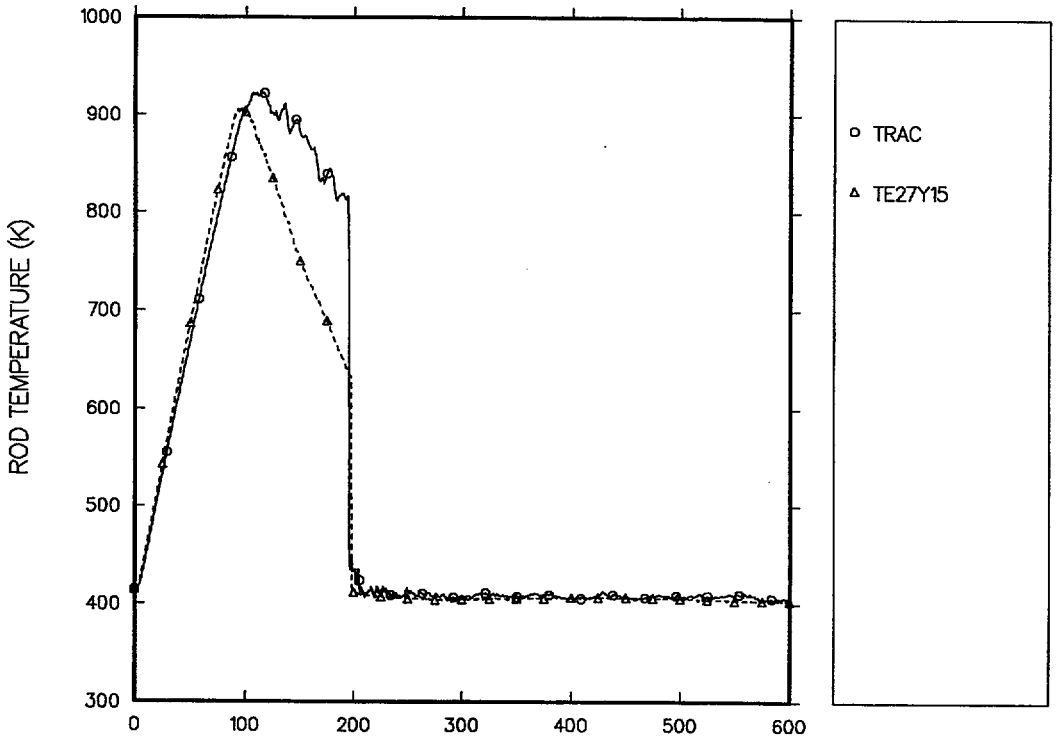

Fig. AA-7. Cladding temperatures for the intermediate-powered rod at the 3.115-m elevation.

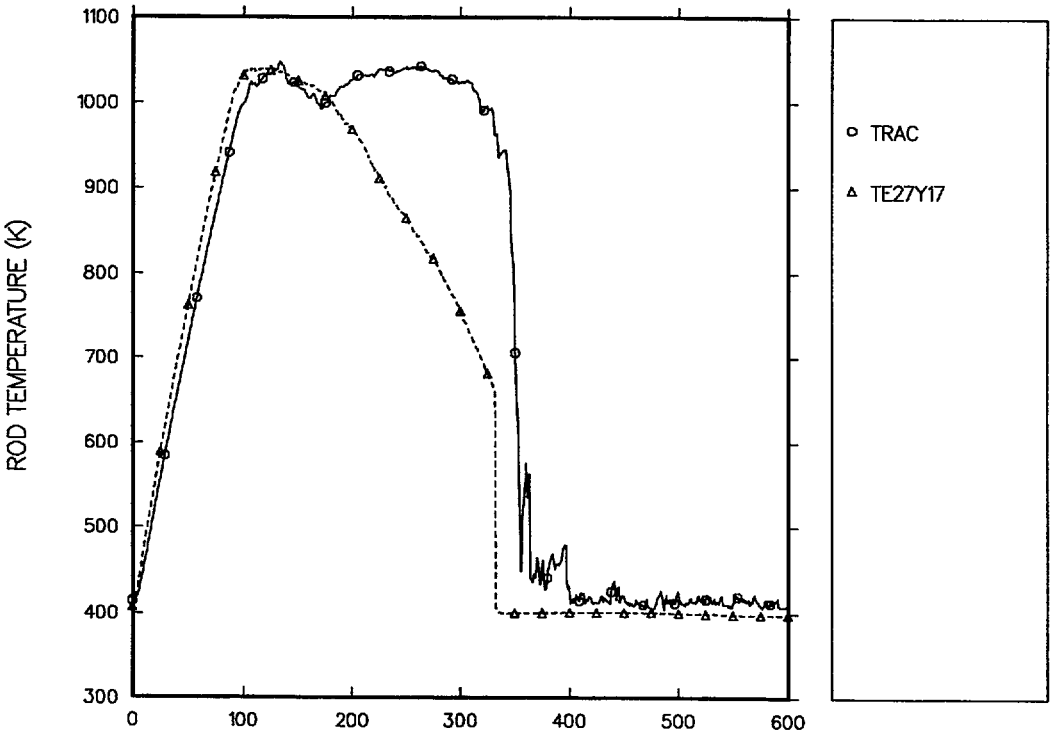

Fig. AA-8. Cladding temperatures for the intermediate-powered rod at the core midplane.

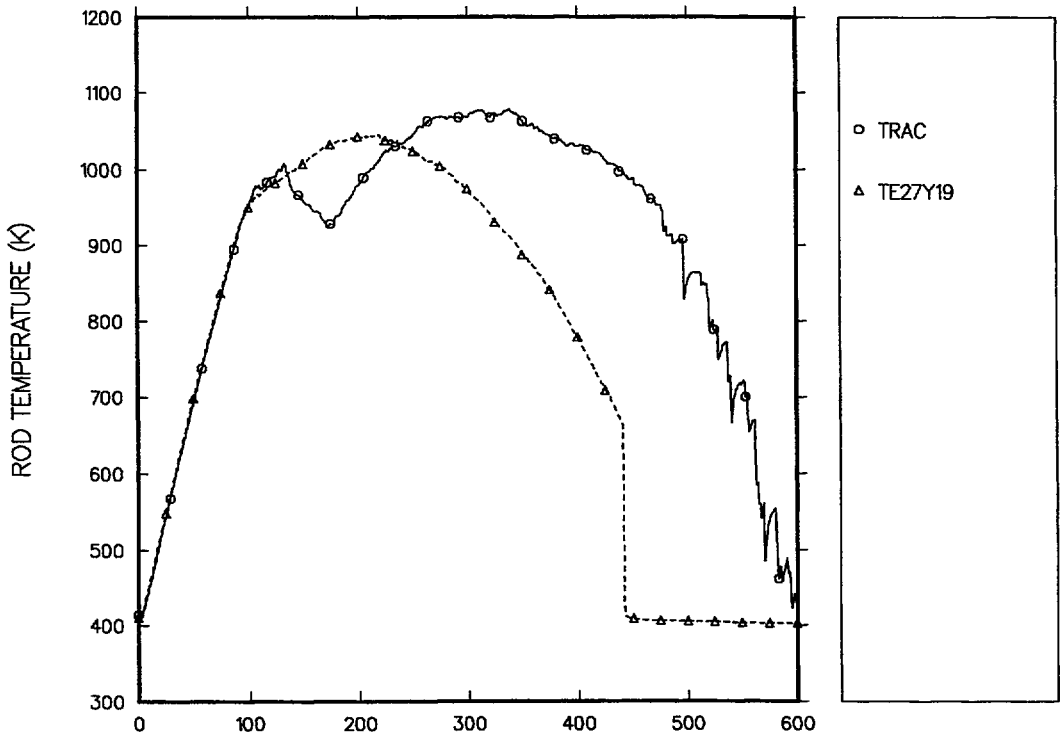

Fig. AA-9. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 4.540-m elevation.

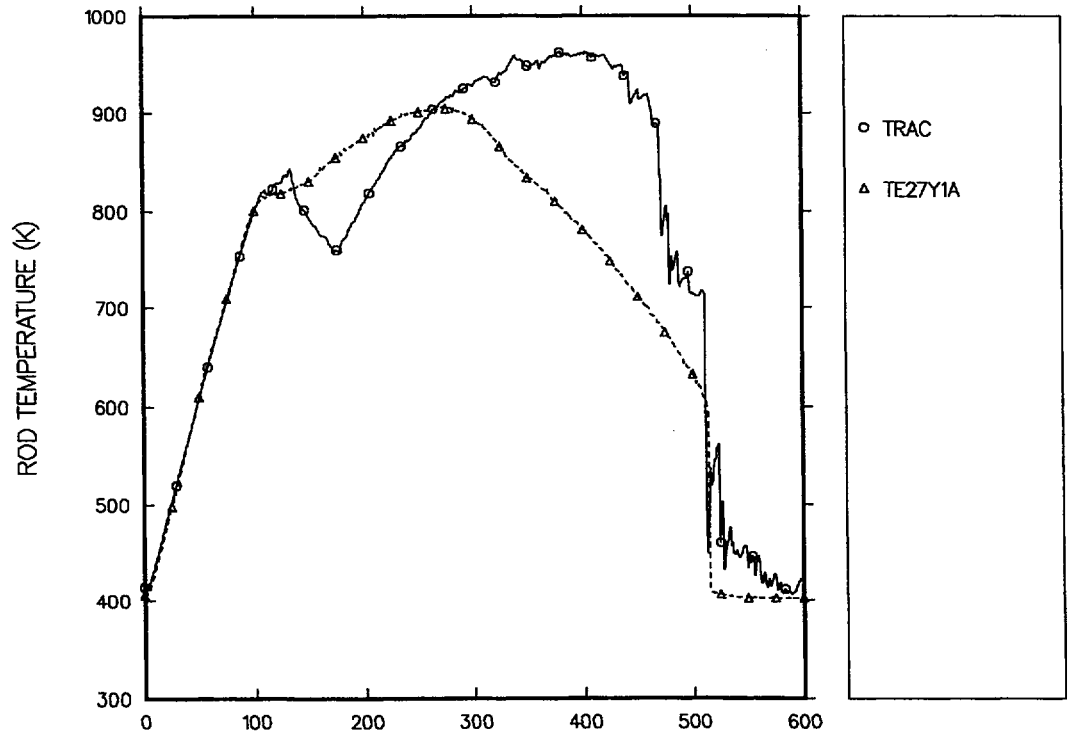

Fig. AA-10. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 5.150-m elevation.

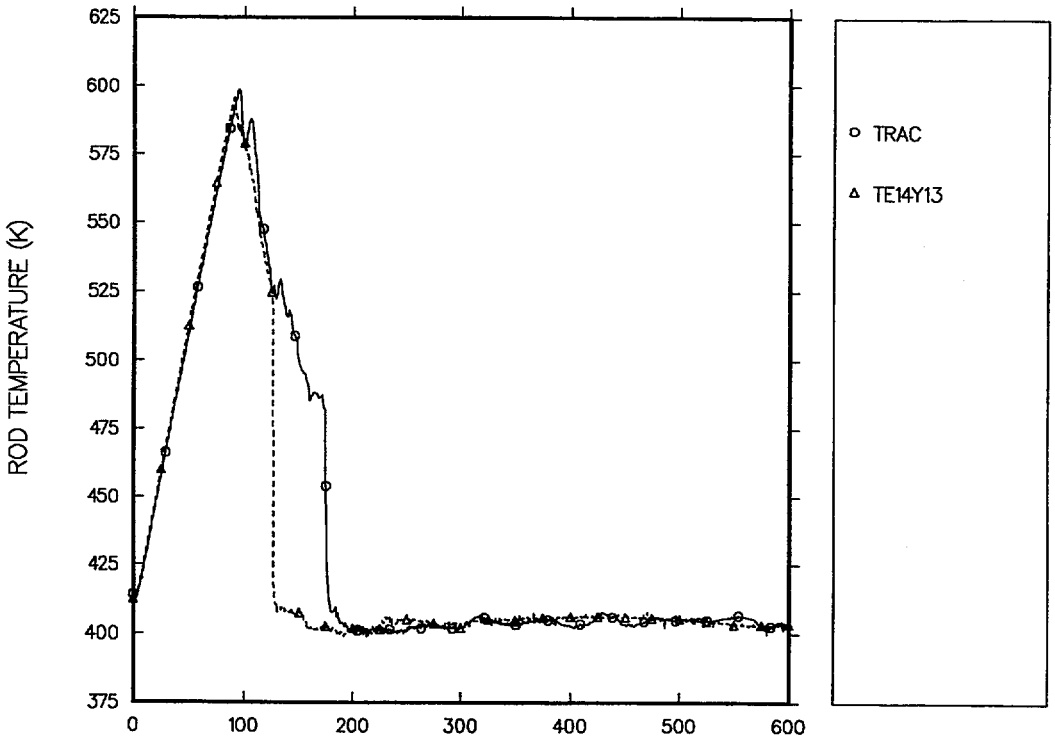

Fig. AA-11. Cladding temperatures for the low-powered rod at the 2.480-m elevation.

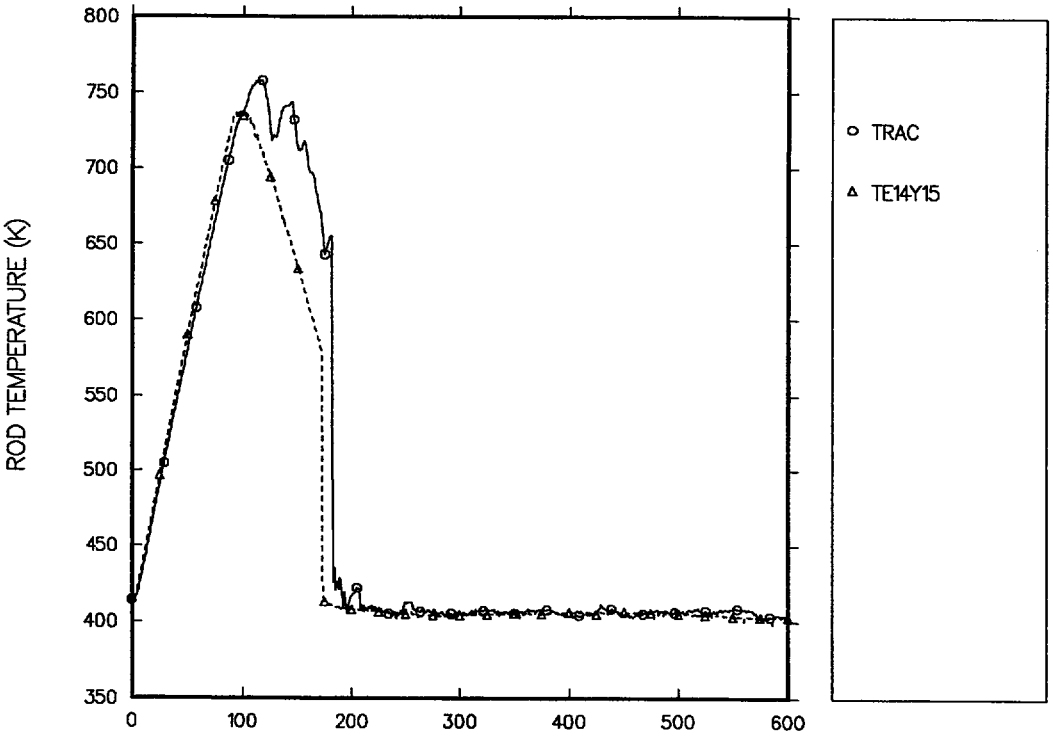

Fig. AA-12. Cladding temperatures for the low-powered rod at the 3.115-m elevation.

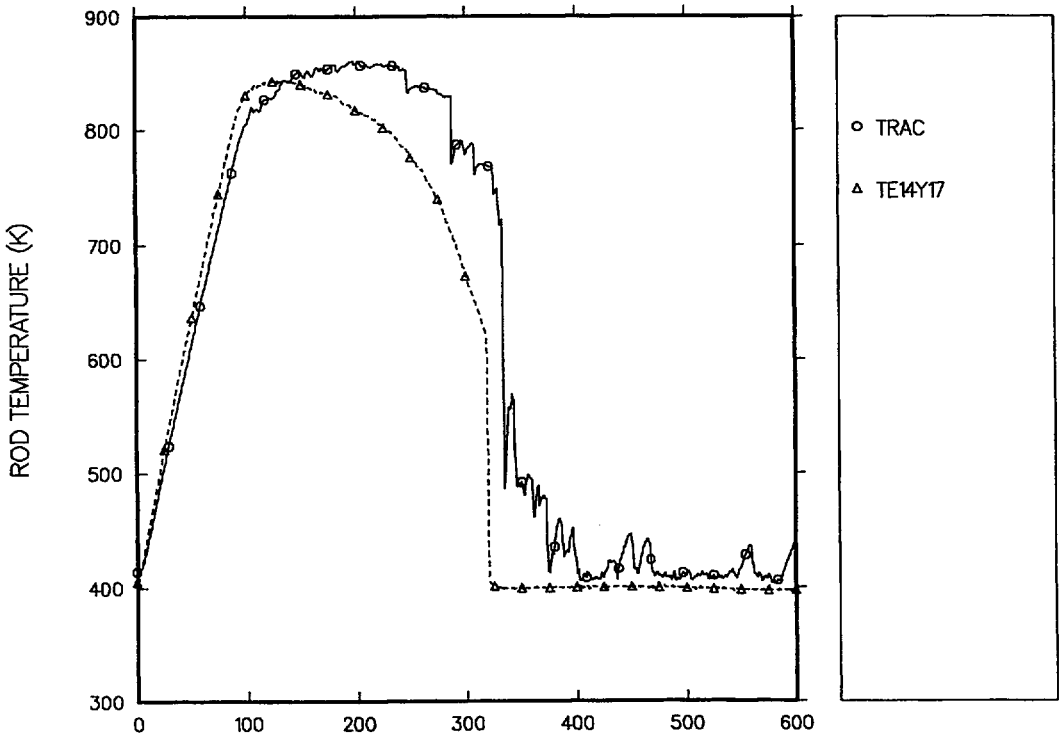

Fig. AA-13. Cladding temperatures for the low-powered rod at the core midplane.

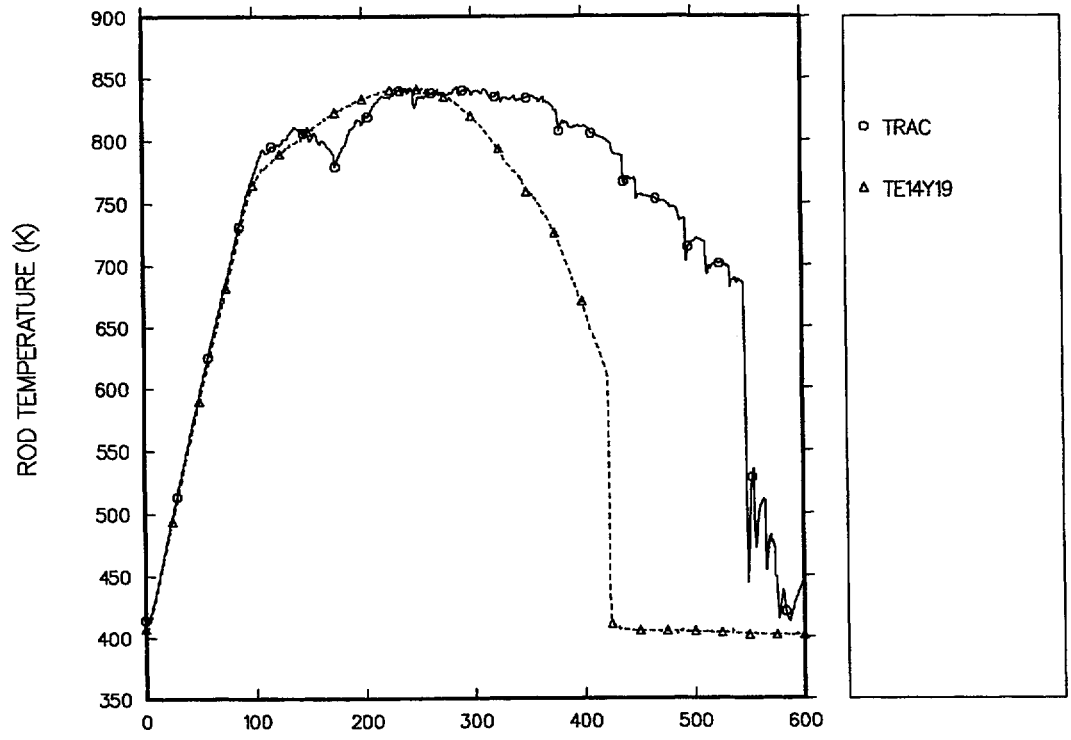

Fig. AA-14. Cladding temperatures for the low-powered rod at the 4.540-m elevation.

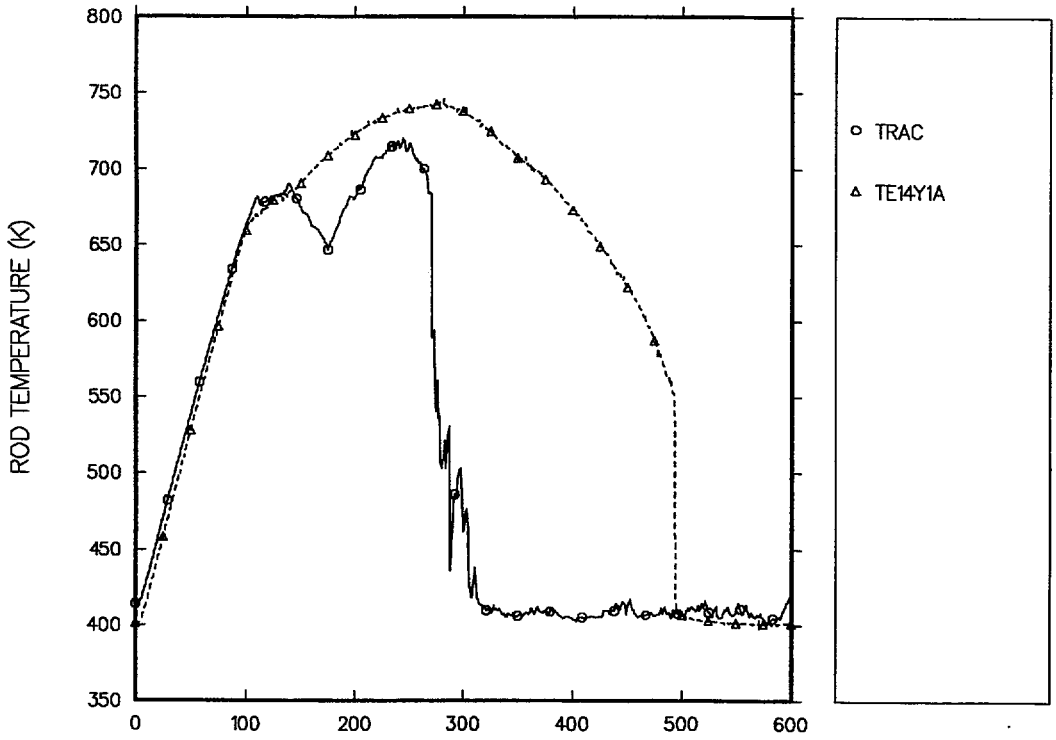

Fig. AA-15. Comparison of calculated and measured cladding temperatures for the low-powered rod at the 5.150-m elevation.

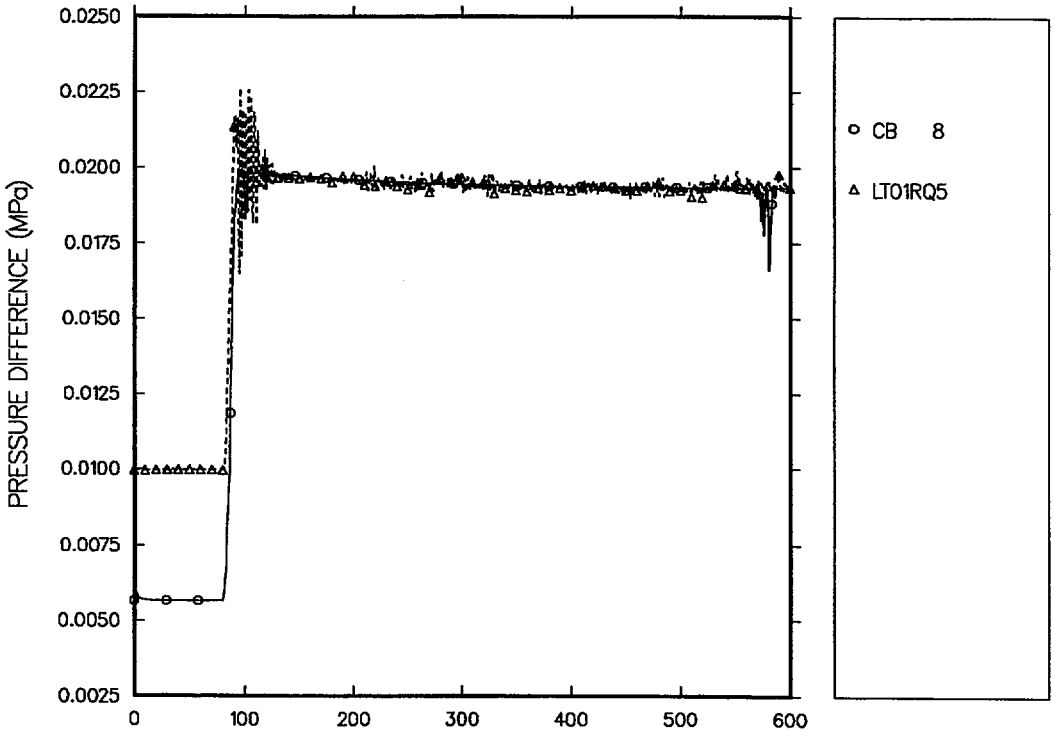

Fig. AA-16. Calculated and measured pressure vessel differential pressure: lower plenum.

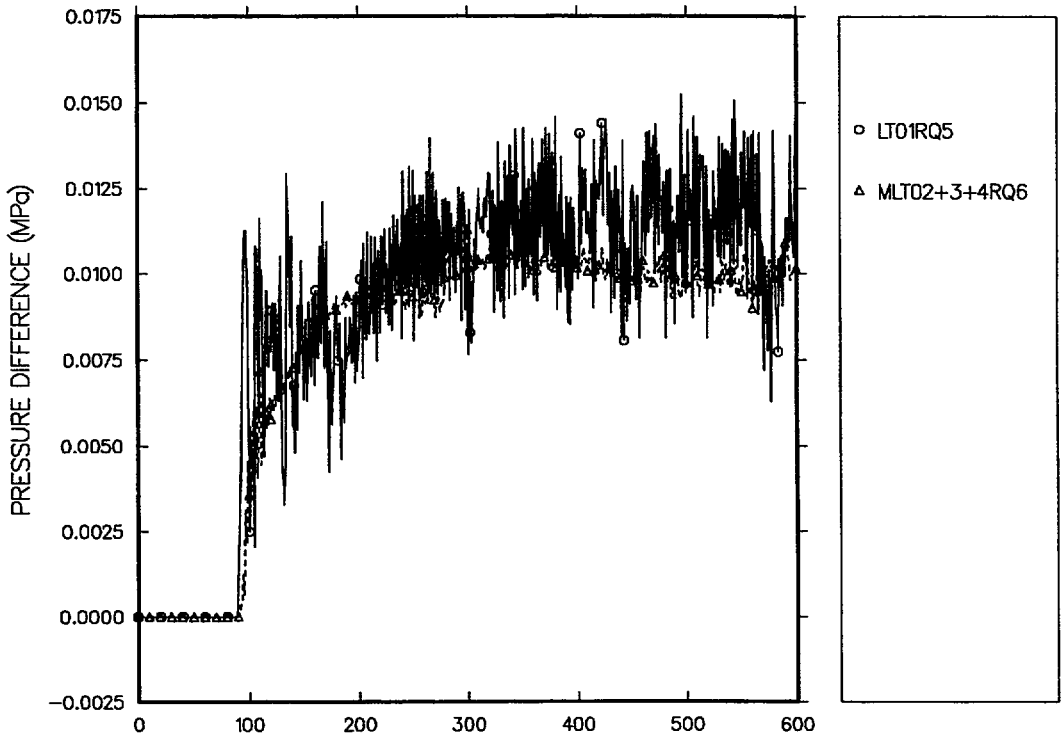

Fig. AA-17. Calculated and measured pressure vessel differential pressure: lower half of the core.

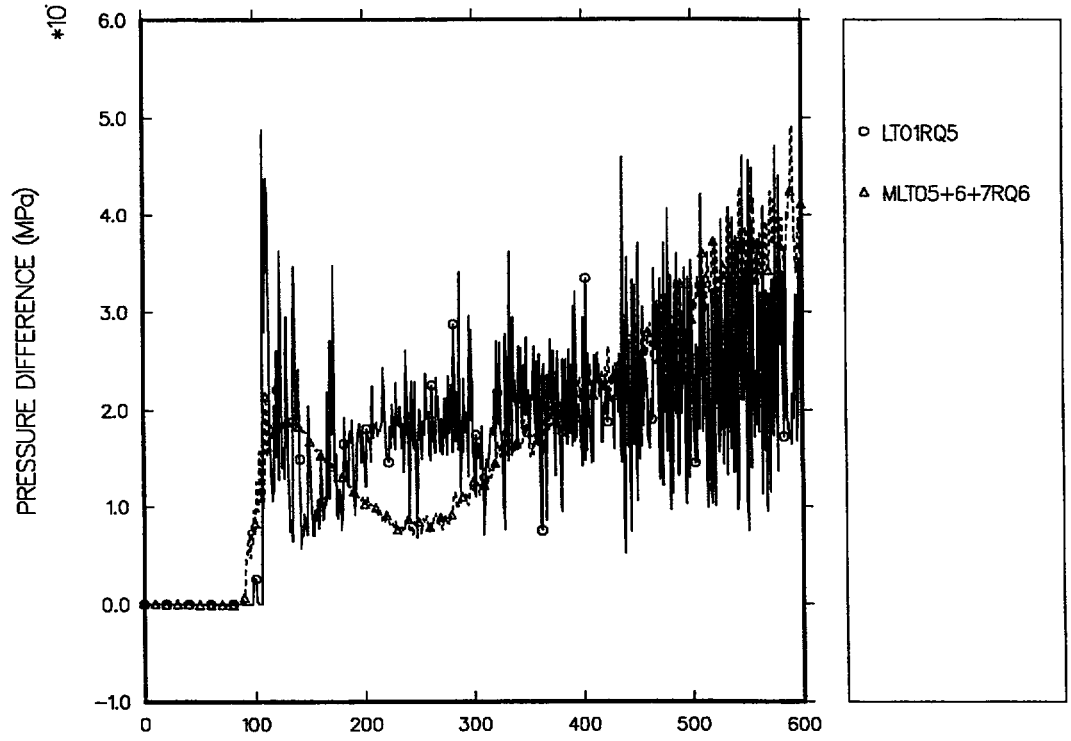

Fig. AA-18. Calculated and measured pressure vessel differential pressure: upper half of the core.

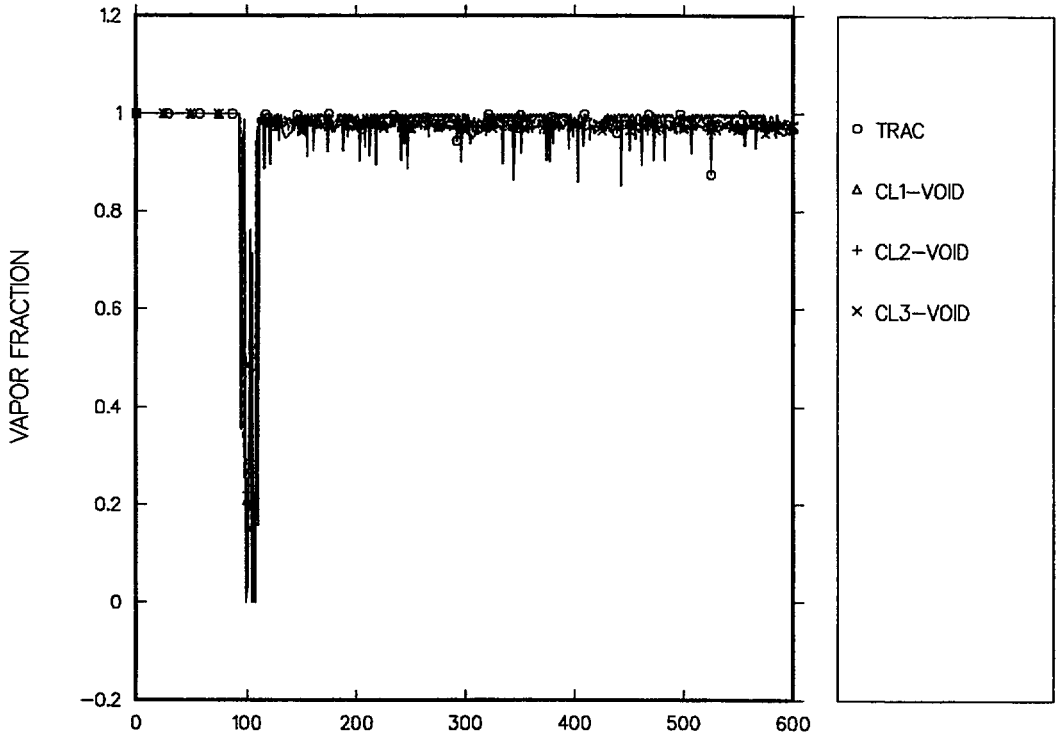

Fig. AA-19. Calculated and measured cold-leg, spool-piece void fraction.

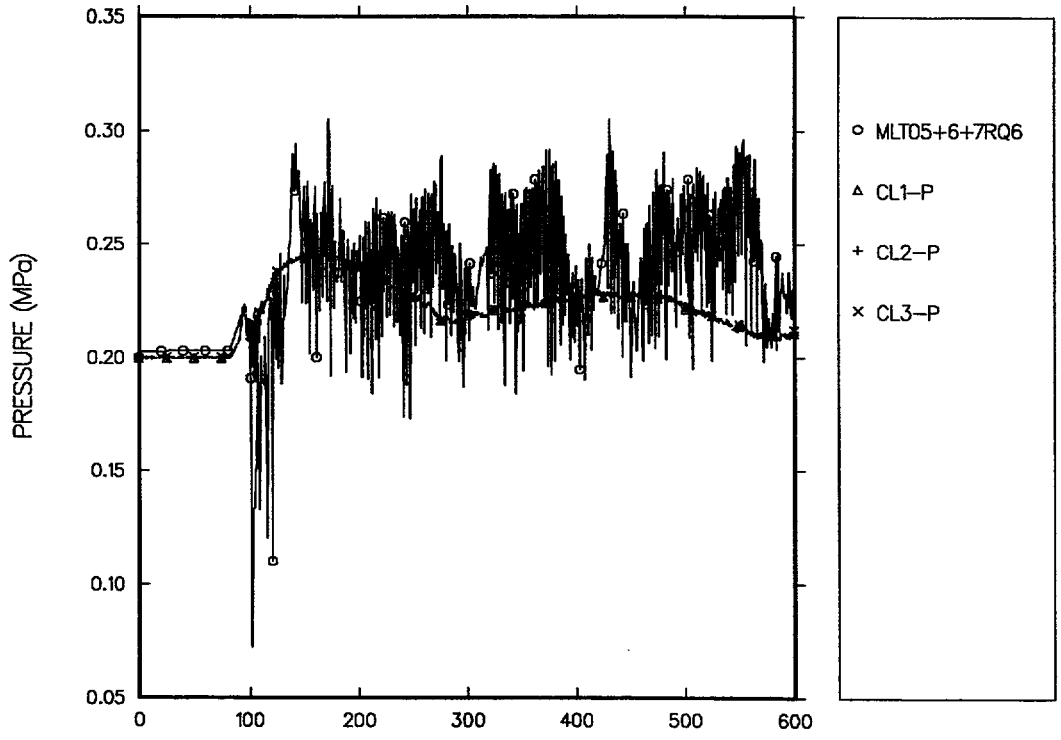

Fig. AA-20. Calculated and measured cold-leg, spool-piece pressure.

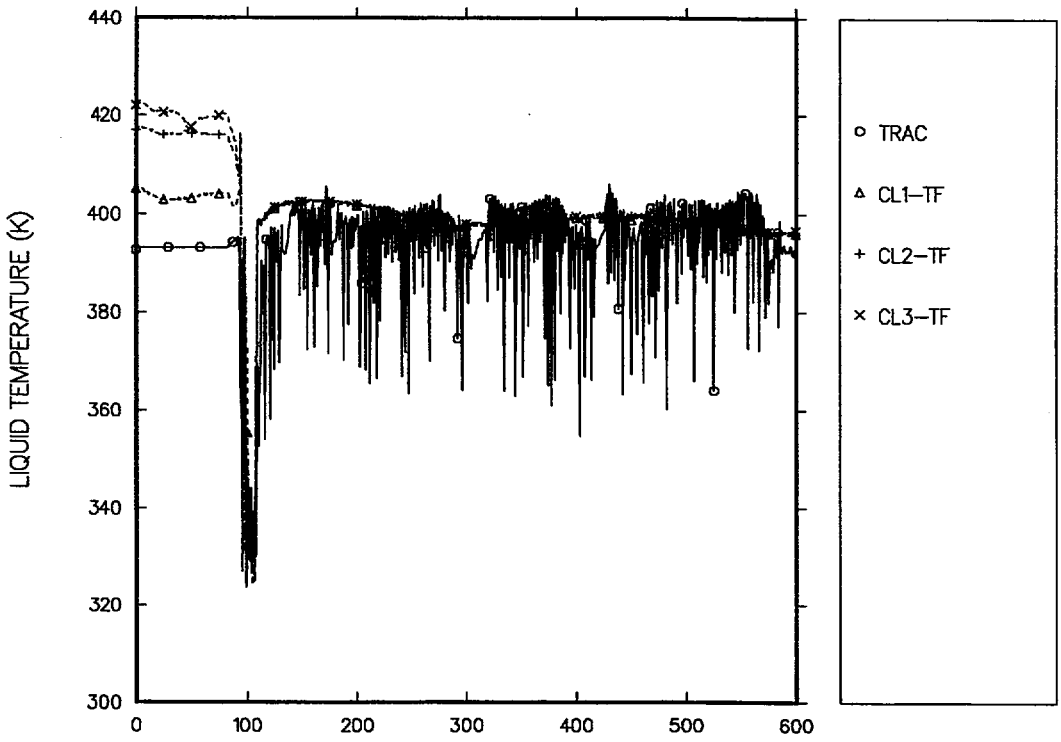

Fig. AA-21. Calculated and measured cold-leg, spool-piece fluid temperature.

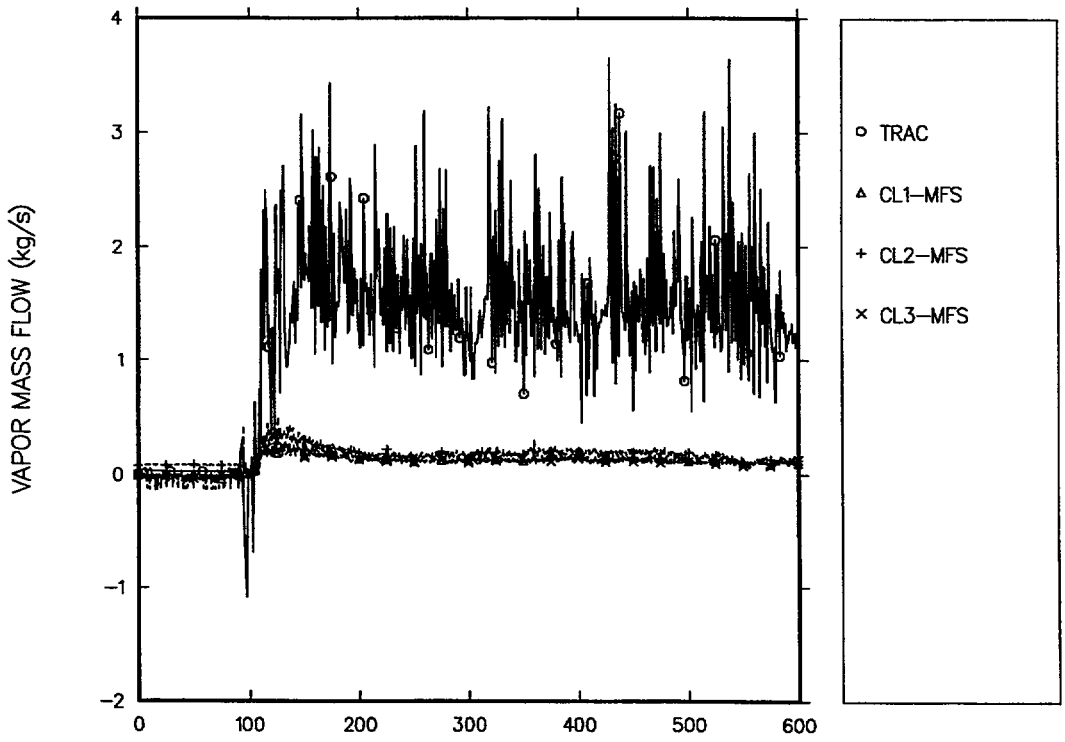

Fig. AA-22. Calculated and measured cold-leg, spool-piece steam mass flow rate.

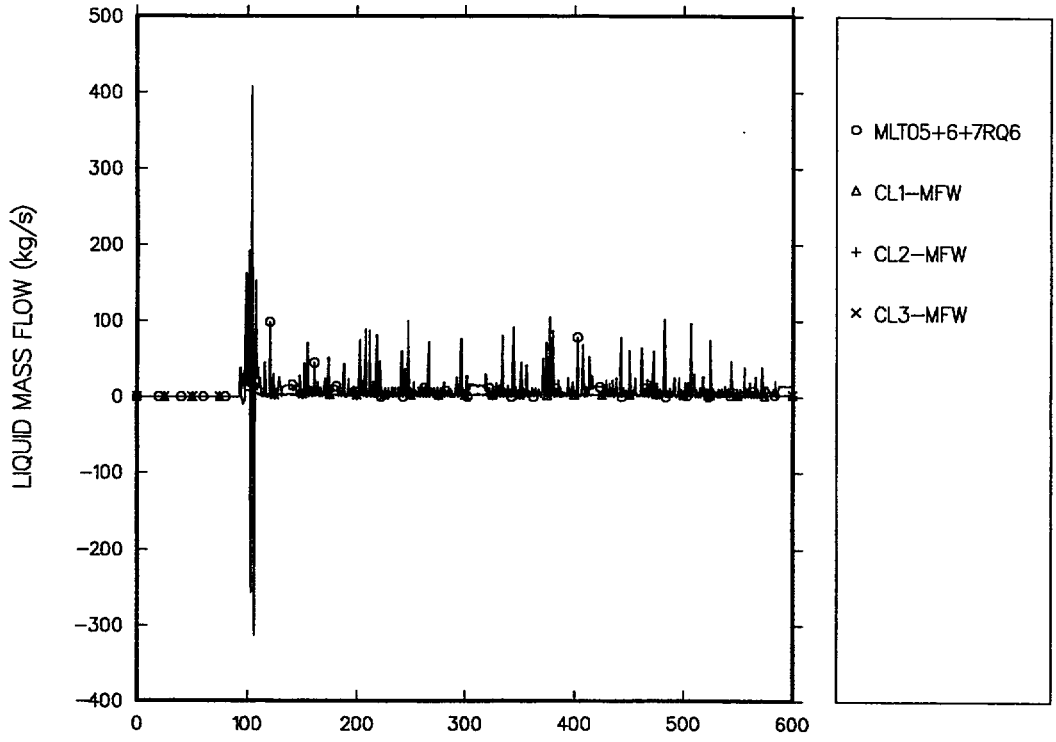

Fig. AA-23. Calculated and measured cold-leg, spool-piece liquid mass flow rate.

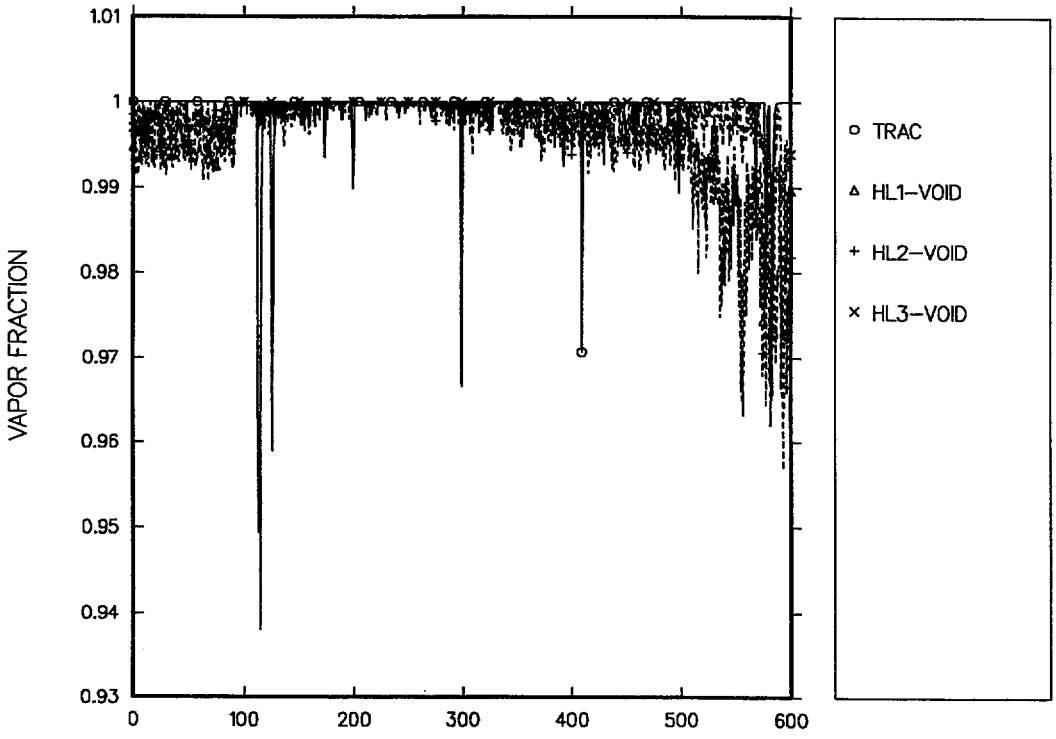

Fig. AA-24. Calculated and measured hot-leg, spool-piece void fraction.

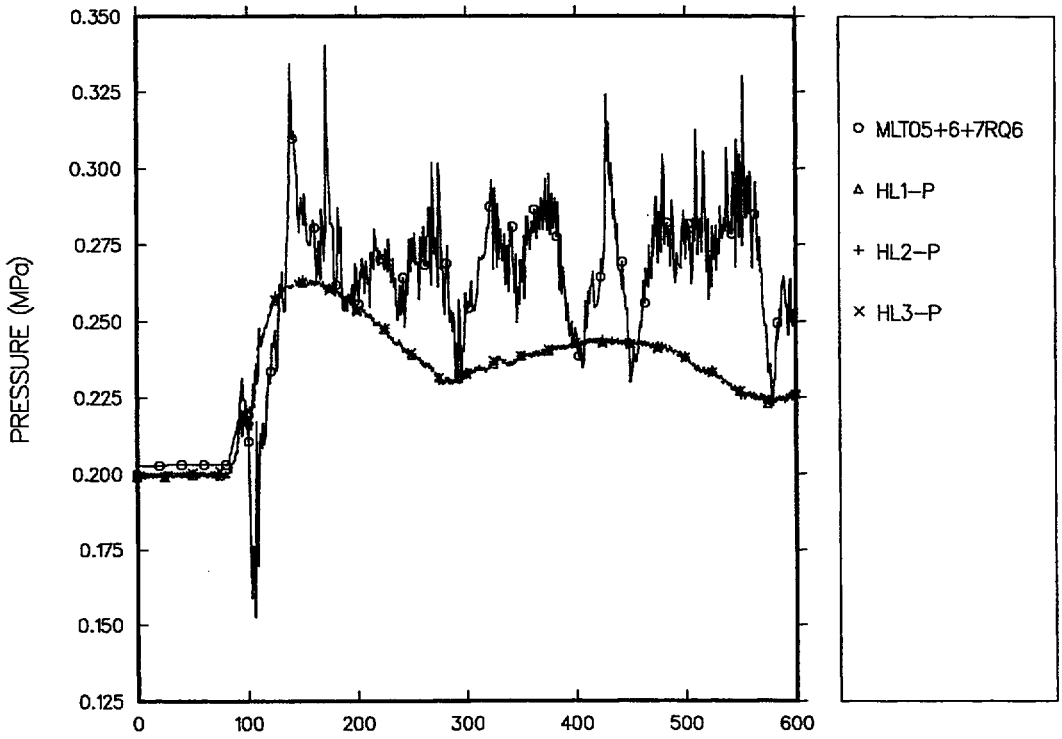

Fig. AA-25. Calculated and measured hot-leg, spool-piece pressure.

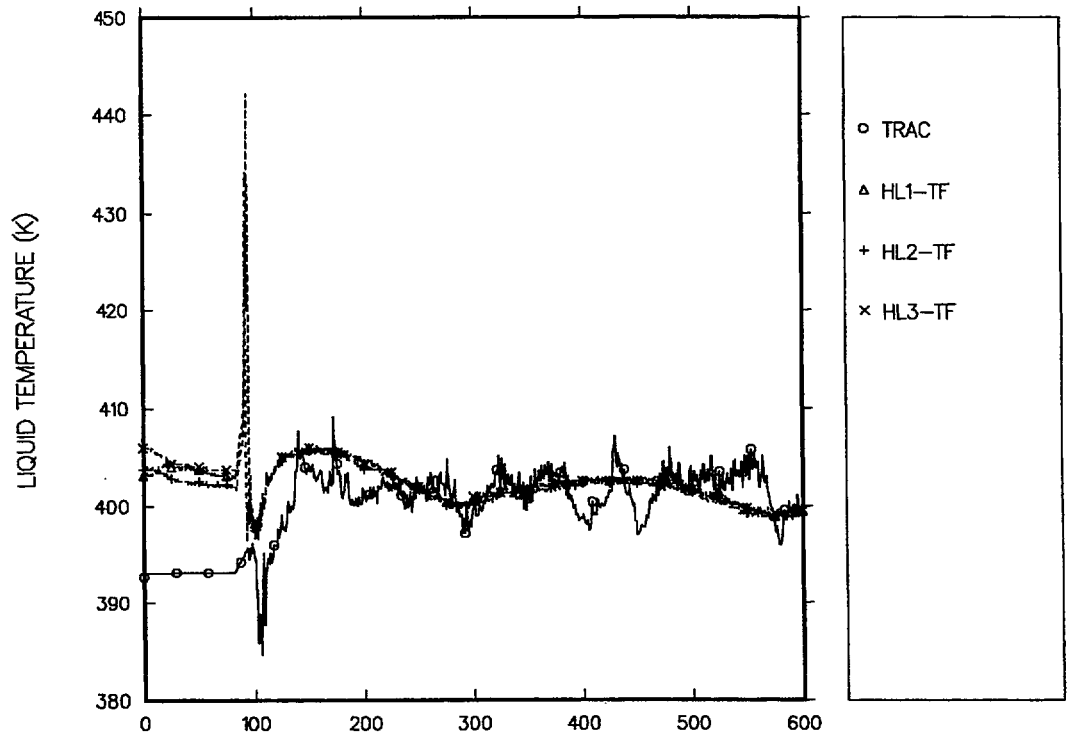

Fig. AA-26. Calculated and measured hot-leg, spool-piece fluid temperature.

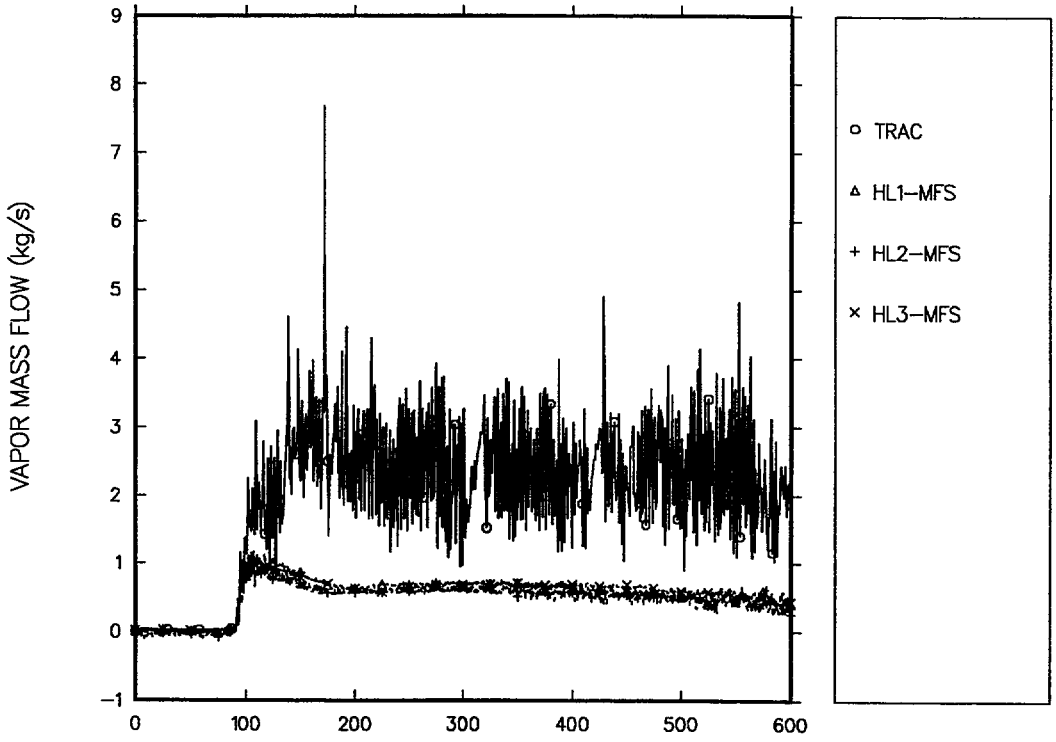

Fig. AA-27. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

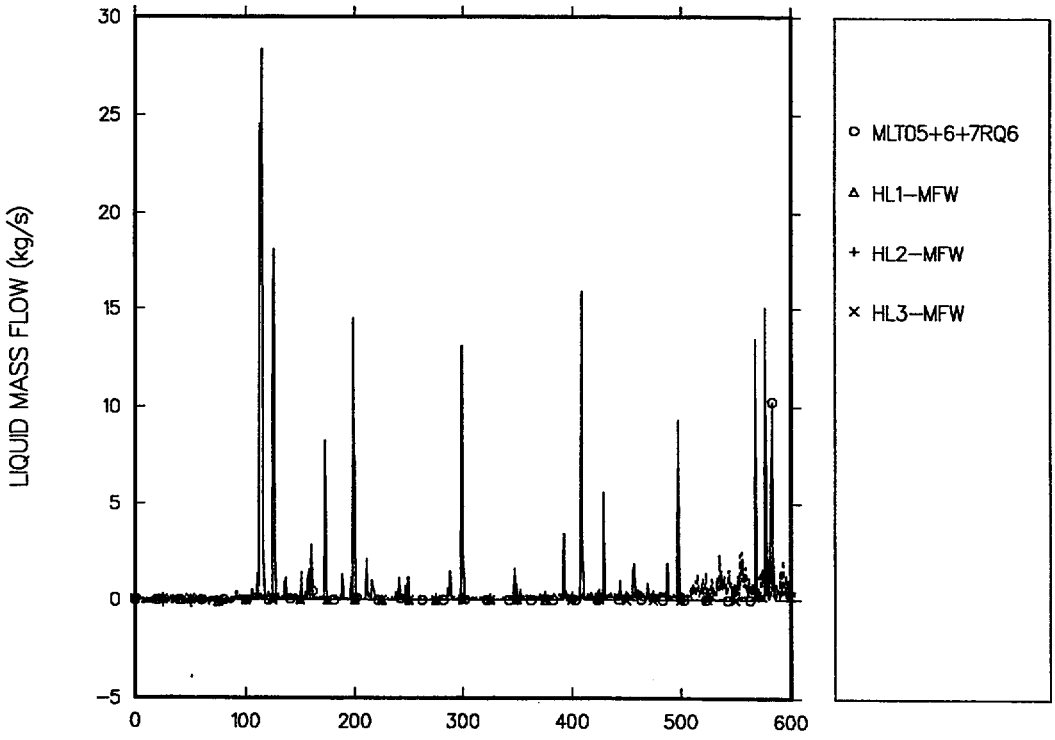

Fig. AA-28. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

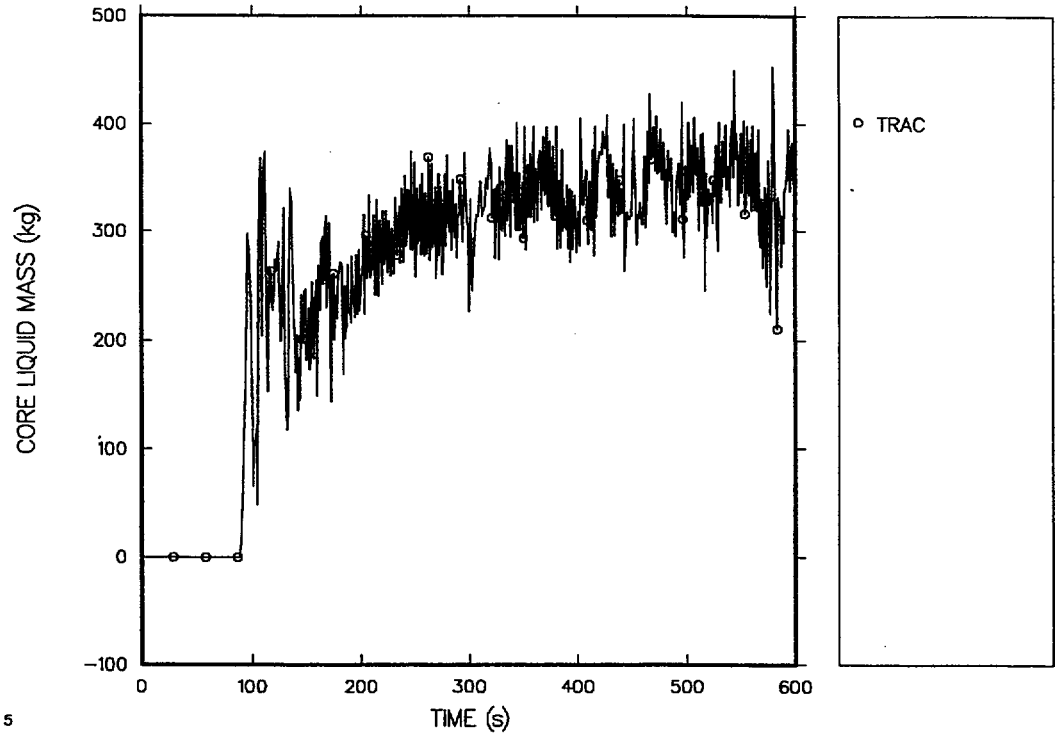

Fig. AA-29. Calculated core liquid mass.

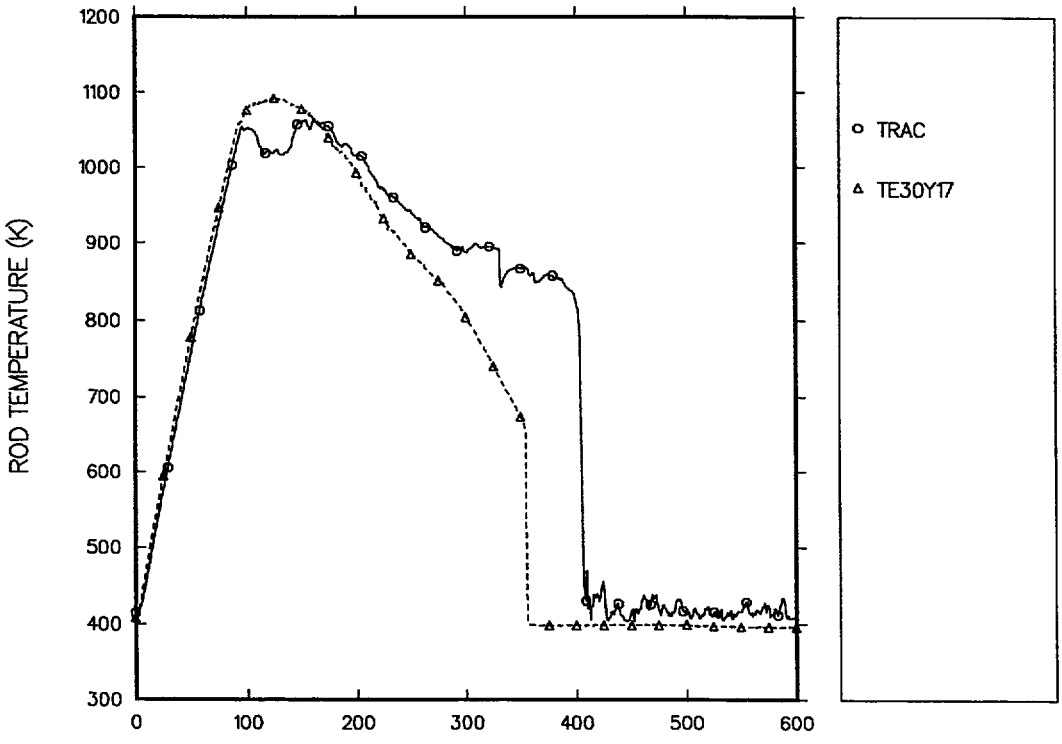

Fig. AA-30. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation (with grid-spacer model).

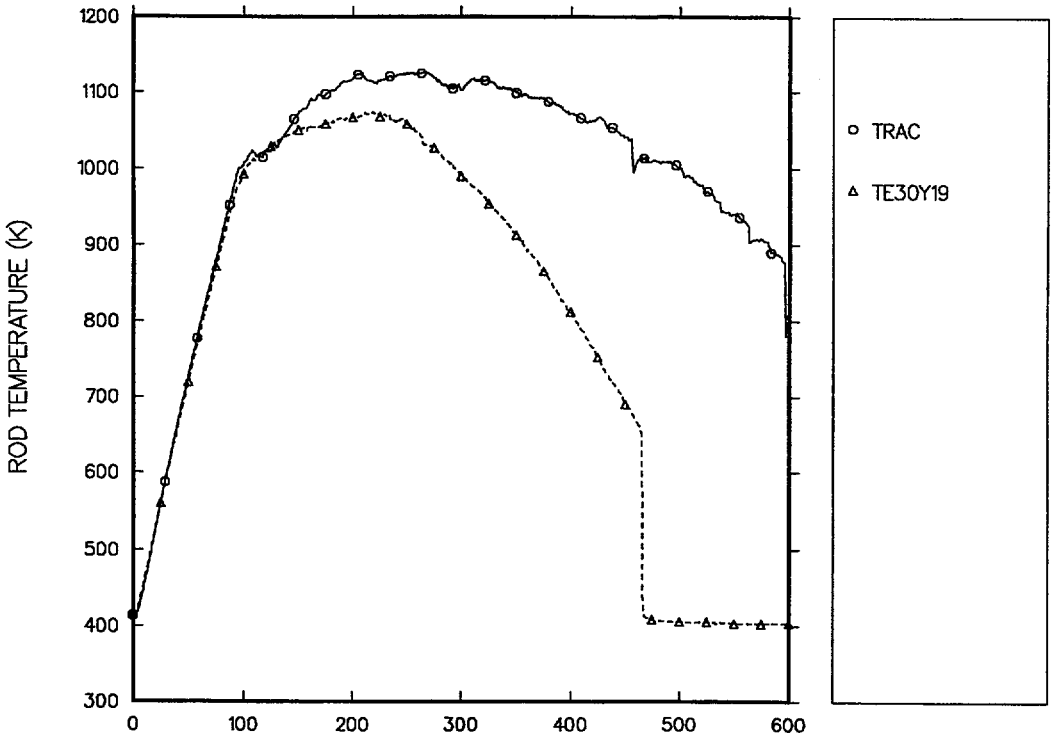

Fig. AA-31. Cladding temperatures for the hot rod at the 4.540-m elevation (with grid-spacer model).

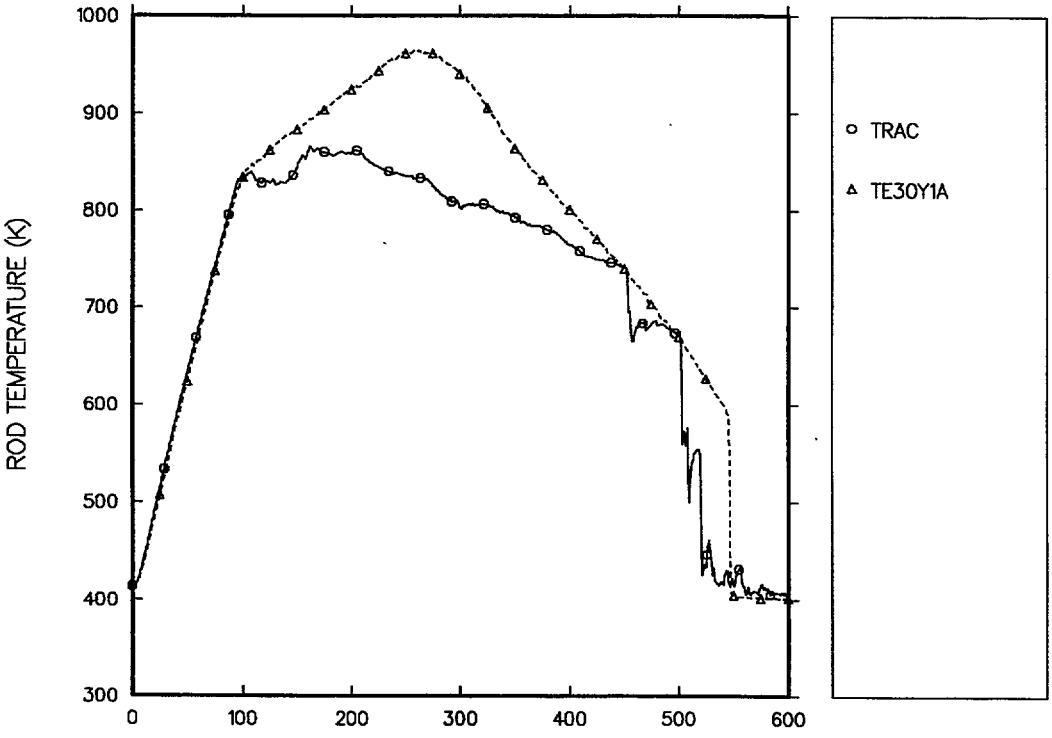

Fig. AA-32. Cladding temperatures for the hot rod at the 5.150-m elevation(with grid-spacer model).

APPENDIX BB

CODE-DATA COMPARISON FOR CCTF RUN 54 WITH RENODED CORE WITH NEWRFD=1

This appendix presents the calculation results for CCTF Run 54 with the core renoded from 7 axial levels to 17 axial levels, with the reflood option newrfd=1. The set of plots presented is the same as presented in Appendix AA for the renoded core with reflood option newrfd=3. For reference purposes, the figure numbers for the two sets of calculations are listed below.

newrfd=1	newrfd=3	newrfd=1	newrfd=3
BB-1	AA-1	BB-17	AA-17
BB-2	AA-2	BB-18	AA-18
BB-3	AA-3	BB-19	AA-19
BB-4	AA-4	BB-20	AA-20
BB-5	AA-5	BB-21	AA-21
BB-6	AA-6	BB-22	AA-22
BB-7	AA-7	BB-23	AA-23
BB-8	AA-8	BB-24	AA-24
BB-9	AA-9	BB-25	AA-25
BB-10	AA-10	BB-26	AA-26
BB-11	AA-11	BB-27	AA-27
BB-12	AA-12	BB-28	AA-28
BB-13	AA-13	BB-29	AA-29
BB-14	AA-14	BB-30	AA-30
BB-15	AA-15	BB-31	AA-31
BB-16	AA-16	BB-32	AA-32

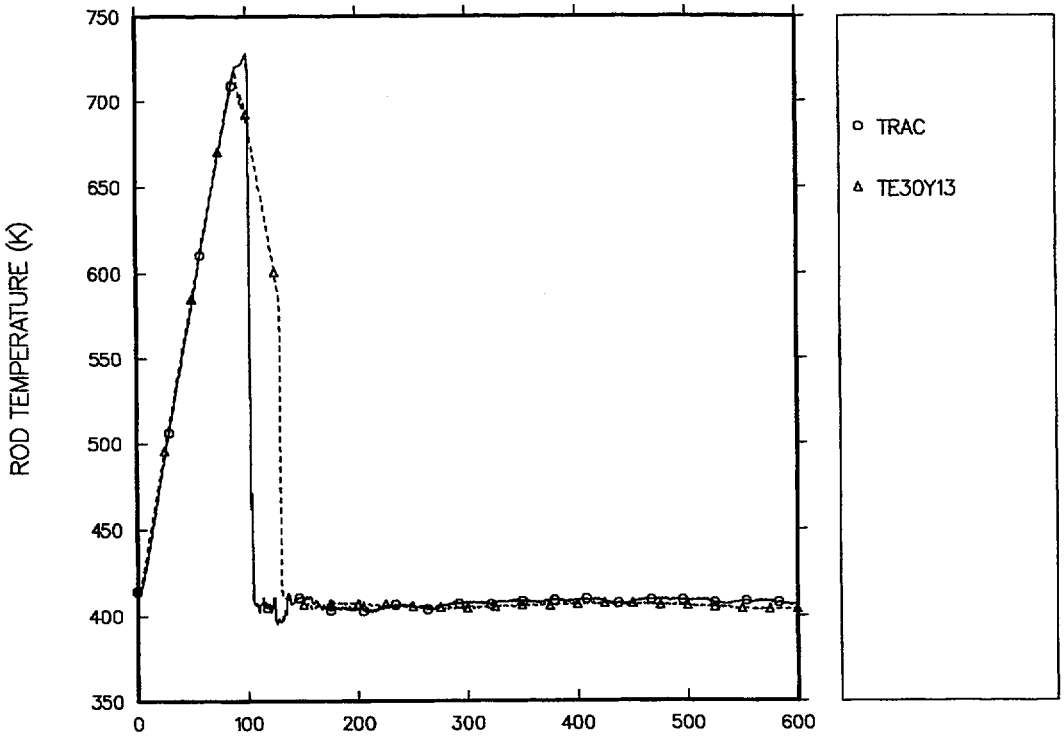

Fig. BB-1. Calculated and measured cladding temperatures for the hot rod at the 2.480-m elevation.

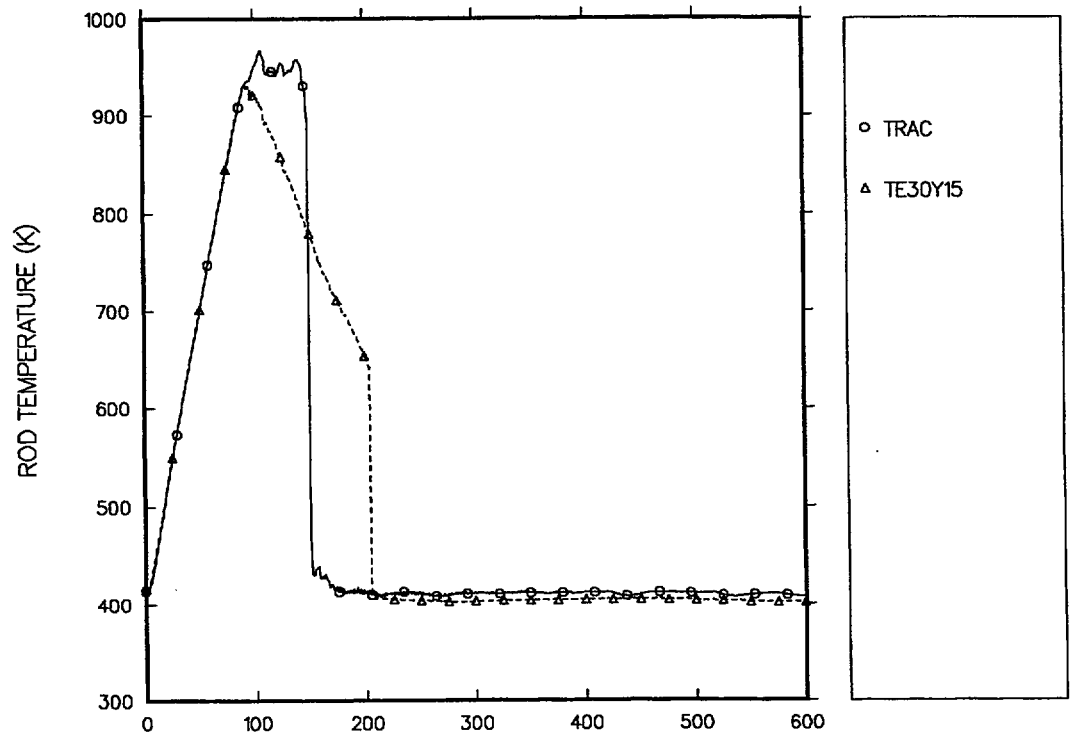

Fig. BB-2. Calculated and measured cladding temperatures for the hot rod at the 3.115-m elevation.

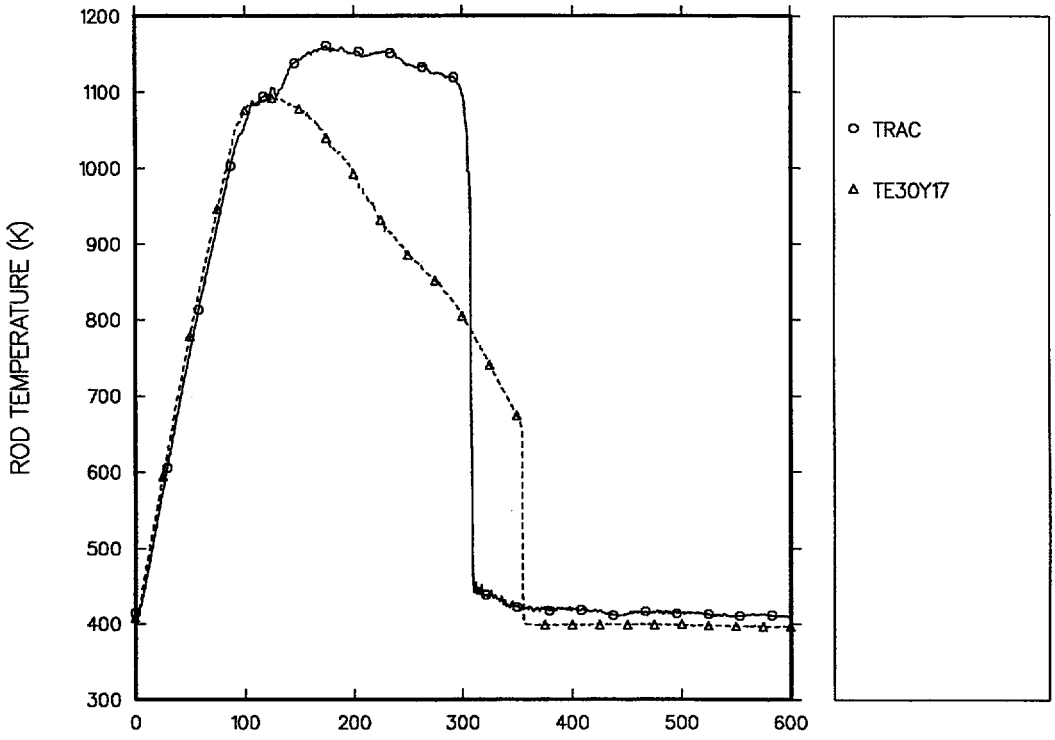

Fig. BB-3. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation.

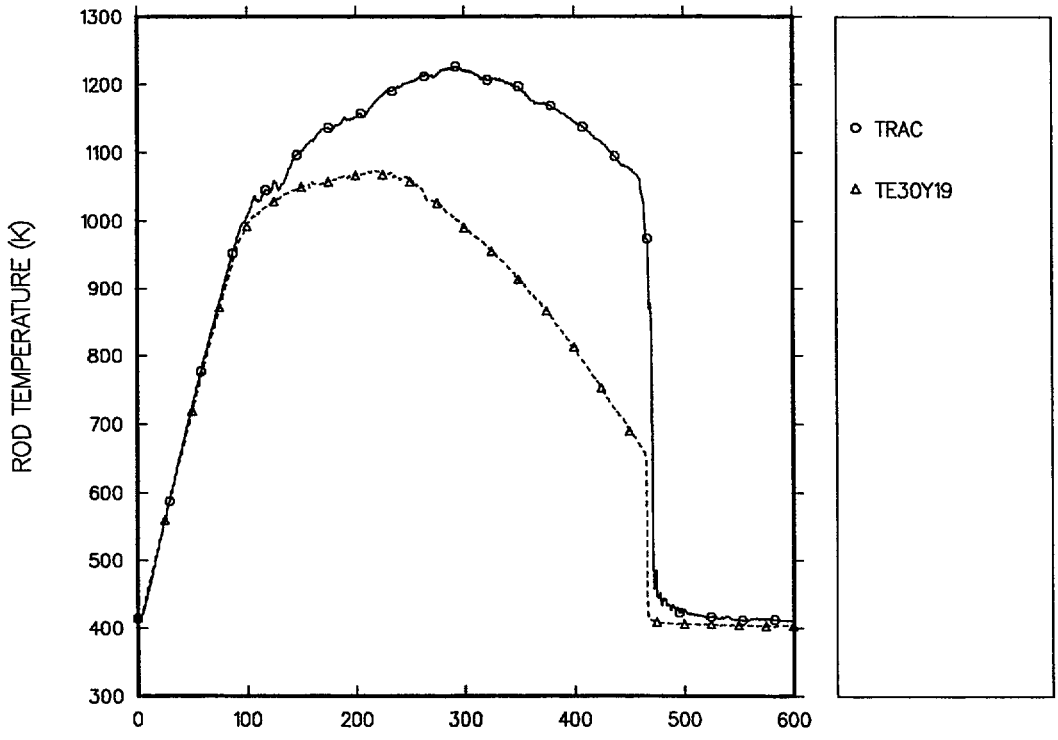

Fig. BB-4. Cladding temperatures for the hot rod at the 4.540-m elevation.

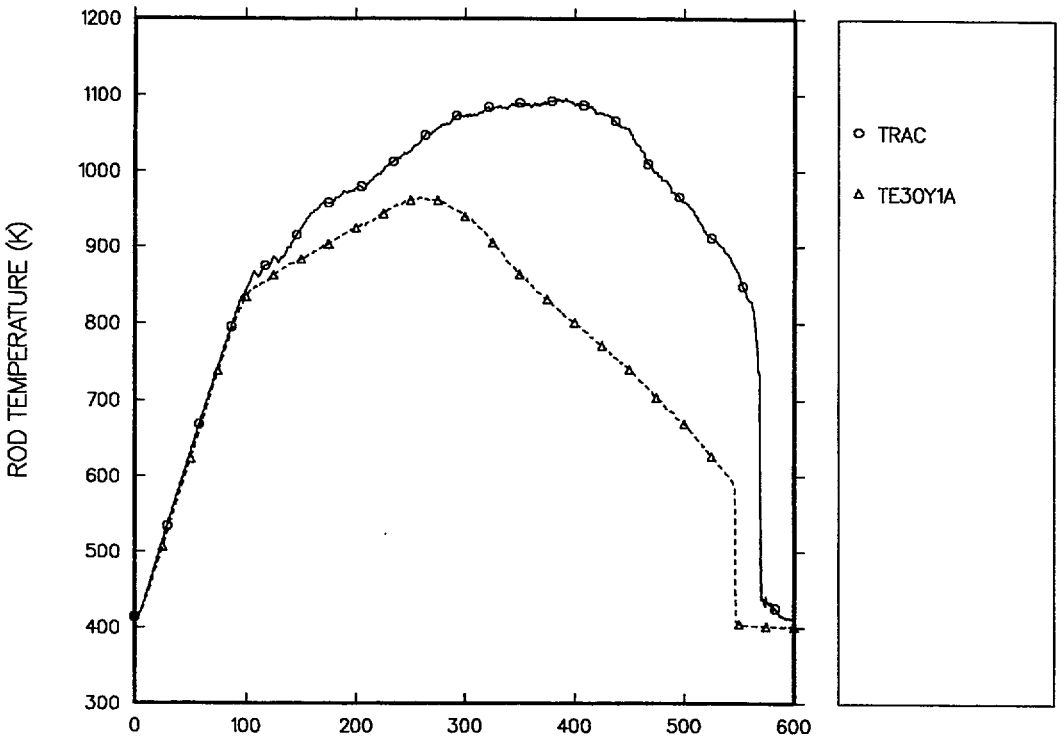

Fig. BB-5. Cladding temperatures for the hot rod at the 5.150-m elevation.

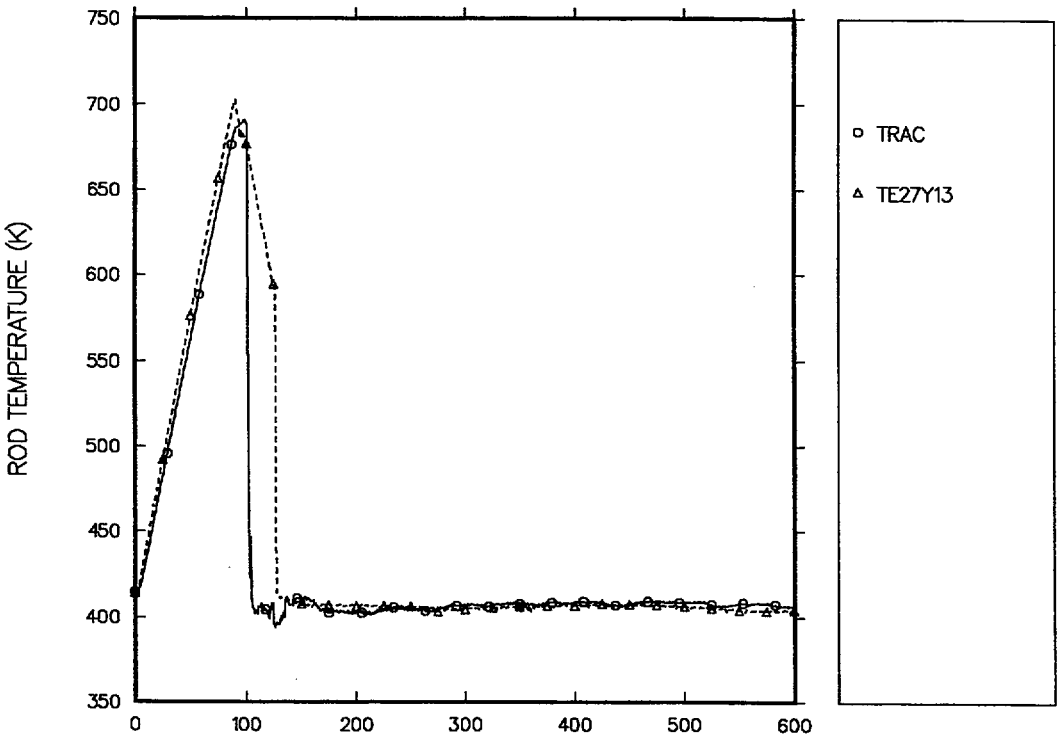

Fig. BB-6. Cladding temperatures for the intermediate-powered rod at the 2.480-m elevation.

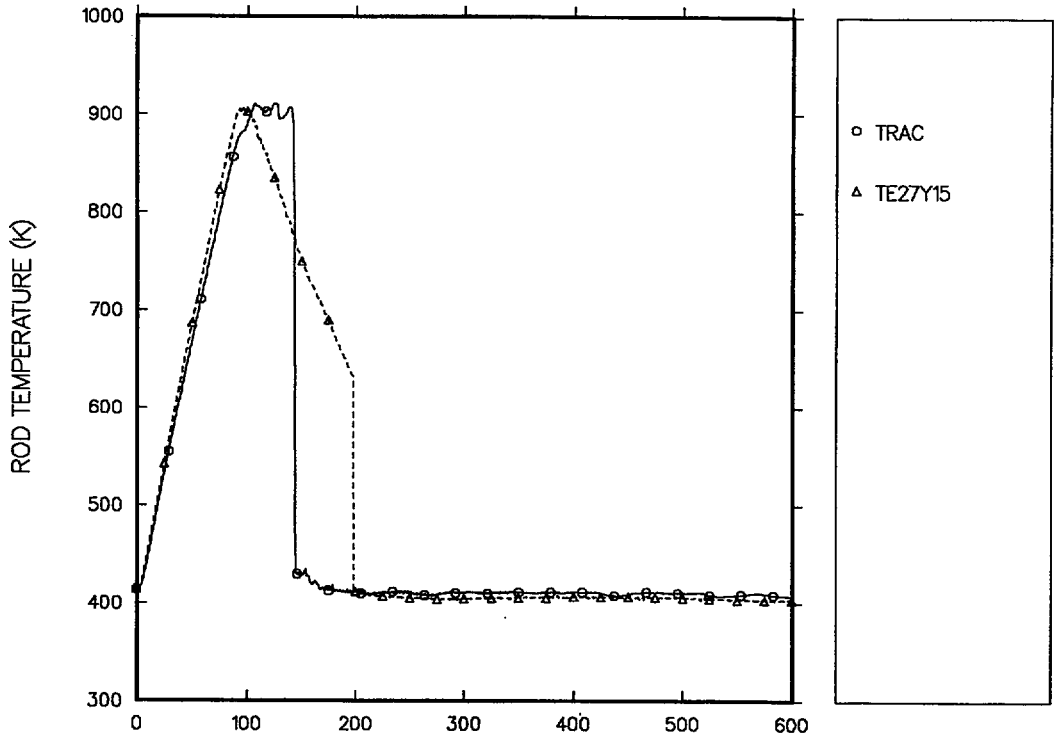

Fig. BB-7. Cladding temperatures for the intermediate-powered rod at the 3.115-m elevation.

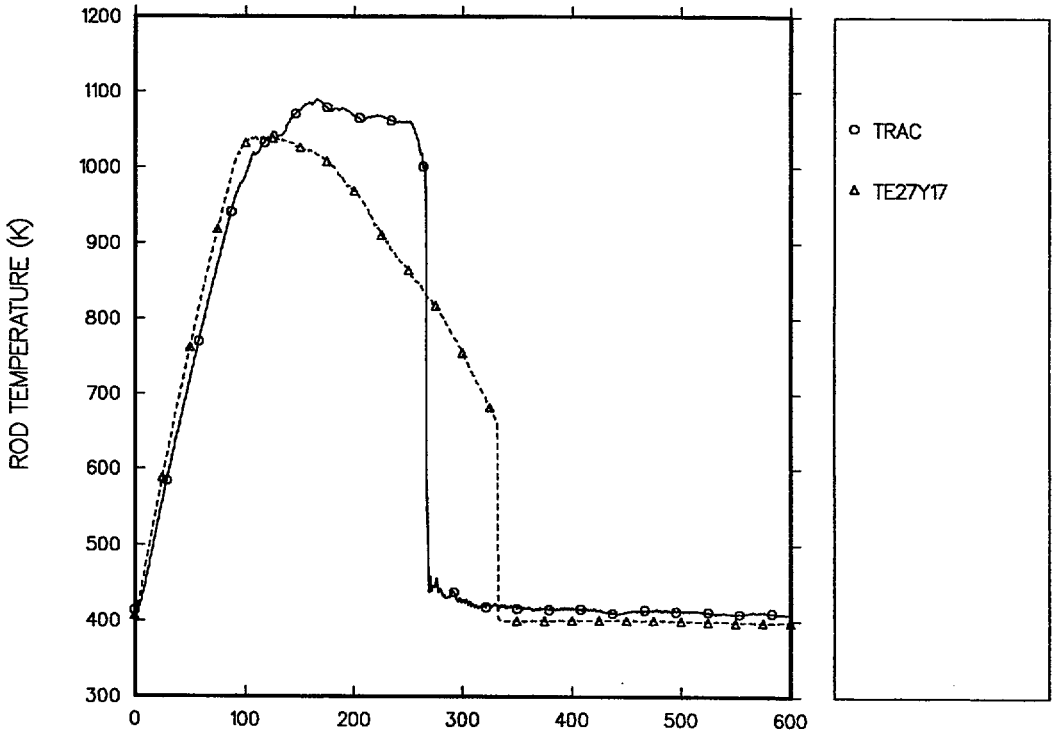

Fig. BB-8. Cladding temperatures for the intermediate-powered rod at the core midplane.

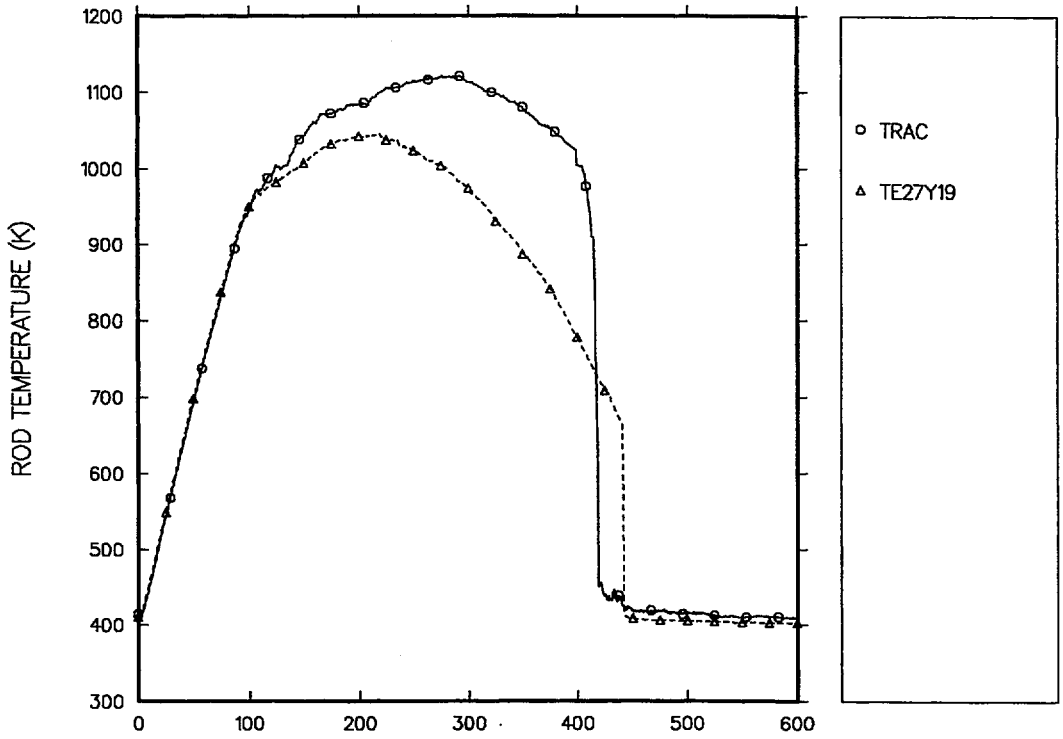

Fig. BB-9. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 4.540-m elevation.

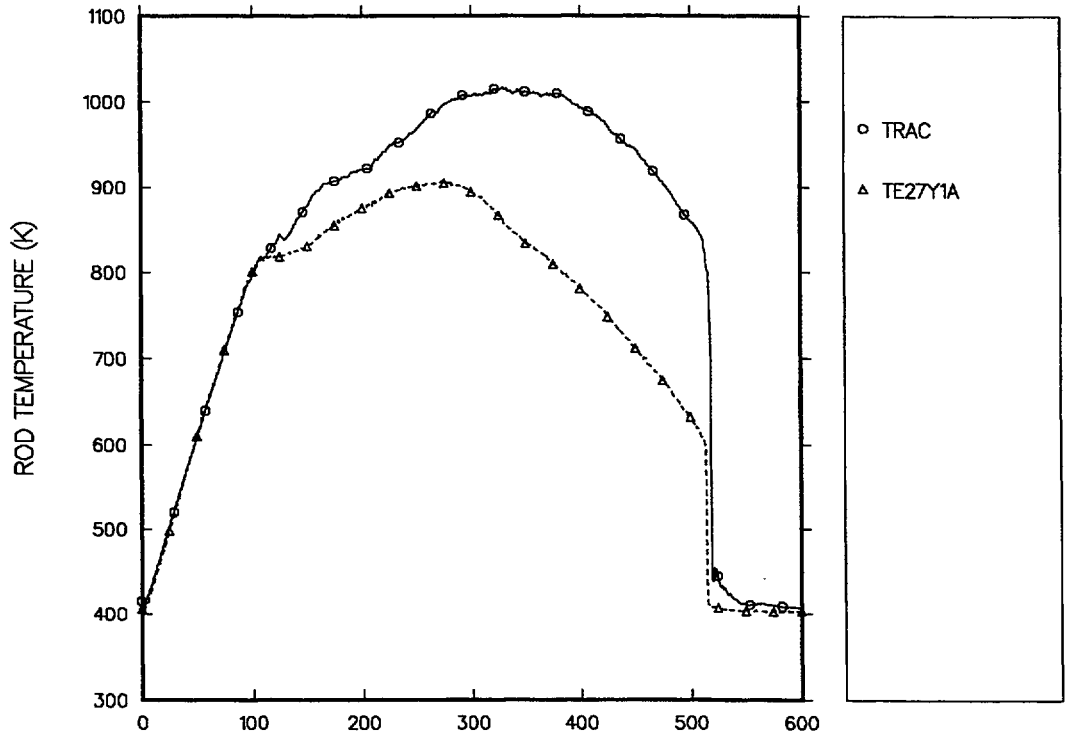

Fig. BB-10. Comparison of calculated and measured cladding temperatures for the intermediate-powered rod at the 5.150-m elevation.

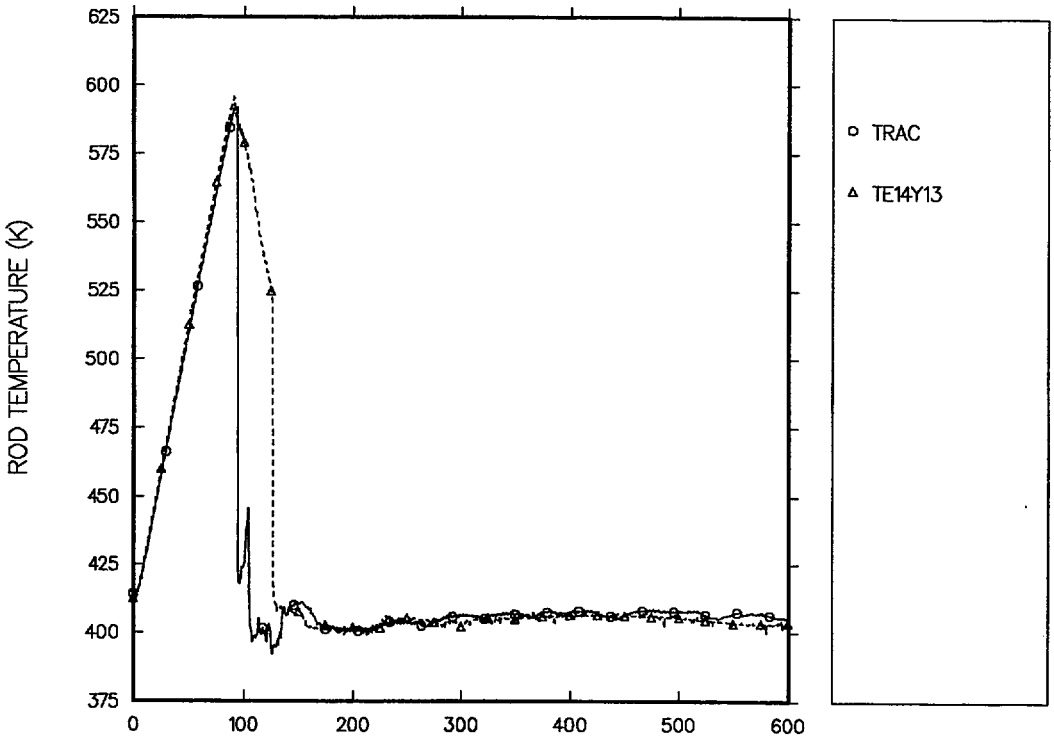

Fig. BB-11. Cladding temperatures for the low-powered rod at the 2.480-m elevation.

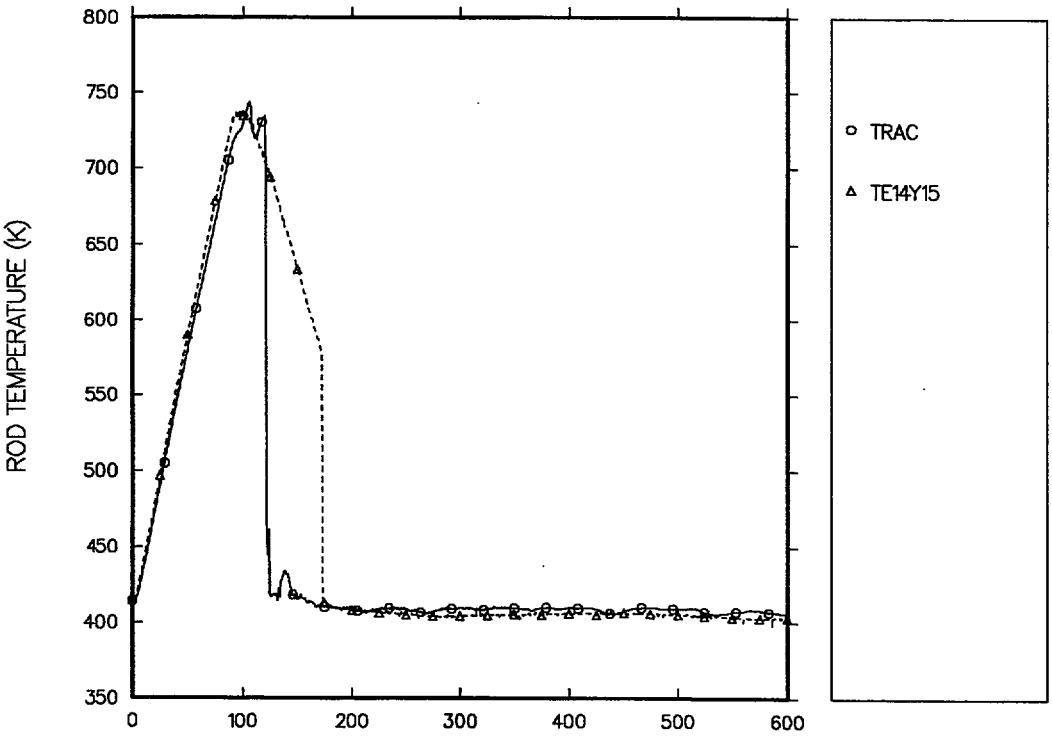

Fig. BB-12. Cladding temperatures for the low-powered rod at the 3.115-m elevation.

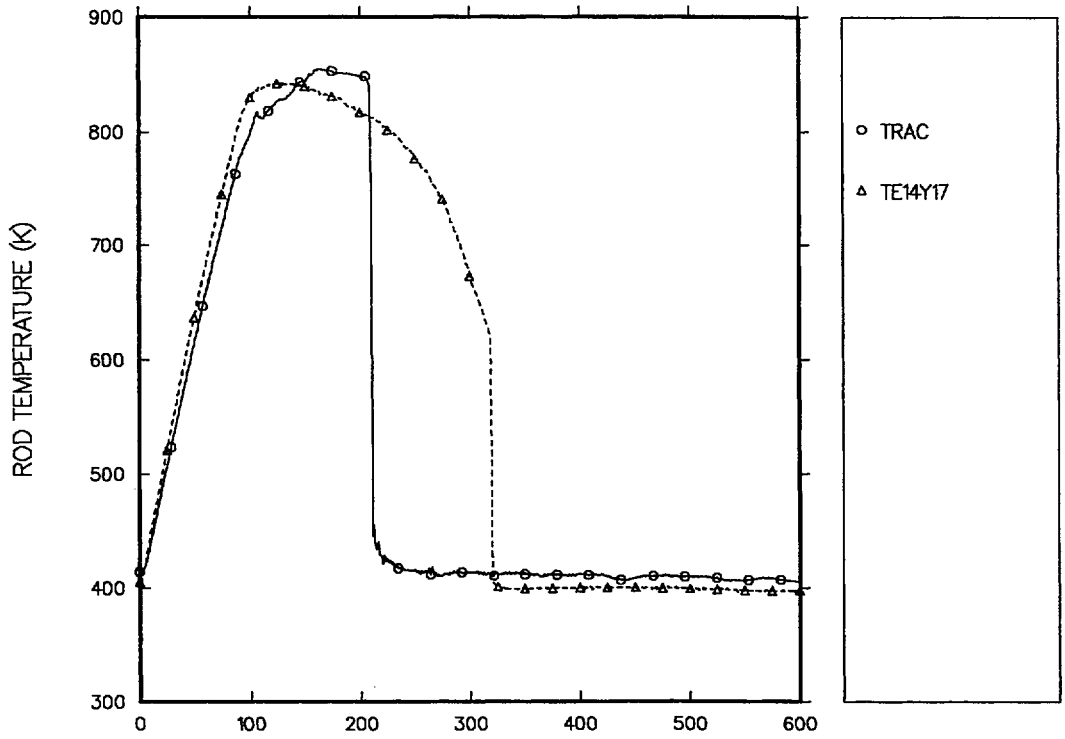

Fig. BB-13. Cladding temperatures for the low-powered rod at the core midplane.

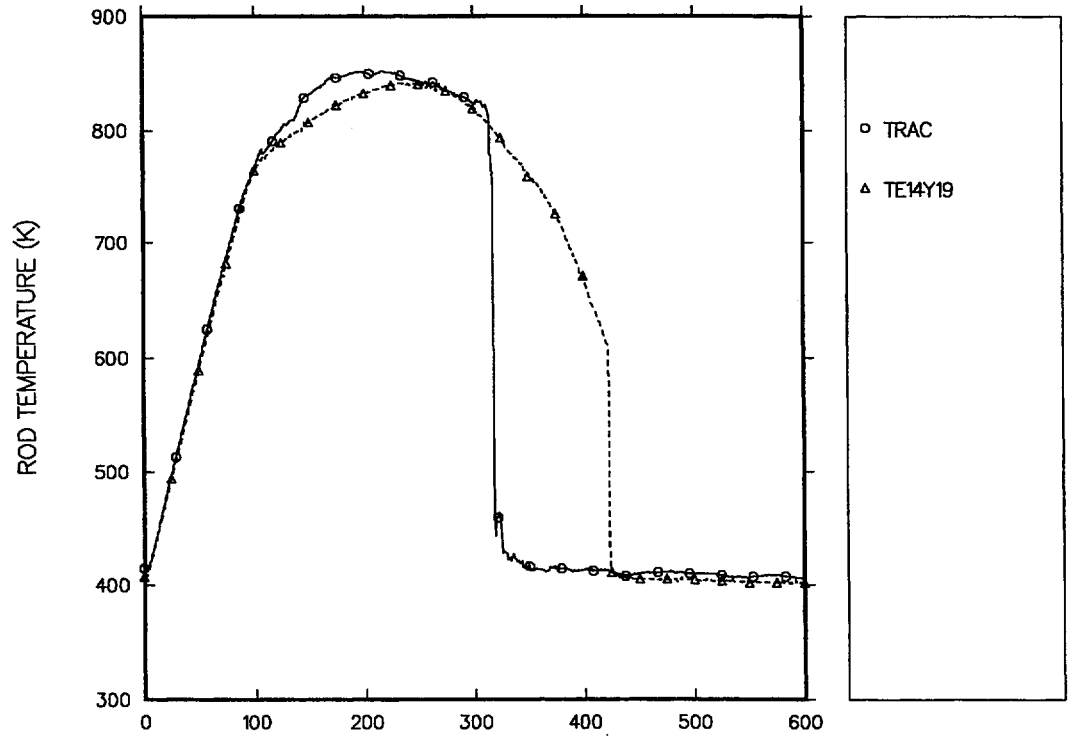

Fig. BB-14. Cladding temperatures for the low-powered rod at the 4.540-m elevation.

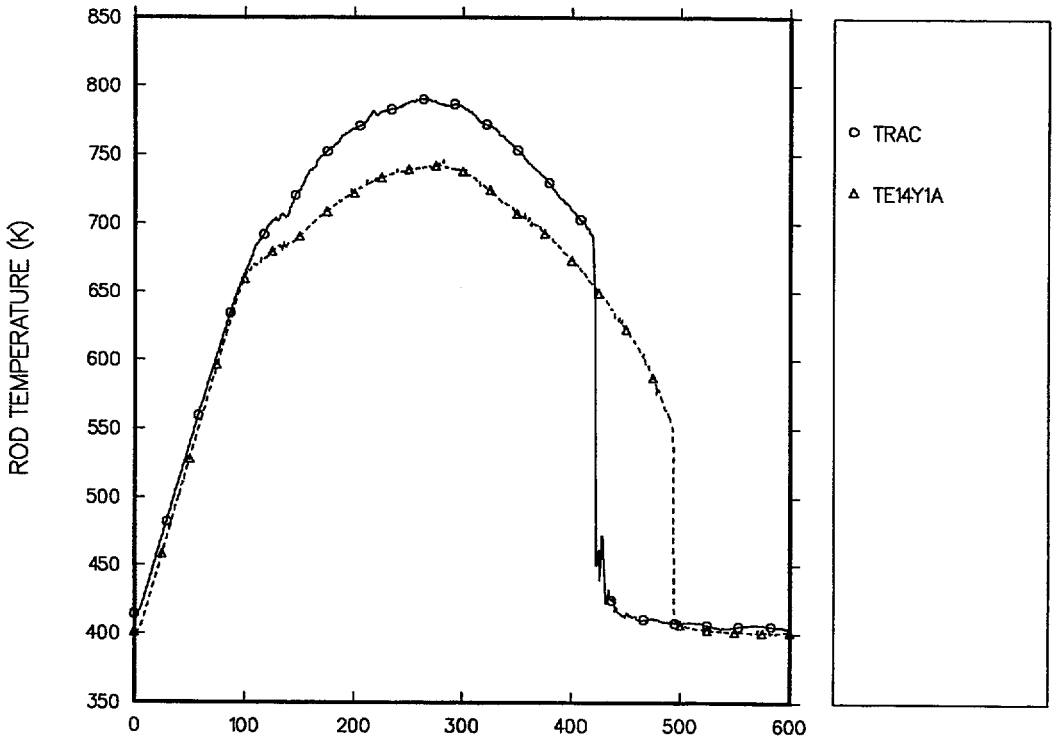

Fig. BB-15. Comparison of calculated and measured cladding temperatures for the low-powered rod at the 5.150-m elevation.

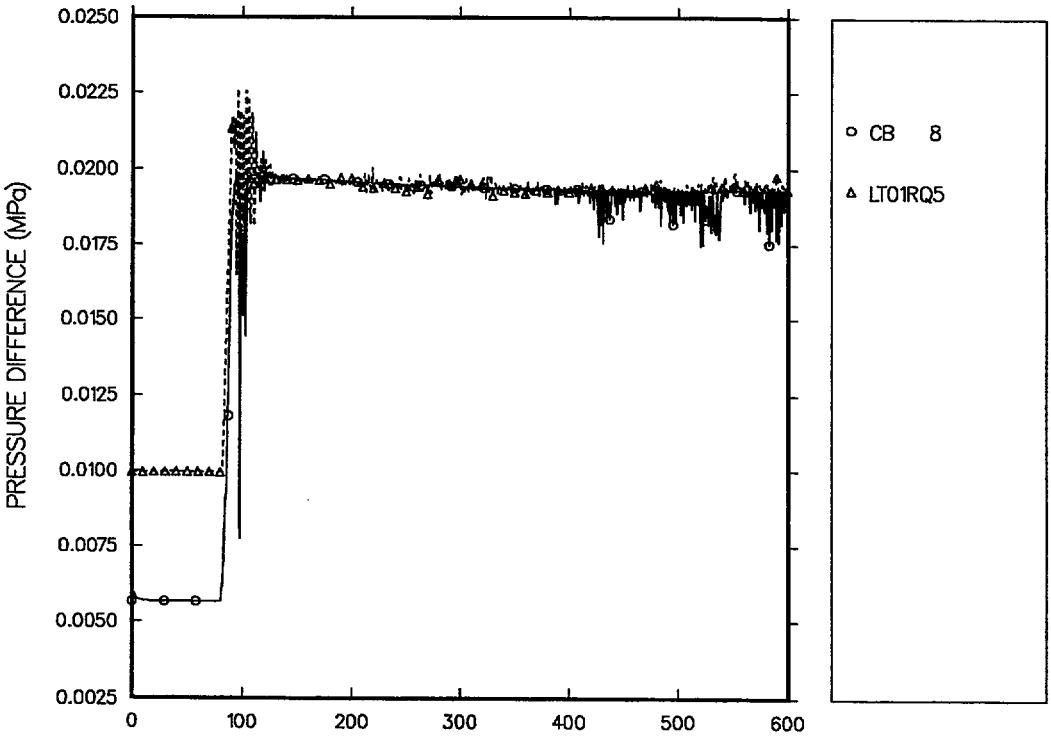

Fig. BB-16. Calculated and measured pressure vessel differential pressure: lower plenum.

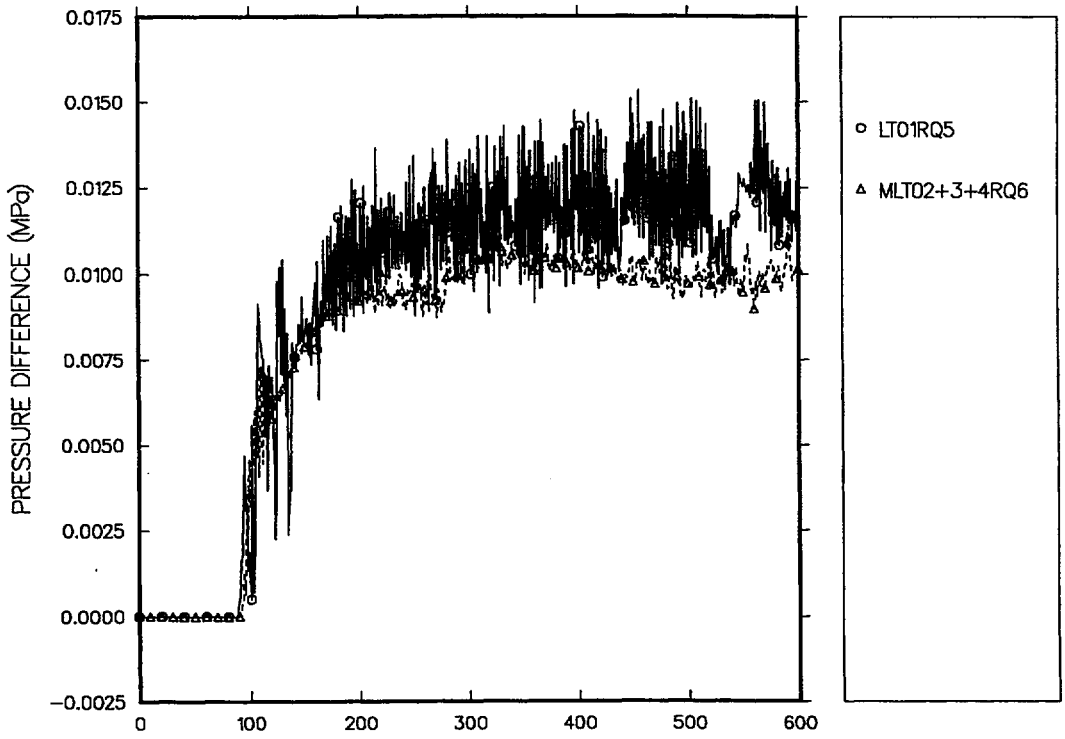

Fig. BB-17. Calculated and measured pressure vessel differential pressure: lower half of the core.

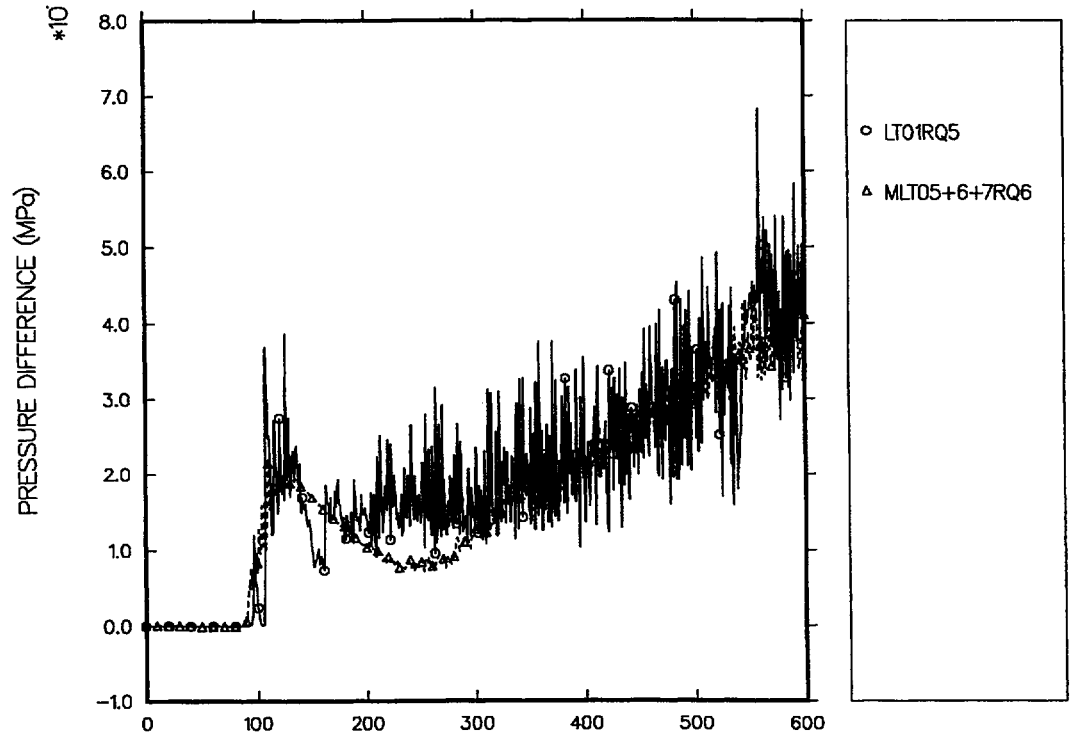

Fig. BB-18. Calculated and measured pressure vessel differential pressure: upper half of the core.

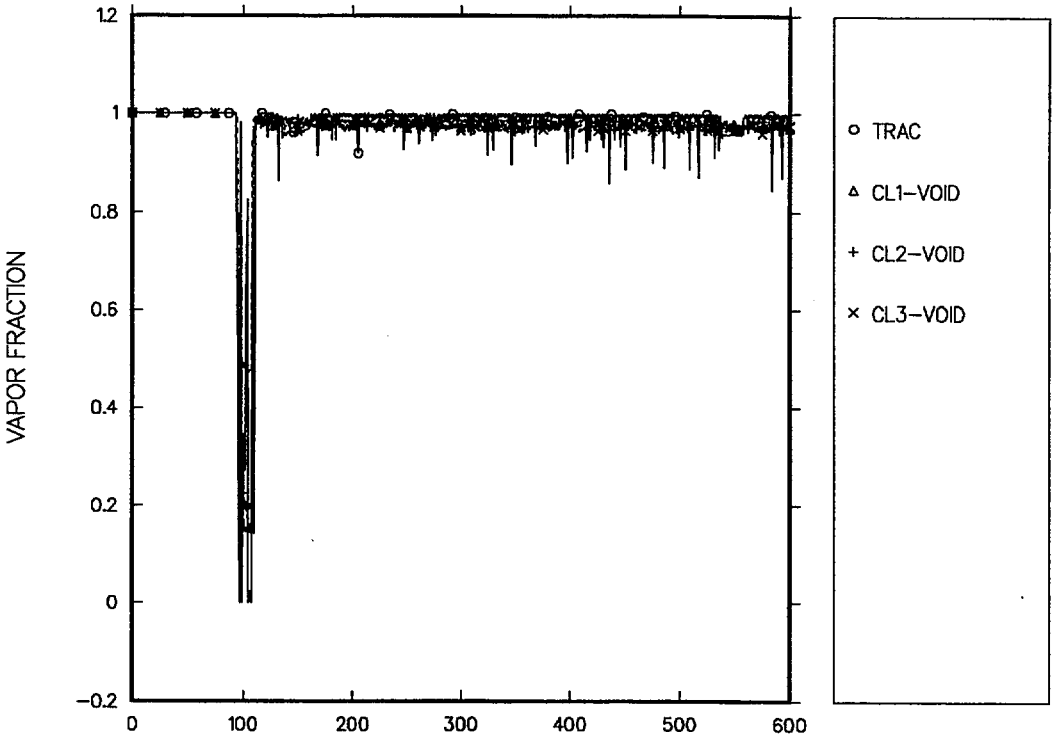

Fig. BB-19. Calculated and measured cold-leg, spool-piece void fraction.

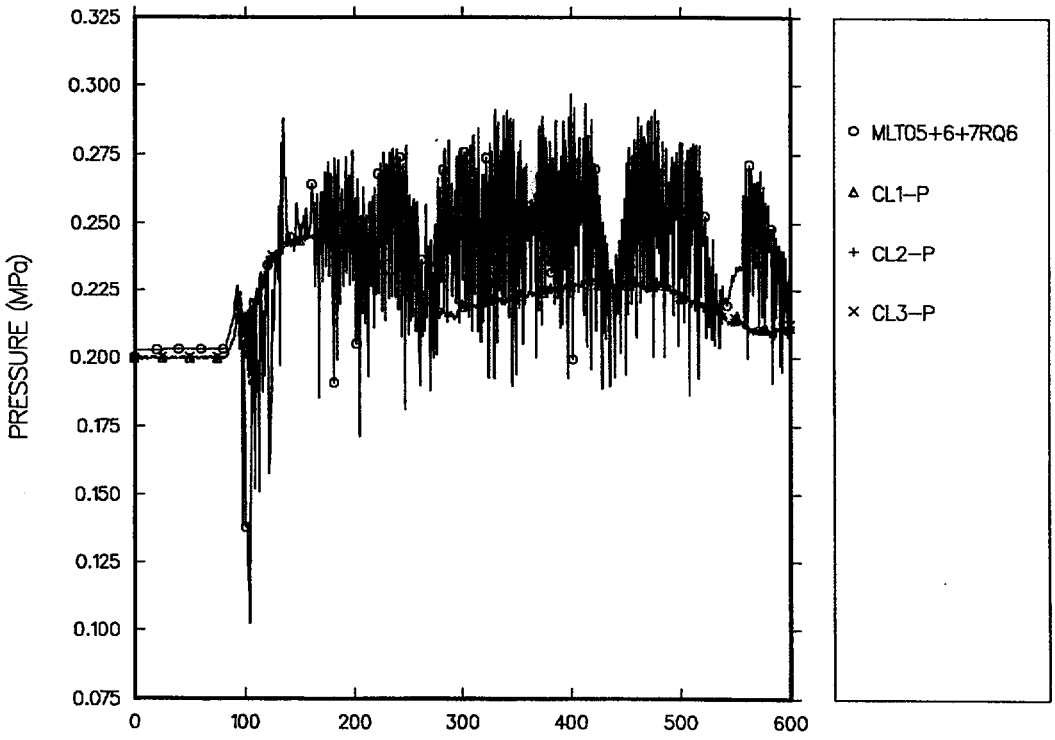

Fig. BB-20. Calculated and measured cold-leg, spool-piece pressure.

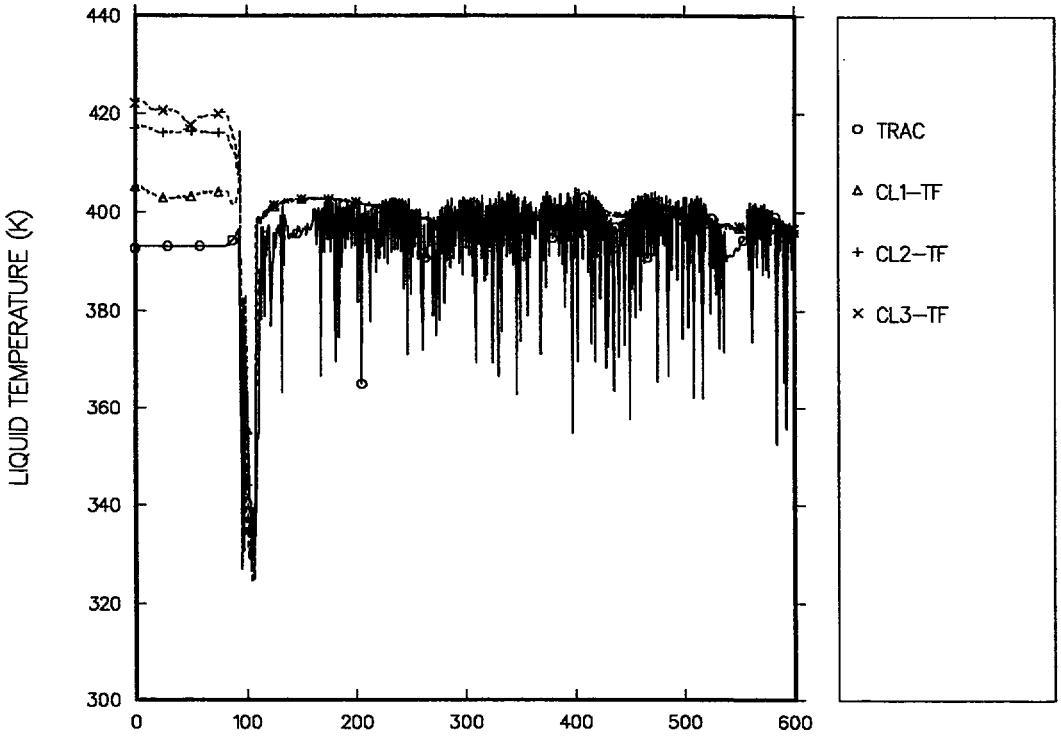

Fig. BB-21. Calculated and measured cold-leg, spool-piece fluid temperature.

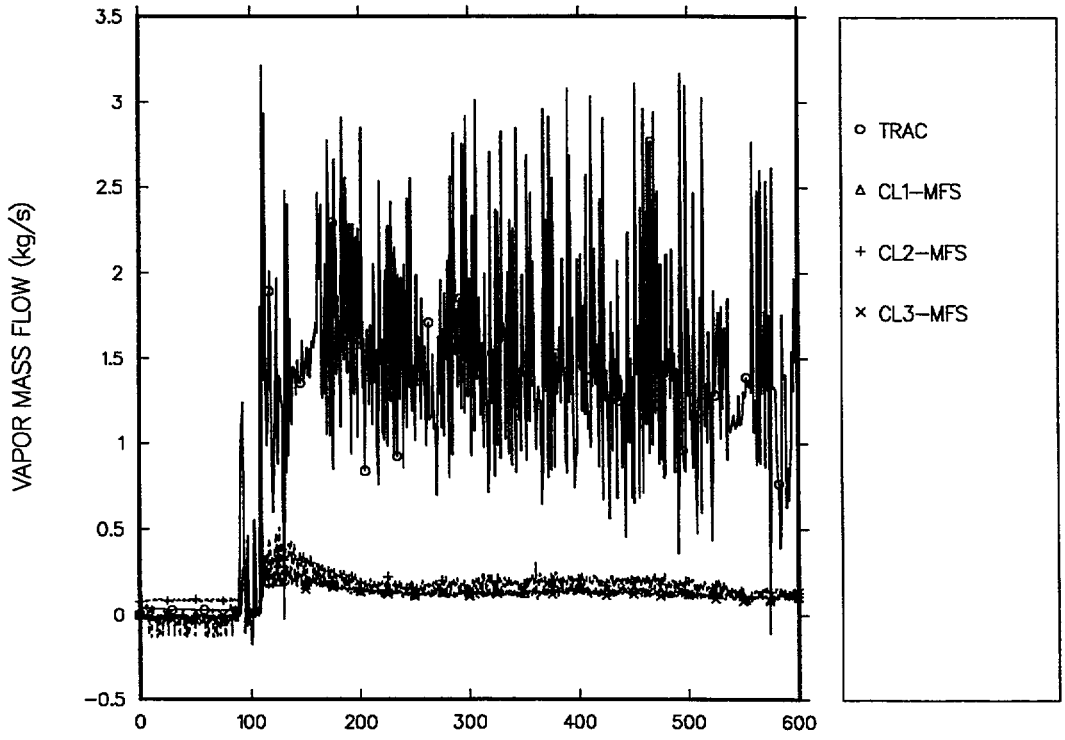

Fig. BB-22. Calculated and measured cold-leg, spool-piece, steam mass flow rate.

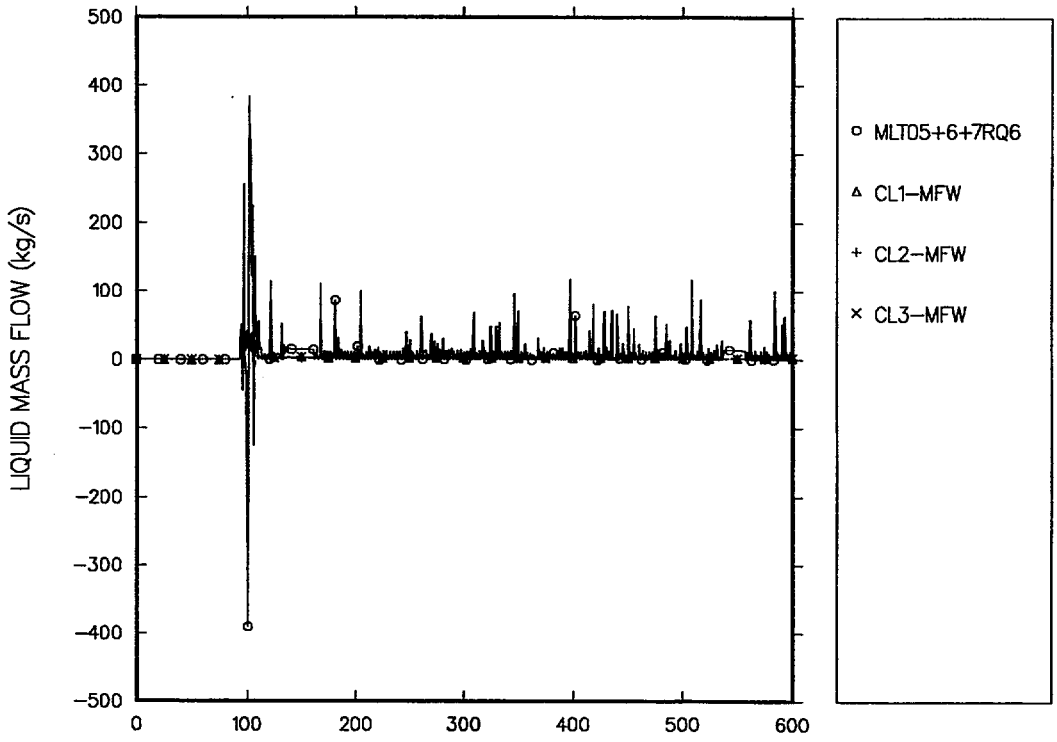

Fig. BB-23. Calculated and measured cold-leg, spool-piece, liquid mass flow rate.

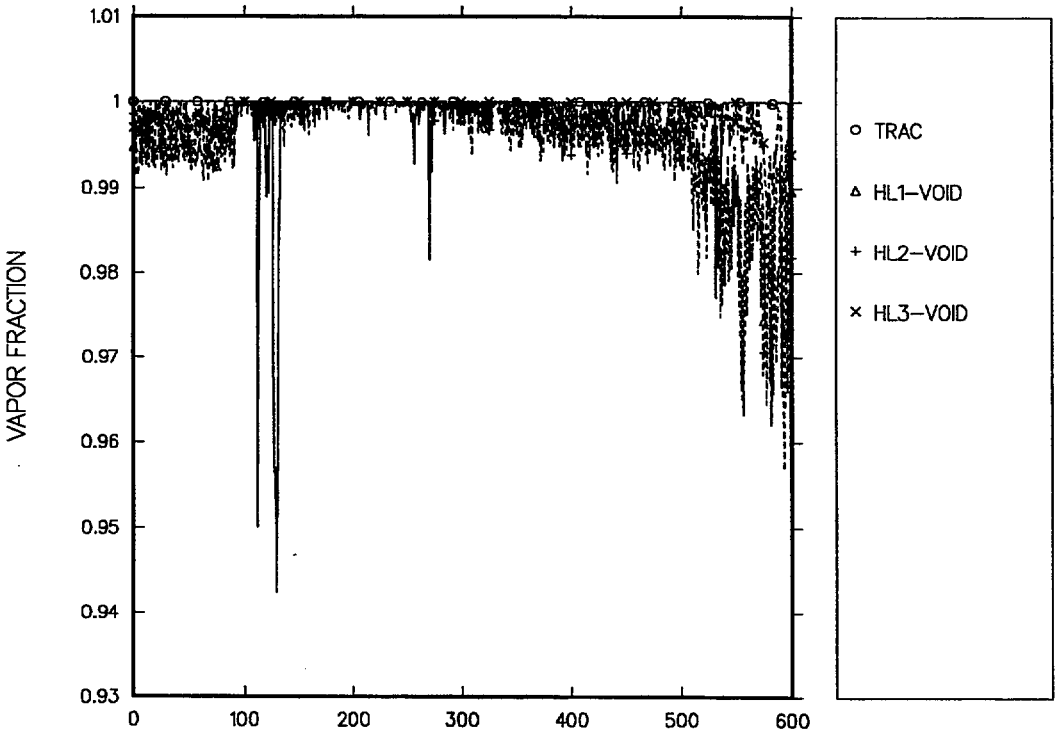

Fig. BB-24. Calculated and measured hot-leg, spool-piece void fraction.

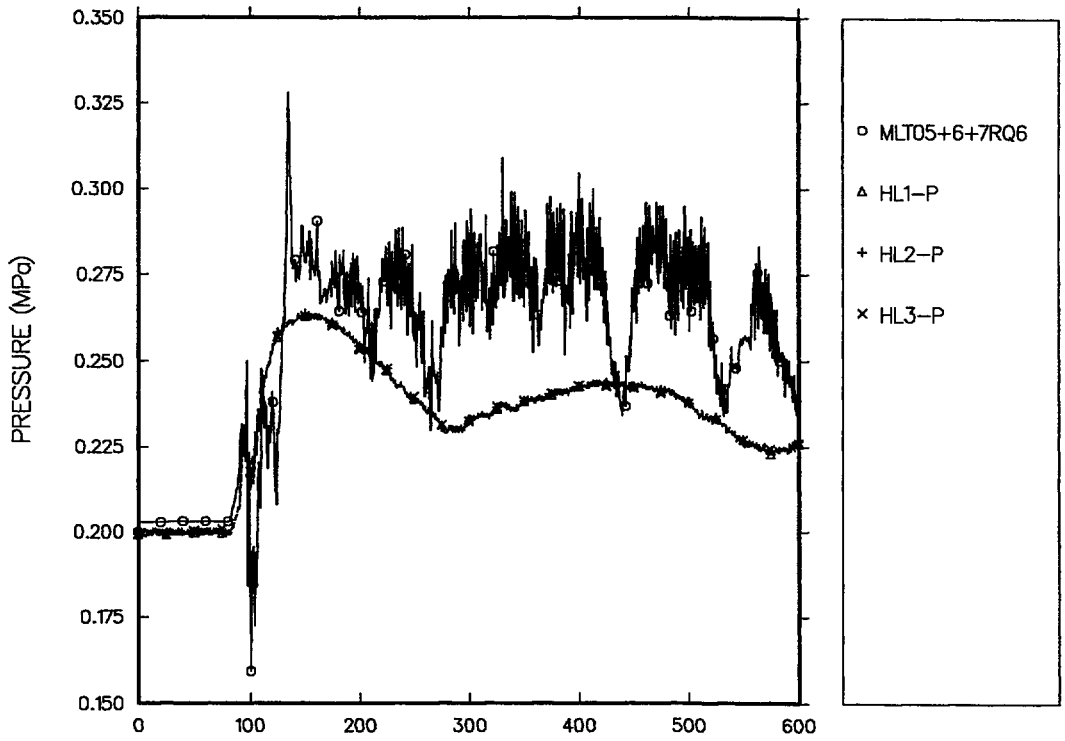

Fig. BB-25. Calculated and measured hot-leg, spool-piece pressure.

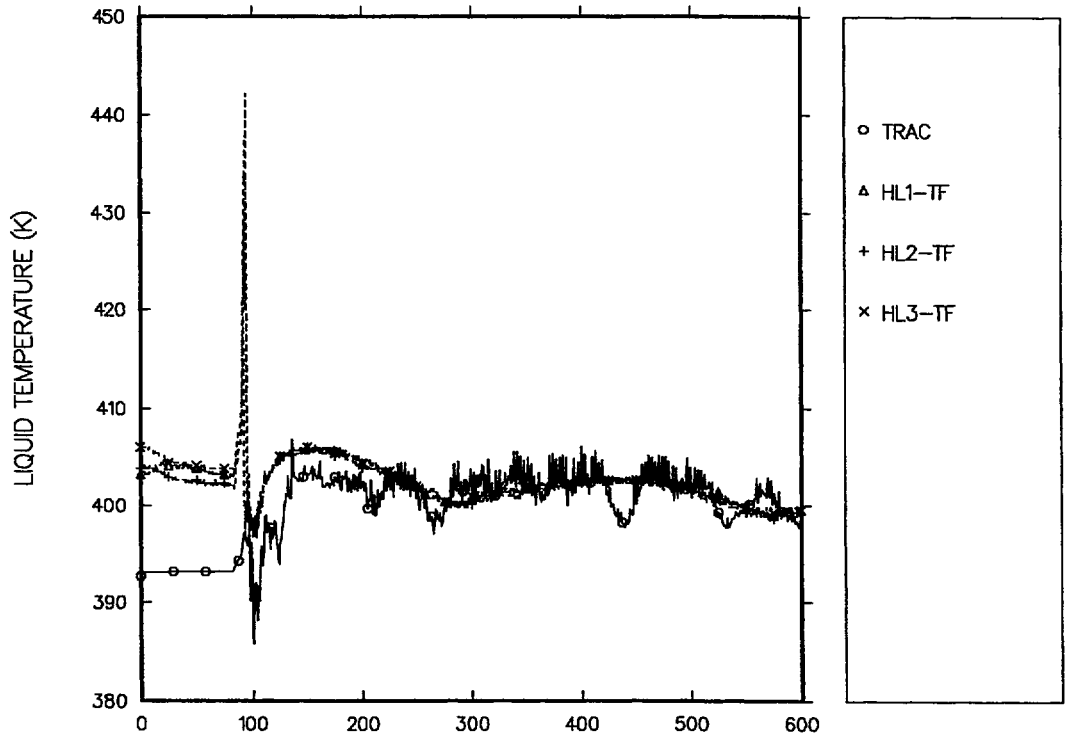

Fig. BB-26. Calculated and measured hot-leg, spool-piece fluid temperature.

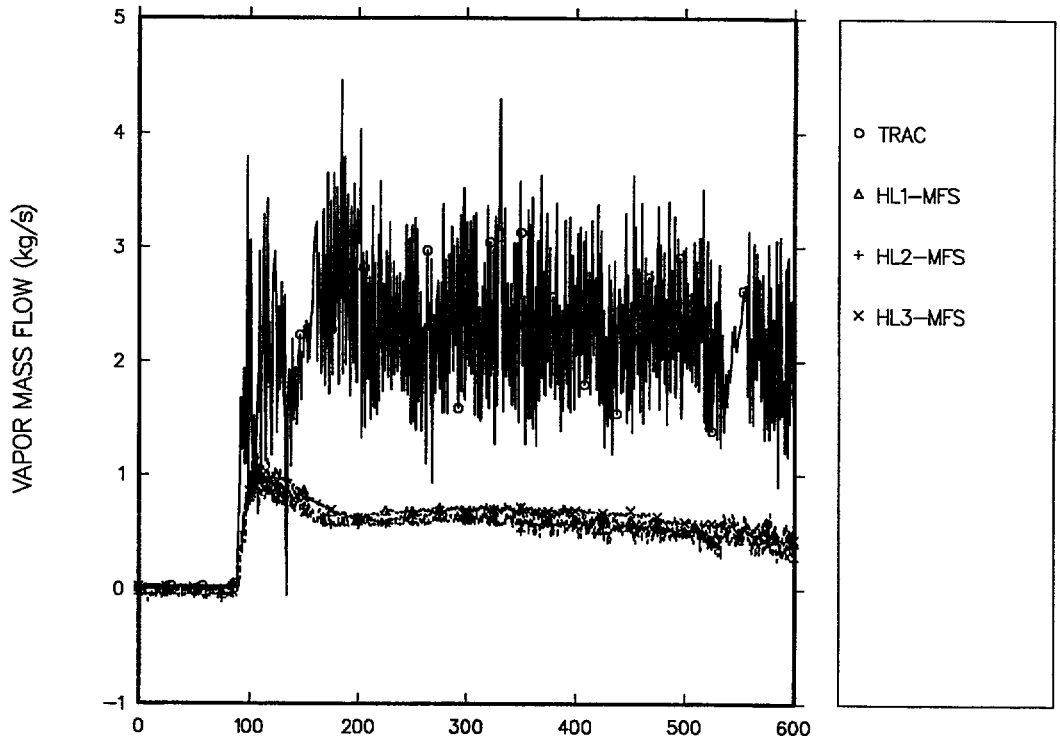

Fig. BB-27. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

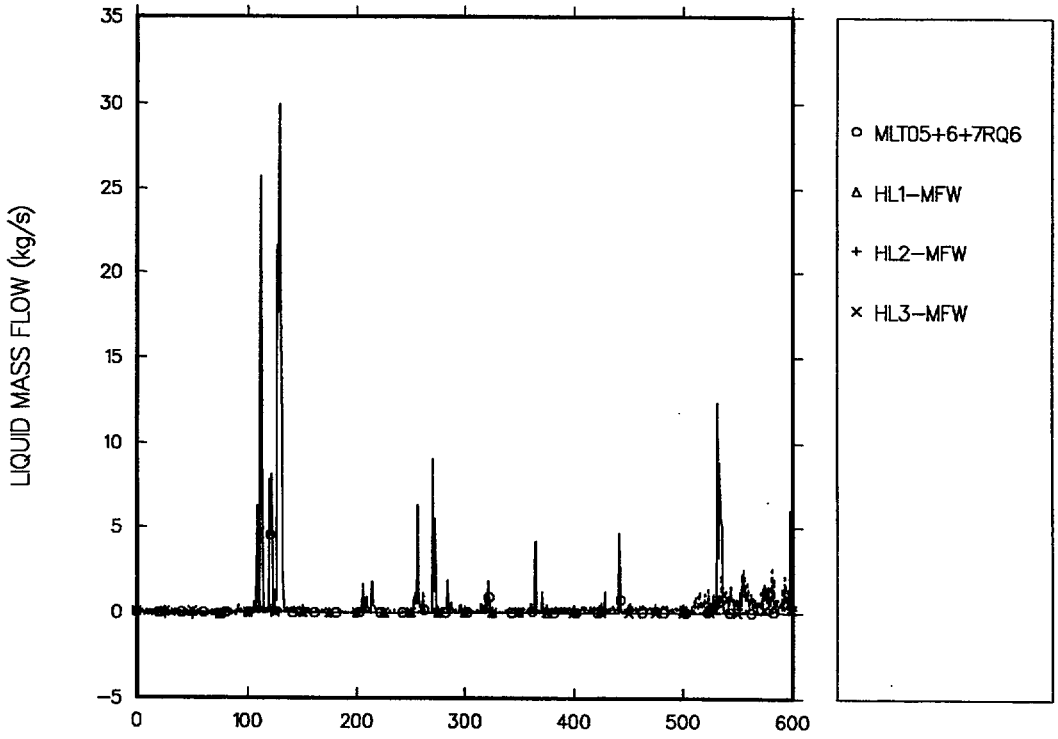

Fig. BB-28. Calculated and measured hot-leg, spool-piece, steam mass flow rate.

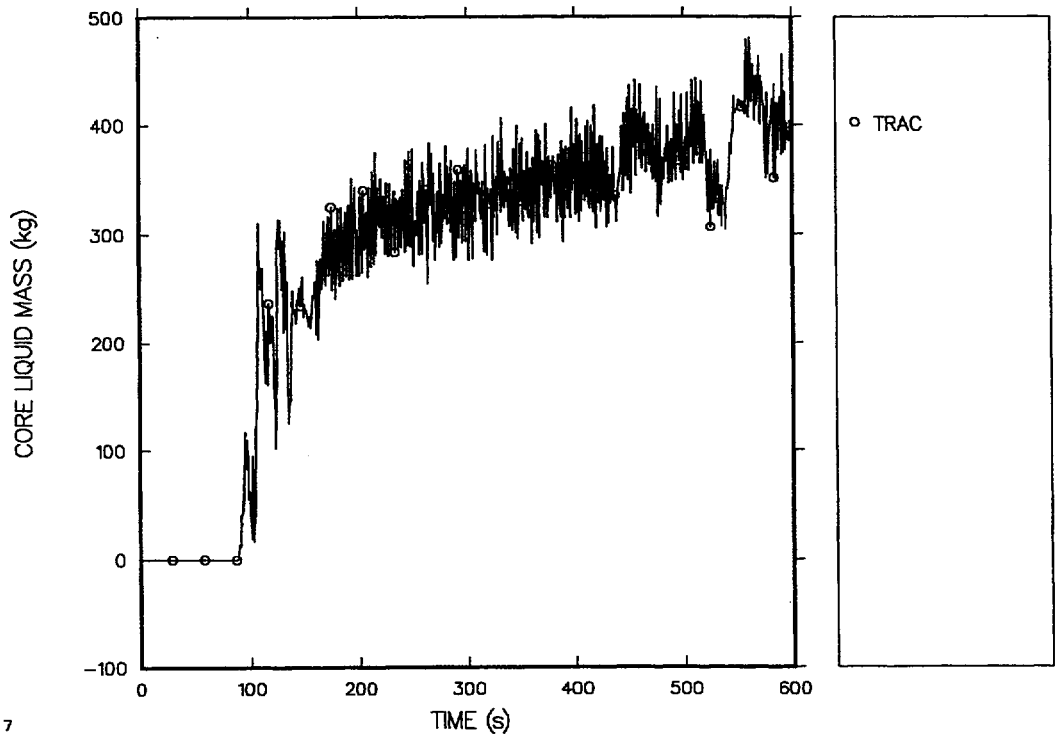

Fig. BB-29. Calculated core liquid mass.

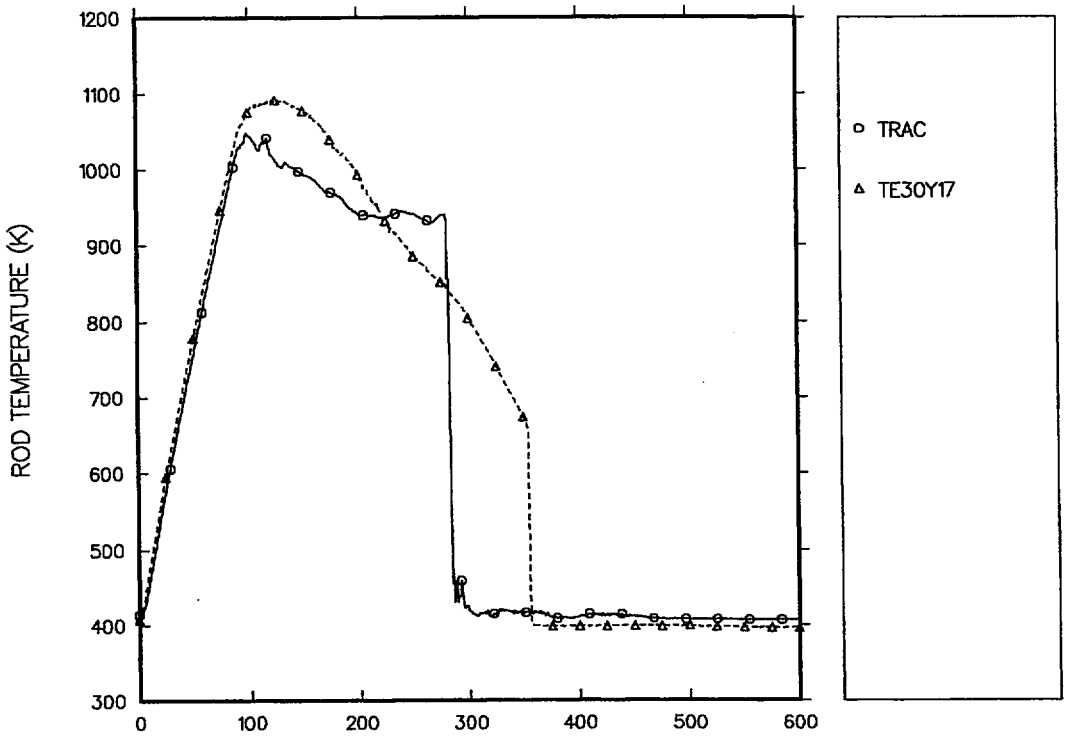

Fig. BB-30. Calculated and measured cladding temperatures for the hot rod at the 3.930-m (core midplane) elevation (with grid-spacer model).

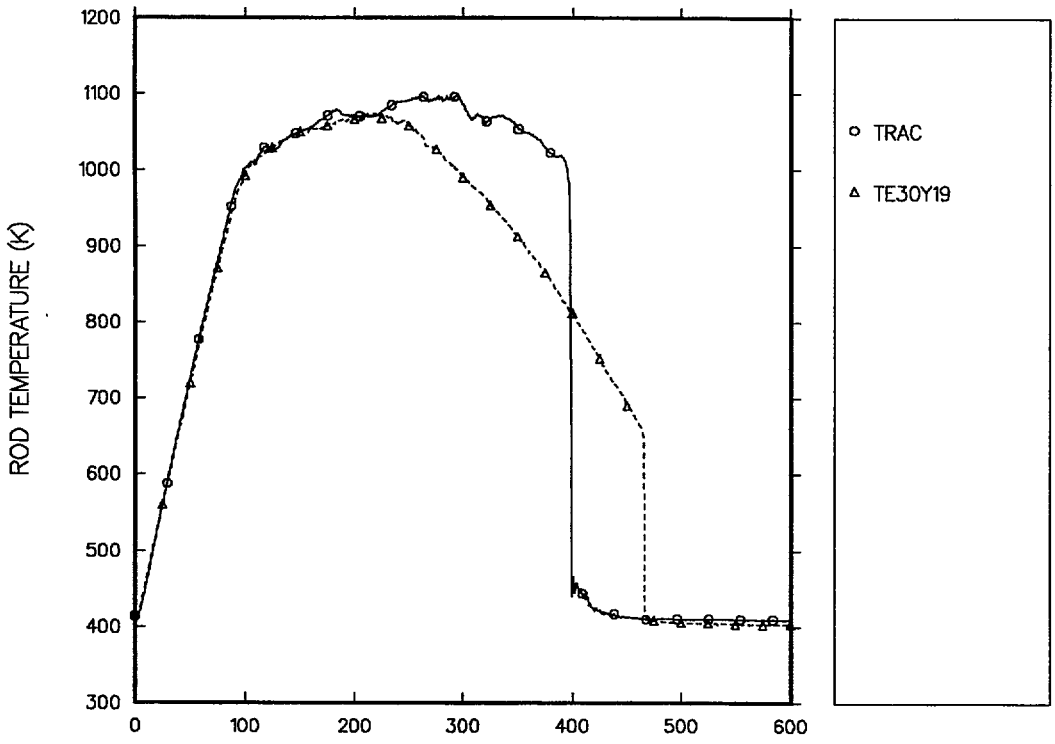

Fig. BB-31. Cladding temperatures for the hot rod at the 4.540-m elevation (with grid-spacer model).

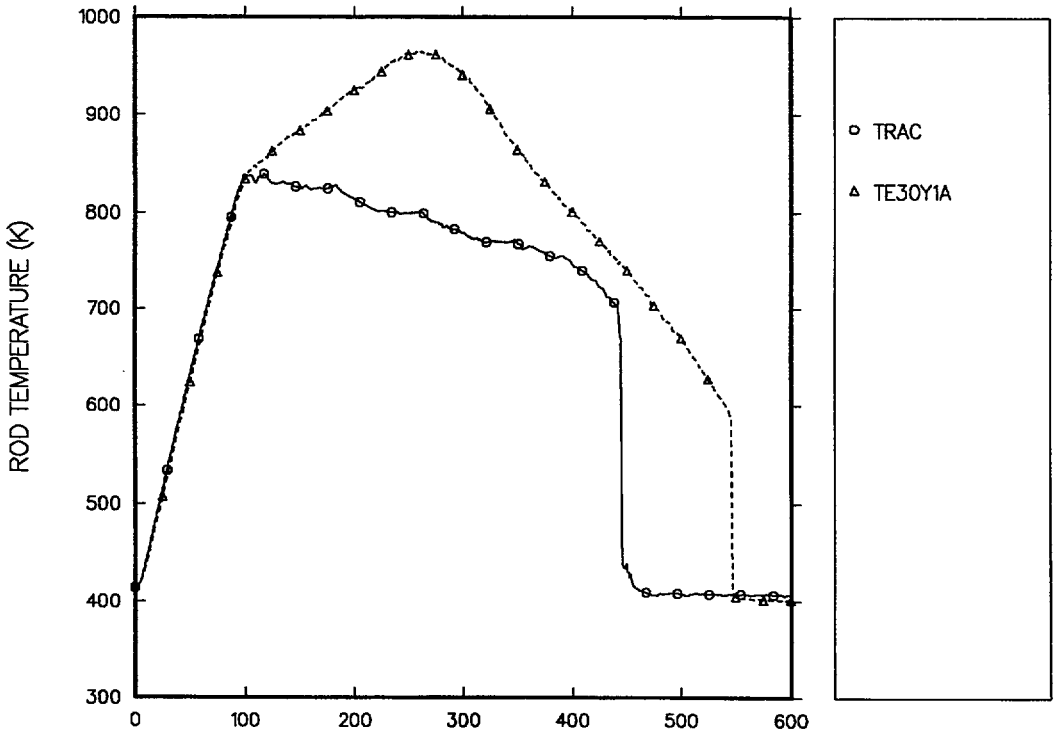

Fig. BB-32. Cladding temperatures for the hot rod at the 5.150-m elevation (with grid-spacer model).

APPENDIX CC

CODE-DATA COMPARISON FOR SCTF RUN 719 WITH NEWRFD=1

The calculation results for the reflood option newrfd=1 are presented in this appendix. The set of plots presented are the same as presented in the main body of the report for the reflood option newrfd=3. Previous TRAC-PF1/MOD2 developmental assessment calculations used the TRAC grid-spacer model. We have run SCTF Run 719 calculations both with and without the grid-spacer model. We have determined that the grid-spacer model should not be used because it results in excessive and nonphysical heat-transfer processes in the upper portions of the core. Therefore, the base-case assessment results for SCTF Run 719 do not use the TRAC grid-spacer model. For reference purposes, the figure numbers for the two reflood options are listed below.

newrfd = 1	newrfd = 3
CC-1	5.4-15
CC-2	5.4-16
CC-3	5.4-17
CC-4	5.4-18
CC-5	5.4-19
CC-6	5.4-20
CC-7	5.4-21
CC-8	5.4-22
CC-9	5.4-23
CC-10	5.4-24
CC-11	5.4-25
CC-12	5.4-26
CC-13	5.4-27
CC-14	5.4-28
CC-15	5.4-29
CC-16	5.4-30
CC-17	5.4-31
CC-18	5.4-32

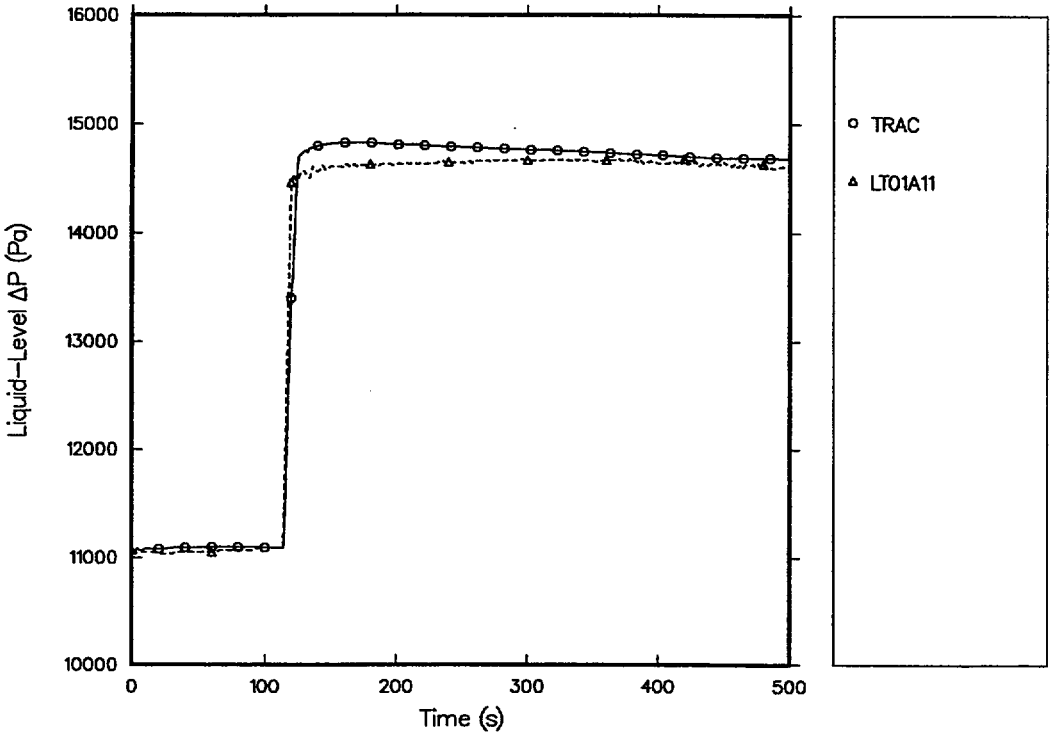

Fig. CC-1. Lower-plenum liquid level.

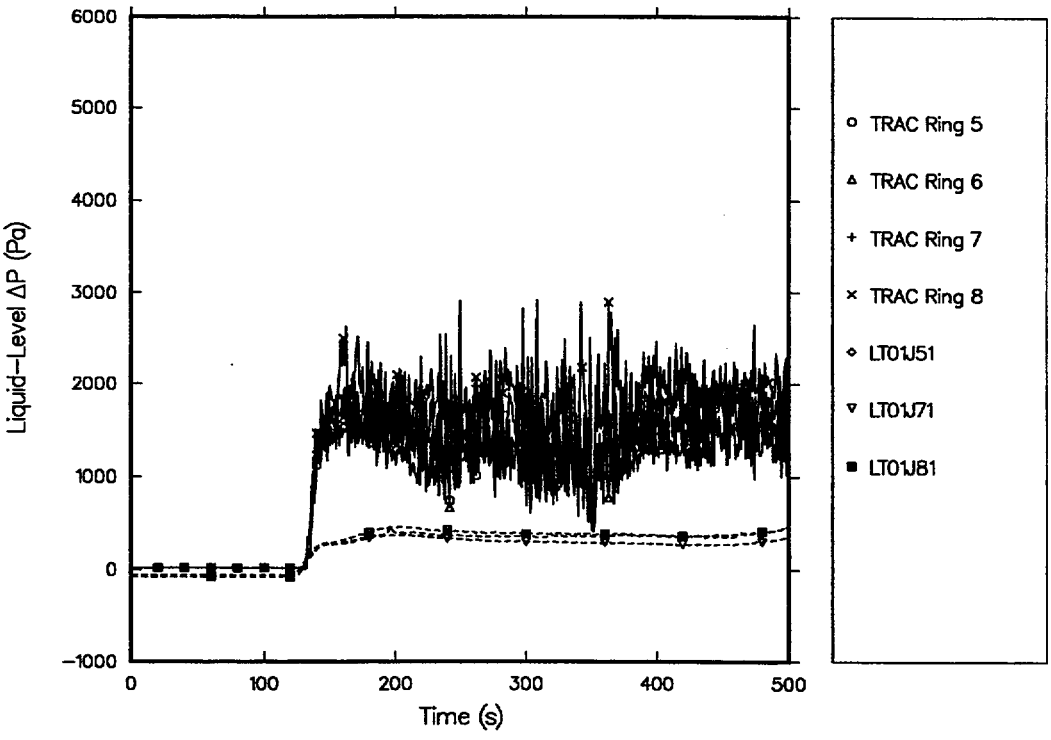

Fig. CC-2. Measured and calculate upper-plenum liquid levels above bundles 5 and 8.

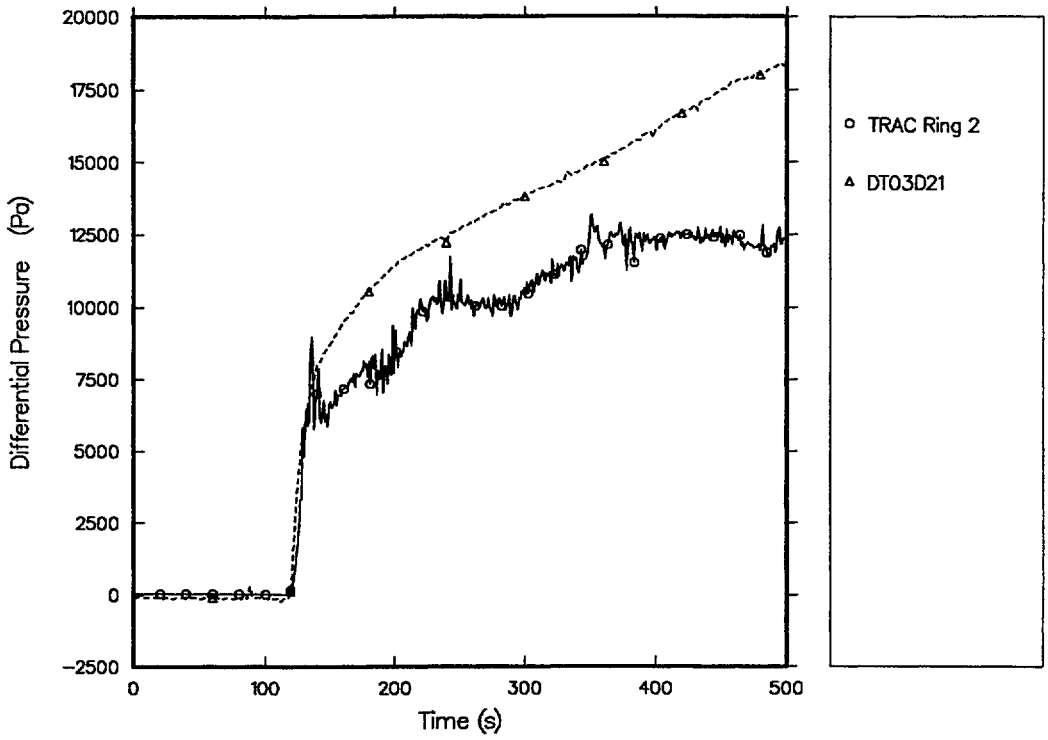

Fig. CC-3. Calculated and measured core full-height level in bundle 2.

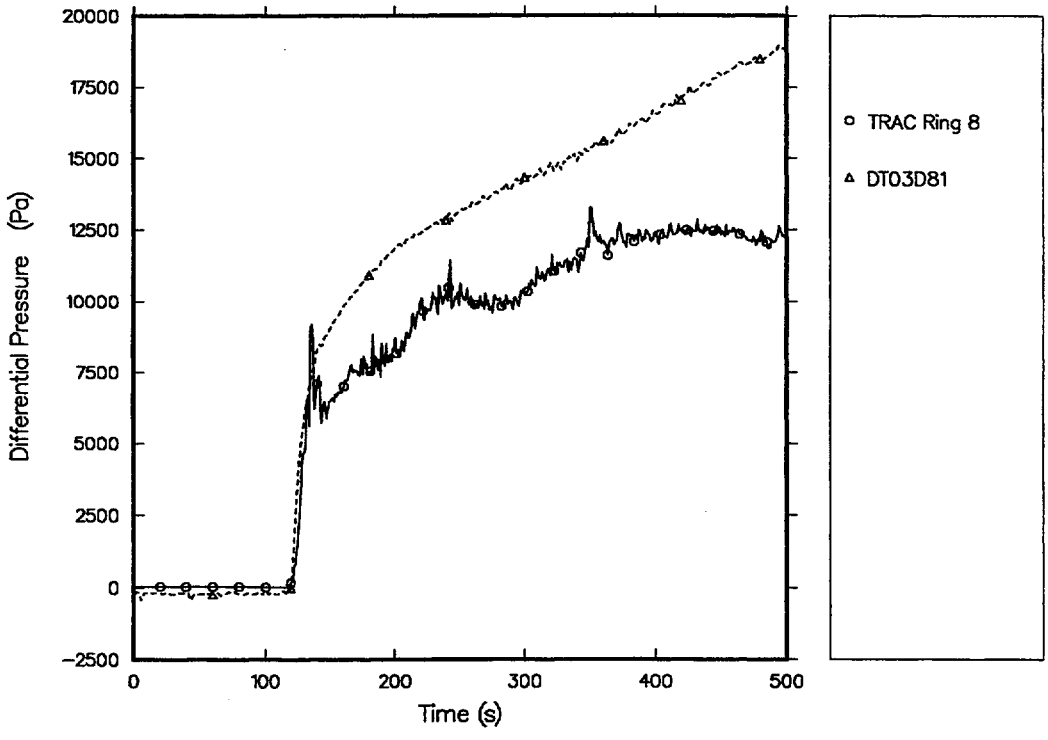

Fig. CC-4. Calculated and measured core full-height level in bundle 8.

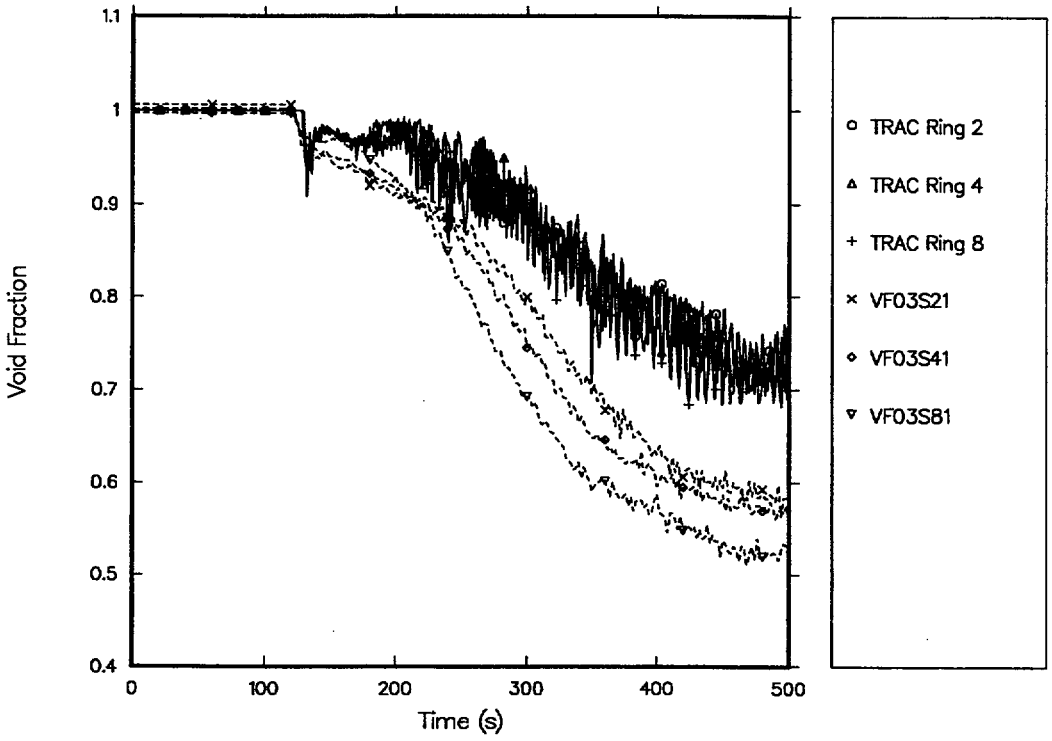

Fig. CC-5. Void fractions in bundles 2, 4, 6, and 8 at the 1.905-m level.

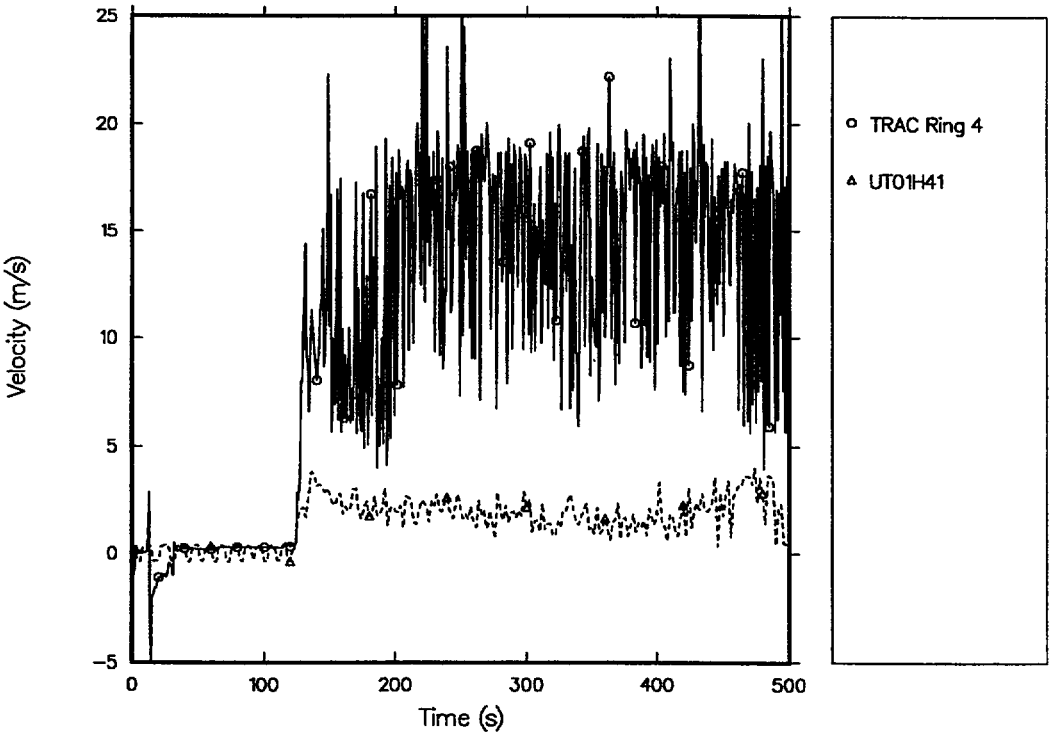

Fig. CC-6. Calculated and measured bundle 4 tie-plate vapor flows.

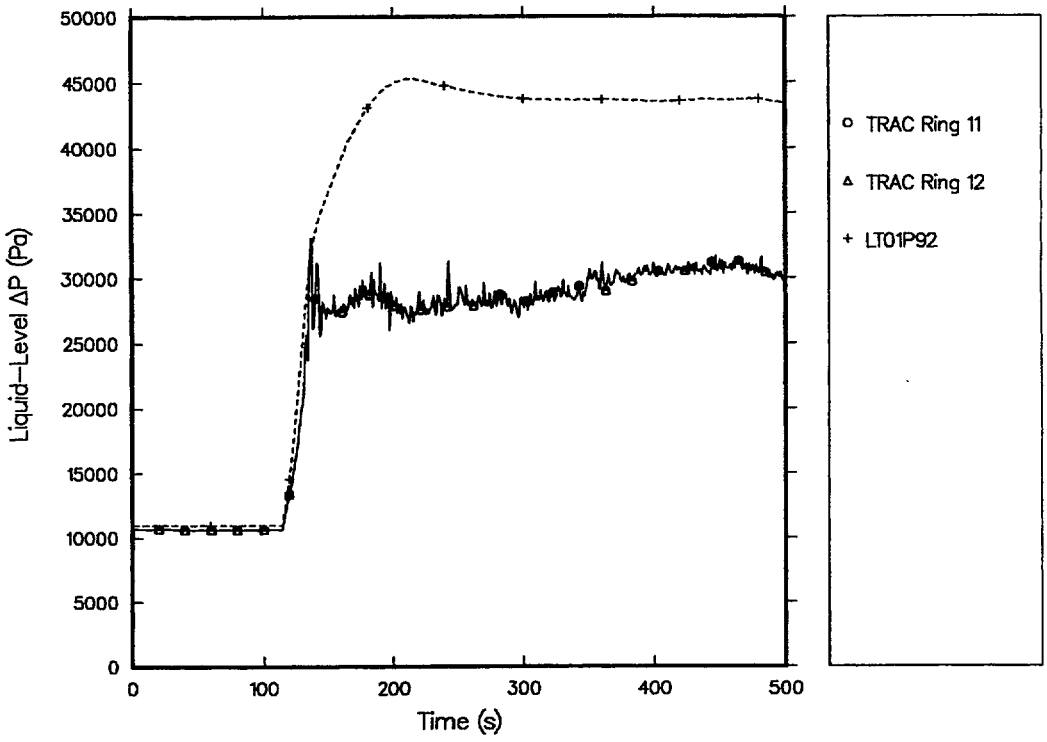

Fig. CC-7. Calculated and measured downcomer liquid level.

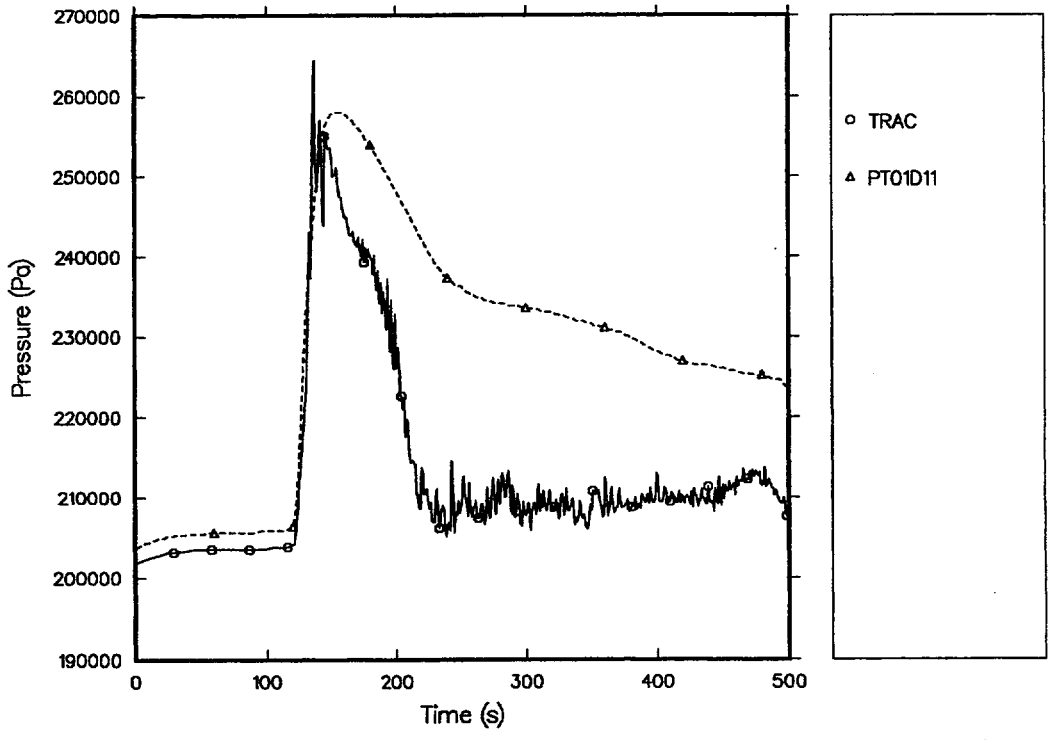

Fig. CC-8. Calculated and measured core average pressure.

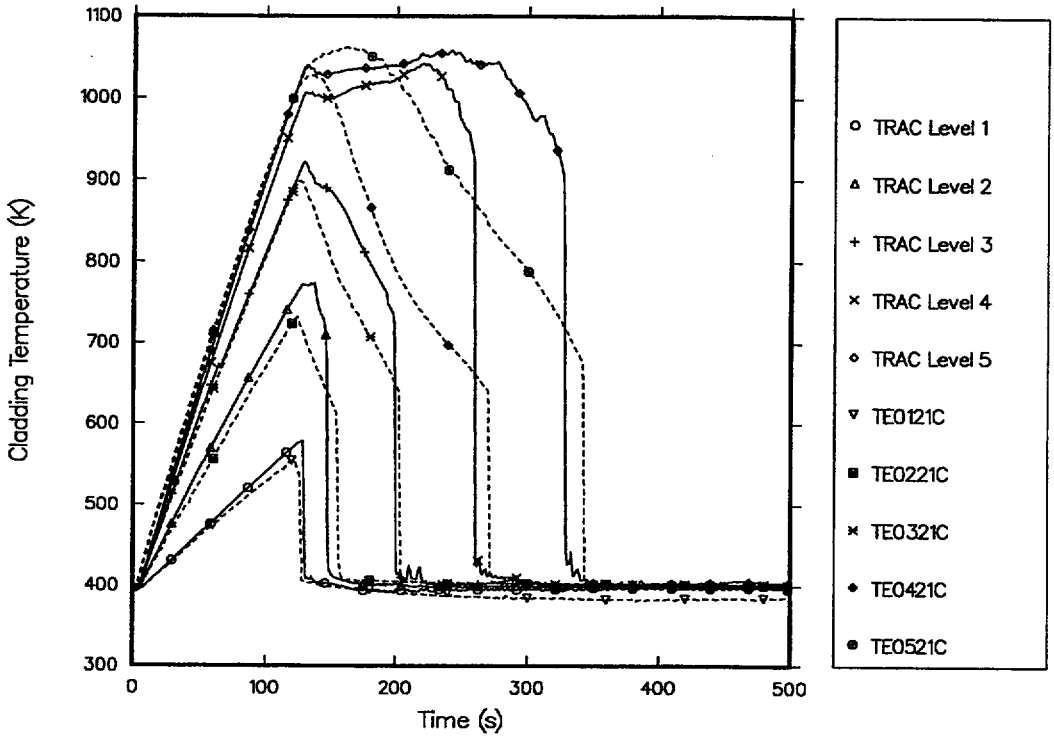

Fig. CC-9. Calculated and measured core-lower-half cladding temperature of bundle 2.

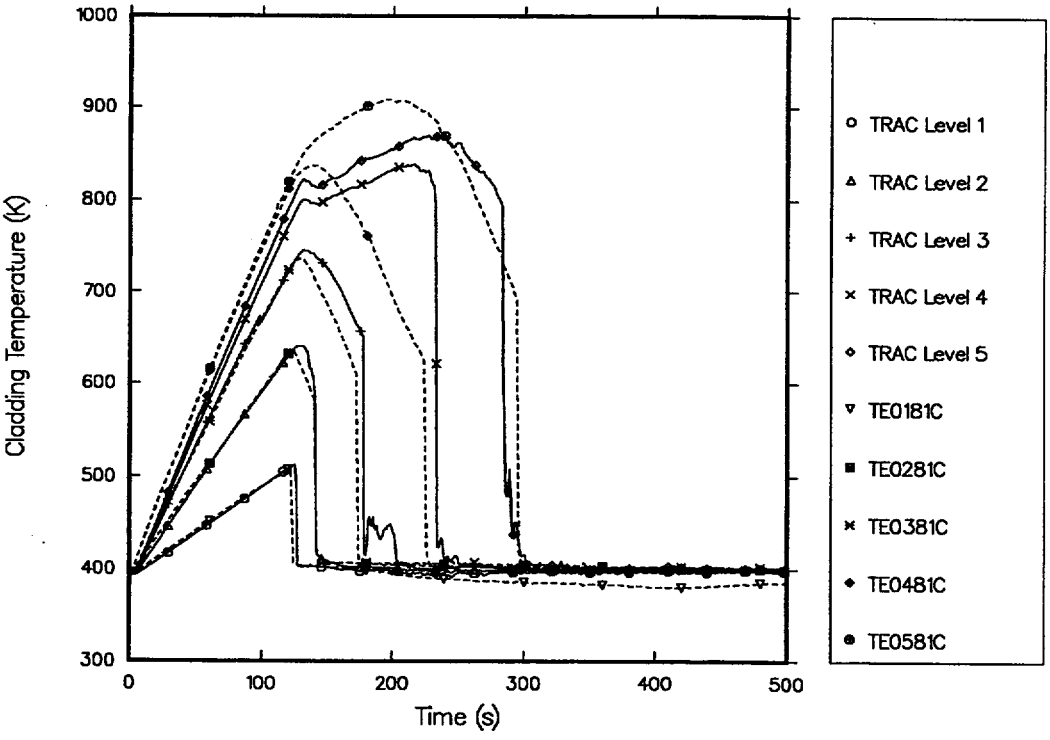

Fig. CC-10. Calculated and measured core-lower-half cladding temperature of bundle 8.

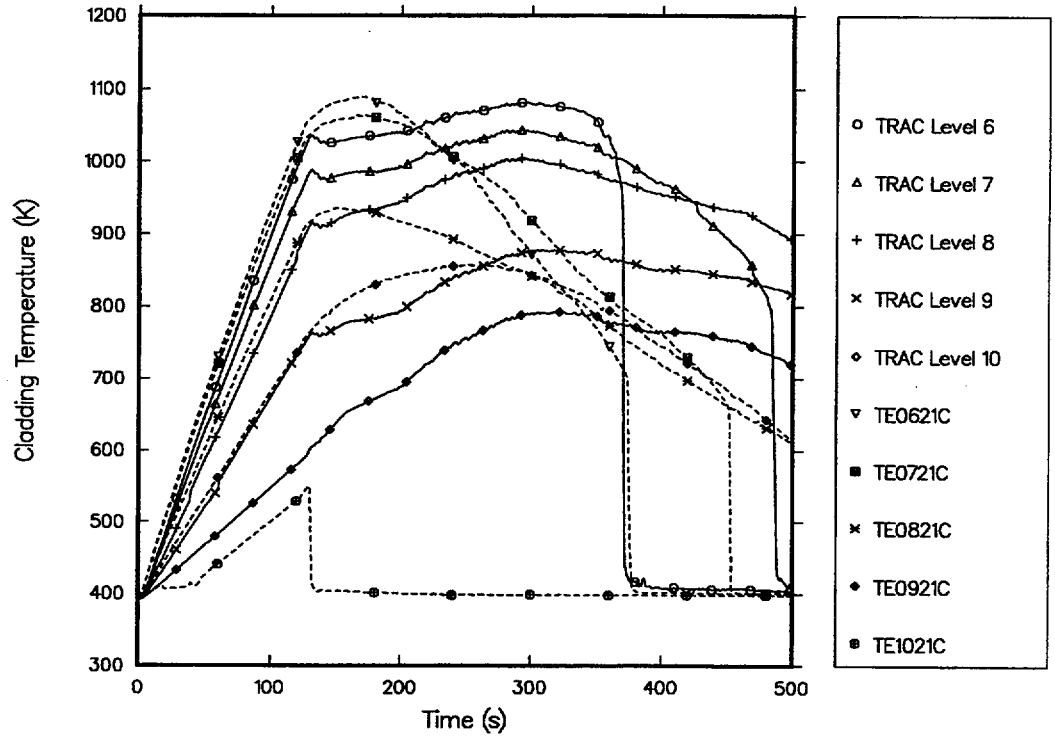

Fig. CC-11. Calculated and measured core-upper-half cladding temperature of bundle 2.

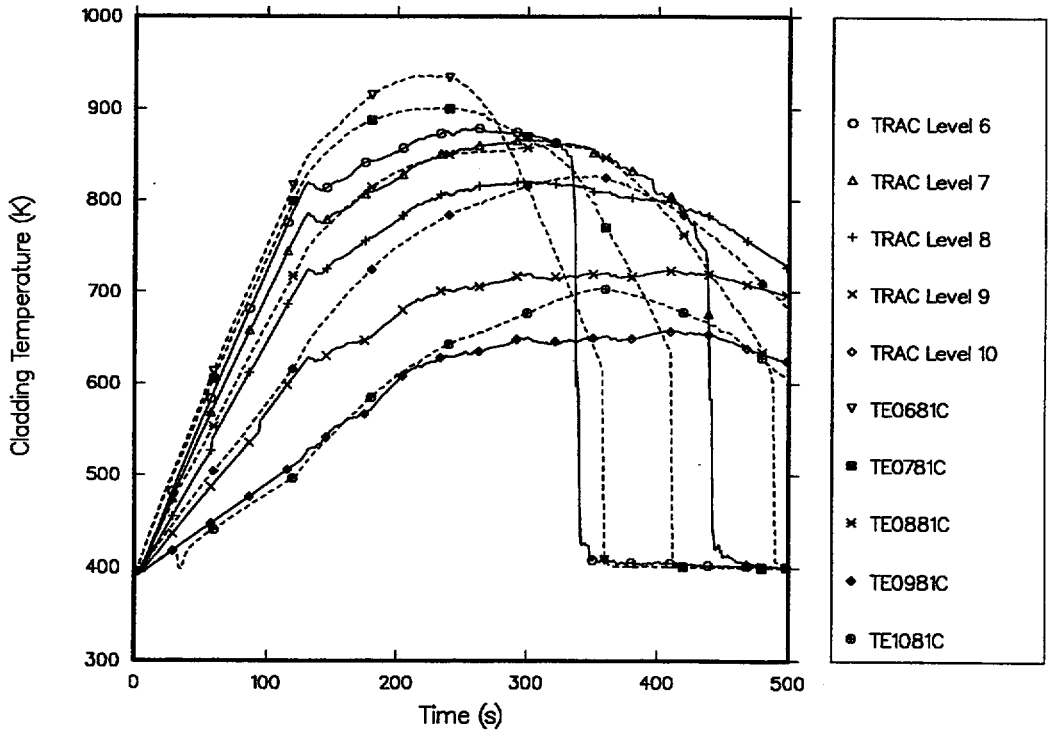

Fig. CC-12. Calculated and measured core-upper-half cladding temperature of bundle 8.

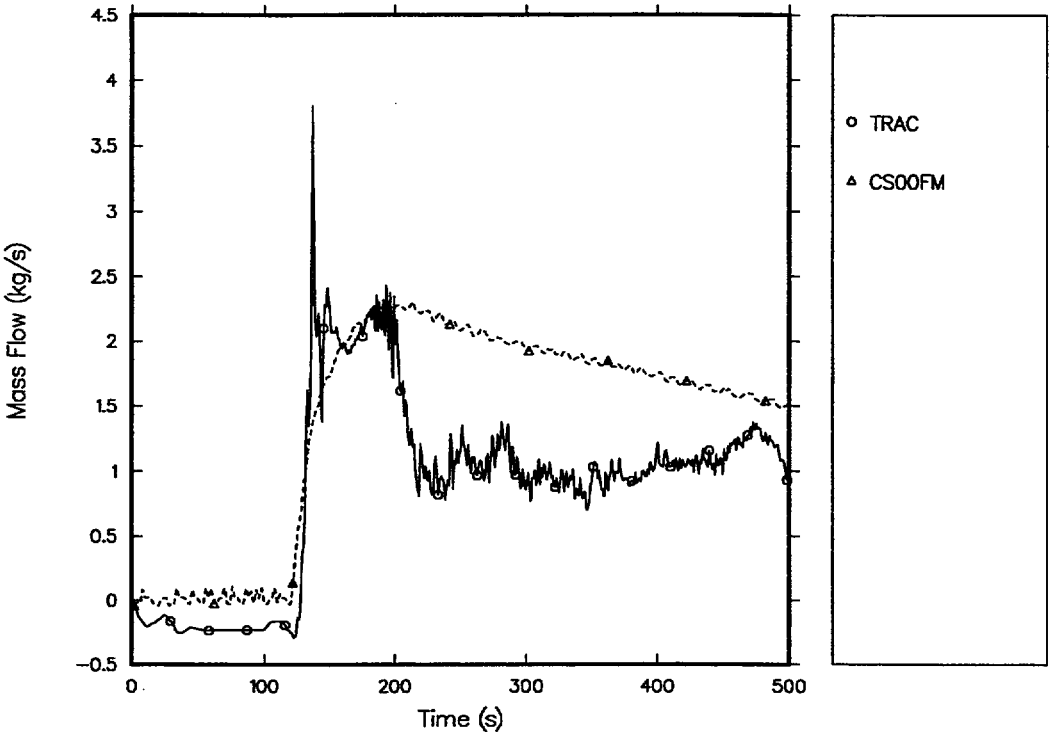

Fig. CC-13. Calculated and measured pressure-vessel-side broken cold-leg mass flow rate.

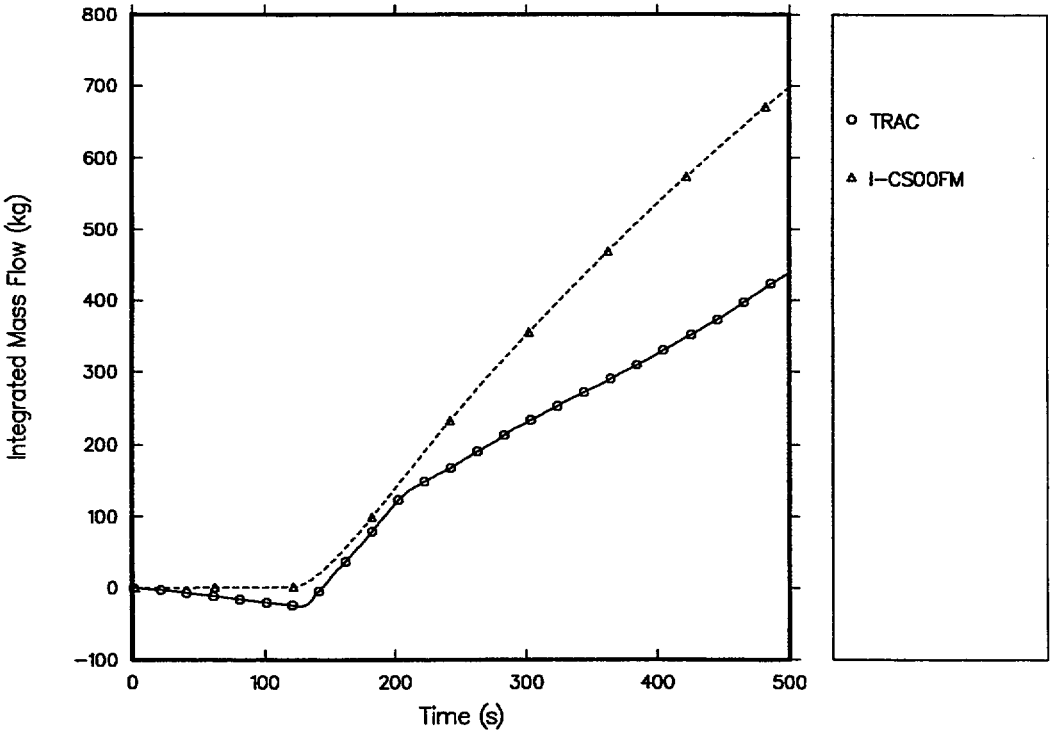

Fig. CC-14. Calculated and measured pressure-vessel-side broken cold-leg integrated mass flow.

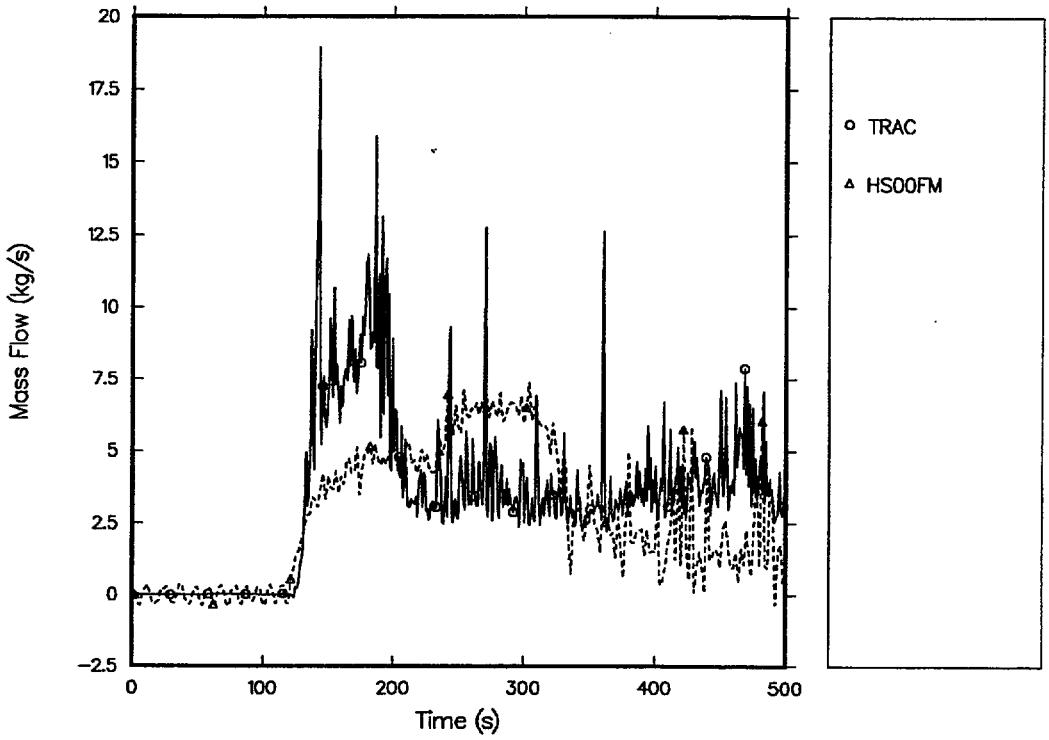

Fig. CC-15. Calculated and measured hot-leg mass flow rate.

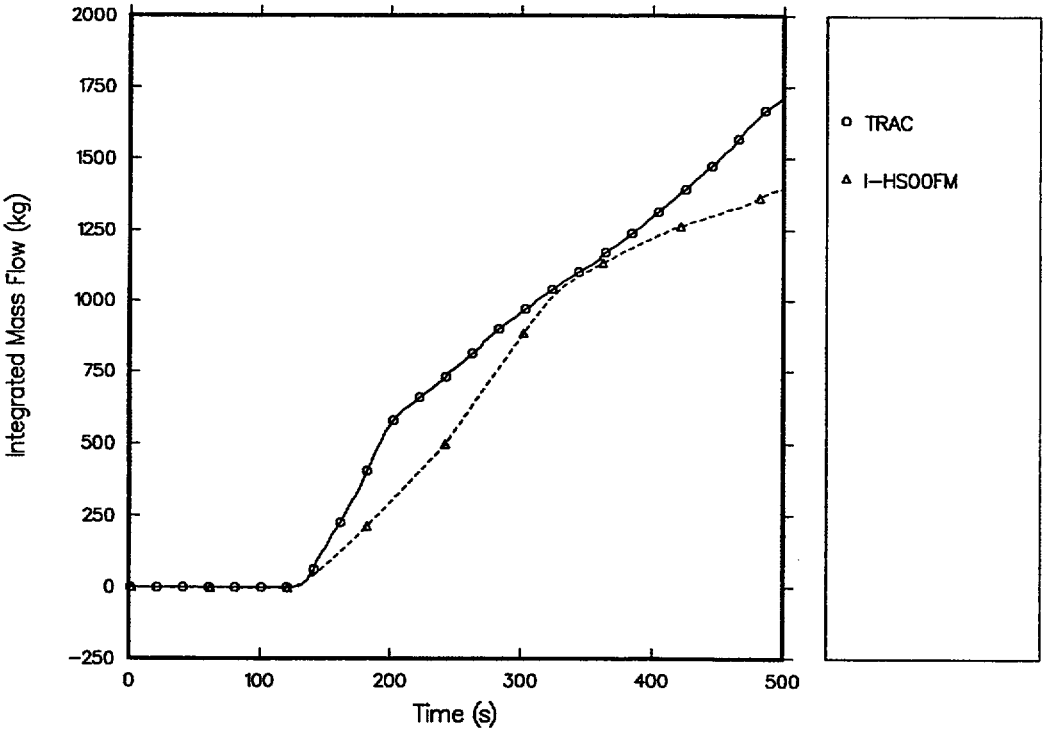

Fig. CC-16. Calculated and measured hot-leg integrated mass flow.

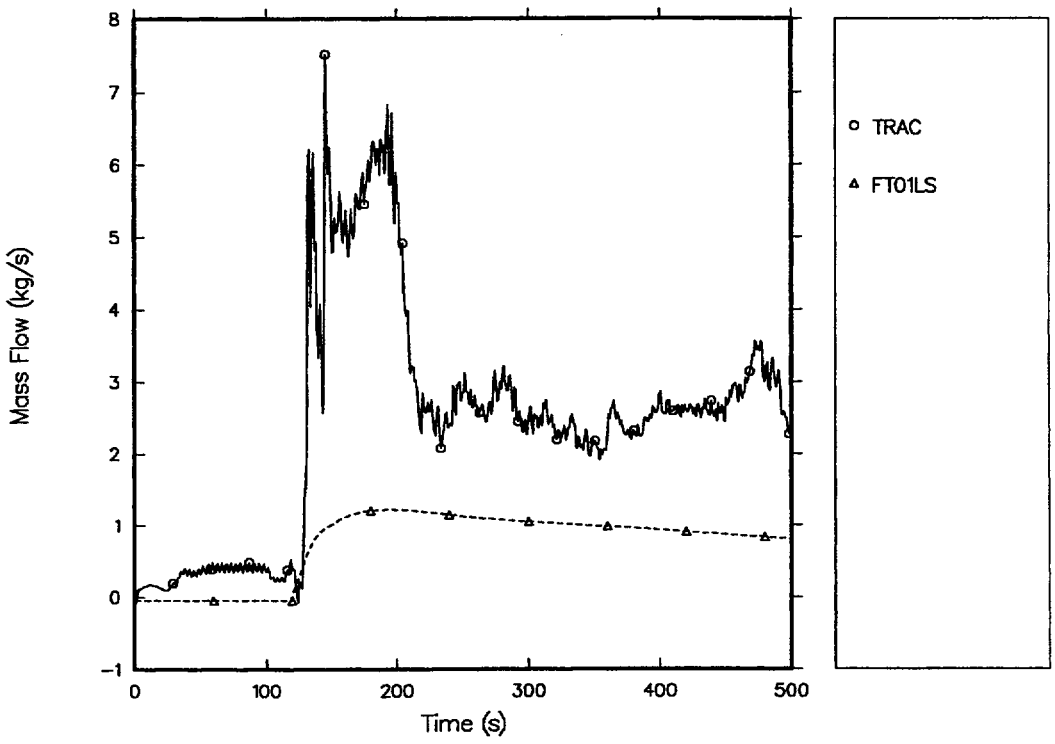

Fig. CC-17. Calculated and measured S/W-separator-side broken cold-leg mass flow rate.

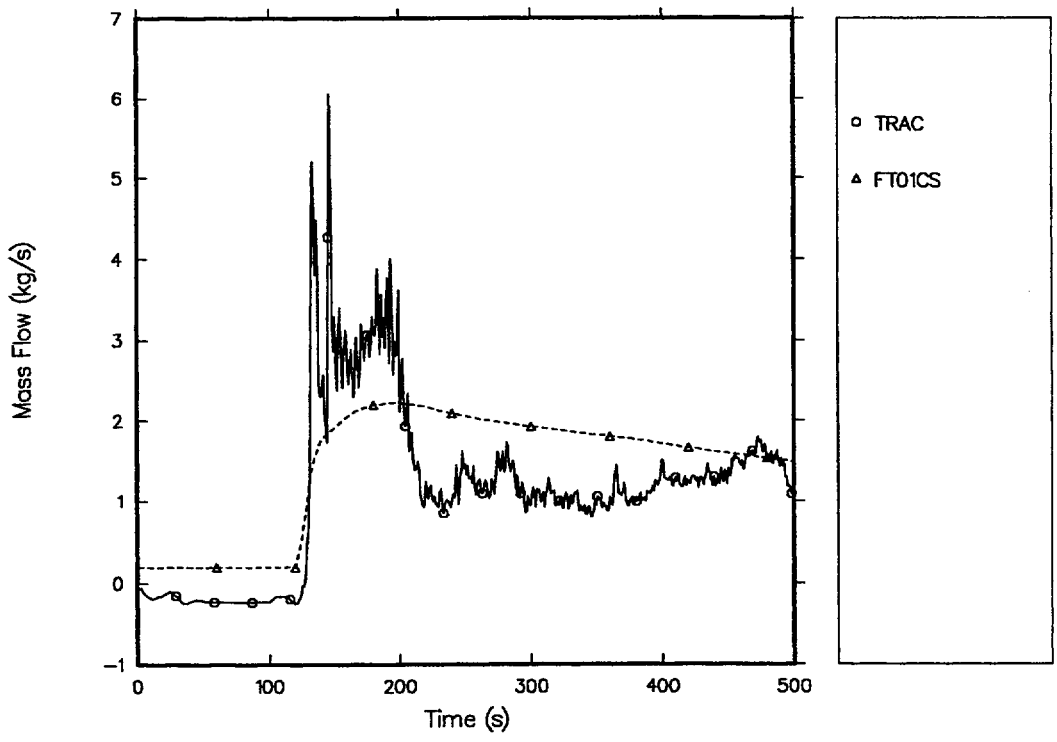

Fig. CC-18. Calculated and measured intact cold-leg mass flow rate.

APPENDIX DD

CODE-DATA COMPARISON FOR SCTF RUN 719 WITH NEWRFD=3, WITH GRID SPACERS MODELED

The calculation results for the reflood option newrfd=3 with grid spacers modeled are presented in this appendix. The set of plots presented are the same as presented in the main body of the report for the reflood option newrfd=3 without grid spacers.

newrfd = 3 with grid spacers modeled	newrfd = 3 without grid spacers modeled
DD-1	5.4-15
DD-2	5.4-16
DD-3	5.4-17
DD-4	5.4-18
DD-5	5.4-19
DD-6	5.4-20
DD-7	5.4-21
DD-8	5.4-22
DD-9	5.4-23
DD-10	5.4-24
DD-11	5.4-25
DD-12	5.4-26
DD-13	5.4-27
DD-14	5.4-28
DD-15	5.4-29
DD-16	5.4-30
DD-17	5.4-31
DD-18	5.4-32

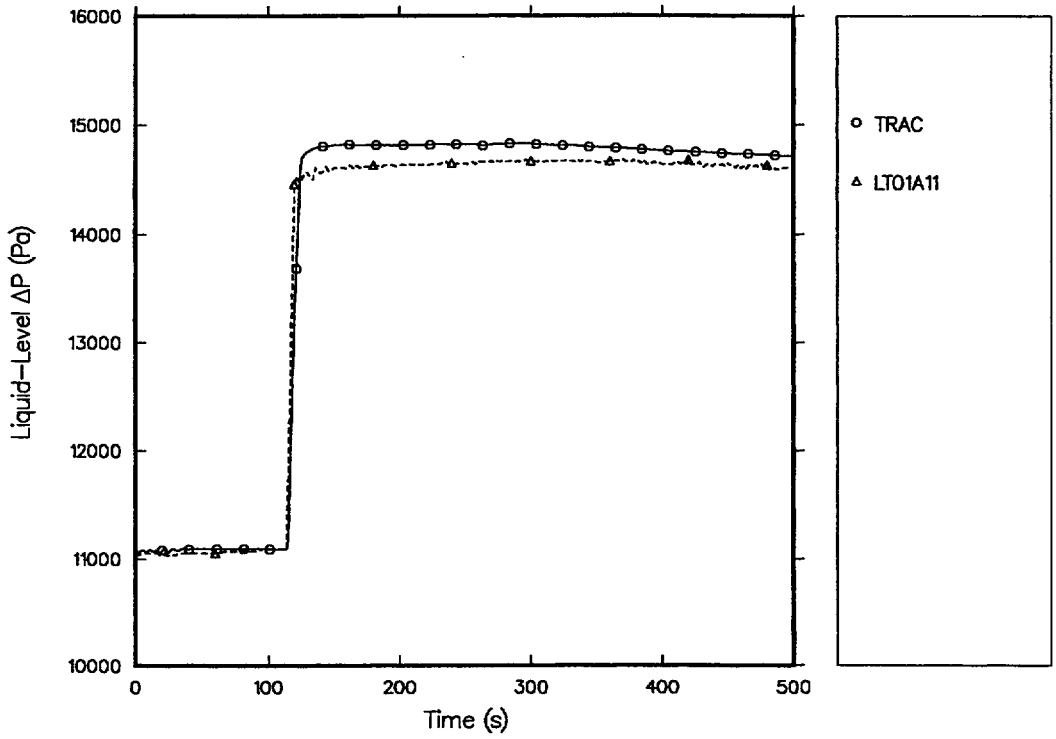

Fig. DD-1. Lower-plenum liquid level.

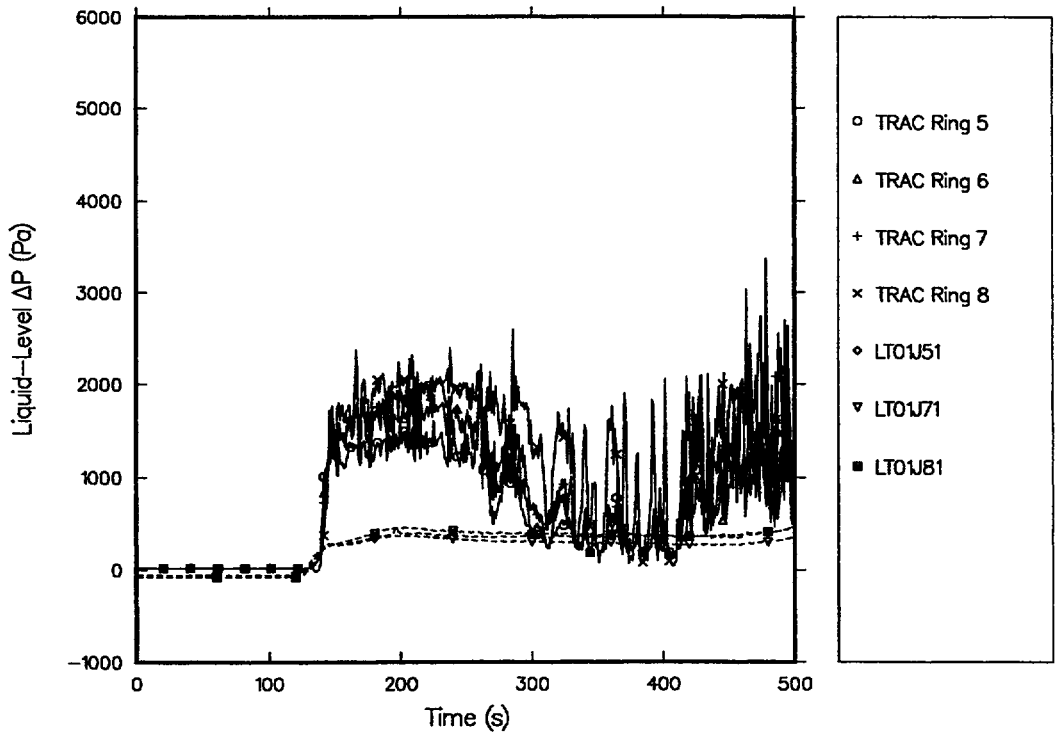

Fig. DD-2. Measured and calculate upper-plenum liquid levels above bundles 5 and 8.

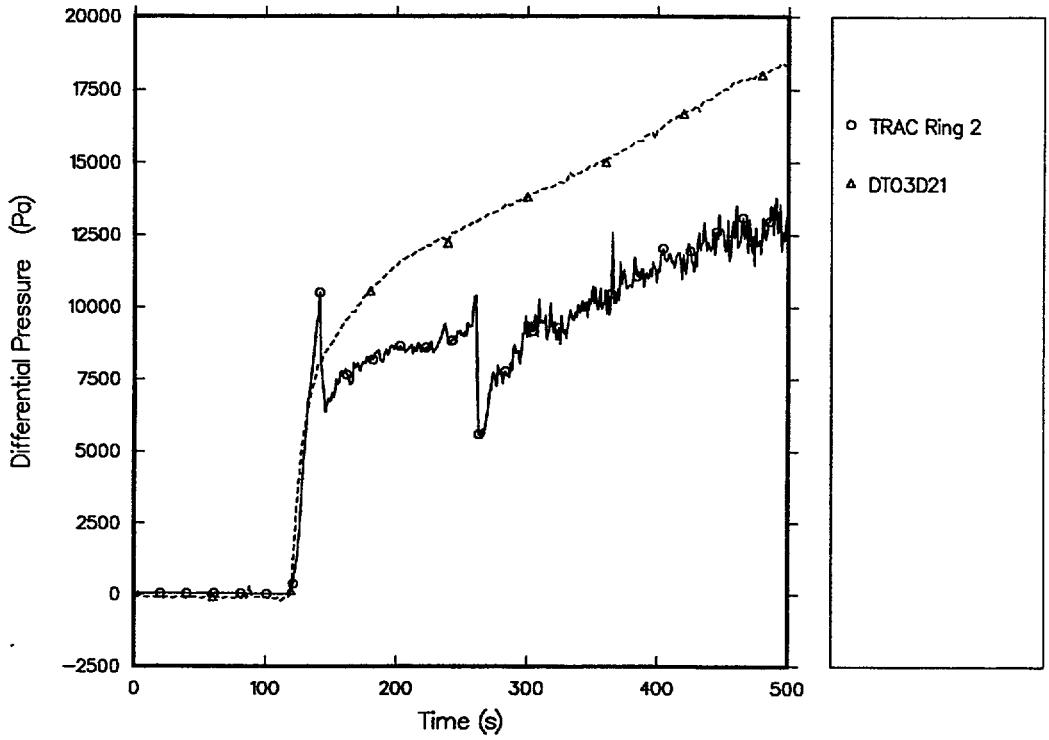

Fig. DD-3. Calculated and measured core full-height level in bundle 2.

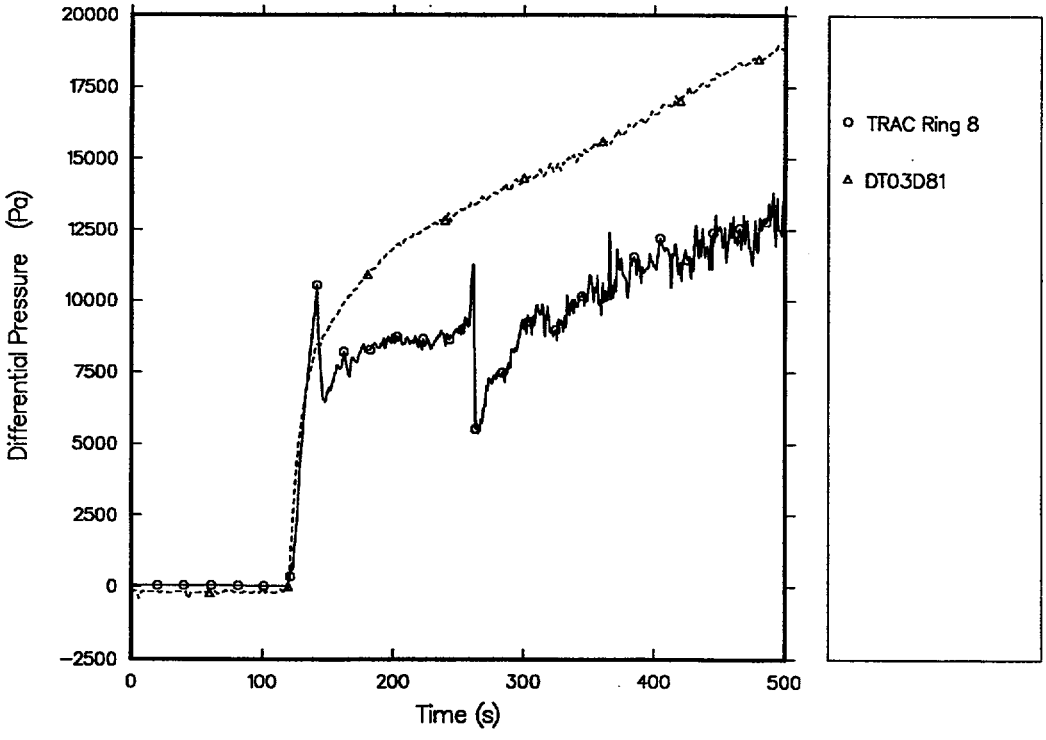

Fig. DD-4. Calculated and measured core full-height level in bundle 8.

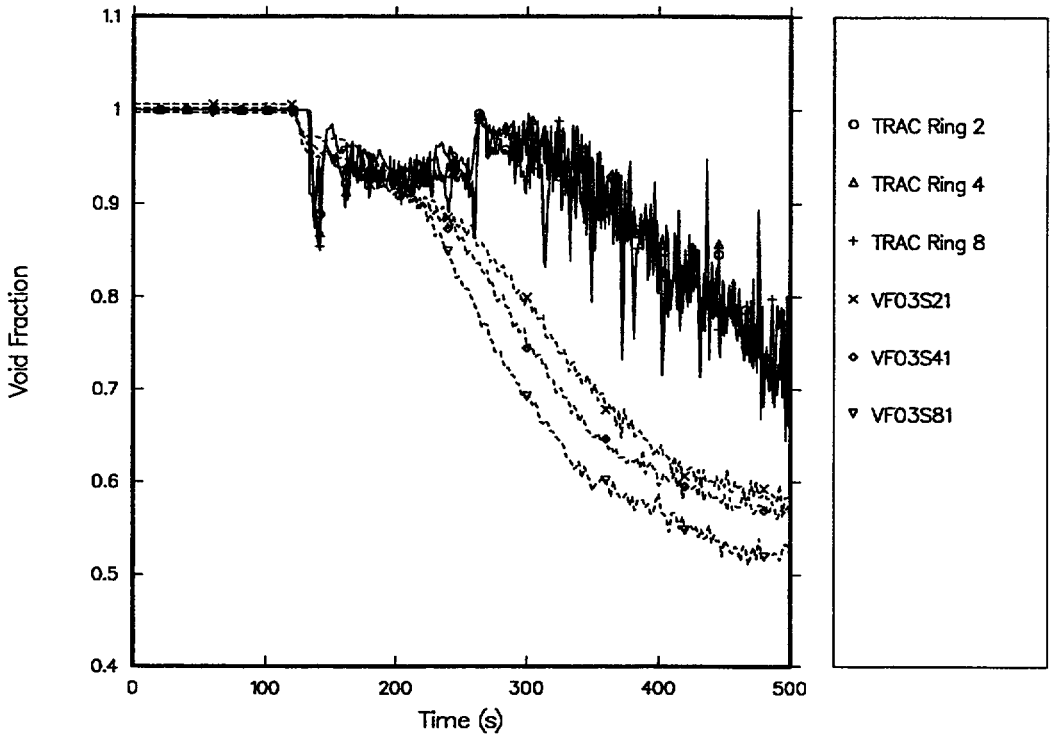

Fig. DD-5. Void fractions in bundles 2, 4, 6, and 8 at the 1.905-m level.

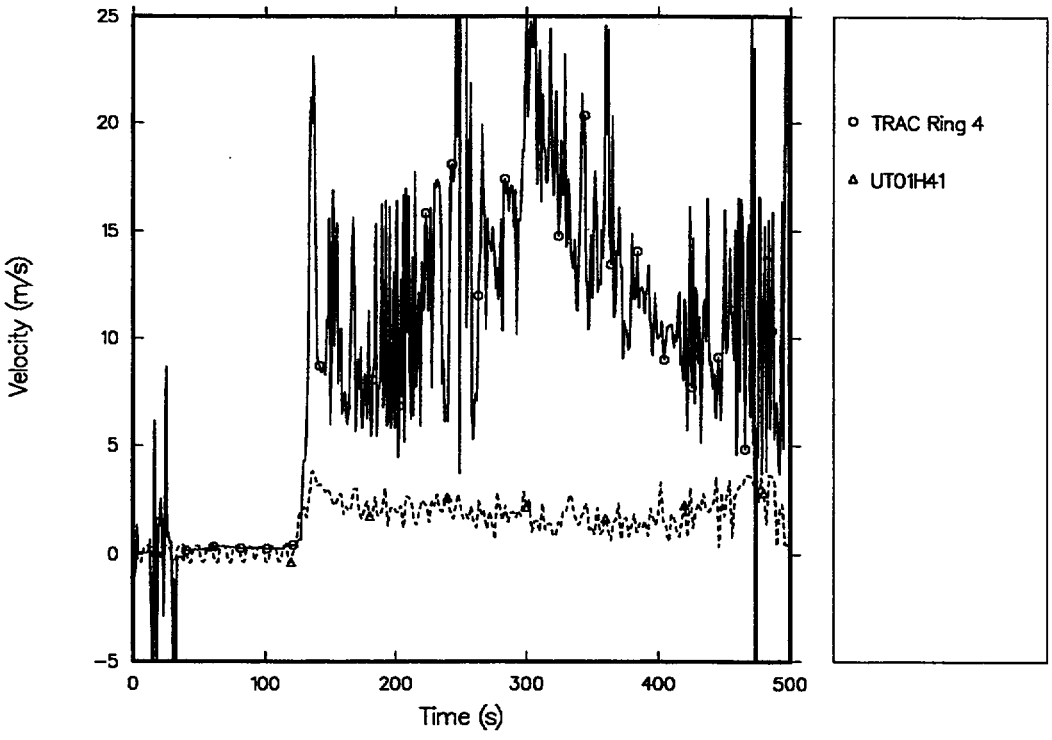

Fig. DD-6. Calculated and measured bundle 4 tie-plate vapor flows.

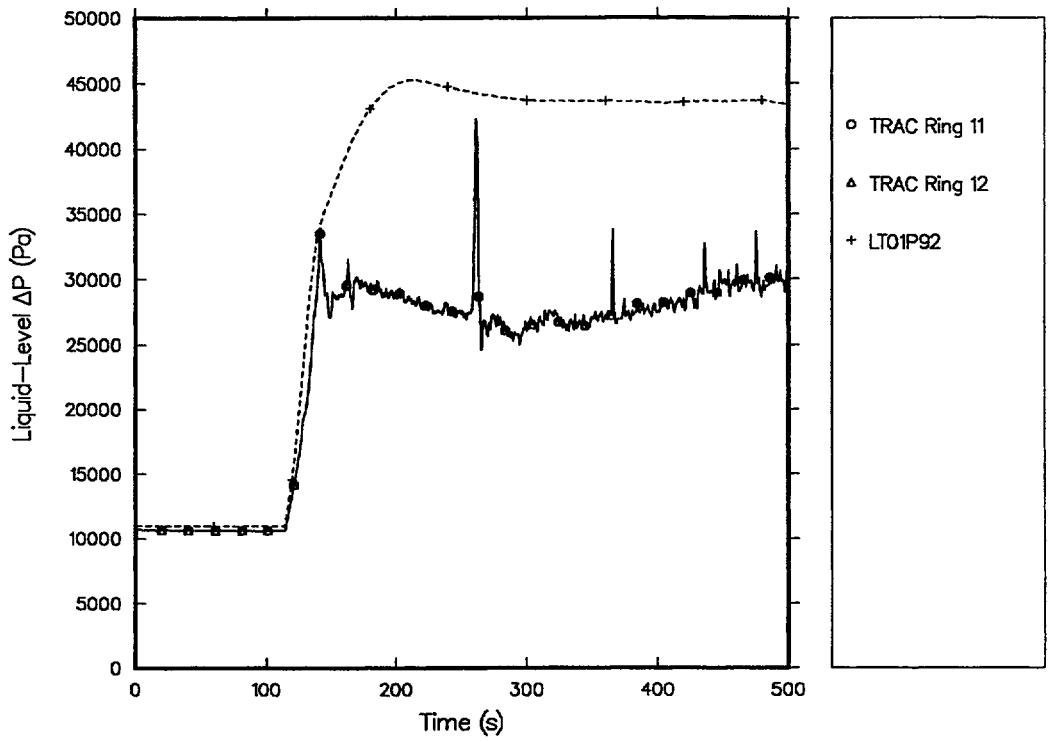

Fig. DD-7. Calculated and measured downcomer liquid level.

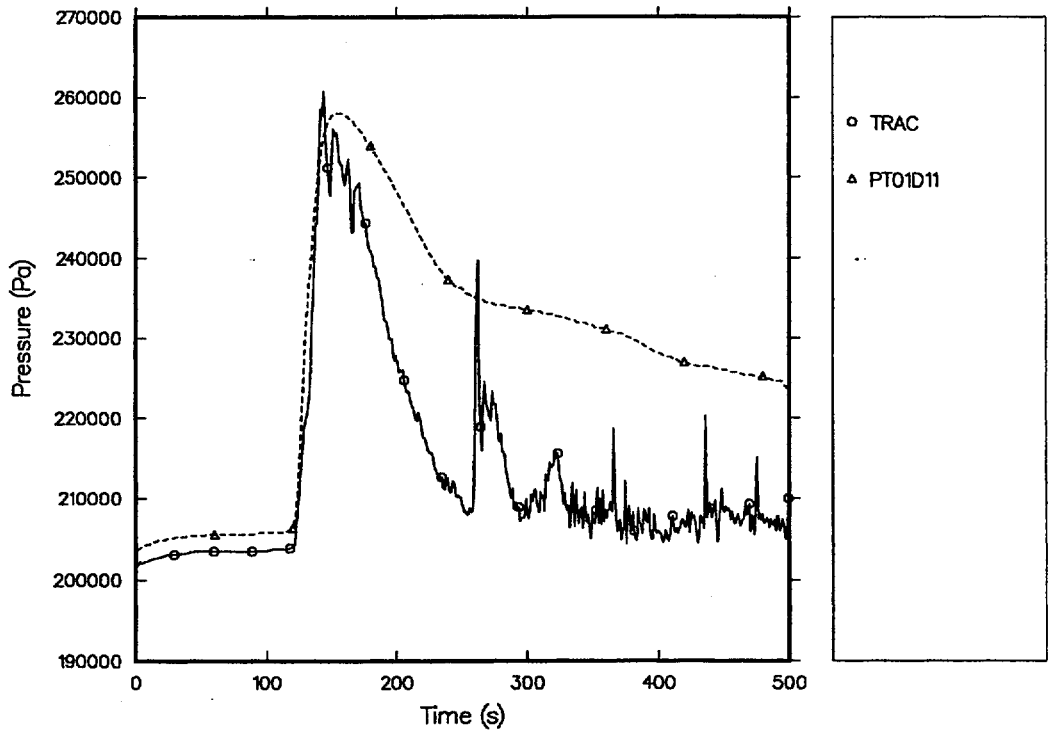

Fig. DD-8. Calculated and measured core average pressure.

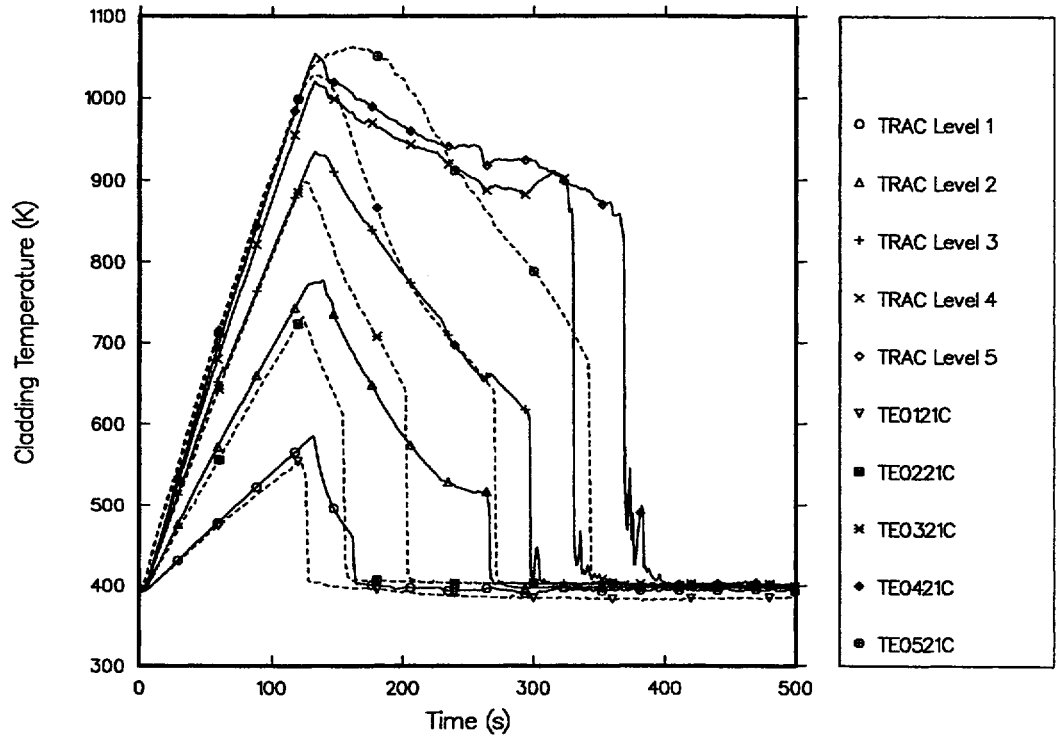

Fig. DD-9. Calculated and measured core-lower-half cladding temperature of bundle 2.

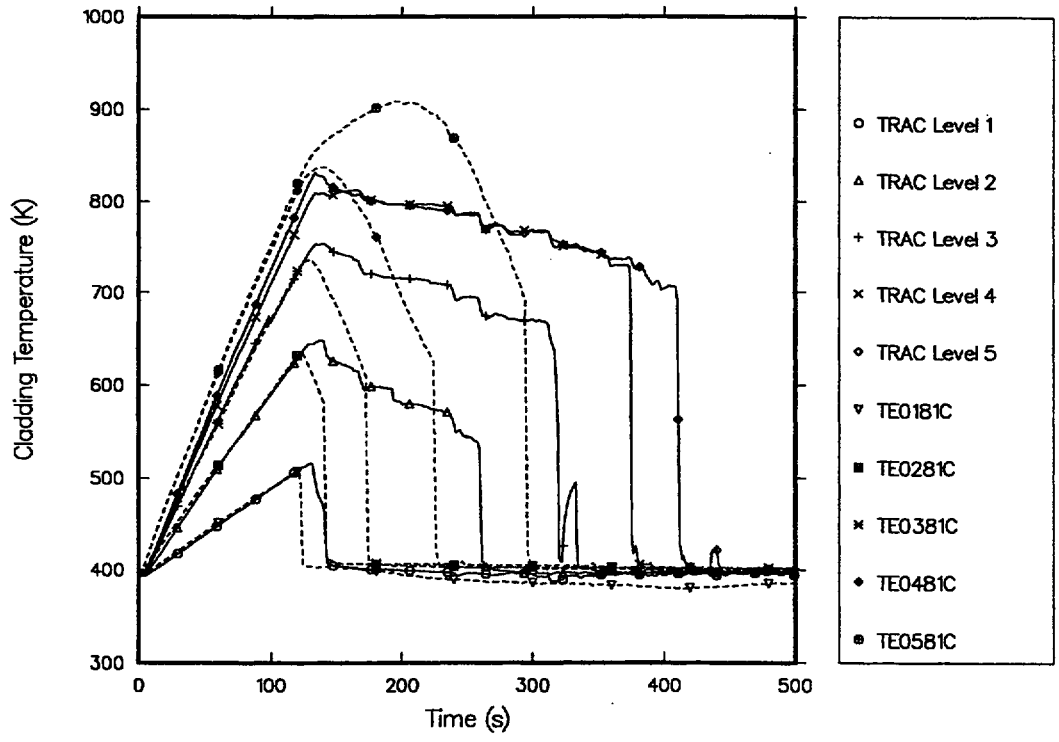

Fig. DD-10. Calculated and measured core-lower-half cladding temperature of bundle 8.

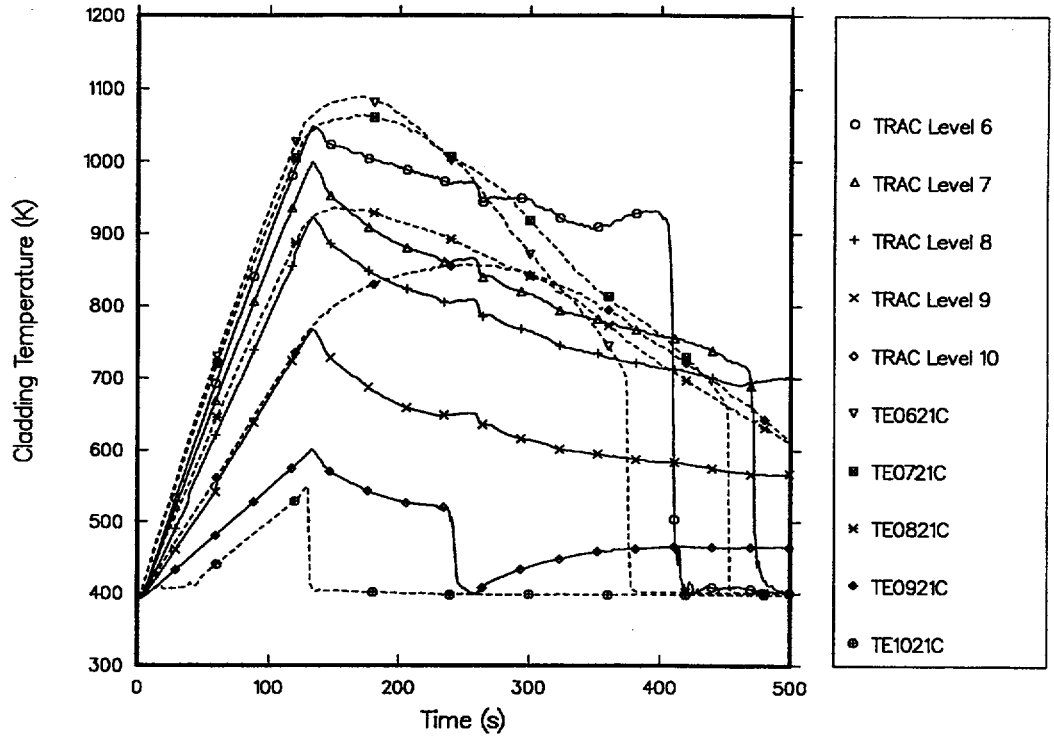

Fig. DD-11. Calculated and measured core-upper-half cladding temperature of bundle 2.

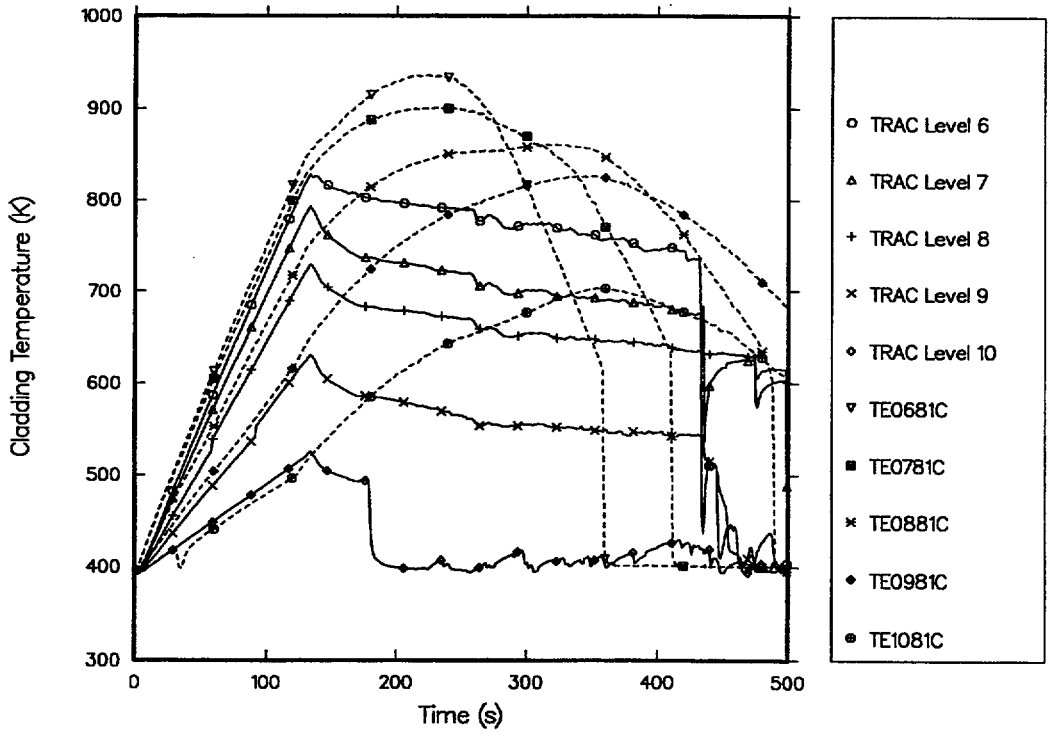

Fig. DD-12. Calculated and measured core-upper-half cladding temperature of bundle 8.

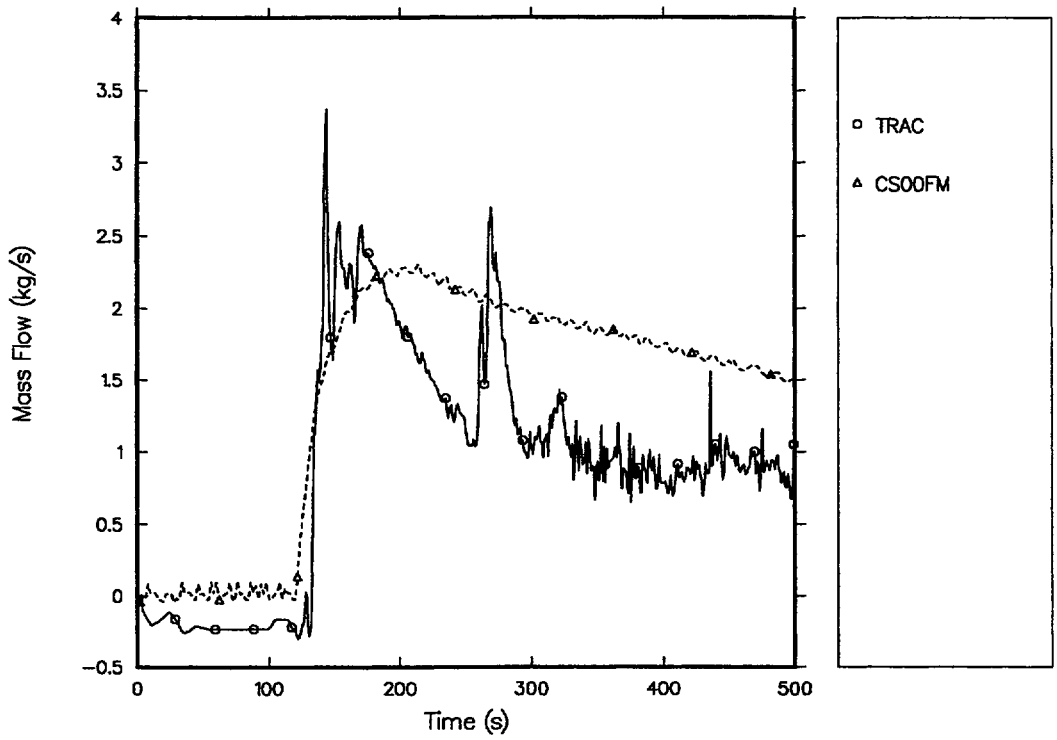

Fig. DD-13. Calculated and measured pressure-vessel-side broken cold-leg mass flow rate.

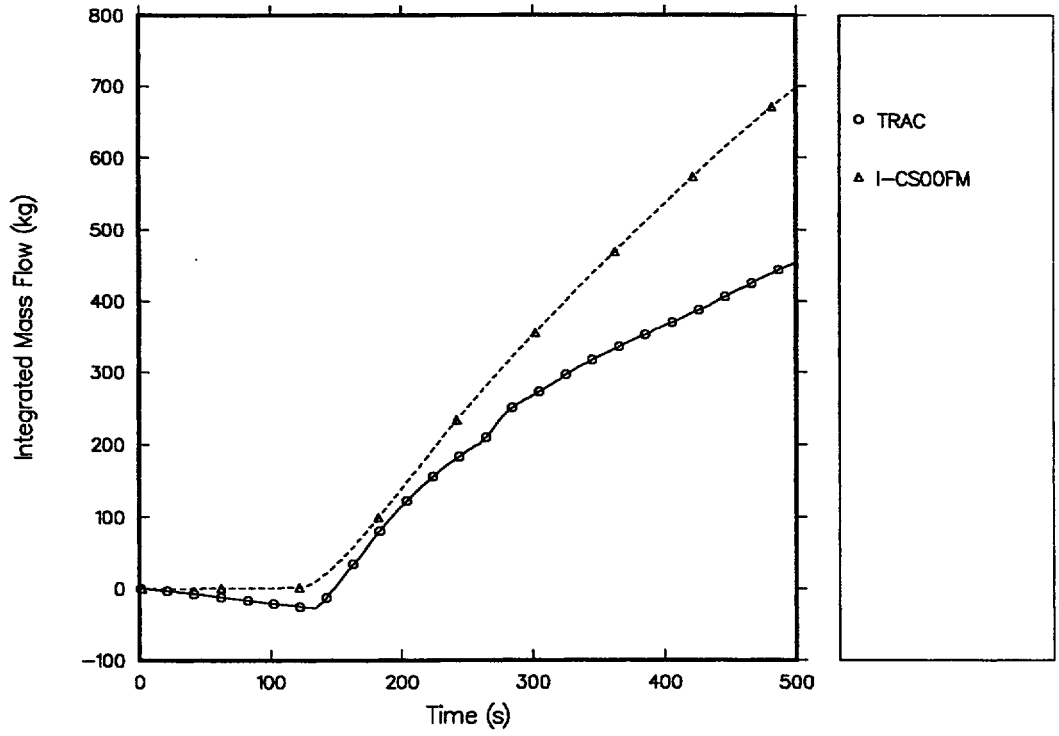

Fig. DD-14. Calculated and measured pressure-vessel-side broken cold-leg integrated mass flow.

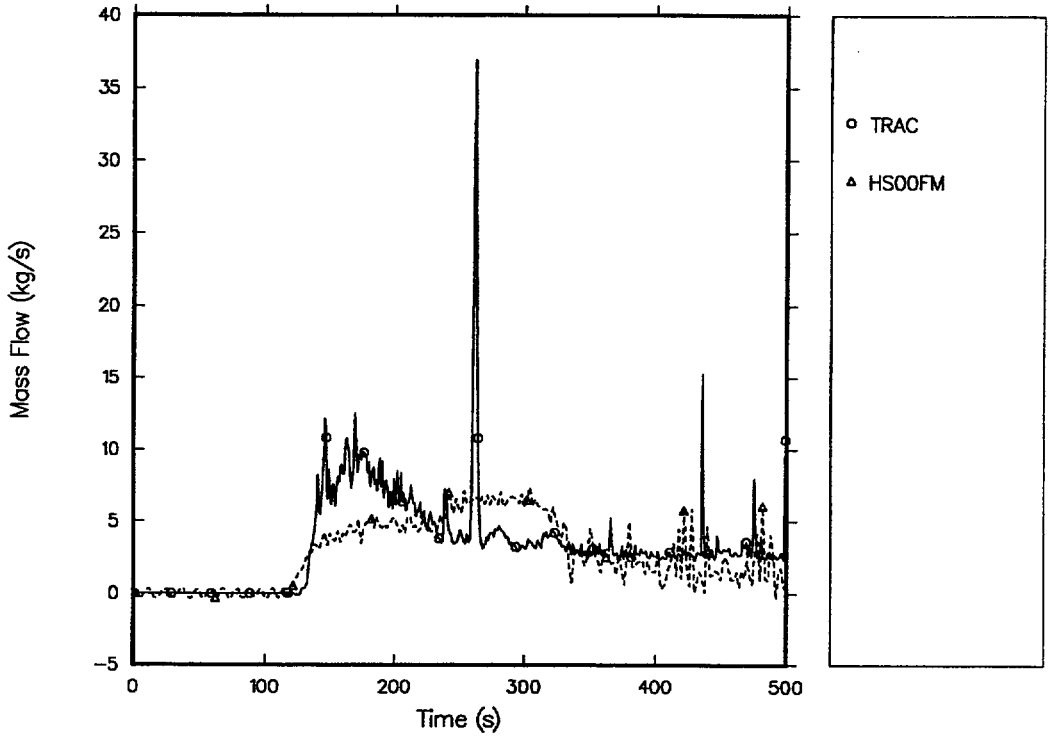

Fig. DD-15. Calculated and measured hot-leg mass flow rate.

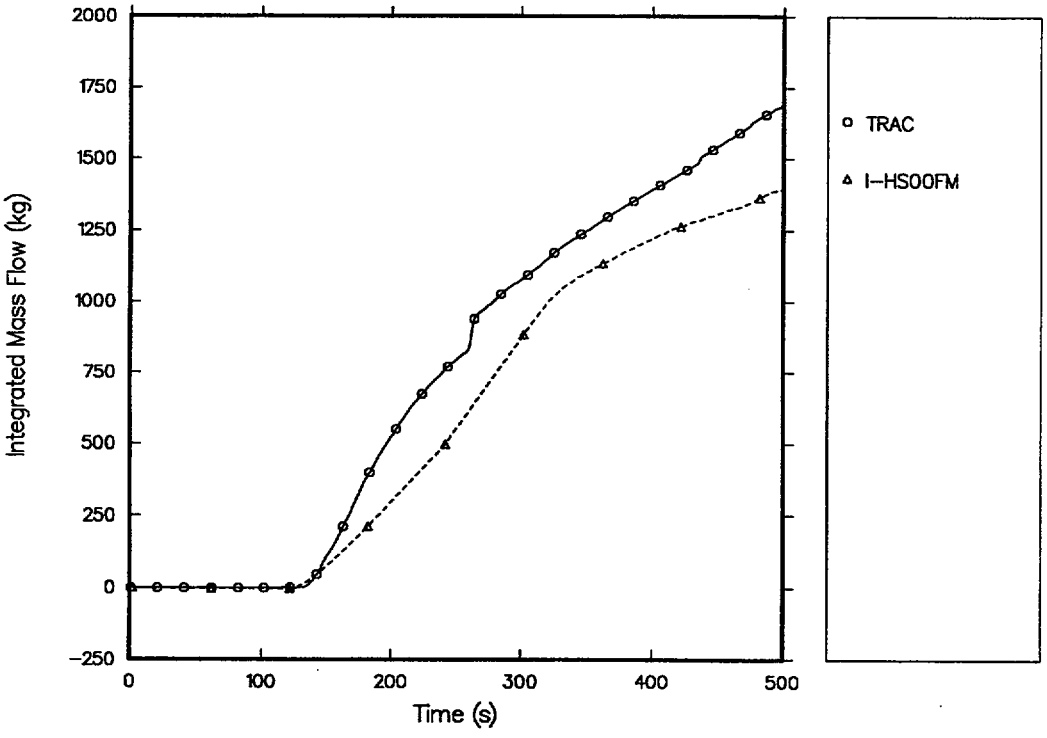

Fig. DD-16. Calculated and measured hot-leg integrated mass flow.

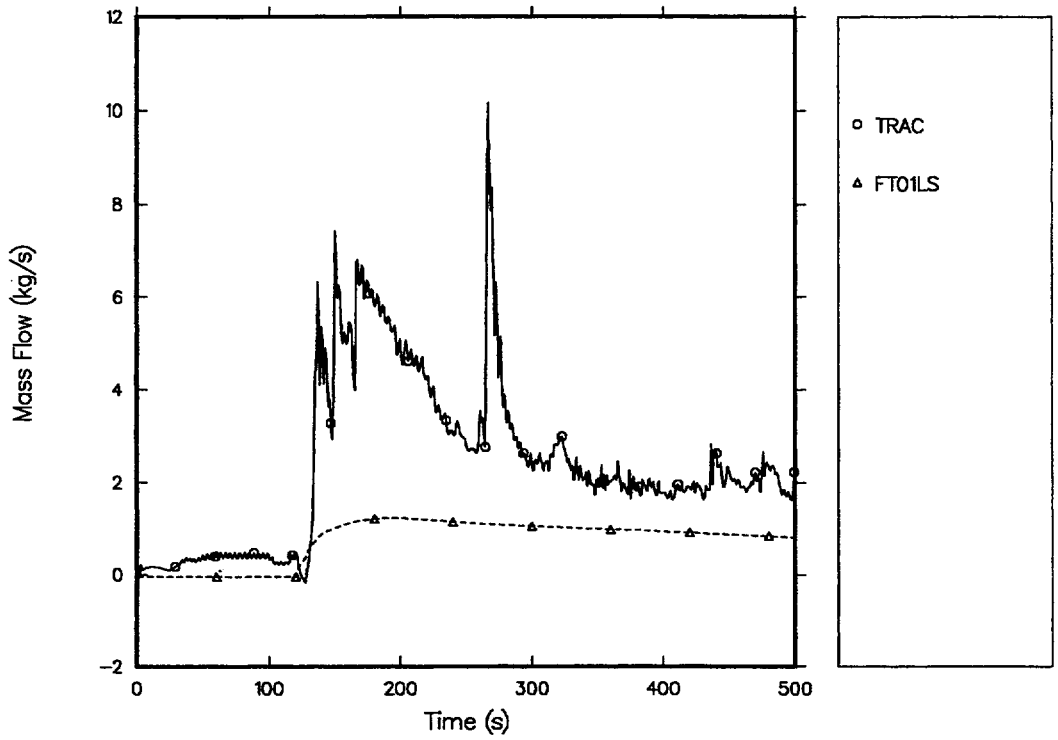

Fig. DD-17. Calculated and measured S/W-separator-side broken cold-leg mass flow rate.

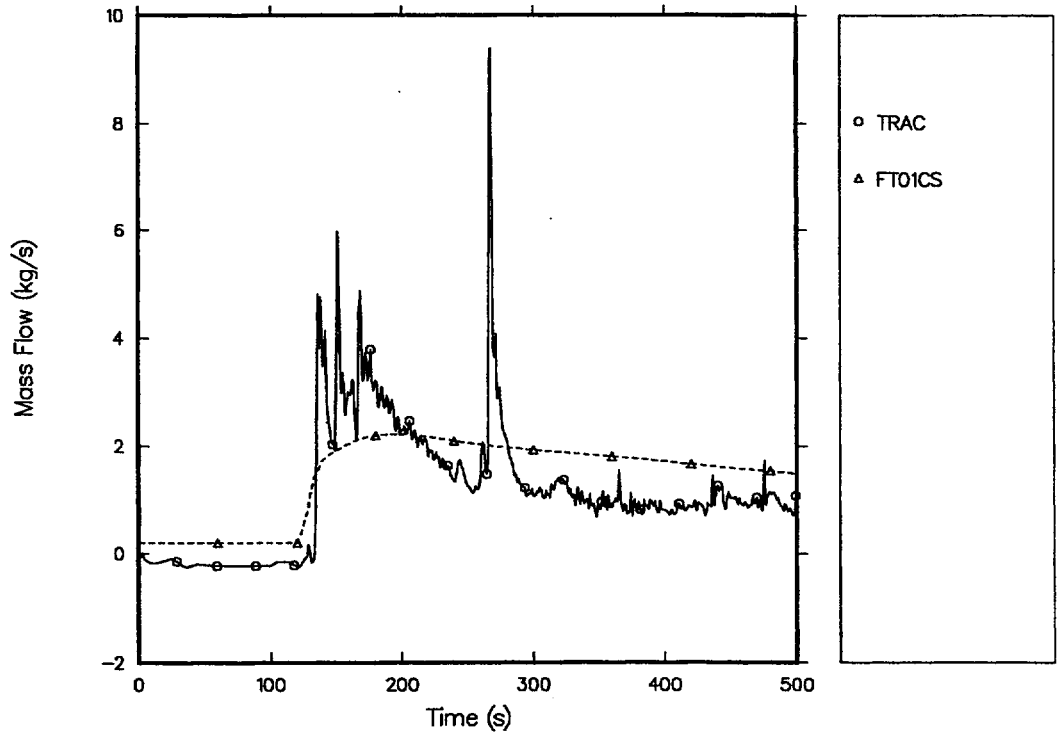

Fig. DD-18. Calculated and measured intact cold-leg mass flow rate.

APPENDIX EE

CODE-DATA COMPARISON FOR SCTF RUN 719 WITH NEWRFD=1, WITH GRID SPACERS MODELED

The calculation results for the reflood option newrfd=1 with grid spacers modeled are presented in this appendix. The set of plots presented are the same as presented in the Appendix V of the report for the reflood option newrfd=1 without grid spacers.

newrfd = 1 with grid spacers modeled	newrfd = 1 without grid spacers modeled
EE-1	DD-1
EE -2	DD -2
EE -3	DD -3
EE -4	DD -4
EE -5	DD -5
EE -6	DD -6
EE-7	DD -7
EE-8	DD -8
EE-9	DD -9
EE-10	DD -10
EE-11	DD -11
EE-12	DD -12
EE-13	DD -13
EE-14	DD -14
EE-15	DD -15
EE-16	DD -16
EE-17	DD -17
EE-18	DD -18

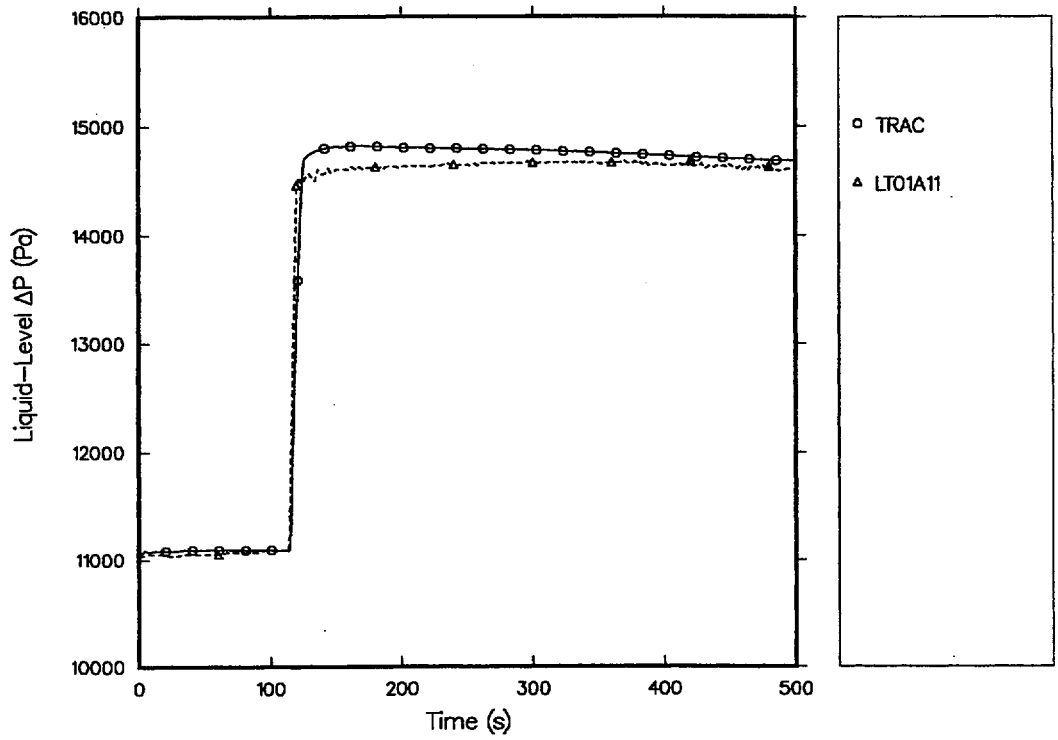

Fig. EE-1. Lower-plenum liquid level.

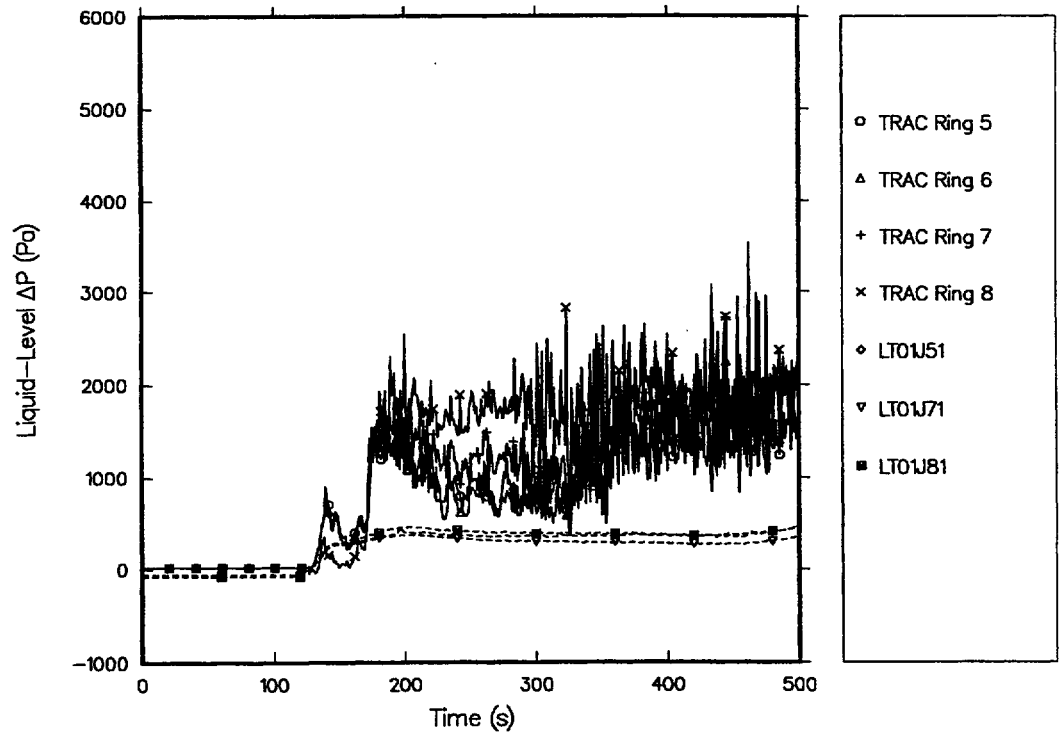

Fig. EE-2. Measured and calculate upper-plenum liquid levels above bundles 5 and 8.

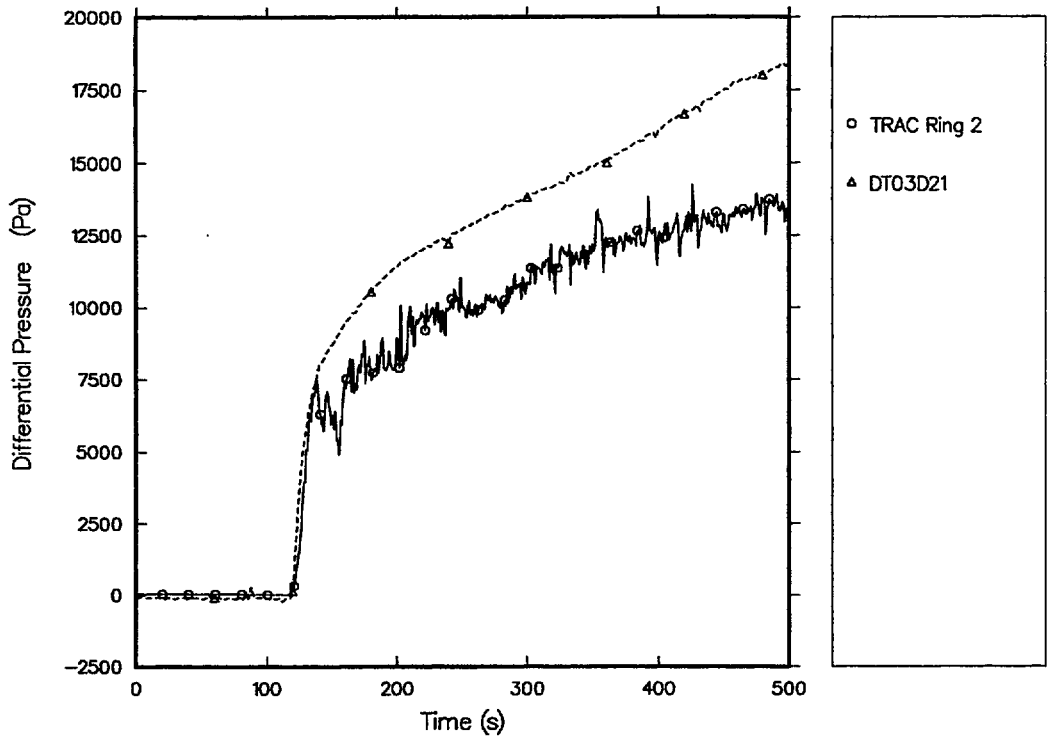

Fig. EE-3. Calculated and measured core full-height level in bundle 2.

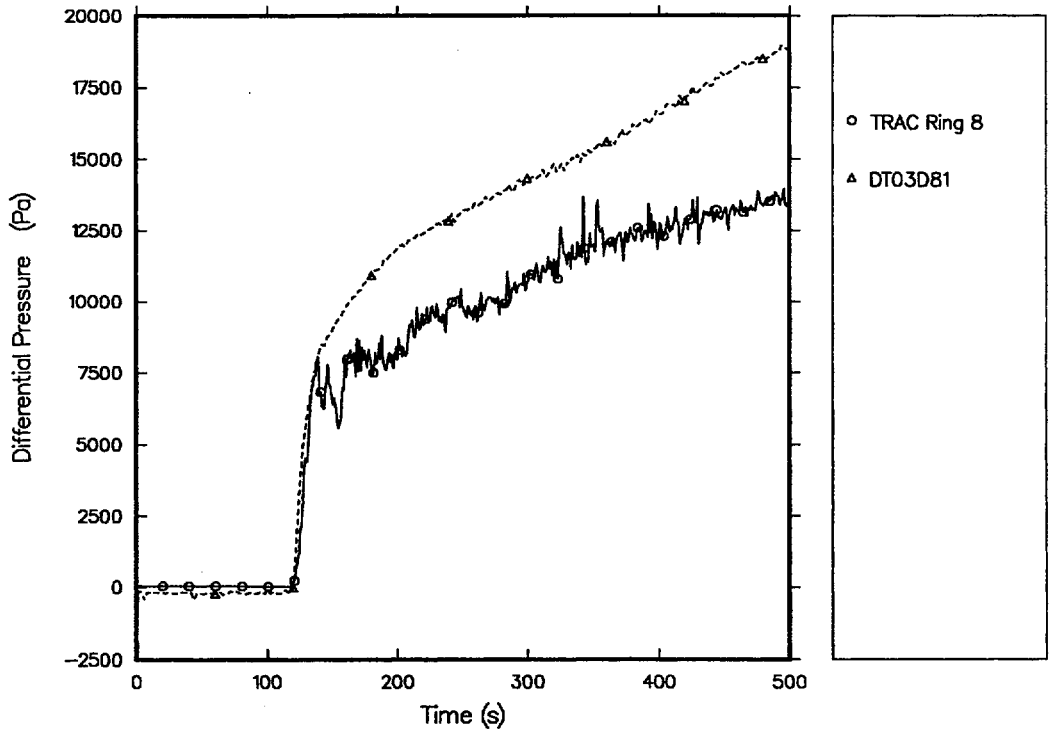

Fig. EE-4. Calculated and measured core full-height level in bundle 8.

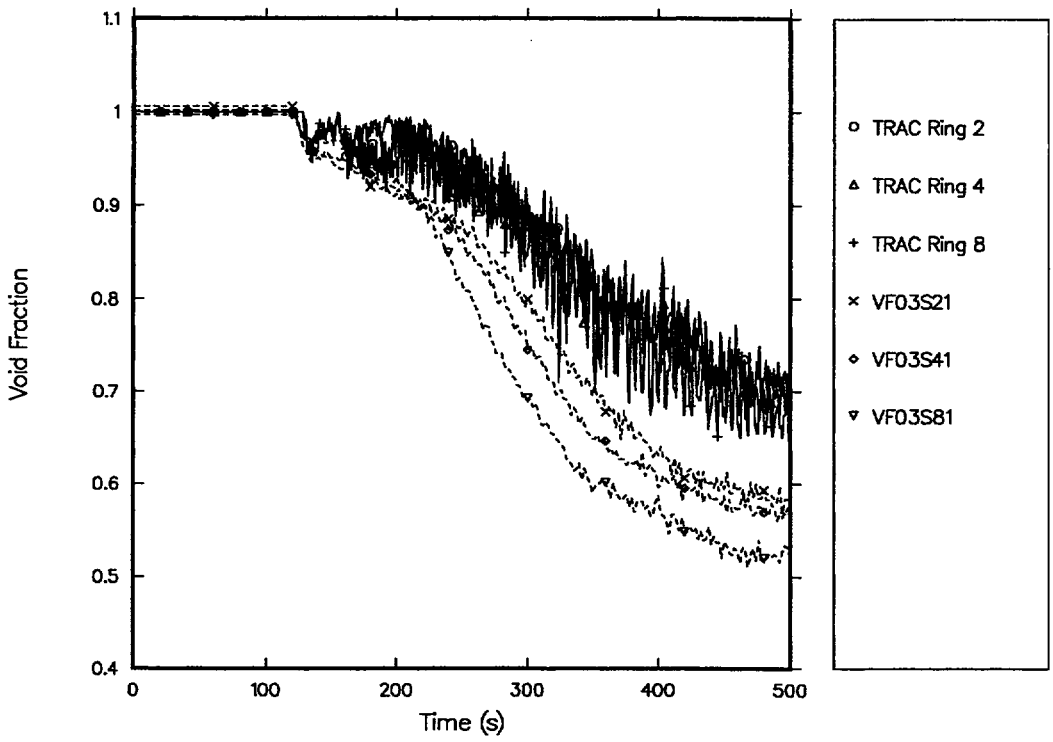

Fig. EE-5. Void fractions in bundles 2, 4, 6, and 8 at the 1.905-m level.

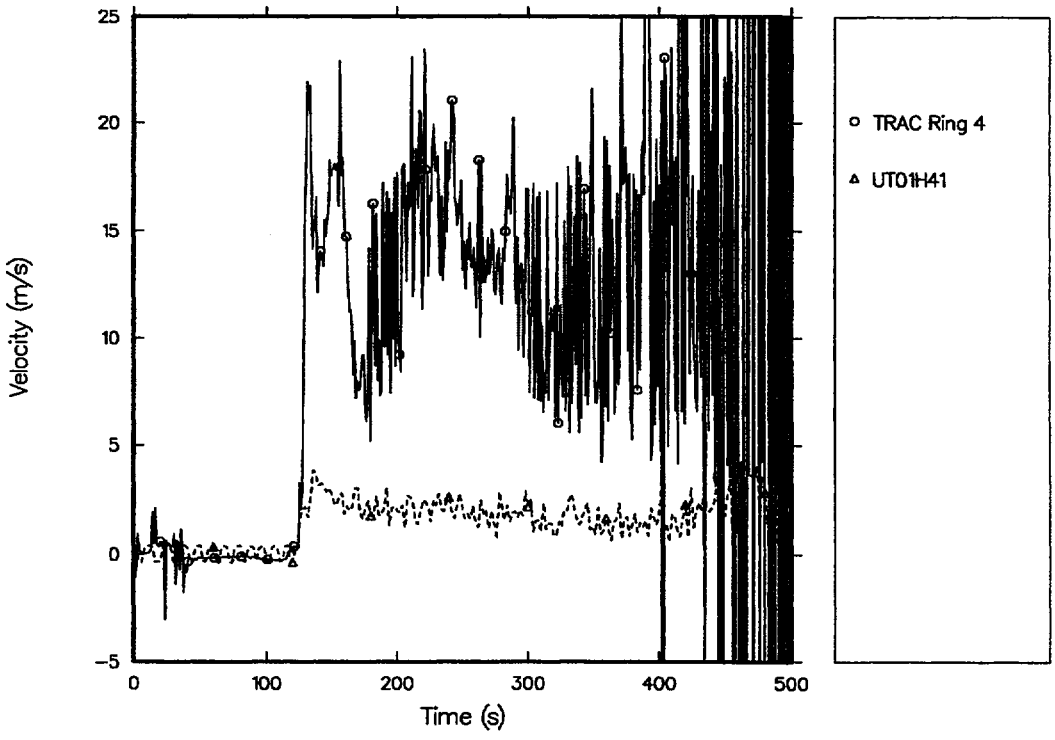

Fig. EE-6. Calculated and measured bundle 4 tie-plate vapor flows.

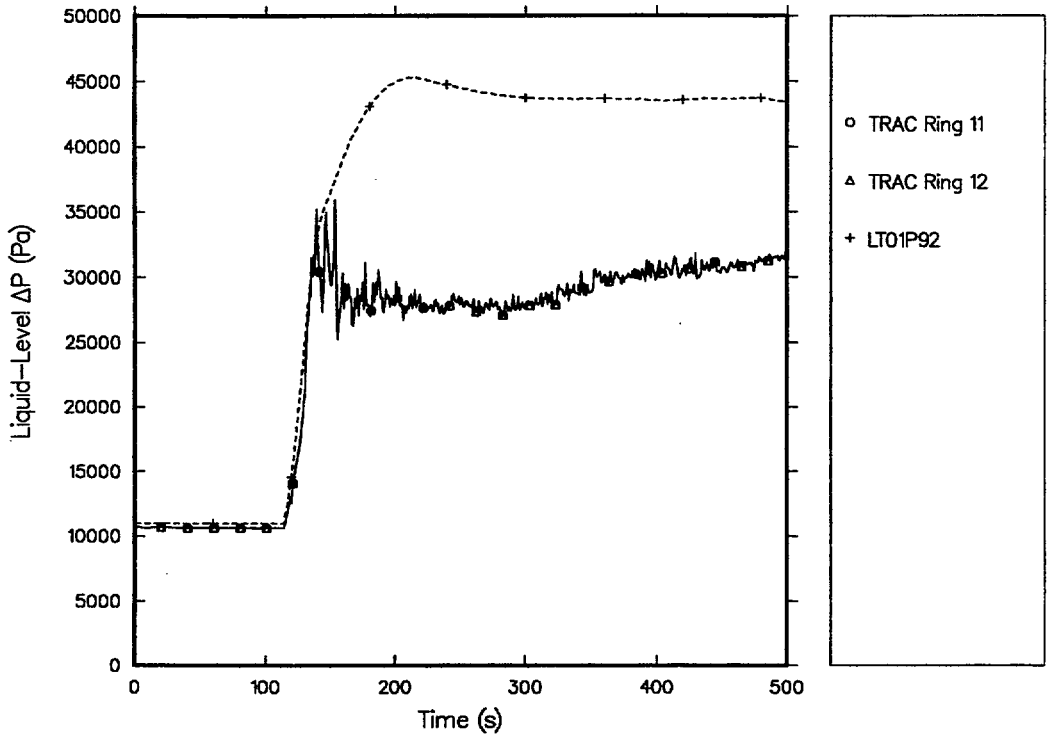

Fig. EE-7. Calculated and measured downcomer liquid level.

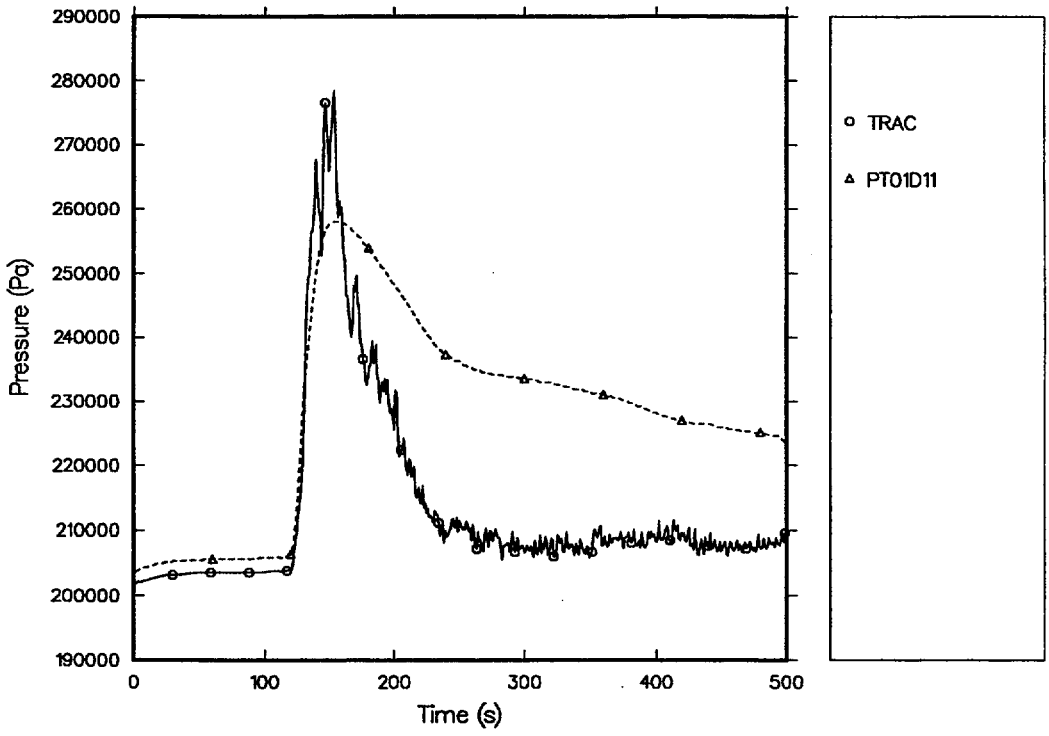

Fig. EE-8. Calculated and measured core average pressure.

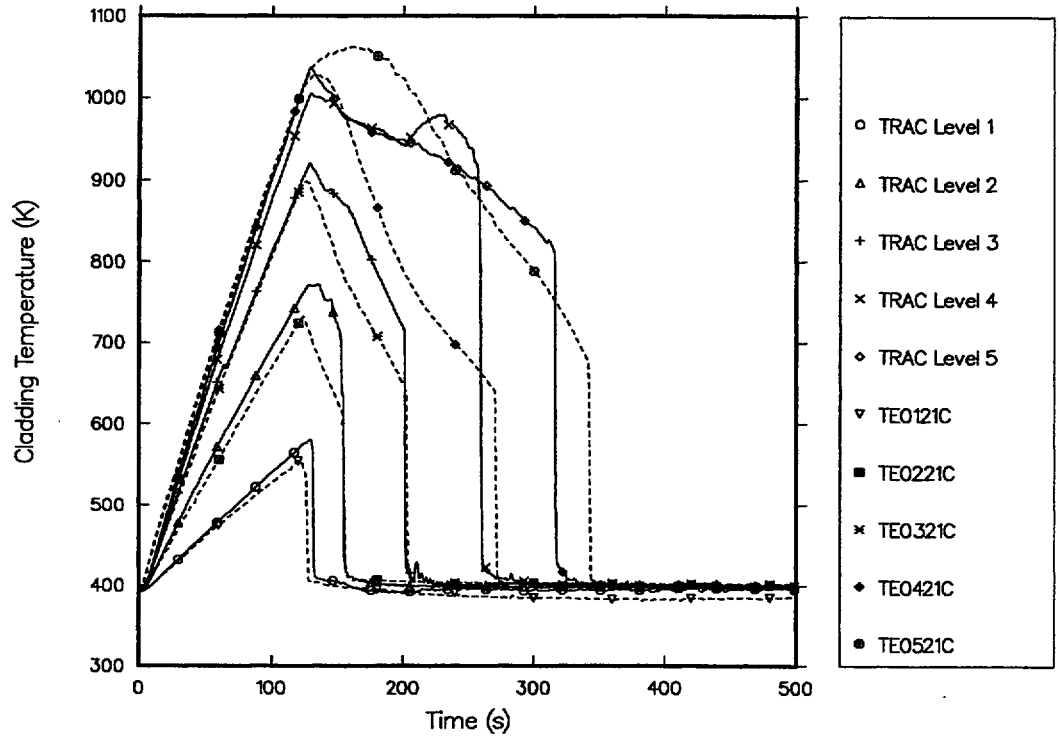

Fig. EE-9. Calculated and measured core-lower-half cladding temperature of bundle 2.

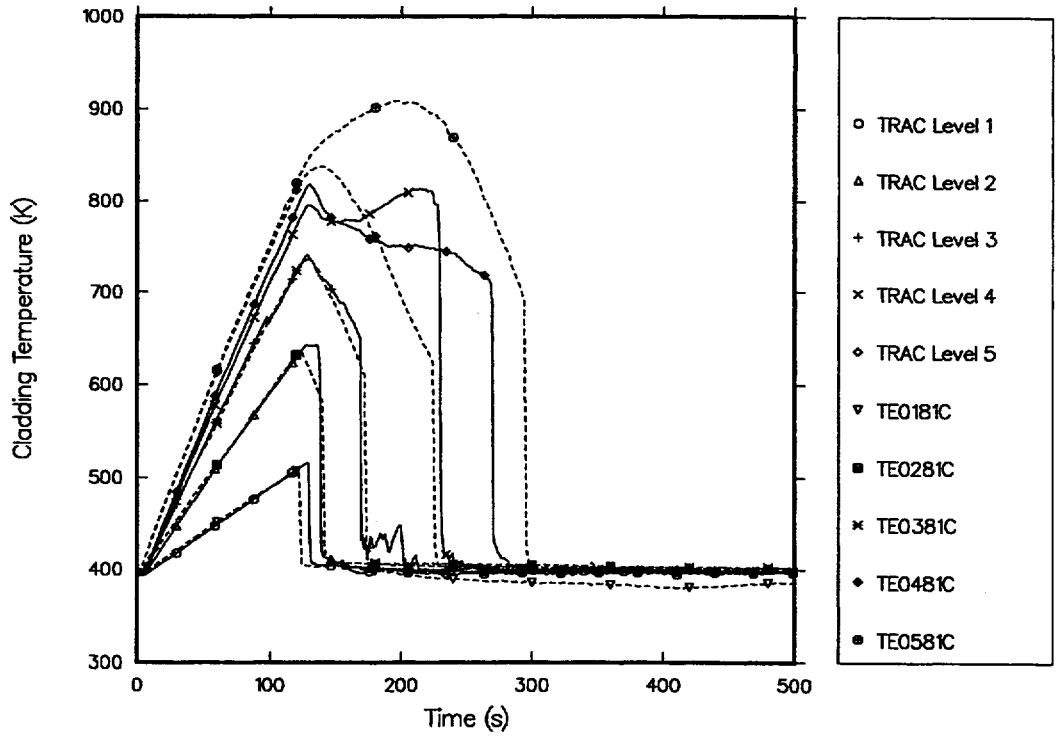

Fig. EE-10. Calculated and measured core-lower-half cladding temperature of bundle 8.

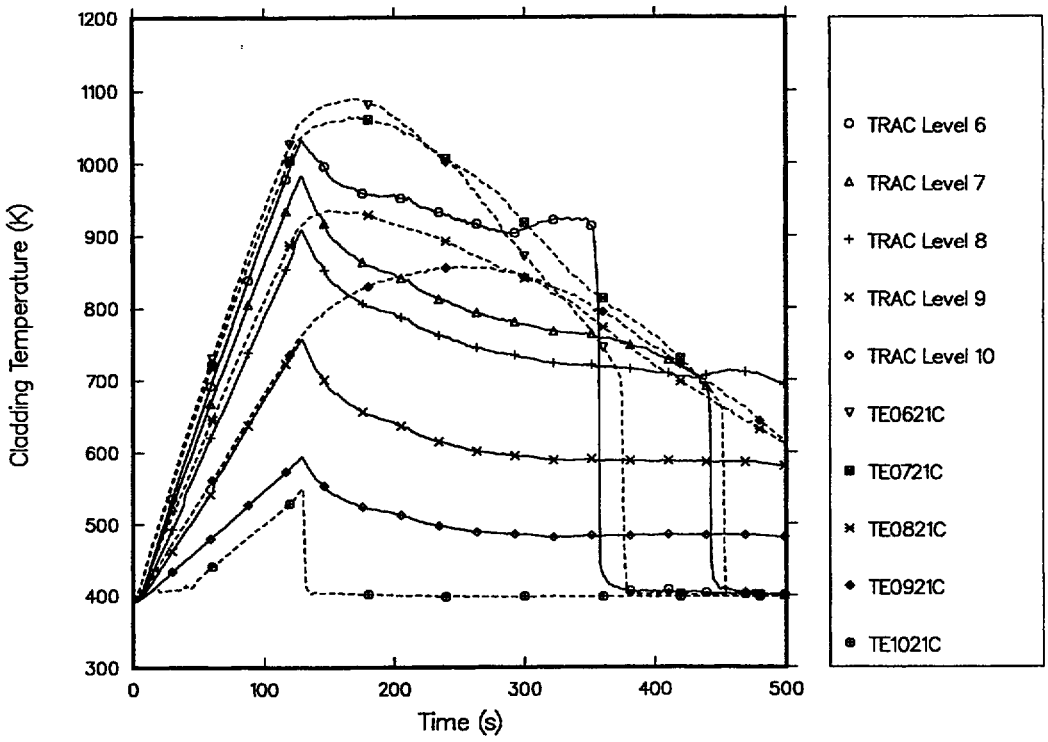

Fig. EE-11. Calculated and measured core-upper-half cladding temperature of bundle 2.

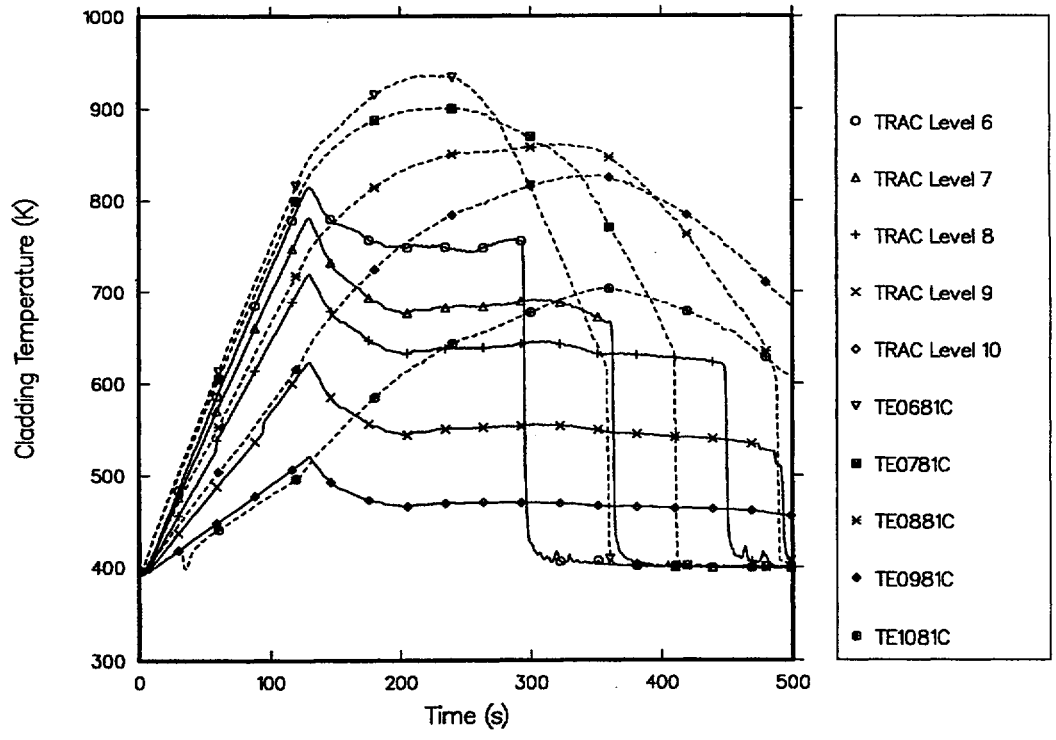

Fig. EE-12. Calculated and measured core-upper-half cladding temperature of bundle 8.

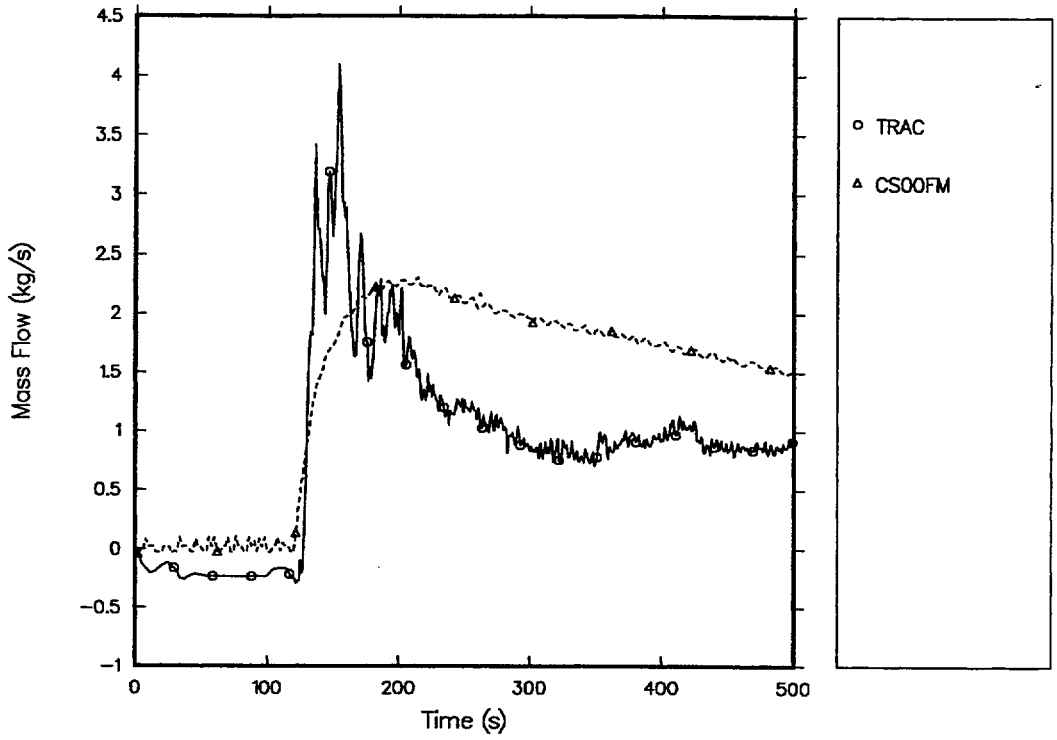

Fig. EE-13. Calculated and measured pressure-vessel-side broken cold-leg mass flow rate.

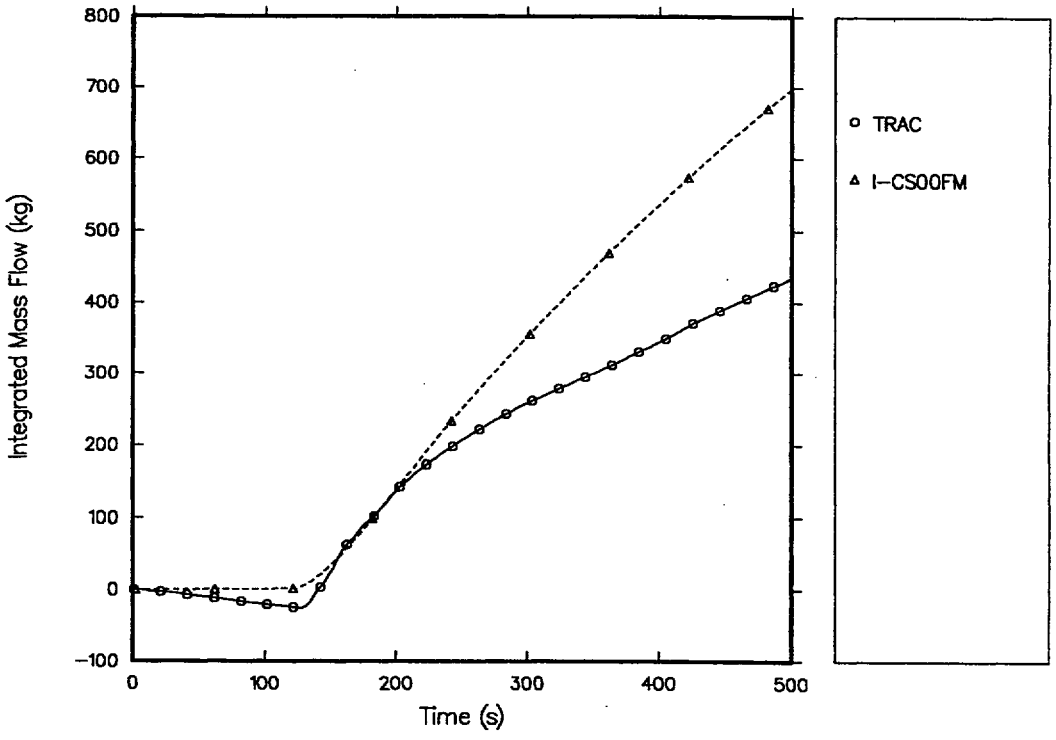

Fig. EE-14. Calculated and measured pressure-vessel-side broken cold-leg integrated mass flow.

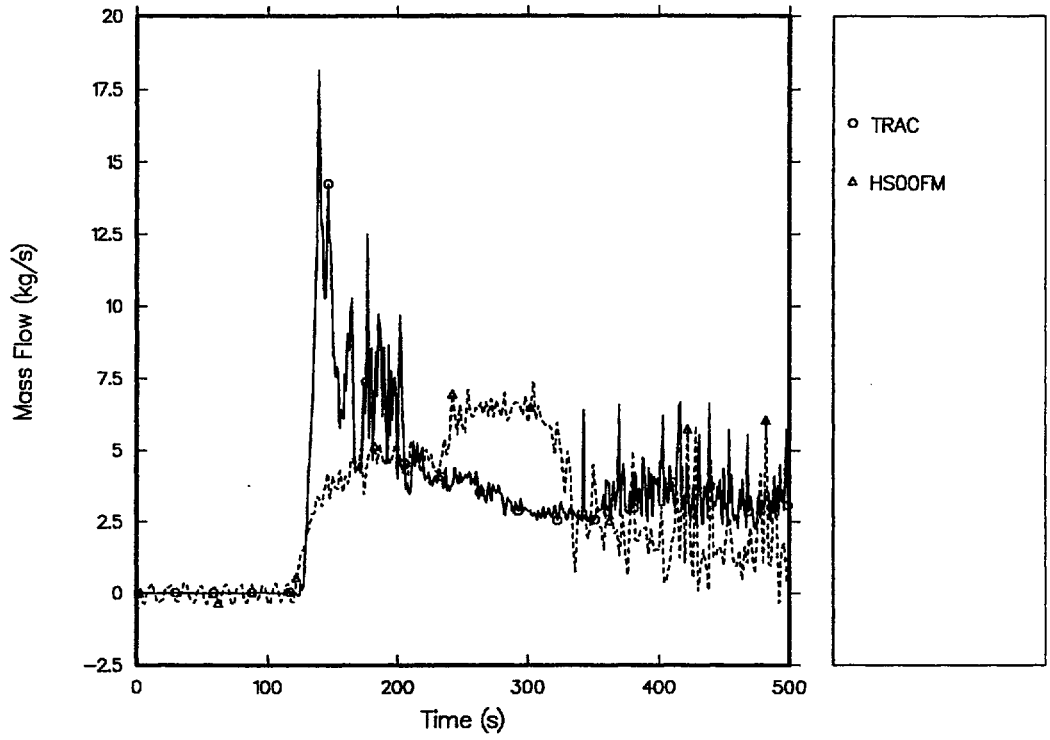

Fig. EE-15. Calculated and measured hot-leg mass flow rate.

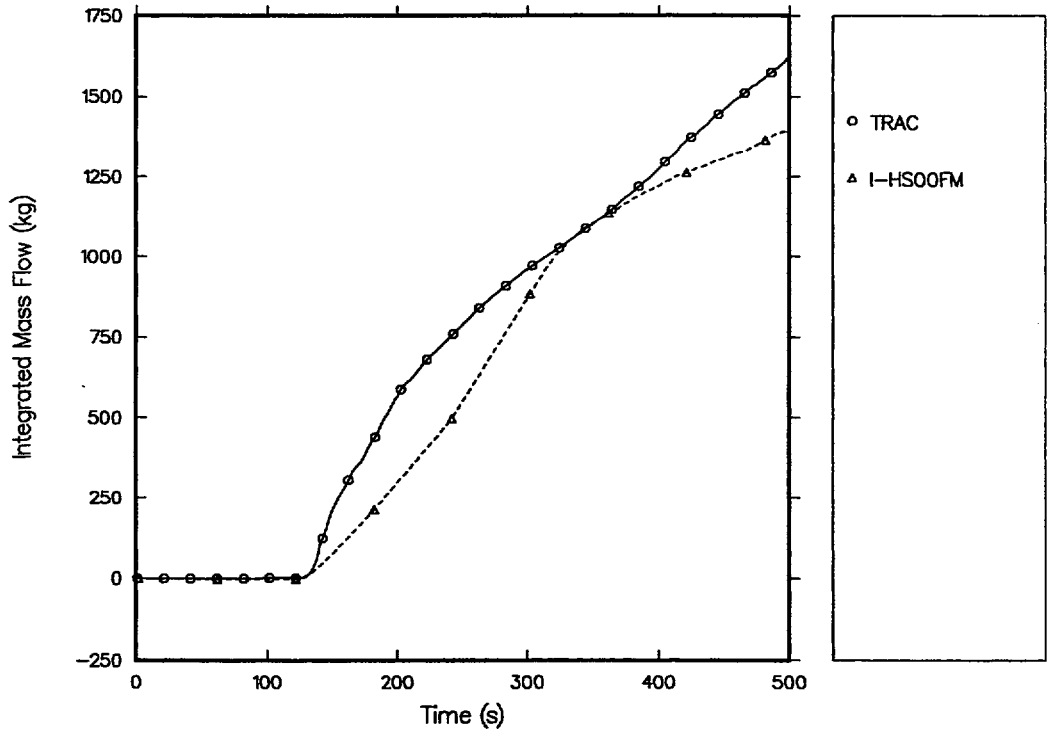

Fig. EE-16. Calculated and measured hot-leg integrated mass flow.

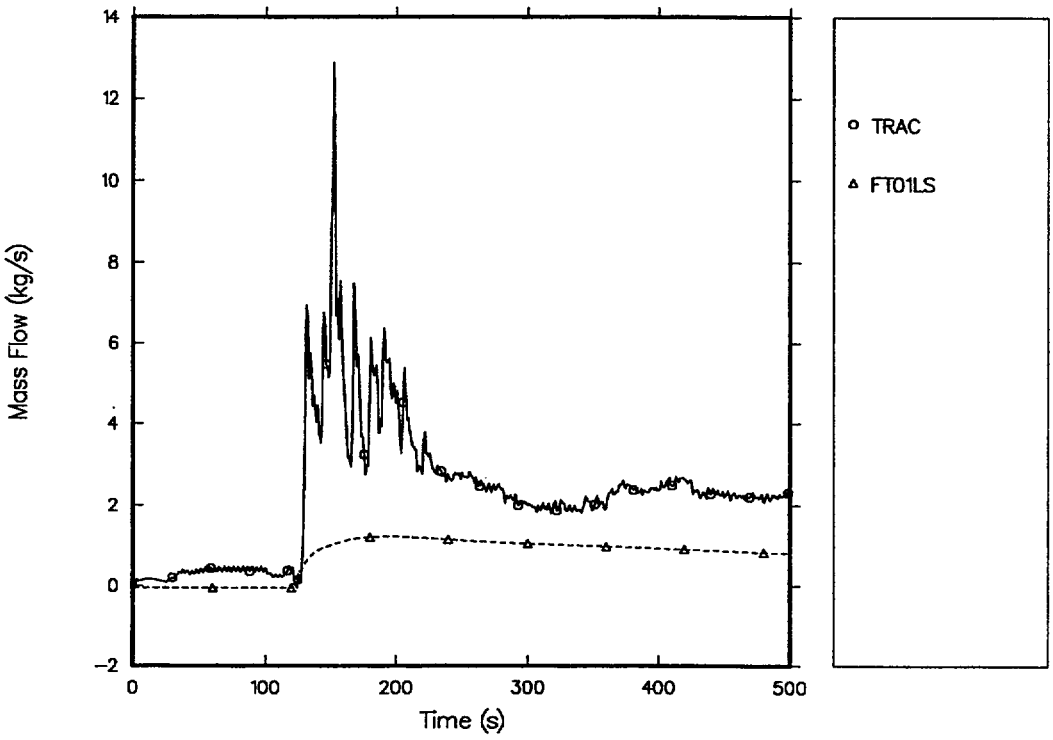

Fig. EE-17. Calculated and measured S/W-separator-side broken cold-leg mass flow rate.

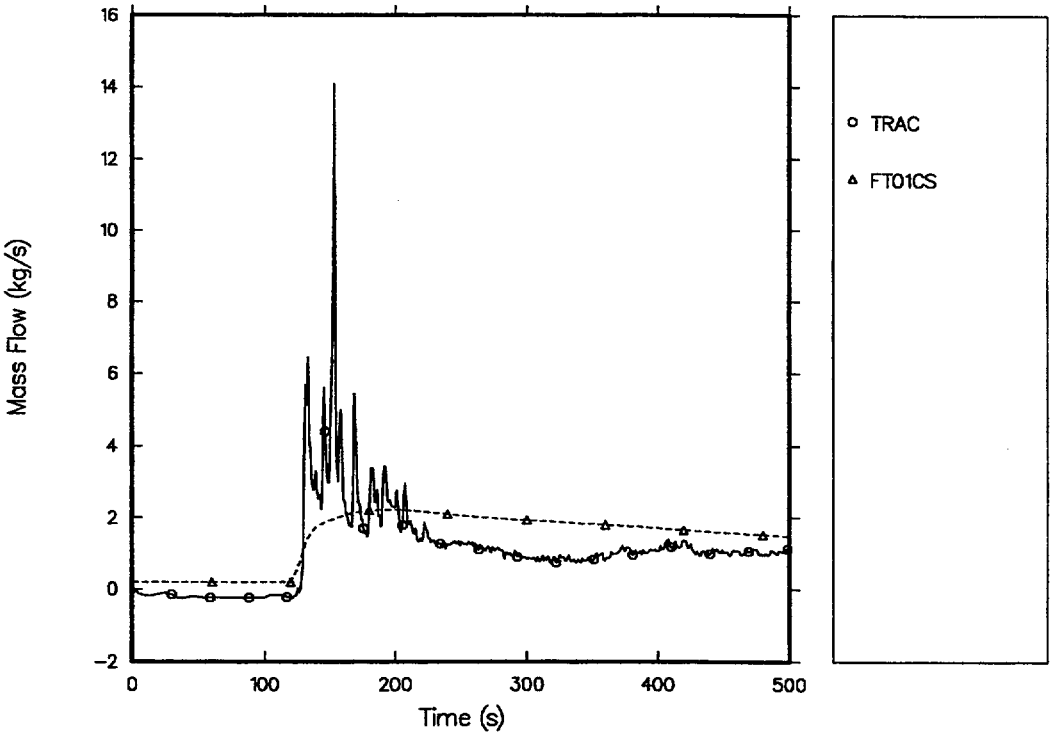

Fig. EE-18. Calculated and measured intact cold-leg mass flow rate.

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F. Odar, NRC Project Manager

11. ABSTRACT *(200 words or less)*

Los Alamos National Laboratory has developed the Transient Reactor Analysis Code (TRAC) to provide advanced, best-estimate simulations of real and postulated transients in pressurized water reactors (PWRs). The modernized TRAC-M/F77, Version 5.5, is the latest release version. TRAC-M/F77 (1) is more portable and maintainable than Version 5.4; (2) retains TRAC's essential features, a one- and/or three-dimensional, two-fluid treatment for the thermal hydraulics; (3) has other necessary modeling capabilities to model a reactor system, and (4) has a newly enhanced reflood model. The Developmental Assessment Manual describes the assessment calculations that were compared with analytical calculations and experimental data. The comparisons were performed to determine the accuracy and the applicability of TRAC-M/F77. Based on these assessments against analytical solutions, separate-effects tests, and integral tests, we believe that TRAC-M/F77 is suitable for analyzing PWRs during a loss-of-coolant accident and operational transients. The developmental assessment calculations demonstrate that TRAC-M/F77 is applicable to a wide range of test facilities and is accurate in terms of predicting major trends.

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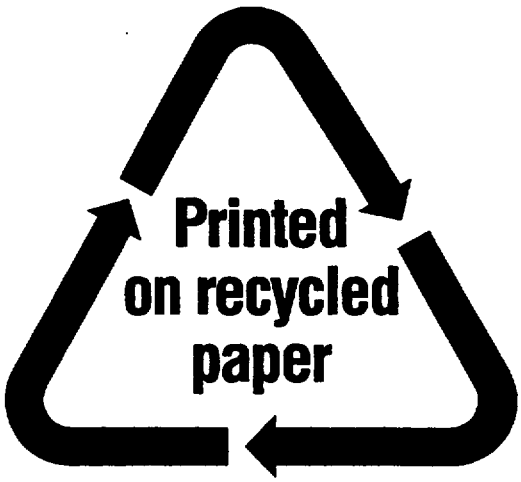

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