From: Leonard Ward
To: rdafluc@entergy.com
Date: 7/8/04 11:54AM
Subject: RELAP5 Vermont Yankee Input Deck

Attached are the initial pages to the Vermont Yankee RELAP5 input decks for the steady state initialization and transient runs.
Hopefully there's enough information to identify the full decks. The email system will not allow transmital of large files.

Thanks,

Len ward

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```
=  r5m8gbe6 - vyloca 0.6 ft2 dis. 11pcs +11pci
* W.K.Hughey, Entergy to NRC, July 14, 1999
* Vermont Yankee transient
* INEEL developed a RELAP/SCDAP deck from this input wlj
*******************************************************************************
*****
*       THIS DECK REPRESENTS THE VY BASE DECK TO BE USED FOR LOCA
ANALYSES    *
*       AND IS BASED ON CALCULATION VYC - 937
*
*******************************************************************************
*****
*
*
*       INITIAL CONDITIONS:  NOMINAL FOR 1698.3 MWTH
*
*
*
*       WATER LEVEL ABOVE TOEF       =    162.34 IN
*
*       DOME PRESSURE                =    1024.0 PSIA
*
*       CORE POWER                   =    1593.13 MWT
*
*       FEEDWATER TEMPERATURE        =    373.13 F
*
*       FEEDWATER FLOW               =    1873   LBM/SEC
*
*       MAINSTEAM FLOW               =    1873   LBM/SEC
*
*       RECIRC PUMP SPEED            =    1670   RPM
*
*       CORE FLOW                    =   13300   LBM/SEC
*
*       COSINE POWER SHAPE AND CONSERVATIVE PEAKING
*
*
*
*******************************************************************************
*****
*
*
*       ACCIDENT CONDITIONS ASSUMED:
*
*
*
*     1.  BREAK IS ASSUMED TO OCCUR 4.0E-6 SECONDS IN DRYWELL
*
*     2.  LOSS OF AUXILIARY POWER OCCURS AT 4.0E-6 SECONDS.
*
*     3.  REACTOR SCRAMS'S AFTER 1.8 SEC DELAY FROM FIRST RPS SIGNAL.
*
*     (EXCEPT HIGH DRYWELL PRESSURE)
*     SCRAM CURVE 67B OF VYNPS TECHS  SPECS IS USED          *
*   4. FEEDWATER COASTS DOWN TO 0.0 LBM/SEC AT 4.5 SECONDS.        *
*   5. MSIV'S CLOSE IN 3.0 SECONDS AFTER ISOLATION SIGNAL PLUS 0.5     *
*     SECOND DELAY.                          *
*   6. RECIRC PUMPS IN A & B LOOPS COAST DOWN WITH LOSS OF OUTSIDE     *
*     POWER(FREEWHEELING)                          *
*   7. ADS MAY ACTUATE IF APPROPRIATE SIGNALS EXIST. THEREAFTER, ADS   *
```

```
*      CYCLES OPEN/CLOSE AT 12 PSID BETWEEN STEAMLINE AND DRYWELL      *
*      WHEN ADS CRITERIA ARE CURRENTLY MET AT ANY TIME.                *
*  8. ECCS OPERABILITY VARIES WITH EVERY CASE.                         *
*  9. RCIC SYSTEM IS NOT AVAILABLE (ASSUMPTION).                       *
*  10. HPSI SYSTEM IS NOT AVAILABLE (SINGLE FAILURE)                   *
*  11. THE RECIRC. DISCHARGE VALVE IN THE BROKEN LOOP DOES NOT CLOSE.  *
*  12. THE RECIRC. DISCHARGE VALVE IN THE INTACT LOOP CLOSES ON DEMAND. *
*  13. THE LPCI SYSTEM IN THE BROKEN LOOP FAILS DUE TO BREAK.          *
*  14. THE LPCI IN THE INTACT LOOP INJECTS UPON DEMAND.                *
*  15. CONTAINMENT PRESSURE IS SET AT 14.7 PSIA AND 165.0.DEGF         *
*  16. EM POINT REACTOR KINETICS INITIALLY AT 1698.3 MWTH.             *
*  17. EM CORE HEAT TRANSFER.                                          *
*  18. PASSIVE HEAT STRUCTURES ARE INCLUDED.                           *
*                                                                      *
************************************************************************
*
100   new     transnt
101   run
102   british  british
*105   4.0   5.0
*109   40  40 4  4    695
110   nitrogen
*
201   4.0e-6 1.0e-6  1.0e-6  00003   4   4    4
202   10.0   1.0e-6  0.002   00003   500 5000 5000
203   400.0  1.0e-6  0.01    00003   100 20000 20000
*
```

```
=  r5m8gstd - vyloca steady-state
* W.K.Hughey, Entergy to NRC, July 14, 1999
* Vermont Yankee transient
*
*********************************************************************
*****
*    THIS DECK REPRESENTS THE VY BASE DECK TO BE USED FOR LOCA ANALYSES
*
*      AND IS BASED ON CALCULATION VYC - 937
*
*********************************************************************
*****
*
*
*      INITIAL CONDITIONS:  NOMINAL FOR 1698.3 MWTH
*
*
*
*      WATER LEVEL ABOVE TOEF       =   162.34 IN
*
*      DOME PRESSURE                =   1024.0 PSIA
*
*      CORE POWER                   =   1593.13 MWT
*
*      FEEDWATER TEMPERATURE        =   373.13 F
*
*      FEEDWATER FLOW               =   1873  LBM/SEC
*
*      MAINSTEAM FLOW               =   1873  LBM/SEC
*
*      RECIRC PUMP SPEED            =   1670  RPM
*
*      CORE FLOW                    =  13300  LBM/SEC
*
*      COSINE POWER SHAPE AND CONSERVATIVE PEAKING
*
*
*
*********************************************************************
*****
*
*
*      ACCIDENT CONDITIONS ASSUMED:
*
*
*
*    1.  BREAK IS ASSUMED TO OCCUR 4.0E-6 SECONDS IN DRYWELL
*
*    2.  LOSS OF AUXILIARY POWER OCCURS AT 4.0E-6 SECONDS.
*
*    3.  REACTOR SCRAMS'S AFTER 1.8 SEC DELAY FROM FIRST RPS SIGNAL.
*
*         (EXCEPT HIGH DRYWELL PRESSURE)
*          SCRAM CURVE 67B OF VYNPS TECHS  SPECS IS USED
*
*    4.  FEEDWATER COASTS DOWN TO 0.0 LBM/SEC AT 4.5 SECONDS.
*
*    5.  MSIV'S CLOSE IN 3.0 SECONDS AFTER ISOLATION SIGNAL PLUS 0.5
*
*          SECOND DELAY.
*
```

```
*     6.  RECIRC PUMPS IN A & B LOOPS COAST DOWN WITH LOSS OF OUTSIDE
*
*           POWER(FREEWHEELING)
*
*     7.  ADS MAY ACTUATE IF APPROPRIATE SIGNALS EXIST.  THEREAFTER, ADS
*
*           CYCLES OPEN/CLOSE AT 12 PSID BETWEEN STEAMLINE AND DRYWELL
*
*           WHEN ADS CRITERIA ARE CURRENTLY MET AT ANY TIME.
*
*     8.  ECCS OPERABILITY VARIES WITH EVERY CASE.
*
*     9.  RCIC SYSTEM IS NOT AVAILABLE (ASSUMPTION).
*
*     10. HPSI SYSTEM IS NOT AVAILABLE (SINGLE FAILURE)
*
*     11. THE RECIRC. DISCHARGE VALVE IN THE BROKEN LOOP DOES NOT CLOSE.
*
*     12. THE RECIRC. DISCHARGE VALVE IN THE INTACT LOOP CLOSES ON
DEMAND.   *
*     13. THE LPCI SYSTEM IN THE BROKEN LOOP FAILS DUE TO BREAK.
*
*     14. THE LPCI IN THE INTACT LOOP INJECTS UPON DEMAND.
*
*     15. CONTAINMENT PRESSURE IS SET AT 14.7 PSIA AND 165.0.DEGF
*
*     16. EM POINT REACTOR KINETICS INITIALLY AT 1698.3 MWTH.
*
*     17. EM CORE HEAT TRANSFER.
*
*     18. PASSIVE HEAT STRUCTURES ARE INCLUDED.
*
*
*
*******************************************************************************
*****
*
100    new      transnt
101    run
102    british   british
*105    4.0    5.0
*109    40   40  4   4     695
110    nitrogen
*
201    4.0e-6 1.0e-6  1.0e-6   00003    4    4     4
202    10.0   1.0e-6  0.002    00003    500  5000  5000
203   400.0   1.0e-6  0.01     00003    100  20000 20000
*
301    rktpow    0                * total core power
302    rkreac    0                * net reactivity
303    cntrlvar  804              * core average void fraction
304    p         240010000        * rpv pressure
305    p         540010000        * main steamline pressure
310    mflowj    401000000         * feedwater flowrate
311    mflowj    549000000         * turbine inlet flowrate
312    pmpvel    310               * pump speed loop a
313    pmpvel    360               * pump speed loop b
314    mflowj    326010000         * recirc loop a flow rate
315    mflowj    376010000         * recirc loop b flow rate
316    mflowj    343000000         * jetpump bank a flowrate
317    mflowj    393000000         * jetpump bank b flowrate
```

```
318    cntrlvar  101                * total core+bypass flowrate
*************************************************************
319    mflowj    100010000          * bypass inlet flowrate
320    mflowj    120020000          * lobndl inlet flowrate
321    mflowj    140020000          * avbndl inlet flowrate
322    mflowj    160020000          * hibndl inlet flowrate
323    cntrlvar  100                * total core inlet flowrate
324    mflowj    109000000          * bypass outlet flowrate
325    mflowj    129000000          * lobndl outlet flowrate
326    mflowj    149000000          * avbndl outlet flowrate
327    mflowj    169000000          * hibndl outlet flowrate
*************************************************************
328    mflowj    541000000          * msiv flowrate
330    mflowj    551000000          * s/rv1 flowrate
331    mflowj    553000000          * s/rv23 flowrate
332    mflowj    555000000          * s/rv4 flowrate
333    mflowj    559000000          * ads flowrate
335    mflowj    802000000          * break j-802 flowrate
*336    mflowj    801000000          * break j-801 flowrate
*************************************************************
337    mflowj    701000000          * hpci pump flowrate
338    mflowj    721000000          * lpcs (1) flowrate
*************************************************************
353    cntrlvar  901                * net inflow to primary system
354    cntrlvar  903                * primary system mass
*************************************************************
355    cntrlvar   003               * anrlvl
359    cntrlvar   012               * awrlvl
363    cntrlvar   676               * bilvlcl
*************************************************************
364    sattemp   206010000          * upper plenum sat temp
365    httemp    122100506          * lobndl temp axnode 5
366    httemp    142100306          * avbndl temp axnode 3
367    httemp    142100506          * avbndl temp axnode 5
368    httemp    162100306          * hibndl temp axnode 3
369    httemp    162100406          * hibndl temp axnode 4
370    httemp    162100506          * hibndl temp axnode 5
371    httemp    162100606          * hibndl temp axnode 6
372    httemp    162100706          * hibndl temp axnode 7
373    httemp    163100306          * hirddl temp axnode 3
374    httemp    163100406          * hirddl temp axnode 4
375    httemp    163100506          * hirddl temp axnode 5
376    httemp    163100606          * hirddl temp axnode 6
377    httemp    163100706          * hirddl temp axnode 7
*************************************************************
393    cntrlvar  990                * total mass
*************************************
***        TRIPS                    ***
*************************************
*
*      ACCIDENT INITIATION AND GENERAL TRIPS
*
*      ACCIDENT TIME = 4.0E-6 SECONDS FOR LOCA BE AND EM DECKS
*      LOSS OF OFFSITE POWER = 4.0E-6 SECONDS FOR LOCA BE AND EM DECKS
*
*     TRIP 501: IS TIME LT ACCIDENT TIME ?
*     TRIP 502: IS TIME GE ACCIDENT TIME ?
*     TRIP 503: IS TIME GT 1.0E+06  SECONDS ? ALWAYS FALSE.
*
501    time    0    lt    null    0    4.0e+6    n    0.0
502    time    0    ge    null    0    4.0e+6    1
```

```
503    time    0    gt    null    0    1.0e+6    n
*
*************************************************************************
*     REACTOR SCRAM SIGNALS AND TRIPS
*
*    TRIP 510: SCRAM ON RPS MG SET UNDERFREQUENCY LESS THAN 57 HZ AT 3.0
SEC
*              AFTER LOSS OF OFFSITE POWER.
*    TRIP 511: SCRAM ON HIGH DRYWELL PRESSURE GE TO 2.5 PSIG
*              (OCCURED AT 3.00 SEC-CONSERVATIVE ASSUMPTION)
*    TRIP 512: SCRAM ON RPV LEVEL LE 127 INCHES (LO LEVEL) ABOVE TOP OF
*              ENRICHED FUEL AT 351.5 INCHES.(LEVEL SCRAM AT 125.0-
CONSERVATIVE)
*    TRIP 513: SCRAM ON RPV PRESSURE ABOVE 1069.7 PSIA (1055 PSIG).
*    TRIP 514: SCRAM ON MSIV CLOSURE @ 10% CLOSED (90% MSIV OPENED)
*              WITH 1.0 SEC DELAY TO REACH 10% CLOSED (IE 100% CLOSED IN
10.0
*              SECONDS) FROM TRIPS 529 AND 531.
*    TRIP 614: DETERMINE IF & WHEN ANY SCRAM SIGNAL HAS OCCURRED AFTER
ACCIDENT
*              INITIATION; THEN
*    TRIP 515: INITIATES CONTROL ROD INSERTION WITH 1.8 SEC. DELAY.
*    TRIP 516: INITIATES TURBINE STOP VALVE (J549) CLOSURE 20.0 SEC
AFTER
*              REACTOR SCRAM (TRIP 614).
*
*    TRIP 616: IS TRIP 511 OR TRIP 516 TRUE ?
*
*    TRIP 517: IS TIME GE TIMEOF TRIP 616 PLUS 0.4 SEC ?
*              IF SO, RAMP TURBINE STOP VALVES CLOSED IN
*              0.1 SEC.
*
*    TRIP 518: INITIATES TURBINE BYPASS VALVE OPENING 0.1
*              SECONDS AFTER TRIP 517 (JNCTN 571)
*
510    time    0    ge    timeof    502    3.5          1
511    time    0              ge    null     0    3.00    1
512    cntrlvar      003      le    null     0   125.0    n
513    p       240010000      ge    null     0  1069.7    n
514    time            0      ge  timeof   531     1.0    1
*
610    512         or            513        n
611    610         or            514        n
612    611         or            511        n
613    612         and           502        n
515    time 0      ge     timeof 613   1.8  1
614    515         or            510        n      * scram trip *
*
*************************************************************
*    TURBINE STOP AND BYPASS VALVE
*
516    time 0      ge     timeof 614  20.0  1
616    511         or            516        1
517    time 0      ge     timeof 616   0.5  1
518    time 0      ge     timeof 517   0.1  1
*
*************************************************************************
***
*   MAIN STEAM ISOLATION VALVE CLOSURE
*
*    TRIP 510: RPS MG SET UNDERFREQUENCY SIGNAL
```

```
*    TRIP 529: HI MAIN STEAMLINE FLOW (140 % RATED) IN J546-01.
*    TRIP 530: RPV LEVEL LE 80.0 INCHES (ACTUAL LO LO LEVEL SETPNT)
*    TRIP 630: PREVENTS CLOSURE ON LO LO LEVEL PRIOR TO ACCIDENT
*    TRIP 631: SELECTS TRIP 510 OR 630 AS VALID SIGNAL
*    TRIP 632: SELECTS TRIP 529 OR 631 AS VALID SIGNAL
*    TRIP 531: 1.8 SECOND DELAY FOR INSTRUMENT AND LOGIC CIRCUITS
*    TRIP 633: LATCH HI MAIN STEAMLINE FLOW SIGNAL FOR HPCI AND
*                RCIC ISOLATION
*
529    mflowj  546010000   ge   null  0    2500.56    n
530    cntrlvar      003   le   null  0       80.0    n
630                  530  and   502                   n
631                  630   or   510                   n     * use for
recirc lin
632                  631   or   529                   n     * use for
main steam
*
531    time            0   ge   timeof  632   1.8     1
633    529    and    529                              1
*************************************************************************
*
*    RECIRC PUMP MOTOR TRIP (This logic not used; pumps trip due to LOOP-
TRIP 5
*
*    TRIP 540: RPM TRIP ON HIGH RPV PRESSURE GE 1164.7 PSIA (1150 PSIG)
*    TRIP 541: 0.3 SECOND DELAY ADDED TO TRIP 540 FOR CIRCUITS
*    TRIP 542: 10.3 SECOND DELAY ADDED TO TRIP 630 (LO LO LEVEL)
*    TRIP 543: TRIP ON RECIRC LOOP MG-SET UNDERFREQUENCY 17.0 SECONDS
*                AFTER LOSS OF OFFSITE POWER.
*    TRIP 642: SELECTS TRIP 541 OR TRIP 542 AS VALID SIGNAL
*    TRIP 643: SELECTS TRIP 543 OR TRIP 642 AS VALID SIGNAL
*    TRIP 644: USE PUMP VELOCITY TABLE
*
540    p    240010000    ge    null      0    1164.7    1
541    time         0    ge    timeof  540      1.8    1
542    time         0    ge    timeof  630     11.8    1
543    time         0    ge    timeof  502     17.0    1
642              541    or    542                      1
643              543    or    642                      1
644             -643    or   -643                      n
*
*************************************************************************
****
*   RECIRC LOOP DISCHARGE VALVE CLOSURE
*     NOTE: POWER IS FROM AN UNINTERUPTIBLE POWER SUPPLY
*     NOTE: ASSUME THE UPS FAILS;THE RECIRC LOOP DISCHARGE
*     VALVES FAIL TO CLOSE IN BOTH LOOPS
*
*    TRIP 646: SELECTS TRIP 511 ( HI DW PRESS) OR TRIP 630 (LO LO LEVEL)
*    TRIP 546: 2.00 SECOND DELAY ADDED TO TRIP 646 FOR CIRCUITS
*    TRIP 547: RPV PRESSURE LT OPEN PERMISSIVE ( 315 PSIA)
*    TRIP 647: TRIP 546 AND TRIP 547 MUST BE TRUE FOR THE RLDV TRIP
*
646              511    or          630             n
546    time        0    ge   timeof  646      2.00    1
547    p   240010000    le     null    0     315.0    1
647              546   and          547             1
*
*************************************************************************
**
*    AUTOMATIC DEPRESSURIZATION SYSTEM
```

```
*
*         ADS ACTUATION CONDITIONS
*
*    TRIP 511: WAS HIGH DRYWELL PRESSURE (17.2 PSIA) EXCEEDED ?
*    TRIP 550: IS RPV LEVEL CURRENTLY BELOW LO LO LEVEL (80.0 INCHES) ?
*    TRIP 650: ARE TRIPS 511 AND 550 BOTH TRUE?  THEN LO LO LEVEL AND
*              HI DRYWELL PRESSURE SIGNALS COEXISTED AT LAST TIME STEP.
*    TRIP 551: 122.0 SECOND DELAY (120 SEC TIMER, 2.0 CIRCUITS) REQUIRED
AFTER
*              TRIP 650 (TESTED AT LAST TIME STEP) IS TRUE PRIOR TO ADS.
*    TRIP 651: ARE BOTH TRIPS 551 AND 650 CURRENTLY TRUE ?
*    TRIP 694: IS AT LEAST ONE LO PRESSURE ECC PUMP RUNNING ?
*    TRIP 652: ARE TRIPS 651 AND 694 BOTH TRUE?  THEN VALID ADS SIGNAL
EXISTS.
*    TRIP 552: IS MAIN STEAMLINE PRESSURE SUFFICIENTLY HIGH,114.7 PSIA
*               TO OPEN PILOTS ON SRV'S?
*    TRIP 653: IF BOTH TRIP 552 AND 652 ARE TRUE, THEN OPEN ADS
AUTOMATICALLY.
*
*    TRIP 554: IS TIME GE TO MANUAL ADS ACTUATION TIME ?
*    TRIP 654: IF  TRIPS 552 AND 554 ARE BOTH TRUE, THEN OPERATORS
*              MANUALLY OPEN ADS VALVES.
*
*    TRIP 655: IF TRIP 653 OR 654 IS TRUE, THEN OPEN ADS VALVES.
*              OTHERWISE, MAINTAIN OR TRIP ADS VALVES CLOSED.
*
550   cntrlvar  003   lt   null      0    80.0    n
650             511  and   550                    n
551   time        0   ge   timeof  650   122.0    l
651             551  and   650                    l
652             651  and   694                    l
552   p   240010000   ge   null      0   114.7    n
553   p   240010000   le   null      0    64.7    n *  close ads valves
653             552  and   652                    n *  criteria for auto
ads
*
554   time        0   ge   timeof  550   602.0    n
654             552  and   554                    n *  criteria for
manual ads
*
655             653   or   654                    n *  ramp ads open
(manual or
*
*******************************************************************************
**
**    SAFETY/RELIEF VALVE 1
*
*    S/RV1 OPENS AT 1080.0 PSID ABOVE DRYWELL AND ADS IS OFF
*    S/RV1 CLOSES AT (0.97)*(1080 PSIG)= 1047.6 PSID ABOVE DRYWELL OR
WHEN ADS
*      (SEPARATE JUNCTION) OPENS.
*
560    p    544010000    ge    p 614010000  1080.0    n
561    p    544010000    le    p 614010000  1047.6    n
566    time         0    ge    timeof  560     0.4    n
660              566   and   -655                    n
661              561    or    655                    n
*
*    SAFETY/RELIEF VALVES 2 AND 3
*    S/RV23 OPENS AT 1090.0 PSID ABOVE DRYWELL AND ADS IS OFF
*    S/RV23 CLOSES AT (0.97)(1090 PSID)= 1057.3 PSID ABOVE DRYWELL OR
```

```
WHEN ADS
*       (SEPARATE JUNCTION) OPENS.
*
562     p     544010000     ge     p 614010000   1090.0     n
563     p     544010000     le     p 614010000   1057.3     n
567     time          0     ge     timeof  562     0.4     n
662                 567    and    -655                      n
663                 563     or     655                      n
*
*     SAFETY/RELIEF VALVE 4
*     S/RV4  OPENS AT 1100.0 PSID ABOVE DRYWELL AND ADS IS OFF
*     S/RV4 CLOSES AT (0.97)(1100 PSID)= 1067.0 PSID ABOVE DRYWELL OR
WHEN ADS
*       OPENS.
*
564     p     544010000     ge     p 614010000   1100.0     n
565     p     544010000     le     p 614010000   1067.0     n
568     time          0     ge     timeof  564     0.4     n
664                 568    and    -655                      n
665                 565     or     655                      n
*
*     SAFETY VALVES 1 AND 2 (CURRENTLY DEACTIVATED)
*     SV12 OPENS AT 1240.0 PSID ABOVE DRYWELL
*     SV12 CLOSES AT (.97)(1240 PSID) = 1202.8 PSID ABOVE DRYWELL
*
*566     P      544010000     GE      P 614010000   1240.0     N
*567     P      544010000     LE      P 614010000   1202.8     N
*
*************************************************************************
*****
*
*     HIGH PRESSURE COOLANT INJECTION (HPCI) SYSTEM
*
*     CRITERIA TO CONTROL HPCI INJECTION ON BISTABLE RPV LEVEL
*
*     TRIP 571: IS MAIN STEAM LINE PRESSURE GT 90 PSIA ?
*                 (70 PSIG TECH SPEC + 15 PSIA ATM + 5 PSI UNCERTAINTY = 90
PSIA) I
*     TRIP 572: IS RPV LEVEL LT BISTABLE LEVEL (CNTRLVAR 676 ) ?
*     TRIP 671: ARE BOTH TRIP 571 AND 572 TRUE ?
*
*     CRITERIA TO INITIATE HPCI INJECTION ON HI DRYWELL PRESSURE FOR
FIRST TIME.
*       AFTER FIRST INITIATION, HI DRYWELL PRESSURE SEALS IN BUT IS
OVERRIDDEN
*       BY RPV LEVEL, MAIN STEAMLINE PRESSURE AND HI MAIN STEAMLINE FLOW
*       SIGNALS.
*
*     TRIP 511: IS DRYWELL PRESSURE GE 17.2 PSIA ?
*     TRIP 672: ARE BOTH TRIP 511 AND TRIP 571 TRUE ?
*     TRIP 673: HAS HPCI EVER BEEN INITIATED DURING THIS CASE ?
*     TRIP 674: HPCI READY TO INJECT FOR FIRST TIME ON HIGH DRYWELL
PRESSURE
*                 SIGNAL
*
*     FINAL HPCI INJECTION SIGNALS AT EACH TIME STEP
*
*     TRIP 675: IS TRIP 671 OR TRIP 674 TRUE ?
*     TRIP 676: ARE TRIPS 675 AND -633 BOTH TRUE ?  IF SO,THEN
*                 HPCI STARTS UP OR CONTINUES TO INJECT.
*     TRIP 573: IF HPCI ECC INJECTION STARTS,THEN START HPCI
```

```
*                STEAM TURBINE FLOW.
*
571    p    544010000    gt    null    0    90.0    n
572    cntrlvar   003    lt    cntrlvar 676  0.0    n
671                571   and   572                  n
*
672                511   and   571                  n
673                676   and   676                  1
674                672   and  -673                  n
*
675                671    or   674                  n
676                675   and  -633                  n * hpci pump
startup or on
*
573    mflowj 701000000  gt    null  0       0.0    n *  hpci steam
turbine on
*
*******************************************************************
*****
*
*    REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM (DEACTIVATED)
*
*      NOTE:  THE RCIC ACTUATION AND TERMINATION LOGIC IS VERY SIMILAR
TO
*             THE HPCI LOGIC EXCEPT RCIC DOES NOT ACTUATE ON HIGH
DRYWELL
*             PRESSURE.  THUS, MANY OF THE HPCI TRIP SIGNALS ARE USED TO
*             AVOID REDUNDANCY.  THESE TRIPS MEAN THE FOLLOWING FOR
RCIC:
*
*    CRITERIA TO CONTROL RCIC INJECTION ON BISTABLE RPV LEVEL
*
*    TRIP 571: IS MAIN STEAM LINE PRESSURE GT 90 PSIA ?
*    TRIP 572: IS RPV LEVEL LT BISTABLE LEVEL (CNTRLVAR 676 ) ?
*    TRIP 671: ARE BOTH TRIP 571 AND 572 TRUE ?
*
*    FINAL RCIC INJECTION SIGNALS AT EACH TIME STEP
*
*    TRIP 677: ARE TRIPS 671 AND -633 BOTH TRUE ?  IF SO,THEN
*                RCIC STARTS UP OR CONTINUES TO INJECT.
*    TRIP 574: IF RCIC ECC INJECTION STARTS, THEN START RCIC
*                STEAM TURBINE FLOW.
*
*571    P    544010000    GT    NULL    0    90.0    N
*572    CNTRLVAR   003    LT    CNTRLVAR 676  0.0    N
*671                571   AND   572                  N
**
**
*677                671   AND   -633                 N * RCIC PUMP
STARTUP OR ON
***
*574    MFLOWJ 711000000  GT    NULL  0       0.0    N *  RCIC STEAM
TURBINE ON
*
*************************************************************
*
*    LOW PRESSURE CORE SPRAY (LPCS) SYSTEMS
*
*    CRITERIA FOR LPCS PUMPS TO REACH RATED SPEED
*
*    TRIP 511: IS HIGH DRYWELL PRESSURE (17.2 PSIA) EXCEEDED ?
```

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*    TRIP 530: IS RPV LEVEL LE LO LO LEVEL (80.0 INCHES WRT TOEF) ?
*    TRIP 630: PREVENTS L0 L0 LEVEL SIGNAL PRIOR TO ACCIDENT.
*    TRIP 547: IS RPV PRESSURE LE LO RPV PRESSURE (315.0 PSIA) ?
*    TRIP 680: VALID LO LO LEVEL WITHR ACCIDENT INITIATION SIGNAL VALID
*    TRIP 681: DOES A VALID LPCS INITIATION SIGNAL EXIST ?
*    TRIP 580: ADD 2.0 SEC DELAY ON EITHER LEVEL OR PRESSURE READINGS.
*    TRIP 581: DID THE LPCS INITIATION SIGNAL OCCUR PRIOR TO THE
EARLIEST
*                  TIME ALLOWED FOR LPCS PUMP START UP ?
*    TRIP 582: IS THE CURRENT TIME GE TO THE EARLIEST TIME ALLOWED FOR
THE
*                  LPCS PUMPS TO BE AT RATED SPEED ?
*    TRIP 682: IF BOTH TRIP 581 AND TRIP 582 ARE TRUE, THEN THE LPCS
PUMPS ARE
*                  AT RATED SPEED.
*    TRIP 583: IF TRIP 581 IS FALSE, THEN IS THE CURRENT TIME GE TO THE
TIME
*     AND    :    THAT A VALID LPCS INITIATION SIGNAL OCCURRED PLUS A
5.4 SEC
*    TRIP 683:    DELAY (2.0 SEC CIRCUIT DELAY AND 5.0 SEC PUMP STARTUP)
?
*    TRIP 684: IF EITHER TRIP 682 OR 683 IS TRUE, THEN THE LPCS PUMPS
ARE AT
*                  RATED SPEED.
*
*    CRITERIA FOR LPCS MOTOR OPERATED DISCHARGE VALVES TO OPEN
*
*    TRIP 584: IS TIME GE TIME OF TRIP 502 + 13.0 SECONDS, IE
*                  IS POWER AVAILABLE ON THE EM BUSES?
*    TRIP 685: ARE BOTH TRIP 584 AND TRIP 681 TRUE?
*    TRIP 686: ARE BOTH TRIP 547 AND TRIP 685 ARE TRUE?
*    TRIP 586: IF TIME IS GE TO TIME OF TRIP 686 PLUS 11. SEC.
*                  (2.0 CIRCUITS,9.0 VALVE OPEN), THEN THE LPCS
*                  INJECTION VALVE IS FULL OPEN.
*
*    CRITERIA FOR LPCS READY FOR INJECTION (SUBJECT TO LPCS SYSTEM
*      PRESSURE VS FLOW CHARACTERISTICS).
*
*    TRIP 687: IF BOTH TRIP 684 AND 586 ARE TRUE, THEN LPCS IS READY TO
INJECT
*
680               547   and    630                  1
681               511    or    680                  1
580    time         0    ge    timeof  681   2.0    1
581    timeof     580    le    timeof  502  23.0    1
582    time         0    ge    timeof  502  28.0    1
682               581   and    582                  1
583    time         0    ge    timeof  580   5.0    1
683               583   and   -581                  1
684               682    or    683                  1
*
584    time         0    ge    timeof  502  13.0    1
685               584   and    681                  1
686               547   and    685                  1
586    time         0    ge    timeof  686   11.0   1
*
687               684   and    586                  1   * lpcs starts
injecting
*
*****************************************************************************
*****
```

```
*
*    LOW PRESSURE COOLANT INJECTION (LPCI) SYSTEMS
*
*    CRITERIA FOR LPCI PUMPS TO REACH RATED SPEED.
*     THE LPCI INITIATION SIGNALS ARE THE SAME AS THE LPCS INITIATION
SIGNALS,
*     ALTHOUGH SEPARATE INSTRUMENTS AND LOGIC CIRCUITS ARE USED.  THUS
TRIP
*     681 IS USED AND MEANS THE FOLLOWING FOR LPCI:
*
*    TRIP 681: DOES A VALID LPCI INITIATION SIGNAL EXIST ?
*    TRIP 588: DID THE LPCI INITIATION SIGNAL OCCUR PRIOR TO POWER
AVAILABLE
*                  ON THE EMERGENCY BUSES ?
*    TRIP 589: IS THE CURRENT TIME GE TO THE EARLIEST TIME ALLOWED
*                  FOR ALL LPCI PUMPS TO BE AT RATED SPEED ?
*    TRIP 689: IF TRIPS 588 AND 589 ARE BOTH TRUE, THEN ALL LPCI
*                  PUMPS ARE AT RATED SPEED AT THEIR EARLIEST TIME.
*    TRIP 590: IF TRIP 588 IS FALSE, THEN IS THE CURRENT TIME GE TO THE
TIME
*     AND    :    THAT A VALID LPCI INITIATION SIGNAL OCCURRED PLUS A
12.10 SEC
*    TRIP 690:    DELAY (2.10 SEC CIRCUIT, 10.0 SEC FOR SEQUENTIAL PUMP
START UP
*
*    TRIP 691: IF EITHER TRIP 689 OR TRIP 690 IS TRUE, THEN THE LPCI
PUMPS
*                  ARE AT RATED SPEED.
*
*    CRITERIA FOR LPCI MOTOR OPERATED INJECTION VALVES TO OPEN.
*
*    TRIP 592: IS THE CURRENT TIME GE TO THE TIME NEEDED TO OPEN THE
INJECTION
*                  VALVES AFTER THE LOW RPV PRESSURE SIGNAL (TRIP 547)
OCCURRED
*                  IE TRIP 547 TIME PLUS 26.10 SEC DELAY (2.10 SEC
CIRCUITS, 24.0
*                  SECOND VALVE OPENING TIME) ?
*    TRIP 692: IF TRIP 681 AND TRIP 592 ARE BOTH TRUE, THEN THE
INJECTION
*                  VALVES SHOULD BE OPEN.
*
*    CRITERIA FOR LPCI READY FOR INJECTION (SUBJECT TO LPCI SYSTEM
*     PRESSURE VS FLOW CHARACTERISTICS)
*
*    TRIP 693: IF TRIP 691 AND 692 ARE BOTH TRUE, THEN LPCI IS READY TO
INJECT.
*    TRIP 694: IF TRIP 684 OR TRIP 691 IS TRUE, THEN AT LEAST ONE LOW
PRESSURE
*                  ECC PUMP IS AT RATED SPEED FOR THE ADS CRITERIA.
*    TRIP 695: IF TRIP 687 OR TRIP 693 IS TRUE, THEN THE REWET/QUENCH
TRIP
*                  IS TRUE FOR AN EM ANALYSIS.
*
588    timeof 580   le    timeof    502    13.00   1
589    time     0   ge    timeof    502    23.0    1
689           588  and    589                      1
590    time     0   ge    timeof    580    10.00   1
690           590  and   -588                      1
691           689   or    690                      1   * the lpci pumps
are star
```

```
*
593     time      0    ge     timeof    547     2.10     1
696             546    and    593                       1    * open lpci
injection val
*
* The following trips are used for the ADS opening criteria *
*
592     time      0    ge     timeof    547     26.1     1
692             592    and    681                       1
*
693             691    and    692                       1
694             684     or    691                       1    * one lp pump is
running
*
* The following trip activates the rewet-quench model *
*
695             687     or    693                       1    * lpci/lpcs
inejecting
*
*******************************************************************************
*******
*           HYDRODYNAMIC COMPONENT DATA
*
*******************************************************************************
*******
*     LOWER PLENUM REGION             *
*************************************
*
0020000     loplnv02    snglvol
*
0020101     0.0         3.516       248.24      0.0         90.0
*
0020102     3.516       1.500e-4    1.827    00000
*
0020200 000          1099.6        515.32       1105.81           0.
*
*************************************
```