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Calculational Methods for Analysis of Postulated UF_6 Releases

W. R. Williams

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Calculational methods and computer programs for the analysis of source terms for postulated releases of UF_6 are presented. Required thermophysical properties of UF_6, HF, and H_2O are described in detail. UF_6 reacts with moisture in the ambient environment to form HF and H_2O. The coexistence of HF and H_2O significantly alters their pure component properties, and HF vapor polymerizes. A release rate model of UF_6 is presented that considers the transient conditions inside containment and the flashing, multiphase flow of UF_6 along the release pathway. Transient compartment models for simulating UF_6 releases inside rooms ventilated by forced- and induced-draft systems are also described. The basic compartment model mass and energy balances are supported by simple heat transfer, ventilation system, and deposition models. A model that can simulate either a closed compartment or a steady-state ventilation system is also discussed. Listings of all main programs (including two plotting routines) and subroutines are included. Example problems illustrate the analysis of postulated releases using the described programs.

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Appendix A
LISTINGS OF MAIN PROGRAMS

This appendix contains listings of the main programs described in Chaps. 3 and 4. These programs include the transient compartment model programs FODRFT (Appendix A.1) and INDRFT (Appendix A.2), the closed compartment/ventilation system model BATCH (Appendix A.3), a program for simulating releases from a cylinder through a breach in containment or a piping system, BYLIND (Appendix A.4), and the plotting programs COMPLT (Appendix A.5) and CYLPLT (Appendix A.6). COMPLT plots output from FODRFT and INDRFT, while CYLPLT plots output from CYLIND.

Table A.1 lists the subroutines required for the execution of each main program, excluding the plotting programs. COMPLT and CYLPLT require the availability of DISSPLA version 9.0* on the user's system. These subroutines are listed in Appendix B. Table A.2 identifies the input/output device numbers used in each main program.

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*For information on DISSPLA, contact Integrated Software Systems Corporation, 10505 Sorrento Valley Road, San Diego, CA, 92121.

Table A.1. Main program subroutine requirements

Subroutines	Main Programs			
	FODRFT	INDRFT	BATCH	CYLIND
BREACH				*
COMPRT	*	*	*	
CPUF6				
DENTHL	*	*	*	
DENUF6	*	*	*	*
DPFLOW	*	*		
EQTUF6	*	*	*	*
FLASH	*	*	*	*
HCOEFF	*	*		
HFPOLY	*	*	*	
HHFH2O	*	*	*	
HUF6	*	*	*	*
HUMID	*	*	*	
INTMEB				*
LEVEL				*
MIXFLW			*	
PHASE	*	*	*	
PHFH2O	*	*	*	
PIPSYS				*
REMOVE	*	*		
RESIST	*	*		
ROOM	*	*	*	
SETRAY	*	*	*	
SSBLOW	*	*		
STERM	*	*	*	
SUF6	*	*	*	*
THCUF6				
TRBLOW		*		
VISUF6				*
VPRUF6	*	*	*	*
ZUF6	*	*	*	*

Table A.2. I/O device numbers

Program	Input Files	Output files: To others programs	Output files: For printing/plotting
FODRFT	40,22[a]	48[b],49	41,42,43,44,45,46,47[c]
INDRFT	40,22[a]	48[b],40	41,42,43,44,45,46,47[c]
BATCH	5		6
CYLIND	20	22,30,31	30
COMPLT	48[b],49		*d*
CYLPLT	30,31		*d*

[a]Input device number 22 is an optional input file to FODRFT and INDRFT.

[b]The file written to device 48 by FODRFT or INDRFT for use by COMPLT is unformatted.

[c]FODRFT and INDRFT output files provide conditions in the compartment (41), inlet flow conditions (42), source term conditions (43), outlet flow conditions (44), deposition rate information (45), condensate accumulation on the floor (46), and release summary (47).

[d]Compressed data files are generated via an initial call to the subroutine COMPRS.

A.1 FODRFT - A Forced-Draft Compartment Model

```
C  THIS PROGRAM MODELS A RELEASE OF UF6 OR HF INTO A COMPARTMENT
C  HAVING A FORCED DRAFT VENTILATION SYSTEM. NODE NUMBERS AND
C  STREAM DEFINITIONS FOR THIS MODEL ARE AS FOLLOWS.
C
C       1        COMPARTMENT
C       2        INLET AIR BLOWER
C       3        SOURCE TERM
C       4        FORCED DRAFT EXHAUST
C       5        CONDENSATE FALLOUT
C       6        COMPARTMENT FLOOR
C       7        AMBIENT
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    COMMON BLOCK VARIABLES
C
C       /LBMASS/
C
C       MASS     (30,9)  NODE MASS, LB, OR MASS FLOW RATE, LB/(DELT)
C       RH               RELATIVE HUMIDITY, % (AS INPUT) OR FRACTION
C                        (INTERNAL)
C
C       /COMPTP/
C
C       TC       (30)    NODE TEMPERATURE, DEG F
C       PC       (30)    NODE PRESSURE, PSIA
C       TSURF    (30)    NODE HEAT TRANSFER SURFACE TEMPERATURE, DEG F
C
C       /MOLWT/
C
C       WMOL     (9)     COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
C
C       /VOLUME/
C
C       VOL      (30)    NODE VOLUME, FT**3
C       KRCOEF   (30)    RESISTANCE COEFFICIENT, --, OR RESISTANCE TERM,
C                        RESISTANCE TERM, PSI-SEC**2/LB-FT**3
C       DPAREA   (30)    DEPOSITION AREA, FT**2
C       DEPVEL           DEPOSITION VELOCITY, FT/SEC
C
C       /ENTHAL/
C
C       H        (30)    NODE ENTHALPY, BTU, OR ENTHALPY RATE, BTU/(DELT)
C       QRATE    (30)    HEAT TRANSFER RATE, BTU/SEC OR BTU/(DELT)
C       QCOOL    (30)    COOLING RATE, BTU/HR (INPUT) OR BTU/SEC
C                        (INTERNAL)
C       HTCOEF   (30)    HEAT TRANSFER COEFFICIENT, BTU/SEC-FT**2-DEG F
C       HTAREA   (30)    HEAT TRANSFER AREA, FT**2
C
C       /ISTRMS/
C
C       IIN      (30,4)  INLET STREAM NODE NUMBER
```

```
C       IOUT    (30,4)  OUTLET STREAM NODE NUMBER
C
C       /CONTRL/
C
C       AMINLN          NATURAL LOG OF MINIMUM NUMBER ACCEPTED BY THE
C                       COMPUTER
C       TIME            CUMULATIVE SIMULATION TIME, SEC
C       DELT            TIME INTERVAL USED FOR TRANSIENT SIMULATION, SEC
C       MAXTIM          MAXIMUM SIMULATION TIME, SEC
C       IFLAG           FLAG TO CONTROL PRINTING OF OUTPUT
C       TRELS           TOTAL RELEASE TIME, SEC
C
C       /POLYMR/
C
C       C1              WEIGHT FRACTION OF HF MONOMER TO TOTAL HF VAPOR
C       C3              WEIGHT FRACTION OF HF TRIMER TO TOTAL HF VAPOR
C       C6              WEIGHT FRACTION OF HF HEXAMER TO TOTAL HF VAPOR
C       WMBHF           MOLECULAR WEIGHT OF HF MONOMER, LB/LB MOLE
C
C       /MISCEL/
C
C       ITYPE           VARIABLE TO SPECIFY TYPE OF RELEASE, SEE CARD 5
C       SOURCE          TOTAL MASS OF RELEASE, LB
C       ISEN            VARIABLE TO SPECIFY ISENTROPIC OR ISENTHALPIC
C                       RELEASE, SEE CARD 5
C
C       /RVFLOW/
C
C       TSTART  (30)    START OF REVERSE FLOW (NOT USED)
C       TSTOP   (30)    END OF REVERSE FLOW (NOT USED)
C
C     EQUIVALENCED VARIABLES
C
C       VOL     ACFM    (30)    VOLUMETRIC FLOW RATE, FT**3/MIN
C               FLAREA  (30)    FLOW AREA FOR PRESSURE-DROP-CONTROLLED
C                               NODE, FT**2
C
C     OTHER DIMENSIONED VARIABLES
C
C       RATE    (9)     COMPONENT MASS FLOW RATE, LB/SEC
C       MSOURC  (5)     INCREMENTAL SOURCE MASS, LB
C       TSOURC  (5)     INCREMENTAL RELEASE TIME, SEC
C       TEMP    (5)     TEMPERATURE OF INCREMENTAL SOURCE, DEG F
C       PRES    (5)     PRESSURE OF INCREMENTAL SOURCE, PSIA
C       NAME    (9)     COMPONENT IDENTIFIER
C       TITLE   (10)    TITLE ARRAY
C       DWGNUM  (6,4)   PLOT NUMBER ARRAY
C
C     UNDIMENSIONED VARIABLES
C
C       INODES          MAXIMUM NUMBER OF NODES ALLOWED BY CODING OF
C                       SUBROUTINES
C       INOUT           MAXIMUM NUMBER OF INLET STREAMS AND OUTLET
C                       STREAMS
```

```
C       IRELST          NUMBER OF INCREMENTAL RELEASES IN TOTAL RELEASE
C                       (MAXIMUM OF 5)
C       MW              MOLECULAR WEIGHT, LB/LB MOLE
C       MWURAN          MOLECULAR WEIGHT OF URANIUM, LB/LB MOLE
C       MRELS           TOTAL MASS OF SOURCE MATERIAL RELEASED, LB
C       PTEST           VAPOR PRESSURE OF SOURCE, PSIA
C       PRINT           PRINT INTERVAL, SEC
C       RATIO           RATIO OF MOLES OF WATER VAPOR TO TOTAL MOLES OF
C                       MOIST AIR
C       UA              PRODUCT OF HEAT TRANSFER COEFICIENT AND AREA,
C                       BTU/SEC-DEG F
C       ICOUNT          COUNTER TO CONTROL PRINTING OF OUTPUT
C       IRELS           CURRENT INCREMENT OF TOTAL RELEASE
C       DELTAT          SOURCE TERM INPUT INTERVAL, SEC
C       SOLIDS          MASS FLOW RATE OF UF6 SOLIDS ONTO THE FLOOR,
C                       LB/(DELT)
C       IDEV            OUTPUT DEVICE
C       HRATE           ENTHALPY RATE, BTU/SEC
C       DENU            COMPARTMENT CONCENTRATION OF URANIUM, LB/FT**3
C       DENHF           COMPARTMENT CONCENTRATION OF HF, LB/FT**3
C       UF6REL          CUMULATIVE MASS OF UF6 RELEASED TO THE
C                       ATMOSPHERE, LB
C       UOFREL          CUMULATIVE MASS OF UO2F2 RELEASED TO THE
C                       ATMOSPHERE, LB
C       UTOT            CUMULATIVE MASS OF URANIUM RELEASED TO THE
C                       ATMOSPHERE, LB
C       HFREL           CUMULATIVE MASS OF HF RELEASED TO THE
C                       ATMOSPHERE, LB
C       HFUF6           CUMULATIVE MASS OF HF THAT CAN BE FORMED FROM
C                       UF6 RELEASED TO THE ATMOSPHERE, LB
C       HFTOT           CUMULATIVE MASS OF HF RELEASED TO OR FORMED IN
C                       THE ATMOSPHERE, LB
C
C    LOGICAL VARIABLES
C
C       CHECK           FLAG IN ESTABLISHING INITIAL STEADY STATE
C                       CONDITIONS ABOUT NODE 2
C
C  THE FOLLOWING SUBROUTINES ARE CALLED BY FODRFT.
C
C               COMPRT
C               DENTHL
C               DPFLOW
C               HCOEFF
C               HUMID
C               PHFH2O
C               REMOVE
C               RESIST
C               ROOM
C               SETRAY
C               SSBLOW
C               STERM
C               VPRUF6
C
```

```
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C                DENUF6
C                EQTUF6
C                FLASH
C                HFPOLY
C                HHFH2O
C                HUF6
C                PHASE
C                SUF6
C                ZUF6
C
C*************************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      LOGICAL CHECK
C
      DIMENSION FLAREA(30), ACFM(30), RATE(9), MSOURC(5), TSOURC(5),
     *     TEMP(5), PRES(5)
      DIMENSION NAME(9), TITLE(10), DWGNUM(6,4)
C
      COMMON /LBMASS/ MASS(30,9), RH
      COMMON /COMPTP/ TC(30), PC(30), TSURF(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ VOL(30), KRCOEF(30), DPAREA(30), DEPVEL
      COMMON /ENTHAL/ H(30), QRATE(30), QCOOL(30), HTCOEF(30),
     *     HTAREA(30)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, MAXTIM, IFLAG, TRELS
      COMMON /POLYMR/ C1, C3, C6, WMBHF
      COMMON /MISCEL/ ITYPE, SOURCE, ISEN
      COMMON /RVFLOW/ TSTART(30), TSTOP(30)
C
      EQUIVALENCE (VOL(1),ACFM(1),FLAREA(1))
C
      DATA NAME /8HAIR   V , 8HH2O   L , 8HH2O   V , 8HHF    L ,
     *     8HHF    V , 8HUF6   S , 8HUF6   L , 8HUF6   V , 8HUO2F2 S /
C
      CALL SETRAY(INODES, INOUT)
C
C  NODE ASSIGNMENT
C  ===============
C
      IIN(1,1) = 2
      IIN(1,2) = 3
      IIN(2,1) = 7
      IIN(4,1) = 1
      IIN(5,1) = 1
      IIN(6,1) = 5
C
```

```
      IOUT(1,1) = 4
      IOUT(1,2) = 5
      IOUT(4,1) = 7
      IOUT(5,1) = 6
C
C  READ STATEMENTS
C  ===============
C
C  ALL INPUT DATA EXCEPT THAT ON CARDS 1 AND 9 ARE READ IN FREE FORMAT.
C  ON CARDS 1 AND 9, COUNT CHARACTERS STARTING IN COLUMN 1.
C
C  ______________________________________________________________________
C /
C/ CARD 1.   READ TITLE (MAXIMUM OF 80 CHARACTERS).
C
      READ (40,4000) TITLE
C
C  ______________________________________________________________________
C /
C/ CARD 2.   READ AMBIENT TEMPERATURE (F), PRESSURE (PSIA), AND RELATIVE
C            HUMIDITY (%).
C
      READ (40,*) TC(7), PC(7), RH
C
      IF (RH.GT.1.D0) RH = RH/1.D2
C
C  ______________________________________________________________________
C /
C/ CARD 3.   READ COMPARTMENT TEMPERATURE (F), PRESSURE (PSIA), VOLUME
C            (FT**3), AND FLOOR (DEPOSITION) AREA (FT**2).
C
      READ (40,*) TC(1), PC(1), VOL(1), DPAREA(1)
C
C  ______________________________________________________________________
C /
C/ CARD 4.   READ INLET AIR BLOWER FLOW RATE (ACFM).
C
      READ (40,*) ACFM(2)
C
C  ______________________________________________________________________
C /
C/ CARD 5.   READ HEAT TRANSFER SURFACE AREA IN COMPARTMENT (FT**2),
C            HEAT TRANSFER SURFACE TEMPERATURE (F), AND COOLING RATE
C            (BTU/HR). A NEGATIVE COOLING RATE IMPLIES A HEATING RATE.
C            WHILE THE VALUE OF THE SURFACE AREA IS NOT PARTICULARLY
C            IMPORTANT BECAUSE THE PRODUCT OF THE SURFACE AREA AND THE
C            HEAT TRANSFER COEFFICIENT TO BE CALCULATED WILL BE
C            CONSTANT, A SURFACE TEMPERATURE GREATER THAN THE
C            COMPARTMENT TEMPERATURE MUST BE SPECIFIED.
C
      READ (40,*) HTAREA(1), TSURF(1), QCOOL(1)
C
      QCOOL(1) = QCOOL(1)/3.6D3
C
```

```
C    ______________________________________________________________________
C /
C/ CARD 6.   READ SOURCE TYPE, NUMBER OF RELEASES, BASIS FOR FLASH, AND
C            MOLECULAR WEIGHT. SOURCE TYPE IS GIVEN BY THE FOLLOWING:
C
C                   4   LIQUID HF
C                   5   VAPOR HF
C                   7   LIQUID UF6 (VAPOR SOURCE TERM GENERATED)
C                  -7   LIQUID UF6 (VAPOR/SOLID SOURCE TERM GENERATED)
C                   8   VAPOR UF6
C                  22   INPUT PROVIDED IN FOR22.DAT
C
C            IF SOURCE TYPE 22 IS SPECIFIED, SET NUMBER OF RELEASES TO
C            ZERO. NO MORE THAN FIVE RELEASES MAY BE SPECIFIED, WHICH
C            ARE TO RUN CONSECUTIVELY. THE BASIS FOR THE FLASH IS GIVEN
C            BY THE FOLLOWING:
C
C                   0   ISENTROPIC
C                   1   ISENTHALPIC
C
C            THE DEFAULT MOLECULAR WEIGHT FOR UF6 IS 352.025; ENTER A
C            VALUE LESS THAN 100 IF THAT VALUE IS ACCEPTABLE.
C
      READ (40,*) ITYPE, IRELST, ISEN, MW
C
      IF (MW.LT.100.D0) GO TO 10
C
      WMOL(9) = WMOL(9) - WMOL(6) + MW
      WMOL(6) = MW
      WMOL(7) = MW
      WMOL(8) = MW
C
   10 CONTINUE
C
      MWURAN = WMOL(6) - 113.99D0
C
      IF (ITYPE.EQ.22) GO TO 30
C
C    ______________________________________________________________________
C /
C/ CARD 7.   -- DO NOT USE "CARD 7" CARDS IF ITYPE = 22. --
C
C            READ FOR EACH INCREMENTAL RELEASE THE DURATION (SEC), MASS
C            (LB), TEMPERATURE (DEG F), AND PRESSURE (PSIA). SPECIFY AS
C            MANY SETS OF DATA AS THE NUMBER OF RELEASES (IRELST). IF
C            THE PRESSURE GIVEN IS LESS THAN OR EQUAL TO ZERO OR GREATER
C            THAN THE VAPOR PRESSURE, THE PRESSURE IS SET EQUAL TO THE
C            VAPOR PRESSURE FOR THAT INCREMENT.
C
      READ (40,*) (TSOURC(I), MSOURC(I), TEMP(I), PRES(I), I=1,IRELST)
C
      TRELS = 0.D0
C
      MRELS = 0.D0
```

```
C
      DO 20 I20=1,IRELST
C
           TRELS = TRELS + TSOURC(I20)
C
           MRELS = MRELS + MSOURC(I20)
C
           IF (ITYPE.EQ.5) CALL PHFH2O(TEMP(I20), 1.D0, 0.D0, PTEST,
     *          0.D0, 0.D0)
           IF (ITYPE.EQ.8) CALL VPRUF6(TEMP(I20), PTEST)
C
           IF (PRES(I20).GT.PTEST .OR. PRES(I20).LE.0.D0)
     *          PRES(I20) = PTEST
C
   20 CONTINUE
C
   30 CONTINUE
C
C ______________________________________________________________________
C /
C/ CARD 8.   READ TIME INTERVAL FOR CALCULATIONS (SEC), DURATION OF
C            SIMULATION (SEC), AND  PRINT INTERVAL (SEC).
C
      READ (40,*) DELT, MAXTIM, PRINT
C
      IFLAG = IDINT(PRINT/DELT+0.01D0)
C
C ______________________________________________________________________
C /
C/ CARD 9.   -- THESE CARDS ARE OPTIONAL. --
C
C            READ DRAWING NUMBERS FOR PLOTS (LIMITED TO 20 CHARACTERS--
C            THE LAST CHARACTER MUST BE A DOLLAR SIGN ($)).
C
C               1ST CARD 9 = CUMULATIVE URANIUM RELEASED
C               2ND CARD 9 = CUMULATIVE HF RELEASED
C               3RD CARD 9 = URANIUM CONCENTRATION IN COMPARTMENT
C               4TH CARD 9 = HF CONCENTRATION IN COMPARTMENT
C               5TH CARD 9 = TEMPERATURE IN COMPARTMENT
C               6TH CARD 9 = PRESSURE IN COMPARTMENT
C
      DO 40 I40=1,6
C
           READ (40,4010,END=50) (DWGNUM(I40,I), I=1,4)
           WRITE (49,4010) (DWGNUM(I40,I), I=1,4)
C
   40 CONTINUE
C
   50 CONTINUE
C
      WRITE (49,4020)
C
C***********************************************************************
C
```

```
C  STEADY STATE CONDITIONS
C  =======================
C
C  SET STEADY-STATE CONDITIONS FOR THE COMPARTMENT, EXHAUST, AND INLET
C  AIR NODES.
C
      CALL HUMID(7, RH, RATIO)
C
      VOL(7) = 1.D9
C
      CALL ROOM(7, RATIO)
C
      CALL ROOM(1, RATIO)
C
      CALL SSBLOW(2, RATIO)
C
      MASS(4,1) = MASS(2,1)
      MASS(4,3) = MASS(2,3)
C
      TC(4) = TC(1)
      PC(4) = PC(1)
C
      KRCOEF(4) = 0.D0
C
      CALL RESIST(4)
C
      CALL DENTHL(TC(4), PC(4), 4, H(4))
C
      CALL HCOEFF(1)
C
      UA = HTCOEF(1) * HTAREA(1)
C
C***********************************************************************
C
C  TITLE BLOCKS
C  ============
C
C  WRITE TITLE AND PROGRAM IDENTIFIER.
C
      DO 60 I60=1,7
C
           IDEV = 40 + I60
C
           WRITE (IDEV,4030) TITLE
C
   60 CONTINUE
C
C  WRITE NODE NAMES AND IMPORTANT CONSTANTS FOR EACH FILE.
C
      WRITE (41,4100) VOL(1), UA, TSURF(1), QCOOL(1)
C
      WRITE (42,4200) ACFM(4), TC(7), PC(7)
C
      IF (ITYPE.EQ.4) WRITE (43,4304)
```

```
      IF (ITYPE.EQ.5) WRITE (43,4305)
      IF (IABS(ITYPE).EQ.7) WRITE (43,4307)
      IF (ITYPE.EQ.8) WRITE (43,4308)
C
      IF (ITYPE.NE.22) WRITE (43,4310)
C
      IF (ITYPE.EQ.4) WRITE (43,4320) (TSOURC(I), MSOURC(I),
     *     TEMP(I), I=1,5)
C
      IF (ITYPE.EQ.5) WRITE (43,4330) (TSOURC(I), MSOURC(I),
     *     TEMP(I), PRES(I), I=1,5)
C
      IF (IABS(ITYPE).EQ.7) WRITE (43,4340) (TSOURC(I), MSOURC(I),
     *     TEMP(I), I=1,3)
C
      IF (IABS(ITYPE).EQ.7 .AND. ISEN.EQ.0) WRITE (43,4341) TSOURC(4),
     *     MSOURC(4), TEMP(4)
C
      IF (IABS(ITYPE).EQ.7 .AND. ISEN.EQ.1) WRITE (43,4342) TSOURC(4),
     *     MSOURC(4), TEMP(4)
C
      IF (IABS(ITYPE).EQ.7) WRITE (43,4343) WMOL(6), TSOURC(5),
     *     MSOURC(5), TEMP(5)
C
      IF (ITYPE.EQ.8) WRITE (43,4350) (TSOURC(I), MSOURC(I),
     *     TEMP(I), PRES(I), I=1,3)
C
      IF (ITYPE.EQ.8 .AND. ISEN.EQ.0) WRITE (43,4351) TSOURC(4),
     *     MSOURC(4), TEMP(4), PRES(4)
C
      IF (ITYPE.EQ.8 .AND. ISEN.EQ.1) WRITE (43,4352) TSOURC(4),
     *     MSOURC(4), TEMP(4), PRES(4)
C
      IF (ITYPE.EQ.8) WRITE (43,4353) WMOL(6), TSOURC(5), MSOURC(5),
     *     TEMP(5), PRES(5)
C
      IF (ITYPE.NE.22) WRITE (43,4360) TRELS, MRELS
C
      IF (ITYPE.EQ.7) WRITE (43,4370)
C
      IF (ITYPE.EQ.22) WRITE (43,4380)
C
      WRITE (44,4400) KRCOEF(4)
C
      WRITE (45,4500) DEPVEL, DPAREA(1)
C
      WRITE (46,4600)
C
      WRITE (47,4700)
C
C  WRITE COLUMN HEADINGS.
C
      WRITE (41,4110) NAME
C
```

```
      DO 70 I70=2,4
C
           IDEV = 40 + I70
C
           WRITE (IDEV,4210) NAME
C
   70 CONTINUE
C
      WRITE (45,4510) NAME
C
      WRITE (46,4610) NAME
C
      WRITE (47,4710)
C
C************************************************************************
C
C  TRANSIENT ANALYSIS
C  ==================
C
C  BEGIN TRANSIENT ANALYSIS.
C
      TIME = 0.D0
C
      ICOUNT = IFLAG
C
      IRELS = 1
C
      TRELS = 0.D0
C
C  ______________________________________________________________________
C /
C/ OPTIONAL SOURCE TERM INPUT:  CARD 1.  ENTER TIME INTERVAL FOR SOURCE
C           TERM INPUT (SEC).
C
      IF (ITYPE.EQ.22) READ (22,*) DELTAT
C
   80 CONTINUE
C
C  EVALUATE SOURCE TERM
C  ====================
C
      IF (TIME.LT.TRELS) GO TO 120
C
      IF (ITYPE.NE.22) GO TO 100
C
C  ______________________________________________________________________
C /
C/ OPTIONAL SOURCE TERM INPUT:  CARD 2.  ENTER INITIAL TIME FOR RELEASE
C           INTERVAL (SEC); MASS FLOW RATE (LB/SEC) FOR EACH OF THE NINE
C           COMPONENTS IN THE FOLLOWING ORDER: AIR, H2O(L), H2O(V),
C           HF(L), HF(V), UF6(S), UF6(L), UF6(V), UO2F2; SOURCE TERM
C           TEMPERATURE FOR INTERVAL (DEG F); AND SOURCE TERM PRESSURE
C           FOR THE INTERVAL (PSIA).
C
```

```
      READ (22,*,END=120) TRELS, (RATE(I),I=1,9),TC(IIN(1,2)),
     *     PC(IIN(1,2))
C
      DO 90 I90=1,9
C
           MASS(IIN(1,2),I90) = RATE(I90)*DELT
C
   90 CONTINUE
C
      CALL DENTHL(TC(IIN(1,2)),PC(IIN(1,2)),IIN(1,2),H(IIN(1,2)))
C
      TRELS = TRELS + DELTAT
C
      GO TO 120
C
  100 CONTINUE
C
      IF (IRELS.GT.IRELST) GO TO 120
C
      TRELS = TSOURC(IRELS)
C
      SOURCE = MSOURC(IRELS)
C
      TC(3) = TEMP(IRELS)
C
      PC(3) = PRES(IRELS)
C
      CALL STERM(3, 1, SOLIDS)
C
      TRELS = 0.D0
C
      DO 110 I110=1,IRELS
C
           TRELS = TRELS + TSOURC(I110)
C
  110 CONTINUE
C
      IRELS = IRELS + 1
C
  120 CONTINUE
C
      IF (TIME.GE.TRELS) IIN(1,2) = INODES
C
C  EVALUATE FLOW RATES
C  ===================
C
C    "CALL TRBLOW(2)" -- NOT CALLED SINCE INLET BLOWER PRODUCES
C                        CONSTANT FLOW RATES THROUGHOUT TRANSIENT
C                        ANALYSIS.

C
      CALL DPFLOW(4)
C
      IF (PC(1).LE.PC(7)) WRITE (44,4410) TIME
```

```
C
C  CALCULATE DEPOSITION RATE.
C
      CALL REMOVE(1, 5)
C
      IF (ICOUNT.LT.IFLAG) GO TO 150
C
C  OUTPUT NODE DATA
C  ================
C
C  WRITE COMPARTMENT DATA.
C
      WRITE (41,4120) TIME, (MASS(1,I),I=1,9), TC(1), PC(1)
C
C  WRITE DATA FOR FLOWING STREAMS.
C
      DO 140 I140=2,5
C
           IF (TIME.GE.TRELS .AND. I140.EQ.3) GO TO 140
C
           DO 130 I130=1,9
C
                RATE(I130) = MASS(I140,I130)/DELT
C
  130      CONTINUE
C
           IDEV = 40 + I140
C
           HRATE = H(I140)/DELT
C
           IF (I140.LE.4) WRITE (IDEV,4120) TIME, RATE, TC(I140),
     *          PC(I140)
           IF (I140.GT.4) WRITE (IDEV,4120) TIME, RATE
C
  140 CONTINUE
C
C  WRITE MASSES OF CONDENSED MATERIALS ON FLOOR.
C
      WRITE (46,4120) TIME, (MASS(6,I),I=1,9)
C
      ICOUNT = 0
C
C  WRITE SUMMARY DATA ON RELEASE.
C
      WRITE (47,4720) TIME, UF6REL, UOFREL, UTOT, HFREL, HFUF6, HFTOT,
     *     DENU, DENHF
C
C  WRITE SUMMARY DATA FOR PLOTTING.
C
      IF (TIME.GT.TRELS) WRITE (48,*) TIME, UTOT, HFTOT, DENU, DENHF,
     *     TC(1), PC(1)
C
  150 CONTINUE
C
```

```
      IF (TIME.LE.60.D0 .AND. TIME.LE.TRELS) WRITE (48,*) TIME, UTOT,
     *     HFTOT, DENU, DENHF, TC(1), PC(1)
C
      IF (TIME.GT.60.D0 .AND. TIME.LE.TRELS .AND.
     *     10*(ICOUNT/10).EQ.ICOUNT)
     *     WRITE (48,*) TIME, UTOT, HFTOT, DENU, DENHF, TC(1), PC(1)
C
C  EVALUATE COMPARTMENT CONDITIONS
C  ===============================
C
      TIME = TIME + DELT
C
      IF (TIME.GT.MAXTIM) STOP
C
      ICOUNT = ICOUNT + 1
C
C  PERFORM MASS AND ENENGY BALANCE FOR THE COMPARTMENT.
C
      CALL COMPRT(1, 2, INODES)
C
C  CALCULATE COMPARTMENT CONCENTRATIONS OF URANIUM AND HF.
C
      DENU = ((MASS(1,6) + MASS(1,7) + MASS(1,8))/WMOL(6)
     *     + MASS(1,9)/WMOL(9))*MWURAN/VOL(1)
C
      DENHF = (MASS(1,4) + MASS(1,5))/VOL(1)
C
C  ACCUMULATE SOLID PARTICLES AND LIQUID DROPLETS ON THE FLOOR.
C
      DO 160 I160=1,9
C
           MASS(6,I160) = MASS(6,I160) + MASS(5,I160)
C
  160 CONTINUE
C
      IF (ITYPE.EQ.7 .AND. TIME.LE.TRELS) MASS(6,6) = MASS(6,6)
     *     + SOLIDS
C
C  ACCUMULATE TOTAL MASS QUANTITIES OF URANIUM AND HF RELEASED TO THE
C  ATMOSPHERE.
C
      UF6REL = UF6REL + MASS(4,6) + MASS(4,7) + MASS(4,8)
C
      UOFREL = UOFREL + MASS(4,9)
C
      UTOT = (UF6REL/WMOL(6) + UOFREL/WMOL(9))*MWURAN
C
      HFREL = HFREL + MASS(4,4) + MASS(4,5)
C
      HFUF6 = 4.D0*UF6REL*WMOL(4)/WMOL(6)
C
      HFTOT = HFREL + HFUF6
C
      GO TO 80
```

```
C
C***********************************************************************
C
C  FORMAT STATEMENTS
C  ================
C
 4000 FORMAT (10A8)
C
 4010 FORMAT (4A5)
C
 4020 FORMAT (6(1H$,/))
C
 4030 FORMAT ('1   TITLE: ',10A8,/,'0   DATA GENERATED BY FODRFT -- ',
     *      'A FORCED DRAFT VENTILATION SYSTEM TRANSIENT',
     *      ' COMPARTMENT MODEL.')
C
 4100 FORMAT ('0   COMPARTMENT CONDITIONS',T60,'COMPARTMENT VOLUME  =',
     *      F11.0,' FT**2',/,T60,'U*A PRODUCT          =',
     *      1PE11.3,' BTU/SEC-DEG F',/,T60,'SURFACE TEMPERATURE =',
     *      0PF11.1,' DEG F',/,T60,'COOLING RATE        =',1PE11.3,
     *      ' BTU/SEC')
C
 4110 FORMAT ('0    TIME',42X,'COMPONENT MASS (LB)',39X,
     *      'TEMPERATURE PRESSURE',/,'     (SEC)',9(3X,A8),
     *      '    (DEG F)    (PSIA)',/,1H )
C
 4120 FORMAT (F10.1,1P9E11.3,0P2F10.4)
C
 4200 FORMAT ('0   INLET AIR BLOWER',T60,'FLOW RATE           =',F11.1,
     *      ' ACFM',/,T60,'AMBIENT TEMPERATURE =',F11.3,' DEG F',/,
     *      T60,'AMBIENT PRESSURE    =',F11.3,' PSIA')
C
 4210 FORMAT ('0    TIME',35X,'COMPONENT MASS FLOW RATE (LB/SEC)',
     *      32X,'TEMPERATURE PRESSURE',/'     (SEC)',9(3X,A8),
     *      '    (DEG F)    (PSIA)',/,1H )
C
 4304 FORMAT ('0   SOURCE TERM: HF LIQUID',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4305 FORMAT ('0   SOURCE TERM: HF VAPOR',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4307 FORMAT ('0   SOURCE TERM: UF6 LIQUID',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4308 FORMAT ('0   SOURCE TERM: UF6 VAPOR',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4310 FORMAT (T60,' MENT     (SEC)   (LB)     (DEG F)     (PSIA)')
C
 4320 FORMAT (1H0,T60,'   1',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   2',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   3',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID',/,
```

```
     *      T60,'   5',F11.1,F8.1,F11.3,'    LIQUID')
C
 4330 FORMAT (1H0,T60,'   1',F11.1,F8.1,2F11.3,/,
     *      T60,'   2',F11.1,F8.1,2F11.3,/,
     *      T60,'   3',F11.1,F8.1,2F11.3,/,
     *      T60,'   4',F11.1,F8.1,2F11.3,/,
     *      T60,'   5',F11.1,F8.1,2F11.3)
C
 4340 FORMAT (1H0,T60,'   1',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   2',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   3',F11.1,F8.1,F11.3,'    LIQUID')
C
 4341 FORMAT ('    FLASH BASIS:         ISENTROPIC',
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID')
C
 4342 FORMAT ('    FLASH BASIS:        ISENTHALPIC',
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID')
C
 4343 FORMAT ('    UF6 MOLECULAR WEIGHT =',F8.3,
     *      T60,'   5',F11.1,F8.1,F11.3,'    LIQUID')
C
 4350 FORMAT (1H0,T60,'   1',F11.1,F8.1,2F11.3,/,
     *      T60,'   2',F11.1,F8.1,2F11.3,/,
     *      T60,'   3',F11.1,F8.1,2F11.3)
C
 4351 FORMAT ('    FLASH BASIS: ISENTROPIC',
     *      T60,'   4',F11.1,F8.1,2F11.3)
C
 4352 FORMAT ('    FLASH BASIS: ISENTHALPIC',
     *      T60,'   4',F11.1,F8.1,2F11.3)
C
 4353 FORMAT ('    UF6 MOLECULAR WEIGHT =',F8.3,
     *      T60,'   5',F11.1,F8.1,2F11.3)
C
 4360 FORMAT (T60,' TOTAL',F9.1,F8.1)
C
 4370 FORMAT ('0   SOLIDS FORMED BY FLASHING UF6 LIQUID ARE ASSUMED',
     *      ' TO ACCUMULATE ON THE FLOOR.',/,'    THESE SOLIDS ARE NOT',
     *      ' INVOLVED IN ENERGY BALANCES ABOUT THE COMPARTMENT.')
C
 4380 FORMAT ('0   SOURCE TERM: SOURCE TERM MASS FLOW RATES,',
     *      ' TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.')
C
 4400 FORMAT ('0   EXHAUST STREAM (FORCED DRAFT)',T60,
     *      'RESISTANCE TERM     =',1PE11.3,' PSI-SEC**2/LB/FT**3')
C
 4410 FORMAT (F10.1,'     REVERSE FLOW OCCURING')
C
 4500 FORMAT ('0   CONDENSATE FALLOUT',T60,'DEPOSITION VELOCITY =',
     *      F10.4,' FT/SEC',/,T60,'DEPOSITION AREA     =',F10.0,' FT**2')
C
 4510 FORMAT ('0    TIME',35X,'COMPONENT MASS FLOW RATE (LB/SEC)',
     *      /,'     (SEC)',9(3X,A8),/,1H )
C
```

```
 4600 FORMAT ('0   CONDENSATE ACCUMULATED ON FLOOR')
C
 4610 FORMAT ('0    TIME',42X,'COMPONENT MASS (LB)',/,
     *     '      (SEC)',9(3X,A8),/,1H )
C
 4700 FORMAT ('0   URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT',
     *     ' CONCENTRATIONS')
C
 4710 FORMAT (1H0,T86,'COMPARTMENT CONCENTRATIONS',/,'     TIME       ',
     *     'CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED',
     *     ' MATERIAL (LB)',T94,'(LB/FT**3)',/,'     (SEC)      ',
     *     '      UF6       UO2F2     TOTAL U      HF      HF FROM UF6',
     *     '  TOTAL HF         URANIUM      HF',/,1H )
C
 4720 FORMAT (F10.1,5X,1P6E11.3,5X,2E11.3)
C
C***********************************************************************
C
      END
```

A.2 INDRFT - An Induced-Draft Compartment Model

```
C  THIS PROGRAM MODELS A RELEASE OF UF6 OR HF INTO A COMPARTMENT
C  HAVING AN INDUCED DRAFT VENTILATION SYSTEM. NODE NUMBERS AND
C  STREAM DEFINITIONS FOR THIS MODEL ARE AS FOLLOWS.
C
C       1        COMPARTMENT
C       2        INLET AIR
C       3        SOURCE TERM
C       4        EXHAUST BLOWER
C       5        CONDENSATE FALLOUT
C       6        COMPARTMENT FLOOR
C       7        AMBIENT
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    COMMON BLOCK VARIABLES
C
C       /LBMASS/
C
C       MASS     (30,9)  NODE MASS, LB, OR MASS FLOW RATE, LB/(DELT)
C       RH               RELATIVE HUMIDITY, % (AS INPUT) OR FRACTION
C                        (INTERNAL)
C
C       /COMPTP/
C
C       TC       (30)    NODE TEMPERATURE, DEG F
C       PC       (30)    NODE PRESSURE, PSIA
C       TSURF    (30)    NODE HEAT TRANSFER SURFACE TEMPERATURE, DEG F
C
C       /MOLWT/
C
C       WMOL     (9)     COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
```

```
C
C       /VOLUME/
C
C       VOL     (30)    NODE VOLUME, FT**3
C       KRCOEF  (30)    RESISTANCE COEFFICIENT, --, OR RESISTANCE TERM,
C                       RESISTANCE TERM, PSI-SEC**2/LB-FT**3
C       DPAREA  (30)    DEPOSITION AREA, FT**2
C       DEPVEL          DEPOSITION VELOCITY, FT/SEC
C
C       /ENTHAL/
C
C       H       (30)    NODE ENTHALPY, BTU, OR ENTHALPY RATE, BTU/(DELT)
C       QRATE   (30)    HEAT TRANSFER RATE, BTU/SEC OR BTU/(DELT)
C       QCOOL   (30)    COOLING RATE, BTU/HR (INPUT) OR BTU/SEC
C                       (INTERNAL)
C       HTCOEF  (30)    HEAT TRANSFER COEFFICIENT, BTU/SEC-FT**2-DEG F
C       HTAREA  (30)    HEAT TRANSFER AREA, FT**2
C
C       /ISTRMS/
C
C       IIN     (30,4)  INLET STREAM NODE NUMBER
C       IOUT    (30,4)  OUTLET STREAM NODE NUMBER
C
C       /CONTRL/
C
C       AMINLN          NATURAL LOG OF MINIMUM NUMBER ACCEPTED BY THE
C                       COMPUTER
C       TIME            CUMULATIVE SIMULATION TIME, SEC
C       DELT            TIME INTERVAL USED FOR TRANSIENT SIMULATION, SEC
C       MAXTIM          MAXIMUM SIMULATION TIME, SEC
C       IFLAG           FLAG TO CONTROL PRINTING OF OUTPUT
C       TRELS           TOTAL RELEASE TIME, SEC
C
C       /POLYMR/
C
C       C1              WEIGHT FRACTION OF HF MONOMER TO TOTAL HF VAPOR
C       C3              WEIGHT FRACTION OF HF TRIMER TO TOTAL HF VAPOR
C       C6              WEIGHT FRACTION OF HF HEXAMER TO TOTAL HF VAPOR
C       WMBHF           MOLECULAR WEIGHT OF HF MONOMER, LB/LB MOLE
C
C       /MISCEL/
C
C       ITYPE           VARIABLE TO SPECIFY TYPE OF RELEASE, SEE CARD 5
C       SOURCE          TOTAL MASS OF RELEASE, LB
C       ISEN            VARIABLE TO SPECIFY ISENTROPIC OR ISENTHALPIC
C                       RELEASE, SEE CARD 5
C
C       /RVFLOW/
C
C       TSTART  (30)    START OF REVERSE FLOW IN NODE
C       TSTOP   (30)    END OF REVERSE FLOW IN NODE
C
C    EQUIVALENCED VARIABLES
C
```

```
C       VOL     ACFM    (30)    VOLUMETRIC FLOW RATE, FT**3/MIN
C               FLAREA  (30)    FLOW AREA FOR PRESSURE-DROP-CONTROLLED
C                               NODE, FT**2
C
C    OTHER DIMENSIONED VARIABLES
C
C       RATE    (9)     COMPONENT MASS RELEASE RATE, LB/SEC
C       MSOURC  (5)     INCREMENTAL SOURCE MASS, LB
C       TSOURC  (5)     INCREMENTAL RELEASE TIME, SEC
C       TEMP    (5)     TEMPERATURE OF INCREMENTAL SOURCE, DEG F
C       PRES    (5)     PRESSURE OF INCREMENTAL SOURCE, PSIA
C       NAME    (9)     COMPONENT IDENTIFIER
C       TITLE   (10)    TITLE ARRAY
C       DWGNUM  (6,4)   PLOT NUMBER ARRAY
C
C    UNDIMENSIONED VARIABLES
C
C       INODES          MAXIMUM NUMBER OF NODES ALLOWED BY CODING OF
C                       SUBROUTINES
C       INOUT           MAXIMUM NUMBER OF INLET STREAMS AND OUTLET
C                       STREAMS
C       IRELST          NUMBER OF INCREMENTAL RELEASES IN TOTAL RELEASE
C                       (MAXIMUM OF 5)
C       MW              MOLECULAR WEIGHT, LB/LB MOLE
C       MWURAN          MOLECULAR WEIGHT OF URANIUM, LB/LB MOLE
C       MRELS           TOTAL MASS OF SOURCE MATERIAL RELEASED, LB
C       PTEST           VAPOR PRESSURE OF SOURCE, PSIA
C       PRINT           PRINT INTERVAL, SEC
C       RATIO           RATIO OF MOLES OF WATER VAPOR TO TOTAL MOLES OF
C                       MOIST AIR
C       MASS2           MASS FLOW RATE THROUGH NODE 2, LB/(DELT)
C       DENS            DENSITY, LB/FT**3
C       DELP            PRESSURE DROP, PSI
C       UA              PRODUCT OF HEAT TRANSFER COEFICIENT AND AREA,
C                       BTU/SEC-DEG F
C       ICOUNT          COUNTER TO CONTROL PRINTING OF OUTPUT
C       IRELS           CURRENT INCREMENT OF TOTAL RELEASE
C       DELTAT          SOURCE TERM INPUT INTERVAL, SEC
C       SOLIDS          MASS FLOW RATE OF UF6 SOLIDS ONTO THE FLOOR,
C                       LB/(DELT)
C       V1              VOLUME OCCUPIED BY CONTENTS OF THE COMPARTMENT
C                       AT AMBIENT PRESSURE, FT**3
C       V2              MAXIMUM VOLUME TO BE RELEASED BY REVERSE FLOW
C                       THROUGH NODE 2 OVER A SPECIFIC TIME INTERVAL,
C                       FT**3/(DELT)
C       FRAC            VOLUME FRACTION (-V2/V1) USED TO OBTAIN MASS
C                       FLOW AND ENTHALPY RATES WHEN LIMITING EXHAUST
C                       RATE THROUGH NODE 2
C       IDEV            OUTPUT DEVICE
C       HRATE           ENTHALPY RATE, BTU/SEC
C       DENU            COMPARTMENT CONCENTRATION OF URANIUM, LB/FT**3
C       DENHF           COMPARTMENT CONCENTRATION OF HF, LB/FT**3
C       UF6REL          CUMULATIVE MASS OF UF6 RELEASED TO THE
C                       ATMOSPHERE, LB
```

```
C       UOFREL           CUMULATIVE MASS OF UO2F2 RELEASED TO THE
C                        ATMOSPHERE, LB
C       UTOT             CUMULATIVE MASS OF URANIUM RELEASED TO THE
C                        ATMOSPHERE, LB
C       HFREL            CUMULATIVE MASS OF HF RELEASED TO THE
C                        ATMOSPHERE, LB
C       HFUF6            CUMULATIVE MASS OF HF THAT CAN BE FORMED FROM
C                        UF6 RELEASED TO THE ATMOSPHERE, LB
C       HFTOT            CUMULATIVE MASS OF HF RELEASED TO OR FORMED IN
C                        THE ATMOSPHERE, LB
C
C    LOGICAL VARIABLES
C
C       CHECK            FLAG IN ESTABLISHING INITIAL STEADY STATE
C                        CONDITIONS ABOUT NODE 2
C
C  THE FOLLOWING SUBROUTINES ARE CALLED BY INDRFT.
C
C                COMPRT
C                DENTHL
C                DPFLOW
C                HCOEFF
C                HUMID
C                PHFH2O
C                REMOVE
C                RESIST
C                ROOM
C                SETRAY
C                SSBLOW
C                STERM
C                TRBLOW
C                VPRUF6
C
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C                DENUF6
C                EQTUF6
C                FLASH
C                HFPOLY
C                HHFH2O
C                HUF6
C                PHASE
C                SUF6
C                ZUF6
C
C************************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      LOGICAL CHECK
C
```

```
      DIMENSION FLAREA(30), ACFM(30), RATE(9), MSOURC(5), TSOURC(5),
     *     TEMP(5), PRES(5)
      DIMENSION NAME(9), TITLE(10), DWGNUM(6,4)
C
      COMMON /LBMASS/ MASS(30,9), RH
      COMMON /COMPTP/ TC(30), PC(30), TSURF(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ VOL(30), KRCOEF(30), DPAREA(30), DEPVEL
      COMMON /ENTHAL/ H(30), QRATE(30), QCOOL(30), HTCOEF(30),
     *     HTAREA(30)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, MAXTIM, IFLAG, TRELS
      COMMON /POLYMR/ C1, C3, C6, WMBHF
      COMMON /MISCEL/ ITYPE, SOURCE, ISEN
      COMMON /RVFLOW/ TSTART(30), TSTOP(30)
C
      EQUIVALENCE (VOL(1),ACFM(1),FLAREA(1))
C
      DATA NAME /8HAIR    V , 8HH2O    L , 8HH2O    V , 8HHF     L ,
     *     8HHF     V , 8HUF6    S , 8HUF6    L , 8HUF6    V , 8HUO2F2 S /
C
      CALL SETRAY(INODES, INOUT)
C
C  NODE ASSIGNMENT
C  ===============
C
      IIN(1,1) = 2
      IIN(1,2) = 3
      IIN(2,1) = 7
      IIN(4,1) = 1
      IIN(5,1) = 1
      IIN(6,1) = 5
C
      IOUT(1,1) = 4
      IOUT(1,2) = 5
      IOUT(2,1) = 1
      IOUT(5,1) = 6
C
C  READ STATEMENTS
C  ===============
C
C  ALL INPUT DATA EXCEPT THAT ON CARDS 1 AND 9 IS READ IN FREE FORMAT.
C  ON CARDS 1 AND 9, COUNT CHARACTERS STARTING IN COLUMN 1.
C
C  ______________________________________________________________________
C /
C/ CARD 1.   READ TITLE (MAXIMUM OF 80 CHARACTERS).
C
      READ (40,4000) TITLE
C
C  ______________________________________________________________________
C /
C/ CARD 2.   READ AMBIENT TEMPERATURE (F), PRESSURE (PSIA), AND RELATIVE
C            HUMIDITY (%).
```

```
C
      READ (40,*) TC(7), PC(7), RH
C
      IF (RH.GT.1.D0) RH = RH/1.D2
C
C ______________________________________________________________________
C /
C/ CARD 3.   READ COMPARTMENT TEMPERATURE (F), PRESSURE (PSIA), VOLUME
C            (FT**3), AND FLOOR (DEPOSITION) AREA (FT**2). IF THE
C            COMPARTMENT PRESSURE IS NOT KNOWN AND IS TO BE CALCULATED,
C            SPECIFY A PRESSURE GREATER THAN OR EQUAL TO THE AMBIENT
C            PRESSURE OR LESS THAN OR EQUAL TO ZERO.
C
      READ (40,*) TC(1), PC(1), VOL(1), DPAREA(1)
C
C ______________________________________________________________________
C /
C/ CARD 4.   READ EXHAUST FLOW RATE (ACFM), INLET FLOW AREA (FT**2), AND
C            INLET RESISTANCE COEFFICIENT (--). IF THE PROGRAM IS TO
C            CALCULATE THE RESISTANCE COEFFICIENT, A COMPARTMENT
C            PRESSURE GREATER THAN OR EQUAL TO THE AMBIENT PRESSURE OR
C            LESS THAN OR EQUAL TO ZERO MUST HAVE BEEN ENTERED, AND
C            AN INLET AREA AND RESISTANCE COEFFICIENT MUST BE GIVEN. A
C            RESISTANCE COEFFICIENT COEFFICIENT OF 1.5 REPRESENTS A
C            SUDDEN CONTRACTION FOLLOWED BY A SUDDEN EXPANSION.
C
      READ (40,*) ACFM(4), FLAREA(2), KRCOEF(2)
C
C ______________________________________________________________________
C /
C/ CARD 5.   READ HEAT TRANSFER SURFACE AREA IN COMPARTMENT (FT**2),
C            HEAT TRANSFER SURFACE TEMPERATURE (F), AND COOLING RATE
C            (BTU/HR). A NEGATIVE COOLING RATE IMPLIES A HEATING RATE.
C            WHILE THE VALUE OF THE SURFACE AREA IS NOT PARTICULARLY
C            IMPORTANT BECAUSE THE PRODUCT OF THE SURFACE AREA AND THE
C            HEAT TRANSFER COEFFICIENT TO BE CALCULATED WILL BE
C            CONSTANT, A SURFACE TEMPERATURE GREATER THAN THE
C            COMPARTMENT TEMPERATURE MUST BE SPECIFIED.
C
      READ (40,*) HTAREA(1), TSURF(1), QCOOL(1)
C
      QCOOL(1) = QCOOL(1)/3.6D3
C
C ______________________________________________________________________
C /
C/ CARD 6.   READ SOURCE TYPE, NUMBER OF RELEASES, BASIS FOR FLASH, AND
C            MOLECULAR WEIGHT. SOURCE TYPE IS GIVEN BY THE FOLLOWING:
C
C                    4   LIQUID HF
C                    5   VAPOR HF
C                    7   LIQUID UF6 (VAPOR SOURCE TERM GENERATED)
C                   -7   LIQUID UF6 (VAPOR/SOLID SOURCE TERM GENERATED)
C                    8   VAPOR UF6
C                   22   INPUT PROVIDED IN FOR22.DAT
```

```
C
C             IF SOURCE TYPE IS SET EQUAL TO 22, SET NUMBER OF RELEASES
C             TO ZERO. NO MORE THAN FIVE RELEASES MAY BE SPECIFIED, WHICH
C             ARE TO RUN CONSECUTIVELY. THE BASIS FOR THE FLASH IS GIVEN
C             BY THE FOLLOWING:
C
C                   0   ISENTROPIC
C                   1   ISENTHALPIC
C
C             THE DEFAULT MOLECULAR WEIGHT FOR UF6 IS 352.025; ENTER A
C             VALUE LESS THAN 100 IF THAT VALUE IS ACCEPTABLE.
C
      READ (40,*) ITYPE, IRELST, ISEN, MW
C
      IF (MW.LT.100.D0) GO TO 10
C
      WMOL(9) = WMOL(9) - WMOL(6) + MW
      WMOL(6) = MW
      WMOL(7) = MW
      WMOL(8) = MW
C
   10 CONTINUE
C
      MWURAN = WMOL(6) - 113.99D0
C
      IF (ITYPE.EQ.22) GO TO 30
C
C   ______________________________________________________________________
C /
C/ CARD 7.    -- DO NOT USE "CARD 7" CARDS IF ITYPE = 22. --
C
C             READ FOR EACH INCREMENTAL RELEASE THE DURATION (SEC), MASS
C             (LB), TEMPERATURE (DEG F), AND PRESSURE (PSIA). SPECIFY AS
C             MANY SETS OF DATA AS THE NUMBER OF RELEASES (IRELST). IF
C             THE PRESSURE GIVEN IS LESS THAN OR EQUAL TO ZERO OR GREATER
C             THAN THE VAPOR PRESSURE, THE PRESSURE IS SET EQUAL TO THE
C             VAPOR PRESSURE FOR THAT INCREMENT.
C
      READ (40,*) (TSOURC(I), MSOURC(I), TEMP(I), PRES(I), I=1,IRELST)
C
      TRELS = 0.D0
C
      MRELS = 0.D0
C
      DO 20 I20=1,IRELST
C
           TRELS = TRELS + TSOURC(I20)
C
           MRELS = MRELS + MSOURC(I20)
C
           IF (ITYPE.EQ.5) CALL PHFH2O(TEMP(I20), 1.D0, 0.D0, PTEST,
     *          0.D0, 0.D0)
           IF (ITYPE.EQ.8) CALL VPRUF6(TEMP(I20), PTEST)
C
```

```
          IF (PRES(I20).GT.PTEST .OR. PRES(I20).LE.0.D0)
     *          PRES(I20) = PTEST
C
   20 CONTINUE
C
   30 CONTINUE
C
C     ____________________________________________________________________
C /
C/ CARD 8.   READ TIME INTERVAL FOR CALCULATIONS (SEC), DURATION OF
C            SIMULATION (SEC), AND  PRINT INTERVAL (SEC).
C
      READ (40,*) DELT, MAXTIM, PRINT
C
      IFLAG = IDINT(PRINT/DELT+0.01D0)
C
C     ____________________________________________________________________
C /
C/ CARD 9.   -- THESE CARDS ARE OPTIONAL. --
C
C            READ DRAWING NUMBERS FOR PLOTS (LIMITED TO 20 CHARACTERS--
C            THE LAST CHARACTER MUST BE A DOLLAR SIGN ($)).
C
C               1ST CARD 9 = CUMULATIVE URANIUM RELEASED
C               2ND CARD 9 = CUMULATIVE HF RELEASED
C               3RD CARD 9 = URANIUM CONCENTRATION IN COMPARTMENT
C               4TH CARD 9 = HF CONCENTRATION IN COMPARTMENT
C               5TH CARD 9 = TEMPERATURE IN COMPARTMENT
C               6TH CARD 9 = PRESSURE IN COMPARTMENT
C
      DO 40 I40=1,6
C
          READ (40,4010,END=50) (DWGNUM(I40,I), I=1,4)
          WRITE (49,4010) (DWGNUM(I40,I), I=1,4)
C
   40 CONTINUE
C
   50 CONTINUE
C
      WRITE (49,4020)
C
C************************************************************************
C
C  STEADY STATE CONDITIONS
C  =======================
C
C  SET STEADY-STATE CONDITIONS FOR THE COMPARTMENT, EXHAUST, AND INLET
C  AIR NODES.
C
      CALL HUMID(7, RH, RATIO)
C
      IF (PC(1).GE.PC(7) .OR. PC(1).LE.0.D0) PC(1) = PC(7)
C
      CHECK = .TRUE.
```

```
C
      VOL(7) = 1.D9
C
      CALL ROOM(7, RATIO)
C
   60 CONTINUE
C
      CALL ROOM(1, RATIO)
C
      CALL SSBLOW(4, RATIO)
C
      MASS(2,1) = MASS(4,1)
      MASS(2,3) = MASS(4,3)
C
      TC(2) = TC(7)
      PC(2) = PC(7)
C
      IF (PC(1).LT.PC(7) .AND. CHECK) GO TO 70
C
      IF (CHECK) CALL RESIST(2)
C
      CHECK = .FALSE.
C
      MASS2 = MASS(2,1) + MASS(2,3)
C
      DENS = (MASS(7,1)+MASS(7,3))/VOL(7)
C
      DELP = KRCOEF(2)*MASS2*MASS2/DENS/DELT/DELT
C
      IF (DABS(PC(7)-PC(1)-DELP).LT.1.D-6.AND.PC(1).LT.PC(7))
     *     GO TO 70
C
      PC(1) = PC(7) - DELP
C
      GO TO 60
C
   70 CONTINUE
C
      KRCOEF(2) = 0.D0
C
      CALL RESIST(2)
C
      CALL DENTHL(TC(2), PC(2), 2, H(2))
C
      CALL HCOEFF(1)
C
      UA = HTCOEF(1) * HTAREA(1)
C
C***********************************************************************
C
C  TITLE BLOCKS
C  ============
C
C  WRITE TITLE AND PROGRAM IDENTIFIER.
```

```
C
      DO 80 I80=1,7
C
           IDEV = 40 + I80
C
           WRITE (IDEV,4030) TITLE
C
   80 CONTINUE
C
C  WRITE NODE NAMES AND IMPORTANT CONSTANTS FOR EACH FILE.
C
      WRITE (41,4100) VOL(1), UA, TSURF(1), QCOOL(1)
C
      WRITE (42,4200) KRCOEF(2), TC(7), PC(7)
C
      IF (ITYPE.EQ.4) WRITE (43,4304)
      IF (ITYPE.EQ.5) WRITE (43,4305)
      IF (IABS(ITYPE).EQ.7) WRITE (43,4307)
      IF (ITYPE.EQ.8) WRITE (43,4308)
C
      IF (ITYPE.NE.22) WRITE (43,4310)
C
      IF (ITYPE.EQ.4) WRITE (43,4320) (TSOURC(I), MSOURC(I),
     *     TEMP(I), I=1,5)
C
      IF (ITYPE.EQ.5) WRITE (43,4330) (TSOURC(I), MSOURC(I),
     *     TEMP(I), PRES(I), I=1,5)
C
      IF (IABS(ITYPE).EQ.7) WRITE (43,4340) (TSOURC(I), MSOURC(I),
     *     TEMP(I), I=1,3)
C
      IF (IABS(ITYPE).EQ.7 .AND. ISEN.EQ.0) WRITE (43,4341) TSOURC(4),
     *     MSOURC(4), TEMP(4)
C
      IF (IABS(ITYPE).EQ.7 .AND. ISEN.EQ.1) WRITE (43,4342) TSOURC(4),
     *     MSOURC(4), TEMP(4)
C
      IF (IABS(ITYPE).EQ.7) WRITE (43,4343) WMOL(6), TSOURC(5),
     *     MSOURC(5), TEMP(5)
C
      IF (ITYPE.EQ.8) WRITE (43,4350) (TSOURC(I), MSOURC(I),
     *     TEMP(I), PRES(I), I=1,3)
C
      IF (ITYPE.EQ.8 .AND. ISEN.EQ.0) WRITE (43,4351) TSOURC(4),
     *     MSOURC(4), TEMP(4), PRES(4)
C
      IF (ITYPE.EQ.8 .AND. ISEN.EQ.1) WRITE (43,4352) TSOURC(4),
     *     MSOURC(4), TEMP(4), PRES(4)
C
      IF (ITYPE.EQ.8) WRITE (43,4353) WMOL(6), TSOURC(5), MSOURC(5),
     *     TEMP(5), PRES(5)
C
      IF (ITYPE.NE.22) WRITE (43,4360) TRELS, MRELS
C
```

```
      IF (ITYPE.EQ.7) WRITE (43,4370)
C
      IF (ITYPE.EQ.22) WRITE (43,4380)
C
      WRITE (44,4400) ACFM(4)
C
      WRITE (45,4500) DEPVEL, DPAREA(1)
C
      WRITE (46,4600)
C
      WRITE (47,4700)
C
C  WRITE COLUMN HEADINGS.
C
      WRITE (41,4110) NAME
C
      DO 90 I90=2,4
C
           IDEV = 40 + I90
C
           WRITE (IDEV,4210) NAME
C
   90 CONTINUE
C
           WRITE (45,4510) NAME
C
      WRITE (46,4610) NAME
C
      WRITE (47,4710)
C
C************************************************************************
C
C  TRANSIENT ANALYSIS
C  ==================
C
C  BEGIN TRANSIENT ANALYSIS.
C
      TIME = 0.D0
C
      ICOUNT = IFLAG
C
      IRELS = 1
C
      TRELS = 0.D0
C
C  ______________________________________________________________________
C /
C/ OPTIONAL SOURCE TERM INPUT:  CARD 1.  ENTER TIME INTERVAL FOR SOURCE
C          TERM INPUT (SEC).
C
      IF (ITYPE.EQ.22) READ (22,*) DELTAT
C
  100 CONTINUE
C
```

```
C  EVALUATE SOURCE TERM
C  ====================
C
      IF (TIME.LT.TRELS) GO TO 140
C
      IF (ITYPE.NE.22) GO TO 120
C
C  ______________________________________________________________________
C /
C/ OPTIONAL SOURCE TERM INPUT:  CARD 2.  ENTER INITIAL TIME FOR RELEASE
C           INTERVAL (SEC); MASS FLOW RATE (LB/SEC) FOR EACH OF THE NINE
C           COMPONENTS IN THE FOLLOWING ORDER: AIR, H2O(L), H2O(V),
C           HF(L), HF(V), UF6(S), UF6(L), UF6(V), UO2F2; SOURCE TERM
C           TEMPERATURE FOR INTERVAL (DEG F); AND SOURCE TERM PRESSURE
C           FOR THE INTERVAL (PSIA).
C
      READ (22,*,END=140) TRELS, (RATE(I),I=1,9),TC(IIN(1,2)),
     *     PC(IIN(1,2))
C
      DO 110 I110=1,9
C
           MASS(IIN(1,2),I110) = RATE(I110)*DELT
C
  110 CONTINUE
C
      TRELS = TRELS + DELTAT
C
      GO TO 140
C
  120 CONTINUE
C
      IF (IRELS.GT.IRELST) GO TO 140
C
      TRELS = TSOURC(IRELS)
C
      SOURCE = MSOURC(IRELS)
C
      TC(3) = TEMP(IRELS)
C
      PC(3) = PRES(IRELS)
C
      CALL STERM(3, 1, SOLIDS)
C
      TRELS = 0.D0
C
      DO 130 I130=1,IRELS
C
           TRELS = TRELS + TSOURC(I130)
C
  130 CONTINUE
C
      IRELS = IRELS + 1
C
  140 CONTINUE
```

```
C
      IF (TIME.GE.TRELS) IIN(1,2) = INODES
C
C  EVALUATE FLOW RATES
C  ===================
C
      CALL TRBLOW(4)
C
      CALL DPFLOW(2)
C
C  LIMIT REVERSE FLOW EXHAUST RATE THROUGH DOOR.
C
      IF (PC(1).LE.PC(7)) GO TO 160
C
      V1 = PC(1)*VOL(1)/PC(7)
C
      V2 = V1 - ACFM(4)*DELT/6.D1 - VOL(1)
C
      IF (V2.LT.0.D0) V2 = 0.D0
C
      FRAC = -V2/V1
C
      IF (DABS(FRAC*MASS(1,1)).GE.DABS(MASS(2,1))) WRITE (42,4220) TIME
C
      IF (DABS(FRAC*MASS(1,1)).GE.DABS(MASS(2,1))) GO TO 160
C
      DO 150 I150=1,9
C
           MASS(2,I150) = FRAC*MASS(1,I150)
C
  150 CONTINUE
C
      H(2) = FRAC*H(1)
C
      TC(2) = TC(1)
C
      PC(2) = PC(1)
C
      WRITE (42,4230) TIME
C
  160 CONTINUE
C
C  CALCULATE DEPOSITION RATE.
C
      CALL REMOVE(1, 5)
C
      IF (ICOUNT.LT.IFLAG) GO TO 190
C
C  OUTPUT NODE DATA
C  ================
C
C  WRITE COMPARTMENT DATA.
C
      WRITE (41,4120) TIME, (MASS(1,I),I=1,9), TC(1), PC(1)
```

```
C
C  WRITE DATA FOR FLOWING STREAMS.
C
      DO 180 I180=2,5
C
            IF (TIME.GE.TRELS .AND. I180.EQ.3) GO TO 180
C
            DO 170 I170=1,9
C
                  RATE(I170) = MASS(I180,I170)/DELT
C
  170       CONTINUE
C
            IDEV = 40 + I180
C
            HRATE = H(I180)/DELT
C
            IF (I180.LE.4) WRITE (IDEV,4120) TIME, RATE, TC(I180),
     *            PC(I180)
            IF (I180.GT.4) WRITE (IDEV,4120) TIME, RATE
C
  180 CONTINUE
C
C  WRITE MASSES OF CONDENSED MATERIALS ON FLOOR.
C
      WRITE (46,4120) TIME, (MASS(6,I),I=1,9)
C
      ICOUNT = 0
C
C  WRITE SUMMARY DATA ON RELEASE.
C
      WRITE (47,4720) TIME, UF6REL, UOFREL, UTOT, HFREL, HFUF6, HFTOT,
     *      DENU, DENHF
C
C  WRITE SUMMARY DATA FOR PLOTTING.
C
      IF (TIME.GT.TRELS) WRITE (48,*) TIME, UTOT, HFTOT, DENU, DENHF,
     *      TC(1), PC(1)
C
  190 CONTINUE
C
      IF (TIME.LE.60.D0.AND.TIME.LE.TRELS) WRITE (48,*) TIME, UTOT,
     *      HFTOT, DENU, DENHF, TC(1), PC(1)
C
      IF (TIME.GT.60.D0.AND.TIME.LE.TRELS.AND.10*(ICOUNT/10).EQ.ICOUNT)
     *      WRITE (48,*) TIME, UTOT, HFTOT, DENU, DENHF, TC(1), PC(1)
C
C  EVALUATE COMPARTMENT CONDITIONS
C  ===============================
C
      TIME = TIME + DELT
C
      IF (TIME.GT.MAXTIM) STOP
C
```

```
      ICOUNT = ICOUNT + 1
C
C  PERFORM MASS AND ENENGY BALANCE FOR THE COMPARTMENT.
C
      CALL COMPRT(1, 2, INODES)
C
C  CALCULATE COMPARTMENT CONCENTRATIONS OF URANIUM AND HF.
C
      DENU = ((MASS(1,6) + MASS(1,7) + MASS(1,8))/WMOL(6)
     *     + MASS(1,9)/WMOL(9))*MWURAN/VOL(1)
C
      DENHF = (MASS(1,4) + MASS(1,5))/VOL(1)
C
C  ACCUMULATE SOLID PARTICLES AND LIQUID DROPLETS ON THE FLOOR.
C
      DO 200 I200=1,9
C
           MASS(6,I200) = MASS(6,I200) + MASS(5,I200)
C
  200 CONTINUE
C
      IF (ITYPE.EQ.7 .AND. TIME.LE.TRELS) MASS(6,6) = MASS(6,6)
     *     + SOLIDS
C
C  ACCUMULATE TOTAL MASS QUANTITIES OF URANIUM AND HF RELEASED TO THE
C  ATMOSPHERE.
C
      UF6REL = UF6REL + MASS(4,6) + MASS(4,7) + MASS(4,8)
     *     + DABS(MASS(2,6) + MASS(2,7) + MASS(2,8))
C
      UOFREL = UOFREL + MASS(4,9) + DABS(MASS(2,9))
C
      UTOT = (UF6REL/WMOL(6) + UOFREL/WMOL(9))*MWURAN
C
      HFREL = HFREL + MASS(4,4) + MASS(4,5)
     *     + DABS(MASS(2,4) + MASS(2,5))
C
      HFUF6 = 4.D0*UF6REL*WMOL(4)/WMOL(6)
C
      HFTOT = HFREL + HFUF6
C
      GO TO 100
C
C***********************************************************************
C
C  FORMAT STATEMENTS
C  =================
C
 4000 FORMAT (10A8)
C
 4010 FORMAT (4A5)
C
 4020 FORMAT (6(1H$,/))
C
```

```
 4030 FORMAT ('1   TITLE: ',10A8,/,'0   DATA GENERATED BY INDRFT -- ',
     *      'AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT',
     *      ' COMPARTMENT MODEL.')
C
 4100 FORMAT ('0   COMPARTMENT CONDITIONS',T60,'COMPARTMENT VOLUME  =',
     *      F11.0,' FT**2',/,T60,'U*A PRODUCT          =',
     *      1PE11.3,' BTU/SEC-DEG F',/,T60,'SURFACE TEMPERATURE =',
     *      0PF11.1,' DEG F',/,T60,'COOLING RATE        =',1PE11.3,
     *      ' BTU/SEC')
C
 4110 FORMAT ('0    TIME',42X,'COMPONENT MASS (LB)',39X,
     *      'TEMPERATURE PRESSURE',/,'     (SEC)',9(3X,A8),
     *      '    (DEG F)    (PSIA)',/,1H )
C
 4120 FORMAT (F10.1,1P9E11.3,0P2F10.4)
C
 4200 FORMAT ('0   INLET AIR STREAM (INDUCED DRAFT)',T60,
     *      'RESISTANCE TERM     =',1PE11.3,' PSI-SEC**2/LB/FT**3',
     *      /,T60,'AMBIENT TEMPERATURE =',0PF11.3,' DEG F',/,
     *      T60,'AMBIENT PRESSURE    =',F11.3,' PSIA')
C
 4210 FORMAT ('0    TIME',35X,'COMPONENT MASS FLOW RATE (LB/SEC)',
     *      32X,'TEMPERATURE PRESSURE',/'     (SEC)',9(3X,A8),
     *      '    (DEG F)    (PSIA)',/,1H )
C
 4220 FORMAT (F10.1,'      REVERSE FLOW OCCURING')
C
 4230 FORMAT (F10.1,'      REVERSE FLOW OCCURING -- FLOW RATES LIMITED')
C
 4304 FORMAT ('0   SOURCE TERM: HF LIQUID',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4305 FORMAT ('0   SOURCE TERM: HF VAPOR',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4307 FORMAT ('0   SOURCE TERM: UF6 LIQUID',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4308 FORMAT ('0   SOURCE TERM: UF6 VAPOR',T60,
     *      'INCRE-  DURATION  MASS  TEMPERATURE  PRESSURE')
C
 4310 FORMAT (T60,' MENT     (SEC)   (LB)     (DEG F)     (PSIA)')
C
 4320 FORMAT (1H0,T60,'   1',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   2',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   3',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   5',F11.1,F8.1,F11.3,'    LIQUID')
C
 4330 FORMAT (1H0,T60,'   1',F11.1,F8.1,2F11.3,/,
     *      T60,'   2',F11.1,F8.1,2F11.3,/,
     *      T60,'   3',F11.1,F8.1,2F11.3,/,
     *      T60,'   4',F11.1,F8.1,2F11.3,/,
     *      T60,'   5',F11.1,F8.1,2F11.3)
```

```
C
 4340 FORMAT (1H0,T60,'   1',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   2',F11.1,F8.1,F11.3,'    LIQUID',/,
     *      T60,'   3',F11.1,F8.1,F11.3,'    LIQUID')
C
 4341 FORMAT ('    FLASH BASIS:         ISENTROPIC',
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID')
C
 4342 FORMAT ('    FLASH BASIS:        ISENTHALPIC',
     *      T60,'   4',F11.1,F8.1,F11.3,'    LIQUID')
C
 4343 FORMAT ('    UF6 MOLECULAR WEIGHT =',F8.3,
     *      T60,'   5',F11.1,F8.1,F11.3,'    LIQUID')
C
 4350 FORMAT (1H0,T60,'   1',F11.1,F8.1,2F11.3,/,
     *      T60,'   2',F11.1,F8.1,2F11.3,/,
     *      T60,'   3',F11.1,F8.1,2F11.3)
C
 4351 FORMAT ('    FLASH BASIS: ISENTROPIC',
     *      T60,'   4',F11.1,F8.1,2F11.3)
C
 4352 FORMAT ('    FLASH BASIS: ISENTHALPIC',
     *      T60,'   4',F11.1,F8.1,2F11.3)
C
 4353 FORMAT ('    UF6 MOLECULAR WEIGHT =',F8.3,
     *      T60,'   5',F11.1,F8.1,2F11.3)
C
 4360 FORMAT (T60,' TOTAL',F9.1,F8.1)
C
 4370 FORMAT ('0   SOLIDS FORMED BY FLASHING UF6 LIQUID ARE ASSUMED',
     *      ' TO ACCUMULATE ON THE FLOOR.',/,'    THESE SOLIDS ARE NOT',
     *      ' INVOLVED IN ENERGY BALANCES ABOUT THE COMPARTMENT.')
C
 4380 FORMAT ('0   SOURCE TERM: SOURCE TERM MASS FLOW RATES,',
     *      ' TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.')
C
 4400 FORMAT ('0   EXHAUST BLOWER',T60,'FLOW RATE =',F10.1,' ACFM')
C
 4500 FORMAT ('0   CONDENSATE FALLOUT',T60,'DEPOSITION VELOCITY =',
     *      F10.4,' FT/SEC',/,T60,'DEPOSITION AREA     =',F10.0,' FT**2')
C
 4510 FORMAT ('0    TIME',35X,'COMPONENT MASS FLOW RATE (LB/SEC)',
     *      /,'     (SEC)',9(3X,A8),/,1H )
C
 4600 FORMAT ('0   CONDENSATE ACCUMULATED ON FLOOR')
C
 4610 FORMAT ('0    TIME',42X,'COMPONENT MASS (LB)',/,
     *      '     (SEC)',9(3X,A8),/,1H )
C
 4700 FORMAT ('0   URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT',
     *      ' CONCENTRATIONS')
C
 4710 FORMAT (1H0,T86,'COMPARTMENT CONCENTRATIONS',/,'     TIME       ',
     *      'CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED',
```

```
     *      ' MATERIAL (LB)',T94,'(LB/FT**3)',/,'      (SEC)       ',
     *      '       UF6        UO2F2      TOTAL U       HF       HF FROM UF6',
     *      '  TOTAL HF          URANIUM       HF',/,1H )
C
 4720 FORMAT (F10.1,5X,1P6E11.3,5X,2E11.3)
C
C***********************************************************************
C
      END
```

A.3 BATCH - A Closed Compartment/Ventilation System Model

```
C  THIS PROGRAM MODELS A RELEASE OF UF6 OR HF INTO A CLOSED COMPARTMENT
C  OR A CONSTANT RELEASE OF UF6 OR HF INTO A CONSTANT VOLUME FLOW. IN
C  THE LATTER CASE, THE REQUESTED COMPARTMENT VOLUME IS CONSIDERED A
C  VOLUMETRIC FLOW RATE BASED ON THE SAME TIME UNIT AS THE SOURCE TERM.
C  IF THE MODEL IS USED IN THE LATTER STEADY-STATE MODE, AN OPTION IS
C  AVAILABLE TO PERMIT THE EVALUATION OF THE FINAL TEMPERATURE AND PHASE
C  COMPOSITION AT AMBIENT PRESSURE (WHICH ASSUMES RELEASE TO THE AMBIENT
C  SURROUNDINGS). THIS MODEL MAKES USE OF SUBROUTINES DEVELOPED FOR
C  TRANSIENT ANALYSIS OF UF6 AND HF RELEASES IN BUILDINGS. NODE NUMBERS
C  AND DEFINITIONS ARE AS FOLLOWS.
C
C       1        CLOSED COMPARTMENT
C       2        AMBIENT CONDITIONS
C       3        SOURCE TERM
C       4        OPEN COMPARTMENT (FINAL PRESSURE = AMBIENT PRESSURE)
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    COMMON BLOCK VARIABLES
C
C       /LBMASS/
C
C       MASS     (30,9)  NODE MASS, LB, OR MASS FLOW RATE, LB/(DELT)
C                        (INTERNAL)
C
C       /COMPTP/
C
C       TC       (30)    NODE TEMPERATURE, DEG F
C       PC       (30)    NODE PRESSURE, PSIA
C
C       /MOLWT/
C
C       WMOL     (9)     COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
C
C       /VOLUME/
C
C       VOL      (30)    NODE VOLUME, FT**3
C
C       /ENTHAL/
C
C       H        (30)    NODE ENTHALPY, BTU, OR ENTHALPY RATE, BTU/(DELT)
```

```
C
C       /ISTRMS/
C
C       IIN      (30,4)  INLET STREAM NODE NUMBER
C       IOUT     (30,4)  OUTLET STREAM NODE NUMBER
C
C       /CONTRL/
C
C       AMINLN           NATURAL LOG OF MINIMUM NUMBER ACCEPTED BY THE
C                        COMPUTER
C       TIME             CUMULATIVE SIMULATION TIME, SEC
C       DELT             TIME INTERVAL USED FOR TRANSIENT SIMULATION, SEC
C       MAXTIM           MAXIMUM SIMULATION TIME, SEC, EQUALS DELT FOR
C                        BATCH ANALYSIS
C       IFLAG            FLAG TO CONTROL PRINTING OF OUTPUT
C       TRELS            TOTAL RELEASE TIME, SEC, EQUALS DELT FOR BATCH
C                        ANALYSIS

C
C       /POLYMR/
C
C       C1               WEIGHT FRACTION OF HF MONOMER TO TOTAL HF VAPOR
C       C3               WEIGHT FRACTION OF HF TRIMER TO TOTAL HF VAPOR
C       C6               WEIGHT FRACTION OF HF HEXAMER TO TOTAL HF VAPOR
C       WMBHF            MOLECULAR WEIGHT OF HF MONOMER, LB/LB MOLE
C
C       /MISCEL/
C
C       ITYPE            VARIABLE TO SPECIFY TYPE OF RELEASE, SEE CARD 5
C       SOURCE           TOTAL MASS OF RELEASE, LB
C       ISEN             VARIABLE TO SPECIFY ISENTROPIC OR ISENTHALPIC
C                        RELEASE, SEE CARD 5
C
C     OTHER DIMENSIONED VARIABLES
C
C       NAME     (9)     COMPONENT IDENTIFIER
C       TITLE    (6)     TITLE ARRAY
C
C     UNDIMENSIONED VARIABLES
C
C       INODES           MAXIMUM NUMBER OF NODES ALLOWED BY CODING OF
C                        SUBROUTINES
C       INOUT            MAXIMUM NUMBER OF INLET STREAMS AND OUTLET
C                        STREAMS
C       RH               RELATIVE HUMIDITY, % (AS INPUT) OR FRACTION
C       MW               MOLECULAR WEIGHT, LB/LB MOLE
C       IWRITE           CONTROL VARIABLE TO SPECIFY OUTPUT BASED ON THE
C                        ASSUMPTION OF AN OPEN COMPARTMENT
C       RATIO            RATIO OF MOLES OF WATER VAPOR TO TOTAL MOLES OF
C                        MOIST AIR
C       SOLIDS           MASS FLOW RATE OF UF6 SOLIDS ONTO THE FLOOR,
C                        LB/(DELT)
C       MSSTOT           FINAL TOTAL MASS IN COMPARTMENT, LB
C       DENS             DENSITY AT FINAL TEMPERATURE, PRESSURE, AND
```

```
C                          VOLUME (SPECIFIC VOLUME OF CONDENSATE IS
C                          NEGLECTED), LB/FT**3
C
C  THE FOLLOWING SUBROUTINES ARE CALLED BY BATCH.
C
C                COMPRT
C                HUMID
C                MIXFLW
C                ROOM
C                SETRAY
C                STERM
C
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C                DENTHL
C                DENUF6
C                EQTUF6
C                FLASH
C                HFPOLY
C                HHFH2O
C                HUF6
C                PHASE
C                PHFH2O
C                SUF6
C                VPRUF6
C                ZUF6
C
C*************************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION NAME(9), TITLE(6)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ VOL(30), DUM3(61)
      COMMON /ENTHAL/ H(30), DUM4(120)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, MAXTIM, IFLAG, TRELS
      COMMON /POLYMR/ C1, C3, C6, WMBHF
      COMMON /MISCEL/ ITYPE, SOURCE, ISEN
C
      DATA NAME /8HAIR    V ,8HH2O    L ,8HH2O    V ,8HHF     L ,
     *     8HHF     V ,8HUF6    S ,8HUF6    L ,8HUF6    V ,
     *     8HUO2F2 S /
C
C  SET PARAMETERS.
C
      CALL SETRAY(INODES, INOUT)
C
```

```
      INOUT = 1
      IFLAG = 1
      IIN(1,1) = 3
      IIN(4,1) = 1
      IOUT(1,1) = INODES
      IOUT(4,1) = 2
      DELT = 6.D1
      MAXTIM = DELT
      TRELS = DELT
C
C  READ STAMENTS
C  =============
C
C  BATCH IS WRITTEN FOR INTERACTIVE EXECUTION.
C
C  ALL INPUT DATA EXCEPT THAT ON CARD 1 ARE READ IN FREE FORMAT.
C  ON CARD 1, COUNT CHARACTERS STARTING IN COLUMN 1.
C
C    WARNING: OUTPUT APPEARS IN FOR06.DAT
C
      WRITE (5,5000)
C
C  ______________________________________________________________________
C /
C/ CARD 1. -----
C
C    ENTER TITLE (MAXIMUM OF 48 CHARACTERS).
C
      WRITE (5,5010)
C
      READ (5,5015) (TITLE(I5015), I5015=1,6)
C
C  ______________________________________________________________________
C /
C/ CARD 2. -----
C
C    ENTER COMPARTMENT TEMPERATURE (F), PRESSURE (PSIA), AND
C    VOLUME (FT**3).
C
      WRITE (5,5020)
C
      READ (5,*) TC(1), PC(1), VOL(1)
C
C  ______________________________________________________________________
C /
C/ CARD 3. -----
C
C    ENTER AMBIENT TEMPERATURE (F), PRESSURE (PSIA), AND RELATIVE
C    HUMIDITY (%)
C
      WRITE (5,5030)
C
      READ (5,*) TC(2), PC(2), RH
C
```

```
      RH = RH/1.D2
C
C  ________________________________________________________________________
C /
C/ CARD 4. -----
C
C    ENTER SOURCE TYPE (4=HF LIQUID, 5=HF VAPOR, 7=UF6 LIQUID WITH VAPOR
C    SOURCE TERM AND SOLIDS IGNORED IN HEAT BALANCE, -7=UF6 LIQUID WITH
C    VAPOR PLUS SOLID SOURCE TERM, 8=UF6 VAPOR), TEMPERATURE (F), AND
C    PRESSURE (PSIA--A NEGATIVE PRESSURE OR A LIQUID RELEASE DEFAULTS
C    TO THE VAPOR PRESSURE CORRESPONDING TO THE SOURCE TEMPERATURE).
C
      WRITE (5,5040)
C
      READ (5,*) ITYPE, TC(3), PC(3)
C
      IF (ITYPE.EQ.4 .OR. ITYPE.EQ.5) GO TO 10
C
C  ________________________________________________________________________
C /
C/ CARD 5. -----
C
C    ENTER UF6 MOLECULAR WEIGHT (A VALUE LESS THAN 100 DEFAULTS TO
C    352.025) AND BASIS FOR FLASH (0=ISENTROPIC, 1=ISENTHALPIC).
C
      WRITE (5,5050)
C
      READ (5,*) MW, ISEN
C
      IF (MW.LT.1.D2) GO TO 10
C
      WMOL(9) = WMOL(9) - WMOL(6) + MW
      WMOL(6) = MW
      WMOL(7) = MW
      WMOL(8) = MW
C
   10 CONTINUE
C
C  ________________________________________________________________________
C /
C/ CARD 6. -----
C
C    ENTER MASS OF SOURCE TERM (LB).
C
      WRITE (5,5060)
C
      READ (5,*) SOURCE
C
C  ________________________________________________________________________
C /
C/ CARD 7. -----
C
C    ENTER OUTPUT BASIS (1=CLOSED COMPARTMENT, 4=OPEN COMPARTMENT WITH
C    FINAL PRESSURE EQUAL TO AMBIENT PRESSURE).
```

```
C
      WRITE (5,5070)
C
      READ (5,*) IWRITE
C
C***********************************************************************
C
C  BATCH ANALYSIS
C  ==============
C
      WRITE (6,6000) (TITLE(I6000), I6000=1,6)
C
C  EVALUATE INITIAL CONDITIONS.
C
      CALL HUMID(2, RH, RATIO)
C
      WRITE (6,6010)
      WRITE (6,6020) TC(2)
      WRITE (6,6030) PC(2)
      WRITE (6,6040) RH, RATIO
C
      CALL ROOM(1, RATIO)
C
      WRITE (6,6050)
      WRITE (6,6020) TC(1)
      WRITE (6,6030) PC(1)
      WRITE (6,6060) VOL(1)
C
      DO 20 I20=1,9
C
           IF (MASS(1,I20).GT.0.D0) WRITE (6,6070) NAME(I20),
     *          MASS(1,I20)
C
   20 CONTINUE
C
C  EVALUATE SOURCE TERM.
C
      IF (ITYPE.EQ.4) WRITE (6,6090)
      IF (ITYPE.EQ.5) WRITE (6,6100)
      IF (IABS(ITYPE).EQ.7) WRITE (6,6110)
      IF (ITYPE.EQ.8) WRITE (6,6120)
C
      WRITE (6,6020) TC(3)
C
      CALL STERM(3, 1, SOLIDS)
C
      IF (ITYPE.EQ.5.OR.ITYPE.EQ.8) WRITE (6,6030) PC(3)
      WRITE (6,6130) SOURCE
C
      IF (IABS(ITYPE).EQ.7.OR.ITYPE.EQ.8) WRITE (6,6140) WMOL(6)
C
      IF (IABS(ITYPE).EQ.7.AND.ISEN.EQ.0) WRITE (6,6150)
      IF (IABS(ITYPE).EQ.7.AND.ISEN.EQ.1) WRITE (6,6160)
      IF (ITYPE.EQ.8.AND.ISEN.EQ.0) WRITE (6,6170)
```

```
      IF (ITYPE.EQ.8.AND.ISEN.EQ.1) WRITE (6,6180)
C
      IF (ITYPE.EQ.7) WRITE (6,6190) SOLIDS
C
      IF (IABS(ITYPE).EQ.7) WRITE (6,6200) TC(3)
      IF (ITYPE.EQ.8) WRITE (6,6210) TC(3)
C
      DO 30 I30=1,9
C
           IF (MASS(3,I30).GT.0.D0) WRITE (6,6070) NAME(I30),
     *          MASS(3,I30)
C
   30 CONTINUE
C
C  EVALUATE CLOSED COMPARTMENT FINAL CONDITIONS.
C
      CALL COMPRT(1, INOUT, INODES)
C
      IF (IWRITE.EQ.1) GO TO 40
C
C  EVALUATE OPEN COMPARTMENT FINAL CONDITIONS.
C
      CALL MIXFLW(4, 1, INODES)
C
   40 CONTINUE
C
      IF (IWRITE.EQ.1) WRITE (6,6220)
      IF (IWRITE.EQ.4) WRITE (6,6230)
C
      WRITE (6,6020) TC(IWRITE)
      WRITE (6,6030) PC(IWRITE)
      WRITE (6,6060) VOL(IWRITE)
C
      MSSTOT = 0.D0
C
      DO 50 I50=1,9
C
           MSSTOT = MSSTOT + MASS(IWRITE,I50)
C
           IF (MASS(IWRITE,I50).GT.0.D0) WRITE (6,6070) NAME(I50),
     *          MASS(IWRITE,I50)
C
   50 CONTINUE
C
      DENS = MSSTOT/VOL(IWRITE)
C
      WRITE (6,6240) DENS
C
      STOP
C
C************************************************************************
C
C  FORMAT STATEMENTS
C  =================
```

```
C
 5000 FORMAT (//, 41H     WARNING: OUTPUT APPEARS IN FOR06.DAT,
     *     //)
C
 5010 FORMAT ('     ENTER TITLE (MAXIMUM OF 48 CHARACTERS).')
C
 5015 FORMAT (6A8)
C
 5020 FORMAT (46H     ENTER COMPARTMENT TEMPERATURE (F), PRESSU,
     *     14HRE (PSIA), AND, /, 20H     VOLUME (FT**3).)
C
 5030 FORMAT (46H     ENTER AMBIENT TEMPERATURE (F), PRESSURE (,
     *     19HPSIA), AND RELATIVE, /, 17H     HUMIDITY (%))
C
 5040 FORMAT (46H     ENTER SOURCE TYPE (4=HF LIQUID, 5=HF VAPO,
     *     2HR,, 24H 7=UF6 LIQUID WITH VAPOR, /, 11H     SOURCE,
     *     16H TERM AND SOLIDS, 28H IGNORED IN HEAT BALANCE, -7,
     *     16H=UF6 LIQUID WITH, /, 10H     VAPOR, 10H PLUS SOLI,
     *     49HD SOURCE TERM, 8=UF6 VAPOR), TEMPERATURE (F), AND,
     *     /, 46H     PRESSURE (PSIA--A NEGATIVE PRESSURE OR A ,
     *     6HLIQUID, 17H RELEASE DEFAULTS, /, 14H     TO THE VA,
     *     12HPOR PRESSURE, 32H CORRESPONDING TO THE SOURCE TEM,
     *     10HPERATURE).)
C
 5050 FORMAT (46H     ENTER UF6 MOLECULAR WEIGHT (A VALUE LESS ,
     *     20HTHAN 100 DEFAULTS TO, /, 17H     352.025) AND,
     *     16H BASIS FOR FLASH, 24H (0=ISENTROPIC, 1=ISENTH,
     *     7HALPIC).)
C
 5060 FORMAT (36H     ENTER MASS OF SOURCE TERM (LB).)
C
 5070 FORMAT (46H     ENTER OUTPUT BASIS (1=CLOSED COMPARTMENT,
     *     24H 4=OPEN COMPARTMENT WITH, /, 17H     FINAL PRESSU,
     *     11HRE EQUAL TO, 19H AMBIENT PRESSURE).)
C
 6000 FORMAT ('1    CASE: ',6A8)
C
 6010 FORMAT ('-    AMBIENT CONDITIONS',/,1H )
C
 6020 FORMAT ('         TEMPERATURE                     ',F13.3,5X,
     *     'DEG F')
C
 6030 FORMAT ('         PRESSURE                        ',F13.3,5X,
     *     'PSIA')
C
 6040 FORMAT ('         RELATIVE HUMIDITY               ',2PF11.1,7X,
     *     '%',/,1H ,/,'         WATER VAPOR : MOIST AIR    ',0PF15.5,
     *     3X,'MOLE/MOLE')
C
 6050 FORMAT ('0    INITIAL COMPARTMENT CONDITIONS',/,1H )
C
 6060 FORMAT ('         VOLUME                          ',F11.1,7X,
     *     'FT**3',/,1H )
C
```

```
 6070 FORMAT (8X,'MASS OF ',A8,11X,F11.1,7X,'LB')
C
 6080 FORMAT (1H ,/,'        TOTAL ENTHALPY              ',F11.1,7X,
     *     'BTU',/,1H )
C
 6090 FORMAT ('0    SOURCE TERM: HF LIQUID',/,1H )
C
 6100 FORMAT ('0    SOURCE TERM: HF VAPOR',/,1H )
C
 6110 FORMAT ('0    SOURCE TERM: UF6 LIQUID',/,1H )
C
 6120 FORMAT ('0    SOURCE TERM: UF6 VAPOR',/,1H )
C
 6130 FORMAT ('        TOTAL MASS OF SOURCE       ',F11.1,7X,
     *     'LB',/,1H )
C
 6140 FORMAT ('        MOLECULAR WEIGHT           ',F13.3,5X,
     *     'LB/LB MOLE',/,1H )
C
 6150 FORMAT ('        BASIS FOR FLASHING OF LIQUID',
     *     '     ISENTROPIC',/,1H )
C
 6160 FORMAT ('        BASIS FOR FLASHING OF LIQUID',
     *     '    ISENTHALPIC',/,1H )
C
 6170 FORMAT ('        BASIS FOR EXPANSION OF VAPOR',
     *     '     ISENTROPIC',/,1H )
C
 6180 FORMAT ('        BASIS FOR EXPANSION OF VAPOR',
     *     '    ISENTHALPIC',/,1H )
C
 6190 FORMAT ('        SOLID UF6 DUMPED ON FLOOR  ',F11.1,7X,
     *     'LB',/,1H )
C
 6200 FORMAT ('        TEMPERATURE AFTER FLASHING ',F13.3,5X,
     *     'DEG F',/,1H )
C
 6210 FORMAT ('        TEMPERATURE AFTER EXPANSION',F13.3,5X,
     *     'DEG F',/,1H )
C
 6220 FORMAT ('0    FINAL CONDITIONS (CLOSED COMPARTMENT)',/,1H )
C
 6230 FORMAT ('0    FINAL CONDITIONS (OPEN COMPARTMENT)',/,1H )
C
 6240 FORMAT ('0       DENSITY OF FINAL MIXTURE   ',F15.5,3X,
     *     'LB/FT**3')
C
C************************************************************************
C
      END
```

A.4 CYLIND - A Cylinder Release Model

```
C  THIS PROGRAM CALCULATES THE MASS FLOW RATE FROM A UF6 CYCLINDER
C  TO THE SURROUNDINGS THROUGH EITHER A BREACH OR HOLE IN THE
C  CYLINDER OR THROUGH A PIGTAIL CONSISTING OF A KNOWN LENGTH OF
C  PIPE AND FIXTURES.  THE PROGRAM AND ALL SUBROUTINES ARE WRITTEN
C  IN DOUBLE PRECISION.
C
C************************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C  COMMON BLOCKS TRANSFER INFORMATION ON THE STATE OF UF6 AND
C  ON THE OPTIONS TO BE USED.
C
      COMMON /ICOMON/ ISEN,IPIG,IBRCH,IGEXIT
      COMMON /CONCYL/ PCYL,TCYL,XVCYL,XLCYL,MW
      COMMON /CONENT/ PENT,TENT,XVENT,XLENT,VNTBAR
      COMMON /GMTRY / PIGRAY
      COMMON /CONIN / PIN,TIN,XVIN,XLIN
      COMMON /CONVOL/ PVOL,TVOL,XVOL,XLVOL
      COMMON /PARAM / VOL,DELT,Q
      COMMON /MASS  / MSFLRT,MIN,MTOT
      COMMON /CYLIND/ DIACYL,LCYL,RHOLE,DHOLE,ALPHA,IVERT
      COMMON /TRIPLE/ TTRIPL,PTRIPL
C
      DIMENSION TITLE(16)
      DIMENSION PIGRAY(99,3),DUMMY(99)
      DIMENSION TOTM(6),TOTV(6),CYLD(6),CYLL(6),HOLR(6),HOLD(6)
      DIMENSION DWGNUM(4,4)
C
C  THE FOLLOWING DATA STATEMENTS PROVIDE DEFAULT VALUES FOR VARIABLES
C  REQUIRED BY THE SUBROUTINE LEVEL. THE USER MAY SPECIFY A COMPLETE
C  SET OF VALUES BY SPECIFYING ICYL = 0 THEN ENTERING THE REQUIRED
C  INFORMATION ON THE FOLLOWING LINE OF INPUT.
C
C  MODEL NUMBER     5A        8A       12B       30B        48X        48Y
C
C  VALUE OF ICYL    1         2         3         4          5          6
C
      DATA TOTM /  55.D0,   255.D0,   460.D0, 5020.D0, 21030.D0, 27560.D0/
      DATA TOTV /0.284D0, 1.319D0,   2.38D0,   26.D0,  108.9D0,  142.7D0/
      DATA CYLD /   5.D0,     8.D0,   12.D0,   29.D0,    48.D0,    48.D0/
      DATA CYLL /24.99D0, 45.34D0, 36.36D0, 68.02D0, 103.99D0, 136.27D0/
      DATA HOLR /1.375D0, 1.375D0, 1.375D0,    9.D0,    17.D0,    17.D0/
      DATA HOLD /0.375D0, 0.375D0, 0.375D0, 0.875D0,  0.875D0,  0.875D0/
C
C  ANY PROGRAM USING THE BREACH AND PIGTAIL SUBROUTINES OR THE
C  LIQUID LEVEL AND MASS/ENERGY BALANCE SUBROUTINES USED HERE
C  MUST SUPPLY SIMILAR DATA AND TRANSFER BLOCK COMMON STATEMENTS.
C
```

```
C  READ STATEMENTS
C  ===============
C
C  ____________________________________________________________________
C /
C/ CARD 1.  READ TITLE (LIMITED TO 80 CHARACTERS).
C
      READ (20,2000) TITLE
C
C  ____________________________________________________________________
C /
C/ CARD 2.  READ FLASH BASIS, CYLINDER TYPE, CYLINDER ORIENTATION,
C           AND NUMBER OF ELEMENTS IN RELEASE PATHWAY.
C
C           FLASH BASIS (ISEN)
C
C             0       ISENTROPIC
C             1       ISENTHALPIC
C
C             ISEN = 1 IS RECOMMENDED SINCE THE FLASHING PROCESS WAS
C             ASSUMED TO BE ISENTHALPIC IN THE DERIVATION OF THE
C             CORRELATION USED IN THE SUBROUTINE PIPSYS FOR PRESSURE
C             DROP IN A PIPE.
C
C           CYLINDER TYPE (ICYL)
C
C             0       USER SPECIFIED
C             1       TYPE 5A CYLINDER
C             2       TYPE 8A CYLINDER
C             3       TYPE 12B CYLINDER
C             4       TYPE 30B CYLINDER (2.5 TON)
C             5       TYPE 48X CYLINDER (10 TON)
C             6       TYPE 48Y CYLINDER (14 TON)
C
C             IF A NEGATIVE VALUE OF ICYL IS READ (-1, -2, -3, -4, -5,
C             -6), THE USER MAY SUBSEQUENTLY SPECIFY A TOTAL MASS OF UF6
C             DIFFERENT FROM THE DEFAULT VALUE (SEE CARD 4).
C
C           CYLINDER ORIENTATION (IVERT)
C
C            -1       CYLINDER STANDS ON END -- RELEASE FROM TOP END
C             0       CYLINDER LIES ON SIDE -- RELEASE FROM END
C             1       CYLINDER STANDS ON END -- RELEASE FROM BOTTOM END
C
C           NUMBER OF ELEMENTS IN RELEASE PATHWAY (IPIG)
C
C             IF IPIG = 2, THE RELEASE PATHWAY IS A BREACH IN THE
C             CYLINDER. IF THE RELEASE PATHWAY IS A PIPING SYSTEM, IPIG
C             IS GREATER THAN 2.
C
      READ (20,*) ISEN, ICYL, IVERT, IPIG
C
      IF(ICYL.GE.-6.AND.ICYL.LE.6) GO TO 10
C
```

```
      WRITE (5,500) ICYL
C
      STOP
C
   10 CONTINUE
C
      IF (IABS(ICYL).GT.0) GO TO 20
C
C     ----------------------------------------------------------------------
C /
C/ CARD 3.  -- USE THIS CARD ONLY IF ICYL = 0 --
C
C           READ MASS OF UF6 IN THE CYLINDER (LB); VOLUME (FT**3),
C           INTERNAL DIAMETER (IN), AND INTERNAL LENGTH (IN) OF THE
C           CYLINDER; RADIUS FROM THE CYLINDER CENTERLINE TO THE VALVE
C           (BREACH) (IN); AND THE VALVE (BREACH) DIAMETER (IN).
C
      READ (20,*) MTOT, VOL, DIACYL, LCYL, RHOLE, DHOLE
C
      GO TO 30
C
   20 CONTINUE
C
      MTOT = TOTM(IABS(ICYL))
      VOL = TOTV(IABS(ICYL))
      DIACYL = CYLD(IABS(ICYL))
      LCYL = CYLL(IABS(ICYL))
      RHOLE = HOLR(IABS(ICYL))
      DHOLE = HOLD(IABS(ICYL))
C
C     ----------------------------------------------------------------------
C /
C/ CARD 4.  -- USE THIS CARD ONLY IF ICYL IS NEGATIVE --
C
C           READ MASS OF UF6 IN CYLINDER (LB).
C
      IF (ICYL.LT.0) READ (20,*) MTOT
C
   30 CONTINUE
C
C     ----------------------------------------------------------------------
C /
C/ CARD 5.  READ PRESSURE (PSIA), TEMPERATURE (DEG F), LIQUID MASS
C           FRACTION OF THE NONVAPOR FRACTION (--), MOLECULAR WEIGHT
C           (LB/LB MOLE), AND THE ANGLE MEASURED FROM A VERTICAL VECTOR
C           PASSING THROUGH THE CENTER OF THE END AND A VECTOR FROM THE
C           CENTER OF THE END AND THE ENTRANCE TO THE RELEASE PATHWAY
C           (DEG). IF PRESSURE IS SPECIFIED AS ZERO AND/OR TEMPERATURE
C           IS SPECIFIED AS NONZERO, THEN THE PRESSURE WILL BE SET EQUAL
C           TO THE VAPOR PRESSURE. IF PRESSURE IS SPECIFIED AS NONZERO
C           AND TEMPERATURE IS SPECIFIED AS ZERO, THEN THE EQUILIBRIUM
C           TEMPERATURE CORRESPONDING TO THE SPECIFIED PRESSURE WILL BE
C           CALCULATED. IF THE TRIPLE POINT TEMPERATURE IS SPECIFIED
C           (147.306561 DEG F), THEN A NONZERO VALUE FOR THE LIQUID MASS
```

```
C           FRACTION OF THE NONVAPOR FRACTION CAN BE SPECIFIED;
C           OTHERWISE, THE VALUE READ AS INPUT WILL BE SET BY THE
C           PROGRAM TO THE APPROPRIATE VALUE. THE DEFAULT VALUE FOR
C           MOLECULAR WEIGHT IS 352.025 -- IF THIS VALUE IS ACCEPTABLE,
C           A ZERO MAY BEPECIFIED FOR THIS VARIABLE.
C
      READ (20,*) PVOL, TVOL, XLVOL, MW, ALPHA
C
C  CHECK SPECIFIED VALUES OF PVOL AND TVOL. TERMINATE EXECUTION IF AN
C  ERROR IS FOUND; OTHERWISE, CALCULATE THE APPROPRIATE VAPOR PRESSURE
C  OR EQUILIBRIUM TEMPERATURE.
C
      IF (PVOL.GE.0.D0.AND.TVOL.GE.0.D0.AND.(PVOL+TVOL).GT.0.D0)
     *     GO TO 40
C
      WRITE(5,510) PVOL, TVOL
C
      STOP
C
   40 CONTINUE
C
      IF (TVOL.GT.0.D0) CALL VPRUF6 (TVOL,PVOL)
C
      IF (TVOL.EQ.0.D0) CALL EQTUF6 (PVOL,TVOL)
C
C  SET THE TRIPLE POINT CONDITIONS AND CHECK THE VALUE OF THE
C  LIQUID/SOLID SPLIT.
C
      PTRIPL = 22.04226474D0
C
      TTRIPL = 147.306561D0
C
      IF (TVOL.LT.TTRIPL) XLVOL = 0.D0
C
      IF (TVOL.GT.TTRIPL) XLVOL = 1.D0
C
      IF (XLVOL.GE.0.D0.AND.XLVOL.LE.1.D0) GO TO 50
C
      WRITE (5,520) XLVOL
C
      STOP
C
   50 CONTINUE
C
      IF (MW.EQ.0.D0) MW = 352.025D0
C
      IF (IPIG.GT.2) GO TO 60
C
C  -----------------------------------------------------------------------
C /
C/ CARD 6.  -- USE THIS CARD ONLY IF IPIG = 2 --
C
C           READ AMBIENT PRESSURE (PSIA). A ZERO VALUE DEFAULTS TO
C           14.7 PSIA.
```

```
C
      READ (20,*) PAMB
C
C  SET UP ELEMENTS OF PIGRAY FOR A BREACH CALCULATION.
C
      PIGRAY(1,1) = 1.D0
      PIGRAY(1,2) = 0.5D0
      PIGRAY(1,3) = DHOLE/12.D0
C
      PIGRAY(2,1) = 2.D0
      PIGRAY(2,2) = 1.D0
      PIGRAY(2,3) = 14.7D0
C
      IF (PAMB.GT.0.D0) PIGRAY(2,3) = PAMB
C
      GO TO 80
C
   60 CONTINUE
C
C  ______________________________________________________________________
C /
C/ CARD 7.  -- USE ONLY IF IPIG IS GREATER THAN 2 --
C
C           READ AS MANY CARDS AS THE VALUE OF IPIG TO SPECIFY THE
C           PIPING SYSTEM. EACH CARD CONTAINS (1) A VALUE SPECIFYING
C           ELEMENT TYPE, (2) ELEMENT LENGTH (FT) OR RESISTANCE
C           COEFFICIENT (--), AND (3) DIAMETER (IN), EXCEPT FOR THE LAST
C           CARD. THE THIRD VALUE ON THE LAST OF THE "CARD 7" CARDS IS
C           THE AMBIENT PRESSURE (PSIA).
C
C           ELEMENT TYPE (PIGRAY(I,1))
C
C             1   SPECIFIES A PIPE SEGMENT (EXCEPT FIRST "CARD 7" WHERE
C                 IT SPECIFIES THE ENTRANCE)
C             2   SPECIFIES A PIPING SYSTEM FEATURE (SUDDEN EXPANSION,
C                 VALVE, BEND, ETC.) FOR WHICH A RESISTANCE COEFFICIENT
C                 IS SUPPLIED
C             3   SPECIFIES A SUDDEN CONTRACTION FOR WHICH A RESISTANCE
C                 COEFFICIENT IS SUPPLIED
C
C           RESISTANCE COEFFICIENT (PIGRAY(I,2))
C
C             THIS VALUE MUST BE CALCULATED BY THE USER.
C
C           DIAMETER (PIGRAY(I,3))
C
C             (NOTE: PIGRAY(IPIG,3) IS THE EXHAUST PRESSURE, PSIA.)
C
C             FOR A SUDDEN CONTRACTION, SPECIFY THE DOWNSTREAM DIAMETER
C             FOLLOWING THE CONTRACTION. FOR A SUDDEN EXPANSION, SPECIFY
C             THE UPSTREAM DIAMETER BEFORE THE EXPANSION.
C
      DO 70 I70  = 1,IPIG
C
```

```
            READ (20,*) (PIGRAY(I70,I), I=1,3)
C
C  CONVERT DIAMETER FROM INCHES TO FEET FOR EACH ELEMENT OF THE
C  PIGTAIL WHICH HAS A DIAMETER VALUE.
C
            IF (I70.LT.IPIG) PIGRAY(I70,3) = PIGRAY(I70,3)/12.D0
C
   70 CONTINUE
C
   80 CONTINUE
C
      PFIN = PIGRAY(IPIG,3)
C
C  ______________________________________________________________________
C /
C/ CARD 8.  READ SIMULATION TIME INTERVAL (SEC) AND MAXIMUM
C           SIMULATION TIME (SEC).
C
      READ (20,*) DELT, MAXTIM
C
C  ______________________________________________________________________
C /
C/ CARD 9.  --  THESE CARDS ARE OPTIONAL --
C
C           ENTER DRAWING NUMBERS (LIMITED TO 20 CHARACTERS--THE LAST
C           CHARACTER MUST BE A DOLLAR SIGN ($)). THESE NUMBERS ARE
C           ENTERED IN A FILE FOR CYLPLT PROCESSING.
C
C            1ST CARD 9 = PHASE MASSES AND TOTAL MASS OF UF6 INSIDE
C                         CYLINDER
C            2ND CARD 9 = PHASE AND TOTAL MASS RELEASE RATES FROM
C                         CYLINDER
C            3RD CARD 9 = TEMPERATURE AND PRESSURE INSIDE CYLINDER
C            4TH CARD 9 = EXHAUST TEMPERATURE
C
      DO 90 I90=1,4
C
           READ (20,2010,END=100) (DWGNUM(I90,I), I=1,4)
           WRITE (31,2010) (DWGNUM(I90,I), I=1,4)
C
   90 CONTINUE
C
  100 CONTINUE
C
      WRITE(31,2020)
C
C*************************************************************************
C
C  INITIAL CONDITIONS
C  ==================
C
C  DENUF6 WILL CALCULATE DENSITIES OF UF6 PHASES IN THE CYLINDER
C
      CALL DENUF6 (TVOL,PVOL,MW,DENSOL,DENLIQ,DENVAP)
```

```
C
C  THE VAPOR MASS FRACTION IN THE CYLINDER CAN NOW BE DETERMINED
C
      XVOL   = ( VOL/MTOT    - XLVOL/DENLIQ - (1.D0-XLVOL)/DENSOL)
     *         /(1.D0/DENVAP - XLVOL/DENLIQ - (1.D0-XLVOL)/DENSOL)
C
C  THIS ARGUMENT TO THE LEVEL SUBROUTINE SAVES PREVIOUS VALUES OF
C  LIQUID LEVEL FOR USE AS INITIAL GUESSES. IT IS INITIALLY  SET EQUAL
C  TO CYLINDER DIAMETER.
C
      VLFACE = DIACYL
C
C  THIS DRIVER ROUTINE DOES NOT CONSIDER AN INLET STREAM TO THE
C  CYLINDER.  THE LEVEL AND INTMEB SUBROUTINES ARE WRITTEN TO
C  HANDLE SUCH A STREAM.  THEREFORE SET MASS OF THE STREAM TO
C  ZERO AND OTHER STREAM PARAMETERS TO MATCH THE CYLINDER
C  CONTENTS.
C
      MIN    = 0.D0
C
      PIN    = PVOL
C
      TIN    = TVOL
C
      XVIN   = XVOL
C
      XLIN   = XLVOL
C
      ITRIPL = 0
C
C  SET TIME STEP AND HEAT TRANSFER
C
      DELTSM = 0.D0
C
      Q      = 0.D0
C
      WRITE (30,3000) TITLE
C
      WRITE (30,3010)
C
      WRITE (22,2200) DELT
C
C***********************************************************************
C
C  TRANSIENT ANALYSIS
C  ==================
C
  110 CONTINUE
C
C  FROM THIS POINT ON THE PROGRAM SOLVES EACH TIME STEP USING
C  VALUES FROM THE PREVIOUS STEP AND FROM THE MASS AND ENERGY
C  BALANCE ABOUT THE CYLINDER.  STARTING VALUES FOR THE STREAM
C  LEAVING THE CYLINDER DURING THE COMING TIME STEP ARE INPUT AND
C  THE LEVEL SUBROUTINE IS CALLED IF NEEDED TO MODIFY THESE
```

```
C  PARAMETERS AS REQUIRED.  TCYL IS ALWAYS EQUAL TO TVOL, BUT
C  XVCYL, XLCYL, AND PCYL MAY BE CHANGED AS THE VAPOR/LIQUID
C  INTERFACE DROPS.
C
      XVCYL  = 1.D0
C
      XLCYL  = XLVOL
C
      PCYL   = PVOL
C
      TCYL   = TVOL
C
C  PHASE INTERFACE LEVEL
C  =====================
C
      IF (IVERT.NE.-1) CALL LEVEL (DENVAP,VLFACE)
C
C  BREACH FLOW RATE ANALYSIS
C  =========================
C
C  THE BREACH SUBROUTINE CALCULATES A MASS VELOCITY AND A SET OF
C  CONDITIONS FOLLOWING THE ENTRANCE PRESSURE DROP.  THOSE
C  CONDITIONS ARE TRANSFERRED TO PIPSYS IF THE PIGTAIL
C  SUBROUTINE IS CALLED.
C
      IF (DELTSM.GT.0.D0 .AND. IPIG.GT.2) GO TO 120
C
      CALL BREACH (G)
C
C  THE BREACH SUBROUTINE HAS CALCULATED A MAXIMUM VALUE OF MASS
C  VELOCITY.
C
      IF(IPIG.EQ.2) GO TO 130
C
C  PIPING SYSTEM FLOW RATE ANALYSIS
C  ================================
C
C  THE PIGTAIL SUBROUTINE CALCULATES NEW VALUES OF G FOR RELEASES
C  OF UF6 THROUGH PIGTAILS CONSISTING OF LENGTHS OF PIPE AND
C  FIXTURES SUCH AS ELBOWS AND VALVES.
C
  120 CONTINUE
C
      IF (TCYL.EQ.TTRIPL .AND. XVCYL.EQ.1 .AND. ITRIPL.EQ.1) GO TO 130
C
      CALL PIPSYS (G)
C
C  SET BASIS FOR SUBSEQUENT EVALUATIONS OF G IN PIPSYS.
C
      IBRCH = 3
C
C  SET FLAG FOR SKIPPING CALL TO PIPSYS.
C
      ITRIPL = 0
```

```
C
      IF (TCYL.EQ.TTRIPL .AND. XVCYL.EQ.1.D0) ITRIPL = 1
C
  130 CONTINUE
C
C  OUTPUT DATA
C  ===========
C
C  PHASE COMPOSITION INSIDE CYLINDER
C
      MSOL = MTOT*(1.D0 - XVOL)*(1.D0 - XLVOL)
      MLIQ = MTOT*(1.D0 - XVOL)*XLVOL
      MVAP = MTOT*XVOL
C
C  PHASE COMPOSITION ENTERING RELEASE PATHWAY
C
      PHASE = '         '
      IF (XVCYL.EQ.1.D0) PHASE = ' VAPOR '
      IF (XVCYL.LT.1.D0.AND.XVCYL.GT.0.D0.AND.XLCYL.EQ.1.D0)
     *     PHASE = 'LIQ-VAP'
      IF (XVCYL.LT.1.D0.AND.XVCYL.GT.0.D0.AND.XLCYL.LT.1.D0.
     *     AND.XLCYL.GT.0.D0) PHASE = '3-PHASE'
      IF (XVCYL.EQ.0.D0.AND.XLCYL.EQ.1.D0) PHASE = 'LIQUID '
      IF (XVCYL.EQ.0.D0.AND.XLCYL.LT.1.D0.AND.XLCYL.GT.0.D0)
     *     PHASE = 'SOL-LIQ'
C
C  CONDITIONS OF UF6 EXHAUSTED AT FINAL PRESSURE
C
      CALL FLASH (TVOL,PVOL,MW,XVCYL,XLCYL,PFIN,ISEN,XVFIN,XLFIN,TFIN)
C
      MSFLRT = G*(PIGRAY(1,3)**2)*3.14159D0/4.D0

      MSSRTS = MSFLRT*(1.D0 - XVFIN)*(1.D0 - XLFIN)
      MSSRTL = MSFLRT*(1.D0 - XVFIN)*XLFIN
      MSSRTV = MSFLRT*XVFIN
C
C  BASIS FOR FLOW RATE CALCULATION
C
      BASIS = 'CHOKE'
      IF (IPIG.EQ.2.AND.IBRCH.EQ.2) BASIS = ' PDC '
      IF (IPIG.GT.2.AND.IGEXIT.EQ.2) BASIS = ' PDC '
C
C  OUTPUT TO TERMINAL FOR MONITORING PROGRESS OF PROGRAM EXECUTION
C
      WRITE (5,530) DELTSM,MTOT,MSFLRT
C
C  PROGRAM OUTPUT
C
      WRITE (30,3020) DELTSM,MSOL,MLIQ,MVAP,MTOT,TVOL,PVOL,PHASE,
     *     PCYL,BASIS,MSSRTS,MSSRTL,MSSRTV,MSFLRT,PFIN,TFIN
C
C  OUTPUT TO DATA FILE FOR INPUT TO FODRFT OR INDRFT
C
      WRITE (22,2210) DELTSM,MSSRTS,MSSRTL,MSSRTV,TFIN,PFIN
```

```
C
C  CYLINDER INTERNAL MASS AND ENERGY BALANCE
C  ========================================
C
      CALL INTMEB
C
      DELTSM = DELTSM+DELT
C
      CALL DENUF6 (TVOL,PVOL,MW,DENSOL,DENLIQ,DENVAP)
C
      IF (TVOL.LT.TTRIPL .OR. MTOT.LT.(MSFLRT*DELT).OR.
     *     DELTSM.GE.MAXTIM) STOP
C
      GO TO 110
C
C************************************************************************
C
C  FORMAT STATEMENTS
C  =================
C
  500 FORMAT('   VALUE OF ICYL =',I3,
     *     ' NOT RECOGNIZED -- EXECUTION TERMINATED.')
C
  510 FORMAT('   PVOL =',F8.3,' AND TVOL =',F8.3,' NOT ALLOWED --',/,
     *     '   EITHER PVOL OR TVOL MUST BE GREATER THAN 0 --',/,
     *     '   NEITHER PVOL OR TVOL CAN BE LESS THAN 0 --',/,
     *     '   EXECUTION TERMINATED.')
C
  520 FORMAT('   TRIPLE POINT SPECIFIED --',/,
     *     '   SPECIFIED VALUE OF XLVOL =',F6.2,' OUT OF BOUNDS --',/,
     *     '   EXECUTION TERMINATED')
C
  530 FORMAT (3F15.5)
C
 2000 FORMAT(16A5)
C
 2010 FORMAT (4A5)
C
 2020 FORMAT(4(1H$,/))
C
 2200 FORMAT (1PE15.7)
C
 2210 FORMAT (1PE15.7,' 0 0 0 0 0 ',3E15.7,' 0 ',2E15.7)
C
 3000 FORMAT(1H1,T22,'TITLE:  ',16A5)
C
 3010 FORMAT('0        ******* CONDITION OF UF6 IN CONTAINMENT',
     *     ' *******   PATHWAY INLET          ********* CONDITION OF',
     *     ' UF6 EXHAUSTED **********',/,T76,'FLOW',/,'  TIME   *****',
     *     '***** MASS (LB)',
     *     ' **********   TEMP    PRES   RELEASE   PRES   RATE   ****',
     *     ' RELEASE RATE (LB/SEC) ****   TEMP    PRES',/,'  (SEC)',
     *     '   SOLID   LIQUID  VAPOR   TOTAL  (DEG F)  (PSIA)',
     *     '   PHASE   (PSIA)  BASIS   SOLID   LIQUID  VAPOR   TOTAL',
```

```
     *     '  (DEG F)  (PSIA)',/,1H )
C
 3020 FORMAT(F7.0,1X,4F8.1,2F8.3,2X,A7,F8.3,2X,A5,1X,6F8.3)
C
C***********************************************************************
C
      END
```

A.5 COMPLT - A Plotting Program for FODRFT and INDRFT Results

```
C  THIS PROGRAM PLOTS OUTPUT FROM FODRFT AND INDRFT.
C
C  THIS PROGRAM USES DISSPLA (VERSION 9.0) SUBROUTINES FOR PLOTTING.
C  DISSPLA IS A PRODUCT OF INTEGRATED SOFTWARE SYSTEMS CORPORATION OF
C  SAN DIEGO, CALIFORNIA. DOCUMENTATION WAS COPYRIGHTED IN 1981.
C
C***********************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*4 (A-H,J-Z)
C
      DIMENSION TIME(1000), UTOT(1000), HFTOT(1000), DENU(1000),
     *     DENHF(1000), T(1000), P(1000)
      DIMENSION DWGNUM(6,4), NUMBER(4)
C
C***********************************************************************
C
C  READ STATEMENTS
C  ===============
C
      IMAX = 0
C
C  CODING BETWEEN "10 CONTINUE" AND "30 CONTINUE" READS AND DEVELOPS
C  DATA FOR PLOTTING
C
   10 CONTINUE
C
      IMAX = IMAX + 1
C
C  INPUT IS READ FROM AN UNFORMATTED OUTPUT FILE GENERATED BY EITHER
C  FODRFT OR INDRFT.
C
      READ (48,*,END=30) TIME(IMAX), UTOT(IMAX), HFTOT(IMAX),
     *     DENU(IMAX), DENHF(IMAX), T(IMAX), P(IMAX)
C
      IF (DENU(IMAX).LT.1.E-20) DENU(IMAX) = 1.E-20
      IF (DENHF(IMAX).LT.1.E-20) DENHF(IMAX) = 1.E-20
C
      IF (IMAX.GT.1) GO TO 20
C
      DUMAX = DENU(1)
```

```
      DUMIN = DENU(1)
C
      DHFMAX = DENHF(1)
      DHFMIN = DENHF(1)
C
      TMAX = T(1)
      TMIN = T(1)
C
      PMAX = P(1)
      PMIN = P(1)
C
      GO TO 10
C
   20 CONTINUE
C
      IF (DENU(IMAX).GT.DUMAX) DUMAX = DENU(IMAX)
      IF (DENU(IMAX).LT.DUMIN) DUMIN = DENU(IMAX)
C
      IF (DENHF(IMAX).GT.DHFMAX) DHFMAX = DENHF(IMAX)
      IF (DENHF(IMAX).LT.DHFMIN) DHFMIN = DENHF(IMAX)
C
      IF (T(IMAX).GT.TMAX) TMAX = T(IMAX)
      IF (T(IMAX).LT.TMIN) TMIN = T(IMAX)
C
      IF (P(IMAX).GT.PMAX) PMAX = P(IMAX)
      IF (P(IMAX).LT.PMIN) PMIN = P(IMAX)
C
      GO TO 10
C
   30 CONTINUE
C
C  READ DRAWING NUMBERS.
C
      DO 40 I40=1,6
C
           READ (49,4900) (DWGNUM(I40,I), I=1,4)
C
   40 CONTINUE
C
      IMAX = IMAX - 1
C
      TIMMAX = TIME(IMAX)
C
      UMAX = UTOT(IMAX)
C
      HFMAX = HFTOT(IMAX)
C
      DUMIN = AMAX1(DUMIN,5.07E-8)
C
      DHFMIN = AMAX1(DHFMIN,6.24E-8)
C
C************************************************************************
C
C  PLOTTING COMMANDS
```

```
C  =================
C
      CALL COMPRS
C
      DO 80 I80=1,6
C
C  SET UP AXES.
C
      CALL RESET('ALL')
      CALL NOBRDR
      CALL GRACE (0.)
      CALL AREA2D(5.,5.)
      CALL FRAME
      CALL DUPLX
      CALL XREVTK
      CALL YREVTK
      CALL YAXANG(0.0)
C
      CALL MX1ALF('STANDARD','!')
      CALL MX2ALF('L/CSTD','@')
      CALL MX3ALF('INSTRUCTION','&')
C
      CALL XINTAX
      CALL XNAME ('CUMULATIVE TIME OF TRANSIENT@ (SEC)!$',100)
      CALL AXSPLT (0.,TIMMAX,5.,XORIG,XSTEP,XAXIS)
      XMAX = XORIG + XSTEP*XAXIS
C
      IF(I80.EQ.3.OR.I80.EQ.4) GO TO 50
C
C  PLOT LINEAR AXES FOR PLOTS 1, 2, 5, AND 6.
C
      IF (I80.EQ.1) CALL YNAME ('CUMULATIVE URANIUM RELEASED@ (LB)!$',
     *     100)
      IF (I80.EQ.1) CALL AXSPLT (0.,UMAX,5.,YORIG,YSTEP,YAXIS)
C
      IF (I80.EQ.2) CALL YNAME ('CUMULATIVE HF RELEASED@ (LB)!$',100)
      IF (I80.EQ.2) CALL AXSPLT (0.,HFMAX,5.,YORIG,YSTEP,YAXIS)
C
      IF (I80.EQ.5) CALL YNAME
     *     ('TEMPERATURE IN COMPARTMENT@ (&EH.5@0&EXHX!F@)!$',100)
      IF (I80.EQ.5) CALL AXSPLT (TMIN,TMAX,5.,YORIG,YSTEP,YAXIS)
C
      IF (I80.EQ.6) CALL YNAME ('PRESSURE IN COMPARTMENT@ (PSIA)!$',
     *     100)
      IF (I80.EQ.6) CALL AXSPLT (PMIN,PMAX,5.,YORIG,YSTEP,YAXIS)
C
      YMAX = YORIG + YSTEP*YAXIS
C
      CALL YINTAX
      CALL GRAF (XORIG,XSTEP,XMAX,YORIG,YSTEP,YMAX)
C
      GO TO 60
C
   50 CONTINUE
```

```
C
C  PLOT SEMILOG AXES FOR PLOTS 3 AND 4.
C
      CALL YTICKS (0)
      CALL YAXEND ('NOENDS')
      CALL RESET ('YINTAX')
      CALL RESET ('YNAME')
      CALL GRAF (XORIG,XSTEP,XMAX,0,1,1)
      CALL RESET ('YAXEND')
      CALL YTICKS(1)
C
      IF (I80.EQ.3) CALL ALGPLT (DUMIN,DUMAX,5.,YORIG,YCYCLE)
      IF (I80.EQ.3) CALL YLGAXS (YORIG,YCYCLE,5.,
     *   'URANIUM CONCENTRATION IN COMPARTMENT@ (LB/FT&EH.8@3&EXHX@)!$',
     *     100,0,0)
C
      IF (I80.EQ.4) CALL ALGPLT (DHFMIN,DHFMAX,5.,YORIG,YCYCLE)
      IF (I80.EQ.4) CALL YLGAXS (YORIG,YCYCLE,5.,
     *     'HF CONCENTRATION IN COMPARTMENT@ (LB/FT&EH.8@3&EXHX@)!$',
     *     100,0,0)
C
   60 CONTINUE
C
      CALL THKCRV (0.05)
      CALL NOCHEK
C
C  PLOT 1.  CUMULATIVE URANIUM RELEASED (LB) VS CUMULATIVE TIME OF
C           TRANSIENT (SEC).
C
      IF (I80.EQ.1) CALL CURVE (TIME,UTOT,IMAX,0)
C
C  PLOT 2.  CUMULATIVE HF RELEASED (LB) VS CUMULATIVE TIME OF TRANSIENT
C           (SEC).
C
      IF (I80.EQ.2) CALL CURVE (TIME,HFTOT,IMAX,0)
C
C  PLOT 3.  URANIUM CONCENTRATION IN COMPARTMENT (LB/FT**3) VS
C           CUMULATIVE TIME OF TRANSIENT (SEC).
C
      IF (I80.EQ.3) CALL CURVE (TIME,DENU,IMAX,0)
C
C  PLOT 4.  HF CONCENTRATION IN COMPARTMENT (LB/FT**3) VS CUMULATIVE
C           TIME OF TRANSIENT (SEC).
C
      IF (I80.EQ.4) CALL CURVE (TIME,DENHF,IMAX,0)
C
C  PLOT 5.  TEMPERATURE IN COMPARTMENT (DEG F) VS CUMULATIVE TIME OF
C           TRANSIENT (SEC).
C
      IF (I80.EQ.5) CALL CURVE (TIME,T,IMAX,0)
C
C  PLOT 6.  PRESSURE IN COMPARTMENT (PSIA) VS CUMULATIVE TIME OF
C           TRANSIENT (SEC).
C
```

```
      IF (I80.EQ.6) CALL CURVE (TIME,P,IMAX,0)
C
C  DRAWING NUMBERS.
C
      DO 70 I70=1,4
C
           NUMBER(I70)=DWGNUM(I80,I70)
C
   70 CONTINUE
C
      CALL HEIGHT (0.1)
      CALL MESSAG (NUMBER,100,3.2,5.1)
C
      CALL ENDPL(0)
C
   80 CONTINUE
C
      CALL DONEPL
C
      STOP
C
C***********************************************************************
C
C  FORMAT STATEMENTS
C  =================
C
 4900 FORMAT (4A5)
C
C***********************************************************************
C
      END
```

A.6 CYLPLT - A Plotting Program for CYLIND Results

```
C  THIS PROGRAM PLOTS OUTPUT FROM CYLIND.
C
C  THIS PROGRAM USES DISSPLA (VERSION 9.0) SUBROUTINES FOR PLOTTING.
C  DISSPLA IS A PRODUCT OF INTEGRATED SOFTWARE SYSTEMS CORPORATION OF
C  SAN DIEGO, CALIFORNIA. DOCUMENTATION WAS COPYRIGHTED IN 1981.
C
C***********************************************************************
C
C  INITIAL STATEMENTS
C  ==================
C
      IMPLICIT REAL*4 (A-H,J-Z)
C
      DIMENSION TIME(1000), MSOL(1000), MLIQ(1000), MTOT(1000),
     *     TCYL(1000), PCYL(1000), MSSRTS(1000), MSSRTL(1000),
     *     MSFLRT(1000), TFIN(1000), BSLNX(2), BSLNY(2), AX(2),
     *     AY(2), BX(2), BY(2), CX(2), CY(2), DX(2), DY(2)
      DIMENSION DWGNUM(4,4), NUMBER(4)
C
```

```
C***********************************************************************
C
C  READ STATEMENTS
C  ===============
C
C  THE FOLLOWING DO LOOP BYPASSES HEADINGS IN THE INPUT FILE WHICH IS
C  THE PRIMARY CYLIND OUTPUT FILE.
C
      DO 10 I10=1,6
C
           READ (30,3010) IDUM
C
   10 CONTINUE
C
      IMAX = 0
C
C  CODING BETWEEN "20 CONTINUE" AND "40 CONTINUE" READS OR DEVELOPS DATA
C  TO BE PLOTTED.
C
   20 CONTINUE
C
      IMAX = IMAX + 1
C
      READ (30,3020,END=40) TIME(IMAX), MSOL(IMAX), MLIQ(IMAX),
     *     MTOT(IMAX), TCYL(IMAX), PCYL(IMAX), MSSRTS(IMAX),
     *     MSSRTL(IMAX), MSFLRT(IMAX), PFIN, TFIN(IMAX)
C
      MLIQ(IMAX) = MSOL(IMAX) + MLIQ(IMAX)
C
      MSSRTL(IMAX) = MSSRTS(IMAX) + MSSRTL(IMAX)
C
      IF (IMAX.NE.1) GO TO 30
C
      TMIN = TFIN(IMAX)
      TMAX = TFIN(IMAX)
C
      GO TO 20
C
   30 CONTINUE
C
      IF (TFIN(IMAX).LT.TMIN) TMIN = TFIN(IMAX)
      IF (TFIN(IMAX).GT.TMAX) TMAX = TFIN(IMAX)
C
      GO TO 20
C
   40 CONTINUE
C
C  READ DRAWING NUMBERS.
C
      DO 50 I50=1,4
C
           READ (31,3110) (DWGNUM(I50,I), I=1,4)
C
   50 CONTINUE
```

```
C
      IMAX = IMAX - 1
C
      BSLNX(1) = 0.
      BSLNX(2) = TIME(IMAX)
      BSLNY(1) = 0.
      BSLNY(2) = 0.
C
C*************************************************************************
C
C  PLOTTING COMMANDS
C  =================
C
      CALL COMPRS
C
      DO 160 I160=1,4
C
C  SET UP AXES.
C
      CALL RESET ('ALL')
      CALL NOBRDR
      CALL GRACE (0.)
      CALL AREA2D(5.,5.)
      CALL FRAME
      CALL DUPLX
C
      CALL XREVTK
      CALL YREVTK
      CALL YAXANG(0.0)
C
      CALL MX1ALF('STANDARD','!')
      CALL MX2ALF('L/CSTD','@')
      CALL MX3ALF('INSTRUCTION','&')
C
      CALL INTAXS
C
      CALL XNAME ('CUMULATIVE TIME OF TRANSIENT@ (SEC)!$',100)
      CALL AXSPLT (0.,TIME(IMAX),5.,XORIG,XSTEP,XAXIS)
      XMAX = XORIG + XSTEP*XAXIS
C
      IF (I160.NE.1) GO TO 60
C
      CALL YNAME ('MASS OF UF&LH.8@6&LXHX! IN CYLINDER@ (LB)!$',100)
      CALL AXSPLT (0.,MTOT(1),5.,YORIG,YSTEP,YAXIS)
C
      GO TO 90
C
   60 CONTINUE
C
      IF (I160.NE.2) GO TO 70
C
      CALL YNAME ('MASS RELEASE RATE OF UF&LH.8@6&LXHX@ (LB/SEC)!$',100)
      CALL AXSPLT (0.,MSFLRT(1),5.,YORIG,YSTEP,YAXIS)
C
```

```
      GO TO 90
C
   70 CONTINUE
C
      IF (I160.NE.3) GO TO 80
C
      CALL YNAME ('UF&LH.8@6&LXHX! TEMPERATURE IN CYLINDER@
     * (&EH.5@O&EXHX!F@)!$',100)
      CALL AXSPLT (TCYL(IMAX),TCYL(1),5.,YORIG,YSTEP,YAXIS)
C
      GO TO 90
C
   80 CONTINUE
C
      CALL YNAME ('UF&LH.8@6&LXHX! EXHAUST TEMPERATURE@
     * (&EH.5@O&LXHX!F@)!$',100)
C
      IF (ABS(TMAX-TMIN).LT.1.) TMIN = FLOAT(IFIX(TMIN))
      IF (ABS(TMAX-TMIN).LT.1.) TMAX = FLOAT(IFIX(TMAX + 2.))
C
      CALL AXSPLT (TMIN,TMAX,5.,YORIG,YSTEP,YAXIS)
C
   90 CONTINUE
C
      YMAX = YORIG + YSTEP*YAXIS
C
      CALL GRAF (XORIG,XSTEP,XMAX,YORIG,YSTEP,YMAX)
C
      XFACT = (XMAX-XORIG)/5.
      YFACT = (YMAX-YORIG)/5.
C
      CALL THKCRV (0.03)
C
      CALL NOCHEK
C
      IF (I160.NE.1) GO TO 100
C
C  PLOT 1.  MASS OF UF6 IN CYLINDER (LB) VS CUMULATIVE TIME OF TRANSIENT
C           (SEC).
C
      CALL CURVE (TIME,MTOT,IMAX,0)
      CALL RESET ('THKCRV')
C
      CALL DOT
      CALL CURVE (TIME,MLIQ,IMAX,0)
C
      CALL CHNDOT
      CALL CURVE (TIME,MSOL,IMAX,0)
      CALL RESET ('CHNDOT')
C
      CALL SHDPAT (45350)
      CALL SHDCRV (BSLNX, BSLNY, 2, TIME, MSOL, IMAX)
      CALL SHDPAT (135190)
      CALL SHDCRV (TIME, MSOL, IMAX, TIME, MLIQ, IMAX)
```

```
      CALL SHDPAT (45590)
      CALL SHDCRV (TIME, MLIQ, IMAX, TIME, MTOT, IMAX)
C
      GO TO 110
C
  100 CONTINUE
C
      IF (I160.NE.2) GO TO 120
C
C  PLOT 2.  MASS RELEASE RATE OF UF6 (LB/SEC) VS CUMULATIVE TIME OF
C           TRANSIENT (SEC).
C
      CALL CURVE (TIME,MSFLRT,IMAX,0)
      CALL RESET ('THKCRV')
C
      CALL DOT
      CALL CURVE (TIME,MSSRTL,IMAX,0)
C
      CALL CHNDOT
      CALL CURVE (TIME,MSSRTS,IMAX,0)
      CALL RESET ('CHNDOT')
C
      CALL SHDPAT (45350)
      CALL SHDCRV (BSLNX, BSLNY, 2, TIME, MSSRTS, IMAX)
      CALL SHDPAT (135190)
      CALL SHDCRV (TIME, MSSRTS, IMAX, TIME, MSSRTL, IMAX)
      CALL SHDPAT (45590)
      CALL SHDCRV (TIME, MSSRTL, IMAX, TIME, MSFLRT, IMAX)
C
  110 CONTINUE
C
C  LEGEND FOR PLOTS 1 AND 2.
C
      AX(1) = 2.5*XFACT
      AX(2) = 3.4*XFACT
      AY(1) = 4.90*YFACT
      AY(2) = AY(1)
C
      BX(1) = AX(1)
      BX(2) = AX(2)
      BY(1) = 4.62*YFACT
      BY(2) = BY(1)
C
      CX(1) = AX(1)
      CX(2) = AX(2)
      CY(1) = 4.34*YFACT
      CY(2) = CY(1)
C
      DX(1) = AX(1)
      DX(2) = AX(2)
      DY(1) = 4.06*YFACT
      DY(2) = DY(1)
C
      CALL THKCRV (0.03)
```

```
      CALL CURVE (AX, AY, 2, 0)
      CALL RESET ('THKCRV')
      CALL CURVE (DX, DY, 2, 0)
      CALL DOT
      CALL CURVE (BX, BY, 2, 0)
      CALL CHNDOT
      CALL CURVE (CX, CY, 2, 0)
C
      CALL RESET ('CHNDOT')
C
      CALL SHDPAT (45350)
      CALL SHDCRV (DX, DY, 2, CX, CY, 2)
      CALL SHDPAT (135190)
      CALL SHDCRV (CX, CY, 2, BX, BY, 2)
      CALL SHDPAT (45590)
      CALL SHDCRV (BX, BY, 2, AX, AY, 2)
C
      CALL MESSAG ('UF&LH.8@6&LXHX! VAPOR$',100,3.5,4.69)
      CALL MESSAG ('UF&LH.8@6&LXHX! LIQUID$',100,3.5,4.41)
      CALL MESSAG ('UF&LH.8@6&LXHX! SOLID$',100,3.5,4.13)
C
      GO TO 140
C
  120 CONTINUE
C
      IF (I160.NE.3) GO TO 130
C
C  PLOT 3.  CURVE 1: TEMPERATURE IN CYLINDER (DEG F) VS CUMULATIVE TIME
C           OF TRANSIENT (SEC).
C
      CALL CURVE (TIME,TCYL,IMAX,0)
C
C  LEGEND FOR PLOT 3 (CURVE 1).
C
      AX(1) = 2.5*XFACT
      AX(2) = 3.4*XFACT
      AY(1) = 4.79*YFACT + YORIG
      AY(2) = AY(1)
C
      CALL CURVE (AX, AY, 2, 0)
C
      CALL MESSAG ('TEMPERATURE$',100,3.5,4.72)
C
C  PLOT 3.  CURVE 2:  VAPOR PRESSURE OF UF6 IN CYLINDER (PSIA) VS
C           CUMULATIVE TIME OF TRANSIENT(SEC).
C
      CALL AXSPLT (PCYL(IMAX),PCYL(1),5.,YORIG,YSTEP,YAXIS)
C
      YMAX = YORIG + YSTEP*YAXIS
C
      CALL YGRAXS (YORIG,YSTEP,YMAX,5.,'VAPOR PRESSURE OF
     * UF&LH.8@6&LXHX! IN CYLINDER@ (PSIA)!$',-100,5.,0.)
C
      CALL CHNDOT
```

```
C
      CALL CURVE (TIME,PCYL,IMAX,0)
C
C  LEGEND FOR PLOT 3 (CURVE 2).
C
      AY(1) = 4.61*(YMAX-YORIG)/5. + YORIG
      AY(2) = AY(1)
C
      CALL CURVE (AX, AY, 2, 0)
C
      CALL MESSAG ('PRESSURE$',100,3.5,4.51)
C
      GO TO 140
C
  130 CONTINUE
C
C  PLOT 4.  EXHAUST TEMPERATURE (DEG F) VS CUMULATIVE TIME OF TRANSIENT
C           (SEC).
C
      CALL CURVE (TIME,TFIN,IMAX,0)
C
      CALL MESSAG ('EXHAUST PRESSURE$',100,3.0,4.72)
      CALL MESSAG ('   = $',100,3.0,4.51)
      CALL REALNO (PFIN,2,'ABUT','ABUT')
      CALL MESSAG ('@ PSIA!$',100,'ABUT','ABUT')
C
  140 CONTINUE
C
C  DRAWING NUMBERS.
C
      DO 150 I150=1,4
C
           NUMBER(I150) = DWGNUM(I160,I150)
C
  150 CONTINUE
C
      CALL HEIGHT (0.1)
      CALL MESSAG (NUMBER, 100, 3.2, 5.1)
C
      CALL ENDPL(0)
C
  160 CONTINUE
C
      CALL DONEPL
C
      STOP
C
C***********************************************************************
C
C  FORMAT STATEMENTS
C  ================
C
 3010 FORMAT (I1)
C
```

```
 3020 FORMAT (F7.0,1X,2F8.1,8X,F8.1,2F8.3,25X,2F8.3,8X,3F8.3)
C
 3110 FORMAT (4A5)
C
C***********************************************************************
C
      END
```

Appendix B
LISTINGS OF SUBROUTINES

This appendix contains listings of all subroutines required by the main programs, FODRFT, INDRFT, BATCH, and CYLIND. These subroutines are arranged alphabetically by subroutine name. Several UF_6 physical properties subroutines described in the text but not required by the aforementioned main programs are also included in this appendix. Table B.1 is a summary of STOPs that may occur during execution of programs using these subroutines. Note that subroutines called by COMPLT and CYLPLT are DISSPLA version 9.0 subroutines.*

*For information on DISSPLA, contact Integrated Software Systems Corporation, 10505 Sorrento Valley Road, San Diego, CA, 92121.

Table B.1. Causes for program termination

STOP	Subroutine	Cause
STOP01	COMPRT	100 iterations without temperature-enthalpy convergence in compartment
STOP02	INTMEB	New estimate of temperature inside cyclinder exceeds 250°F (upper limit based on DOE regulations, see Table 8) or is less than the triple point when UF_6 condensate is known to be liquid
STOP03	INTMEB	20 iterations without temperature-enthalpy convergence; UF_6 condensate is liquid
STOP04	INTMEB	20 iterations without temperature-enthalpy convergence; UF_6 condensate is solid
STOP05	INTMEB	New estimate of temperature inside cyclinder is less than 0°F (arbitrary lower limit) or is greater than the triple point when UF_6 condensate is known to be solid
STOP06	LEVEL	100 iterations without convergence on UF_6 vapor-liquid interface level (not bounded)
STOP07	LEVEL	100 iterations without convergence on UF_6 vapor-liquid interface level (bounded)
STOP11	LEVEL	UF_6 solid-vapor interface level above hole
STOP12	LEVEL	HF-H_2O equilibrium partitioning did not converge in 100 iterations
STOP13	PIPSYS	Pressure drop-pipe length calculation did not converge within 100 iterations
STOP14	PIPSYS	Pressure drop calculation across a contraction did not converge within 100 iterations
STOP15	STERM	ITYPE (release type identifier) not recognized

B.1 BREACH

```
      SUBROUTINE BREACH (G)
C
C  THIS SUBROUTINE CALCULATES THE MASS VELOCITY, IN UNITS OF LBS/SEC/
C  FT**2, OF UF6 ESCAPING FROM A VESSEL THROUGH A BREACH OR HOLE IN THE
C  VESSEL WALL.  THE INSIDE TEMPERATURE (DEG F) AND PRESSURE (PSIA), THE
C  OUTSIDE PRESSURE (PSIA), AND THE INITIAL MASS FRACTIONS OF VAPOR,
C  LIQUID, AND SOLID UF6 ARE KNOWN.  THE MASS VELOCITY IS CALCULATED.
C
C       ALPHA, BETA, DELTA, GAMMA ARE CONSTANTS USED IN DIFFERENT
C       FORMS OF THE BASIC PRESSURE DROP EQUATION RELATING CHANGE
C       IN PRESSURE TO MASS VELOCITY AND TO SPECIFIC
C       VOLUME.  THEY ARE SET IN BREACH AND PASSED TO THE CALLING
C       PROGRAM FOR USE IN OTHER SUBROUTINES THROUGH THE LABELED
C       BLOCK COMMON /CNSTNT/.
C
C       EPSLN IS A CONVERGENCE CRITERION ALSO SET HERE AND PASSED
C       THROUGH THE LABELED BLOCK COMMON /CNSTNT/.
C
C  INPUT VARIABLES, VALUES PROVIDED BY CALLING PROGRAM.
C
C       ISEN     INDEX FOR CONSTANT ENTROPY/CONSTANT ENTHALPY
C                   ISEN=0, ASSUME CONSTANT ENTROPY FLASH
C                   ISEN=1, ASSUME CONSTANT ENTHALPY FLASH
C       IPIG     NUMBER OF ELEMENTS IN RELEASE PATHWAY:
C                   IPIG=2, PATHWAY IS A BREACH OR HOLE.
C                   IPIG>2, PATHWAY IS A PIPE AND FIXTURE SYSTEM.
C       PIGRAY   ARRAY OF VALUES DESCRIBING THE RELEASE PATHWAY.
C                EACH PATHWAY ELEMENT CORRESPONDS TO ONE ROW OF
C                THE ARRAY.  SPECIAL VALUES INCLUDE
C                PIGRAY(IPIG,3), THE AMBIENT PRESSURE IN PSIA.
C                PIGRAY IS MORE FULLY DESCRIBED IN THE
C                CALLING PROGRAM AND INPUT DATA FILES.
C       PCYL     PRESSURE OF MASS ENTERING RELEASE PATHWAY, PSIA
C       TCYL     TEMPERATURE OF MASS ENTERING PATHWAY, DEGREES F
C       PTRIPL,  PRESSURE IN PSIA AND TEMPERATURE IN DEGREES F,
C        TTRIPL  RESPECTIVELY, FOR THE TRIPLE POINT CONDITION,
C                INPUT FROM THE CALLING PROGRAM
C       XVCYL    VAPOR MASS FRACTION ENTERING PATHWAY
C       XLCYL    MASS FRACTION OF THE NON-VAPOR MASS
C                WHICH IS LIQUID ENTERING PATHWAY
C       MW       MOLECULAR WEIGHT OF UF6, LB MASS/LB-MOLE
C
C  INTERNAL VARIABLES, USED ONLY IN BREACH AND ITS SUBROUTINES.
C
C       PINT     INTERMEDIATE PRESSURE, PRESSURE-DROP-CONTROLLED
C                FLOW, PSIA
C       TINT     INTERMEDIATE TEMPERATURE, PDC FLOW, DEGREES F
C       XVINT    VAPOR MASS FRACTION AT INTERMEDIATE CONDITIONS
C                IN PDC FLOW
C       XLINT    MASS FRACTION OF THE NON-VAPOR PHASE WHICH IS
C                LIQUID AT INTERMEDIATE CONDITIONS IN PDC FLOW
```

```
C       RHOVI,   DENSITIES OF VAPOR, LIQUID, AND SOLID,
C        RHOLI,  RESPECTIVELY, AT INTERMEDIATE CONDITIONS,
C        RHOSI   LB MASS/FT**3
C       VIBAR    SPECIFIC VOLUME OF MASS IN RELEASE PATHWAY AT
C                INTERMEDIATE CONDITIONS, FT**3/LB MASS
C       ICHECK   INTEGER VARIABLE WHICH CONTROLS PROGRAM FLOW
C       PUPPER,  UPPER AND LOWER LIMITS ON PRESSURE IN PSIA
C        PLOWER  FOR INTERVAL HALVING SEARCH TECHNIQUE
C       P2       PRESSURE IN PSIA ONLY SLIGHTLY LOWER THAN
C                THE CHOKED FLOW PRESSURE.  THE SMALL PRESSURE
C                DIFFERENCE AND THE CORRESPONDING SMALL
C                DIFFERENCE IN SPECIFIC VOLUME ARE USED TO
C                APPROXIMATE THE DERIVATIVE OF PRESSURE WITH
C                RESPECT TO SPECIFIC VOLUME AT CHOKED FLOW
C                CONDITIONS.
C       T2       TEMPERATURE IN DEGREES F CORRESPONDING TO P2
C       XV2      VAPOR MASS FRACTION CORRESPONDING TO P2
C       XL2      MASS FRACTION OF THE NON-VAPOR PHASE WHICH IS
C                LIQUID AT P2, T2
C       V2BAR    SPECIFIC VOLUME IN FT**3/LB MASS CORRESPONDING
C                TO P2
C       GMAX     CHOKED FLOW MASS VELOCITY, LB MASS/S/FT**2,
C                EVALUATED AT CURRENT GUESS FOR P1, T1 CONDITIONS
C       PCHECK   PRESSURE IN PSIA PREDICTED WHEN CHOKED FLOW MASS
C                VELOCITY IS USED IN PDC FLOW EQUATION BETWEEN
C                CYLINDER CONDITIONS AND P1, T1 CONDITIONS.  WHEN
C                GMAX CORRESPONDS TO P1, T1 CONDITIONS, PCHECK
C                EQUALS P1.
C
C  OUTPUT VARIABLES, VALUES SET BY BREACH FOR CALLING PROGRAM.
C
C       G        MASS VELOCITY THROUGH THE HOLE, LB MASS/S/FT**2
C
C       * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C       *  NOTE!  PRESSURE-DROP-CONTROLLED MASS VELOCITY (PDC G)  *
C       *  IS A FUNCTION OF CONDITIONS IN THE CYLINDER,           *
C       *  INTERMEDIATE CONDITIONS, AND AMBIENT CONDITIONS.       *
C       *  CHOKED FLOW G IS DETERMINED BY MATCHING CRITERIA FOR   *
C       *  PDC G FROM CYLINDER CONDITIONS TO THE CHOKED FLOW      *
C       *  CONDITIONS WITH THE CHOKED FLOW EQUATION, WHICH        *
C       *  RELATES MAXIMUM G TO THE DERIVATIVE OF PRESSURE WITH   *
C       *  RESPECT TO SPECIFIC VOLUME AT CHOKED FLOW CONDITIONS.  *
C       *  THE SMALLER VALUE, PDC G OR CHOKED FLOW G, IS THEN     *
C       *  OUTPUT AS THE BREACH MASS VELOCITY.                    *
C       * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C       T1       TEMPERATURE IN DEGREES F CORRESPONDING TO THE
C                INTERMEDIATE OR CHOKED FLOW CONDITIONS
C       P1       PRESSURE IN PSIA CORRESPONDING TO THE
C                INTERMEDIATE OR CHOKED FLOW CONDITIONS
C       XV1      VAPOR MASS FRACTION AT T1, P1
C       XL1      MASS FRACTION OF THE NON-VAPOR PHASE AT T1, P1
C                WHICH IS LIQUID
C       V1BAR    SPECIFIC VOLUME AT T1, P1
```

```
C       IBRCH    INDEX OUTPUT CHARACTERIZING BREACH MASS VELOCITY
C                   =1, CHOKED FLOW CONTROLS THE MASS VELOCITY
C                   =2, PDC FLOW CONTROLS THE MASS VELOCITY
C
C  THIS SUBROUTINE IS WRITTEN IN DOUBLE PRECISION. ALL INTEGER VARIABLE
C  NAMES START WITH 'I'.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C  NAMED COMMON BLOCKS TRANSFER MOST INPUTS FROM THE CALLING PROGRAM AND
C  MOST OUTPUTS CALCULATED BY THE BREACH SUBROUTINE.
C
      COMMON /ICOMON/ ISEN, IPIG, IBRCH, IGEXIT
      COMMON /GMTRY / PIGRAY
      COMMON /CONCYL/ PCYL,TCYL,XVCYL,XLCYL,MW
      COMMON /CONENT/ P1,T1,XV1,XL1,V1BAR
      COMMON /CNSTNT/ ALPHA,BETA,DELTA,GAMMA,EPSLN
      COMMON /TRIPLE/ TTRIPL,PTRIPL
C
C  AN ARRAY IS DIMENSIONED WHICH CONTAINS DESCRIPTIVE VALUES FOR THE
C  RELEASE PATHWAY, MODELED AS AN INFINITESIMAL LENGTH BETWEEN ENTRANCE
C  AND EXIT PRESSURE LOSSES.
C
      DIMENSION PIGRAY(99,3)
C
C  FOUR RELATED CONSTANTS ARE USED IN THE VARIOUS PRESSURE DROP
C  CORRELATIONS.
C
      ALPHA  = 4633.1D0
      BETA   = ALPHA*4.D0/3.D0
      DELTA  = ALPHA*2.D0
      GAMMA  = ALPHA*4.D0
C
C  DEFINE A SMALL NUMBER FOR CONVERGENCE TOLERANCE.
C
      EPSLN  = 1.D-6
C
C  AN INTERMEDIATE PRESSURE INSIDE THE BREACH IS CALCULATED.
C
      PINT   = (PCYL*2.D0+PIGRAY(IPIG,3))/3.D0
C
C  IN THE PRESENCE OF LIQUID, THIS INTERMEDIATE PRESSURE MUST BE
C  AT OR ABOVE THE TRIPLE POINT.  ADJUST PINT UPWARD IF NECESSARY.
C
      IF (XVCYL.NE.1.D0.AND.
     *    XLCYL.NE.0.D0.AND.
     *     PINT.LT.PTRIPL) PINT   = PTRIPL
C
C  AT THIS PRESSURE A FLASH CALCULATION IS MADE TO DETERMINE THE
C  INTERMEDIATE TEMPERATURE AND MASS FRACTIONS.
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,PINT,ISEN,
     *             XVINT,XLINT,TINT)
C
```

```
C  CALCULATE THE INTERMEDIATE SPECIFIC VOLUME.
C
C  THE DENSITIES OF EACH PHASE ARE REQUIRED.
C
      CALL DENUF6 (TINT,PINT,MW,RHOSI,RHOLI,RHOVI)
C
      VIBAR  = XVINT/RHOVI+(1.D0-XVINT)*XLINT/RHOLI
     *     +(1.D0-XVINT)*(1.D0-XLINT)/RHOSI
C
C  CALCULATE THE MASS VELOCITY LIMITED BY PRESSURE DROP.
C
      G      = SQRT(DELTA*(PCYL-PIGRAY(IPIG,3))/1.5D0/VIBAR)
C
C  THE MASS VELOCITY MIGHT BE LIMITED BY CHOKED FLOW. EQUATION 119 MAY
C  BE USED TO EVALUATE THE CHOKED FLOW MASS VELOCITY.  USE THE
C  INTERMEDIATE CONDITIONS AS FIRST GUESSES FOR THE CHOKED FLOW
C  CONDITIONS.  ONCE THE CHOICE BETWEEN PDC FLOW AND CHOKED FLOW IS
C  MADE, THE STORAGE LOCATIONS FIRST DEFINED HERE WILL BE UPDATED WITH
C  THE CORRECT BREACH CONDITIONS FOR OUTPUT TO THE CALLING PROGRAM.
C
      T1     = TINT
      P1     = PINT
      XV1    = XVINT
      XL1    = XLINT
      V1BAR  = VIBAR
C
C  THE ITERATION BELOW CLOSES TO A VALUE OF P1 EQUAL TO PCHECK. THE
C  METHOD USED IS CHANGED AS REQUIRED FROM DIRECT SUBSTITUTION TO
C  INTERVAL HALVING TO REGULA FALSI. THE FOLLOWING PARAMETERS ARE
C  INITIALIZED FOR BOOKKEEPING IN THE ITERATION.
C
C  INDICES FOR PROGRAM LOGIC CONTROL
C
      ICHECK = 0
      IPLUS  = 0
C
C  UPPER AND LOWER BOUNDS ON PRESSURE FOR INTERVAL HALVING.
C
      CALL VPRUF6 (TCYL, PCYLEQ)
C
      PUPPER = PCYLEQ
      PLOWER = 0.D0
C
C  UPPER AND LOWER BOUNDS ON PRESSURE FOR REGULA FALSI.
C
      PUCHK  = 0.D0
      PLCHK  = 0.D0
C
   10 CONTINUE
C
C  THE PROGRAM BEGINS THE DETERMINATION OF GMAX, THE CHOKED FLOW MASS
C  VELOCITY, BY SETTING A SMALL (APROXIMATELY INFINITESIMAL) PRESSURE
C  DIFFERENCE, STARTING FROM THE MOST RECENT GUESS FOR THE CHOKED FLOW
C  PRESSURE.
```

```
C
      P2     = P1-1.D-3
C
C  AT THIS PRESSURE A FLASH CALCULATION IS MADE TO DETERMINE THE
C  DIFFERENTIAL TEMPERATURE AND MASS FRACTIONS.
C
C  FLASH BASIS FOR CHOKE FLOW CONDITION IS ISENTROPIC.
C
      ISNGMX = 0
C
      CALL FLASH (T1,P1,MW,XV1,XL1,P2,ISNGMX,XV2,XL2,T2)
C
C  CALCULATE THE DIFFERENTIAL SPECIFIC VOLUME. THE DENSITIES OF EACH
C  PHASE ARE REQUIRED.
C
      CALL DENUF6 (T2,P2,MW,RHOS2,RHOL2,RHOV2)
C
      V2BAR  = XV2/RHOV2+(1.D0-XV2)*XL2/RHOL2
     *      +(1.D0-XV2)*(1.D0-XL2)/RHOS2
C
C  THE CHOKED FLOW MASS VELOCITY CORRESPONDING TO THE LATEST GUESSES FOR
C  CHOKED FLOW TEMPERATURE AND PRESSURE IS CALCULATED.
C
      GMAX   = SQRT(ALPHA*(P1-P2)/(V2BAR-V1BAR))
C
C  A CHECK IS REQUIRED TO SEE IF THE GUESSED PRESSURE FOR CHOKED FLOW
C  CORRESPONDS TO THE PDCPRESSURE CALCULATED USING GMAX, THE CYLINDER
C  PRESSURE, AND THE SPECIFIC VOLUME AT THE GUESSED PRESSURE.  WHEN THE
C  GUESSED PRESSURE AND THE PDC PRESSURE DIFFER BY LESS THAN SOME
C  TOLERANCE CRITERION, THE CLCULATION OF GMAX IS COMPLETE.
C
      PCHECK = PCYL-(GMAX**2.D0*V1BAR/GAMMA)
C
      IF (PCHECK.GT.PCYLEQ) PCHECK = PCYLEQ
C
      IF (DABS(PCHECK-P1).LT.(100.D0*EPSLN)
     *      .OR.DABS(PUPPER-P1).LT.(EPSLN)) GO TO 40
C
C  IF THE MAXIMUM MASS VELOCITY FOR CHOKED FLOW IS NOT COMPATIBLE WITH
C  THE PREVIOUSLY CALCULATED CHOKED FLOW CONDITIONS, AN ITERATION IS
C  NECESSARY TO FIND THE ACTUAL CHOKED FLOW CONDITIONS OF PRESSURE,
C  TEMPERATURE, AND MASS VELOCITY.
C
      IF (PCHECK.GT.P1) GO TO 20
C
      ICHECK = 1
C
      IF (PCHECK.GT.0.D0.AND.PLCHK.GT.0.D0) ICHECK = 3
C
   20 CONTINUE
C
      IF (ICHECK.GT.0) GO TO 60
C
      PLOWER = P1
```

```
      PLCHK  = PCHECK
      P1     = PCHECK
C
   30 CONTINUE
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,P1,ISEN,XV1,XL1,T1)
C
      CALL DENUF6(T1,P1,MW,RHOS1,RHOL1,RHOV1)
C
      V1BAR  = XV1/RHOV1+(1.D0-XV1)*XL1/RHOL1
     *     +(1.D0-XV1)*(1.D0-XL1)/RHOS1
C
      GO TO 10
C
   40 CONTINUE
C
C  NOW THAT THE CHOKED FLOW MASS VELOCITY HAS BEEN CALCULATED THE LOWER
C  OF THE TWO VALUES FOR MASS VELOCITY WILL BE RETURNED TO THE CALLING
C  PROGRAM.
C
      IF (GMAX-G) 50,120,120
C
   50 CONTINUE
C
C  CHOKED FLOW CONTROLS THE MASS VELOCITY.  THE CHOKED FLOW CONDITIONS
C  ARE THE INTERMEDIATE CONDITIONS, SO P1, ETC., NEED NOT BE CHANGED.
C
      G = GMAX
C
      IBRCH = 1
C
      GO TO 130
C
   60 CONTINUE
C
      IF (ICHECK.GT.1) GO TO 70
C
      PUPPER = P1
      PUCHK  = PCHECK
C
      P1     = (PUPPER+PLOWER)/2.D0
C
      ICHECK = 2
C
      GO TO 80
C
   70 CONTINUE
C
      IF (ICHECK.GT.2) GO TO 90
C
      PLOWER = P1
      PLCHK  = PCHECK
C
      P1     = (PLOWER+PUPPER)/2.D0
```

```
C
   80 CONTINUE
C
      GO TO 30
C
   90 CONTINUE
C
      IF (P1.GT.PCHECK) GO TO 100
C
      PLOWER = P1
      PLCHK  = PCHECK
C
      IF (ICHECK.EQ.4) IPLUS = 1
C
      ICHECK = 4
C
      GO TO 110
C
  100 CONTINUE
C
      PUPPER = P1
      PUCHK  = PCHECK
C
  110 CONTINUE
C
      P1     = (PUPPER*PLCHK-PLOWER*PUCHK)
     *        /(PUPPER+PLCHK-PLOWER-PUCHK)
C
      P1PLUS = 2.D0*P1-PLOWER
C
      IF (IPLUS.EQ.1.AND.P1PLUS.LT.PUPPER) P1 = P1PLUS
C
      IPLUS  = 0
C
      GO TO 30
C
  120 CONTINUE
C
C  PDC FLOW CONTROLS THE MASS VELOCITY.  THE INTERMEDIATE CONDITIONS ARE
C  THE BREACH CONDITIONS. P1, ETC., ARE RESET FOR OUTPUT.
C
      T1     = TINT
      P1     = PINT
      XV1    = XVINT
      XL1    = XLINT
      V1BAR  = VIBAR
C
      IBRCH = 2
C
  130 CONTINUE
      RETURN
      END
```

B.2 COMPRT

```
      SUBROUTINE COMPRT (IC, INOUT, INODES)
C
C  THIS SUBROUTINE PERFORMS A MASS AND ENERGY BALANCE FOR NODE IC. IT
C  DETERMINES THE TEMPERATURE, PRESSURE, AND PHASE COMPOSITION AT THE
C  END OF A TIME STEP. THE MASS AND ENERGY OF INLET AND OUTLET STREAMS
C  ARE ADDED OR SUBTRACTED TO THE MASS AND ENERGY OF THE COMPARTMENT
C  NODE, THEN COMPONENTS WITHIN THE NODE ARE ALLOWED TO REACT BEFORE THE
C  FINAL CONDITIONS ARE EVALUATED.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC                NODE NUMBER OF COMPARTMENT
C       INOUT             MAXIMUM NUMBER OF THE NUMBER OF INLET STREAMS
C                         AND THE NUMBER OF OUTLET STREAMS (LESS THAN OR
C                         EQUAL TO 4)
C       INODES            MAXIMUM NUMBER OF NODES ALLOWED, CORRESPONDING
C                         TO THE NULL VECTOR
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)    COMPONENT MASS OR MASS RATE, LB OR LB/(DELT)
C       TC      (30)      NODE TEMPERATURE, DEG F
C       PC      (30)      NODE PRESSURE, PSIA
C       TSURF   (30)      HEAT TRANSFER SURFACE TEMPERATURE, DEG F
C       WMOL    (9)       COMPONENT MOLECULAR WEIGHT, LB/LB MOLE
C       VOL     (30)      NODE VOLUME, FT**3
C       H       (30)      NODE ENTHALPY OR ENTHALPY RATE, BTU OR
C                         BTU/(DELT)
C       QRATE   (30)      HEAT TRANSFER RATE TO COMPARTMENT ATMOSPHERE
C                         FROM HEAT TRANSFER SURFACES, BTU/(DELT)
C       QCOOL   (30)      COOLING RATE, BTU/SEC
C       HTCOEF  (30)      HEAT TRANSFER COEFFICIENT, BTU/SEC-FT**2-DEG F
C       HTAREA  (30)      SURFACE AREA FOR HEAT TRANSFER, FT**2
C       IIN     (30,4)    INLET STREAM NODE NUMBERS
C       IOUT    (30,4)    OUTLET STREAM NODE NUMBERS
C       AMINLN            NATURAL LOG OF MINIMUM NUMBER ACCEPTABLE TO THE
C                         COMPUTER
C       TIME              CUMULATIVE TIME OF TRANSIENT SIMULATION, SEC
C       DELT              TIME INTERVAL FOR TRANSIENT SIMULATION, SEC
C
C    INTERNAL VARIABLES
C
C       T       (3)       ESTIMATED FINAL TEMPERATURE, DEG F
C       HDIF    (3)       DIFFERENCE BETWEEN ENTHALPY AT ESTIMATED FINAL
C                         TEMPERATURE AND THE ACTUAL FINAL ENTHALPY, BTU
C       HRXN              HEAT RELEASED BY REACTION, BTU
C       HAVAIL            FINAL ENTHALPY, BTU
C       ITEMP             INDEX FOR ITERATION VARIABLES T AND HDIF
C       ICOUNT            COUNTER TO LIMIT NUMBER OF ITERATIONS
C       TR                ABSOLUTE TEMPERATURE, DEG R
```

```
C       PUF6               VAPOR PRESSURE OF UF6, PSIA
C       MAXVAP             MAXIMUM AMOUNT OF UF6 THAT CAN BE CONTAINED AS
C                          VAPOR IN THE COMPARTMENT VOLUME AT THE ASSUMED
C                          TEMPERATURE BASED ON THE VAPOR PRESSURE OF UF6
C       NAIR               MOLES OF AIR
C       NH2O               MOLES OF WATER VAPOR
C       NHF                MOLES OF HF VAPOR BASED ON THE EFFECTIVE
C                          MOLECULAR WEIGHT OF THE POLYMERIZED VAPOR
C       NUF6               MOLES OF UF6 VAPOR
C       NTOT               TOTAL MOLES OF VAPOR IN THE COMPARTMENT
C       PTOT               TOTAL PRESSURE IN THE COMPARTMENT, PSIA
C       HTEST              ENTHALPY AT THE ESTIMATED FINAL TEMPERATURE, BTU
C       M                  APPROXIMATE SLOPE OF HDIF VS T, BTU/DEG F
C
C   THE FOLLOWING SUBROUTINES ARE CALLED BY COMPRT.
C
C               DENTHL
C               PHASE
C               VPRUF6
C
C   THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED TO USE COMPRT.
C
C               DENUF6
C               HFPOLY
C               HHFH2O
C               HUF6
C               PHFH2O
C               ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION T(3), HDIF(3)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), TSURF(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ VOL(30), DUM2(61)
      COMMON /ENTHAL/ H(30), QRATE(30), QCOOL(30), HTCOEF(30),
     *                HTAREA(30)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, DUM3, IDUM1, DUM4
C
C   SUM INLET AND OUTLET STREAM MASSES AND ENTHALPIES FOR THE TIME STEP.
C
      DO 20 I20 = 1,INOUT
C
          IF ((IIN(IC,I20)+IOUT(IC,I20)).EQ.(2*INODES)) GO TO 30
C
          DO 10 I10 = 1,9
C
              MASS(IC,I10) = MASS(IC,I10) + MASS(IIN(IC,I20),I10)
     *                      - MASS(IOUT(IC,I20),I10)
C
   10     CONTINUE
```

```
C
            H(IC)  = H(IC) + H(IIN(IC,I20)) - H(IOUT(IC,I20))
C
   20 CONTINUE
C
   30 CONTINUE
C
C  PLACE ALL COMPONENTS IN THE VAPOR PHASE.
C
      MASS(IC,3) = MASS(IC,2) + MASS(IC,3)
      MASS(IC,5) = MASS(IC,4) + MASS(IC,5)
      MASS(IC,8) = MASS(IC,6) + MASS(IC,7) + MASS(IC,8)
C
      MASS(IC,2) = 0.D0
      MASS(IC,4) = 0.D0
      MASS(IC,6) = 0.D0
      MASS(IC,7) = 0.D0
C
C  REACT UF6 WITH H2O TO THE EXTENT POSSIBLE.
C
C     UF6(V) + 2 H2O(V) --> UO2F2(S) + 4 HF(V)
C
C     HRXN = 25,199 BTU/LB MOLE H2O AT 77 F AND 1 ATM
C
      HRXN = 0.D0
C
      IF (MASS(IC,8).EQ.0.D0.OR.MASS(IC,3).EQ.0.D0) GO TO 50
C
      IF ((MASS(IC,8)/MASS(IC,3)).LT.(WMOL(8)/(2.D0*WMOL(3)))) GO TO 40
C
C  THE FOLLOWING MASS AND ENERGY BALANCE IS BASED ON H2O CONTROLLING THE
C  EXTENT OF REACTION.
C
      MASS(IC,8) = MASS(IC,8) - MASS(IC,3)*WMOL(8)/(2.D0*WMOL(3))
      MASS(IC,9) = MASS(IC,9) + MASS(IC,3)*WMOL(9)/(2.D0*WMOL(3))
      MASS(IC,5) = MASS(IC,5) + MASS(IC,3)*2.D0*WMOL(4)/WMOL(3)
C
      HRXN       = 25.199D3*MASS(IC,3)/WMOL(3)
C
      MASS(IC,3) = 0.D0
C
      GO TO 50
C
   40 CONTINUE
C
C  THE FOLLOWING MASS AND ENERGY BALANCE IS BASED ON UF6 CONTROLLING THE
C  EXTENT OF REACTION.
C
      MASS(IC,3) = MASS(IC,3) - MASS(IC,8)*2.D0*WMOL(3)/WMOL(8)
      MASS(IC,9) = MASS(IC,9) + MASS(IC,8)*WMOL(9)/WMOL(8)
      MASS(IC,5) = MASS(IC,5) + MASS(IC,8)*4.D0*WMOL(4)/WMOL(8)
C
      HRXN       = 50.398D3*MASS(IC,8)/WMOL(8)
C
```

```
      MASS(IC,8) = 0.D0
C
   50 CONTINUE
C
C  EVALUATE HEAT TRANSFER TO THE COMPARTMENT ATMOSPHERE FROM HOT
C  SURFACES.
C
      QRATE(IC) = HTCOEF(IC)*HTAREA(IC)*(TSURF(IC) - TC(IC))*DELT
C
C  CALCULATE THE TOTAL ENTHALPY IN THE COMPARTMENT AT THE END OF THE
C  TIME STEP.
C
      HAVAIL = HRXN + H(IC) + QRATE(IC) - (QCOOL(IC)*DELT)
C
C  BEGIN ITERATIVE PROCEDURE TO FIND FINAL TEMPERATURE, PRESSURE, AND
C  PHASE COMPOSITIONS. TEMPERATURE IS VARIED UNTIL ENTHALPY AGREES WITH
C  HAVAIL.
C
      ITEMP  = 1
C
      T(ITEMP) = TC(IC)
C
      HDIF(2) = 0.D0
C
      ICOUNT = 0
C
   60 CONTINUE
C
      ICOUNT = ICOUNT + 1
C
C  PLACE ALL COMPONENTS IN THE VAPOR PHASE.
C
      MASS(IC,3) = MASS(IC,2) + MASS(IC,3)
      MASS(IC,5) = MASS(IC,4) + MASS(IC,5)
      MASS(IC,8) = MASS(IC,6) + MASS(IC,7) + MASS(IC,8)
C
      MASS(IC,2) = 0.D0
      MASS(IC,4) = 0.D0
      MASS(IC,6) = 0.D0
      MASS(IC,7) = 0.D0
C
      TR     = T(ITEMP) + 459.67D0
C
C  DETERMINE IF ANY UF6 CONDENSES.
C
      IF (MASS(IC,8).LE.0.D0) GO TO 70
C
      CALL VPRUF6 (T(ITEMP), PUF6)
C
      MAXVAP = WMOL(8)*PUF6*VOL(IC)/10.73D0/TR
C
      IF (MASS(IC,8).LE.MAXVAP) GO TO 70
C
      IF (T(ITEMP).GT.147.306561D0) MASS(IC,7) = MASS(IC,8) - MAXVAP
```

```
C
      IF (T(ITEMP).LE.147.306561D0) MASS(IC,6) = MASS(IC,8) - MAXVAP
C
      MASS(IC,8) = MAXVAP
C
   70 CONTINUE
C
C  DETERMINE IF HF AND/OR H2O CONDENSE.
C
      IF (MASS(IC,3).EQ.0.D0.AND.MASS(IC,5).EQ.0.D0) GO TO 80
C
      CALL PHASE (T(ITEMP), IC)
C
   80 CONTINUE
C
C  ESTIMATE FINAL COMPARTMENT PRESSURE.
C
      NAIR    = MASS(IC,1)/WMOL(1)
      NH2O    = MASS(IC,3)/WMOL(3)
      NHF     = MASS(IC,5)/WMOL(5)
      NUF6    = MASS(IC,8)/WMOL(8)
C
      NTOT    = NAIR + NH2O + NHF + NUF6
C
      PTOT    = NTOT*10.73D0*TR/VOL(IC)
C
C  EVALUATE ENTHALPY CORRESPONDING TO ESTIMATED TEMPERATURE AND COMPARE
C  TO HAVAIL.
C
      CALL DENTHL (T(ITEMP), PTOT, IC, HTEST)
C
      HDIF(ITEMP) = HTEST - HAVAIL
C
      IF (DABS(HDIF(ITEMP)).LT.DMAX1(1.D-3,DABS(HAVAIL*1.D-3)))
     *    GO TO 140
C
      IF (ICOUNT.EQ.100) STOP01
C
C  ESTIMATE NEW TEMPERATURE TO CONTINUE ITERATION.
C
      IF (ITEMP.EQ.3) GO TO 120
      IF (ITEMP.EQ.2) GO TO 100
C
      IF (HDIF(1).LT.0.D0.AND.HDIF(2).GT.0.D0) GO TO 110
C
      IF (HDIF(1).GT.0.D0) GO TO 90
C
      ITEMP   = 2
C
      T(2)    = T(1) + 5.D0
C
      GO TO 60
C
   90 CONTINUE
```

```
C
      T(2)    = T(1)
      HDIF(2) = HDIF(1)
      T(1)    = T(2) - 5.D0
C
      GO TO 60
C
  100 CONTINUE
C
      IF (HDIF(2).GT.0.D0) GO TO 110
C
      HDIF(1) = HDIF(2)
      T(1)    = T(2)
      T(2)    = T(1) + 5.D0
C
      GO TO 60
C
  110 CONTINUE
C
      ITEMP  = 3
C
      M      = (HDIF(2) - HDIF(1))/(T(2) - T(1))
      T(3)   = T(2) - HDIF(2)/M
C
      GO TO 60
C
  120 CONTINUE
C
      IF ((T(2) - T(1)).LT.1.D-3) GO TO 140
C
      IF (HDIF(3).GT.0.D0) GO TO 130
C
      HDIF(1) = HDIF(3)
      T(1)    = T(3)
C
      GO TO110
C
  130 CONTINUE
C
      HDIF(2) = HDIF(3)
      T(2)    = T(3)
C
      GO TO110
C
  140 CONTINUE
C
C  THE MATERIAL AND ENERGY BALANCE HAS BEEN CLOSED FOR COMPARTMENT IC.
C
      TC(IC) = T(ITEMP)
      PC(IC) = PTOT
      H(IC) = HAVAIL
C
      RETURN
C
      END
```

B.3 CPUF6

```
      SUBROUTINE CPUF6 (TF, PSIA, MW, CPSOL, CPLIQ, CPVAP, CVVAP,
     *                  CPTOCV)
C
C  THIS SUBROUTINE CALCULATES THE CONSTANT PRESSURE HEAT CAPACITIES OF
C  UF6 SOLID, LIQUID, AND VAPOR, AS WELL AS THE CONSTANT VOLUME HEAT
C  CAPACITY AND THE HEAT CAPACITY RATIO FOR THE VAPOR. THE FOLLOWING
C  VARIABLES ARE USED.
C
C      TF        TEMPERATURE, DEG F
C      TR        ABSOLUTE TEMPERATURE, DEG R
C      TRSQ      TR**2
C      PSIA      PRESSURE, PSIA
C      MW        MOLECULAR WEIGHT, LB MASS/LB MOLE
C      CPSOL     CONSTANT PRESSURE HEAT CAPACITY OF THE SOLID,
C                BTU/LB MASS-DEG F
C      CPLIQ     CONSTANT PRESSURE HEAT CAPACITY OF THE LIQUID,
C                BTU/LB MASS-DEG F
C      CPVAP     CONSTANT PRESSURE HEAT CAPACITY OF THE VAPOR,
C                BTU/LB MASS-DEG F
C      CVVAP     CONSTANT VOLUME HEAT CAPACITY OF THE VAPOR,
C                BTU/LB MASS-DEG F
C      CPTOCV    HEAT CAPACITY RATIO
C      ZPSIA     VAPOR COMPRESSIBILITY FACTOR AT TF AND PSIA
C      Z1ATM     VAPOR COMPRESSIBILITY FACTOR AT TF AND 14.696 PSIA
C      ZT
C      ZP
C
C  THE FOLLOWING SUBROUTINE IS CALLED.
C
C      ZUF6
C
C  THE HEAT CAPACITY CORRELATIONS ARE BASED ON INFORMATION IN R. DEWITT,
C  "URANIUM HEXAFLUORIDE: A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES,"
C  GAT-280, GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960,
C  PAGES 56 - 64. THE HEAT CAPACITY OF THE VAPOR GIVEN BY THE CORRELA-
C  TION IN GAT-280 IS FOR A PRESSURE OF 1 ATM. THE VAPOR CORRELATION
C  GIVEN BELOW HAS BEEN MODIFIED USING THE MAGNUSON EQUATION OF STATE
C  (SEE GAT-280, PAGES 97 - 101) AND THE DEPARTURE FUNCTION CORRELATIONS
C  GIVEN IN R. C. REID, J. M. PRAUSNITZ, AND T.  K. SHERWOOD, THE
C  PROPERTIES OF GASES AND LIQUIDS, 3RD ED., MCGRAW-HILL BOOK COMPANY,
C  1977, PAGE 93, SO THAT BOTH SATURATED AND UNSATURATED VAPOR HEAT
C  CAPACITIES CAN BE CALCULATED.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR     = TF + 459.67D0
C
      TRSQ   = TR**2
C
C  THE HEAT CAPACITY OF THE SOLID IS GIVEN BY THE FOLLOWING CORRELATION
C  WHICH IS ACCURATE WITHIN 1% BETWEEN -10 DEG F AND THE TRIPLE POINT
C  (147.3 DEG F).
```

```
C
      CPSOL  = ( -5.70531D-2 + 2.55019D-4*TR
     *         + ( 9.64563D3/TRSQ ) ) * ( 3.52D2/MW )
C
C  THE HEAT CAPACITY OF THE LIQUID IS GIVEN BY THE FOLLOWING CORRELATION
C  WHICH IS REPORTED TO HAVE AN ACCURACY OF 0.6% BETWEEN 147.3 AND 206.3
C  DEG F.
C
      CPLIQ  = ( 5.10057D-2 + 1.02633D-4*TR
     *         + ( 6.13934D3/TRSQ ) ) * ( 3.52D2/MW )
C
C  CALCULATE THE VAPOR COMPRESSIBILITY FACTOR AT 14.696 PSIA AND AT
C  "PSIA" AS WELL AS ZP AND ZT AT "PSIA."
C
      CALL ZUF6 (TF, 14.696D0, Z1ATM, 0.0D0, 0.0D0)
C
      CALL ZUF6 (TF, PSIA, ZPSIA, ZP, ZT)
C
C  THE CONSTANT PRESSURE HEAT CAPACITY OF THE VAPOR IS GIVEN BY THE
C  FOLLOWING CORRELATION.
C
      CPVAP  = (9.21307D-2 + 1.25253D-5*TR
     *         - ( 2.95171D3/TRSQ )
     *         + 3.0939D-3 * ( (4.D0*ZPSIA-3.D0*ZPSIA**2)
     *         - (4.D0*Z1ATM-3.D0*Z1ATM**2) ) ) * ( 3.52D2/MW )
C
C  THE CONSTANT VOLUME HEAT CAPACITY OF THE VAPOR IS GIVEN BY THE
C  FOLLOWING CORRELATION.
C
      CVVAP  = CPVAP - ( 1.9872D0 * ZT**2 )/( MW * ZP )
C
C  THE HEAT CAPACITY RATIO FOR THE VAPOR IS GIVEN BY
C
      CPTOCV = CPVAP / CVVAP
C
      RETURN
C
      END
```

B.4 DENTHL

```
      SUBROUTINE DENTHL (T, P, I, H)
C
C  THIS SUBROUTINE DETERMINES THE ENTHALPY OF A MIXTURE AT A GIVEN
C  TEMPERATURE WITH RESPECT TO A REFERENCE TEMPERATURE OF 77 F AND
C  THE FOLLOWING REFERENCE STATES:
C
C                AIR     VAPOR
C                H2O     VAPOR
C                HF      MONOMERIC VAPOR
C                UF6     VAPOR
C                UO2F2   SOLID
C
```

```
C  THE FOLLOWING VARIABLES ARE USED:
C
C    INPUT VARIABLES
C
C       T                   TEMPERATURE, DEG F
C       P                   TOTAL PRESSURE, PSIA
C       I                   NODE NUMBER
C
C    OUTPUT VARIABLE
C
C       H                   ENTHALPY OF A MULTICOMPONENT MIXTURE WITH
C                           RESPECT TO THE REFERENCE TEMPERATURE AND STATES,
C                           BTU OR BTU/(DELT)
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)      COMPONENT MASS OR MASS FLOW RATE WITHIN A NODE,
C                           LB (COMPARTMENT) OR LB/(DELT) (STREAM)
C       WMOL    (9)         COMPONENT MOLECULAR WEIGHT, LB/LB MOLE
C       C1                  WEIGHT FRACTION OF HF MONOMER TO HF VAPOR
C       C3                  WEIGHT FRACTION OF HF TRIMER TO HF VAPOR
C       C6                  WEIGHT FRACTION OF HF HEXAMER TO HF VAPOR
C
C     ******************************************************************
C     *                                                                *
C     *  WARNING !  THIS SUBROUTINE RESETS THE VALUES OF C1, C3, AND   *
C     *  C6. BE SURE THAT SUBSEQUENT CODING YIELDS APPROPRIATE VALUES  *
C     *  OF C1, C3, AND C6 FOR LATER USE.                              *
C     *                                                                *
C     ******************************************************************
C
C       WMBHF               MOLECULAR WEIGHT OF HF MONOMER, LB/LB MOLE
C
C    INTERNAL VARIABLES
C
C       HA                  ENTHALPY OF AIR WITH RESPECT TO THE REFERENCE
C                           TEMPERATURE AND STATE, BTU OR BTU/(DELT)
C       HMX                 ENTHALPY OF HF AND H2O WITH RESPECT TO THE
C                           REFERENCE TEMPERATURE AND STATES, BTU OR
C                           BTU/(DELT)
C       HFH2OL              COMBINED MASS OF LIQUID HF AND LIQUID H2O, LB
C                           OR LB/(DELT)
C       HFH2OV              COMBINED MASS OF HF VAPOR AND H2O VAPOR, LB
C                           OR LB/(DELT)
C       WHFL                WEIGHT FRACTION OF HF LIQUID IN A LIQUID MIXTURE
C                           OF HF AND H2O
C       WHFV                WEIGHT FRACTION OF HF VAPOR IN A VAPOR MIXTURE
C                           OF HF AND H2O
C       HMXLT               ENTHALPY OF THE HF-H2O LIQUID PHASE, BTU OR
C                           BTU/(DELT)
C       HMXVT               ENTHALPY OF THE HF-H2O VAPOR PHASE, BTU OR
C                           BTU/(DELT)
C       HFH2OT              COMBINED MASS OF HF AND H2O, LB OR LB/(DELT)
C       WHFTOT              WEIGHT FRACTION OF HF LIQUID AND VAPOR IN A TWO
```

```
C                        PHASE MIXTURE OF HF AND H2O
C      HMXV77            REFERENCE ENTHALPY FOR THE HF-H2O SYSTEM,BTU
C                        OR BTU/(DELT)
C      UF6TOT            COMBINED MASS OF UF6 SOLID, LIQUID, AND VAPOR,I
C                        LB OR LB/(DELT)
C      H6ST              ENTHALPY OF SOLID UF6, BTU OR BTU/(DELT)
C      H6LT              ENTHALPY OF LIQUID UF6, BTU OR BTU/(DELT)
C      H6VT              ENTHALPY OF VAPOR UF6, BTU OR BTU/(DELT)
C      H6V77             REFERENCE ENTHALPY FOR UF6, BTU OR BTU/(DELT)
C      HHUF6             ENTHALPY OF UF6 WITH RESPECT TO THE REFERENCE
C                        TEMPERATURE AND STATE, BTU OR BTU/(DELT)
C      HUF2              ENTHALPY OF UO2F2 WITH RESPECT TO THE REFERENCE
C                        TEMPERATURE AND STATE, BTU OR BTU/(DELT)
C
C  SUBROUTINES CALLED BY DENTHL ARE:
C
C             HHFH2O
C             HUF6
C
C  OTHER SUBROUTINES REQUIRED TO USE DENTHL ARE:
C
C             DENUF6
C             VPRUF6
C             ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON / LBMASS / MASS(30,9)
      COMMON / MOLWT  / WMOL(9)
      COMMON / POLYMR / C1, C3, C6, WMBHF
C
C  CALCULATE THE ENTHALPY OF AIR WITH RESPECT TO THE REFERENCE
C  TEMPERATURE AND STATE.
C
      HA     = MASS(I,1)*0.24073D0*(T-77.D0)
C
C  CALCULATE THE ENTHALPY OF THE HF-H2O SYSTEM WITH RESPECT TO THE
C  REFERENCE TEMPERATURE AND STATES.
C
      HMX    = 0.D0
C
      HFH2OL = MASS(I,2) + MASS(I,4)
      HFH2OV = MASS(I,3) + MASS(I,5)
C
      IF ((HFH2OL+HFH2OV) .LE. 0.D0) GO TO 30
C
      IF (HFH2OL.LE.0.D0) GO TO 10
C
      WHFL   = MASS(I,4)/HFH2OL
C
   10 CONTINUE
C
      IF (HFH2OV.LE.0.D0) GO TO 20
C
```

```
      WHFV   = MASS(I,5)/HFH2OV
C
   20 CONTINUE
C
      CALL HHFH2O (T,WHFL,WHFV,HMXLT,HMXVT)
C
      HFH2OT = HFH2OL + HFH2OV
C
      WHFTOT = (MASS(I,4) + MASS(I,5))/HFH2OT
C
      C1     = 1.D0
      C3     = 0.D0
      C6     = 0.D0
C
      CALL HHFH2O (77.D0,0.D0,WHFTOT,0.D0,HMXV77)
C
      HMX    = (HFH2OL*HMXLT + HFH2OV*HMXVT) - HFH2OT*HMXV77
C
   30 CONTINUE
C
C  CALCULATE THE ENTHALPY OF UF6 WITH RESPECT TO THE REFERENCE
C  TEMPERATURE AND STATE.
C
      UF6TOT = MASS(I,6) + MASS(I,7) + MASS(I,8)
C
      CALL HUF6 (T,P,WMOL(8),H6ST,H6LT,H6VT)
C
      CALL HUF6 (77.D0,14.696D0,WMOL(8),0.D0,0.D0,H6V77)
C
      HHUF6  = (MASS(I,6)*H6ST
     *         + MASS(I,7)*H6LT + MASS(I,8)*H6VT)
     *         -UF6TOT*H6V77
C
C  CALCULATE THE ENTHALPY OF UO2F2 WITH RESPECT TO THE REFERENCE
C  TEMPERATURE AND STATE.
C
      HUF2   = MASS(I,9)*0.0821D0*(T-77.D0)
C
C  CALCULATE THE ENTHALPY FOR NODE I WITH RESPECT TO THE REFERENCE
C  TEMPERATURE AND STATES.
C
      H      = HA + HMX + HHUF6 + HUF2
C
      RETURN
C
      END
```

B.5 DENUF6

```
      SUBROUTINE DENUF6 (TF, PSIA, MW, DENSOL, DENLIQ, DENVAP)
C
C  THIS SUBROUTINE CALCULATES THE DENSITIES OF UF6 SOLID, LIQUID, AND
C  VAPOR. THE FOLLOWING VARIABLES ARE USED.
```

```
C
C     TF       TEMPERATURE, DEG F
C     TR       ABSOLUTE TEMPERATURE, DEG R
C     PSIA     PRESSURE, PSIA
C     MW       MOLECULAR WEIGHT, LB MASS/LB MOLE
C     Z        COMPRESSIBILITY FACTOR FOR THE VAPOR
C     DENSOL   DENSITY OF SOLID, LB MASS/FT**3
C     DENLIQ   DENSITY OF LIQUID, LB MASS/FT**3
C     DENVAP   DENSITY OF VAPOR, LB MASS/FT**3
C
C  THE DENSITY CORRELATIONS USED ARE BASED ON R. DEWITT, "URANIUM
C  HEXAFLUORIDE: A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES," GAT-280,
C  GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960, PAGES 17 -
C  24. A CORRELATION FOR SOLID DENSITY, BASED ON TABLE 7 OF GAT-280
C  (EXCLUDING PRELIMINARY VALUES), WAS DERIVED BY W. R. WILLIAMS.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR     = TF + 459.67D0
C
C  THE DENSITY OF THE SOLID IS GIVEN BY THE FOLLOWING CORRELATION WHICH
C  IS BASED ON DATA REPORTED OVER THE TEMPERATURE RANGE OF 69 TO 145
C  DEG F.
C
      DENSOL = ( 3.300D2 - 1.800D-1*TF ) * ( MW / 3.52D2 )
C
C  THE DENSITY OF THE LIQUID IS GIVEN BY
C
      DENLIQ = ( 2.506D2 - ( 1.241D-1 + 2.620D-4 * TF ) * TF )
     *         * ( MW / 3.52D2 )
C
C  EVALUATE THE COMPRESSIBILITY FACTOR FOR UF6 VAPOR.
C
      CALL ZUF6 (TF, PSIA, Z, ZP, ZT)
C
C  THE DENSITY OF THE VAPOR IS GIVEN BY
C
      DENVAP = ( MW * PSIA * Z ) / ( 10.73D0 * TR )
C
      RETURN
C
      END
```

B.6 DPFLOW

```
      SUBROUTINE DPFLOW (IC)
C
C  THIS SUBROUTINE EVALUATES THE MASS FLOW THROUGH A PRESSURE-DROP-
C  CONTROLLED PATHWAY OVER A TIME STEP DELT. THE ENTHALPY CHANGE ASSOCI-
C  ATED WITH THIS MASS FLOW IS ALSO DETERMINED. IF REVERSE FLOW OCCURS
C  (WITH RESPECT TO THE NORMAL DIRECTION OF FLOW), THEN THE MASS IS
C  TAKEN FROM THE PROPER NODE AND THE INDIVIDUAL COMPONENTS ARE ASSIGNED
C  NEGATIVE VALUES.
```

```
C
C  THE TOTAL MASS FLOW RATE IS ESTABLISHED USING A RESISTANCE TERM
C  EVALUATED IN THE SUBROUTINE RESIST.
C
C  NOTE THAT THIS SUBROUTINE IDENTIFIES THE TIME WHEN REVERSE FLOW
C  BEGINS AND WHEN IT ENDS. PREVIOUS FLOW REVERSAL START AND STOP TIMES
C  FOR A NODE ARE OVERWRITTEN AS SUBSEQUENT REVERSALS OCCUR.
C
C  THIS SUBROUTINE USES THE FOLLOWING VARIABLES:
C
C    INPUT VARIABLE
C
C       IC               NODE NUMBER FOR STREAM BEING EVALUATED
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)   COMPONENT NODE MASS OR MASS FLOW RATE, LB
C                        (COMPARTMENT) OR LB/(DELT) (STREAM)
C       TC      (30)     NODE TEMPERATURE, DEG F
C       PC      (30)     NODE PRESSURE, PSIA
C       VOL     (30)     COMPARTMENT NODE VOLUME, FT**3
C       KRCOEF  (30)     RESISTANCE TERM, PSI-SEC**2/LB-FT**3
C       H       (30)     NODE ENTHALPY OR ENTHALPY RATE, BTU OR
C                        BTU/(DELT)
C       IIN     (30,4)   NODE INPUT STREAM NUMBER
C       IOUT    (30,4)   NODE OUTPUT STREAM NUMBER
C       AMINLN           MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C       TIME             TIME AT WHICH MASS AND ENTHALPY RATES ARE BEING
C                        DETERMINED, SEC
C       DELT             TIME INTERVAL USED IN TRANSIENT SIMULATION, SEC
C       TSTART  (30)     TIME AT WHICH FLOW REVERSAL BEGINS, SEC
C       TSTOP   (30)     TIME AT WHICH FLOW REVERSAL ENDS, SEC
C
C    INTERNAL VARIABLES
C
C       CHECK   (30)     LOGICAL VARIABLE USED IN DETERMINING TSTART AND
C                        TSTOP
C       DELP             PRESSURE DIFFERENCE BETWEEN NORMAL INLET AND
C                        OUTLET NODES, PSI
C       INLET            ACTUAL INLET NODE TO STREAM
C       MASS1            TOTAL MASS CONTAINED IN ACTUAL INLET NODE, LB
C       DENS             DENSITY OF ACTUAL INLET STREAM, LB/FT**3
C       MASS2            TOTAL MASS FLOW RATE THROUGH STREAM, LB/(DELT)
C       FRAC             RATIO OF MASS FLOW THROUGH STREAM NODE TO TOTAL
C                        MASS IN ACTUAL INLET NODE -- A POSITIVE VALUE
C                        CORRESPONDS TO NORMAL FLOW AND A NEGATIVE VALUE
C                        TO REVERSE FLOW
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      LOGICAL CHECK(30)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
```

```
      COMMON /VOLUME/ VOL(30), KRCOEF(30), DUM3(31)
      COMMON /ENTHAL/ H(30), DUM4(120)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, DUM5, IDUM1, DUM6
      COMMON /RVFLOW/ TSTART(30), TSTOP(30)
C
      IF (TIME.EQ.0.D0) CHECK(IC) = .TRUE.
C
C  DETERMINE PRESSURE DIFFERENCE ACROSS STREAM NODE, ACTUAL INLET NODE,
C  AND THE TOTAL MASS CONTAINED IN THE ACTUAL INLET NODE.
C
      DELP   = PC(IIN(IC,1)) - PC(IOUT(IC,1))
C
      INLET  = IIN(IC,1)
C
      IF (DELP.LT.0.D0) INLET = IOUT(IC,1)
C
      MASS1  = 0.D0
C
      DO 10 I10=1,9
C
           MASS1  = MASS1 + MASS(INLET,I10)
C
   10 CONTINUE
C
C  DETERMINE INLET DENSITY AND TOTAL MASS FLOW RATE THROUGH THE STREAM
C  NODE.
C
      DENS   = MASS1/VOL(INLET)
C
      MASS2  = DSQRT(DABS(DELP)*DENS/KRCOEF(IC))*DELT
C
C  DETERMINE COMPONENT MASS FLOW RATES, STREAM ENTHALPY RATE, AND STREAM
C  TEMPERATURE AND PRESSURE.
C
      IF (DELP.LT.0.D0) MASS2 = - MASS2
C
      FRAC   = MASS2/MASS1
C
      DO 20 I20=1,9
C
           MASS(IC,I20) = MASS(INLET,I20)*FRAC
C
   20 CONTINUE
C
      H(IC)  = H(INLET)*FRAC
      TC(IC) = TC(INLET)
      PC(IC) = PC(INLET)
C
C  CHECK FOR REVERSE FLOW.
C
      IF (DELP.GE.0.D0) GO TO 30
C
      IF (DELP.LT.0.D0.AND.CHECK(IC)) WRITE (5,100) IC, TIME
```

```
      IF (DELP.LT.0.D0.AND.CHECK(IC)) TSTART(IC) = TIME - DELT
C
      CHECK(IC)  = .FALSE.
C
      RETURN
C
   30 CONTINUE
C
      IF (.NOT.CHECK(IC)) WRITE (5,110) IC, TIME
      IF (.NOT.CHECK(IC)) TSTOP(IC) = TIME - DELT
C
      CHECK(IC)  = .TRUE.
C
      RETURN
C
  100 FORMAT (' REVERSE FLOW OCCURING IN NODE',I3,' AT',F10.5,' SEC.')
C
  110 FORMAT (' NORMAL FLOW RESUMES IN NODE',I3,' AT',F10.5,' SEC.')
C
      END
```

B.7 EQTUF6

```
      SUBROUTINE EQTUF6 (PSIA, TF)
C
C  THIS SUBROUTINE CALCULATES THE EQUILIBRIUM TEMPERATURE, TF,
C  CORRESPONTING TO A GIVEN PRESSURE, PSIA. THE FOLLOWING VARIABLES ARE
C  USED.
C
C      PSIA      PRESSURE, PSIA
C      P1        ESTIMATED PRESSURE, PSIA
C      P2        ESTIMATED PRESSURE, PSIA
C      P3        ESTIMATED PRESSURE, PSIA
C      TF        TEMPERATURE, DEG F
C      T1        ESTIMATED TEMPERATURE, DEG F
C      T2        ESTIMATED TEMPERATURE, DEG F
C      T3        ESTIMATED TEMPERATURE, DEG F
C      LIMIT     ACCURACY REQUIRED OF P3 RELATIVE TO PSIA
C      F1        DIFFERENCE BETWEEN P1 AND PSIA
C      F2        DIFFERENCE BETWEEN P2 AND PSIA
C      F3        DIFFERENCE BETWEEN P3 AND PSIA
C      M         SLOPE OF F = M*T + B
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C  THE ACCURACY REQUIRED OF P3 RELATIVE TO PSIA IS GIVEN BY LIMIT.
C
      LIMIT  = PSIA/1.D8
C
C  THE INITIAL GUESS OF TF, WHICH IS T1, IS BASED ON THE CORRELATION
C  FOR VAPOR PRESSURE USED BETWEEN 147.3 AND 240 DEG F (22.04 AND
C  87.91 PSIA).
C
```

```
      T1      = ( -4.66807D3 / (DLOG(PSIA) - 12.1600D0) ) - 367.533D0
C
      IF (PSIA.GE.22.04226474D0) GO TO 40
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS, THROUGH STATEMENT 40, GIVES THE
C  EQUILBRIUM TEMPERATURE FOR A PRESSURE LESS THAN 22.04 PSIA.
C
C  A SECOND ESTIMATED TEMPERATURE IS ALSO REQUIRED.
C
      T2      = T1 + 1.0D0
C
      IF (T2.GT.147.306561D0) T2 = 147.306561
C
   10 CONTINUE
C
C  CALCULATE VAPOR PRESSURES CORRESPONDING TO T1 AND T2.
C
      CALL VPRUF6 (T1, P1)
      CALL VPRUF6 (T2, P2)
C
   20 CONTINUE
C
C  EVALUATE T3, AN IMPROVED ESTIMATE OF TF.
C
      F1      = P1 - PSIA
      F2      = P2 - PSIA
      M       = ( F2 - F1 ) / ( T2 - T1 )
      T3      = T2 - F2/M
C
C  CHECK ACCURACY OF T3 BY CHECKING ACCURACY OF P3.
C
      CALL VPRUF6 (T3, P3)
C
      F3      = P3 - PSIA
C
      IF (DABS(F3).LT.LIMIT) GO TO 30
C
      T1      = T2
      T2      = T3
      P1      = P2
      P2      = P3
C
      GO TO 20
C
   30 CONTINUE
C
      TF      = T3
C
      RETURN
C
   40 CONTINUE
C
      IF (PSIA.GT.87.91333852D0) GO TO 50
C
```

```
C  THE ESTIMATED TEMPERATURE, T1, CORRESPONDS TO TF BETWEEN 147.3 AND
C  240 DEG F (22.04 AND 87.91 PSIA).
C
      TF     = T1
C
      RETURN
C
   50 CONTINUE
C
      IF (PSIA.GT.135.4039894D0) GO TO 60
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS, THROUGH STATEMENT 60, GIVES THE
C  EQUILBRIUM TEMPERATURE FOR PRESSURES BETWEEN 87.91 AND 135.4 PSIA.
C
C  CHECK T1 TO ENSURE THAT IT DOES NOT EXCEED 275.8 DEG F. A SECOND
C  ESTIMATED TEMPERATURE IS ALSO REQUIRED.
C
      IF (T1.GT.275.8D0) T1 = 275.8
C
      T2     = T1 + 0.2D0
C
C  RETURN TO 10 TO EVALUATE TF CORRESPONTING TO PSIA.
C
      GO TO 10
C
   60 CONTINUE
C
C  THE FOLLOWING EQUATION GIVES TF FOR PRESSURES EXCEEDING 135.4039894
C  PSIA (276 DEG F).
C
      TF     = ( -6.97611D3 / (DLOG(PSIA) - 13.7627D0) ) - 511.866D0
C
      RETURN
C
      END
```

B.8 FLASH

```
      SUBROUTINE FLASH (TINIT, PINIT, MW, XVINIT, XLINIT, PFIN, ISEN,
     *                  XVFIN, XLFIN, TFIN)
C
C  THIS SUBROUTINE DETERMINES THE VAPOR MASS FRACTION FOR A GIVEN FINAL
C  PRESSURE BASED ON THE INITIAL TEMPERATURE, PRESSURE, VAPOR MASS
C  FRACTION, AND LIQUID MASS FRACTION OF THE NON-VAPOR FRACTION AS WELL
C  AS WHETHER THE FLASH IS ISENTROPIC OR ISENTHALPIC. THE FOLLOWING
C  VARIABLES ARE USED.
C
C       INPUT VARIABLES:
C
C       TINIT    INITIAL TEMPERATURE, DEG F
C       PINIT    INITIAL PRESSURE, PSIA
C       MW       MOLECULAR WEIGHT, LB MASS/LB MOLE
C       XVINIT   INITIAL VAPOR MASS FRACTION
```

```
C      XLINIT   INITIAL LIQUID MASS FRACTION OF THE NON-VAPOR FRACTION
C      PFIN     FINAL PRESSURE, PSIA
C      ISEN     VARIABLE SPECIFYING BASIS FOR FLASH CALCULATION
C                  ISEN = 0, ISENTROPIC FLASH
C                  ISEN = 1, ISENTHALPIC FLASH
C
C      OUTPUT VARIABLES:
C
C      XVFIN    FINAL VAPOR MASS FRACTION
C      XLFIN    FINAL LIQUID MASS FRACTION OF THE NON-VAPOR FRACTION
C      TFIN     FINAL TEMPERATURE, DEG F
C
C    ************************************************************
C    *                                                          *
C    *  WARNING! PINIT MUST BE GREATER THAN OR EQUAL TO PFIN.   *
C    *                                                          *
C    ************************************************************
C
C      INTERNAL VARIABLES:
C
C      SSOL     ENTROPY OF THE SOLID, BTU/LB MASS-DEG F
C      SLIQ     ENTROPY OF THE LIQUID, BTU/LB MASS-DEG F
C      SVAP     ENTROPY OF THE VAPOR, BTU/LB MASS-DEG F
C      SAVG     AVERAGE ENTROPY OF THE INITIAL MIXTURE,
C               BTU/LB MASS-DEG F
C
C      HSOL     ENTHALPY OF THE SOLID, BTU/LB MASS
C      HLIQ     ENTHALPY OF THE LIQUID, BTU/LB MASS
C      HVAP     ENTHALPY OF THE VAPOR, BTU/LB MASS
C      HAVG     AVERAGE ENTHALPY OF THE INITIAL MIXTURE, BTU/LB MASS
C
C      F1, F2, F3    VALUES OF THE FUNCTION F = M*T + B CORRESPONDING
C                    TO T1, T2, AND T3
C
C                    THE FUNCTION F CORRESPONDS TO THE TEST VALUE
C                    MINUS THE AVERAGE VALUE OF THE PROPERTY.
C
C      S1, S2, S3   TEST ENTROPIES CORRESPONDING TO T1, T2, AND T3
C
C      H1, H2, H3   TEST ENTHALPIES CORRESPONDING TO T1, T2, AND T3
C
C      T1, T2, T3   TEST TEMPERATURES
C
C      M        SLOPE OF THE FUNCTION F
C      LIMIT    ACCURACY REQUIRED IN ESTIMATING THE AVERAGE PROPERTY
C               IN SELECTING THE FINAL TEMPERATURE
C      TMAX     MAXIMUM TEMPERATURE A SUBCOOLED LIQUID CAN ATTAIN AT
C               THE FINAL PRESSURE, DEG F
C
C  THE FOLLOWING SUBROUTINES ARE USED.
C
C      SUF6     CALCULATES UF6 ENTROPIES
C      EQTUF6   CALCULATES TEMPERATURE CORRESPONDING TO A GIVEN
C               VAPOR PRESSURE
```

```
C      HUF6     CALCULATES UF6 ENTHALPIES
C
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C               DENUF6
C               VPRUF6
C               ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C  A THREE PHASE INITIAL RELEASE CAN ONLY EXIST AT THE TRIPLE POINT;
C  THEREFORE, XLINIT EQUALS 1 OR 0 EXCEPT AT THE TRIPLE POINT.
C
      IF (TINIT.GT.147.306561D0) XLINIT = 1.0D0
      IF (TINIT.LT.147.306561D0) XLINIT = 0.0D0
C
C  SELECT BASIS FOR FLASH CALCULATION.
C
      IF (ISEN.EQ.1) GO TO 40
C
C  CALCULATE THE AVERAGE ENTROPY OF THE INITIAL MIXTURE.
C
      CALL SUF6 (TINIT, PINIT, MW, SSOL, SLIQ, SVAP)
C
      SAVG   = XVINIT*SVAP + (1.D0-XVINIT)*XLINIT*SLIQ
     *          + (1.D0-XVINIT)*(1.D0-XLINIT)*SSOL
C
C  CALCULATE THE FINAL VAPOR MASS FRACTION ASSUMING AN EQUILIBRIUM
C  FLASH.
C
      CALL EQTUF6 (PFIN, TFIN)
C
      CALL SUF6 (TFIN, PFIN, MW, SSOL, SLIQ, SVAP)
C
      IF (TFIN.GE.147.306561D0) XVFIN = (SAVG-SLIQ)/(SVAP-SLIQ)
      IF (TFIN.LT.147.306561D0) XVFIN = (SAVG-SSOL)/(SVAP-SSOL)
C
      IF (XVFIN.GE.0.0D0) GO TO 10
C
C  A VALUE OF XVFIN LESS THAN ZERO IMPLIES A SUBCOOLED CONDENSED PHASE
C  IS RELEASED. SINCE THERE IS CURRENTLY NO PRESSURE DEPENDENCE FOR
C  LIQUID ENTROPY, TFIN = TINIT.
C
      XLFIN  = XLINIT
      XVFIN  = 0.0D0
      TFIN   = TINIT
C
      RETURN
C
   10 CONTINUE
C
C  THE CONDENSED PHASE RELEASED WITH THE VAPOR IS LIQUID IF THE FINAL
C  TEMPERATURE IS GREATER THAN OR EQUAL TO THE TRIPLE POINT TEMPERATURE.
C
```

```
      IF (TFIN.GE.147.306561D0) XLFIN = 1.0D0
      IF (TFIN.LT.147.306561D0) XLFIN = 0.0D0
C
      IF (XVFIN.LE.1.D0) RETURN
C
C  A VALUE OF XVFIN GREATER THAN 1 IMPLIES THAT THE FINAL FORM OF THE
C  RELEASE IS A SUPERHEATED VAPOR. THE FOLLOWING SEQUENCE OF EQUATIONS
C  THROUGH 40 EVALUATES THE FINAL TEMPERATURE OF A SUPERHEATED VAPOR
C  HAVING PFIN AS THE FINAL PRESSURE.
C
      LIMIT  = SAVG / 1.D8
      S1     = SVAP
      T1     = TFIN
      T2     = T1 + 1.D0
C
      CALL SUF6 (T2, PFIN, MW, 0.0D0, 0.0D0, S2)
C
   20 CONTINUE
C
      F1     = S1 - SAVG
      F2     = S2 - SAVG
      M      = ( F2 - F1 ) / ( T2 - T1 )
      T3     = T2 - F2/M
C
      CALL SUF6 (T3, PFIN, MW, 0.0D0, 0.0D0, S3)
C
      F3     = S3 - SAVG
C
      IF (DABS(F3).LT.LIMIT) GO TO 30
C
      T1     = T2
      T2     = T3
      S1     = S2
      S2     = S3
C
      GO TO 20
C
   30 CONTINUE
C
      XVFIN  = 1.D0
      TFIN   = T3
C
      RETURN
C
   40 CONTINUE
C
C  CALCULATE THE AVERAGE ENTHALPY OF THE INITIAL MIXTURE.
C
      CALL HUF6 (TINIT, PINIT, MW, HSOL, HLIQ, HVAP)
C
      HAVG   = XVINIT*HVAP + (1.D0-XVINIT)*XLINIT*HLIQ
     *         + (1.D0-XVINIT)*(1.D0-XLINIT)*HSOL
C
C  CALCULATE THE FINAL VAPOR MASS FRACTION ASSUMING AN EQUILIBRIUM
```

```
C  FLASH.
C
      CALL EQTUF6 (PFIN, TFIN)
C
      TMAX    = TFIN
C
      CALL HUF6 (TFIN, PFIN, MW, HSOL, HLIQ, HVAP)
C
      IF (TFIN.GE.147.306561D0) XVFIN = (HAVG-HLIQ)/(HVAP-HLIQ)
      IF (TFIN.LT.147.306561D0) XVFIN = (HAVG-HSOL)/(HVAP-HSOL)
C
      IF (XVFIN.GE.0.0D0) GO TO 70
C
C  A VALUE OF XVFIN LESS THAN ZERO IMPLIES A SUBCOOLED PHASE IS
C  RELEASED.
C
      XLFIN   = XLINIT
      XVFIN   = 0.0D0
C
C  IF XLINIT EQUALS ZERO, THAN THE SUBCOOLED PHASE IS SOLID.
C
      TFIN    = TINIT
C
      IF (XLINIT.EQ.0.D0) RETURN
C
C  IF XLINIT IS NOT EQUAL TO ZERO, THEN A SUBCOOLED LIQUID IS RELEASED.
C  THE FOLLOWING SEQUENCE OF EQUATIONS THROUGH 60 DETERMINES THE FINAL
C  TEMPERATURE OF A SUBCOOLED LIQUID HAVING PFIN AS THE FINAL PRESSURE.
C
      XLFIN   = 1.0D0
      LIMIT   = HAVG / 1.D8
      T1      = TMAX
      H1      = HLIQ
      T2      = TINIT
C
      CALL HUF6 (T2, PFIN, MW, 0.0D0, H2, 0.0D0)
C
   50 CONTINUE
C
      F1      = H1 - HAVG
      F2      = H2 - HAVG
      M       = ( F2 - F1 ) / ( T2 - T1 )
      T3      = T2 - F2/M
C
      IF (T3.GT.TMAX) T3 = (TMAX + DMAX1(T1,T2))/2.D0
      IF (T3.LT.TINIT) T3 = (TINIT + DMIN1(T1,T2))/2.D0
C
      CALL HUF6 (T3, PFIN, MW, 0.0D0, H3, 0.0D0)
C
      F3      = H3 - HAVG
C
      IF (DABS(F3).LT.LIMIT) GO TO 60
C
      IF ((DMAX1(T1,T2,T3) - DMIN1(T1,T2,T3)).LT.1.D-3) GO TO 60
```

```
C
      T1     = T2
      T2     = T3
      H1     = H2
      H2     = H3
C
      GO TO 50
C
   60 CONTINUE
C
      TFIN   = T3
C
      RETURN
C
   70 CONTINUE
C
C  THE CONDENSED PHASE RELEASED WITH THE VAPOR IS LIQUID IF THE FINAL
C  TEMPERATURE IS GREATER THAN OR EQUAL TO THE TRIPLE POINT TEMPERATURE.
C
      IF (TFIN.GE.147.306561D0) XLFIN = 1.0D0
      IF (TFIN.LT.147.306561D0) XLFIN = 0.0D0
C
      IF (XVFIN.LE.1.D0) RETURN
C
C  A VALUE OF XVFIN GREATER THAN 1 IMPLIES THAT THE FINAL FORM OF THE
C  RELEASE IS A SUPERHEATED VAPOR. THE FOLLOWING SEQUENCE OF EQUATIONS
C  THROUGH THE END OF THE SUBROUTINE EVALUATES THE FINAL TEMPERATURE
C  OF A SUPERHEATED VAPOR HAVING PFIN AS THE FINAL PRESSURE.
C
      LIMIT  = HAVG / 1.D8
      H1     = HVAP
      T1     = TFIN
      T2     = T1 + 1.D0
C
      CALL HUF6 (T2, PFIN, MW, 0.0D0, 0.0D0, H2)
C
   80 CONTINUE
C
      F1     = H1 - HAVG
      F2     = H2 - HAVG
      M      = ( F2 - F1 ) / ( T2 - T1 )
      T3     = T2 - F2/M
C
      CALL HUF6 (T3, PFIN, MW, 0.0D0, 0.0D0, H3)
C
      F3     = H3 - HAVG
C
      IF (DABS(F3).LT.LIMIT) GO TO 90
C
      T1     = T2
      T2     = T3
      H1     = H2
      H2     = H3
C
```

```
      GO TO 80
C
   90 CONTINUE
C
      XVFIN  = 1.D0
      TFIN   = T3
C
      RETURN
C
      END
```

B.9 HCOEFF

```
      SUBROUTINE HCOEFF (IC)
C
C  THIS SUBROUTINE DETERMINES THE HEAT TRANSFER COEFFICIENT GIVEN THE
C  ENTHALPIES OF THE INLET STREAMS AND THE COMPARTMENT, THE MASSES IN
C  THE INLET STREAMS AND THE COMPARTMENT, THE COOLING RATE AND THE TIME
C  STEP, AND THE AREA AND TEMPERATURE OF HEAT TRANSFER SURFACES. THE
C  HEAT TRANSFER COEFFICIENT IS BASED ON HEATING UP THE MASS BROUGHT IN
C  BY THE INLET STREAMS TO THE TEMPERATURE OF THE COMPARTMENT ATMOSPHERE
C  UNDER NORMAL STEADY STATE CONDITIONS. THE TEMPERATURES USED IN
C  EVALUATING THE HEAT TRANSFER COEFFICIENT ARE THE ROOM TEMPERATURE
C  (NOT THE INLET STREAM TEMPERATURES) AND THE HEAT TRANSFER SURFACE
C  TEMPERATURES.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC              NODE NUMBER OF THE COMPARTMENT FOR WHICH THE
C                       HEAT TRANSFER COEFFICIENT IS BEING CALCULATED
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)  COMPONENT MASS IN A NODE, LB (FOR COMPARTMENT
C                       NODES), OR LB/(DELT) (FOR STREAM NODES)
C       TC      (30)    NODE TEMPERATURE, DEG F
C       PC      (30)    NODE PRESSURE, PSIA
C       TSURF   (30)    HEAT TRANSFER SURFACE TEMPERATURE, DEG F
C       H       (30)    TOTAL ENTHALPY OR ENTHALPY RATE, BTU OR
C                       BTU/(DELT)
C       QRATE   (30)    AMOUNT OF HEAT ADDED TO A NODE TO MAINTAIN A
C                       CONSTANT TEMPERATURE UNDER NORMAL STEADY STATE
C                       CONDITIONS, BTU/SEC
C       QCOOL   (30)    COOLING RATE, BTU/SEC
C       HTCOEF  (30)    HEAT TRANSFER COEFFICIENT, BTU/SEC-FT**2-DEG F
C       HTAREA  (30)    SURFACE AREA FOR HEAT TRANSFER, FT**2
C       AMINLN          NATURAL LOG OF THE MINIMUM NUMBER ACCEPTED BY
C                       THE COMPUTER
C       DELT    (30)    TIME INTERVAL USED FOR THE TRANSIENT SIMULATION,
C                       SEC
C       IIN     (30,4)  INLET STREAM NODE NUMBER
```

```
C
C    INTERNAL VARIABLES
C
C       MASSIC          TOTAL MASS IN COMPARTMENT NODE IC, LB
C       MASS1           TOTAL MASS RATE IN INLET STREAM 1, LB/(DELT)
C       MASS2           TOTAL MASS RATE IN INLET STREAM 2, LB/(DELT)
C       MASS3           TOTAL MASS RATE IN INLET STREAM 3, LB/(DELT)
C       MASS4           TOTAL MASS RATE IN INLET STREAM 4, LB/(DELT)
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), TSURF(30)
      COMMON /ENTHAL/ H(30), QRATE(30), QCOOL(30), HTCOEF(30),
     *                HTAREA(30)
      COMMON /CONTRL/ AMINLN, DUM2, DELT, DUM3, IDUM1, DUM4
      COMMON /ISTRMS/ IIN(30,4), IDUM2(120)
C
      MASSIC = 0.D0
      MASS1  = 0.D0
      MASS2  = 0.D0
      MASS3  = 0.D0
      MASS4  = 0.D0
C
      DO 10 I10=1,9
C
           MASSIC = MASSIC + MASS(IC,I10)
           MASS1  = MASS1 + MASS(IIN(IC,1),I10)
           MASS2  = MASS2 + MASS(IIN(IC,2),I10)
           MASS3  = MASS3 + MASS(IIN(IC,3),I10)
           MASS4  = MASS4 + MASS(IIN(IC,4),I10)
C
   10 CONTINUE
C
      QRATE(IC) = (H(IC)*(MASS1 + MASS2 + MASS3 + MASS4)/MASSIC
     *            - (H(IIN(IC,1)) + H(IIN(IC,2)) + H(IIN(IC,3))
     *            + H(IIN(IC,4))) + QCOOL(IC)*DELT)/DELT
C
      HTCOEF(IC) = QRATE(IC)/HTAREA(IC)/(TSURF(IC) - TC(IC))
C
      RETURN
C
      END
```

B.10 HFPOLY

```
      SUBROUTINE HFPOLY (TF, PHF, MW, C1C3C6)
C
C  THIS SUBROUTINE IS BASED ON INFORMATION PRESENTED IN JOHN M.
C  BECKERDITE, DAVID R. POWELL, AND EMORY T. ADAMS, JR., "SELF-ASSOCI-
C  ATION OF GASES. 2. THE ASSOCIATION OF HYDROGEN FLUORIDE," J. CHEM.
C  ENG. DATA 1983, 28, 287-293. THE EQUILIBRIUM COEFFICIENTS USED BELOW
C  WERE DEVELOPED FROM STROHMEIER AND BRIEGLEB'S DATA (SEE TABLE III).
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```
C  THE FOLLOWING VARIABLES ARE USED.
C
C       TF      TEMPERATURE, DEG F
C       TR      ABSOLUTE TEMPERATURE, DEG R
C       PHF     PARTIAL PRESSURE OF HF, PSIA
C       PLIMIT  CONVERGENCE LIMIT FOR PRESSURE, PSI
C       MW      AVERAGE MOLECULAR WEIGHT OF HF, LB/LB MOLE
C       WMBHF   MOLECULAR WEIGHT OF HF MONOMER, LB/LB MOLE
C       K3      EQUILIBRIUM COEFFICIENT FOR TRIMER, PSIA**-2
C       K6      EQUILIBRIUM COEFFICIENT FOR HEXAMER, PSIA**-5
C       P1      PRESSURE OF HF MONOMER, PSIA
C       P1MW1   PRESSURE-MOLECULAR WEIGHT PRODUCT FOR HF MONOMER
C       P3MW3   PRESSURE-MOLECULAR WEIGHT PRODUCT FOR HF TRIMER
C       P6MW6   PRESSURE-MOLECULAR WEIGHT PRODUCT FOR HF HEXAMER
C       PMWSUM  SUM OF PRESSURE-MOLECULAR WEIGHT PRODUCTS
C       C1      MASS FRACTION OF MONOMER TO TOTAL HF, LB MONOMER/LB HF
C                       VAPOR
C       C3      MASS FRACTION OF TRIMER TO TOTAL HF, LB TRIMER/LB HF
C                       VAPOR
C       C6      MASS FRACTION OF HEXAMER TO TOTAL HF, LB HEXAMER/LB HF
C                       VAPOR
C
C       C1C3C6  A LOGICAL VARIABLE TO INDICATE WHETHER EXISTING VALUES
C               OF C1, C3, AND C6 SHOULD BE CHANGED
C
C                  .TRUE.   PERMITS VALUES TO BE CHANGED
C                  .FALSE.  RETAINS EXISTING VALUES
C
C               THIS VARIABLE IS GENERALLY .TRUE. EXCEPT, FOR EXAMPLE,
C               WHEN ONLY THE MOLECULAR WEIGHT IS REQUIRED IN PHFH2O TO
C               ESTABLISH THE AZEOTROPIC MOLE FRACTION OF HF IN THE HF-
C               H2O SYSTEM; IN THAT CASE, A CHANGE IN THE VALUES OF
C               C1, C3, AND C6 WOULD MESS UP OTHER CALCULATIONS.
C
C       F       FUNCTION OF PHF AND ESTIMATED P1 THAT MUST CONVERGE TO
C               ZERO TO OBTAIN THE AVERAGE MOLECULAR WEIGHT OF HF VAPOR
C       DFDP    DERIVATIVE OF F WITH RESPECT TO P1
C
      IMPLICIT REAL*8(A-H,K-Z)
C
      LOGICAL C1C3C6
C
      COMMON /POLYMR/ C1, C3, C6,WMBHF
C
      MW = WMBHF
C
      IF (.NOT.C1C3C6) GO TO 10
C
      C1 = 1.D0
      C3 = 0.D0
      C6 = 0.D0
C
   10 CONTINUE
C
```

```
      IF (PHF.LT.1.D-5) RETURN
C
      PLIMIT = PHF*1.D-6
      TR = TF + 459.67D0
      K3 = DEXP(23884.0D0/TR - 51.2393D0)
      K6 = DEXP(40319.6D0/TR - 87.7927D0)
      P1 = PHF
C
   20 CONTINUE
C
      F = PHF - P1 - K3*P1**3 - K6*P1**6
      IF (DABS(F).LT.PLIMIT) GO TO 30
      DFDP = -1.D0 - 3.D0*K3*P1**2 - 6.D0*K6*P1**5
      P1 = P1 - F/DFDP
C
      GO TO 20
C
   30 CONTINUE
C
      P1MW1 = WMBHF*P1
      P3MW3 = 3.D0*WMBHF*K3*P1**3
      P6MW6 = 6.D0*WMBHF*K6*P1**6
      PMWSUM = P1MW1 + P3MW3 + P6MW6
      MW = PMWSUM/PHF
C
      IF (.NOT.C1C3C6) GO TO 40
C
      C1 = P1MW1/PMWSUM
      C3 = P3MW3/PMWSUM
      C6 = P6MW6/PMWSUM
C
   40 CONTINUE
C
      RETURN
      END
```

B.11 HHFH2O

```
      SUBROUTINE HHFH2O (TF, WHFL, WHFV, HL, HV)
C
C  THIS SUBROUTINE CALCULATES THE ENTHALPIES OF LIQUID AND VAPOR
C  MIXTURES OF HF AND H2O GIVEN THE TEMPERATURE AND THE WEIGHT MASS
C  FRACTION OF HF IN EACH PHASE. THE FOLLOWING VARIABLES ARE USED.
C
C       TF      TEMPERATURE, DEG F
C       WHFL    WEIGHT FRACTION HF IN LIQUID, LB HF/LB HF-H2O LIQ MIX
C       WHFV    WEIGHT FRACTION HF IN VAPOR, LB HF/LB HF-H2O VAP MIX
C       HL      ENTHALPY OF HF-H2O LIQUID MIXTURE, BTU/LB LIQ MIX
C       HV      ENTHALPY OF HF-H2O VAPOR MIXTURE, BTU/LB VAP MIX
C       C3POLY  MASS HF TRIMER TO MASS OF HF, LB TRIMER/LB HF VAPOR
C       C6POLY  MASS HF HEXAMER TO MASS OF HF, LB HEXAMER/LB HF VAPOR
C       WHFLSQ  WHFL**2
C
```

```
C        A1,A2,A3,A4,A5  CONSTANTS IN EQUATIONS FOR LIQUID ENTHALPY
C        B1,B2,B3,B4,B5  LINEAR CONSTANTS IN EQUATIONS FOR LIQUID
C                        ENTHALPY
C        C2,C3,C4,C5     QUADRATIC CONSTANTS IN EQUATIONS FOR LIQUID
C                        ENTHALPY
C
C        H20,H60,H80,H90,H100    LIQUID ENTHALPY AT 20, 60, 80, 90, AND
C                                100 WT %, RESPECTIVELY, BTU/LB HF-H2O
C                                MIXTURE
C
C        M20,M60,M80,M90         SLOPE OF H-WHFL CURVE AT 20, 60, 80, AND
C                                90 WT %
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /POLYMR/ DUM1,C3POLY,C6POLY,DUM2
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS THROUGH "50 CONTINUE" EVALUATE
C  THE ENTHALPY OF HF-H2O LIQUID MIXTURES. THE EQUATIONS ARE BASED ON
C  A PLOT OF ENTHALPY VS CONCENTRATION AS A FUNCTION OF TEMPERATURE
C  WHICH WAS SENT TO W. REID WILLIAMS BY BRIAN C. ROGERS OF ALLIED
C  CHEMICAL, SOLVAY, NY, IN A LETTER DATED JULY 26, 1983. THE EQUATIONS
C  WERE DEVELOPED BY W. R. WILLIAMS.
C
      WHFLSQ = WHFL*WHFL
C
      A1     = -32.252D0 + 0.99783D0*TF
      B1     = -357.75D0 - 0.969D0*TF + 0.0013D0*TF**2
C
      IF (WHFL.GT.0.2D0) GO TO 10
C
C  THE FOLLOWING EQUATION IS APPLICABLE FOR WHFL BETWEEN 0.0 AND 0.2.
C
      HL     = A1 + B1*WHFL
C
      GO TO 50
C
   10 CONTINUE
C
      H20    = A1 + B1*0.2D0
      H60    = -179.68D0 + 0.63569D0*TF + 5.8429D-4*TF**2
      M20    = B1
      C2     = (H20 - H60 + 0.4D0*M20) / (-0.16D0)
      B2     = M20 - 0.4D0*C2
      A2     = H20 - 0.2D0*B2 - 0.04D0*C2
C
      IF (WHFL.GT.0.6D0) GO TO 20
C
C  THE FOLLOWING EQUATION IS APPLICABLE FOR WHFL BETWEEN 0.2 AND 0.6.
C
      HL     = A2 + B2*WHFL + C2*WHFLSQ
C
      GO TO 50
C
```

```
   20 CONTINUE
C
      H80     = -159.26D0 + 0.7985D0*TF
      M60     = B2 + 1.2D0*C2
      C3      = (H60 - H80 + 0.2D0*M60) / (-0.04D0)
      B3      = M60 - 1.2D0*C3
      A3      = H60 - 0.6D0*B3 - 0.36D0*C3
C
      IF (WHFL.GT.0.8D0) GO TO 30
C
C  THE FOLLOWING EQUATION IS APPLICABLE FOR WHFL BETWEEN 0.6 AND 0.8.
C
      HL      = A3 + B3*WHFL + C3*WHFLSQ
C
      GO TO 50
C
   30 CONTINUE
C
      H90     = -111.54D0 + 0.67057*TF
      M80     = B3 + 1.6D0*C3
      C4      = (H80 - H90 + 0.1D0*M80) / (-0.01D0)
      B4      = M80 - 1.6D0*C4
      A4      = H80 - 0.8D0*B4 - 0.64D0*C4
C
      IF (WHFL.GT.0.9D0) GO TO 40
C
C  THE FOLLOWING EQUATION IS APPLICABLE FOR WHFL BETWEEN 0.8 AND 0.9.
C
      HL      = A4 + B4*WHFL + C4*WHFLSQ
C
      GO TO 50
C
   40 CONTINUE
C
      H100    = -23.3142D0 + 0.870283D0*TF
      M90     = B4 + 1.8D0*C4
      C5      = (H90 - H100 + 0.1D0*M90) / (-0.01D0)
      B5      = M90 - 1.8D0*C5
      A5      = H90 - 0.9D0*B5 - 0.81D0*C5
C
C  THE FOLLOWING EQUATION IS APPLICABLE FOR WHFL BETWEEN 0.9 AND 1.0
C
      HL      = A5 + B5*WHFL + C5*WHFLSQ
C
   50 CONTINUE
C
C  THE FOLLOWING EQUATION FOR THE ENTHALPY OF A VAPOR MIXTURE OF HF AND
C  H2O WAS DERIVED BY W. R. WILLIAMS FROM THE ABOVE CITED PLOT AND FROM
C  INFORMATION PRESENTED IN JOHN M. BECKERDITE, DAVID R. POWELL, AND
C  EMORY T. ADAMS, JR., "SELF-ASSOCIATION OF GASES. 2. THE ASSOCIATION
C  OF HYDROGEN FLUORIDE," J. CHEM. ENG. DATA 1983, 28, 287-293.
C
      HV      = (1051.0D0 + 0.472D0*TF) - (376.0D0 + 0.136D0*TF
     *          + 790.642D0*C3POLY + 667.358D0*C6POLY)*WHFV
```

```
C
      RETURN
C
      END
```

B.12 HUF6

```
      SUBROUTINE HUF6 (TF, PSIA, MW, HSOL, HLIQ, HVAP)
C
C  THIS SUBROUTINE CALCULATES THE ENTHALPIES OF UF6 SOLID, LIQUID, AND
C  VAPOR. THE FOLLOWING VARIABLES ARE USED.
C
C       TF        TEMPERATURE, DEG F
C       TR        ABSOLUTE TEMPERATURE, DEG R
C       TRSQ      (DEG R)**2
C       PSIA      PRESSURE, PSIA
C       VPSIA     VAPOR PRESSURE CORRESPONDING TO TF, PSIA
C       MW        MOLECULAR WEIGHT, LB MASS/LB MOLE
C       HSOL      ENTHALPY OF THE SOLID, BTU/LB MASS
C       HLIQ      ENTHALPY OF THE LIQUID, BTU/LB MASS
C       HVAP      ENTHALPY OF THE VAPOR, BTU/LB MASS
C       DENLIQ    DENSITY OF THE LIQUID, LB MASS/FT**3
C       ZPSIA     VAPOR COMPRESSIBILITY FACTOR AT TF AND PSIA
C       Z1ATM     VAPOR COMPRESSIBILITY FACTOR AT TF AND 14.696 PSIA
C
C  THE FOLLOWING SUBROUTINES ARE CALLED.
C
C       DENUF6
C       VPRUF6
C       ZUF6
C
C  THE ENTHALPY CORRELATIONS ARE BASED OF INFORMATION FOUND IN R.
C  DEWITT, "URANIUM HEXAFLUORIDE: A SURVEY OF THE PHYSICO-CHEMICAL
C  PROPERTIES," GAT-280, GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN.
C  29, 1960, PAGES 65 - 67. THE CORRELATIONS REPORTED IN GAT-280 FOR THE
C  ENTHALPIES OF THE SOLID AND LIQUID ARE FOR SATURATED CONDITIONS, AND
C  THE ENTHALPY OF THE VAPOR IS BASED ON A PRESSURE OF 1 ATM. THE LIQUID
C  ENTHALPY CORRELATION WAS MODIFIED FOR SUPERSATURATED CONDITIONS (PSIA
C  GRAETER THAN VPSIA) ASSUMING AN INCOMPRESSIBLE LIQUID. THE VAPOR
C  ENTHALPY CORRELATION WAS MODIFIED USING THE MAGNUSON EQUATION OF
C  STATE (SEE GAT-280, PAGES 97 - 101) AND THE DEPARTURE FUNCTION
C  CORRELATIONS GIVEN IN R. C. REID, J. M. PRAUSNITZ, AND T. K.
C  SHERWOOD, THE PROPERTIES OF GASES AND LIQUIDS, 3RD ED., MCGRAW-HILL
C  BOOK COMPANY, 1977, PAGE 93, SO THAT BOTH SATURATED AND UNSATURATED
C  VAPOR ENTHALPIES CAN BE CALCULATED.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR     = TF + 459.67D0
C
      TRSQ   = TR**2
C
C  THE ENTHALPY OF THE SOLID IS GIVEN BY THE FOLLOWING CORRELATION WHICH
```

```
C  IS ACCURATE WITHIN 0.01% FROM 17 DEG F TO THE TRIPLE POINT (147.3
C  DEG F).
C
      HSOL    = ( 50.4460D0 - 5.70531D-2*TR + 1.27509D-4*TRSQ
     *          - ( 9.64563D3/TR ) ) * ( 3.52D2/MW )
C
C  CALCULATE THE DENSITY OF THE LIQUID AND THE VAPOR PRESSURE.
C
      CALL DENUF6 (TF, PSIA, MW, 0.0D0, DENLIQ, 0.0D0)
C
      CALL VPRUF6 (TF, VPSIA)
C
C  THE ENTHALPY OF THE LIQUID IS GIVEN BY THE FOLLOWING CORRELATION
C  WHICH IS REPORTED TO HAVE AN ACCURACY WITHIN 0.01% [OVER THE ASSUMED
C  RANGE OF 147.3 TO 206.3 DEG F] FOR THE SATURATED LIQUID.
C
      HLIQ    = ( 30.6133D0 + 5.10057D-2*TR + 5.13165D-5*TRSQ
     *          - ( 6.13934D3/TR )
     *          + ( 1.82628D-1 * ( PSIA - VPSIA ) / DENLIQ ) )
     *          * ( 3.52D2/MW )
C
C CALCULATE THE VAPOR COMPRESSIBILITY AT 14.696 PSIA AND AT "PSIA."
C
      CALL ZUF6 (TF, 14.696D0, Z1ATM, 0.0D0, 0.0D0)
C
      CALL ZUF6 (TF, PSIA, ZPSIA, 0.0D0, 0.0D0)
C
C  THE ENTHALPY OF THE VAPOR IS GIVEN BY THE FOLLOWING CORRELATION.
C
      HVAP    = ( 43.2614D0 + 9.21307D-2*TR + 6.26265D-6*TRSQ
     *          + ( 2.95171D3/TR )
     *          + 3.0939D-3 * TR * (ZPSIA - Z1ATM) ) * ( 3.52D2/MW )
C
      RETURN
C
      END
```

B.13 HUMID

```
      SUBROUTINE HUMID (IC, RH, RATIO)
C
C  THIS SUBROUTINE CALCULATES THE RATIO OF MOLES OF WATER VAPOR IN HUMID
C  AIR TO THE TOTAL MOLES OF AIR PLUS WATER VAPOR.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC                NODE NUMBER OF VECTOR HAVING TEMPERATURE AND
C                         PRESSURE REQUIRED FOR CALCULATING RATIO
C       RH                RELATIVE HUMIDITY CORRESPONDING TO TEMPERATURE
C                         AND PRESSURE OF NODE IC
C
```

```
C     OUTPUT VARIABLE
C
C        RATIO              RATIO OF MOLES OF WATER VAPOR TO TOTAL MOLES OF
C                           MOIST AIR
C
C     COMMON BLOCK VARIABLES
C
C        TC      (30)       NODE TEMPERATURE, DEG F
C        PC      (30)       NODE PRESSURE, PSIA
C
C     INTERNAL VARIABLES
C
C        WHFL               WEIGHT FRACTION OF HF IN HF-H2O CONDENSATE
C        PH2O               VAPOR PRESSURE OF H2O, PSIA
C
C   THE FOLLOWING SUBROUTINE IS REQUIRED.
C
C                PHFH2O
C
C   THE SUBROUTINE HFPOLY IS CALLED BY PHFH2O, BUT IT IS NOT CALLED IN
C   CALCULATING PH2O FOR THIS SUBROUTINE.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /COMPTP/ TC(30), PC(30), DUM1(30)
C
      WHFL   = 0.D0
C
      CALL PHFH2O (TC(IC), WHFL, 0.D0, 0.D0, PH2O, 0.D0)
C
      RATIO  = RH*PH2O/PC(IC)
C
      RETURN
C
      END
```

B.14 INTMEB

```
      SUBROUTINE INTMEB
C
C   THIS SUBROUTINE DETERMINES THE FINAL STATE (PRESSURE, TEMPERATURE,
C   MASS FRACTIONS IN EACH PHASE) OF UF6 IN A CONTROL VOLUME GIVEN THE
C   INITIAL STATES OF INLET AND OUTLET STREAMS AND OF THE MASS IN THE
C   VOLUME AT THE BEGINNING OF A TIME STEP DURING WHICH MASS AND ENERGY
C   ARE ASSUMED TO FLOW AT CONSTANT RATES.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C   COMMON BLOCKS TRANSFER DATA BETWEEN INTMEB AND THE DRIVER.
C
      COMMON /ICOMON/ ISEN,IPIG,IBRCH,IGEXIT
      COMMON /CONCYL/ PCYL,TCYL,XVCYL,XLCYL,MW
      COMMON /CONIN / PIN,TIN,XVIN,XLIN
```

```
      COMMON /CONVOL/ PVOL,TVOL,XVOL,XLVOL
      COMMON /PARAM / VOL,DELT,Q
      COMMON /MASS  / MOUT,MIN,MTOT
      COMMON /TRIPLE/ TTRIPL,PTRIPL
C
      DIMENSION HARRAY(3,3),HVECTR(3)
C
C  THE ARRAY FOR ENTHALPIES OF MATERIAL AT TIME T IS FILLED
C
      CALL HUF6(TVOL,PVOL,MW,HARRAY(1,3),HARRAY(1,2),HARRAY(1,1))
      CALL HUF6( TIN, PIN,MW,HARRAY(2,3),HARRAY(2,2),HARRAY(2,1))
      CALL HUF6(TVOL,PVOL,MW,HARRAY(3,3),HARRAY(3,2),HARRAY(3,1))
C
      HTOT   =
     * MTOT*(HARRAY(3,1)*XVOL + HARRAY(3,2)*(1.D0-XVOL)*XLVOL
     *                   + HARRAY(3,3)*(1.D0-XVOL)*(1.D0-XLVOL))
     *+(MIN*(HARRAY(2,1)*XVIN + HARRAY(2,2)*(1.D0-XVIN)*XLIN
     *                   + HARRAY(2,3)*(1.D0-XVIN)*(1.D0-XLIN))
     *-MOUT*(HARRAY(1,1)*XVCYL + HARRAY(1,2)*(1.D0-XVCYL)*XLCYL
     *                   + HARRAY(1,3)*(1.D0-XVCYL)*(1.D0-XLCYL))
     *+ Q)*DELT
C
      MTOT   = MTOT + DELT*(MIN-MOUT)
C
C  FIRST ASSUME A FINAL CONDITION AT THE TRIPLE POINT
C
      CALL HUF6  (TTRIPL,PTRIPL,MW,HVECTR(3),HVECTR(2),HVECTR(1))
C
      CALL DENUF6(TTRIPL,PTRIPL,MW,DENSOL,DENLIQ,DENVAP)
C
      MVAP   = DENVAP*( VOL*DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *                 +MTOT*(DENSOL*HVECTR(3)-DENLIQ*HVECTR(2))
     *                 +HTOT*(DENLIQ-DENSOL))
     *       /( DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *         +DENVAP*DENLIQ*(HVECTR(1)-HVECTR(2))
     *         -DENVAP*DENSOL*(HVECTR(1)-HVECTR(3)))
C
      MLIQ   = HTOT/(HVECTR(2)-HVECTR(3))
     *         -MTOT*HVECTR(3)/(HVECTR(2)-HVECTR(3))
     *         -MVAP*(HVECTR(1)-HVECTR(3))/(HVECTR(2)-HVECTR(3))
C
      MSOL   = MTOT-MVAP-MLIQ
C
      ITER8R = 0
C
      OLDSOL = MSOL
      OLDT   = TTRIPL
C
      IF (MLIQ.LT.0.D0) GO TO 50
      IF (MSOL.LT.0.D0) GO TO 20
C
      TVOL   = TTRIPL
      PVOL   = PTRIPL
      XVOL   = MVAP/MTOT
```

```
C
      IF (MLIQ.EQ.0.D0.AND.MSOL.EQ.0.D0) GO TO 10
C
      XLVOL  = MLIQ/(MLIQ+MSOL)
C
      RETURN
C
   10 CONTINUE
C
      XLVOL  = 1.D0
C
      RETURN
C
C  FOLLOWING CODE SEGMENTS ARE CALLED WHEN FINAL CONDITIONS
C  DO NOT MATCH THE TRIPLE POINT.
C
   20 CONTINUE
C
C  FINAL TEMPERATURE IS ABOVE TRIPLE POINT.  NO SOLID IS PRESENT.
C
      XLVOL  = 1.D0
C
   30 CONTINUE
C
      CALL HUF6  (TVOL,PVOL,MW,HVECTR(3),HVECTR(2),HVECTR(1))
C
      CALL DENUF6(TVOL,PVOL,MW,DENSOL,DENLIQ,DENVAP)
C
      MVAP   = DENVAP*( VOL*DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *                 +MTOT*(DENSOL*HVECTR(3)-DENLIQ*HVECTR(2))
     *                 +HTOT*(DENLIQ-DENSOL))
     *       /( DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *         +DENVAP*DENLIQ*(HVECTR(1)-HVECTR(2))
     *         -DENVAP*DENSOL*(HVECTR(1)-HVECTR(3)))
C
      MLIQ   = HTOT/(HVECTR(2)-HVECTR(3))
     *         -MTOT*HVECTR(3)/(HVECTR(2)-HVECTR(3))
     *         -MVAP*(HVECTR(1)-HVECTR(3))/(HVECTR(2)-HVECTR(3))
C
      MSOL   = MTOT-MVAP-MLIQ
C
      XVOL   = MVAP/MTOT
C
      IF (DABS(MSOL).LT.1.D-6) RETURN
C
      IF (MSOL.GT.0.D0) GO TO 40
C
      OLDSOL = MSOL
      OLDT   = TVOL
      TVOL   = HITVOL
      MSOL   = HIMSOL
C
   40 CONTINUE
C
```

```
      NEWT   = TVOL - MSOL*(TVOL-OLDT)/(MSOL-OLDSOL)
C
      IF (NEWT.GT.250.D0.OR.NEWT.LT.TTRIPL) STOP02
C
      ITER8R = 1 + ITER8R
C
      IF (ITER8R.GT.20) STOP03
C
      HIMSOL = MSOL
      HITVOL = TVOL
      TVOL   = NEWT
C
      CALL VPRUF6(TVOL,PVOL)
C
      GO TO 30
C
   50 CONTINUE
C
C  FINAL TEMPERATURE IS BELOW TRIPLE POINT. NO LIQUID IS PRESENT.
C
      XLVOL  = 0.D0
      TVOL   = TTRIPL - 10.D0
C
      CALL VPRUF6(TVOL,PVOL)
C
   60 CONTINUE
C
      CALL HUF6  (TVOL,PVOL,MW,HVECTR(3),HVECTR(2),HVECTR(1))
C
      CALL DENUF6(TVOL,PVOL,MW,DENSOL,DENLIQ,DENVAP)
C
      MVAP   = DENVAP*( VOL*DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *                 +MTOT*(DENSOL*HVECTR(3)-DENLIQ*HVECTR(2))
     *                 +HTOT*(DENLIQ-DENSOL))
     *       /( DENLIQ*DENSOL*(HVECTR(2)-HVECTR(3))
     *         +DENVAP*DENLIQ*(HVECTR(1)-HVECTR(2))
     *         -DENVAP*DENSOL*(HVECTR(1)-HVECTR(3)))
C
      MLIQ   = HTOT/(HVECTR(2)-HVECTR(3))
     *         -MTOT*HVECTR(3)/(HVECTR(2)-HVECTR(3))
     *         -MVAP*(HVECTR(1)-HVECTR(3))/(HVECTR(2)-HVECTR(3))
C
      MSOL   = MTOT-MVAP-MLIQ
C
      XVOL   = MVAP/MTOT
C
      IF (DABS(MLIQ).LT.1.D-6) RETURN
C
      IF (MLIQ.GT.0.D0) GO TO 80
C
      OLDLIQ = MLIQ
      OLDT   = TVOL
C
      IF (ITER8R.GT.0.D0) GO TO 70
```

```
C
      TVOL   = TVOL - 10.D0
C
      CALL VPRUF6(TVOL,PVOL)
C
      GO TO 60
C
   70 CONTINUE
C
      OLDT   = TVOL
      OLDLIQ = MLIQ
      TVOL   = LOTVOL
      MLIQ   = LOMLIQ
C
   80 CONTINUE
C
      ITER8R = 1 + ITER8R
C
      IF (ITER8R.GT.20) STOP04
C
      NEWT   = TVOL + MLIQ*(OLDT-TVOL)/(MLIQ-OLDLIQ)
C
      IF (NEWT.GT.TTRIPL.OR.NEWT.LT.0.D0) STOP05
C
      LOMLIQ = MLIQ
      LOTVOL = TVOL
      TVOL   = NEWT
C
      CALL VPRUF6(TVOL,PVOL)
C
      GO TO 60
C
      RETURN
C
      END
```

B.15 LEVEL

```
      SUBROUTINE LEVEL (DENVAP, VLFACE)
C
C  THIS SUBROUTINE CALCULATES THE LEVEL OF THE PHASE INTERFACE WITH
C  RESPECT TO THE BOTTOM OF A CONTAINMENT VOLUME AND W.R.T. A BREACH
C  OR PIPE SYSTEM ENTRANCE.  THE CODE THEN DETERMINES THE MASS FRACTIONS
C  OF VAPOR, LIQUID, AND SOLID WHICH LEAVE THE CONTAINMENT AND THE
C  PRESSURE OF THE RELEASE, IF DIFFERENT FROM THE SATURATION PRESSURE.
C
C  THE TOTAL MASS IN CONTAINMENT IS INPUT ALONG WITH THE TOTAL VOLUME,
C  SATURATION PRESSURE AND TEMPERATURE, AND THE MASS FRACTIONS OF EACH
C  PHASE PRESENT.  ALSO INPUT ARE THE CONTAINMENT PARAMETERS OF LENGTH
C  AND DIAMETER, THE BREACH PARAMETERS OF HOLE DIAMETER AND DISTANCE OF
C  THE HOLE CENTER FROM THE CONTAINMENT CENTER.  THE CONTAINMENT IS
C  MODELED AS A CYLINDER WITH THE HOLE IN ONE END AND THE CYLINDER
C  ORIENTATION (UPRIGHT OR ON ITS SIDE) IS ALSO INPUT.
```

```
C
C  INPUT VARIABLES, VALUES PROVIDED BY CALLING PROGRAM.
C
C       DENVAP   DENSITY OF VAPOR, LB MASS/FT**3
C       VLFACE   HEIGHT ABOVE CYLINDER BOTTOM OF VAPOR-LIQUID
C                INTERFACE, IN
C       XVOL     MASS FRACTION OF VAPOR IN CYLINDER
C       MTOT     TOTAL MASS IN CYLINDER, LB MASS
C       VOL      TOTAL VOLUME ENCLOSED IN CYLINDER, FT**3
C       DIACYL   DIAMETER OF CYLINDER, IN
C       LCYL     LENGTH OF CYLINDER, IN
C       RHOLE    LENGTH OF RAY FROM CENTER OF CYLINDER
C                TO CENTER OF HOLE, IN
C       DHOLE    DIAMETER OF HOLE, IN
C
C  INTERNAL VARIABLES USED BY THE LEVEL SUBROUTINE
C
C       ALPHA    ANGLE BETWEEN VERTICAL UPWARD RAY AND RAY FROM
C                CENTER OF CYLINDER TO CENTER OF HOLE, DEGREES
C       VVOL     VOLUME OF VAPOR IN CYLINDER, FT**3
C       VOL2,    TOTAL VOLUME AND VAPOR VOLUME IN CYLINDER,
C        VVOL2   RESPECTIVELY, IN**3
C       RADIAN   ANGLE AS DEFINED FOR ALPHA, RADIANS
C       ISPLIT   =0, VAPOR-LIQUID INTERFACE IS ABOVE (BELOW) HOLE
C                =1, VAPOR-LIQUID INTERFACE COINCIDES WITH HOLE
C       IVERT    =0,  CYLINDER LIES ON SIDE
C                =1,  CYLINDER STANDS ON END, HOLE ON BOTTOM
C       ITER8R   INDEX USED TO CONTROL NUMBER OF ITERATIONS
C       A1,A2,A3 OLD, CURRENT, AND NEW RESULTS FOR VLFACE
C       G1,G2,G3 OLD, CURRENT, AND NEW GUESSES FOR VLFACE
C       OLDVLF   STORAGE LOCATION FOR PREVIOUS VALUE OF VLFACE.
C       HINTER   DEPTH OF LIQUID ABOVE BOTTOM OF HOLE, IN
C       YVCYL    VAPOR VOLUME FRACTION
C                OF MATERIAL ENTERING RELEASE PATHWAY.
C       DENLS    DENSITY OF THE MASS FRACTION WHICH IS NOT VAPOR,
C                LB MASS/FT**3
C
C  OUTPUT VARIABLES, VALUES RETURNED TO CALLING PROGRAM.
C
C       XVCYL    VAPOR MASS FRACTION
C                OF MATERIAL ENTERING RELEASE PATHWAY.
C       PCYL     PRESSURE OF MATERIAL
C                ENTERING RELEASE PATHWAY, PSIA
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
C  COMMON BLOCKS TRANSFER MOST OF THE INPUT AND OUTPUT VALUES.
C
      COMMON /CONCYL/ PCYL,TCYL,XVCYL,XLCYL,MW
      COMMON /CONVOL/ PVOL,TVOL,XVOL,XLVOL
      COMMON /PARAM / VOL,DELT,Q
      COMMON /MASS  / MSFLRT,MIN,MTOT
      COMMON /CYLIND/ DIACYL,LCYL,RHOLE,DHOLE,ALPHA,IVERT
C
```

```
C  CALCULATE THE VOLUME OF VAPOR IN THE CYLINDER.
C
      VVOL    = XVOL*MTOT/DENVAP
C
C  VOL AND VVOL ARE IN CUBIC FEET. CONVERT TO CUBIC INCHES.
C
      VOL2    = VOL*1728.D0
C
      VVOL2   = VVOL*1728.D0
C
C  ALPHA IS IN DEGREES.  USE EQUIVALENT ANGLE IN RADIANS.
C
      RADIAN = ALPHA*3.14159D0/180.D0
C
C  AN INTEGER INDEX IS SET TO ZERO FOR A VAPOR-LIQUID INTERFACE ABOVE
C  THE TOP OF THE HOLE OR BELOW THE BOTTOM OF THE HOLE. IF THE VAPOR-
C  LIQUID INTERFACE IS FOUND TO COINCIDE WITH THE HOLE, THE INDEX WILL
C  BE RESET TO 1.
C
      ISPLIT = 0
C
C  IF THE HOLE IS AT THE BOTTOM OF A CYLINDER STANDING ON END, THE
C  VAPOR-LIQUID INTERFACE CAN BE CALCULATED DIRECTLY. THE PROGRAM WILL
C  SKIP DOWN TO THAT SECTION.
C
      IF (IVERT.EQ.1) GO TO 70
C
C  CALCULATE VAPOR-LIQUID INTERFACE.  START WITH THE VALUE OF VLFACE
C  PASSED FROM THE CALLING PROGRAM. THEN EVALUATE VLFACE USING THE
C  PREVIOUS VALUE AS A GUESS.
C
      ITER8R = 0
C
      A1      = 0.D0
C
      G1      = 0.D0
C
      A2      = 0.D0
C
      G2      = 0.D0
C
      A3      = 0.D0
C
      G3      = 0.D0
C
   10 CONTINUE
C
      OLDVLF = VLFACE
C
      VLFACE = DIACYL/2.D0*(1.D0 + DCOS(3.14159D0*LCYL/VOL2
     *         *(VVOL2/LCYL + (VLFACE - DIACYL/2.D0)
     *         *DSQRT(VLFACE*DIACYL - VLFACE**2))))
C
C  IF VLFACE CONVERGES STOP THE ITERATION.
```

```
C
      IF (DABS(VLFACE-OLDVLF).LT.1.D-6) GO TO 60
C
      ITER8R = ITER8R + 1
C
C  IF VLFACE DOES NOT CONVERGE STOP EXECUTION.
C
      IF (ITER8R.GT.100) STOP06
C
      IF (VLFACE.GT.OLDVLF.AND.G1.GT.A1) GO TO 20
C
      G1      = OLDVLF
C
      A1      = VLFACE
C
      GO TO 10
C
   20 CONTINUE
C
C  A REGULA FALSI SCHEME DETERMINES FURTHER GUESSES FOR VLFACE.
C
      G2      = OLDVLF
C
      A2      = VLFACE
C
   30 CONTINUE
C
      G3      = (G2*(A1-A2)-A2*(G1-G2))
     *         /(    (A1-A2)-    (G1-G2))
C
      A3      = DIACYL/2.D0*(1.D0 + DCOS(3.14159D0*LCYL/VOL2
     *         *(VVOL2/LCYL + (G3 - DIACYL/2.D0)
     *         *DSQRT(G3*DIACYL - G3**2))))
C
C  IF A3 CONVERGES STOP THE ITERATION.
C
      IF (DABS(A3-G3).LT.1.D-6) GO TO 50
C
      ITER8R = ITER8R + 1
C
C  IF A3 DOES NOT CONVERGE STOP EXECUTION.
C
      IF (ITER8R.GT.100) STOP07
C
C  THIS MODIFIED REGULA FALSI SELECTS WHICH OF THE TWO PREVIOUS GUESSES
C  TO REPLACE WITH THE NEW GUESS.  BY THIS MEANS THE REGULA FALSI IS
C  ALWAYS USED FOR INTERPOLATION, SPEEDING CONVERGENCE.
C
      IF (G3.LT.A3) GO TO 40
C
      A2      = A3
C
      G2      = G3
C
```

```
      GO TO 30
C
   40 CONTINUE
C
      A1     = A3
C
      G1     = G3
C
      GO TO 30
C
   50 CONTINUE
C
C  HEIGHT OF THE VAPOR-LIQUID INTERFACE IS DETERMINED. THE LAST PAIR OF
C  GUESS AND RESULT IS STORED AS OLDVLF AND VLFACE, RESPECTIVELY.
C
      VLFACE = A3
C
      OLDVLF = G3
C
   60 CONTINUE
C
C  NOW CALCULATE THE DEPTH OF LIQUID ABOVE THE BOTTOM OF THE HOLE.
C
      HINTER = VLFACE - (DIACYL/2.D0 + RHOLE*DCOS(RADIAN)
     *                               - DHOLE/2.D0)
C
C  HINTER NEGATIVE MEANS VAPOR-LIQUID INTERFACE IS BELOW BOTTOM OF HOLE;
C  A VAPOR RELEASE OCCURS.  SINCE THE CALLING PROGRAM HAS ALREADY
C  INITIALIZED A VAPOR RELEASE, LEVEL RETURNS WITHOUT FURTHER
C  CALCULATION.
C
      IF (HINTER.LE.0.D0) GO TO 100
C
C  THE LIQUID LEVEL IS ABOVE THE BOTTOM OF THE HOLE.  IF IT IS ABOVE THE
C  TOP OF THE HOLE, THE RELEASE WILL CONTAIN NO VAPOR. CALCULATE THE
C  INTERFACE LEVEL FOR A PRESSURE CORRECTION.
C
      VLFACE = HINTER - DHOLE/2.D0
C
      IF (HINTER.GE.DHOLE) GO TO 80
C
C  THE LIQUID LEVEL COINCIDES WITH THE HOLE LEVEL.  CALCULATE THE VAPOR
C  VOLUME FRACTION AND SET ISPLIT TO 1.
C
      YVCYL  = (ACOS(SNGL(2.D0*HINTER/DHOLE-1.D0))
     *         -4.D0/DHOLE**2*(HINTER-DHOLE/2.D0)
     *         *DSQRT(DHOLE*HINTER-HINTER**2))/3.14159D0
C
      ISPLIT = 1
C
   70 CONTINUE
C
C  CALCULATE DEPTH OF LIQUID IN VERTICAL CYLINDER.
C
```

```
      VLFACE = LCYL*VVOL/VOL
C
   80 CONTINUE
C
C  SET XVCYL TO ZERO AND CALCULATE THE DENSITY OF THE NON-VAPOR MASS
C  FRACTION.
C
      XVCYL  = 0.D0
C
      DENLS  = MTOT*(1.D0-XVOL)/(VOL-VVOL)
C
      IF (ISPLIT.NE.1) GO TO 90
C
C  IF THE LIQUID LEVEL COINCIDES WITH THE LEVEL OF THE HOLE THE VAPOR
C  MASS FRACTION OF THE RELEASE IS RECALCULATED.  VLFACE IS SET TO ZERO
C  SO THAT THE PRESSURE OF THE RELEASE WILL EQUAL THE SATURATION
C  PRESSURE.
C
      XVCYL  =  YVCYL*DENVAP/DENLS
     *         /(1.D0 - YVCYL + YVCYL*DENVAP/DENLS)
C
      VLFACE = 0.D0
C
   90 CONTINUE
C
C  CALCULATE RELEASE PRESSURE.  NO CORRECTION IF VLFACE IS ZERO.
C
      PCYL   = PVOL + VLFACE*DENLS/1728.D0
C
  100 CONTINUE
C
      VLFACE = OLDVLF
C
C  THIS SUBROUTINE CANNOT PROVIDE REASONABLE RESULTS IF THE UF6 GOES
C  SOLID BEFORE THE INTERFACE DROPS BELOW THE BOTTOM OF THE HOLE.  CHECK
C  FOR THIS RESULT AND STOP IF A PROBLEM IS ENCOUNTERED.
C
      IF (XLCYL.EQ.0.D0.AND.XVCYL.NE.1.D0) STOP11
C
      RETURN
C
      END
```

B.16 MIXFLW

```
      SUBROUTINE MIXFLW (IC, INLET, INODES)
C
C  ***********************************************************************
C  *                                                                     *
C  *  WARNING !  THIS SUBROUTINE USES THE NULL VECTOR (NODE 30) FOR      *
C  *  INTERMEDIATE STORAGE. NODE 30 VALUES ARE RESET TO THOSE VALUES     *
C  *  ASSIGNED BY THE SUBROUTINE SETRAY.                                 *
C  *                                                                     *
```

```
C   *********************************************************************
C
C   THIS SUBROUTINE COMBINES UP TO 4 INLET STREAMS AND DETERMINES THE
C   OUTLET PHASE COMPOSITION AND TEMPERATURE AT A GIVEN FINAL PRESSURE.
C   IF REACTIVE COMPONENTS ARE IN THE STREAMS, THEY ARE ALLOWED TO
C   REACT TO THE EXTENT OF THE LIMITING REACTANT. ALL INLET STREAMS MUST
C   BE BLOWER NODES.
C
C   THE FOLLOWING VARIABLES ARE USED IN THIS SUBROUTINE.
C
C     INPUT VARIABLES
C
C        IC                NODE NUMBER REPRESENTING COMBINED STREAM
C        INLET             NUMBER OF STREAMS TO BE MIXED (MAXIMUM OF 4)
C        INODES            MAXIMUM NUMBER OF NODES ALLOWED BY THE SET OF
C                          SUBROUTINES OF WHICH THIS SUBROUTINE IS A PART,
C                          CORRESPONDS TO THE NULL VECTOR NODE NUMBER
C
C     COMMON BLOCK VARIABLES
C
C        MASS    (30,9)    COMPONENT MASS FLOW RATE, LB/(DELT)
C        TC      (30)      NODE TEMPERATURE, DEG F
C        PC      (30)      NODE PRESSURE, PSIA
C        ACFM    (30)      VOLUMETRIC FLOW RATE THROUGH STREAM NODE,
C                          FT**3/MIN
C        H       (30)      NODE ENTHALPY RATE, BTU/(DELT)
C        IIN     (30,4)    NODE INPUT STREAM NUMBER
C        IOUT    (30,4)    NODE OUTPUT STREAM NUMBER
C        AMINLN            MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C        DELT              TIME INTERVAL USED IN TRANSIENT SIMULATION, SEC
C
C     INTERNAL VARIABLE
C
C        IOUTMP            TEMPORARY STORAGE VARIABLE
C
C   THE FOLLOWING SUBROUTINE IS CALLED BY MIXFLW.
C
C                COMPRT
C
C   THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C                DENTHL
C                DENUF6
C                HFPOLY
C                HHFH2O
C                HUF6
C                PHASE
C                PHFH2O
C                VPRUF6
C                ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
```

```
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /VOLUME/ ACFM(30), DUM3(61)
      COMMON /ENTHAL/ H(30), DUM4(120)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, DUM5, DELT, DUM6, IDUM1, DUM7
C
C  SPECIFY INITIAL ESTIMATES OF MIXED STREAM TEMPERATURE AND VOLUME
C  FLOW RATE.
C
      IF (TC(IC).EQ.0.D0) TC(IC) = TC(IIN(IC,1))
C
      IF (ACFM(IC).GT.0.D0) GO TO 20
C
      ACFM(IC) = 0.D0
C
      DO 10 I10=1,INLET
C
           ACFM(IC) = ACFM(IC) + ACFM(IIN(IC,I10))
C
   10 CONTINUE
C
   20 CONTINUE
C
      ACFM(IC) = ACFM(IC)*DELT/6.D1
C
C  SET NODE IC COMPONENT MASS AND ENTHALPY RATES TO ZERO AND TEMPORARILY
C  SET THE OUTLET NODE OF NODE IC TO THE NULL VECTOR.
C
      DO 30 I30=1,9
C
           MASS(IC,I30) = 0.D0
C
   30 CONTINUE
C
      H(IC)  = 0.D0
C
      IOUTMP = IOUT(IC,1)
C
      IOUT(IC,1) = 30
C
C  COMBINE STREAMS TO OBTAIN COMPONENT MASS AND ENTHALPY RATES, THEN
C  RESET OUTLET STREAM NODE FOR NODE IC.
C
      CALL COMPRT (IC, INLET, INODES)
C
      IOUT(IC,1) = IOUTMP
C
C  SET "NULL VECTOR" VALUES TO BEGIN ITERATION TO OBTAIN MIXED STREAM
C  PHASE COMPOSITION AND TEMPERATURE AS WELL AS VOLUME FLOW RATE WHICH
C  CORRESPOND TO THE OUTLET PRESSURE.
C
      ACFM(30) = ACFM(IC)*PC(IC)/PC(IOUT(IC,1))
C
      H(30)  = H(IC)
```

```
C
      TC(30) = TC(IC)
C
      DO 40 I40=1,9
C
           MASS(30,I40) = MASS(IC,I40)
C
   40 CONTINUE
C
   50 CONTINUE
C
      CALL COMPRT (30, 1, INODES)
C
      IF (DABS(PC(30) - PC(IOUT(IC,1))).LT.1.D-4) GO TO 60
C
      ACFM(30) = ACFM(30)*PC(30)/PC(IOUT(IC,1))
C
      GO TO 50
C
   60 CONTINUE
C
C  TRANSFER TEMPORARY VALUES STORED IN THE NULL VECTOR TO NODE VECTOR
C  IC, THEN RESET NULL VECTOR VALUES.
C
      DO 70 I70=1,9
C
           MASS(IC,I70) = MASS(30,I70)
           MASS(30,I70) = 0.D0
C
   70 CONTINUE
C
      PC(IC) = PC(30)
      PC(30) = 0.D0
C
      TC(IC) = TC(30)
      TC(30) = 0.D0
C
      H(30)  = 0.D0
C
      ACFM(IC) = 6.D1*ACFM(30)/DELT
      ACFM(30) = 0.D0
C
      RETURN
C
      END
```

B.17 PHASE

```
      SUBROUTINE PHASE (TF, IC)
C
C  THIS SUBROUTINE CALCULATES THE PHASE COMPOSITION OF THE HF-H2O SYSTEM
C  IN A COMPARTMENT. THE FOLLOWING VARIABLES ARE USED.
C
```

```
C       TF      TEMPERATURE, DEG F
C       TR      ABSOLUTE TEMPERATURE, DEG R
C       IC      NUMBER OF NODE BEING EVALUATED
C       MASS    MASS OF COMPONENT IN NODE, LB
C       MSSH2O  MASS OF WATER IN NODE, LB
C       MSSHF   MASS OF HF IN NODE, LB
C       MSSTOT  COMBINED MASS OF H2O AND HF IN NODE, LB
C       MSSVAP  MASS OF HF AND H2O VAPOR IN NODE, LB
C       WMOL    COMPONENT MOLECULAR WEIGHT, LB/LB MOLE
C       MW      ESTIMATED MOLECULAR WEIGHT OF HF VAPOR, LB/LB MOLE
C       VOL     VOLUME OF NODE, FT**3
C       WHFL    WEIGHT FRACTION OF HF IN THE HF-H2O LIQUID CONDENSATE,
C               LB HF LIQ/LB HF-H2O LIQ MIX
C       WHFV    WEIGHT FRACTION OF HF IN THE HF-H2O VAPOR MIXTURE,
C               LB HF VAP/LB HF-H2O VAP MIX
C       WHFTOT  WEIGHT FRACTION HF IN THE HF-H2O SYSTEM, LB HF/LB HF+H2O
C       AZEOTR  WEIGHT FRACTION OF HF IN AN HF-H2O MIXTURE OF AZEOTROPIC
C               COMPOSITION, LB HF/LB HF-H2O MIX
C       WHF     WEIGHT FRACTION OF HF IN THE LIQUID REQUIRED TO YIELD
C               PHF BASED ON THE CONCENTRATION OF HF ASSUMED TO BE
C               VAPOR ONLY, LB HF LIQUID/LB HF-H2O LIQ MIX
C       PHF     PARTIAL VAPOR PRESSURE OF HF, PSIA
C       PH2O    PARTIAL VAPOR PRESSURE OF H2O, PSIA
C       PSUM    VAPOR PRESSURE OF THE HF-H2O SYSTEM, PSIA
C       YHF     MOLE FRACTION OF HF IN THE HF-H2O VAPOR SYSTEM, MOLES HF
C               VAPOR/MOLES HF-H2O VAPOR MIXTURE
C       NVAP    MOLES OF HF-H2O VAPOR MIXTURE, MOLES/LB PLUME
C       PCALC   PARTIAL PRESSURE OF HF-H2O VAPOR MIXTURE RESULTING FROM
C               NVAP, VOLUME, AND TR, PSIA
C       PDIF    PCALC - PSUM
C       PCONV   PRESSURE CONVERSION FACTOR FROM TORR TO PSIA
C       AMINLN  MINIMUM NATURAL LOG ACCEPTED BY COMPUTER
C       LNPHF   LN(PHF/PCONV)
C
C       A, B    COEFFICIENTS FOR LN(PHF) = A/TR + B
C
C       LNPHF1, LNPHF2  LN(PHF) AT I AND I + 1
C
C       IJ      INDEX CONTROLLING PHASE ITERATION SCHEME
C       ICOUNT  COUNTER FOR PHASE ITERATION SCHEME
C
C  THE FOLLOWING SUBROUTINES ARE CALLED.
C
C       HFPOLY
C       PHFH2O
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION WHFL(3), PDIF(3)
      DIMENSION A(20), B(20)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /VOLUME/ VOL(30), DUM2(61)
      COMMON /MOLWT/  WMOL(9)
```

```
      COMMON /CONTRL/ AMINLN, DUM3, DUM4(2), IDUM1, DUM5
C
      DATA A /-10689D0,-10536D0,-10647D0,-10675D0,-10460D0,-10362D0,
     *    -9779.5D0,-8917.7D0,-8188.2D0,-7770.0D0,-7575.0D0,-7411.4D0,
     *    -7315.7D0,-7163.4D0,-6984.3D0,-6459.7D0,-6269.7D0,-5891.7D0,
     *    -5849.8D0,-5641.0D0/
C
      DATA B /17.680D0,18.069D0,18.793D0,19.409D0,19.595D0,19.951D0,
     *    19.429D0,18.948D0,18.256D0,17.975D0,18.054D0,18.178D0,
     *    18.365D0,18.457D0,18.492D0,17.857D0,17.812D0,17.391D0,
     *    17.555D0,17.364D0/
C
      TR     = TF + 459.67D0
      PCONV  = 14.696D0/7.6D2
C
      MSSHF  = MASS(IC,4) + MASS(IC,5)
      MSSH2O = MASS(IC,2) + MASS(IC,3)
      MSSTOT = MSSHF + MSSH2O
C
      WHFTOT = MSSHF/MSSTOT
C
C  THE FOLLOWING SECTION EVALUATES THE WEIGHT FRACTION OF HF IN THE
C  LIQUID, WHF, REQUIRED TO YIELD PHF BASED ON THE ASSUMPTION THAT ALL
C  HF IS IN THE VAPOR PHASE. IF THE REQUIRED WHF IS GREATER THAN ONE,
C  CONDENSATION WILL OCCUR. IF WHF IS LESS THAN OR EQUAL TO ONE, PSUM
C  CORRESPONDING TO WHF IS CALCULATED AND COMPARED TO PHF + PH2O EVALU-
C  ATED ASSUMING ALL HF AND H2O IS IN THE VAPOR PHASE. IF PSUM IS LESS
C  THAN PHF + PH2O, CONDENSATION WILL OCCUR.
C
   10 CONTINUE
C
      PHF    = MSSHF*TR*10.73D0/VOL(IC)/WMOL(5)
C
      CALL HFPOLY (TF, PHF, MW, .TRUE.)
C
      IF (DABS(MW-WMOL(5)).LT.1.D-4) GO TO 20
C
      WMOL(5) = (MW + WMOL(5))/2.D0
C
      GO TO 10
C
   20 CONTINUE
C
      WMOL(5) = MW
C
      PH2O   = MSSH2O*TR*10.73D0/VOL(IC)/WMOL(3)
C
      LNPHF  = AMINLN
C
      IF (PHF.GT.0.D0) LNPHF  = DLOG(PHF/PCONV)
C
C  THE FOLLOWING EQUATION APPLIES FOR WHF BETWEEN 0.00 AND 0.05.
C
      WHF    = PHF*0.05D0/PCONV/DEXP(A(1)/TR + B(1))
```

```
C
      IF (WHF.LT.0.05D0) GO TO 40
C
C  THE FOLLOWING SET OF ITERATIVE EQUATIONS IS APPLICABLE BETWEEN 0.05
C  AND 1.00. IF WHF IS FOUND TO BE GREATER THAN 1 ON THE INTERATION 19,
C  CONDENSATION OCCURS.
C
      DO 30 I30 = 1,19
C
           LNPHF1 = A(I30)/TR + B(I30)
           LNPHF2 = A(I30+1)/TR + B(I30+1)
C
           WHF    = 0.05D0*((LNPHF - LNPHF1)/(LNPHF2 - LNPHF1)
     *               + DFLOAT(I30))
C
           IF (WHF.GE.(0.05D0*DFLOAT(I30)).AND.WHF.LE.
     *          (0.05D0*DFLOAT(I30+1))) GO TO 40
C
   30 CONTINUE
C
      IF (WHF.GT.1.D0) GO TO 50
C
   40 CONTINUE
C
      CALL PHFH2O (TF, WHF, 0.D0, 0.D0, 0.D0, PSUM)
C
      IF (PSUM.LT.(PHF+PH2O)) GO TO 50
C
      MASS(IC,5) = MSSHF
      MASS(IC,4) = 0.D0
      MASS(IC,3) = MSSH2O
      MASS(IC,2) = 0.D0
C
      RETURN
C
   50 CONTINUE
C
C  IF CONDENSATION OCCURS, THE FOLLOWING SECTION EVALUATES THE
C  EQUILIBRIUM VAPOR PHASE COMPOSITION AT TF.
C
      IF (MSSHF.EQ.0.D0.OR.MSSH2O.EQ.0.D0) GO TO 60
C
      AZEOTR = 0.3826D0
C
      IF (DABS(AZEOTR-WHFTOT).GE.1.D-6) GO TO 70
C
C  THE FOLLOWING SECTION EVALUATES THE VAPOR CONCENTRATION AT THE
C  AZETROPE OR FOR A PURE COMPONENT.
C
   60 CONTINUE
C
      CALL PHFH2O (TF,WHFTOT,YHF,PHF,PH2O,PSUM)
C
      IF (MSSHF.GT.0.D0) CALL HFPOLY (TF,PHF,WMOL(5),.TRUE.)
```

```
C
      MASS(IC,5) = PHF*VOL(IC)*WMOL(5)/10.73D0/TR
      MASS(IC,4) = MSSHF-MASS(IC,5)
      MASS(IC,3) = PH2O*VOL(IC)*WMOL(3)/10.73D0/TR
      MASS(IC,2) = MSSH2O-MASS(IC,3)
C
      RETURN
C
   70 CONTINUE
C
      ICOUNT = 0
C
      WHFL(1) = AZEOTR + DSIGN(1.D-6,(WHFTOT-AZEOTR))
      WHFL(2) = WHFTOT
C
      IJ      = 1
C
      GO TO 90
C
   80 CONTINUE
C
      IJ      = 2
C
   90 CONTINUE
C
      CALL PHFH2O (TF,WHFL(IJ),YHF,PHF,PH2O,PSUM)
C
      CALL HFPOLY (TF,PHF,WMOL(5),.TRUE.)
C
      WHFV    = YHF*WMOL(5)/(YHF*WMOL(5) + (1.D0 - YHF)*WMOL(3))
C
      MSSVAP = (MSSH2O*WHFL(IJ) - MSSHF*(1.D0 - WHFL(IJ)))
     1          / (WHFL(IJ) - WHFV)
C
      NVAP    = MSSVAP*WHFV/WMOL(5) + MSSVAP*(1.D0 - WHFV)/WMOL(3)
C
      PCALC   = NVAP*10.73D0*TR/VOL(IC)
C
      PDIF(IJ) = PCALC - PSUM
C
      IF (IJ - 2) 80,100,110
C
  100 CONTINUE
C
      ICOUNT = ICOUNT + 1
C
      IJ      = 3
C
      M       = (PDIF(2) - PDIF(1))/(WHFL(2) - WHFL(1))
C
      WHFL(3) = WHFL(2) - PDIF(2)/M
C
      IF ((PDIF(1)-PDIF(2)).GE.PSUM) WHFL(3) = (WHFL(1) + WHFL(2))/2.D0
C
```

```
      GO TO 90
C
  110 CONTINUE
C
      IF (DABS(PDIF(3)).LT.(PSUM*1.D-3)) GO TO 140
C
      IF (ICOUNT.EQ.100) STOP12
C
      IF (PDIF(3)) 120,140,130
C
  120 CONTINUE
C
      WHFL(2) = WHFL(3)
      PDIF(2) = PDIF(3)
C
      GO TO 100
C
  130 CONTINUE
C
      WHFL(1) = WHFL(3)
      PDIF(1) = PDIF(3)
C
      GO TO 100
C
  140 CONTINUE
C
      MASS(IC,5) = MSSVAP*WHFV
      MASS(IC,4) = MSSHF-MASS(IC,5)
      MASS(IC,3) = MSSVAP*(1.D0 - WHFV)
      MASS(IC,2) = MSSH2O-MASS(IC,3)
C
      RETURN
C
      END
```

B.18 PHFH2O

```
      SUBROUTINE PHFH2O (TF, WHFL, YHF, PHF, PH2O, PSUM)
C
C  THIS ROUTINE CALCULATES THE MOLE FRACTION OF HF IN THE VAPOR PHASE OF
C  THE HF-H2O SYSTEM AS WELL AS THE PARTIAL VAPOR PRESSURES OF HF AND
C  H2O AND THEIR SUM GIVEN THE TEMPERATURE IN DEG F AND THE WEIGHT
C  FRACTION OF HF IN THE LIQUID PHASE. THE FOLLOWING VARIABLES ARE USED.
C
C       TF      TEMPERATURE, DEG F
C       TR      TEMPERATURE, DEG R
C       WHFL    WEIGHT FRACTION OF HF IN THE LIQUID HF-H2O MIXTURE,
C               LB HF LIQ/LB HF-H2O LIQ MIX
C       YHF     MOLE FRACTION OF HF IN THE VAPOR HF-H2O MIXTURE,
C               MOLES HF VAPOR/MOLES HF-H2O VAPOR
C       PHF     PARTIAL VAPOR PRESSURE OF HF, PSIA
C       PH2O    PARTIAL VAPOR PRESSURE OF H2O, PSIA
C       PSUM    VAPOR PRESSURE OF THE HF-H2O VAPOR MIXTURE, PSIA
```

```
C       PCONV   CONVERSION FACTOR FROM TORR TO PSIA, PSIA/TORR
C
C       A, B    COEFFICIENTS FOR LN(PHF) = A/TR + B
C
C       LNPHF1, LNPHF2  LN(PHF) EVALUATED AT I1 AND I2
C       I1, I2  INDICES FOR EVALUATING PHF (I2 = I1 + 1)
C
C       LNPHF   LN(PHF)
C       AMINLN  MINIMUM NATURAL LOG ACCEPTED BY COMPUTER
C       MWAZ    MOLECULAR WEIGHT OF HF VAPOR AT THE AZEOTROPE,
C               LB/LB MOLE
C       AZEOTR  AZEOTROPIC WEIGHT FRACTION OF HF IN THE HF-H2O SYSTEM
C       PHFAZ   PARTIAL VAPOR OF HF AT THE AZEOTROPIC COMPOSITION
C       PH2OAZ  PARTIAL VAPOR OF H2O AT THE AZEOTROPIC COMPOSITION
C       PAZEOT  PHFAZ + PH2OAZ
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION A(20), B(20)
C
      COMMON /CONTRL/ AMINLN
C
      DATA A /-10689D0,-10536D0,-10647D0,-10675D0,-10460D0,-10362D0,
     *    -9779.5D0,-8917.7D0,-8188.2D0,-7770.0D0,-7575.0D0,-7411.4D0,
     *    -7315.7D0,-7163.4D0,-6984.3D0,-6459.7D0,-6269.7D0,-5891.7D0,
     *    -5849.8D0,-5641.0D0/
C
      DATA B /17.680D0,18.069D0,18.793D0,19.409D0,19.595D0,19.951D0,
     *    19.429D0,18.948D0,18.256D0,17.975D0,18.054D0,18.178D0,
     *    18.365D0,18.457D0,18.492D0,17.857D0,17.812D0,17.391D0,
     *    17.555D0,17.364D0/
C
      TR     = TF + 459.67D0
C
      PCONV  = 14.696D0/7.6D2
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS THROUGH "30 CONTINUE" EVALUATES
C  THE PARTIAL VAPOR PRESSURE OF HF. THESE EQUATIONS ARE BASED ON A PLOT
C  OF PARTIAL VAPOR PRESSURE OF HF VS TEMPERATURE AS A FUNCTION OF
C  WEIGHT FRACTION OF HF IN THE LIQUID PHASE. THIS PLOT WAS PROVIDED TO
C  W. REID WILLIAMS BY BRIAN C. ROGERS OF ALLIED CHEMICAL, SOLVAY, NY,
C  IN A LETTER DATED JULY 26, 1983. THE EQUATIONS WERE DERIVED BY W. R.
C  WILLIAMS.
C
      PHF    = 0.0D0
C
      IF (WHFL.LE.(DEXP(AMINLN+6.D0))) GO TO 30
C
      I1     = IDINT(WHFL/0.05D0)
C
      IF (I1.EQ.20) I1 = 19
C
      I2     = I1 + 1
C
```

```
      IF (I1.EQ.0) GO TO 10
C
      LNPHF1 = A(I1)/TR + B(I1)
C
   10 CONTINUE
C
      LNPHF2 = A(I2)/TR + B(I2)
C
      IF (I1.EQ.0) GO TO 20
C
C  THE FOLLOWING EQUATION APPLIES FOR WHFL BETWEEN 0.05 AND 1.00.
C
      LNPHF  = LNPHF1 + (LNPHF2 - LNPHF1)*(WHFL/0.05 - DFLOAT(I1))
C
      PHF    = PCONV*DEXP(LNPHF)
C
      GO TO 30
C
   20 CONTINUE
C
C  THE FOLLOWING EQUATION APPLIES FOR WHFL BETWEEN 0.00 AND 0.05.
C
      PHF    = (WHFL/0.05D0)*PCONV*DEXP(LNPHF2)
C
   30 CONTINUE
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS THROUGH "60 CONTINUE" EVALUATES
C  A PSUEDO PARTIAL VAPOR PRESSURE FOR H2O. THE EQUATIONS ARE BASED ON
C  THE VAPOR PRESSURE OF WATER GIVEN IN R. C. REID, J. M. PRAUSNITZ, AND
C  T. K. SHERWOOD, THE PROPERTIES OF GASES AND LIQUIDS, 3RD ED., MCGRAW-
C  HILL BOOK COMPANY, 1977, PP. 629 AND 632, AN ESTIMATED VALUE OF THE
C  PARTIAL VAPOR PRESSURE OF H2O AT THE AZEOTROPE, AND THE REQUIREMENT
C  THAT PH2O = 0 AT WHFL = 1. THE EQUATIONS USED BELOW WERE DERIVED BY
C  W. R. WILLIAMS.
C
C  THE FOLLOWING EQUATION GIVES THE VAPOR PRESSURE OF H2O.
C
      PH2O   = PCONV*DEXP(18.3034D0 - 6869.59D0/(TF + 376.64D0))
C
      IF (WHFL.EQ.0.D0) GO TO 50
C
C  THE FOLLOWING SEQUENCE OF EQUATIONS ESTIMATES THE PARTIAL VAPOR
C  PRESSURE OF H2O AT THE AZEOTROPE.
C
      LNPHF1 = A(7)/TR + B(7)
C
      LNPHF2 = A(8)/TR + B(8)
C
      AZEOTR = 0.3826D0
C
      LNPHF  = LNPHF1 + (LNPHF2 - LNPHF1)*(AZEOTR - 0.35D0)/0.05D0
C
      PHFAZ  = PCONV*DEXP(LNPHF)
C
```

```
C  IN THE FOLLOWING CALL TO HFPOLY, THE LOGICAL VARIABLE C1C3C6 IS
C  SPECIFIED AS .FALSE. SINCE PREVIOUS ESTIMATES OF C1, C3, AND C6
C  SHOULD NOT BE CHANGED.
C
      CALL HFPOLY (TF, PHFAZ, MWAZ, .FALSE.)
C
      YHF    = (AZEOTR/MWAZ)/(AZEOTR/MWAZ + (1.D0 - AZEOTR)/18.016D0)
C
      PH2OAZ = (1.D0 - YHF)*PHFAZ/YHF
C
      IF (WHFL.GT.0.3826D0) GO TO 40
C
C  THE FOLLOWING EQUATIONS APPLY FOR WHFL BETWEEN 0.0 AND THE AZEOTROPE.
C
      PAZEOT = PHFAZ + PH2OAZ
C
      PSUM   = PH2O + (PAZEOT - PH2O)*WHFL/AZEOTR
C
      PH2O   = PSUM - PHF
C
      GO TO 60
C
   40 CONTINUE
C
C  THE FOLLOWING EQUATION APPLIES FOR WHFL BETWEEN THE AZEOTROPE AND 1.
C
      PH2O   = PH2OAZ*((1.D0 - WHFL)/(1.D0 - AZEOTR))**3
C
   50 CONTINUE
C
      PSUM   = PHF + PH2O
C
   60 CONTINUE
C
      YHF    = PHF/PSUM
C
      RETURN
C
      END
```

B.19 PIPSYS

```
      SUBROUTINE PIPSYS(G)
C
C  THE PIPSYS SUBROUTINE RECALCULATES THE MASS VELOCITY AS IT MOVES DOWN
C  THE LENGTH OF THE PIPE AND FIXTURE SYSTEM.  THE INITIAL MASS VELOCITY
C  SUPPLIED TO PIPSYS CORRESPONDS TO THE ENTRANCE EFFECT PRESSURE DROP.
C  THE TRUE MASS VELOCITY MUST BE LESS THAN OR EQUAL TO THIS FIGURE.  SO
C  A NEW GUESS OF MASS VELOCITY IS CALCULATED.
C
C        ****************************************************************
C        *                                                              *
C        * WARNING:  THE VALUE OF MASS VELOCITY, G, IS CONSTANT ONLY    *
```

```
C      *     IF THE PIPING SYSTEM DIAMETER IS CONSTANT.  HOWEVER,    *
C      *     MASS FLOW RATE IS CONSTANT.  THESE VALUES ARE RELATED   *
C      *     THROUGH PIPE DIAMETERS.  THE VALUE GFEAT IS CALCULATED  *
C      *     WHEN A MASS VELOCITY POTENTIALLY DIFFERENT FROM THE     *
C      *     INITIAL G CAN BE EXPECTED FOR A PARTICULAR DOWNSTREAM   *
C      *     FEATURE.                                                *
C      *                                                             *
C      ***************************************************************
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /ICOMON/ ISEN, IPIG, IBRCH, IGEXIT
      COMMON /CONCYL/ PCYL,TCYL,XVCYL,XLCYL,MW
      COMMON /CONENT/ PENT,TENT,XVENT,XLENT,VNTBAR
      COMMON /GMTRY / PIGRAY
      COMMON /CNSTNT/ ALPHA,BETA,DELTA,GAMMA,EPSLN
      COMMON /TRIPLE/ TTRIPL,PTRIPL
C
      DIMENSION PIGRAY(99,3),CONRAY(99,6)
C
      TWELTH = 1.D0/12.D0
C
      REYNMX = 1.15D4
C
C  THE IGEXIT SWITCH CONTROLS THE CALCULATION OF THE EXIT.  AT A VALUE
C  OF IGEXIT=2 THE EXIT IS KNOWN TO BE CONTROLLED BY PRESSURE DROP AND
C  THE FURTHER CALCULATION OF GMAX VALUES SHOULD BE SUPPRESSED.
C
      IGEXIT = 1
C
C  TO BEGIN THE PIPE SYSTEM CALCULATION, A GUESS FOR G ONE-HALF THE
C  VALUE ENTERED AS PIPSYS WAS CALLED (WHICH MIGHT BE A CHOKE FLOW
C  VALUE) IS USED IN CALCULATING THE ENTRY PRESSURE DROP. A NEW GMAX FOR
C  CHOKE FLOW IS THEN DETERMINED AND IF THIS VALUE IS LESS THAN THE
C  ASSUMED G, THE ASSUMED G IS REDUCED BEFORE ENTRY CONDITIONS ARE
C  RECALCULATED.
C
      CONRAY(IPIG,1) = PIGRAY(IPIG,3)
C
C  SET UPPER AND LOWER BOUNDS ON G AND MAKE FIRST GUESS.
C
      CONRAY(IPIG,5) = 1.D10
C
      IF (IBRCH.LT.3) CONRAY(IPIG,5) = G
C
      CONRAY(IPIG,6) = 0.D0
C
      IF (IBRCH.LT.3) G      = G/2.D0
C
   10 CONTINUE
C
C  ON RETURNING TO THIS POINT IN THE SUBROUTINE (I.E., 10 CONTINUE), THE
C  VALUE OF G HAS BEEN ADJUSTED AND THE ENTIRE PIPE SYSTEM CALCULATION
C  IS REPEATED STARTING WITH THE ENTRANCE EFFECT.
```

```
C
      IF ( (CONRAY(IPIG,5)-CONRAY(IPIG,6)) / (CONRAY(IPIG,5)+
     *     CONRAY(IPIG,6)) .LT.EPSLN) GO TO 200
C
   20 CONTINUE
C
      PENT   = PCYL-PIGRAY(1,2)*G**2/DELTA*VNTBAR
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,PENT,ISEN,XVENT,XLENT,TENT)
C
      CALL DENUF6(TENT,PENT,MW,RHOS,RHOL,RHOV)
C
      OLDVBR = VNTBAR
C
      VNTBAR = XVENT/RHOV+(1.D0-XVENT)*XLENT/RHOL
     *         +(1.D0-XVENT)*(1.D0-XLENT)/RHOS
C
C  A NEW SET OF ENTRANCE CONDITIONS BASED ON THE NEW VALUE OF MASS
C  VELOCITY HAS BEEN COMPUTED.
C
      IF (DABS(VNTBAR-OLDVBR).GT.(EPSLN)) GO TO 20
C
      P2     = PENT-1.D-3
C
C  EVALUATE GMAX BASED ON ISENTROPIC EXPANSION.
C
      ISNGMX = 0
C
      CALL FLASH (TENT, PENT, MW, XVENT, XLENT, P2, ISNGMX,
     *     XV2, XL2, T2)
C
      CALL DENUF6(T2,P2,MW,RHOS,RHOL,RHOV)
C
      V2BAR  = XV2/RHOV+(1.D0-XV2)*XL2/RHOL
     *        +(1.D0-XV2)*(1.D0-XL2)/RHOS
C
      GMAX   = DSQRT(ALPHA*(PENT-P2)/(V2BAR-VNTBAR))
C
      IF (GMAX.LE.G) GO TO 180
C
C  LOAD THE FIRST ROW OF CONRAY.
C
      CONRAY(1,1) = PENT
      CONRAY(1,2) = TENT
      CONRAY(1,3) = XVENT
      CONRAY(1,4) = XLENT
      CONRAY(1,5) = VNTBAR
      CONRAY(1,6) = GMAX
C
      IFEAT  = 2
C
   30 CONTINUE
C
      IF (IFEAT.EQ.IPIG) GO TO 150
```

```
C
      GO TO (40,100,130), IDINT(PIGRAY(IFEAT,1))
C
   40 CONTINUE
C
C  THE PIPE SOLVER STARTS HERE BY LIMITING THE TOTAL NUMBER OF STEPS TO
C  THE PRESSURE DIFFERENCE BETWEEN THE BEGINNING OF THE PIPE AND THE
C  SURROUNDINGS.  IN LATER PASSES THE TOTAL PRESSURE DROP CONSIDERED
C  WILL BE UPDATED. EACH STEP INCLUDES A CALCULATION OF THE PIPE LENGTH
C  CORRESPONDING TO AN INCREMENTAL PRESSURE DROP OF ABOUT ONE PSI.
C
      DELTAP = CONRAY((IFEAT-1),1)-CONRAY(IPIG,1)
C
C  THE TRIPLE POINT PRESSURE MUST NOT BE INCLUDED IN DELTAP IF FLASHING
C  FLOW IS OCCURING.
C
      IF (CONRAY((IFEAT-1),1).GT.PTRIPL .AND.
     *     CONRAY(IPIG,1).LT.PTRIPL .AND.
     *     CONRAY((IFEAT-1),3).NE.1.D0)
     *     DELTAP = CONRAY((IFEAT-1),1)-PTRIPL
C
      IF (DELTAP.LE.0.D0) GO TO 180
C
      ICON   = 1
C
   50 CONTINUE
C
      IDELP  = IDINT(DELTAP)
C
      IF (IDELP.EQ.0) IDELP = 1
C
      DELP   = DELTAP/DFLOAT(IDELP)
      P1     = CONRAY((IFEAT-1),1)
      T1     = CONRAY((IFEAT-1),2)
      XV1    = CONRAY((IFEAT-1),3)
      XL1    = CONRAY((IFEAT-1),4)
      V1BAR  = CONRAY((IFEAT-1),5)
      DLSUM  = 0.D0
C
C  ADJUST THE MASS VELOCITY BASED ON THE ENTRANCE DIAMETER TO THE
C  CURRENT DIAMETER.
C
      GFEAT = G*(PIGRAY(1,3)**2)/(PIGRAY(IFEAT,3)**2)
C
      DO 80 I80 = 1,IDELP
C
      P2     = P1-DELP
C
   60 CONTINUE
C
      PAVG   = (P2+P1)/2.D0
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,P2,ISEN,XV2,XL2,T2)
C
```

```
      CALL DENUF6(T2,P2,MW,RHOS,RHOL,RHOV)
C
      V2BAR  = XV2/RHOV + (1.D0-XV2)*XL2/RHOL
     *        +(1.D0-XV2)*(1.D0-XL2)/RHOS
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,PAVG,ISEN,XVAVG,XLAVG,TAVG)
C
      CALL DENUF6(TAVG,PAVG,MW,RHOS,RHOL,RHOV)
C
      VBRAVG = XVAVG/RHOV + (1.D0-XVAVG)*XLAVG/RHOL
     *        +(1.D0-XVAVG)*(1.D0-XLAVG)/RHOS
C
      CALL VISUF6(TAVG,PAVG,MW,VISL,VISV)
C
      VIS    = (VISV*XVAVG/RHOV + VISL*(1.D0-XVAVG)*XLAVG/RHOL)/VBRAVG
C
      REYN   = 3600.D0*PIGRAY(IFEAT,3)*GFEAT/VIS
C
      BFACTR = 1.D25
C
      IF (REYN.GT.1.D3) BFACTR = (37580.D0/REYN)**16
C
      AFACTR = 0.D0
C
      IF (REYN.GT.1.D3) AFACTR = (2.457D0*
     *     DLOG(1.D0/((7.D0/REYN)**0.9D0 + (0.27D0*EPSOD))))**16
C
C  THE EQUATION FOR FRICTION FACTOR IS OF A TYPE WHICH LEADS TO AN ERROR
C  MESSAGE IF REYN IS TOO LARGE. LIMITING REYN WILL NOT AFFECT THIS
C  CALCULATION AT THIS POINT. THIS PROBLEM IS SIMPLY A MACHINE
C  LIMITATION.
C
      IF (REYN.GT.REYNMX) REYN = REYNMX
C
      FFACTR = 2.D0*((8.D0/REYN)**12
     *       + (1.D0/(AFACTR+BFACTR)**1.5D0))**TWELTH
C
      DELTAL = (4633.1D0*(P1-P2) + GFEAT**2*(V1BAR-V2BAR))/
     *         (2.D0*FFACTR*GFEAT**2*(VBRAVG)/PIGRAY(IFEAT,3)
     *         + 32.174D0*DSIN(THETA)/(VBRAVG))
C
      IF (DELTAL.LE.0.D0 .AND. IGEXIT.EQ.2) WRITE (5,500) IFEAT
C
       IF (DELTAL.LE.0.D0) GO TO 180
C
       DLSUM  = DLSUM + DELTAL
C
C  EVALUATE GMAX BASED ON ISENTROPIC EXPANSION.
C
      P3     = P2-1.D-3
C
      ISNGMX = 0
C
      CALL FLASH (T2, P2, MW, XV2, XL2, P3, ISNGMX,
```

```
     *      XV3, XL3, T3)
C
      CALL DENUF6(T3,P3,MW,RHOS,RHOL,RHOV)
C
      V3BAR  = XV3/RHOV+(1.D0-XV3)*XL3/RHOL
     *         +(1.D0-XV3)*(1.D0-XL3)/RHOS
C
      GMAX   = DSQRT(ALPHA*(P2-P3)/(V3BAR-V2BAR))
C
      IF (GMAX.LE.GFEAT .AND. DLSUM.LT.(PIGRAY(IFEAT,2)-0.01D0) .AND.
     *      IGEXIT.EQ.2) WRITE (5,510) IFEAT
C
      IF (GMAX.LE.GFEAT .AND. DLSUM.LT.(PIGRAY(IFEAT,2)-0.01))
     *      GO TO 180
C
      IF (DABS(DLSUM-PIGRAY(IFEAT,2)).LT.1.D-2) GO TO 90
C
      IF (DLSUM.LT.PIGRAY(IFEAT,2) .AND. ICON.EQ.1) GO TO 70
C
      IF (ICON.EQ.100) STOP13
C
      IF (ICON.EQ.1) PUPPER = P1
      IF (ICON.EQ.1) PLOWER = P2
C
      IF (DLSUM.GT.PIGRAY(IFEAT,2) .AND. ICON.GT.1) PLOWER = P2
      IF (DLSUM.LT.PIGRAY(IFEAT,2) .AND. ICON.GT.1) PUPPER = P2
C
      P2 = (PUPPER + PLOWER)/2.D0
C
      ICON = ICON + 1
C
      DLSUM = DLSUM - DELTAL
C
      GO TO 60
C
   70 CONTINUE
C
      P1     = P2
      T1     = T2
      XV1    = XV2
      XL1    = XL2
      V1BAR  = V2BAR
C
   80 CONTINUE
C
      GO TO 180
C
   90 CONTINUE
C
C  PRESSURE DROP EVALUATED FOR TOTAL LENGTH OF CURRENT FEATURE. CHOKE
C  FLOW DOES NOT OCCUR IN THE CURRENT FEATURE.
C
      CONRAY(IFEAT,1) = P2
      CONRAY(IFEAT,2) = T2
```

```
      CONRAY(IFEAT,3) = XV2
      CONRAY(IFEAT,4) = XL2
      CONRAY(IFEAT,5) = V2BAR
      CONRAY(IFEAT,6) = GMAX*PIGRAY(IFEAT,3)**2/PIGRAY(IFEAT,1)**2
C
      IFEAT  = IFEAT + 1
C
C  FINISHED WITH PIPE ELEMENT.
C
      GO TO 30
C
  100 CONTINUE
C
C  EXPANSIONS AND FITTINGS FOR WHICH PRESSURE DROP MUST BE CALCULATED
C  ARE HANDLED BY THIS SECTION OF PROGRAMMING.
C
C  ADJUST THE MASS VELOCITY BASED ON THE ENTRANCE DIAMETER TO THE
C  CURRENT DIAMETER.
C
      GFEAT = G*(PIGRAY(1,3)**2)/(PIGRAY(IFEAT,3)**2)
C
      CONRAY(IFEAT,1) = CONRAY((IFEAT-1),1)
     *                - PIGRAY(IFEAT,2) * GFEAT**2/DELTA
     *                * CONRAY((IFEAT-1),5)
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,CONRAY(IFEAT,1),ISEN,
     *     CONRAY(IFEAT,3),CONRAY(IFEAT,4),CONRAY(IFEAT,2))
C
      CALL DENUF6 (CONRAY(IFEAT,2),CONRAY(IFEAT,1),MW,RHOS,RHOL,RHOV)
C
      CONRAY(IFEAT,5) =                CONRAY(IFEAT,3)/RHOV
     *       + (1.D0-CONRAY(IFEAT,3))*CONRAY(IFEAT,4)/RHOL
     *+ (1.D0-CONRAY(IFEAT,3))*(1.D0-CONRAY(IFEAT,4))/RHOS
C
C  FOR A SUDDEN EXPANSION, A GMAX VALUE NEED NOT BE CALCULATED. GMAX
C  FOR THE PREVIOUS ELEMENT IS PLACED IN THE CONDITIONS ARRAY.
C
      IF (PIGRAY((IFEAT+1),3).GT.PIGRAY(IFEAT,3) .AND.
     *     (IFEAT+1).LT.IPIG) GO TO 120
C
  110 CONTINUE
C
      P2     = CONRAY(IFEAT,1)-1.D-3
C
C  EVALUATE GMAX BASED ON ISENTROPIC EXPANSION.
C
      ISNGMX = 0
C
      CALL FLASH (CONRAY(IFEAT,2), CONRAY(IFEAT,1), MW,
     *     CONRAY(IFEAT,3), CONRAY(IFEAT,4), P2, ISNGMX, XV2, XL2, T2)
C
      CALL DENUF6(T2,P2,MW,RHOS,RHOL,RHOV)
C
      V2BAR  = XV2/RHOV+(1.D0-XV2)*XL2/RHOL
```

```
     *        + (1.D0-XV2)*(1.D0-XL2)/RHOS
C
      GMAX    = DSQRT(ALPHA*(CONRAY(IFEAT,1)-P2)/
     *                  (V2BAR-CONRAY(IFEAT,5)))
C
C  IF GMAX IS SMALLER THAN G, THE CALCULATION MUST BE RESTARTED AT A
C  NEW, LOWER VALUE OF G.
C
      IF (GMAX.LE.GFEAT) GO TO 180
C
  120 CONTINUE
C
      CONRAY(IFEAT,6) = GMAX*PIGRAY(IFEAT,3)**2/PIGRAY(1,3)**2
C
      IF (PIGRAY((IFEAT+1),3).GT.PIGRAY(IFEAT,3) .AND.
     *     (IFEAT+1).LT.IPIG) CONRAY(IFEAT,6) = CONRAY((IFEAT-1),6)
C
      IFEAT   = IFEAT+1
C
      GO TO 30
C
  130 CONTINUE
C
C  CONTRACTIONS IN THE PIPE SYSTEM ARE HANDLED BY THIS SECTION OF THE
C  PROGRAM.  SINCE THE PRESSURE DROP IS A FUNCTION OF DOWNSTREAM
C  CONDITIONS, AN ITERATION IS REQUIRED.  INITIALLY THE SPECIFIC VOLUME
C  UPSTREAM IS ASSUMED TO HOLD DOWNSTREAM. THEN A NEW GUESS IS COMPUTED.
C
      ICON    = 1
C
      CONRAY(IFEAT,5) = CONRAY((IFEAT-1),5)
C
C  ADJUST THE MASS VELOCITY BASED ON THE ENTRANCE DIAMETER TO
C  THE CURRENT DIAMETER.
C
      GFEAT = G*(PIGRAY(1,3)**2)/(PIGRAY(IFEAT,3)**2)
C
  140 CONTINUE
C
      CONRAY(IFEAT,1) = CONRAY((IFEAT-1),1)
     *                - PIGRAY(IFEAT,2)*(GFEAT**2)/DELTA
     *                * CONRAY(IFEAT,5)
C
      CALL FLASH (TCYL,PCYL,MW,XVCYL,XLCYL,CONRAY(IFEAT,1),ISEN,
     *     CONRAY(IFEAT,3),CONRAY(IFEAT,4),CONRAY(IFEAT,2))
C
      CALL DENUF6 (CONRAY(IFEAT,2),CONRAY(IFEAT,1),MW,RHOS,RHOL,RHOV)
C
      OLDCON = CONRAY(IFEAT,5)
C
      CONRAY(IFEAT,5) =                            CONRAY(IFEAT,3)/RHOV
     *              + (1.D0-CONRAY(IFEAT,3))*CONRAY(IFEAT,4)/RHOL
     *        + (1.D0-CONRAY(IFEAT,3))*(1.D0-CONRAY(IFEAT,4))/RHOS
C
```

```
      ICON   = ICON + 1
C
      IF (ICON.GT.100) STOP14
C
      IF (DABS(CONRAY(IFEAT,5)-OLDCON).GT.EPSLN) GO TO 140
C
      GO TO 110
C
  150 CONTINUE
C
C  EVALUATION OF PRESSURE DROP ALONG THE PIPING SYSTEM FOR THE CURRENT
C  VALUE OF G IS COMPLETE EXCEPT FOR THE EXHAUST PRESSURE DROP.
C
      DELTAP = PIGRAY(IPIG,2)*GFEAT**2*CONRAY((IPIG-1),5)/DELTA
C
C  DETERMINE WHETHER THE CURRENT VALUE OF G IS AN UPPER OR LOWER LIMIT.
C
      IF (CONRAY((IPIG-1),1) - DELTAP - PIGRAY(IPIG,3)) 170, 190, 160
C
  160 CONTINUE
C
C  RESET LOWER BOUND ON G AND INCREASE MASS VELOCITY.
C
      CONRAY(IPIG,6) = G
C
      G      = (G + CONRAY(IPIG,5))/2.D0
C
      IF (CONRAY(IPIG,5).EQ.1.D10) G = CONRAY(IPIG,6)/0.98D0
C
      GO TO 10
C
C  RESET UPPER BOUND AND REDUCE MASS VELOCITY.
C
  170 CONTINUE
C
      IGEXIT = 2
C
  180 CONTINUE
C
      CONRAY(IPIG,5) = G
C
      G      = (G+ CONRAY(IPIG,6))/2.D0
C
      IF (CONRAY(IPIG,6).EQ.0.D0 .AND. IBRCH.EQ.3)
     *     G = CONRAY(IPIG,5)*0.98D0
C
      GO TO 10
C
  190 CONTINUE
C
      IGEXIT = 2
C
  200 CONTINUE
C
```

```
      RETURN
C
  500 FORMAT (' ',/,'  WARNING !  CHOKE FLOW PREDICTED IN FEATURE',
     *      I3,/,'  AFTER PRESSURE-DROP-CONTROLLED FLOW ESTABLISHED',
     *      ' FOR PIPING SYSTEM (DELTAL.LE.0).')
C
  510 FORMAT (' ',/,'  WARNING !  CHOKE FLOW PREDICTED IN FEATURE',
     *      I3,/,'  AFTER PRESSURE-DROP-CONTROLLED FLOW ESTABLISHED',
     *      ' FOR PIPING SYSTEM (ISENTROPIC FLASH).')
C
      END
```

B.20 REMOVE

```
      SUBROUTINE REMOVE (IC, IREMOV)
C
C  THIS SUBROUTINE DETERMINES THE MASSES OF CONDENSED PHASES REMOVED BY
C  DEPOSITION FROM A ROOM.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC                NODE NUMBER OF COMPARTMENT FROM WHICH CONDENSATE
C                         IS BEING REMOVED BY FALL OUT
C       IREMOV            NODE NUMBER OF REMOVAL STREAM
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)    COMPONENT MASS REMOVAL RATE, LB/(DELT), OR
C                         COMPONENT MASS IN COMPARTMENT, LB
C       VOL     (30)      NODE VOLUME, FT**3
C       DPAREA  (30)      DEPOSITION AREA, FT**2
C       DEPVEL            DEPOSITION VELOCITY, FT/SEC
C       AMINLN            MINIMUM NATURAL LOG ACCEPTED BY COMPUTER
C       DELT              TIME INTERVAL FOR TRANSIENT SIMULATION, SEC
C       TC      (30)      NODE TEMPERATURE, DEG F
C       PC      (30)      NODE PRESSURE, PSIA
C       H       (30)      ENTHALPY RATE, BTU/(DELT)
C
C    INTERNAL VARIABLE
C
C       RMFRAC            REMOVAL FRACTION (VOLUME BASIS)
C
C  THE FOLLOWING SUBROUTINE IS CALLED.
C
C               DENTHL
C
C  OTHER SUBROUTINES REQUIRED ARE:
C
C               DENUF6
C               HHFH2O
C               HUF6
```

```
C               VPRUF6
C               ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /VOLUME/ VOL(30), DUM2(30), DPAREA(30), DEPVEL
      COMMON /CONTRL/ AMINLN, DUM3, DELT, DUM4, IDUM1, DUM5
      COMMON /COMPTP/ TC(30), PC(30), DUM6(30)
      COMMON /ENTHAL/ H(30), DUM7(120)
C
C  CALCULATE THE REMOVAL FRACTION WHICH IS BASED ON THE VOLUME FROM
C  WHICH CONDENSATES CAN BE REMOVED DURING THE TIME INTERVAL USED
C  FOR THE TRANSIENT ANALYSIS DIVIDED BY THE TOTAL VOLUME OF THE
C  COMPARTMENT. THE FIRST VOLUME IS THE PRODUCT OF THE DEPOSITION
C  VELOCITY, THE DEPOSITION AREA, AND THE TIME INTERVAL.
C
      RMFRAC = DEPVEL*DPAREA(IC)*DELT/VOL(IC)
C
C  APPLY THE REMOVAL FRACTION, RMFRAC, TO CONDENSED PHASES CONTAINED
C  IN NODE IC.
C
      MASS(IREMOV,1) = 0.D0
      MASS(IREMOV,2) = MASS(IC,2)*RMFRAC
      MASS(IREMOV,3) = 0.D0
      MASS(IREMOV,4) = MASS(IC,4)*RMFRAC
      MASS(IREMOV,5) = 0.D0
      MASS(IREMOV,6) = MASS(IC,6)*RMFRAC
      MASS(IREMOV,7) = MASS(IC,7)*RMFRAC
      MASS(IREMOV,8) = 0.D0
      MASS(IREMOV,9) = MASS(IC,9)*RMFRAC
C
C  SET THE TEMPERATURE AND PRESSURE OF THE REMOVAL STREAM TO THAT OF THE
C  SOURCE NODE, THEN CALCULATE THE ENTHALPY RATE OF THE REMOVAL STREAM.
C
      TC(IREMOV) = TC(IC)
      PC(IREMOV) = PC(IC)
C
      CALL DENTHL (TC(IREMOV), PC(IREMOV), IREMOV, H(IREMOV))
C
      RETURN
C
      END
```

B.21 RESIST

```
      SUBROUTINE RESIST (IC)
C
C  THIS SUBROUTINE EVALUATES THE RESISTENCE TERM FOR THE RELATIONSHIP
C  DELP = KRCOEF*MASS-FLOW-RATE**2/DENSITY. THE MASS FLOW RATE FOR THE
C  TIME STEP DELT MUST HAVE ALREADY BEEN CALCULATED BEFORE THIS
C  SUBROUTINE IS CALLED UNLESS A RESISTANCE COEFFICIENT FOR THE STREAM
C  HAS BEEN ENTERED.
```

```
C
C  THE FOLLOWING VARIABLES ARE USED IN THIS SUBROUTINE:
C
C    INPUT VARIABLE
C
C       IC                STREAM NODE FOR WHICH RESISTANCE TERM IS TO BE
C                         EVALUATED
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)    COMPONENT NODE MASS OR MASS FLOW RATE, LB
C                         (COMPARTMENT) OR LB/(DELT) (STREAM)
C       TC      (30)      NODE TEMPERATURE, DEG F
C       PC      (30)      NODE PRESSURE, PSIA
C       VOL     (30)      COMPARTMENT NODE VOLUME, FT**3
C       KRCOEF  (30)      RESISTANCE COEFFICIENT (INPUT), --, OR
C                         RESISTANCE TERM (OUTPUT), PSI-SEC**2/LB-FT**3
C
C               NOTE: AS A RESISTANCE TERM, KRCOEF IS A COMBINATION
C                     OF THE RESISTANCE TERM, THE CROSS-SECTIONAL
C                     AREA OF FLOW, AND CONVERSION FACTORS.
C
C       IIN     (30,4)    NODE INPUT STREAM NUMBER
C       IOUT    (30,4)    NODE OUTPUT STREAM NUMBER
C       AMINLN            MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C       DELT              TIME INTERVAL USED IN TRANSIENT SIMULATION, SEC
C
C    EQUIVALENCED VARIABLE
C
C       FLAREA  (30)      CROSS-SECTIONAL AREA FOR FLOW, FT**2
C
C    INTERNAL VARIABLES
C
C       DELP              ABSOLUTE PRESSURE DIFFERENCE ACROSS NODE, PSI
C       MASS1             TOTAL MASS IN INLET NODE, LB
C       MASS2             TOTAL MASS FLOW RATE IN STREAM NODE, LB/(DELT)
C       DENS              DENSITY OF MATERIAL FLOWING INTO THE STREAM
C                         NODE, LB/FT**3
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION FLAREA(30)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /VOLUME/ VOL(30), KRCOEF(30), DUM3(31)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, DUM4, DELT, DUM5, IDUM1, DUM6
C
      EQUIVALENCE (VOL(1), FLAREA(1))
C
      IF (KRCOEF(IC).LE.0.D0) GO TO 10
C
C  IF A POSITIVE RESISTANCE COEFFICIENT HAS BEEN ENTERED, FOR EXAMPLE, A
```

```
C  VALUE OF 1.5 CORRESPONDING TO A SUDDEN CONTRACTION FOLLOWED BY A
C  SUDDEN EXPANSION, THE RESISTANCE TERM IS EVALUATED USING THE FOLLOW-
C  ING EQUATION.
C
      KRCOEF(IC) = KRCOEF(IC)/FLAREA(IC)/FLAREA(IC)/9266.1D0
C
      RETURN
C
   10 CONTINUE
C
C  THE REMAINDER OF THIS SUBROUTINE EVALUATES A COEFFICIENT WHICH
C  INCORPORATES THE RESISTANCE COEFFICIENT, FLOW AREA, AND CONVERSION
C  FACTORS INDIRECTLY BY USING INITIAL STEADY STATE CONDITIONS OF MASS
C  FLOW RATE AND PRESSURE DROP.
C
      DELP   = PC(IIN(IC,1)) - PC(IOUT(IC,1))
C
      MASS1  = 0.D0
      MASS2  = 0.D0
C
      DO 20 I20=1,9
C
           MASS1  = MASS1 + MASS(IIN(IC,1),I20)
           MASS2  = MASS2 + MASS(IC,I20)
C
   20 CONTINUE
C
      DENS   = MASS1/VOL(IIN(IC,1))
C
      KRCOEF(IC) = DELP*DENS*DELT*DELT/MASS2/MASS2
C
      RETURN
C
      END
```

B.22 ROOM

```
      SUBROUTINE ROOM (IC, RATIO)
C
C  THIS SUBROUTINE EVALUATES THE INITIAL MASSES AND ENTHALPIES IN NODES
C  WHICH REPRESENT ROOMS.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC               NUMBER OF NODE BEING INITIALIZED
C       RATIO            RATIO OF THE MOLES OF WATER VAPOR TO THE TOTAL
C                        NUMBER OF MOLES OF MOIST AIR
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)  NODE COMPONENT MASS, LB
```

```
C       TC      (30)    NODE TEMPERATURE, DEG F
C       PC      (30)    NODE PRESSURE, PSIA
C       WMOL    (9)     COMPONENT MOLECULAR WEIGHT, LB/LB MOLE
C       H       (30)    NODE ENTHALPY, BTU
C       VOL     (30)    NODE VOLUME, FT**3
C
C    INTERNAL VARIABLES
C
C       NTOT            TOTAL MOLES OF MOIST AIR IN NODE
C       NH20            MOLES OF WATER VAPOR IN NODE
C       NAIR            MOLES OF DRY AIR IN NODE
C
C  THE FOLLOWING SUBROUTINE IS CALLED.
C
C               DENTHL
C
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED.
C
C               DENUF6
C               HHFH20
C               HUF6
C               VPRUF6
C               ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /ENTHAL/ H(30), DUM3(120)
      COMMON /VOLUME/ VOL(30), DUM4(61)
C
      NTOT   = PC(IC)*VOL(IC)/10.73D0/(TC(IC) + 459.67D0)
C
      NH20   = RATIO*NTOT
      NAIR   = NTOT - NH20
C
      MASS(IC,3) = NH20*WMOL(3)
      MASS(IC,1) = NAIR*WMOL(1)
C
      CALL DENTHL(TC(IC), PC(IC), IC, H(IC))
C
      RETURN
C
      END
```

B.23 SETRAY

```
      SUBROUTINE SETRAY (INODES, INOUT)
C
C  THIS SUBROUTINE IS USED TO INITIALIZE VALUES IN THE VARIOUS ARRAYS
C  NEEDED FOR TRANSIENT COMPARTMENT ANALYSIS.
C
```

```
C  THE FOLLOWING VARIABLES ARE USED.
C
C    OUTPUT VARIABLES
C
C       INODES              NUMBER OF NODES AVAILABLE IN THE TRANSIENT
C                           COMPARTMENT MODEL (NOTE: NODE 30 IS THE NULL
C                           VECTOR)
C       INOUT               NUMBER OF INPUT AND NUMBER OF OUTPUT STREAMS
C                           ALLOWED IN THE TRANSIENT COMPARTMENT MODEL
C
C    COMMON BLOCK VARIABLES
C
C       MASS     (30,9)     NODE COMPONENT MASS, LB, OR NODE COMPONENT FLOW
C                           RATE, LB/(DELT)
C       RH                  FRACTIONAL RELATIVE HUMIDITY, --
C       TC       (30)       NODE TEMPERATURE, DEG F
C       PC       (30)       NODE PRESSURE, PSIA
C       TSURF    (30)       NODE HEAT TRANSFER SURFACE TEMPERATURE, DEG F
C       WMOL     (9)        COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
C       VOL      (30)       NODE VOLUME, FT**3
C       KRCOEF   (30)       RESISTANCE COEFFICIENT, --, OR RESISTENCE TERM,
C                           PSI-SEC**2/LB-FT**2
C       DPAREA   (30)       DEPOSITION AREA, FT**2
C       DEPVEL              DEPOSITION VELOCITY, FT/SEC
C       H        (30)       NODE ENTHALPY, BTU, OR NODE ENTHALPY RATE,
C                           BTU/(DELT)
C       QRATE    (30)       HEAT TRANSFER RATE, BTU/(DELT)
C       QCOOL    (30)       COOLING RATE, BTU/(DELT)
C       HTCOEF   (30)       HEAT TRANSFER COEFFICIENT, BTU/SEC-FT**2-DEG F
C       HTAREA   (30)       HEAT TRANSFER AREA, FT**2
C       IIN      (30,4)     NODE INLET STREAMS
C       IOUT     (30,4)     NODE OUTLET STREAMS
C       AMINLN              NATURAL LOG OF THE MINIMUM NUMBER ACCEPTED BY
C                           THE COMPUTER
C       TIME                CUMULATIVE TIME OF THE TRANSIENT SIMULATION, SEC
C       DELT                TIME INCREMENT FOR THE TRANSIENT SIMULATION, SEC
C       MAXTIM              MAXIMUM CUMULATIVE TIME OF THE SIMULATION, SEC
C       IFLAG               CONTROL VARIABLE FOR PRINTING OUTPUT
C       TRELS               TOTAL RELEASE TIME, SEC
C       C1                  WEIGHT FRACTION OF MONOMER TO HF VAPOR
C       C3                  WEIGHT FRACTION OF TRIMER TO HF VAPOR
C       C6                  WEIGHT FRACTION OF HEXAMER TO HF VAPOR
C       WMBHF               EFFECTIVE MOLECULAR WEIGHT OF HF VAPOR,
C                           LB/LB MOLE
C       ITYPE               TYPE OF RELEASE
C       SOURCE              TOTAL MASS OF RELEASED MATERIAL, LB
C       ISEN                CONTROL VARIABLE IDENTIFYING BASIS FOR UF6
C                           LIQUID FLASH OR VAPOR EXPANSION
C
C    EQUIVALENCED VARIABLES
C
C       ACFM     (30)       BLOWER FLOW RATE, FT**3/MIN
C       FLAREA   (30)       FLOW AREA FOR PRESSURE DROP CONTROLLED FLOW,
C                           FT**2
```

```
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION ACFM(30), FLAREA(30)
C
      COMMON /LBMASS/ MASS(30,9), RH
      COMMON /COMPTP/ TC(30), PC(30), TSURF(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ VOL(30), KRCOEF(30), DPAREA(30), DEPVEL
      COMMON /ENTHAL/ H(30), QRATE(30), QCOOL(30), HTCOEF(30),
     *                HTAREA(30)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, MAXTIM, IFLAG, TRELS
      COMMON /POLYMR/ C1, C3, C6, WMBHF
      COMMON /MISCEL/ ITYPE, SOURCE, ISEN
C
      EQUIVALENCE (VOL(1), ACFM(1), FLAREA(1))
C
      AMINLN = -88.D0
C
      INODES = 30
      INOUT  = 4
C
C  MOLECULAR WEIGHTS.
C
      WMOL(1) = 28.966D0
      WMOL(2) = 18.016D0
      WMOL(3) = WMOL(2)
      WMOL(4) = 20.008D0
      WMOL(5) = WMOL(4)
      WMOL(6) = 352.025D0
      WMOL(7) = WMOL(6)
      WMOL(8) = WMOL(6)
      WMOL(9) = 308.025D0
C
      WMBHF  = WMOL(4)
C
      DO 30 I30=1,INODES
C
           DO 10 I10=1,9
C
                MASS(I30,I10) = 0.D0
C
   10      CONTINUE
C
           VOL(I30) = 0.D0
           H(I30)   =0.D0
           QRATE(I30) = 0.D0
           QCOOL(I30) = 0.D0
           HTCOEF(I30) = 0.D0
           VOL(I30) = 0.D0
           KRCOEF(I30) = 0.D0
           DPAREA(I30) = 0.D0
C
```

```
          DO 20 I20=1,INOUT
C
                IIN(I30,I20)  = INODES
                IOUT(I30,I20) = INODES
C
   20     CONTINUE
C
   30 CONTINUE
C
      DEPVEL = 0.033D0
C
      RETURN
C
      END
```

B.24 SSBLOW

```
      SUBROUTINE SSBLOW (IC, RATIO)
C
C  THIS SUBROUTINE EVALUATES THE STEADY-STATE COMPONENT MASS FLOW RATES
C  RESULTING FROM THE FLOW OF MOIST AIR THROUGH A CONSTANT VOLUME BLOWER
C  GIVEN THE RATIO OF WATER VAPOR TO AIR AND WATER. FOR STEADY STATE
C  CONDITIONS, THE TEMPERATURE AND PRESSURE OF NODE IC SHOULD BE THAT OF
C  THE NODE SERVING AS THE INLET TO NODE IC.
C
C  THE FOLLOWING VARIABLES ARE USED:
C
C    INPUT VARIABLES
C
C       IC                STREAM NODE NUMBER
C       RATIO             RATIO OF MOLES OF WATER VAPOR TO TOTAL MOLES OF
C                         MOIST AIR
C
C    COMMON BLOCK VARIABLES
C
C       MASS    (30,9)    COMPONENT NODE MASS OR MASS FLOW RATE, LB
C                         (COMPARTMENT) OR LB/(DELT) (STREAM)
C       TC      (30)      NODE TEMPERATURE, DEG F
C       PC      (30)      NODE PRESSURE, PSIA
C       WMOL    (9)       COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
C       ACFM    (30)      VOLUMETRIC FLOW RATE THROUGH STREAM NODE,
C                         FT**3/MIN
C       H       (30)      ENTHALPY RATE, BTU/(DELT)
C       IIN     (30,4)    NODE INPUT STREAM NUMBER
C       IOUT    (30,4)    NODE OUTPUT STREAM NUMBER
C       AMINLN            MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C       TIME              TIME AT WHICH FLOW RATE IS BEING EVALUATED, SEC
C       DELT              TIME INTERVAL USED IN TRANSIENT SIMULATION, SEC
C
C    INTERNAL VARIABLES
C
C       TR                ABSOLUTE TEMPERATURE, DEG R
C       NTOT              TOTAL MOLE FLOW RATE, MOLE/(DELT)
```

```
C
C  THE FOLLOWING SUBROUTINE IS CALLED BY DENTHL:
C
C                DENTHL
C
C  OTHER SUBROUTINES REQUIRED (BECAUSE OF DENTHL) ARE:
C
C                HHFH2O
C                HUF6
C                DENUF6
C                VPRUF6
C                ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ ACFM(30), DUM3(61)
      COMMON /ENTHAL/ H(30), DUM4(120)
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
      COMMON /CONTRL/ AMINLN, TIME, DELT, DUM5, IDUM, DUM6
C
      TC(IC) = TC(IIN(IC,1))
      PC(IC) = PC(IIN(IC,1))
C
      TR     = TC(IC) + 459.67D0
C
      NTOT   = PC(IC)*ACFM(IC)*DELT/10.73D0/TR/6.D1
C
      MASS(IC,3) = RATIO*NTOT*WMOL(3)
      MASS(IC,1) = (1.D0 - RATIO)*NTOT*WMOL(1)
C
      CALL DENTHL (TC(IC), PC(IC), IC, H(IC))
C
      RETURN
C
      END
```

B.25 STERM

```
      SUBROUTINE STERM (IC, ICMAIN, SOLIDS)
C
C  THIS SUBROUTINE EVALUATES A STEADY STATE RELEASE RATE BASED ON THE
C  INITIAL PRESSURE OF THE MAIN COMPARTMENT AND, FOR UF6 RELEASES,
C  WHETHER THE RELEASE IS ISENTROPIC OR ISENTHALPIC.
C
C  THE FOLLOWING VARIABLES ARE USED.
C
C    INPUT VARIABLES
C
C       IC                NODE NUMBER FOR SOURCE
C       ICMAIN            NODE NUMBER OF COMPARTMENT IN WHICH SOURCE IS
```

```
C                      LOCATED
C
C    OUTPUT VARIABLE
C
C       SOLIDS            MASS FLOW RATE OF UF6 SOLIDS BEING DEPOSITED ON
C                         FLOOR, LB/(DELT)
C
C    COMMON BLOCK VARIABLES
C
C       MASS     (30,9)   COMPONENT MASS FLOW RATE, LB/(DELT)
C       TC       (30)     NODE TEMPERATURE, DEG F
C       PC       (30)     NODE PRESSURE, PSIA
C       WMOL     (9)      COMPONENT MOLECULAR WEIGHT
C       H        (30)     NODE ENTHALPY RATE, BTU/(DELT)
C       AMINLN            MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C       DELT              INTERVAL OF TIME USED FOR TRANSIENT SIMULATION,
C                         SEC
C       TRELS             TOTAL TIME OF RELEASE, SEC
C       ITYPE             RELEASE TYPE INENTIFIER
C
C                            4    HF LIQUID
C                            5    HF VAPOR
C                            7    UF6 LIQUID, SOLIDS DUMPED TO FLOOR
C                           -7    UF6 LIQUID, SOLIDS AIRBORNE
C                            8    UF6 VAPOR
C
C       SOURCE            TOTAL MASS OF SOURCE, LB
C       ISEN              BASIS FOR FLASH OF UF6 LIQUID
C
C                            0    ISENTROPIC FLASH
C                            1    ISENTHALPIC FLASH
C
C    INTERNAL VARIABLES
C
C       WHFL              WEIGHT FRACTION OF HF IN HF-H2O CONDENSATE
C       PHF               VAPOR PRESSURE OF HF, PSIA
C       XVINIT            INITIAL UF6 VAPOR MASS FRACTION
C       XLINIT            INITIAL UF6 LIQUID MASS FRACTION IN THE UF6
C                         CONDENSED FRACTION
C       XVFIN             FINAL UF6 VAPOR MASS FRACTION
C       XLFIN             FINAL UF6 LIQUID MASS FRACTION IN THE UF6
C                         CONDENSED FRACTION
C       TFIN              FINAL TEMPERATURE OF FLASHED UF6 CORRESPONDING
C                         TO THE PRESSURE OF THE MAIN COMPARTMENT, DEG F
C       PUF6              VAPOR PRESSURE OF UF6, PSIA
C
C  THE FOLLOWING SUBROUTINES ARE CALLED BY THIS SUBROUTINE.
C
C              DENTHL
C              FLASH
C              HFPOLY
C              PHFH2O
C              VPRUF6
C
```

```
C  THE FOLLOWING SUBROUTINES ARE ALSO REQUIRED TO EXECUTE THIS
C  SUBROUTINE.
C
C               DENUF6
C               EQTUF6
C               HHFH2O
C               HUF6
C               SUF6
C               ZUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /ENTHAL/ H(30), DUM3(120)
      COMMON /CONTRL/ AMINLN, DUM4, DELT, DUM5, IDUM, TRELS
      COMMON /MISCEL/ ITYPE, SOURCE, ISEN
C
      SOLIDS = 0.D0
C
      MASS(IC,IABS(ITYPE)) = SOURCE*DELT/TRELS
C
C  SOURCE TERM FOR HF LIQUID.
C
      IF (ITYPE.EQ.4) GO TO 40
C
C  SOURCE TERM FOR HF VAPOR. IF THE ENTERED SOURCE PRESSURE IS LESS
C  THAN ZERO OR GREATER THAN THE VAPOR PRESSURE CORRESPONDING TO THE
C  SOURCE TERMPERTURE, THE SOURCE PRESSURE IS SET EQUAL TO THE VAPOR
C  PRESSURE.
C
      IF (ITYPE.NE.5) GO TO 10
C
      WHFL   = 1.D0
C
      CALL PHFH2O (TC(IC), WHFL, 0.D0, PHF, 0.D0, 0.D0)
C
      IF (PHF.LT.PC(IC).OR.PC(IC).LT.0.D0) PC(IC) = PHF
C
      CALL HFPOLY (TC(IC), PC(IC), WMOL(5), .TRUE.)
C
      GO TO 40
C
   10 CONTINUE
C
C  SOURCE TERM FOR UF6 LIQUID. UF6 LIQUID IS FLASHED TO THE INITIAL
C  PRESSURE OF THE COMPARTMENT. IF ITYPE = 7, ONLY THE VAPOR FRACTION IS
C  UTILIZED AS A SOURCE TERM FOR THE COMPARTMENT, WHILE THE SOLIDS
C  FRACTION IS ACCUMULATED ON THE FLOOR. IF ITYPE = -7, BOTH SOLID AND
C  VAPOR ARE INCORPORATED INTO THE SOURCE TERM.
C
      IF (IABS(ITYPE).NE.7) GO TO 20
C
```

```
      CALL VPRUF6 (TC(IC), PC(IC))
C
      XVINIT = 0.D0
      XLINIT = 1.D0
C
      CALL FLASH (TC(IC), PC(IC), WMOL(7), XVINIT, XLINIT, PC(ICMAIN),
     *    ISEN, XVFIN, XLFIN, TFIN)
C
      MASS(IC,8) = MASS(IC,7)*XVFIN
C
      SOLIDS = MASS(IC,7) - MASS(IC,8)
C
      IF (ITYPE.EQ.-7) MASS(IC,6) = SOLIDS
      IF (ITYPE.EQ.-7) SOLIDS = 0.D0
C
      MASS(IC,7) = 0.D0
C
      TC(IC)   = TFIN
C
      PC(IC)   = PC(ICMAIN)
C
      GO TO 40
C
   20 CONTINUE
C
C  SOURCE TERM FOR UF6 VAPOR. IF THE ENTERED SOURCE PRESSURE IS LESS
C  THAN OR EQUAL TO ZERO OR GREATER THAN THE VAPOR PRESSURE
C  CORRESPONDING TO THE SOURCE TERMPERTURE, THE SOURCE PRESSURE IS SET
C  EQUAL TO THE VAPOR PRESSURE.
C
      IF (ITYPE.NE.8) GO TO 30
C
      CALL VPRUF6 (TC(IC), PUF6)
C
      IF (PUF6.LT.PC(IC).OR.PC(IC).LE.0.D0) PC(IC) = PUF6
C
      GO TO 40
C
   30 CONTINUE
C
      WRITE (5,500) ITYPE
C
      STOP15
C
   40 CONTINUE
C
      CALL DENTHL (TC(IC), PC(IC), IC, H(IC))
C
      RETURN
C
  500 FORMAT (//,5X,'ITYPE =',3I,' NOT RECOGNIZED.',//)
C
      END
```

B.26 SUF6

```
      SUBROUTINE SUF6 (TF, PSIA, MW, SSOL, SLIQ, SVAP)
C
C  THIS SUBROUTINE CALCULATES THE ENTROPIES OF UF6 SOLID, LIQUID, AND
C  VAPOR. THE FOLLOWING VARIABLES ARE USED.
C
C      TF        TEMPERATURE, DEG F
C      TR        ABSOLUTE TEMPERATURE, DEG R
C      LNTR      LN(TR)
C      TRSQ      TR**2
C      PSIA      PRESSURE, PSIA
C      MW        MOLECULAR WEIGHT, LB MASS/LB MOLE
C      SSOL      ENTROPY OF THE SOLID, BTU/LB MASS-DEG F
C      SLIQ      ENTROPY OF THE LIQUID, BTU/LB MASS-DEG F
C      SVAP      ENTROPY OF THE VAPOR, BTU/LB MASS-DEG F
C      ZPSIA     VAPOR COMPRESSIBILITY FACTOR AT TF AND PSIA
C      Z1ATM     VAPOR COMPRESSIBILITY FACTOR AT TF AND 14.696 PSIA
C
C  THE FOLLOWING SUBROUTINE IS CALLED.
C
C      ZUF6
C
C  THE ENTROPY CORRELATIONS ARE BASED ON INFORMATION IN R. DEWITT,
C  "URANIUM HEXAFLUORIDE: A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES,"
C  GAT-280, GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960,
C  PAGES 67 - 70. THE ENTROPY OF THE VAPOR GIVEN BY THE CORRELATION IN
C  GAT-280 IS FOR A PRESSURE OF 1 ATM. THE VAPOR CORRELATION GIVEN BELOW
C  HAS BEEN MODIFIED USING THE MAGNUSON EQUATION OF STATE (SEE GAT-280,
C  PAGES 97 - 101) AND THE DEPARTURE FUNCTION CORRELATIONS GIVEN IN
C  R. C. REID, J. M. PRAUSNITZ, AND T. K. SHERWOOD, THE PROPERTIES OF
C  GASES AND LIQUIDS, 3RD ED., MCGRAW-HILL BOOK COMPANY, 1977, PAGE 93,
C  SO THAT BOTH SATURATED AND UNSATURATED VAPOR ENTROPIES CAN BE
C  CALCULATED.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR      = TF + 459.67D0
      LNTR    = DLOG(TR)
      TRSQ    = TR**2
C
C  THE ENTROPY OF THE SOLID IS GIVEN BY THE FOLLOWING CORRELATION WHICH
C  IS ACCURATE WITHIN 0.01% BETWEEN 32 DEG F AND THE TRIPLE POINT (147.3
C  DEG F).
C
      SSOL    = ( 3.93535D-1 - 5.70531D-2*LNTR + 2.55019D-4*TR
     *          - ( 4.82282D3/TRSQ ) ) * ( 3.52D2/MW )
C
C  THE ENTROPY OF THE LIQUID IS GIVEN BY THE FOLLOWING CORRELATION WHICH
C  IS REPORTED TO HAVE AN ACCURACY OF 0.01% [OVER AN ASSUMED RANGE OF
C  147.3 TO 206.3 DEG F].
C
      SLIQ    = ( -1.72963D-1 + 5.10057D-2*LNTR + 1.02633D-4*TR
     *          - ( 3.06967D3/TRSQ ) ) * ( 3.52D2/MW )
```

```
C
C  CALCULATE THE VAPOR COMPRESSIBILITY FACTOR AT 14.696 PSIA AND AT
C  "PSIA."
C
      CALL ZUF6 (TF, 14.696D0, Z1ATM, 0.0D0, 0.0D0)
      CALL ZUF6 (TF, PSIA, ZPSIA, 0.0D0, 0.0D0)
C
C  THE ENTROPY OF THE VAPOR IS GIVEN BY THE FOLLOWING CORRELATION.
C
      SVAP   = ( -3.32704D-1 + 9.21307D-2*LNTR + 1.25237D-5*TR
     *          + ( 1.47586D3/TRSQ ) + 3.0939D-3 * (ZPSIA - Z1ATM)
     *          + 1.0313D-3 * DLOG( (1.D0 - Z1ATM) / (1.D0 - ZPSIA) ) )
     *          * ( 3.52D2/MW )
C
      RETURN
C
      END
```

B.27 THCUF6

```
      SUBROUTINE THCUF6 (TF, PSIA, MW, THCSOL, THCLIQ, THCVAP)
C
C  THIS SUBROUTINE CALCULATES THE THERMAL CONDUCTIVITY OF UF6 SOLID,
C  LIQUID, AND VAPOR. THE FOLLOWING VARIABLES ARE USED.
C
C       TF        TEMPERATURE, DEG F
C       TR        ABSOLUTE TEMPERATURE, DEG R
C       PSIA      PRESSURE, PSIA
C       MW        MOLECULAR WEIGHT, LB MASS/LB MOLE
C       THCSOL    THERMAL CONDUCTIVITY OF THE SOLID, BTU/HR-FT-DEG F
C       THCLIQ    THERMAL CONDUCTIVITY OF THE LIQUID, BTU/HR-FT-DEG F
C       THCVAP    THERMAL CONDUCTIVITY OF THE VAPOR, BTU/HR-FT-DEG F
C       CPLIQ     HEAT CAPACITY OF THE LIQUID, BTU/LB MASS-DEG F
C       DENLIQ    DENSITY OF THE LIQUID, LB MASS/FT**3
C
C  THE FOLLOWING SUBROUTINES ARE CALLED.
C
C       CPUF6
C       DENUF6
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR     = TF + 459.67D0
C
C  THE THERMAL CONDUCTIVITY OF THE SOLID IS BASED ON DATA OBTAINED FROM
C  E. J. BARBER (PERSONAL COMMUNICATION, JULY 13, 1983). ASSUMING A
C  LINEAR RELATIONSHIP BETWEEN THERMAL CONDUCTIVITY AND TEMPERATURE,
C  THE THERMAL CONDUCTIVITY OF THE SOLID IS GIVEN BY
C
      THCSOL = 2.586D-1 + 6.084D-4*TF
C
C  CALCULATE THE HEAT CAPACITY AND THE DENSITY OF THE LIQUID.
C
```

```
      CALL CPUF6 (TF, PSIA, MW, 0.0D0, CPLIQ, 0.0D0, 0.0D0, 0.0D0)
C
      CALL DENUF6 (TF, PSIA, MW, 0.0D0, DENLIQ, 0.0D0)
C
C  THE THERMAL CONDUCTIVITY OF THE LIQUID IS BASED ON A SINGLE VALUE
C  REPORTED IN R. DEWITT, "URANIUM HEXAFLUORIDE: A SURVEY OF THE
C  PHYSICO-CHEMICAL PROPERTIES," GAT-280, GOODYEAR ATOMIC CORP.,
C  PORTSMOUTH, OHIO, JAN. 29, 1960, PAGE 46. ASSUMING A GENERAL FORM OF
C  VARIOUS PREDICTIVE CORRELATIONS FOR THERMAL CONDUCTIVITY OF A LIQUID,
C  WHICH IS K = B * CP * (DEN**1.33) / TR, THE COEFFICIENT B WAS
C  DETERMINED. THUS, AN APPROXIMATE CORRELATION FOR LIQUID THERMAL
C  CONDUCTIVITY IS GIVEN BY
C
      THCLIQ = 3.247D-1 * CPLIQ * ( DENLIQ**(4.D0/3.D0) ) / TR
C
C  THE THERMAL CONDUCTIVITY OF THE VAPOR IS BASED ON GAT-280, PAGES 44 -
C  46, AND IS GIVEN BY
C
      THCVAP = 3.268D-3 * ( 1.0D0 + 2.52D-3*TF )
C
      RETURN
C
      END
```

B.28 TRBLOW

```
      SUBROUTINE TRBLOW (IC)
C
C  THIS SUBROUTINE EVALUATES THE TRANSIENT MASS FLOW RATES FOR A
C  CONSTANT VOLUME BLOWER REPRESENTED BY NODE IC WHICH DRAWS FROM A
C  COMPARTMENT REPRESENTED BY NODE IIN(IC,1).
C
C  THE FOLLOWING VARIABLES ARE USED:
C
C    INPUT VARIABLE
C
C      IC                STREAM NODE NUMBER
C
C    COMMON BLOCK VARIABLES
C
C      MASS    (30,9)  COMPONENT NODE MASS OR MASS FLOW RATE, LB
C                      (COMPARTMENT) OR LB/(DELT) (STREAM)
C      TC      (30)    NODE TEMPERATURE, DEG F
C      PC      (30)    NODE PRESSURE, PSIA
C      WMOL    (9)     COMPONENT MOLECULAR WEIGHTS, LB/LB MOLE
C      ACFM    (30)    VOLUMETRIC FLOW RATE THROUGH BLOWER, FT**3/MIN
C      H       (30)    ENTHALPY OR ENTHALPY RATE, BTU OR BTU/(DELT)
C      AMINLN          MINIMUM NATURAL LOG ACCEPTED BY THE COMPUTER
C      DELT            TIME INTERVAL USED IN TRANSIENT SIMULATION, SEC
C      IIN     (30,4)  NODE INPUT STREAM NUMBER
C      IOUT    (30,4)  NODE OUTPUT STREAM NUMBER
C
C    EQUIVALENCED VARIABLE
```

```
C
C       VOL      (30)     COMPARTMENT NODE VOLUME, FT**3
C
C    INTERNAL VARIABLE
C
C       FRAC              RATIO OF BLOWER VOLUME FLOW RATE-TIME INTERVAL
C                         PRODUCT TO INLET NODE VOLUME
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      DIMENSION VOL(30)
C
      COMMON /LBMASS/ MASS(30,9), DUM1
      COMMON /COMPTP/ TC(30), PC(30), DUM2(30)
      COMMON /MOLWT/ WMOL(9)
      COMMON /VOLUME/ ACFM(30), DUM3(61)
      COMMON /ENTHAL/ H(30), DUM4(120)
      COMMON /CONTRL/ AMINLN, DUM5, DELT, DUM6, IDUM1, DUM7
      COMMON /ISTRMS/ IIN(30,4), IOUT(30,4)
C
      EQUIVALENCE (VOL(1),ACFM(1))
C
      FRAC   = ACFM(IC)*DELT/6.D1/VOL(IIN(IC,1))
C
      DO 10 I10=1,9
C
           MASS(IC,I10) = FRAC*MASS(IIN(IC,1),I10)
C
   10 CONTINUE
C
      H(IC)  = FRAC*H(IIN(IC,1))
      TC(IC) = TC(IIN(IC,1))
      PC(IC) = PC(IIN(IC,1))
C
      RETURN
C
      END
```

B.29 VISUF6

```
      SUBROUTINE VISUF6 (TF, PSIA, MW, VISLIQ, VISVAP)
C
C  THIS SUBROUTINE CALCULATES THE VISCOSITIES OF UF6 LIQUID AND VAPOR.
C  THE FOLLOWING VARIABLES ARE USED.
C
C      TF        TEMPERATURE, DEG F
C      TR        ABSOLUTE TEMPERATURE, DEG R
C      PSIA      PRESSURE, PSIA
C      MW        MOLECULAR WEIGHT, LB/LB MOLE
C      VISLIQ    LIQUID VISCOSITY, LB MASS/FT-HR
C      VISVAP    VAPOR VISCOSITY, LB MASS/FT-HR
C
C  THE FOLLOWING SUBROUTINE IS CALLED.
```

```
C
C      VPRUF6
C
C  THE VISCOSITY CORRELATIONS ARE BASED ON INFORMATION FROM R. DEWITT,
C  "URANIUM HEXAFLUORID: A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES,"
C  GAT-280, GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960,
C  PAGES 38 - 44. THE VAPOR VISCOSITY CORRELATION WAS FITTED TO DATA
C  REPORTED IN GAT-280 BY W. R. WILLIAMS.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR     = TF + 459.67D0
C
C  THE VISCOSITY OF THE LIQUID IS GIVEN BY THE FOLLOWING CORRELATION
C  WHICH IS BASED ON DATA RANGING FROM 158 TO 410 DEG F. THE SUM OF THE
C  TERMS IN THE EXPONENTIAL IS CORRECT BASED ON THE DATA OF BLATT
C  REPORTED BY DEWITT IN TABLE 25.
C
      VISLIQ = 0.404D0 * DEXP( (9.97D2 + 4.1D-2*PSIA)/TR )
C
C  THE VISCOSITY OF THE VAPOR BASED ON DATA RANGING FROM 104 TO 392
C  DEG F ISGIVEN WITHIN 0.6% BY THE FOLLOWING CORRELATION.
C
      VISVAP =           1.192D-4 * TR**0.9305D0
C
      RETURN
C
      END
```

B.30 VPRUF6

```
      SUBROUTINE VPRUF6 (TF, PSIA)
C
C  THIS SUBROUTINE CALCULATES THE VAPOR PRESSURE OF UF6. THE FOLLOWING
C  VARIABLES ARE USED.
C
C           TF        TEMPERATURE, DEG F
C           PSIA      PRESSURE, PSIA
C           P1        PRESSURE, PSIA
C           P2        PRESSURE, PSIA
C
C  THE VAPOR PRESSURE CORRELATIONS USED ARE BASED ON R. DEWITT, "URANIUM
C  HEXAFLUORIDE: A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES," GAT-280,
C  GOODYEAR ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960, PAGE 81.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      IF (TF.GE.147.306561D0) GO TO 10
C
C  THE VAPOR PRESSURE OF UF6 OVER THE SOLID FROM 32 DEG F TO THE TRIPLE
C  POINT AT 147.3 DEG F IS GIVEN BY
C
      PSIA   = DEXP ( 10.4443D0 + 9.64233D-3*TF - ( 3.90741D3 /
```

```
     *          ( TF + 298.149D0 ) ) )
C
      RETURN
C
   10 CONTINUE
C
C  DEWITT RECOMMENDS 2 CORRELATIONS FOR THE VAPOR PRESSURE OF UF6 OVER
C  THE LIQUID. THE FIRST, WHICH IS GIVEN BELOW BY P1, GIVES GOOD AGREE-
C  MENT (0.03%) FROM THE TRIPLE POINT TO 240.8 DEG F. THE SECOND, WHICH
C  IS GIVEN BELOW BY P2, AGREES WITHIN 0.3% ON AVERAGE BETWEEN THE
C  240.8 DEG F AND THE CRITICAL POINT. P2 EXCEEDS THE TABULATED VALUES
C  OF VAPOR PRESSURE FROM 240.8 DEG F TO ABOUT 276 DEG F. BY USING A
C  WEIGHTED AVERAGE OF P1 AND P2 OVER THIS RANGE, A BETTER AGREEMENT
C  WITH TABULATED VALUES IS OBTAINED, AS WELL AS A CONTINUOUS FUNCTION
C  FOR VAPOR PRESSURE.
C
      P1      = DEXP ( 12.1600D0 - ( 4.66807D3 / ( TF + 367.533D0 ) ) )
      P2      = DEXP ( 13.7627D0 - ( 6.97611D3 / ( TF + 511.866D0 ) ) )
C
      IF (TF. GE. 2.40D2) GO TO 20
C
C  THE VAPOR PRESSURE OF UF6 OVER THE LIQUID FROM THE TRIPLE POINT TO
C  240 DEG F IS GIVEN BY
C
      PSIA    = P1
C
      RETURN
C
   20 CONTINUE
C
      IF (TF.GE.2.76D2) GO TO 30
C
C  THE VAPOR PRESSURE OF UF6 OVER THE LIQUID FROM 240 TO 276 DEG F IS
C  GIVEN BY
C
      PSIA    = ( (2.76D2 - TF)*P1 + (TF - 2.40D2)*P2 )/ 3.6D1
C
      RETURN
C
   30 CONTINUE
C
C  THE VAPOR PRESSURE OF UF6 OVER THE LIQUID FROM 276 DEG F TO THE
C  CRITICAL POINT IS GIVEN BY
C
      PSIA    = P2
C
      RETURN
C
      END
```

B.31 ZUF6

```
      SUBROUTINE ZUF6 (TF, PSIA, Z, ZP, ZT)
C
C  THIS SUBROUTINE CALCULATES THE COMPRESSIBILITY FACTOR OF UF6 AS WELL
C  AS THE QUANTITIES ZP AND ZT. THE FOLLOWING VARIABLES ARE USED.
C
C     TF        TEMPERATURE, DEG F
C     TR        ABSOLUTE TEMPERATURE, DEG R
C     TCUBE     (DEG R)**3
C     PSIA      PRESSURE, PSIA
C     Z         COMPRESSIBILITY FACTOR
C
C     ZP = Z - P (DZ/DP), EVALUATED FOR CONSTANT T
C     ZT = Z + T (DZ/DT), EVALUATED FOR CONSTANT P
C
C  THE COMPRESSIBILITY FACTOR IS BASED ON THE EQUATION OF STATE FOR UF6
C  PROPOSED BY D. W. MAGNUSON CITED BY R. DEWITT, "URANIUM HEXAFLUORIDE:
C  A SURVEY OF THE PHYSICO-CHEMICAL PROPERTIES," GAT-280, GOODYEAR
C  ATOMIC CORP., PORTSMOUTH, OHIO, JAN. 29, 1960, PAGES 24 AND 97 - 101.
C
      IMPLICIT REAL*8 (A-H,J-Z)
C
      TR       = TF + 459.67D0
      TCUBE    = TR**3
C
      Z        = TCUBE / ( TCUBE + 4.8923D5*PSIA )
C
      ZP       = ( 2.0D0 - Z ) * Z
      ZT       = ( 4.0D0 - 3.0D0*Z ) * Z
C
      RETURN
C
      END
```

Appendix C
EXAMPLE PROBLEM OUTPUT

Output for Examples 1 (Cases 1 through 4), 2 (Cases 1 and 3), 3 (Cases 1 through 3), 4 (Cases 1 through 4), and 5 are included in this appendix. Output for Examples 1, 2, and 3 were produced by CYLIND. Output for Example 4, Cases 1 and 3, as well as Example 5, were produced by FODRFT and for Example 4, Cases 2 and 4, by INDRFT. Example problems are described in Chapter 5. Output for Examples 2 (Case 2) and 6 from CYLIND and BATCH, respectively, are included in Chapter 5 as are selected plots produced by COMPLT and CYLPLT.

TITLE: EX. 1, CASE 1. 10-TON CYL, SHEARED VALVE AT 6 O'CLOCK, UF6 AT 200 F

TIME (SEC)	******* CONDITION OF UF6 IN CONTAINMENT ******* ********** MASS (LB) ********** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	PATHWAY INLET RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	********* CONDITION OF UF6 EXHAUSTED ********* **** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	21003.4	26.6	21030.0	200.000	51.152	LIQUID	55.298	CHOKE	2.944	0.000	3.390	6.334	14.700	133.780
60.	0.0	20619.2	30.7	20650.0	199.949	51.114	LIQUID	55.157	CHOKE	2.943	0.000	3.387	6.330	14.700	133.780
120.	0.0	20235.3	34.9	20270.2	199.896	51.075	LIQUID	55.019	CHOKE	2.942	0.000	3.384	6.326	14.700	133.780
180.	0.0	19851.6	39.0	19890.6	199.843	51.036	LIQUID	54.884	CHOKE	2.941	0.000	3.381	6.322	14.700	133.780
240.	0.0	19468.1	43.2	19511.3	199.789	50.996	LIQUID	54.751	CHOKE	2.940	0.000	3.379	6.318	14.700	133.780
300.	0.0	19084.8	47.3	19132.2	199.734	50.955	LIQUID	54.620	CHOKE	2.939	0.000	3.376	6.314	14.700	133.780
360.	0.0	18701.9	51.4	18753.3	199.678	50.914	LIQUID	54.490	CHOKE	2.938	0.000	3.373	6.310	14.700	133.780
420.	0.0	18319.1	55.6	18374.7	199.621	50.871	LIQUID	54.360	CHOKE	2.937	0.000	3.370	6.306	14.700	133.780
480.	0.0	17936.6	59.7	17996.3	199.562	50.828	LIQUID	54.232	CHOKE	2.935	0.000	3.367	6.302	14.700	133.780
540.	0.0	17554.4	63.8	17618.2	199.503	50.785	LIQUID	54.104	CHOKE	2.934	0.000	3.363	6.298	14.700	133.780
600.	0.0	17172.5	67.8	17240.3	199.442	50.740	LIQUID	53.976	CHOKE	2.933	0.000	3.360	6.293	14.700	133.780
660.	0.0	16790.8	71.9	16862.7	199.381	50.695	LIQUID	53.849	CHOKE	2.932	0.000	3.357	6.289	14.700	133.780
720.	0.0	16409.4	76.0	16485.4	199.318	50.648	LIQUID	53.721	CHOKE	2.931	0.000	3.354	6.284	14.700	133.780
780.	0.0	16028.3	80.0	16108.3	199.254	50.601	LIQUID	53.594	CHOKE	2.929	0.000	3.350	6.280	14.700	133.780
840.	0.0	15647.5	84.1	15731.6	199.188	50.553	LIQUID	53.466	CHOKE	2.928	0.000	3.347	6.275	14.700	133.780
900.	0.0	15267.0	88.1	15355.1	199.121	50.503	LIQUID	53.338	CHOKE	2.927	0.000	3.343	6.270	14.700	133.780
960.	0.0	14886.7	92.1	14978.9	199.052	50.453	LIQUID	53.210	CHOKE	2.925	0.000	3.340	6.265	14.700	133.780
1020.	0.0	14506.8	96.1	14603.0	198.982	50.402	LIQUID	53.080	CHOKE	2.924	0.000	3.336	6.260	14.700	133.780
1080.	0.0	14127.2	100.1	14227.4	198.910	50.349	LIQUID	52.951	CHOKE	2.922	0.000	3.332	6.255	14.700	133.780
1140.	0.0	13748.0	104.1	13852.1	198.837	50.295	LIQUID	52.820	CHOKE	2.921	0.000	3.328	6.249	14.700	133.780
1200.	0.0	13369.0	108.1	13477.1	198.761	50.240	LIQUID	52.688	CHOKE	2.920	0.000	3.325	6.244	14.700	133.780
1260.	0.0	12990.5	112.0	13102.5	198.684	50.184	LIQUID	52.556	CHOKE	2.918	0.000	3.320	6.238	14.700	133.780
1320.	0.0	12612.2	116.0	12728.2	198.605	50.126	LIQUID	52.422	CHOKE	2.916	0.000	3.316	6.233	14.700	133.780
1380.	0.0	12234.3	119.9	12354.2	198.524	50.066	LIQUID	52.287	CHOKE	2.915	0.000	3.312	6.227	14.700	133.780
1440.	0.0	11856.8	123.8	11980.6	198.440	50.006	LIQUID	52.150	CHOKE	2.913	0.000	3.308	6.221	14.700	133.780
1500.	0.0	11479.7	127.7	11607.3	198.354	49.943	LIQUID	52.012	CHOKE	2.911	0.000	3.303	6.215	14.700	133.780
1560.	0.0	11102.9	131.6	11234.5	198.266	49.879	LIQUID	51.872	CHOKE	2.910	0.000	3.299	6.208	14.700	133.780
1620.	0.0	10726.5	135.4	10862.0	198.175	49.812	LIQUID	51.730	CHOKE	2.908	0.000	3.294	6.202	14.700	133.780
1680.	0.0	10350.6	139.3	10489.9	198.081	49.744	LIQUID	51.586	CHOKE	2.906	0.000	3.289	6.195	14.700	133.780
1740.	0.0	9975.1	143.1	10118.2	197.984	49.674	LIQUID	51.441	CHOKE	2.904	0.000	3.284	6.188	14.700	133.780
1800.	0.0	9600.0	146.9	9746.9	197.884	49.601	LIQUID	51.292	CHOKE	2.902	0.000	3.279	6.181	14.700	133.780
1860.	0.0	9225.4	150.7	9376.0	197.780	49.526	LIQUID	51.141	CHOKE	2.900	0.000	3.274	6.173	14.700	133.780
1920.	0.0	8851.2	154.4	9005.6	197.673	49.449	LIQUID	50.987	CHOKE	2.898	0.000	3.268	6.166	14.700	133.780
1980.	0.0	8477.5	158.1	8635.7	197.562	49.369	LIQUID	50.831	CHOKE	2.896	0.000	3.262	6.158	14.700	133.780
2040.	0.0	8104.4	161.8	8266.2	197.447	49.286	LIQUID	50.670	CHOKE	2.893	0.000	3.256	6.150	14.700	133.780
2100.	0.0	7731.7	165.5	7897.2	197.327	49.199	LIQUID	50.507	CHOKE	2.891	0.000	3.250	6.141	14.700	133.780
2160.	0.0	7359.6	169.2	7528.8	197.202	49.109	LIQUID	50.339	CHOKE	2.888	0.000	3.244	6.132	14.700	133.780
2220.	0.0	6988.1	172.8	7160.9	197.071	49.015	LIQUID	50.167	CHOKE	2.886	0.000	3.237	6.123	14.700	133.780
2280.	0.0	6617.1	176.4	6793.5	196.935	48.918	LIQUID	49.990	CHOKE	2.883	0.000	3.230	6.113	14.700	133.780
2340.	0.0	6246.8	179.9	6426.7	196.792	48.815	LIQUID	49.808	CHOKE	2.880	0.000	3.223	6.103	14.700	133.780
2400.	0.0	5877.1	183.5	6060.6	196.642	48.708	LIQUID	49.620	CHOKE	2.877	0.000	3.215	6.092	14.700	133.780
2460.	0.0	5508.1	186.9	5695.0	196.484	48.595	LIQUID	49.426	CHOKE	2.874	0.000	3.207	6.081	14.700	133.780
2520.	0.0	5139.8	190.4	5330.2	196.317	48.476	LIQUID	49.224	CHOKE	2.871	0.000	3.198	6.069	14.700	133.780

Ex. 1, Case 1 (continued)

2580.	0.0	4772.3	193.8	4966.1	196.140	48.350	LIQUID	49.015	CHOKE	2.867	0.000	3.189	6.056	14.700	133.780
2640.	0.0	4405.6	197.1	4602.7	195.951	48.217	LIQUID	48.796	CHOKE	2.863	0.000	3.180	6.043	14.700	133.780
2700.	0.0	4039.7	200.4	4240.1	195.750	48.074	LIQUID	48.567	CHOKE	2.856	0.000	3.167	6.023	14.700	133.780
2760.	0.0	3675.1	203.6	3878.7	195.535	47.922	LIQUID	48.327	CHOKE	2.844	0.000	3.147	5.991	14.700	133.780
2820.	0.0	3312.6	206.7	3519.3	195.303	47.759	LIQUID	48.073	CHOKE	2.831	0.000	3.126	5.957	14.700	133.780
2880.	0.0	2952.1	209.7	3161.9	195.051	47.582	LIQUID	47.805	CHOKE	2.817	0.000	3.104	5.921	14.700	133.780
2940.	0.0	2594.0	212.7	2806.6	194.777	47.390	LIQUID	47.518	CHOKE	2.803	0.000	3.080	5.883	14.700	133.780
3000.	0.0	2238.2	215.5	2453.6	194.476	47.179	LIQ-VAP	47.179	CHOKE	2.761	0.000	3.040	5.801	14.700	133.780
3060.	0.0	1887.7	217.9	2105.6	194.078	46.903	VAPOR	46.903	CHOKE	0.000	0.000	2.366	2.366	14.700	192.978
3120.	0.0	1781.4	182.2	1963.6	179.706	37.704	VAPOR	37.704	PDC	0.000	0.000	1.902	1.902	14.700	178.873
3180.	0.0	1695.4	154.0	1849.5	167.107	30.838	VAPOR	30.838	PDC	0.000	0.000	1.485	1.485	14.700	166.491
3240.	0.0	1627.7	132.7	1760.4	156.501	25.843	VAPOR	25.843	PDC	0.000	0.000	1.163	1.163	14.700	156.057
3300.	0.0	1574.1	116.5	1690.6	147.655	22.178	VAPOR	22.178	PDC	0.000	0.000	0.906	0.906	14.700	147.345
3360.	79.8	1440.1	116.3	1636.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3420.	162.9	1303.0	116.6	1582.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3480.	245.9	1165.8	117.0	1528.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3540.	328.9	1028.7	117.4	1474.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3600.	411.9	891.5	117.8	1421.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3660.	494.9	754.3	118.1	1367.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3720.	577.9	617.2	118.5	1313.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3780.	660.9	480.0	118.9	1259.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3840.	743.9	342.9	119.3	1206.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3900.	826.9	205.7	119.6	1152.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3960.	909.9	68.5	120.0	1098.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

TITLE: EX. 1, CASE 2. 10-TON CYL, SHEARED VALVE AT 9 O'CLOCK, UF6 AT 200 F

	****** CONDITION OF UF6 IN CONTAINMENT ******						PATHWAY INLET			********* CONDITION OF UF6 EXHAUSTED *********					
TIME (SEC)	********* MASS (LB) ********* SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	**** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	21003.4	26.6	21030.0	200.000	51.152	LIQUID	53.179	CHOKE	2.944	0.000	3.390	6.334	14.700	133.780
60.	0.0	20619.2	30.7	20649.9	199.949	51.114	LIQUID	53.039	CHOKE	2.943	0.000	3.387	6.331	14.700	133.780
120.	0.0	20235.2	34.9	20270.1	199.896	51.075	LIQUID	52.901	CHOKE	2.942	0.000	3.384	6.327	14.700	133.780
180.	0.0	19851.5	39.0	19890.5	199.843	51.036	LIQUID	52.766	CHOKE	2.941	0.000	3.382	6.323	14.700	133.780
240.	0.0	19468.0	43.2	19511.1	199.789	50.996	LIQUID	52.632	CHOKE	2.940	0.000	3.379	6.319	14.700	133.780
300.	0.0	19084.7	47.3	19132.0	199.734	50.955	LIQUID	52.501	CHOKE	2.939	0.000	3.376	6.315	14.700	133.780
360.	0.0	18701.7	51.4	18753.1	199.678	50.914	LIQUID	52.371	CHOKE	2.938	0.000	3.373	6.311	14.700	133.780
420.	0.0	18318.9	55.6	18374.5	199.620	50.871	LIQUID	52.241	CHOKE	2.937	0.000	3.370	6.307	14.700	133.780
480.	0.0	17936.4	59.7	17996.1	199.562	50.828	LIQUID	52.112	CHOKE	2.936	0.000	3.367	6.302	14.700	133.780
540.	0.0	17554.1	63.8	17617.9	199.503	50.785	LIQUID	51.984	CHOKE	2.934	0.000	3.364	6.298	14.700	133.780
600.	0.0	17172.2	67.8	17240.0	199.442	50.740	LIQUID	51.857	CHOKE	2.933	0.000	3.361	6.294	14.700	133.780
660.	0.0	16790.5	71.9	16862.4	199.381	50.695	LIQUID	51.729	CHOKE	2.932	0.000	3.357	6.289	14.700	133.780
720.	0.0	16409.0	76.0	16485.0	199.318	50.648	LIQUID	51.602	CHOKE	2.931	0.000	3.354	6.285	14.700	133.780
780.	0.0	16027.9	80.0	16107.9	199.253	50.601	LIQUID	51.474	CHOKE	2.930	0.000	3.351	6.280	14.700	133.780
840.	0.0	15647.0	84.1	15731.1	199.188	50.553	LIQUID	51.346	CHOKE	2.928	0.000	3.347	6.275	14.700	133.780
900.	0.0	15266.5	88.1	15354.6	199.121	50.503	LIQUID	51.218	CHOKE	2.927	0.000	3.344	6.271	14.700	133.780
960.	0.0	14886.2	92.1	14978.4	199.052	50.453	LIQUID	51.089	CHOKE	2.926	0.000	3.340	6.266	14.700	133.780
1020.	0.0	14506.3	96.1	14602.4	198.982	50.402	LIQUID	50.960	CHOKE	2.924	0.000	3.336	6.259	14.700	133.780
1080.	0.0	14126.7	100.1	14226.9	198.910	50.349	LIQUID	50.830	CHOKE	2.915	0.000	3.324	6.239	14.700	133.780
1140.	0.0	13748.4	104.1	13852.6	198.837	50.295	LIQUID	50.699	CHOKE	2.906	0.000	3.312	6.218	14.700	133.780
1200.	0.0	13371.4	108.1	13479.5	198.762	50.240	LIQUID	50.568	CHOKE	2.898	0.000	3.300	6.198	14.700	133.780
1260.	0.0	12995.6	112.0	13107.6	198.685	50.184	LIQUID	50.436	CHOKE	2.889	0.000	3.288	6.177	14.700	133.780
1320.	0.0	12621.1	115.9	12736.9	198.607	50.127	LIQUID	50.304	CHOKE	2.881	0.000	3.276	6.157	14.700	133.780
1380.	0.0	12247.8	119.8	12367.5	198.527	50.069	LIQUID	50.170	CHOKE	2.872	0.000	3.264	6.136	14.700	133.780
1440.	0.0	11875.7	123.6	11999.3	198.444	50.009	LIQ-VAP	50.009	CHOKE	2.828	0.000	3.232	6.060	14.700	133.780
1500.	0.0	11508.4	127.4	11635.7	198.340	49.933	LIQ-VAP	49.933	CHOKE	1.238	0.000	2.648	3.887	14.700	133.780
1560.	0.0	11274.7	127.8	11402.5	196.942	48.923	VAPOR	48.923	CHOKE	0.000	0.000	2.462	2.462	14.700	195.786
1620.	0.0	11130.3	124.5	11254.8	193.642	46.601	VAPOR	46.601	CHOKE	0.000	0.000	2.352	2.352	14.700	192.550
1680.	0.0	10992.5	121.2	11113.7	190.435	44.425	VAPOR	44.425	CHOKE	0.000	0.000	2.249	2.249	14.700	189.404
1740.	0.0	10860.7	118.0	10978.8	187.317	42.385	VAPOR	42.385	CHOKE	0.000	0.000	2.152	2.152	14.700	186.345
1800.	0.0	10734.8	114.9	10849.7	184.286	40.471	VAPOR	40.471	CHOKE	0.000	0.000	2.060	2.060	14.700	183.369
1860.	0.0	10614.3	111.8	10726.1	181.337	38.673	VAPOR	38.673	PDC	0.000	0.000	1.959	1.959	14.700	180.475
1920.	0.0	10499.7	108.8	10608.5	178.490	36.995	VAPOR	36.995	PDC	0.000	0.000	1.860	1.860	14.700	177.679
1980.	0.0	10391.0	105.9	10496.9	175.748	35.433	VAPOR	35.433	PDC	0.000	0.000	1.766	1.766	14.700	174.985
2040.	0.0	10287.8	103.2	10391.0	173.106	33.976	VAPOR	33.976	PDC	0.000	0.000	1.678	1.678	14.700	172.389
2100.	0.0	10189.7	100.5	10290.2	170.562	32.617	VAPOR	32.617	PDC	0.000	0.000	1.595	1.595	14.700	169.889
2160.	0.0	10096.6	97.9	10194.5	168.113	31.348	VAPOR	31.348	PDC	0.000	0.000	1.517	1.517	14.700	167.480
2220.	0.0	10008.0	95.5	10103.5	165.754	30.163	VAPOR	30.163	PDC	0.000	0.000	1.443	1.443	14.700	165.161
2280.	0.0	9923.8	93.1	10016.9	163.484	29.055	VAPOR	29.055	PDC	0.000	0.000	1.373	1.373	14.700	162.928
2340.	0.0	9843.7	90.9	9934.6	161.300	28.019	VAPOR	28.019	PDC	0.000	0.000	1.306	1.306	14.700	160.779
2400.	0.0	9767.5	88.7	9856.2	159.198	27.049	VAPOR	27.049	PDC	0.000	0.000	1.243	1.243	14.700	158.711
2460.	0.0	9695.0	86.7	9781.7	157.177	26.141	VAPOR	26.141	PDC	0.000	0.000	1.183	1.183	14.700	156.722
2520.	0.0	9626.0	84.7	9710.7	155.233	25.291	VAPOR	25.291	PDC	0.000	0.000	1.126	1.126	14.700	154.809

Ex. 1, Case 2 (continued)

2580.	0.0	9560.3	82.8	9643.2	153.366	24.494	VAPOR	24.494	PDC	0.000	0.000	1.071	1.071	14.700	152.970
2640.	0.0	9497.8	81.1	9578.9	151.572	23.747	VAPOR	23.747	PDC	0.000	0.000	1.019	1.019	14.700	151.204
2700.	0.0	9438.4	79.4	9517.8	149.850	23.047	VAPOR	23.047	PDC	0.000	0.000	0.969	0.969	14.700	149.508
2760.	0.0	9381.9	77.7	9459.6	148.197	22.390	VAPOR	22.390	PDC	0.000	0.000	0.922	0.922	14.700	147.880
2820.	37.3	9289.9	77.0	9404.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2880.	120.3	9152.7	77.4	9350.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2940.	203.4	9015.6	77.8	9296.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3000.	286.4	8878.4	78.2	9243.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3060.	369.4	8741.3	78.6	9189.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3120.	452.4	8604.1	78.9	9135.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3180.	535.4	8466.9	79.3	9081.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3240.	618.4	8329.8	79.7	9027.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3300.	701.4	8192.6	80.1	8974.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3360.	784.4	8055.5	80.4	8920.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3420.	867.4	7918.3	80.8	8866.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3480.	950.4	7781.1	81.2	8812.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3540.	1033.4	7644.0	81.6	8759.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3600.	1116.4	7506.8	81.9	8705.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3660.	1199.4	7369.7	82.3	8651.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3720.	1282.4	7232.5	82.7	8597.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3780.	1365.4	7095.4	83.1	8543.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3840.	1448.4	6958.2	83.5	8490.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3900.	1531.4	6821.0	83.8	8436.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3960.	1614.4	6683.9	84.2	8382.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4020.	1697.4	6546.7	84.6	8328.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4080.	1780.4	6409.6	85.0	8275.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4140.	1863.4	6272.4	85.3	8221.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4200.	1946.4	6135.2	85.7	8167.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4260.	2029.4	5998.1	86.1	8113.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4320.	2112.4	5860.9	86.5	8059.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4380.	2195.4	5723.8	86.8	8006.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4440.	2278.5	5586.6	87.2	7952.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4500.	2361.5	5449.5	87.6	7898.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4560.	2444.5	5312.3	88.0	7844.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4620.	2527.5	5175.1	88.4	7791.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4680.	2610.5	5038.0	88.7	7737.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4740.	2693.5	4900.8	89.1	7683.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4800.	2776.5	4763.7	89.5	7629.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4860.	2859.5	4626.5	89.9	7575.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4920.	2942.5	4489.3	90.2	7522.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4980.	3025.5	4352.2	90.6	7468.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5040.	3108.5	4215.0	91.0	7414.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5100.	3191.5	4077.9	91.4	7360.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5160.	3274.5	3940.7	91.8	7307.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5220.	3357.5	3803.5	92.1	7253.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5280.	3440.5	3666.4	92.5	7199.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5340.	3523.5	3529.2	92.9	7145.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5400.	3606.5	3392.1	93.3	7091.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

Ex. 1, Case 2 (continued)

5460.	3689.5	3254.9	93.6	7038.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5520.	3772.5	3117.8	94.0	6984.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5580.	3855.5	2980.6	94.4	6930.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5640.	3938.5	2843.4	94.8	6876.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5700.	4021.5	2706.3	95.1	6823.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5760.	4104.5	2569.1	95.5	6769.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5820.	4187.5	2432.0	95.9	6715.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5880.	4270.5	2294.8	96.3	6661.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5940.	4353.5	2157.6	96.7	6607.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6000.	4436.6	2020.5	97.0	6554.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6060.	4519.6	1883.3	97.4	6500.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6120.	4602.6	1746.2	97.8	6446.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6180.	4685.6	1609.0	98.2	6392.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6240.	4768.6	1471.8	98.5	6339.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6300.	4851.6	1334.7	98.9	6285.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6360.	4934.6	1197.5	99.3	6231.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6420.	5017.6	1060.4	99.7	6177.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6480.	5100.6	923.2	100.0	6123.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6540.	5183.6	786.1	100.4	6070.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6600.	5266.6	648.9	100.8	6016.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6660.	5349.6	511.7	101.2	5962.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6720.	5432.6	374.6	101.6	5908.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6780.	5515.6	237.4	101.9	5855.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6840.	5598.6	100.3	102.3	5801.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

TITLE: EX. 1, CASE 3. 10-TON CYL, SHEARED VALVE AT 12 O'CLOCK, UF6 AT 200 F

	****** CONDITION OF UF6 IN CONTAINMENT ******						PATHWAY INLET			********* CONDITION OF UF6 EXHAUSTED *********					
TIME	********* MASS (LB) *********				TEMP	PRES	RELEASE	PRES	FLOW RATE	**** RELEASE RATE (LB/SEC) ****				TEMP	PRES
(SEC)	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)	PHASE	(PSIA)	BASIS	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)
0.	0.0	21003.4	26.6	21030.0	200.000	51.152	VAPOR	51.152	CHOKE	0.000	0.000	2.567	2.567	14.700	198.784
60.	0.0	20847.9	28.1	20876.0	198.100	49.758	VAPOR	49.758	CHOKE	0.000	0.000	2.502	2.502	14.700	196.922
120.	0.0	20696.5	29.4	20725.9	196.231	48.415	VAPOR	48.415	CHOKE	0.000	0.000	2.438	2.438	14.700	195.089
180.	0.0	20549.0	30.6	20579.6	194.392	47.121	VAPOR	47.121	CHOKE	0.000	0.000	2.377	2.377	14.700	193.286
240.	0.0	20405.2	31.7	20437.0	192.582	45.873	VAPOR	45.873	CHOKE	0.000	0.000	2.318	2.318	14.700	191.511
300.	0.0	20265.2	32.7	20297.9	190.801	44.669	VAPOR	44.669	CHOKE	0.000	0.000	2.260	2.260	14.700	189.763
360.	0.0	20128.7	33.6	20162.3	189.048	43.508	VAPOR	43.508	CHOKE	0.000	0.000	2.205	2.205	14.700	188.043
420.	0.0	19995.5	34.4	20030.0	187.322	42.388	VAPOR	42.388	CHOKE	0.000	0.000	2.152	2.152	14.700	186.350
480.	0.0	19865.7	35.2	19900.9	185.624	41.307	VAPOR	41.307	CHOKE	0.000	0.000	2.100	2.100	14.700	184.683
540.	0.0	19739.1	35.8	19774.9	183.952	40.264	VAPOR	40.264	CHOKE	0.000	0.000	2.050	2.050	14.700	183.041
600.	0.0	19615.5	36.4	19651.9	182.305	39.256	VAPOR	39.256	PDC	0.000	0.000	1.993	1.993	14.700	181.425
660.	0.0	19495.4	36.9	19532.3	180.692	38.287	VAPOR	38.287	PDC	0.000	0.000	1.936	1.936	14.700	179.840
720.	0.0	19378.8	37.3	19416.1	179.111	37.356	VAPOR	37.356	PDC	0.000	0.000	1.881	1.881	14.700	178.288
780.	0.0	19265.5	37.7	19303.2	177.563	36.461	VAPOR	36.461	PDC	0.000	0.000	1.828	1.828	14.700	176.768
840.	0.0	19155.5	38.0	19193.5	176.048	35.601	VAPOR	35.601	PDC	0.000	0.000	1.777	1.777	14.700	175.279
900.	0.0	19048.7	38.3	19086.9	174.563	34.774	VAPOR	34.774	PDC	0.000	0.000	1.727	1.727	14.700	173.821
960.	0.0	18944.8	38.5	18983.3	173.110	33.978	VAPOR	33.978	PDC	0.000	0.000	1.679	1.679	14.700	172.392
1020.	0.0	18844.0	38.7	18882.6	171.687	33.212	VAPOR	33.212	PDC	0.000	0.000	1.632	1.632	14.700	170.994
1080.	0.0	18745.9	38.8	18784.7	170.294	32.476	VAPOR	32.476	PDC	0.000	0.000	1.587	1.587	14.700	169.624
1140.	0.0	18650.6	38.9	18689.5	168.930	31.767	VAPOR	31.767	PDC	0.000	0.000	1.543	1.543	14.700	168.283
1200.	0.0	18557.9	39.0	18596.9	167.594	31.084	VAPOR	31.084	PDC	0.000	0.000	1.501	1.501	14.700	166.970
1260.	0.0	18467.8	39.1	18506.9	166.286	30.427	VAPOR	30.427	PDC	0.000	0.000	1.459	1.459	14.700	165.684
1320.	0.0	18380.3	39.1	18419.3	165.007	29.794	VAPOR	29.794	PDC	0.000	0.000	1.420	1.420	14.700	164.426
1380.	0.0	18295.1	39.1	18334.2	163.754	29.185	VAPOR	29.185	PDC	0.000	0.000	1.381	1.381	14.700	163.193
1440.	0.0	18212.2	39.1	18251.3	162.527	28.598	VAPOR	28.598	PDC	0.000	0.000	1.343	1.343	14.700	161.987
1500.	0.0	18131.7	39.0	18170.7	161.327	28.032	VAPOR	28.032	PDC	0.000	0.000	1.307	1.307	14.700	160.806
1560.	0.0	18053.3	39.0	18092.3	160.153	27.486	VAPOR	27.486	PDC	0.000	0.000	1.271	1.271	14.700	159.651
1620.	0.0	17977.1	38.9	18016.0	159.003	26.961	VAPOR	26.961	PDC	0.000	0.000	1.237	1.237	14.700	158.520
1680.	0.0	17903.0	38.8	17941.8	157.879	26.454	VAPOR	26.454	PDC	0.000	0.000	1.203	1.203	14.700	157.413
1740.	0.0	17830.9	38.7	17869.6	156.779	25.965	VAPOR	25.965	PDC	0.000	0.000	1.171	1.171	14.700	156.330
1800.	0.0	17760.7	38.6	17799.4	155.703	25.494	VAPOR	25.494	PDC	0.000	0.000	1.139	1.139	14.700	155.271
1860.	0.0	17692.5	38.5	17731.0	154.650	25.040	VAPOR	25.040	PDC	0.000	0.000	1.108	1.108	14.700	154.235
1920.	0.0	17626.1	38.4	17664.5	153.621	24.602	VAPOR	24.602	PDC	0.000	0.000	1.078	1.078	14.700	153.221
1980.	0.0	17561.5	38.3	17599.8	152.614	24.179	VAPOR	24.179	PDC	0.000	0.000	1.049	1.049	14.700	152.230
2040.	0.0	17498.7	38.1	17536.8	151.630	23.771	VAPOR	23.771	PDC	0.000	0.000	1.021	1.021	14.700	151.261
2100.	0.0	17437.6	38.0	17475.6	150.668	23.378	VAPOR	23.378	PDC	0.000	0.000	0.993	0.993	14.700	150.314
2160.	0.0	17378.2	37.8	17416.0	149.728	22.998	VAPOR	22.998	PDC	0.000	0.000	0.966	0.966	14.700	149.387
2220.	0.0	17320.4	37.7	17358.1	148.809	22.631	VAPOR	22.631	PDC	0.000	0.000	0.939	0.939	14.700	148.482
2280.	0.0	17264.2	37.5	17301.7	147.911	22.278	VAPOR	22.278	PDC	0.000	0.000	0.914	0.914	14.700	147.598
2340.	26.3	17183.1	37.5	17246.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2400.	109.3	17045.9	37.9	17193.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2460.	192.3	16908.8	38.3	17139.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2520.	275.3	16771.6	38.6	17085.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

Ex. 1, Case 3 (continued)

2580.	358.3	16634.5	39.0	17031.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2640.	441.3	16497.3	39.4	16978.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2700.	524.3	16360.2	39.8	16924.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2760.	607.3	16223.0	40.1	16870.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2820.	690.3	16085.8	40.5	16816.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2880.	773.3	15948.7	40.9	16762.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2940.	856.3	15811.5	41.3	16709.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3000.	939.3	15674.4	41.7	16655.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3060.	1022.3	15537.2	42.0	16601.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3120.	1105.3	15400.0	42.4	16547.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3180.	1188.3	15262.9	42.8	16494.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3240.	1271.3	15125.7	43.2	16440.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3300.	1354.3	14988.6	43.5	16386.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3360.	1437.3	14851.4	43.9	16332.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3420.	1520.3	14714.2	44.3	16278.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3480.	1603.3	14577.1	44.7	16225.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3540.	1686.3	14439.9	45.0	16171.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3600.	1769.3	14302.8	45.4	16117.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3660.	1852.3	14165.6	45.8	16063.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3720.	1935.3	14028.5	46.2	16010.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3780.	2018.4	13891.3	46.6	15956.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3840.	2101.4	13754.1	46.9	15902.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3900.	2184.4	13617.0	47.3	15848.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
3960.	2267.4	13479.8	47.7	15794.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4020.	2350.4	13342.7	48.1	15741.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4080.	2433.4	13205.5	48.4	15687.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4140.	2516.4	13068.3	48.8	15633.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4200.	2599.4	12931.2	49.2	15579.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4260.	2682.4	12794.0	49.6	15526.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4320.	2765.4	12656.9	49.9	15472.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4380.	2848.4	12519.7	50.3	15418.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4440.	2931.4	12382.5	50.7	15364.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4500.	3014.4	12245.4	51.1	15310.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4560.	3097.4	12108.2	51.5	15257.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4620.	3180.4	11971.1	51.8	15203.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4680.	3263.4	11833.9	52.2	15149.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4740.	3346.4	11696.8	52.6	15095.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4800.	3429.4	11559.6	53.0	15042.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4860.	3512.4	11422.4	53.3	14988.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4920.	3595.4	11285.3	53.7	14934.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
4980.	3678.4	11148.1	54.1	14880.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5040.	3761.4	11011.0	54.5	14826.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5100.	3844.4	10873.8	54.8	14773.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5160.	3927.4	10736.6	55.2	14719.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5220.	4010.4	10599.5	55.6	14665.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5280.	4093.5	10462.3	56.0	14611.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5340.	4176.5	10325.2	56.4	14558.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5400.	4259.5	10188.0	56.7	14504.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

Ex. 1, Case 3 (continued)

5460.	4342.5	10050.8	57.1	14450.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5520.	4425.5	9913.7	57.5	14396.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5580.	4508.5	9776.5	57.9	14342.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5640.	4591.5	9639.4	58.2	14289.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5700.	4674.5	9502.2	58.6	14235.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5760.	4757.5	9365.1	59.0	14181.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5820.	4840.5	9227.9	59.4	14127.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5880.	4923.5	9090.7	59.7	14074.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
5940.	5006.5	8953.6	60.1	14020.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6000.	5089.5	8816.4	60.5	13966.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6060.	5172.5	8679.3	60.9	13912.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6120.	5255.5	8542.1	61.3	13858.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6180.	5338.5	8404.9	61.6	13805.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6240.	5421.5	8267.8	62.0	13751.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6300.	5504.5	8130.6	62.4	13697.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6360.	5587.5	7993.5	62.8	13643.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6420.	5670.5	7856.3	63.1	13590.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6480.	5753.5	7719.2	63.5	13536.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6540.	5836.5	7582.0	63.9	13482.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6600.	5919.5	7444.8	64.3	13428.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6660.	6002.5	7307.7	64.7	13374.9	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6720.	6085.5	7170.5	65.0	13321.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6780.	6168.5	7033.4	65.4	13267.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6840.	6251.6	6896.2	65.8	13213.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6900.	6334.6	6759.0	66.2	13159.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
6960.	6417.6	6621.9	66.5	13106.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
7020.	6500.6	6484.7	66.9	13052.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
7080.	6583.6	6347.6	67.3	12998.4	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
7140.	6666.6	6210.4	67.7	12944.6	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

TITLE: EX. 1, CASE 4. 10-TON CYL, SHEARED VALVE AT 6 O'CLOCK, UF6 AT 250 F

	******* CONDITION OF UF6 IN CONTAINMENT *******						PATHWAY INLET		FLOW	********* CONDITION OF UF6 EXHAUSTED *********					
TIME	********** MASS (LB) **********				TEMP	PRES	RELEASE	PRES	RATE	**** RELEASE RATE (LB/SEC) ****				TEMP	PRES
(SEC)	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)	PHASE	(PSIA)	BASIS	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)
0.	0.0	21007.6	22.4	21030.0	250.000	99.709	LIQUID	103.976	CHOKE	3.776	0.000	6.934	10.710	14.700	133.780
60.	0.0	20351.9	35.5	20387.4	249.850	99.525	LIQUID	103.586	CHOKE	3.775	0.000	6.921	10.696	14.700	133.780
120.	0.0	19697.1	48.6	19745.7	249.696	99.335	LIQUID	103.213	CHOKE	3.773	0.000	6.907	10.681	14.700	133.780
180.	0.0	19043.3	61.5	19104.8	249.537	99.141	LIQUID	102.849	CHOKE	3.772	0.000	6.894	10.665	14.700	133.780
240.	0.0	18390.4	74.5	18464.9	249.373	98.941	LIQUID	102.488	CHOKE	3.770	0.000	6.879	10.650	14.700	133.780
300.	0.0	17738.6	87.3	17825.9	249.205	98.735	LIQUID	102.129	CHOKE	3.769	0.000	6.865	10.633	14.700	133.780
360.	0.0	17087.8	100.1	17187.9	249.031	98.522	LIQUID	101.770	CHOKE	3.767	0.000	6.850	10.617	14.700	133.780
420.	0.0	16438.1	112.8	16550.9	248.851	98.304	LIQUID	101.407	CHOKE	3.765	0.000	6.834	10.599	14.700	133.780
480.	0.0	15789.6	125.4	15915.0	248.665	98.077	LIQUID	101.042	CHOKE	3.763	0.000	6.818	10.582	14.700	133.780
540.	0.0	15142.1	137.9	15280.1	248.473	97.844	LIQUID	100.671	CHOKE	3.761	0.000	6.802	10.563	14.700	133.780
600.	0.0	14495.9	150.4	14646.3	248.273	97.602	LIQUID	100.295	CHOKE	3.759	0.000	6.785	10.544	14.700	133.780
660.	0.0	13850.9	162.7	14013.6	248.066	97.351	LIQUID	99.911	CHOKE	3.757	0.000	6.767	10.524	14.700	133.780
720.	0.0	13207.2	175.0	13382.2	247.851	97.091	LIQUID	99.520	CHOKE	3.755	0.000	6.749	10.504	14.700	133.780
780.	0.0	12564.8	187.2	12751.9	247.626	96.820	LIQUID	99.120	CHOKE	3.753	0.000	6.730	10.482	14.700	133.780
840.	0.0	11923.8	199.2	12123.0	247.392	96.538	LIQUID	98.709	CHOKE	3.750	0.000	6.710	10.460	14.700	133.780
900.	0.0	11284.3	211.1	11495.4	247.147	96.244	LIQUID	98.286	CHOKE	3.748	0.000	6.689	10.437	14.700	133.780
960.	0.0	10646.2	223.0	10869.2	246.891	95.936	LIQUID	97.850	CHOKE	3.745	0.000	6.667	10.412	14.700	133.780
1020.	0.0	10009.8	234.7	10244.5	246.621	95.613	LIQUID	97.400	CHOKE	3.742	0.000	6.645	10.387	14.700	133.780
1080.	0.0	9375.1	246.2	9621.3	246.337	95.274	LIQUID	96.933	CHOKE	3.739	0.000	6.621	10.360	14.700	133.780
1140.	0.0	8742.1	257.6	8999.7	246.037	94.917	LIQUID	96.447	CHOKE	3.730	0.000	6.586	10.316	14.700	133.780
1200.	0.0	8111.9	268.8	8380.7	245.719	94.539	LIQUID	95.941	CHOKE	3.720	0.000	6.547	10.266	14.700	133.780
1260.	0.0	7484.9	279.8	7764.8	245.381	94.139	LIQUID	95.412	CHOKE	3.709	0.000	6.506	10.214	14.700	133.780
1320.	0.0	6861.3	290.6	7151.9	245.021	93.714	LIQUID	94.856	CHOKE	3.697	0.000	6.463	10.160	14.700	133.780
1380.	0.0	6241.1	301.2	6542.3	244.635	93.259	LIQUID	94.270	CHOKE	3.686	0.000	6.418	10.104	14.700	133.780
1440.	0.0	5624.5	311.5	5936.1	244.219	92.771	LIQUID	93.648	CHOKE	3.673	0.000	6.371	10.045	14.700	133.780
1500.	0.0	5011.8	321.5	5333.4	243.768	92.243	LIQUID	92.984	CHOKE	3.661	0.000	6.321	9.982	14.700	133.780
1560.	0.0	4403.2	331.2	4734.5	243.274	91.668	LIQUID	92.271	CHOKE	3.647	0.000	6.268	9.915	14.700	133.780
1620.	0.0	3799.0	340.5	4139.6	242.729	91.036	LIQUID	91.497	CHOKE	3.633	0.000	6.210	9.843	14.700	133.780
1680.	0.0	3199.6	349.4	3548.9	242.121	90.334	LIQUID	90.647	CHOKE	3.618	0.000	6.148	9.765	14.700	133.780
1740.	0.0	2605.4	357.7	2963.0	241.430	89.541	LIQUID	89.701	CHOKE	3.572	0.000	6.030	9.602	14.700	133.780
1800.	0.0	2021.7	365.3	2386.9	240.639	88.639	LIQ-VAP	88.639	CHOKE	3.319	0.000	5.789	9.108	14.700	133.780
1860.	0.0	1472.0	368.4	1840.4	238.883	86.678	VAPOR	86.678	CHOKE	0.000	0.000	4.203	4.203	14.700	236.832
1920.	0.0	1308.5	279.7	1588.2	212.777	61.307	VAPOR	61.307	CHOKE	0.000	0.000	3.042	3.042	14.700	211.301
1980.	0.0	1190.3	215.4	1405.7	190.643	44.564	VAPOR	44.564	CHOKE	0.000	0.000	2.255	2.255	14.700	189.609
2040.	0.0	1101.7	168.7	1270.4	171.766	33.254	VAPOR	33.254	PDC	0.000	0.000	1.634	1.634	14.700	171.072
2100.	0.0	1036.5	135.8	1172.3	156.340	25.772	VAPOR	25.772	PDC	0.000	0.000	1.158	1.158	14.700	155.898
2160.	26.3	957.7	118.9	1102.8	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2220.	109.3	820.6	119.3	1049.1	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2280.	192.3	683.4	119.6	995.3	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2340.	275.3	546.2	120.0	941.5	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2400.	358.3	409.1	120.4	887.7	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2460.	441.3	271.9	120.8	834.0	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003
2520.	524.3	134.8	121.1	780.2	147.307	22.042	VAPOR	22.042	PDC	0.000	0.000	0.896	0.896	14.700	147.003

TITLE: EX. 2, CASE 1. RELEASE FROM 8" BREACH IN SIDE OF 14-T CYL (AS HOLE IN END)

	****** CONDITION OF UF6 IN CONTAINMENT ******						PATHWAY INLET			********* CONDITION OF UF6 EXHAUSTED *********					
TIME (SEC)	********* MASS (LB) ********* SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	**** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	25850.6	49.4	25900.0	190.000	44.136	LIQUID	48.687	CHOKE	16.396	0.000	17.275	33.671	14.700	133.780
10.	0.0	25510.7	52.6	25563.3	189.967	44.114	LIQUID	48.604	CHOKE	16.392	0.000	17.266	33.658	14.700	133.780
20.	0.0	25170.9	55.8	25226.7	189.934	44.093	LIQUID	48.521	CHOKE	16.388	0.000	17.256	33.645	14.700	133.780
30.	0.0	24831.3	59.0	24890.3	189.901	44.070	LIQUID	48.439	CHOKE	16.384	0.000	17.247	33.631	14.700	133.780
40.	0.0	24491.8	62.2	24553.9	189.867	44.048	LIQUID	48.357	CHOKE	16.380	0.000	17.238	33.618	14.700	133.780
50.	0.0	24152.4	65.4	24217.8	189.833	44.025	LIQUID	48.276	CHOKE	16.376	0.000	17.228	33.604	14.700	133.780
60.	0.0	23813.2	68.6	23881.7	189.798	44.003	LIQUID	48.195	CHOKE	16.372	0.000	17.218	33.590	14.700	133.780
70.	0.0	23474.1	71.8	23545.8	189.763	43.979	LIQUID	48.115	CHOKE	16.367	0.000	17.208	33.576	14.700	133.780
80.	0.0	23135.1	74.9	23210.1	189.728	43.956	LIQUID	48.035	CHOKE	16.363	0.000	17.198	33.562	14.700	133.780
90.	0.0	22796.3	78.1	22874.5	189.692	43.932	LIQUID	47.955	CHOKE	16.359	0.000	17.188	33.547	14.700	133.780
100.	0.0	22457.7	81.3	22539.0	189.655	43.908	LIQUID	47.875	CHOKE	16.354	0.000	17.178	33.532	14.700	133.780
110.	0.0	22119.2	84.5	22203.7	189.618	43.883	LIQUID	47.795	CHOKE	16.350	0.000	17.168	33.517	14.700	133.780
120.	0.0	21780.9	87.6	21868.5	189.581	43.859	LIQUID	47.716	CHOKE	16.345	0.000	17.157	33.502	14.700	133.780
130.	0.0	21442.7	90.8	21533.5	189.543	43.834	LIQUID	47.636	CHOKE	16.340	0.000	17.147	33.487	14.700	133.780
140.	0.0	21104.7	93.9	21198.6	189.504	43.808	LIQUID	47.557	CHOKE	16.336	0.000	17.136	33.472	14.700	133.780
150.	0.0	20766.8	97.1	20863.9	189.465	43.782	LIQUID	47.477	CHOKE	16.331	0.000	17.125	33.456	14.700	133.780
160.	0.0	20429.1	100.2	20529.3	189.425	43.756	LIQUID	47.398	CHOKE	16.326	0.000	17.114	33.440	14.700	133.780
170.	0.0	20091.6	103.4	20194.9	189.385	43.730	LIQUID	47.318	CHOKE	16.321	0.000	17.102	33.424	14.700	133.780
180.	0.0	19754.2	106.5	19860.7	189.344	43.703	LIQUID	47.238	CHOKE	16.316	0.000	17.091	33.407	14.700	133.780
190.	0.0	19417.0	109.6	19526.6	189.302	43.675	LIQUID	47.158	CHOKE	16.311	0.000	17.079	33.390	14.700	133.780
200.	0.0	19080.0	112.7	19192.7	189.260	43.648	LIQUID	47.078	CHOKE	16.306	0.000	17.068	33.374	14.700	133.780
210.	0.0	18743.1	115.8	18859.0	189.217	43.620	LIQUID	46.998	CHOKE	16.301	0.000	17.056	33.356	14.700	133.780
220.	0.0	18406.5	118.9	18525.4	189.174	43.591	LIQUID	46.917	CHOKE	16.295	0.000	17.044	33.339	14.700	133.780
230.	0.0	18070.0	122.0	18192.0	189.130	43.562	LIQUID	46.836	CHOKE	16.290	0.000	17.031	33.321	14.700	133.780
240.	0.0	17733.7	125.1	17858.8	189.085	43.532	LIQUID	46.755	CHOKE	16.284	0.000	17.019	33.303	14.700	133.780
250.	0.0	17397.6	128.2	17525.8	189.039	43.502	LIQUID	46.673	CHOKE	16.279	0.000	17.006	33.285	14.700	133.780
260.	0.0	17061.6	131.3	17192.9	188.992	43.472	LIQUID	46.591	CHOKE	16.273	0.000	16.993	33.266	14.700	133.780
270.	0.0	16725.9	134.4	16860.3	188.945	43.441	LIQUID	46.509	CHOKE	16.267	0.000	16.980	33.247	14.700	133.780
280.	0.0	16390.4	137.4	16527.8	188.897	43.409	LIQUID	46.426	CHOKE	16.261	0.000	16.966	33.228	14.700	133.780
290.	0.0	16055.0	140.5	16195.5	188.848	43.377	LIQUID	46.342	CHOKE	16.255	0.000	16.953	33.208	14.700	133.780
300.	0.0	15719.9	143.5	15863.4	188.798	43.345	LIQUID	46.258	CHOKE	16.249	0.000	16.939	33.188	14.700	133.780
310.	0.0	15385.0	146.6	15531.6	188.747	43.311	LIQUID	46.174	CHOKE	16.243	0.000	16.925	33.168	14.700	133.780
320.	0.0	15050.3	149.6	15199.9	188.695	43.277	LIQUID	46.089	CHOKE	16.236	0.000	16.910	33.147	14.700	133.780
330.	0.0	14715.8	152.6	14868.4	188.642	43.243	LIQUID	46.003	CHOKE	16.230	0.000	16.896	33.126	14.700	133.780
340.	0.0	14381.5	155.6	14537.2	188.588	43.207	LIQUID	45.917	CHOKE	16.223	0.000	16.881	33.104	14.700	133.780
350.	0.0	14047.5	158.6	14206.1	188.533	43.172	LIQUID	45.830	CHOKE	16.217	0.000	16.865	33.082	14.700	133.780
360.	0.0	13713.7	161.6	13875.3	188.476	43.135	LIQUID	45.742	CHOKE	16.210	0.000	16.850	33.059	14.700	133.780
370.	0.0	13380.1	164.6	13544.7	188.419	43.097	LIQUID	45.653	CHOKE	16.203	0.000	16.834	33.036	14.700	133.780
380.	0.0	13046.7	167.6	13214.3	188.360	43.059	LIQUID	45.564	CHOKE	16.195	0.000	16.818	33.013	14.700	133.780
390.	0.0	12713.6	170.6	12884.2	188.300	43.020	LIQUID	45.473	CHOKE	16.188	0.000	16.801	32.989	14.700	133.780
400.	0.0	12380.8	173.5	12554.3	188.239	42.980	LIQUID	45.382	CHOKE	16.180	0.000	16.784	32.964	14.700	133.780
410.	0.0	12048.2	176.5	12224.7	188.176	42.939	LIQUID	45.289	CHOKE	16.173	0.000	16.767	32.939	14.700	133.780
420.	0.0	11715.9	179.4	11895.3	188.111	42.898	LIQUID	45.196	CHOKE	16.165	0.000	16.749	32.914	14.700	133.780

Ex. 2, Case 1 (continued)

430.	0.0	11383.8	182.3	11566.2	188.045	42.855	LIQUID	45.101	CHOKE	16.157	0.000	16.731	32.887	14.700	133.780
440.	0.0	11052.0	185.3	11237.3	187.978	42.811	LIQUID	45.006	CHOKE	16.148	0.000	16.712	32.860	14.700	133.780
450.	0.0	10720.5	188.2	10908.7	187.908	42.766	LIQUID	44.908	CHOKE	16.140	0.000	16.693	32.833	14.700	133.780
460.	0.0	10389.3	191.0	10580.3	187.837	42.720	LIQUID	44.810	CHOKE	16.131	0.000	16.673	32.804	14.700	133.780
470.	0.0	10058.4	193.9	10252.3	187.763	42.672	LIQUID	44.710	CHOKE	16.122	0.000	16.653	32.775	14.700	133.780
480.	0.0	9727.8	196.8	9924.6	187.688	42.624	LIQUID	44.609	CHOKE	16.113	0.000	16.633	32.745	14.700	133.780
490.	0.0	9397.5	199.6	9597.1	187.610	42.574	LIQUID	44.505	CHOKE	16.103	0.000	16.611	32.714	14.700	133.780
500.	0.0	9067.5	202.5	9270.0	187.531	42.522	LIQUID	44.401	CHOKE	16.093	0.000	16.590	32.683	14.700	133.780
510.	0.0	8737.9	205.3	8943.1	187.448	42.469	LIQUID	44.294	CHOKE	16.083	0.000	16.567	32.650	14.700	133.780
520.	0.0	8408.6	208.1	8616.6	187.363	42.414	LIQUID	44.185	CHOKE	16.072	0.000	16.544	32.616	14.700	133.780
530.	0.0	8079.6	210.8	8290.5	187.275	42.358	LIQUID	44.074	CHOKE	16.062	0.000	16.520	32.581	14.700	133.780
540.	0.0	7751.1	213.6	7964.7	187.184	42.300	LIQUID	43.961	CHOKE	16.050	0.000	16.495	32.545	14.700	133.780
550.	0.0	7422.9	216.3	7639.2	187.090	42.239	LIQUID	43.846	CHOKE	16.039	0.000	16.469	32.508	14.700	133.780
560.	0.0	7095.1	219.1	7314.1	186.992	42.177	LIQUID	43.728	CHOKE	16.027	0.000	16.443	32.469	14.700	133.780
570.	0.0	6767.7	221.8	6989.4	186.891	42.112	LIQUID	43.607	CHOKE	16.014	0.000	16.415	32.429	14.700	133.780
580.	0.0	6440.7	224.4	6665.1	186.785	42.044	LIQUID	43.483	CHOKE	16.001	0.000	16.386	32.387	14.700	133.780
590.	0.0	6114.2	227.1	6341.3	186.675	41.974	LIQUID	43.355	CHOKE	15.987	0.000	16.357	32.344	14.700	133.780
600.	0.0	5788.1	229.7	6017.8	186.560	41.901	LIQUID	43.224	CHOKE	15.973	0.000	16.326	32.299	14.700	133.780
610.	0.0	5462.5	232.3	5694.8	186.440	41.824	LIQUID	43.089	CHOKE	15.958	0.000	16.293	32.251	14.700	133.780
620.	0.0	5137.5	234.9	5372.3	186.314	41.744	LIQUID	42.950	CHOKE	15.943	0.000	16.259	32.202	14.700	133.780
630.	0.0	4812.9	237.4	5050.3	186.182	41.660	LIQUID	42.806	CHOKE	15.926	0.000	16.223	32.150	14.700	133.780
640.	0.0	4488.9	239.9	4728.8	186.043	41.572	LIQUID	42.656	CHOKE	15.909	0.000	16.186	32.095	14.700	133.780
650.	0.0	4165.5	242.3	4407.9	185.895	41.479	LIQUID	42.501	CHOKE	15.891	0.000	16.146	32.037	14.700	133.780
660.	0.0	3842.7	244.7	4087.5	185.739	41.380	LIQUID	42.338	CHOKE	15.871	0.000	16.104	31.976	14.700	133.780
670.	0.0	3520.6	247.1	3767.7	185.573	41.275	LIQUID	42.169	CHOKE	15.851	0.000	16.060	31.911	14.700	133.780
680.	0.0	3199.2	249.4	3448.6	185.395	41.163	LIQUID	41.991	CHOKE	15.829	0.000	16.012	31.841	14.700	133.780
690.	0.0	2878.6	251.6	3130.2	185.204	41.043	LIQUID	41.803	CHOKE	15.805	0.000	15.961	31.766	14.700	133.780
700.	0.0	2558.8	253.8	2812.5	184.997	40.914	LIQUID	41.603	CHOKE	15.779	0.000	15.907	31.686	14.700	133.780
710.	0.0	2239.8	255.9	2495.7	184.772	40.773	LIQUID	41.391	CHOKE	15.751	0.000	15.847	31.598	14.700	133.780
720.	0.0	1921.8	257.9	2179.7	184.526	40.619	LIQUID	41.162	CHOKE	15.721	0.000	15.782	31.502	14.700	133.780
730.	0.0	1605.0	259.7	1864.7	184.252	40.450	LIQUID	40.913	CHOKE	15.687	0.000	15.710	31.397	14.700	133.780
740.	0.0	1289.3	261.4	1550.7	183.946	40.260	LIQUID	40.640	CHOKE	15.644	0.000	15.625	31.269	14.700	133.780
750.	0.0	975.0	263.0	1238.0	183.597	40.045	LIQUID	40.335	CHOKE	15.546	0.000	15.480	31.026	14.700	133.780
760.	0.0	663.5	264.3	927.8	183.193	39.797	LIQUID	39.989	CHOKE	15.436	0.000	15.315	30.751	14.700	133.780
770.	0.0	355.0	265.3	620.3	182.712	39.503	LIQ-VAP	39.503	CHOKE	15.151	0.000	15.023	30.174	14.700	133.780

TITLE: EX. 2, CASE 3. RELEASE FROM 8" BREACH IN SIDE OF 14-T CYL (AS HOLE IN END)

TIME (SEC)	******* CONDITION OF UF6 IN CONTAINMENT ******* ********** MASS (LB) ********** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	PATHWAY INLET RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	********* CONDITION OF UF6 EXHAUSTED ********** **** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	25850.6	49.4	25900.0	190.000	44.136	LIQUID	48.687	CHOKE	16.396	0.000	17.275	33.671	14.700	133.780
60.	0.0	23811.1	68.6	23879.7	189.791	43.998	LIQUID	48.190	CHOKE	16.371	0.000	17.216	33.587	14.700	133.780
120.	0.0	21776.8	87.6	21864.5	189.565	43.848	LIQUID	47.705	CHOKE	16.343	0.000	17.153	33.496	14.700	133.780
180.	0.0	19748.2	106.5	19854.7	189.318	43.686	LIQUID	47.221	CHOKE	16.313	0.000	17.084	33.397	14.700	133.780
240.	0.0	17725.8	125.1	17850.9	189.047	43.508	LIQUID	46.729	CHOKE	16.280	0.000	17.008	33.288	14.700	133.780
300.	0.0	15710.1	143.5	15853.6	188.745	43.310	LIQUID	46.223	CHOKE	16.243	0.000	16.924	33.167	14.700	133.780
360.	0.0	13702.0	161.6	13863.6	188.406	43.089	LIQUID	45.694	CHOKE	16.201	0.000	16.830	33.031	14.700	133.780
420.	0.0	11702.4	179.3	11881.8	188.017	42.836	LIQUID	45.133	CHOKE	16.153	0.000	16.723	32.876	14.700	133.780
480.	0.0	9712.6	196.6	9909.2	187.561	42.542	LIQUID	44.524	CHOKE	16.097	0.000	16.598	32.695	14.700	133.780
540.	0.0	7734.2	213.3	7947.5	187.010	42.188	LIQUID	43.847	CHOKE	16.029	0.000	16.448	32.476	14.700	133.780
600.	0.0	5769.8	229.2	5999.0	186.314	41.744	LIQUID	43.064	CHOKE	15.943	0.000	16.259	32.201	14.700	133.780
660.	0.0	3823.1	243.7	4066.9	185.362	41.142	LIQUID	42.097	CHOKE	15.825	0.000	16.004	31.828	14.700	133.780
720.	0.0	1901.4	255.8	2157.2	183.849	40.200	LIQUID	40.738	CHOKE	15.636	0.000	15.604	31.240	14.700	133.780

TITLE: EX. 3, CASE 1. 14-TON CYL W/ RUPTURED PIGTAIL (6 IN)

TIME	****** CONDITION OF UF6 IN CONTAINMENT ******						PATHWAY INLET		FLOW	********* CONDITION OF UF6 EXHAUSTED *********					
	********* MASS (LB) *********				TEMP	PRES	RELEASE	PRES	RATE	**** RELEASE RATE (LB/SEC) ****				TEMP	PRES
(SEC)	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)	PHASE	(PSIA)	BASIS	SOLID	LIQUID	VAPOR	TOTAL	(DEG F)	(PSIA)
0.	0.0	25948.1	51.9	26000.0	200.000	51.152	VAPOR	51.152	CHOKE	0.000	0.000	2.126	2.126	14.700	198.784
30.	0.0	25883.8	52.4	25936.2	199.368	50.685	VAPOR	50.685	CHOKE	0.000	0.000	2.108	2.108	14.700	198.165
60.	0.0	25820.1	52.9	25873.0	198.740	50.224	VAPOR	50.224	CHOKE	0.000	0.000	2.090	2.090	14.700	197.549
90.	0.0	25757.0	53.3	25810.3	198.115	49.769	VAPOR	49.769	CHOKE	0.000	0.000	2.072	2.072	14.700	196.936
120.	0.0	25694.4	53.7	25748.1	197.493	49.319	VAPOR	49.319	CHOKE	0.000	0.000	2.055	2.055	14.700	196.326
150.	0.0	25632.3	54.2	25686.5	196.874	48.874	VAPOR	48.874	CHOKE	0.000	0.000	2.037	2.037	14.700	195.720
180.	0.0	25570.8	54.6	25625.4	196.259	48.435	VAPOR	48.435	CHOKE	0.000	0.000	2.020	2.020	14.700	195.117
210.	0.0	25509.8	54.9	25564.8	195.647	48.001	VAPOR	48.001	PDC	0.000	0.000	2.002	2.002	14.700	194.517
240.	0.0	25449.4	55.3	25504.7	195.039	47.573	VAPOR	47.573	PDC	0.000	0.000	1.983	1.983	14.700	193.920
270.	0.0	25389.6	55.6	25445.2	194.434	47.150	VAPOR	47.150	PDC	0.000	0.000	1.966	1.966	14.700	193.327
300.	0.0	25330.3	56.0	25386.2	193.833	46.733	VAPOR	46.733	PDC	0.000	0.000	1.951	1.951	14.700	192.737
330.	0.0	25271.4	56.3	25327.7	193.234	46.320	VAPOR	46.320	PDC	0.000	0.000	1.934	1.934	14.700	192.150
360.	0.0	25213.1	56.6	25269.7	192.639	45.912	VAPOR	45.912	PDC	0.000	0.000	1.918	1.918	14.700	191.566
390.	0.0	25155.2	56.9	25212.1	192.047	45.509	VAPOR	45.509	PDC	0.000	0.000	1.903	1.903	14.700	190.986
420.	0.0	25097.9	57.2	25155.0	191.458	45.110	VAPOR	45.110	PDC	0.000	0.000	1.887	1.887	14.700	190.408
450.	0.0	25041.0	57.5	25098.4	190.871	44.716	VAPOR	44.716	PDC	0.000	0.000	1.872	1.872	14.700	189.832
480.	0.0	24984.6	57.7	25042.3	190.288	44.327	VAPOR	44.327	PDC	0.000	0.000	1.856	1.856	14.700	189.260
510.	0.0	24928.6	58.0	24986.6	189.708	43.943	VAPOR	43.943	PDC	0.000	0.000	1.838	1.838	14.700	188.691
540.	0.0	24873.3	58.2	24931.5	189.133	43.564	VAPOR	43.564	PDC	0.000	0.000	1.823	1.823	14.700	188.126
570.	0.0	24818.4	58.4	24876.8	188.560	43.189	VAPOR	43.189	PDC	0.000	0.000	1.808	1.808	14.700	187.564
600.	0.0	24763.9	58.6	24822.6	187.990	42.819	VAPOR	42.819	PDC	0.000	0.000	1.791	1.791	14.700	187.005
630.	0.0	24710.0	58.8	24768.8	187.423	42.453	VAPOR	42.453	PDC	0.000	0.000	1.777	1.777	14.700	186.449
660.	0.0	24656.5	59.0	24715.5	186.860	42.092	VAPOR	42.092	PDC	0.000	0.000	1.762	1.762	14.700	185.896
690.	0.0	24603.5	59.2	24662.7	186.300	41.735	VAPOR	41.735	PDC	0.000	0.000	1.748	1.748	14.700	185.346
720.	0.0	24550.9	59.4	24610.2	185.742	41.382	VAPOR	41.382	PDC	0.000	0.000	1.735	1.735	14.700	184.799
750.	0.0	24498.6	59.5	24558.2	185.187	41.033	VAPOR	41.033	PDC	0.000	0.000	1.720	1.720	14.700	184.254
780.	0.0	24446.9	59.7	24506.6	184.636	40.688	VAPOR	40.688	PDC	0.000	0.000	1.703	1.703	14.700	183.713
810.	0.0	24395.7	59.8	24455.5	184.088	40.348	VAPOR	40.348	PDC	0.000	0.000	1.689	1.689	14.700	183.175
840.	0.0	24344.9	60.0	24404.8	183.543	40.012	VAPOR	40.012	PDC	0.000	0.000	1.676	1.676	14.700	182.640
870.	0.0	24294.5	60.1	24354.5	183.001	39.679	VAPOR	39.679	PDC	0.000	0.000	1.662	1.662	14.700	182.108

TITLE: EX. 3, CASE 2. 14-TON CYL W/ RUPTURED PIGTAIL (2 FT)

TIME (SEC)	******* CONDITION OF UF6 IN CONTAINMENT ******* ********** MASS (LB) ********** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	PATHWAY INLET RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	********* CONDITION OF UF6 EXHAUSTED ********* **** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	25948.1	51.9	26000.0	200.000	51.152	VAPOR	51.152	PDC	0.000	0.000	1.914	1.914	14.700	198.784
30.	0.0	25890.2	52.4	25942.6	199.431	50.732	VAPOR	50.732	PDC	0.000	0.000	1.899	1.899	14.700	198.227
60.	0.0	25832.9	52.8	25885.6	198.866	50.317	VAPOR	50.317	PDC	0.000	0.000	1.884	1.884	14.700	197.673
90.	0.0	25775.9	53.2	25829.1	198.303	49.906	VAPOR	49.906	PDC	0.000	0.000	1.870	1.870	14.700	197.121
120.	0.0	25719.5	53.6	25773.0	197.742	49.499	VAPOR	49.499	PDC	0.000	0.000	1.855	1.855	14.700	196.571
150.	0.0	25663.4	53.9	25717.4	197.185	49.097	VAPOR	49.097	PDC	0.000	0.000	1.841	1.841	14.700	196.024
180.	0.0	25607.8	54.3	25662.1	196.630	48.699	VAPOR	48.699	PDC	0.000	0.000	1.826	1.826	14.700	195.480
210.	0.0	25552.7	54.7	25607.4	196.078	48.307	VAPOR	48.307	PDC	0.000	0.000	1.811	1.811	14.700	194.939
240.	0.0	25498.0	55.0	25553.0	195.529	47.918	VAPOR	47.918	PDC	0.000	0.000	1.798	1.798	14.700	194.401
270.	0.0	25443.8	55.3	25499.1	194.982	47.533	VAPOR	47.533	PDC	0.000	0.000	1.784	1.784	14.700	193.865
300.	0.0	25389.9	55.6	25445.6	194.438	47.153	VAPOR	47.153	PDC	0.000	0.000	1.770	1.770	14.700	193.331
330.	0.0	25336.5	56.0	25392.5	193.897	46.777	VAPOR	46.777	PDC	0.000	0.000	1.757	1.757	14.700	192.800
360.	0.0	25283.5	56.2	25339.8	193.358	46.405	VAPOR	46.405	PDC	0.000	0.000	1.743	1.743	14.700	192.272
390.	0.0	25231.0	56.5	25287.5	192.822	46.037	VAPOR	46.037	PDC	0.000	0.000	1.729	1.729	14.700	191.746
420.	0.0	25178.8	56.8	25235.6	192.289	45.673	VAPOR	45.673	PDC	0.000	0.000	1.716	1.716	14.700	191.223
450.	0.0	25127.1	57.1	25184.1	191.759	45.313	VAPOR	45.313	PDC	0.000	0.000	1.702	1.702	14.700	190.703
480.	0.0	25075.8	57.3	25133.1	191.231	44.958	VAPOR	44.958	PDC	0.000	0.000	1.689	1.689	14.700	190.185
510.	0.0	25024.8	57.5	25082.4	190.706	44.606	VAPOR	44.606	PDC	0.000	0.000	1.676	1.676	14.700	189.670
540.	0.0	24974.3	57.8	25032.1	190.183	44.258	VAPOR	44.258	PDC	0.000	0.000	1.664	1.664	14.700	189.157
570.	0.0	24924.2	58.0	24982.2	189.663	43.913	VAPOR	43.913	PDC	0.000	0.000	1.650	1.650	14.700	188.647
600.	0.0	24874.5	58.2	24932.7	189.146	43.573	VAPOR	43.573	PDC	0.000	0.000	1.638	1.638	14.700	188.140
630.	0.0	24825.1	58.4	24883.5	188.631	43.236	VAPOR	43.236	PDC	0.000	0.000	1.625	1.625	14.700	187.635
660.	0.0	24776.2	58.6	24834.8	188.119	42.903	VAPOR	42.903	PDC	0.000	0.000	1.614	1.614	14.700	187.132
690.	0.0	24727.6	58.8	24786.4	187.610	42.573	VAPOR	42.573	PDC	0.000	0.000	1.600	1.600	14.700	186.632
720.	0.0	24679.4	58.9	24738.4	187.103	42.247	VAPOR	42.247	PDC	0.000	0.000	1.588	1.588	14.700	186.135
750.	0.0	24631.6	59.1	24690.7	186.599	41.925	VAPOR	41.925	PDC	0.000	0.000	1.576	1.576	14.700	185.640
780.	0.0	24584.2	59.3	24643.4	186.097	41.606	VAPOR	41.606	PDC	0.000	0.000	1.565	1.565	14.700	185.147
810.	0.0	24537.1	59.4	24596.5	185.597	41.290	VAPOR	41.290	PDC	0.000	0.000	1.553	1.553	14.700	184.657
840.	0.0	24490.3	59.6	24549.9	185.100	40.978	VAPOR	40.978	PDC	0.000	0.000	1.540	1.540	14.700	184.169
870.	0.0	24444.0	59.7	24503.7	184.606	40.670	VAPOR	40.670	PDC	0.000	0.000	1.529	1.529	14.700	183.684

TITLE: EX. 3, CASE 3. 14-TON CYL W/ RUPTURED PIGTAIL (4 FT)

TIME (SEC)	******* CONDITION OF UF6 IN CONTAINMENT ******* ********** MASS (LB) ********** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)	PATHWAY INLET RELEASE PHASE	PRES (PSIA)	FLOW RATE BASIS	********* CONDITION OF UF6 EXHAUSTED ********** **** RELEASE RATE (LB/SEC) **** SOLID	LIQUID	VAPOR	TOTAL	TEMP (DEG F)	PRES (PSIA)
0.	0.0	25948.1	51.9	26000.0	200.000	51.152	VAPOR	51.152	PDC	0.000	0.000	1.754	1.754	14.700	198.784
30.	0.0	25895.1	52.3	25947.4	199.479	50.767	VAPOR	50.767	PDC	0.000	0.000	1.741	1.741	14.700	198.274
60.	0.0	25842.4	52.7	25895.1	198.960	50.386	VAPOR	50.386	PDC	0.000	0.000	1.728	1.728	14.700	197.765
90.	0.0	25790.2	53.1	25843.3	198.444	50.009	VAPOR	50.009	PDC	0.000	0.000	1.716	1.716	14.700	197.259
120.	0.0	25738.4	53.4	25791.8	197.930	49.635	VAPOR	49.635	PDC	0.000	0.000	1.704	1.704	14.700	196.756
150.	0.0	25686.9	53.8	25740.7	197.419	49.266	VAPOR	49.266	PDC	0.000	0.000	1.691	1.691	14.700	196.254
180.	0.0	25635.8	54.1	25690.0	196.910	48.900	VAPOR	48.900	PDC	0.000	0.000	1.679	1.679	14.700	195.755
210.	0.0	25585.1	54.5	25639.6	196.403	48.538	VAPOR	48.538	PDC	0.000	0.000	1.667	1.667	14.700	195.258
240.	0.0	25534.8	54.8	25589.6	195.899	48.179	VAPOR	48.179	PDC	0.000	0.000	1.654	1.654	14.700	194.763
270.	0.0	25484.9	55.1	25540.0	195.397	47.825	VAPOR	47.825	PDC	0.000	0.000	1.642	1.642	14.700	194.271
300.	0.0	25435.3	55.4	25490.7	194.897	47.474	VAPOR	47.474	PDC	0.000	0.000	1.630	1.630	14.700	193.781
330.	0.0	25386.1	55.7	25441.8	194.400	47.127	VAPOR	47.127	PDC	0.000	0.000	1.619	1.619	14.700	193.294
360.	0.0	25337.3	55.9	25393.2	193.905	46.783	VAPOR	46.783	PDC	0.000	0.000	1.607	1.607	14.700	192.808
390.	0.0	25288.8	56.2	25345.0	193.413	46.442	VAPOR	46.442	PDC	0.000	0.000	1.596	1.596	14.700	192.325
420.	0.0	25240.7	56.5	25297.2	192.922	46.106	VAPOR	46.106	PDC	0.000	0.000	1.584	1.584	14.700	191.844
450.	0.0	25192.9	56.7	25249.6	192.434	45.772	VAPOR	45.772	PDC	0.000	0.000	1.573	1.573	14.700	191.365
480.	0.0	25145.5	57.0	25202.5	191.948	45.442	VAPOR	45.442	PDC	0.000	0.000	1.562	1.562	14.700	190.889
510.	0.0	25098.4	57.2	25155.6	191.465	45.115	VAPOR	45.115	PDC	0.000	0.000	1.551	1.551	14.700	190.414
540.	0.0	25051.7	57.4	25109.1	190.983	44.791	VAPOR	44.791	PDC	0.000	0.000	1.540	1.540	14.700	189.942
570.	0.0	25005.3	57.6	25062.9	190.504	44.471	VAPOR	44.471	PDC	0.000	0.000	1.529	1.529	14.700	189.472
600.	0.0	24959.2	57.8	25017.0	190.027	44.154	VAPOR	44.154	PDC	0.000	0.000	1.518	1.518	14.700	189.004
630.	0.0	24913.5	58.0	24971.5	189.552	43.840	VAPOR	43.840	PDC	0.000	0.000	1.507	1.507	14.700	188.538
660.	0.0	24868.1	58.2	24926.3	189.080	43.529	VAPOR	43.529	PDC	0.000	0.000	1.497	1.497	14.700	188.075
690.	0.0	24823.0	58.4	24881.4	188.610	43.222	VAPOR	43.222	PDC	0.000	0.000	1.486	1.486	14.700	187.613
720.	0.0	24778.2	58.6	24836.8	188.141	42.917	VAPOR	42.917	PDC	0.000	0.000	1.476	1.476	14.700	187.154
750.	0.0	24733.8	58.7	24792.5	187.675	42.616	VAPOR	42.616	PDC	0.000	0.000	1.465	1.465	14.700	186.696
780.	0.0	24689.7	58.9	24748.6	187.211	42.317	VAPOR	42.317	PDC	0.000	0.000	1.454	1.454	14.700	186.241
810.	0.0	24645.9	59.1	24704.9	186.750	42.022	VAPOR	42.022	PDC	0.000	0.000	1.444	1.444	14.700	185.788
840.	0.0	24602.4	59.2	24661.6	186.291	41.729	VAPOR	41.729	PDC	0.000	0.000	1.434	1.434	14.700	185.338
870.	0.0	24559.3	59.4	24618.6	185.834	41.440	VAPOR	41.440	PDC	0.000	0.000	1.424	1.424	14.700	184.889

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

COMPARTMENT CONDITIONS

COMPARTMENT VOLUME = 500000. FT**2
U*A PRODUCT = 7.903E+00 BTU/SEC-DEG F
SURFACE TEMPERATURE = 120.0 DEG F
COOLING RATE = 0.000E+00 BTU/SEC

TIME	COMPONENT MASS (LB)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	3.548E+04	0.000E+00	4.630E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	3.240E+04	0.000E+00	8.722E+01	0.000E+00	7.454E+02	0.000E+00	0.000E+00	0.000E+00	2.742E+03	134.0796	14.7871
240.0	3.198E+04	0.000E+00	0.000E+00	0.000E+00	9.270E+02	0.000E+00	0.000E+00	1.555E+03	3.213E+03	135.9586	14.7603
360.0	3.227E+04	0.000E+00	0.000E+00	0.000E+00	9.355E+02	0.000E+00	0.000E+00	3.220E+03	3.087E+03	128.3078	14.7632
480.0	3.244E+04	0.000E+00	0.000E+00	0.000E+00	9.404E+02	0.000E+00	0.000E+00	4.361E+03	3.004E+03	123.7446	14.7659
600.0	3.254E+04	0.000E+00	0.000E+00	0.000E+00	9.432E+02	0.000E+00	0.000E+00	5.123E+03	2.949E+03	121.0188	14.7673
720.0	3.259E+04	0.000E+00	0.000E+00	0.000E+00	9.448E+02	0.000E+00	0.000E+00	5.598E+03	2.913E+03	119.4511	14.7686
840.0	3.245E+04	0.000E+00	0.000E+00	0.000E+00	9.408E+02	0.000E+00	0.000E+00	4.104E+03	2.875E+03	124.0808	14.7706
960.0	3.222E+04	0.000E+00	0.000E+00	0.000E+00	9.340E+02	0.000E+00	0.000E+00	1.617E+03	2.839E+03	131.6553	14.7662
1080.0	3.216E+04	0.000E+00	1.120E+01	0.000E+00	9.073E+02	0.000E+00	0.000E+00	0.000E+00	2.730E+03	134.7454	14.7475
1200.0	3.326E+04	0.000E+00	1.371E+02	0.000E+00	6.597E+02	0.000E+00	0.000E+00	0.000E+00	1.797E+03	118.4066	14.7483
1320.0	3.400E+04	0.000E+00	2.282E+02	0.000E+00	4.786E+02	0.000E+00	0.000E+00	0.000E+00	1.181E+03	108.1649	14.7489
1440.0	3.449E+04	0.000E+00	2.940E+02	0.000E+00	3.467E+02	0.000E+00	0.000E+00	0.000E+00	7.744E+02	101.6697	14.7493
1560.0	3.482E+04	0.000E+00	3.415E+02	0.000E+00	2.509E+02	0.000E+00	0.000E+00	0.000E+00	5.074E+02	97.5195	14.7495
1680.0	3.504E+04	0.000E+00	3.756E+02	0.000E+00	1.814E+02	0.000E+00	0.000E+00	0.000E+00	3.323E+02	94.8546	14.7494
1800.0	3.518E+04	0.000E+00	4.001E+02	0.000E+00	1.312E+02	0.000E+00	0.000E+00	0.000E+00	2.175E+02	93.1375	14.7496
1920.0	3.528E+04	0.000E+00	4.177E+02	0.000E+00	9.479E+01	0.000E+00	0.000E+00	0.000E+00	1.423E+02	92.0294	14.7496
2040.0	3.534E+04	0.000E+00	4.304E+02	0.000E+00	6.849E+01	0.000E+00	0.000E+00	0.000E+00	9.312E+01	91.3131	14.7497
2160.0	3.539E+04	0.000E+00	4.395E+02	0.000E+00	4.949E+01	0.000E+00	0.000E+00	0.000E+00	6.092E+01	90.8528	14.7499
2280.0	3.541E+04	0.000E+00	4.461E+02	0.000E+00	3.575E+01	0.000E+00	0.000E+00	0.000E+00	3.985E+01	90.5538	14.7500
2400.0	3.543E+04	0.000E+00	4.508E+02	0.000E+00	2.583E+01	0.000E+00	0.000E+00	0.000E+00	2.606E+01	90.3688	14.7501
2520.0	3.545E+04	0.000E+00	4.542E+02	0.000E+00	1.866E+01	0.000E+00	0.000E+00	0.000E+00	1.705E+01	90.2307	14.7498
2640.0	3.546E+04	0.000E+00	4.567E+02	0.000E+00	1.348E+01	0.000E+00	0.000E+00	0.000E+00	1.115E+01	90.1489	14.7498
2760.0	3.546E+04	0.000E+00	4.584E+02	0.000E+00	9.735E+00	0.000E+00	0.000E+00	0.000E+00	7.293E+00	90.0959	14.7498
2880.0	3.547E+04	0.000E+00	4.597E+02	0.000E+00	7.032E+00	0.000E+00	0.000E+00	0.000E+00	4.770E+00	90.0695	14.7500
3000.0	3.547E+04	0.000E+00	4.606E+02	0.000E+00	5.079E+00	0.000E+00	0.000E+00	0.000E+00	3.120E+00	90.0433	14.7500
3120.0	3.547E+04	0.000E+00	4.613E+02	0.000E+00	3.669E+00	0.000E+00	0.000E+00	0.000E+00	2.041E+00	90.0302	14.7500
3240.0	3.547E+04	0.000E+00	4.618E+02	0.000E+00	2.650E+00	0.000E+00	0.000E+00	0.000E+00	1.335E+00	90.0171	14.7500
3360.0	3.547E+04	0.000E+00	4.621E+02	0.000E+00	1.914E+00	0.000E+00	0.000E+00	0.000E+00	8.729E-01	90.0171	14.7500
3480.0	3.547E+04	0.000E+00	4.623E+02	0.000E+00	1.383E+00	0.000E+00	0.000E+00	0.000E+00	5.709E-01	90.0171	14.7500
3600.0	3.547E+04	0.000E+00	4.625E+02	0.000E+00	9.989E-01	0.000E+00	0.000E+00	0.000E+00	3.734E-01	90.0041	14.7500

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

INLET AIR BLOWER

FLOW RATE = 0.0 ACFM
AMBIENT TEMPERATURE = 80.000 DEG F
AMBIENT PRESSURE = 14.700 PSIA

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
720.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
840.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
960.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1080.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1200.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1320.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1440.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1560.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1680.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1800.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1920.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2040.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2160.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2280.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2400.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2520.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2640.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2760.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2880.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3000.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

SOURCE TERM: SOURCE TERM MASS FLOW RATES, TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.640E+01	0.000E+00	1.727E+01	0.000E+00	133.7805	14.7000
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.634E+01	0.000E+00	1.716E+01	0.000E+00	133.7805	14.7000
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.628E+01	0.000E+00	1.702E+01	0.000E+00	133.7805	14.7000
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.621E+01	0.000E+00	1.685E+01	0.000E+00	133.7805	14.7000
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.611E+01	0.000E+00	1.663E+01	0.000E+00	133.7805	14.7000
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.597E+01	0.000E+00	1.631E+01	0.000E+00	133.7805	14.7000
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+01	0.000E+00	1.575E+01	0.000E+00	133.7805	14.7000

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

EXHAUST STREAM (FORCED DRAFT) RESISTANCE TERM = 3.798E-07 PSI-SEC**2/LB/FT**3

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	1.157E+02	0.000E+00	3.114E-01	0.000E+00	2.661E+00	0.000E+00	0.000E+00	0.000E+00	9.789E+00	134.0796	14.7871
240.0	9.284E+01	0.000E+00	0.000E+00	0.000E+00	2.691E+00	0.000E+00	0.000E+00	4.513E+00	9.328E+00	135.9586	14.7603
360.0	9.364E+01	0.000E+00	0.000E+00	0.000E+00	2.715E+00	0.000E+00	0.000E+00	9.343E+00	8.959E+00	128.3078	14.7632
480.0	9.465E+01	0.000E+00	0.000E+00	0.000E+00	2.744E+00	0.000E+00	0.000E+00	1.272E+01	8.765E+00	123.7446	14.7659
600.0	9.503E+01	0.000E+00	0.000E+00	0.000E+00	2.755E+00	0.000E+00	0.000E+00	1.496E+01	8.613E+00	121.0188	14.7673
720.0	9.555E+01	0.000E+00	0.000E+00	0.000E+00	2.770E+00	0.000E+00	0.000E+00	1.641E+01	8.539E+00	119.4511	14.7686
840.0	9.850E+01	0.000E+00	0.000E+00	0.000E+00	2.855E+00	0.000E+00	0.000E+00	1.245E+01	8.724E+00	124.0808	14.7706
960.0	9.811E+01	0.000E+00	0.000E+00	0.000E+00	2.844E+00	0.000E+00	0.000E+00	4.925E+00	8.645E+00	131.6553	14.7662
1080.0	8.501E+01	0.000E+00	2.960E-02	0.000E+00	2.398E+00	0.000E+00	0.000E+00	0.000E+00	7.217E+00	134.7454	14.7475
1200.0	8.856E+01	0.000E+00	3.650E-01	0.000E+00	1.757E+00	0.000E+00	0.000E+00	0.000E+00	4.786E+00	118.4066	14.7483
1320.0	9.105E+01	0.000E+00	6.112E-01	0.000E+00	1.282E+00	0.000E+00	0.000E+00	0.000E+00	3.162E+00	108.1649	14.7489
1440.0	9.271E+01	0.000E+00	7.904E-01	0.000E+00	9.319E-01	0.000E+00	0.000E+00	0.000E+00	2.082E+00	101.6697	14.7493
1560.0	9.382E+01	0.000E+00	9.201E-01	0.000E+00	6.761E-01	0.000E+00	0.000E+00	0.000E+00	1.367E+00	97.5195	14.7495
1680.0	9.431E+01	0.000E+00	1.011E+00	0.000E+00	4.884E-01	0.000E+00	0.000E+00	0.000E+00	8.945E-01	94.8546	14.7494
1800.0	9.487E+01	0.000E+00	1.079E+00	0.000E+00	3.537E-01	0.000E+00	0.000E+00	0.000E+00	5.865E-01	93.1375	14.7496
1920.0	9.513E+01	0.000E+00	1.126E+00	0.000E+00	2.556E-01	0.000E+00	0.000E+00	0.000E+00	3.838E-01	92.0294	14.7496
2040.0	9.543E+01	0.000E+00	1.162E+00	0.000E+00	1.849E-01	0.000E+00	0.000E+00	0.000E+00	2.514E-01	91.3131	14.7497
2160.0	9.567E+01	0.000E+00	1.188E+00	0.000E+00	1.338E-01	0.000E+00	0.000E+00	0.000E+00	1.647E-01	90.8528	14.7499
2280.0	9.582E+01	0.000E+00	1.207E+00	0.000E+00	9.673E-02	0.000E+00	0.000E+00	0.000E+00	1.078E-01	90.5538	14.7500
2400.0	9.598E+01	0.000E+00	1.221E+00	0.000E+00	6.995E-02	0.000E+00	0.000E+00	0.000E+00	7.060E-02	90.3688	14.7501
2520.0	9.578E+01	0.000E+00	1.227E+00	0.000E+00	5.041E-02	0.000E+00	0.000E+00	0.000E+00	4.606E-02	90.2307	14.7498
2640.0	9.579E+01	0.000E+00	1.234E+00	0.000E+00	3.641E-02	0.000E+00	0.000E+00	0.000E+00	3.013E-02	90.1489	14.7498
2760.0	9.581E+01	0.000E+00	1.239E+00	0.000E+00	2.630E-02	0.000E+00	0.000E+00	0.000E+00	1.970E-02	90.0959	14.7498
2880.0	9.601E+01	0.000E+00	1.245E+00	0.000E+00	1.904E-02	0.000E+00	0.000E+00	0.000E+00	1.291E-02	90.0695	14.7500
3000.0	9.602E+01	0.000E+00	1.247E+00	0.000E+00	1.375E-02	0.000E+00	0.000E+00	0.000E+00	8.446E-03	90.0433	14.7500
3120.0	9.602E+01	0.000E+00	1.249E+00	0.000E+00	9.932E-03	0.000E+00	0.000E+00	0.000E+00	5.524E-03	90.0302	14.7500
3240.0	9.602E+01	0.000E+00	1.250E+00	0.000E+00	7.174E-03	0.000E+00	0.000E+00	0.000E+00	3.613E-03	90.0171	14.7500
3360.0	9.602E+01	0.000E+00	1.251E+00	0.000E+00	5.182E-03	0.000E+00	0.000E+00	0.000E+00	2.363E-03	90.0171	14.7500
3480.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	3.743E-03	0.000E+00	0.000E+00	0.000E+00	1.545E-03	90.0171	14.7500
3600.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	2.704E-03	0.000E+00	0.000E+00	0.000E+00	1.011E-03	90.0041	14.7500

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE FALLOUT

DEPOSITION VELOCITY = 0.0330 FT/SEC
DEPOSITION AREA = 12500. FT**2

TIME	COMPONENT MASS FLOW RATE (LB/SEC)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.262E+00
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.651E+00
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.547E+00
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.478E+00
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.433E+00
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.403E+00
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.371E+00
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.342E+00
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.252E+00
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E+00
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.741E-01
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.389E-01
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.186E-01
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.741E-01
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.794E-01
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.174E-01
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.682E-02
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.026E-02
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.287E-02
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.150E-02
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.406E-02
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.199E-03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.017E-03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.935E-03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.574E-03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E-03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.101E-03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.202E-04
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.710E-04
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.081E-04

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE ACCUMULATED ON FLOOR

TIME	COMPONENT MASS (LB)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.466E+02
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.633E+02
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.748E+02
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.076E+03
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.371E+03
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.661E+03
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.947E+03
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.230E+03
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.510E+03
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.731E+03
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.877E+03
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.972E+03
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.035E+03
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.076E+03
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.103E+03
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.120E+03
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.132E+03
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.139E+03
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.144E+03
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.148E+03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.150E+03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.151E+03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.152E+03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+03
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.154E+03
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.154E+03

TITLE: EX. 4, CASE 1. RELEASE (EX. 2.2), FORCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT CONCENTRATIONS

TIME (SEC)	CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED MATERIAL (LB) UF6	UO2F2	TOTAL U	HF	HF FROM UF6	TOTAL HF	COMPARTMENT CONCENTRATIONS (LB/FT**3) URANIUM	HF
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	6.401E+02	4.946E+02	1.714E+02	0.000E+00	1.714E+02	4.237E-03	1.491E-03
240.0	1.915E+02	1.834E+03	1.546E+03	5.045E+02	4.353E+01	5.481E+02	7.068E-03	1.854E-03
360.0	1.041E+03	2.933E+03	2.971E+03	8.301E+02	2.368E+02	1.067E+03	9.126E-03	1.871E-03
480.0	2.382E+03	4.001E+03	4.702E+03	1.159E+03	5.416E+02	1.701E+03	1.054E-02	1.881E-03
600.0	4.058E+03	5.047E+03	6.644E+03	1.490E+03	9.226E+02	2.413E+03	1.149E-02	1.886E-03
720.0	5.953E+03	6.079E+03	8.723E+03	1.823E+03	1.353E+03	3.176E+03	1.207E-02	1.890E-03
840.0	7.844E+03	7.116E+03	1.080E+04	2.161E+03	1.783E+03	3.944E+03	9.992E-03	1.882E-03
960.0	8.861E+03	8.154E+03	1.229E+04	2.502E+03	2.015E+03	4.516E+03	6.575E-03	1.868E-03
1080.0	9.120E+03	9.173E+03	1.326E+04	2.837E+03	2.073E+03	4.911E+03	4.219E-03	1.815E-03
1200.0	9.120E+03	9.884E+03	1.380E+04	3.085E+03	2.073E+03	5.158E+03	2.778E-03	1.319E-03
1320.0	9.120E+03	1.036E+04	1.417E+04	3.266E+03	2.073E+03	5.339E+03	1.825E-03	9.572E-04
1440.0	9.120E+03	1.067E+04	1.441E+04	3.398E+03	2.073E+03	5.471E+03	1.197E-03	6.934E-04
1560.0	9.120E+03	1.087E+04	1.457E+04	3.494E+03	2.073E+03	5.567E+03	7.843E-04	5.018E-04
1680.0	9.120E+03	1.100E+04	1.467E+04	3.563E+03	2.073E+03	5.637E+03	5.136E-04	3.629E-04
1800.0	9.120E+03	1.109E+04	1.474E+04	3.614E+03	2.073E+03	5.687E+03	3.362E-04	2.623E-04
1920.0	9.120E+03	1.115E+04	1.478E+04	3.650E+03	2.073E+03	5.723E+03	2.200E-04	1.896E-04
2040.0	9.120E+03	1.119E+04	1.481E+04	3.676E+03	2.073E+03	5.750E+03	1.439E-04	1.370E-04
2160.0	9.120E+03	1.121E+04	1.483E+04	3.695E+03	2.073E+03	5.769E+03	9.415E-05	9.897E-05
2280.0	9.120E+03	1.123E+04	1.484E+04	3.709E+03	2.073E+03	5.782E+03	6.159E-05	7.150E-05
2400.0	9.120E+03	1.124E+04	1.485E+04	3.719E+03	2.073E+03	5.792E+03	4.028E-05	5.165E-05
2520.0	9.120E+03	1.125E+04	1.486E+04	3.726E+03	2.073E+03	5.799E+03	2.635E-05	3.731E-05
2640.0	9.120E+03	1.125E+04	1.486E+04	3.731E+03	2.073E+03	5.805E+03	1.723E-05	2.695E-05
2760.0	9.120E+03	1.125E+04	1.486E+04	3.735E+03	2.073E+03	5.808E+03	1.127E-05	1.947E-05
2880.0	9.120E+03	1.126E+04	1.486E+04	3.738E+03	2.073E+03	5.811E+03	7.373E-06	1.406E-05
3000.0	9.120E+03	1.126E+04	1.487E+04	3.740E+03	2.073E+03	5.813E+03	4.822E-06	1.016E-05
3120.0	9.120E+03	1.126E+04	1.487E+04	3.741E+03	2.073E+03	5.814E+03	3.154E-06	7.338E-06
3240.0	9.120E+03	1.126E+04	1.487E+04	3.742E+03	2.073E+03	5.815E+03	2.063E-06	5.301E-06
3360.0	9.120E+03	1.126E+04	1.487E+04	3.743E+03	2.073E+03	5.816E+03	1.349E-06	3.829E-06
3480.0	9.120E+03	1.126E+04	1.487E+04	3.743E+03	2.073E+03	5.817E+03	8.824E-07	2.766E-06
3600.0	9.120E+03	1.126E+04	1.487E+04	3.744E+03	2.073E+03	5.817E+03	5.771E-07	1.998E-06

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

COMPARTMENT CONDITIONS

COMPARTMENT VOLUME = 500000. FT**2
U*A PRODUCT = 7.733E+00 BTU/SEC-DEG F
SURFACE TEMPERATURE = 120.0 DEG F
COOLING RATE = 0.000E+00 BTU/SEC

TIME (SEC)	COMPONENT MASS (LB) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	3.524E+04	0.000E+00	4.599E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.6500
120.0	3.135E+04	0.000E+00	5.556E+01	0.000E+00	7.853E+02	0.000E+00	0.000E+00	0.000E+00	2.886E+03	148.6713	14.6811
240.0	3.095E+04	0.000E+00	0.000E+00	0.000E+00	8.972E+02	0.000E+00	0.000E+00	1.996E+03	3.087E+03	150.8196	14.6611
360.0	3.105E+04	0.000E+00	0.000E+00	0.000E+00	9.002E+02	0.000E+00	0.000E+00	3.767E+03	2.944E+03	146.1227	14.6608
480.0	3.110E+04	0.000E+00	0.000E+00	0.000E+00	9.016E+02	0.000E+00	0.000E+00	5.027E+03	2.847E+03	143.1848	14.6597
600.0	3.113E+04	0.000E+00	0.000E+00	0.000E+00	9.024E+02	0.000E+00	0.000E+00	5.904E+03	2.782E+03	141.3893	14.6610
720.0	3.114E+04	0.000E+00	0.000E+00	0.000E+00	9.028E+02	0.000E+00	0.000E+00	6.482E+03	2.739E+03	140.2905	14.6612
840.0	3.123E+04	0.000E+00	0.000E+00	0.000E+00	9.053E+02	0.000E+00	0.000E+00	5.076E+03	2.719E+03	140.6654	14.6590
960.0	3.136E+04	0.000E+00	0.000E+00	0.000E+00	9.091E+02	0.000E+00	0.000E+00	2.576E+03	2.713E+03	141.9990	14.6608
1080.0	3.146E+04	0.000E+00	0.000E+00	0.000E+00	9.119E+02	0.000E+00	0.000E+00	7.612E+02	2.710E+03	142.8290	14.6592
1200.0	3.212E+04	0.000E+00	6.463E+01	0.000E+00	7.875E+02	0.000E+00	0.000E+00	0.000E+00	2.231E+03	132.9291	14.6475
1320.0	3.317E+04	0.000E+00	1.755E+02	0.000E+00	5.716E+02	0.000E+00	0.000E+00	0.000E+00	1.466E+03	117.1900	14.6484
1440.0	3.386E+04	0.000E+00	2.551E+02	0.000E+00	4.149E+02	0.000E+00	0.000E+00	0.000E+00	9.636E+02	107.3898	14.6489
1560.0	3.432E+04	0.000E+00	3.123E+02	0.000E+00	3.011E+02	0.000E+00	0.000E+00	0.000E+00	6.333E+02	101.1908	14.6493
1680.0	3.462E+04	0.000E+00	3.534E+02	0.000E+00	2.186E+02	0.000E+00	0.000E+00	0.000E+00	4.162E+02	97.2302	14.6496
1800.0	3.482E+04	0.000E+00	3.831E+02	0.000E+00	1.587E+02	0.000E+00	0.000E+00	0.000E+00	2.736E+02	94.7005	14.6500
1920.0	3.496E+04	0.000E+00	4.044E+02	0.000E+00	1.152E+02	0.000E+00	0.000E+00	0.000E+00	1.798E+02	93.0491	14.6500
2040.0	3.505E+04	0.000E+00	4.198E+02	0.000E+00	8.359E+01	0.000E+00	0.000E+00	0.000E+00	1.182E+02	91.9873	14.6501
2160.0	3.511E+04	0.000E+00	4.309E+02	0.000E+00	6.067E+01	0.000E+00	0.000E+00	0.000E+00	7.766E+01	91.2959	14.6501
2280.0	3.515E+04	0.000E+00	4.389E+02	0.000E+00	4.404E+01	0.000E+00	0.000E+00	0.000E+00	5.104E+01	90.8422	14.6501
2400.0	3.518E+04	0.000E+00	4.447E+02	0.000E+00	3.196E+01	0.000E+00	0.000E+00	0.000E+00	3.354E+01	90.5454	14.6500
2520.0	3.520E+04	0.000E+00	4.489E+02	0.000E+00	2.320E+01	0.000E+00	0.000E+00	0.000E+00	2.205E+01	90.3595	14.6500
2640.0	3.521E+04	0.000E+00	4.519E+02	0.000E+00	1.684E+01	0.000E+00	0.000E+00	0.000E+00	1.449E+01	90.2360	14.6500
2760.0	3.522E+04	0.000E+00	4.541E+02	0.000E+00	1.222E+01	0.000E+00	0.000E+00	0.000E+00	9.522E+00	90.1553	14.6500
2880.0	3.522E+04	0.000E+00	4.557E+02	0.000E+00	8.872E+00	0.000E+00	0.000E+00	0.000E+00	6.258E+00	90.1020	14.6500
3000.0	3.523E+04	0.000E+00	4.568E+02	0.000E+00	6.440E+00	0.000E+00	0.000E+00	0.000E+00	4.113E+00	90.0626	14.6499
3120.0	3.523E+04	0.000E+00	4.577E+02	0.000E+00	4.674E+00	0.000E+00	0.000E+00	0.000E+00	2.703E+00	90.0494	14.6500
3240.0	3.523E+04	0.000E+00	4.583E+02	0.000E+00	3.393E+00	0.000E+00	0.000E+00	0.000E+00	1.777E+00	90.0363	14.6500
3360.0	3.523E+04	0.000E+00	4.587E+02	0.000E+00	2.462E+00	0.000E+00	0.000E+00	0.000E+00	1.168E+00	90.0232	14.6500
3480.0	3.523E+04	0.000E+00	4.590E+02	0.000E+00	1.787E+00	0.000E+00	0.000E+00	0.000E+00	7.674E-01	90.0102	14.6500
3600.0	3.523E+04	0.000E+00	4.592E+02	0.000E+00	1.297E+00	0.000E+00	0.000E+00	0.000E+00	5.043E-01	90.0102	14.6500

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

INLET AIR STREAM (INDUCED DRAFT)

RESISTANCE TERM = 4.026E-07 PSI-SEC**2/LB/FT**3
AMBIENT TEMPERATURE = 80.000 DEG F
AMBIENT PRESSURE = 14.700 PSIA

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
120.0	5.781E+01	0.000E+00	7.545E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
240.0	8.285E+01	0.000E+00	1.081E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
360.0	8.319E+01	0.000E+00	1.086E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
480.0	8.435E+01	0.000E+00	1.101E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
600.0	8.304E+01	0.000E+00	1.084E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
720.0	8.277E+01	0.000E+00	1.080E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
840.0	8.508E+01	0.000E+00	1.110E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
960.0	8.321E+01	0.000E+00	1.086E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1080.0	8.487E+01	0.000E+00	1.108E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1200.0	9.628E+01	0.000E+00	1.257E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1320.0	9.547E+01	0.000E+00	1.246E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1440.0	9.494E+01	0.000E+00	1.239E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1560.0	9.460E+01	0.000E+00	1.235E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1680.0	9.438E+01	0.000E+00	1.232E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1800.0	9.397E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1920.0	9.397E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2040.0	9.388E+01	0.000E+00	1.225E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2160.0	9.386E+01	0.000E+00	1.225E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2280.0	9.391E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2400.0	9.400E+01	0.000E+00	1.227E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2520.0	9.392E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2640.0	9.392E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2760.0	9.393E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2880.0	9.394E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3000.0	9.402E+01	0.000E+00	1.227E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3120.0	9.395E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3240.0	9.395E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3360.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3480.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3600.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

SOURCE TERM: SOURCE TERM MASS FLOW RATES, TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.640E+01	0.000E+00	1.727E+01	0.000E+00	133.7805	14.7000
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.634E+01	0.000E+00	1.716E+01	0.000E+00	133.7805	14.7000
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.628E+01	0.000E+00	1.702E+01	0.000E+00	133.7805	14.7000
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.621E+01	0.000E+00	1.685E+01	0.000E+00	133.7805	14.7000
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.611E+01	0.000E+00	1.663E+01	0.000E+00	133.7805	14.7000
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.597E+01	0.000E+00	1.631E+01	0.000E+00	133.7805	14.7000
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+01	0.000E+00	1.575E+01	0.000E+00	133.7805	14.7000

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

EXHAUST BLOWER FLOW RATE = 80000.0 ACFM

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.6500
120.0	8.359E+01	0.000E+00	1.481E-01	0.000E+00	2.094E+00	0.000E+00	0.000E+00	0.000E+00	7.696E+00	148.6713	14.6811
240.0	8.254E+01	0.000E+00	0.000E+00	0.000E+00	2.393E+00	0.000E+00	0.000E+00	5.323E+00	8.232E+00	150.8196	14.6611
360.0	8.281E+01	0.000E+00	0.000E+00	0.000E+00	2.400E+00	0.000E+00	0.000E+00	1.005E+01	7.849E+00	146.1227	14.6608
480.0	8.294E+01	0.000E+00	0.000E+00	0.000E+00	2.404E+00	0.000E+00	0.000E+00	1.340E+01	7.592E+00	143.1848	14.6597
600.0	8.302E+01	0.000E+00	0.000E+00	0.000E+00	2.406E+00	0.000E+00	0.000E+00	1.574E+01	7.420E+00	141.3893	14.6610
720.0	8.305E+01	0.000E+00	0.000E+00	0.000E+00	2.407E+00	0.000E+00	0.000E+00	1.729E+01	7.305E+00	140.2905	14.6612
840.0	8.328E+01	0.000E+00	0.000E+00	0.000E+00	2.414E+00	0.000E+00	0.000E+00	1.354E+01	7.252E+00	140.6654	14.6590
960.0	8.363E+01	0.000E+00	0.000E+00	0.000E+00	2.424E+00	0.000E+00	0.000E+00	6.869E+00	7.236E+00	141.9990	14.6608
1080.0	8.389E+01	0.000E+00	0.000E+00	0.000E+00	2.432E+00	0.000E+00	0.000E+00	2.030E+00	7.225E+00	142.8290	14.6592
1200.0	8.565E+01	0.000E+00	1.724E-01	0.000E+00	2.100E+00	0.000E+00	0.000E+00	0.000E+00	5.949E+00	132.9291	14.6475
1320.0	8.844E+01	0.000E+00	4.680E-01	0.000E+00	1.524E+00	0.000E+00	0.000E+00	0.000E+00	3.910E+00	117.1900	14.6484
1440.0	9.029E+01	0.000E+00	6.802E-01	0.000E+00	1.106E+00	0.000E+00	0.000E+00	0.000E+00	2.570E+00	107.3898	14.6489
1560.0	9.151E+01	0.000E+00	8.328E-01	0.000E+00	8.030E-01	0.000E+00	0.000E+00	0.000E+00	1.689E+00	101.1908	14.6493
1680.0	9.232E+01	0.000E+00	9.425E-01	0.000E+00	5.829E-01	0.000E+00	0.000E+00	0.000E+00	1.110E+00	97.2302	14.6496
1800.0	9.286E+01	0.000E+00	1.021E+00	0.000E+00	4.231E-01	0.000E+00	0.000E+00	0.000E+00	7.295E-01	94.7005	14.6500
1920.0	9.322E+01	0.000E+00	1.078E+00	0.000E+00	3.071E-01	0.000E+00	0.000E+00	0.000E+00	4.794E-01	93.0491	14.6500
2040.0	9.346E+01	0.000E+00	1.119E+00	0.000E+00	2.229E-01	0.000E+00	0.000E+00	0.000E+00	3.151E-01	91.9873	14.6501
2160.0	9.363E+01	0.000E+00	1.149E+00	0.000E+00	1.618E-01	0.000E+00	0.000E+00	0.000E+00	2.071E-01	91.2959	14.6501
2280.0	9.373E+01	0.000E+00	1.170E+00	0.000E+00	1.174E-01	0.000E+00	0.000E+00	0.000E+00	1.361E-01	90.8422	14.6501
2400.0	9.381E+01	0.000E+00	1.186E+00	0.000E+00	8.524E-02	0.000E+00	0.000E+00	0.000E+00	8.945E-02	90.5454	14.6500
2520.0	9.386E+01	0.000E+00	1.197E+00	0.000E+00	6.187E-02	0.000E+00	0.000E+00	0.000E+00	5.879E-02	90.3595	14.6500
2640.0	9.389E+01	0.000E+00	1.205E+00	0.000E+00	4.491E-02	0.000E+00	0.000E+00	0.000E+00	3.864E-02	90.2360	14.6500
2760.0	9.391E+01	0.000E+00	1.211E+00	0.000E+00	3.259E-02	0.000E+00	0.000E+00	0.000E+00	2.539E-02	90.1553	14.6500
2880.0	9.393E+01	0.000E+00	1.215E+00	0.000E+00	2.366E-02	0.000E+00	0.000E+00	0.000E+00	1.669E-02	90.1020	14.6500
3000.0	9.394E+01	0.000E+00	1.218E+00	0.000E+00	1.717E-02	0.000E+00	0.000E+00	0.000E+00	1.097E-02	90.0626	14.6499
3120.0	9.394E+01	0.000E+00	1.220E+00	0.000E+00	1.246E-02	0.000E+00	0.000E+00	0.000E+00	7.209E-03	90.0494	14.6500
3240.0	9.395E+01	0.000E+00	1.222E+00	0.000E+00	9.047E-03	0.000E+00	0.000E+00	0.000E+00	4.738E-03	90.0363	14.6500
3360.0	9.395E+01	0.000E+00	1.223E+00	0.000E+00	6.567E-03	0.000E+00	0.000E+00	0.000E+00	3.114E-03	90.0232	14.6500
3480.0	9.396E+01	0.000E+00	1.224E+00	0.000E+00	4.766E-03	0.000E+00	0.000E+00	0.000E+00	2.046E-03	90.0102	14.6500
3600.0	9.396E+01	0.000E+00	1.225E+00	0.000E+00	3.460E-03	0.000E+00	0.000E+00	0.000E+00	1.345E-03	90.0102	14.6500

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE FALLOUT

DEPOSITION VELOCITY = 0.0330 FT/SEC
DEPOSITION AREA = 12500. FT**2

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.381E+00
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.547E+00
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.428E+00
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.349E+00
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.296E+00
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.260E+00
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.243E+00
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.239E+00
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.235E+00
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.841E+00
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.210E+00
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.950E-01
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.225E-01
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.434E-01
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.257E-01
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E-01
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.748E-02
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.407E-02
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.211E-02
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.767E-02
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.819E-02
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.195E-02
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.856E-03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.163E-03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.393E-03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.230E-03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.466E-03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.633E-04
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.331E-04
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.161E-04

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE ACCUMULATED ON FLOOR

TIME	COMPONENT MASS (LB)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.518E+02
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.637E+02
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.618E+02
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.048E+03
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.327E+03
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.600E+03
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.870E+03
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.139E+03
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.407E+03
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.664E+03
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.845E+03
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.964E+03
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.042E+03
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.093E+03
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.127E+03
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.163E+03
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.173E+03
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.179E+03
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.183E+03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.186E+03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.188E+03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.189E+03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.190E+03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.190E+03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.191E+03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.191E+03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.191E+03
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.191E+03
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.191E+03

TITLE: EX. 4, CASE 2. RELEASE (EX. 2.2), INDUCED VENT, AIRBORNE SOLIDS

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT CONCENTRATIONS

TIME	CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED MATERIAL (LB)						COMPARTMENT CONCENTRATIONS (LB/FT**3)	
(SEC)	UF6	UO2F2	TOTAL U	HF	HF FROM UF6	TOTAL HF	URANIUM	HF
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	4.906E+02	3.791E+02	1.314E+02	0.000E+00	1.314E+02	4.460E-03	1.571E-03
240.0	2.756E+02	1.499E+03	1.345E+03	4.148E+02	6.267E+01	4.774E+02	7.471E-03	1.794E-03
360.0	1.211E+03	2.463E+03	2.722E+03	7.024E+02	2.753E+02	9.778E+02	9.644E-03	1.800E-03
480.0	2.628E+03	3.388E+03	4.395E+03	9.907E+02	5.975E+02	1.588E+03	1.120E-02	1.803E-03
600.0	4.385E+03	4.288E+03	6.279E+03	1.279E+03	9.968E+02	2.276E+03	1.229E-02	1.805E-03
720.0	6.373E+03	5.171E+03	8.306E+03	1.568E+03	1.449E+03	3.017E+03	1.300E-02	1.806E-03
840.0	8.363E+03	6.044E+03	1.033E+04	1.857E+03	1.901E+03	3.759E+03	1.107E-02	1.811E-03
960.0	9.570E+03	6.913E+03	1.181E+04	2.148E+03	2.176E+03	4.323E+03	7.677E-03	1.818E-03
1080.0	1.009E+04	7.780E+03	1.284E+04	2.439E+03	2.294E+03	4.733E+03	5.217E-03	1.824E-03
1200.0	1.016E+04	8.611E+03	1.352E+04	2.722E+03	2.309E+03	5.031E+03	3.448E-03	1.575E-03
1320.0	1.016E+04	9.195E+03	1.397E+04	2.938E+03	2.309E+03	5.246E+03	2.266E-03	1.143E-03
1440.0	1.016E+04	9.579E+03	1.427E+04	3.094E+03	2.309E+03	5.403E+03	1.489E-03	8.298E-04
1560.0	1.016E+04	9.832E+03	1.446E+04	3.208E+03	2.309E+03	5.517E+03	9.788E-04	6.023E-04
1680.0	1.016E+04	9.997E+03	1.459E+04	3.291E+03	2.309E+03	5.599E+03	6.433E-04	4.372E-04
1800.0	1.016E+04	1.011E+04	1.468E+04	3.351E+03	2.309E+03	5.659E+03	4.228E-04	3.173E-04
1920.0	1.016E+04	1.018E+04	1.473E+04	3.394E+03	2.309E+03	5.703E+03	2.779E-04	2.303E-04
2040.0	1.016E+04	1.023E+04	1.477E+04	3.426E+03	2.309E+03	5.734E+03	1.826E-04	1.672E-04
2160.0	1.016E+04	1.026E+04	1.479E+04	3.449E+03	2.309E+03	5.757E+03	1.200E-04	1.213E-04
2280.0	1.016E+04	1.028E+04	1.481E+04	3.465E+03	2.309E+03	5.774E+03	7.888E-05	8.807E-05
2400.0	1.016E+04	1.029E+04	1.482E+04	3.477E+03	2.309E+03	5.786E+03	5.184E-05	6.393E-05
2520.0	1.016E+04	1.030E+04	1.483E+04	3.486E+03	2.309E+03	5.795E+03	3.407E-05	4.640E-05
2640.0	1.016E+04	1.030E+04	1.483E+04	3.492E+03	2.309E+03	5.801E+03	2.239E-05	3.368E-05
2760.0	1.016E+04	1.031E+04	1.483E+04	3.497E+03	2.309E+03	5.806E+03	1.472E-05	2.445E-05
2880.0	1.016E+04	1.031E+04	1.483E+04	3.500E+03	2.309E+03	5.809E+03	9.673E-06	1.774E-05
3000.0	1.016E+04	1.031E+04	1.484E+04	3.503E+03	2.309E+03	5.812E+03	6.357E-06	1.288E-05
3120.0	1.016E+04	1.031E+04	1.484E+04	3.505E+03	2.309E+03	5.813E+03	4.178E-06	9.348E-06
3240.0	1.016E+04	1.031E+04	1.484E+04	3.506E+03	2.309E+03	5.815E+03	2.746E-06	6.785E-06
3360.0	1.016E+04	1.031E+04	1.484E+04	3.507E+03	2.309E+03	5.816E+03	1.805E-06	4.925E-06
3480.0	1.016E+04	1.031E+04	1.484E+04	3.508E+03	2.309E+03	5.816E+03	1.186E-06	3.575E-06
3600.0	1.016E+04	1.031E+04	1.484E+04	3.508E+03	2.309E+03	5.817E+03	7.795E-07	2.595E-06

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

COMPARTMENT CONDITIONS

COMPARTMENT VOLUME = 500000. FT**2
U*A PRODUCT = 7.903E+00 BTU/SEC-DEG F
SURFACE TEMPERATURE = 120.0 DEG F
COOLING RATE = 0.000E+00 BTU/SEC

TIME	COMPONENT MASS (LB)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	3.548E+04	0.000E+00	4.630E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	3.351E+04	0.000E+00	2.621E+02	0.000E+00	3.893E+02	0.000E+00	0.000E+00	0.000E+00	1.431E+03	118.3174	14.7714
240.0	3.230E+04	0.000E+00	1.283E+02	0.000E+00	6.514E+02	0.000E+00	0.000E+00	0.000E+00	2.303E+03	136.2934	14.7693
360.0	3.158E+04	0.000E+00	3.935E+01	0.000E+00	8.280E+02	0.000E+00	0.000E+00	0.000E+00	2.833E+03	147.3134	14.7680
480.0	3.132E+04	0.000E+00	0.000E+00	0.000E+00	9.079E+02	0.000E+00	0.000E+00	1.887E+02	3.005E+03	150.6106	14.7626
600.0	3.141E+04	0.000E+00	0.000E+00	0.000E+00	9.105E+02	0.000E+00	0.000E+00	5.592E+02	2.919E+03	148.2761	14.7617
720.0	3.147E+04	0.000E+00	0.000E+00	0.000E+00	9.122E+02	0.000E+00	0.000E+00	7.761E+02	2.865E+03	146.9060	14.7631
840.0	3.156E+04	0.000E+00	0.000E+00	0.000E+00	9.149E+02	0.000E+00	0.000E+00	1.663E+01	2.835E+03	146.1753	14.7606
960.0	3.284E+04	0.000E+00	1.278E+02	0.000E+00	6.681E+02	0.000E+00	0.000E+00	0.000E+00	1.877E+03	125.6005	14.7474
1080.0	3.372E+04	0.000E+00	2.217E+02	0.000E+00	4.852E+02	0.000E+00	0.000E+00	0.000E+00	1.234E+03	112.6702	14.7483
1200.0	3.431E+04	0.000E+00	2.894E+02	0.000E+00	3.517E+02	0.000E+00	0.000E+00	0.000E+00	8.100E+02	104.5255	14.7489
1320.0	3.470E+04	0.000E+00	3.382E+02	0.000E+00	2.546E+02	0.000E+00	0.000E+00	0.000E+00	5.310E+02	99.3438	14.7493
1440.0	3.496E+04	0.000E+00	3.733E+02	0.000E+00	1.842E+02	0.000E+00	0.000E+00	0.000E+00	3.478E+02	96.0259	14.7495
1560.0	3.513E+04	0.000E+00	3.985E+02	0.000E+00	1.332E+02	0.000E+00	0.000E+00	0.000E+00	2.277E+02	93.8922	14.7495
1680.0	3.524E+04	0.000E+00	4.166E+02	0.000E+00	9.627E+01	0.000E+00	0.000E+00	0.000E+00	1.490E+02	92.5164	14.7497
1800.0	3.532E+04	0.000E+00	4.297E+02	0.000E+00	6.957E+01	0.000E+00	0.000E+00	0.000E+00	9.750E+01	91.6398	14.7500
1920.0	3.537E+04	0.000E+00	4.390E+02	0.000E+00	5.026E+01	0.000E+00	0.000E+00	0.000E+00	6.379E+01	91.0611	14.7500
2040.0	3.541E+04	0.000E+00	4.457E+02	0.000E+00	3.631E+01	0.000E+00	0.000E+00	0.000E+00	4.173E+01	90.6941	14.7501
2160.0	3.543E+04	0.000E+00	4.506E+02	0.000E+00	2.623E+01	0.000E+00	0.000E+00	0.000E+00	2.729E+01	90.4474	14.7500
2280.0	3.544E+04	0.000E+00	4.540E+02	0.000E+00	1.895E+01	0.000E+00	0.000E+00	0.000E+00	1.785E+01	90.2935	14.7500
2400.0	3.545E+04	0.000E+00	4.565E+02	0.000E+00	1.369E+01	0.000E+00	0.000E+00	0.000E+00	1.168E+01	90.1848	14.7498
2520.0	3.546E+04	0.000E+00	4.583E+02	0.000E+00	9.888E+00	0.000E+00	0.000E+00	0.000E+00	7.637E+00	90.1316	14.7500
2640.0	3.547E+04	0.000E+00	4.596E+02	0.000E+00	7.143E+00	0.000E+00	0.000E+00	0.000E+00	4.995E+00	90.0786	14.7500
2760.0	3.547E+04	0.000E+00	4.606E+02	0.000E+00	5.160E+00	0.000E+00	0.000E+00	0.000E+00	3.267E+00	90.0523	14.7500
2880.0	3.547E+04	0.000E+00	4.612E+02	0.000E+00	3.727E+00	0.000E+00	0.000E+00	0.000E+00	2.137E+00	90.0391	14.7500
3000.0	3.547E+04	0.000E+00	4.617E+02	0.000E+00	2.692E+00	0.000E+00	0.000E+00	0.000E+00	1.398E+00	90.0261	14.7500
3120.0	3.547E+04	0.000E+00	4.621E+02	0.000E+00	1.945E+00	0.000E+00	0.000E+00	0.000E+00	9.142E-01	90.0131	14.7500
3240.0	3.547E+04	0.000E+00	4.623E+02	0.000E+00	1.405E+00	0.000E+00	0.000E+00	0.000E+00	5.979E-01	90.0131	14.7500
3360.0	3.547E+04	0.000E+00	4.625E+02	0.000E+00	1.015E+00	0.000E+00	0.000E+00	0.000E+00	3.911E-01	90.0131	14.7500
3480.0	3.547E+04	0.000E+00	4.626E+02	0.000E+00	7.329E-01	0.000E+00	0.000E+00	0.000E+00	2.558E-01	90.0131	14.7500
3600.0	3.547E+04	0.000E+00	4.627E+02	0.000E+00	5.294E-01	0.000E+00	0.000E+00	0.000E+00	1.673E-01	90.0131	14.7500

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

INLET AIR BLOWER

FLOW RATE = 0.0 ACFM
AMBIENT TEMPERATURE = 80.000 DEG F
AMBIENT PRESSURE = 14.700 PSIA

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
720.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
840.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
960.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1080.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1200.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1320.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1440.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1560.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1680.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1800.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1920.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2040.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2160.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2280.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2400.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2520.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2640.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2760.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2880.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3000.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

SOURCE TERM: SOURCE TERM MASS FLOW RATES, TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.727E+01	0.000E+00	133.7805	14.7000
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.716E+01	0.000E+00	133.7805	14.7000
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.702E+01	0.000E+00	133.7805	14.7000
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.685E+01	0.000E+00	133.7805	14.7000
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.663E+01	0.000E+00	133.7805	14.7000
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.631E+01	0.000E+00	133.7805	14.7000
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.575E+01	0.000E+00	133.7805	14.7000

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

EXHAUST STREAM (FORCED DRAFT) RESISTANCE TERM = 3.798E-07 PSI-SEC**2/LB/FT**3

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	1.089E+02	0.000E+00	8.517E-01	0.000E+00	1.265E+00	0.000E+00	0.000E+00	0.000E+00	4.651E+00	118.3174	14.7714
240.0	1.037E+02	0.000E+00	4.120E-01	0.000E+00	2.092E+00	0.000E+00	0.000E+00	0.000E+00	7.397E+00	136.2934	14.7693
360.0	1.006E+02	0.000E+00	1.254E-01	0.000E+00	2.638E+00	0.000E+00	0.000E+00	0.000E+00	9.029E+00	147.3134	14.7680
480.0	9.557E+01	0.000E+00	0.000E+00	0.000E+00	2.770E+00	0.000E+00	0.000E+00	5.756E-01	9.169E+00	150.6106	14.7626
600.0	9.467E+01	0.000E+00	0.000E+00	0.000E+00	2.744E+00	0.000E+00	0.000E+00	1.685E+00	8.798E+00	148.2761	14.7617
720.0	9.555E+01	0.000E+00	0.000E+00	0.000E+00	2.770E+00	0.000E+00	0.000E+00	2.357E+00	8.698E+00	146.9060	14.7631
840.0	9.488E+01	0.000E+00	0.000E+00	0.000E+00	2.750E+00	0.000E+00	0.000E+00	5.001E-02	8.523E+00	146.1753	14.7606
960.0	8.707E+01	0.000E+00	3.388E-01	0.000E+00	1.772E+00	0.000E+00	0.000E+00	0.000E+00	4.976E+00	125.6005	14.7474
1080.0	9.007E+01	0.000E+00	5.920E-01	0.000E+00	1.296E+00	0.000E+00	0.000E+00	0.000E+00	3.296E+00	112.6702	14.7483
1200.0	9.207E+01	0.000E+00	7.767E-01	0.000E+00	9.439E-01	0.000E+00	0.000E+00	0.000E+00	2.174E+00	104.5255	14.7489
1320.0	9.340E+01	0.000E+00	9.104E-01	0.000E+00	6.854E-01	0.000E+00	0.000E+00	0.000E+00	1.429E+00	99.3438	14.7493
1440.0	9.429E+01	0.000E+00	1.007E+00	0.000E+00	4.968E-01	0.000E+00	0.000E+00	0.000E+00	9.380E-01	96.0259	14.7495
1560.0	9.464E+01	0.000E+00	1.074E+00	0.000E+00	3.588E-01	0.000E+00	0.000E+00	0.000E+00	6.134E-01	93.8922	14.7495
1680.0	9.511E+01	0.000E+00	1.124E+00	0.000E+00	2.598E-01	0.000E+00	0.000E+00	0.000E+00	4.021E-01	92.5164	14.7497
1800.0	9.568E+01	0.000E+00	1.164E+00	0.000E+00	1.885E-01	0.000E+00	0.000E+00	0.000E+00	2.641E-01	91.6398	14.7500
1920.0	9.577E+01	0.000E+00	1.189E+00	0.000E+00	1.361E-01	0.000E+00	0.000E+00	0.000E+00	1.727E-01	91.0611	14.7500
2040.0	9.593E+01	0.000E+00	1.208E+00	0.000E+00	9.838E-02	0.000E+00	0.000E+00	0.000E+00	1.131E-01	90.6941	14.7501
2160.0	9.593E+01	0.000E+00	1.220E+00	0.000E+00	7.103E-02	0.000E+00	0.000E+00	0.000E+00	7.390E-02	90.4474	14.7500
2280.0	9.599E+01	0.000E+00	1.230E+00	0.000E+00	5.132E-02	0.000E+00	0.000E+00	0.000E+00	4.835E-02	90.2935	14.7500
2400.0	9.580E+01	0.000E+00	1.234E+00	0.000E+00	3.699E-02	0.000E+00	0.000E+00	0.000E+00	3.155E-02	90.1848	14.7498
2520.0	9.601E+01	0.000E+00	1.241E+00	0.000E+00	2.677E-02	0.000E+00	0.000E+00	0.000E+00	2.068E-02	90.1316	14.7500
2640.0	9.601E+01	0.000E+00	1.244E+00	0.000E+00	1.934E-02	0.000E+00	0.000E+00	0.000E+00	1.352E-02	90.0786	14.7500
2760.0	9.602E+01	0.000E+00	1.247E+00	0.000E+00	1.397E-02	0.000E+00	0.000E+00	0.000E+00	8.845E-03	90.0523	14.7500
2880.0	9.602E+01	0.000E+00	1.249E+00	0.000E+00	1.009E-02	0.000E+00	0.000E+00	0.000E+00	5.785E-03	90.0391	14.7500
3000.0	9.602E+01	0.000E+00	1.250E+00	0.000E+00	7.288E-03	0.000E+00	0.000E+00	0.000E+00	3.784E-03	90.0261	14.7500
3120.0	9.602E+01	0.000E+00	1.251E+00	0.000E+00	5.264E-03	0.000E+00	0.000E+00	0.000E+00	2.475E-03	90.0131	14.7500
3240.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	3.802E-03	0.000E+00	0.000E+00	0.000E+00	1.618E-03	90.0131	14.7500
3360.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	2.747E-03	0.000E+00	0.000E+00	0.000E+00	1.059E-03	90.0131	14.7500
3480.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	1.984E-03	0.000E+00	0.000E+00	0.000E+00	6.923E-04	90.0131	14.7500
3600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	1.433E-03	0.000E+00	0.000E+00	0.000E+00	4.528E-04	90.0131	14.7500

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE FALLOUT

DEPOSITION VELOCITY = 0.0330 FT/SEC
DEPOSITION AREA = 12500. FT**2

TIME	COMPONENT MASS FLOW RATE (LB/SEC)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.181E+00
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.900E+00
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.338E+00
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.479E+00
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.408E+00
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.363E+00
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.339E+00
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.548E+00
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.018E+00
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.682E-01
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.380E-01
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.869E-01
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.878E-01
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.229E-01
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.044E-02
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.262E-02
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.442E-02
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.252E-02
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.473E-02
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.634E-03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.301E-03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.121E-03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.696E-03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.763E-03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.153E-03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.542E-04
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.933E-04
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.226E-04
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.110E-04
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E-04

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE ACCUMULATED ON FLOOR

TIME (SEC)	COMPONENT MASS (LB) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.611E+01
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.641E+02
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.204E+02
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.151E+02
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.108E+03
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.394E+03
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.676E+03
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.907E+03
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.059E+03
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.159E+03
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.224E+03
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.267E+03
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.295E+03
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.314E+03
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.326E+03
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.334E+03
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.339E+03
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.342E+03
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.344E+03
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.346E+03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.347E+03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.347E+03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.349E+03
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.349E+03
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.349E+03

TITLE: EX. 4, CASE 3. RELEASE (EX. 2.2), FORCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT CONCENTRATIONS

TIME	CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED MATERIAL (LB)						COMPARTMENT CONCENTRATIONS (LB/FT**3)	
(SEC)	UF6	UO2F2	TOTAL U	HF	HF FROM UF6	TOTAL HF	URANIUM	HF
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	3.015E+02	2.330E+02	8.073E+01	0.000E+00	8.073E+01	2.212E-03	7.785E-04
240.0	0.000E+00	1.037E+03	8.014E+02	2.851E+02	0.000E+00	2.851E+02	3.560E-03	1.303E-03
360.0	0.000E+00	2.030E+03	1.569E+03	5.709E+02	0.000E+00	5.709E+02	4.379E-03	1.656E-03
480.0	1.303E+01	3.147E+03	2.441E+03	9.023E+02	2.963E+00	9.053E+02	4.899E-03	1.816E-03
600.0	1.539E+02	4.226E+03	3.370E+03	1.234E+03	3.500E+01	1.269E+03	5.268E-03	1.821E-03
720.0	4.014E+02	5.280E+03	4.352E+03	1.566E+03	9.125E+01	1.657E+03	5.477E-03	1.824E-03
840.0	6.233E+02	6.313E+03	5.300E+03	1.898E+03	1.417E+02	2.039E+03	4.404E-03	1.830E-03
960.0	6.234E+02	7.055E+03	5.874E+03	2.148E+03	1.417E+02	2.290E+03	2.900E-03	1.336E-03
1080.0	6.234E+02	7.546E+03	6.253E+03	2.331E+03	1.417E+02	2.473E+03	1.907E-03	9.704E-04
1200.0	6.234E+02	7.870E+03	6.503E+03	2.464E+03	1.417E+02	2.606E+03	1.252E-03	7.035E-04
1320.0	6.234E+02	8.083E+03	6.668E+03	2.562E+03	1.417E+02	2.703E+03	8.206E-04	5.093E-04
1440.0	6.234E+02	8.224E+03	6.777E+03	2.632E+03	1.417E+02	2.774E+03	5.375E-04	3.684E-04
1560.0	6.234E+02	8.316E+03	6.848E+03	2.683E+03	1.417E+02	2.825E+03	3.519E-04	2.664E-04
1680.0	6.234E+02	8.376E+03	6.894E+03	2.720E+03	1.417E+02	2.862E+03	2.303E-04	1.925E-04
1800.0	6.234E+02	8.415E+03	6.925E+03	2.747E+03	1.417E+02	2.888E+03	1.507E-04	1.391E-04
1920.0	6.234E+02	8.441E+03	6.945E+03	2.766E+03	1.417E+02	2.908E+03	9.859E-05	1.005E-04
2040.0	6.234E+02	8.458E+03	6.958E+03	2.780E+03	1.417E+02	2.922E+03	6.449E-05	7.262E-05
2160.0	6.234E+02	8.469E+03	6.966E+03	2.790E+03	1.417E+02	2.932E+03	4.218E-05	5.247E-05
2280.0	6.234E+02	8.476E+03	6.972E+03	2.797E+03	1.417E+02	2.939E+03	2.759E-05	3.790E-05
2400.0	6.234E+02	8.481E+03	6.976E+03	2.802E+03	1.417E+02	2.944E+03	1.805E-05	2.738E-05
2520.0	6.234E+02	8.484E+03	6.978E+03	2.806E+03	1.417E+02	2.948E+03	1.180E-05	1.978E-05
2640.0	6.234E+02	8.486E+03	6.980E+03	2.809E+03	1.417E+02	2.951E+03	7.721E-06	1.429E-05
2760.0	6.234E+02	8.488E+03	6.981E+03	2.811E+03	1.417E+02	2.953E+03	5.050E-06	1.032E-05
2880.0	6.234E+02	8.488E+03	6.981E+03	2.812E+03	1.417E+02	2.954E+03	3.303E-06	7.454E-06
3000.0	6.234E+02	8.489E+03	6.982E+03	2.813E+03	1.417E+02	2.955E+03	2.160E-06	5.384E-06
3120.0	6.234E+02	8.489E+03	6.982E+03	2.814E+03	1.417E+02	2.956E+03	1.413E-06	3.889E-06
3240.0	6.234E+02	8.490E+03	6.982E+03	2.815E+03	1.417E+02	2.956E+03	9.241E-07	2.809E-06
3360.0	6.234E+02	8.490E+03	6.982E+03	2.815E+03	1.417E+02	2.957E+03	6.044E-07	2.029E-06
3480.0	6.234E+02	8.490E+03	6.982E+03	2.815E+03	1.417E+02	2.957E+03	3.953E-07	1.466E-06
3600.0	6.234E+02	8.490E+03	6.982E+03	2.816E+03	1.417E+02	2.957E+03	2.585E-07	1.059E-06

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

COMPARTMENT CONDITIONS

COMPARTMENT VOLUME = 500000. FT**2
U*A PRODUCT = 7.733E+00 BTU/SEC-DEG F
SURFACE TEMPERATURE = 120.0 DEG F
COOLING RATE = 0.000E+00 BTU/SEC

TIME (SEC)	COMPONENT MASS (LB) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	3.524E+04	0.000E+00	4.599E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.6500
120.0	3.322E+04	0.000E+00	2.523E+02	0.000E+00	4.026E+02	0.000E+00	0.000E+00	0.000E+00	1.479E+03	119.0574	14.6681
240.0	3.191E+04	0.000E+00	1.050E+02	0.000E+00	6.918E+02	0.000E+00	0.000E+00	0.000E+00	2.441E+03	138.7703	14.6669
360.0	3.108E+04	0.000E+00	1.279E+00	0.000E+00	8.982E+02	0.000E+00	0.000E+00	0.000E+00	3.060E+03	151.5805	14.6660
480.0	3.121E+04	0.000E+00	0.000E+00	0.000E+00	9.046E+02	0.000E+00	0.000E+00	6.112E+02	2.939E+03	147.9825	14.6606
600.0	3.130E+04	0.000E+00	0.000E+00	0.000E+00	9.073E+02	0.000E+00	0.000E+00	1.037E+03	2.853E+03	145.5106	14.6597
720.0	3.135E+04	0.000E+00	0.000E+00	0.000E+00	9.089E+02	0.000E+00	0.000E+00	1.307E+03	2.795E+03	143.9654	14.6588
840.0	3.143E+04	0.000E+00	0.000E+00	0.000E+00	9.112E+02	0.000E+00	0.000E+00	5.766E+02	2.761E+03	143.6034	14.6593
960.0	3.225E+04	0.000E+00	8.026E+01	0.000E+00	7.565E+02	0.000E+00	0.000E+00	0.000E+00	2.154E+03	131.0129	14.6476
1080.0	3.325E+04	0.000E+00	1.867E+02	0.000E+00	5.491E+02	0.000E+00	0.000E+00	0.000E+00	1.415E+03	116.0086	14.6484
1200.0	3.391E+04	0.000E+00	2.632E+02	0.000E+00	3.986E+02	0.000E+00	0.000E+00	0.000E+00	9.302E+02	106.6472	14.6490
1320.0	3.435E+04	0.000E+00	3.181E+02	0.000E+00	2.893E+02	0.000E+00	0.000E+00	0.000E+00	6.113E+02	100.7183	14.6493
1440.0	3.465E+04	0.000E+00	3.576E+02	0.000E+00	2.100E+02	0.000E+00	0.000E+00	0.000E+00	4.018E+02	96.9272	14.6496
1560.0	3.484E+04	0.000E+00	3.861E+02	0.000E+00	1.524E+02	0.000E+00	0.000E+00	0.000E+00	2.641E+02	94.4881	14.6495
1680.0	3.497E+04	0.000E+00	4.066E+02	0.000E+00	1.106E+02	0.000E+00	0.000E+00	0.000E+00	1.735E+02	92.9118	14.6496
1800.0	3.506E+04	0.000E+00	4.214E+02	0.000E+00	8.030E+01	0.000E+00	0.000E+00	0.000E+00	1.141E+02	91.8911	14.6496
1920.0	3.511E+04	0.000E+00	4.320E+02	0.000E+00	5.828E+01	0.000E+00	0.000E+00	0.000E+00	7.496E+01	91.2332	14.6499
2040.0	3.515E+04	0.000E+00	4.397E+02	0.000E+00	4.230E+01	0.000E+00	0.000E+00	0.000E+00	4.927E+01	90.8073	14.6501
2160.0	3.518E+04	0.000E+00	4.453E+02	0.000E+00	3.071E+01	0.000E+00	0.000E+00	0.000E+00	3.238E+01	90.5266	14.6500
2280.0	3.520E+04	0.000E+00	4.493E+02	0.000E+00	2.229E+01	0.000E+00	0.000E+00	0.000E+00	2.128E+01	90.3421	14.6500
2400.0	3.521E+04	0.000E+00	4.522E+02	0.000E+00	1.618E+01	0.000E+00	0.000E+00	0.000E+00	1.399E+01	90.2311	14.6500
2520.0	3.522E+04	0.000E+00	4.543E+02	0.000E+00	1.174E+01	0.000E+00	0.000E+00	0.000E+00	9.192E+00	90.1499	14.6500
2640.0	3.522E+04	0.000E+00	4.559E+02	0.000E+00	8.523E+00	0.000E+00	0.000E+00	0.000E+00	6.041E+00	90.0967	14.6500
2760.0	3.523E+04	0.000E+00	4.570E+02	0.000E+00	6.186E+00	0.000E+00	0.000E+00	0.000E+00	3.970E+00	90.0704	14.6500
2880.0	3.523E+04	0.000E+00	4.578E+02	0.000E+00	4.490E+00	0.000E+00	0.000E+00	0.000E+00	2.609E+00	90.0443	14.6500
3000.0	3.523E+04	0.000E+00	4.583E+02	0.000E+00	3.259E+00	0.000E+00	0.000E+00	0.000E+00	1.715E+00	90.0312	14.6500
3120.0	3.523E+04	0.000E+00	4.588E+02	0.000E+00	2.366E+00	0.000E+00	0.000E+00	0.000E+00	1.127E+00	90.0181	14.6500
3240.0	3.523E+04	0.000E+00	4.591E+02	0.000E+00	1.717E+00	0.000E+00	0.000E+00	0.000E+00	7.408E-01	90.0181	14.6500
3360.0	3.523E+04	0.000E+00	4.593E+02	0.000E+00	1.246E+00	0.000E+00	0.000E+00	0.000E+00	4.868E-01	90.0181	14.6500
3480.0	3.523E+04	0.000E+00	4.594E+02	0.000E+00	9.046E-01	0.000E+00	0.000E+00	0.000E+00	3.200E-01	90.0051	14.6500
3600.0	3.523E+04	0.000E+00	4.595E+02	0.000E+00	6.566E-01	0.000E+00	0.000E+00	0.000E+00	2.103E-01	90.0051	14.6500

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

INLET AIR STREAM (INDUCED DRAFT)

RESISTANCE TERM = 4.026E-07 PSI-SEC**2/LB/FT**3
AMBIENT TEMPERATURE = 80.000 DEG F
AMBIENT PRESSURE = 14.700 PSIA

TIME (SEC)	AIR V	H2O L	H2O V	COMPONENT MASS FLOW RATE (LB/SEC) HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
120.0	7.500E+01	0.000E+00	9.789E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
240.0	7.648E+01	0.000E+00	9.981E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
360.0	7.749E+01	0.000E+00	1.011E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
480.0	8.345E+01	0.000E+00	1.089E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
600.0	8.432E+01	0.000E+00	1.101E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
720.0	8.529E+01	0.000E+00	1.113E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
840.0	8.479E+01	0.000E+00	1.107E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
960.0	9.618E+01	0.000E+00	1.255E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1080.0	9.541E+01	0.000E+00	1.245E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1200.0	9.490E+01	0.000E+00	1.239E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1320.0	9.457E+01	0.000E+00	1.234E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1440.0	9.436E+01	0.000E+00	1.231E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1560.0	9.447E+01	0.000E+00	1.233E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1680.0	9.429E+01	0.000E+00	1.231E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1800.0	9.430E+01	0.000E+00	1.231E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1920.0	9.406E+01	0.000E+00	1.228E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2040.0	9.391E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2160.0	9.392E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2280.0	9.395E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2400.0	9.392E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2520.0	9.394E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2640.0	9.394E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2760.0	9.395E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2880.0	9.395E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3000.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3120.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3240.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3360.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3480.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3600.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

SOURCE TERM: SOURCE TERM MASS FLOW RATES, TEMPERATURE, AND PRESSURE WERE READ FROM DATA FILE.

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.727E+01	0.000E+00	133.7805	14.7000
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.716E+01	0.000E+00	133.7805	14.7000
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.702E+01	0.000E+00	133.7805	14.7000
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.685E+01	0.000E+00	133.7805	14.7000
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.663E+01	0.000E+00	133.7805	14.7000
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.631E+01	0.000E+00	133.7805	14.7000
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.575E+01	0.000E+00	133.7805	14.7000

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

EXHAUST BLOWER FLOW RATE = 80000.0 ACFM

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	9.396E+01	0.000E+00	1.226E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.6500
120.0	8.859E+01	0.000E+00	6.729E-01	0.000E+00	1.074E+00	0.000E+00	0.000E+00	0.000E+00	3.945E+00	119.0574	14.6681
240.0	8.509E+01	0.000E+00	2.800E-01	0.000E+00	1.845E+00	0.000E+00	0.000E+00	0.000E+00	6.509E+00	138.7703	14.6669
360.0	8.289E+01	0.000E+00	3.409E-03	0.000E+00	2.395E+00	0.000E+00	0.000E+00	0.000E+00	8.159E+00	151.5805	14.6660
480.0	8.321E+01	0.000E+00	0.000E+00	0.000E+00	2.412E+00	0.000E+00	0.000E+00	1.630E+00	7.837E+00	147.9825	14.6606
600.0	8.346E+01	0.000E+00	0.000E+00	0.000E+00	2.419E+00	0.000E+00	0.000E+00	2.766E+00	7.607E+00	145.5106	14.6597
720.0	8.361E+01	0.000E+00	0.000E+00	0.000E+00	2.424E+00	0.000E+00	0.000E+00	3.485E+00	7.454E+00	143.9654	14.6588
840.0	8.382E+01	0.000E+00	0.000E+00	0.000E+00	2.430E+00	0.000E+00	0.000E+00	1.538E+00	7.363E+00	143.6034	14.6593
960.0	8.599E+01	0.000E+00	2.140E-01	0.000E+00	2.017E+00	0.000E+00	0.000E+00	0.000E+00	5.743E+00	131.0129	14.6476
1080.0	8.867E+01	0.000E+00	4.980E-01	0.000E+00	1.464E+00	0.000E+00	0.000E+00	0.000E+00	3.774E+00	116.0086	14.6484
1200.0	9.044E+01	0.000E+00	7.018E-01	0.000E+00	1.063E+00	0.000E+00	0.000E+00	0.000E+00	2.481E+00	106.6472	14.6490
1320.0	9.161E+01	0.000E+00	8.483E-01	0.000E+00	7.714E-01	0.000E+00	0.000E+00	0.000E+00	1.630E+00	100.7183	14.6493
1440.0	9.239E+01	0.000E+00	9.537E-01	0.000E+00	5.599E-01	0.000E+00	0.000E+00	0.000E+00	1.071E+00	96.9272	14.6496
1560.0	9.291E+01	0.000E+00	1.030E+00	0.000E+00	4.064E-01	0.000E+00	0.000E+00	0.000E+00	7.042E-01	94.4881	14.6495
1680.0	9.325E+01	0.000E+00	1.084E+00	0.000E+00	2.950E-01	0.000E+00	0.000E+00	0.000E+00	4.628E-01	92.9118	14.6496
1800.0	9.348E+01	0.000E+00	1.124E+00	0.000E+00	2.141E-01	0.000E+00	0.000E+00	0.000E+00	3.042E-01	91.8911	14.6496
1920.0	9.364E+01	0.000E+00	1.152E+00	0.000E+00	1.554E-01	0.000E+00	0.000E+00	0.000E+00	1.999E-01	91.2332	14.6499
2040.0	9.374E+01	0.000E+00	1.173E+00	0.000E+00	1.128E-01	0.000E+00	0.000E+00	0.000E+00	1.314E-01	90.8073	14.6501
2160.0	9.381E+01	0.000E+00	1.187E+00	0.000E+00	8.188E-02	0.000E+00	0.000E+00	0.000E+00	8.635E-02	90.5266	14.6500
2280.0	9.386E+01	0.000E+00	1.198E+00	0.000E+00	5.943E-02	0.000E+00	0.000E+00	0.000E+00	5.675E-02	90.3421	14.6500
2400.0	9.389E+01	0.000E+00	1.206E+00	0.000E+00	4.314E-02	0.000E+00	0.000E+00	0.000E+00	3.730E-02	90.2311	14.6500
2520.0	9.391E+01	0.000E+00	1.212E+00	0.000E+00	3.131E-02	0.000E+00	0.000E+00	0.000E+00	2.451E-02	90.1499	14.6500
2640.0	9.393E+01	0.000E+00	1.216E+00	0.000E+00	2.273E-02	0.000E+00	0.000E+00	0.000E+00	1.611E-02	90.0967	14.6500
2760.0	9.394E+01	0.000E+00	1.219E+00	0.000E+00	1.650E-02	0.000E+00	0.000E+00	0.000E+00	1.059E-02	90.0704	14.6500
2880.0	9.394E+01	0.000E+00	1.221E+00	0.000E+00	1.197E-02	0.000E+00	0.000E+00	0.000E+00	6.958E-03	90.0443	14.6500
3000.0	9.395E+01	0.000E+00	1.222E+00	0.000E+00	8.691E-03	0.000E+00	0.000E+00	0.000E+00	4.573E-03	90.0312	14.6500
3120.0	9.395E+01	0.000E+00	1.223E+00	0.000E+00	6.308E-03	0.000E+00	0.000E+00	0.000E+00	3.006E-03	90.0181	14.6500
3240.0	9.395E+01	0.000E+00	1.224E+00	0.000E+00	4.579E-03	0.000E+00	0.000E+00	0.000E+00	1.975E-03	90.0181	14.6500
3360.0	9.395E+01	0.000E+00	1.225E+00	0.000E+00	3.323E-03	0.000E+00	0.000E+00	0.000E+00	1.298E-03	90.0181	14.6500
3480.0	9.396E+01	0.000E+00	1.225E+00	0.000E+00	2.412E-03	0.000E+00	0.000E+00	0.000E+00	8.532E-04	90.0051	14.6500
3600.0	9.396E+01	0.000E+00	1.225E+00	0.000E+00	1.751E-03	0.000E+00	0.000E+00	0.000E+00	5.608E-04	90.0051	14.6500

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE FALLOUT

DEPOSITION VELOCITY = 0.0330 FT/SEC
DEPOSITION AREA = 12500. FT**2

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.221E+00
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.014E+00
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.524E+00
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.425E+00
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.354E+00
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.306E+00
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.278E+00
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.777E+00
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.168E+00
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.674E-01
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.044E-01
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.315E-01
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.179E-01
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.432E-01
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.410E-02
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.184E-02
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.065E-02
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.671E-02
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.756E-02
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.154E-02
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.583E-03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.984E-03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.276E-03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.153E-03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.415E-03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.299E-04
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.111E-04
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.017E-04
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.640E-04
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.735E-04

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE ACCUMULATED ON FLOOR

TIME	COMPONENT MASS (LB)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.783E+01
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.749E+02
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.492E+02
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.462E+02
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.133E+03
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.412E+03
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.687E+03
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.942E+03
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.116E+03
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.231E+03
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.306E+03
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.356E+03
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.388E+03
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.410E+03
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.424E+03
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.433E+03
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.439E+03
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.443E+03
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.445E+03
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.447E+03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.448E+03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.449E+03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.450E+03

TITLE: EX. 4, CASE 4. RELEASE (EX. 2.2), INDUCED VENT, SOLIDS TO FLOOR

DATA GENERATED BY INDRFT -- AN INDUCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT CONCENTRATIONS

TIME (SEC)	CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED MATERIAL (LB) UF6	UO2F2	TOTAL U	HF	HF FROM UF6	TOTAL HF	COMPARTMENT CONCENTRATIONS (LB/FT**3) URANIUM	HF
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	2.516E+02	1.944E+02	6.739E+01	0.000E+00	6.739E+01	2.287E-03	8.052E-04
240.0	0.000E+00	8.886E+02	6.867E+02	2.447E+02	0.000E+00	2.447E+02	3.772E-03	1.384E-03
360.0	0.000E+00	1.775E+03	1.372E+03	5.007E+02	0.000E+00	5.007E+02	4.729E-03	1.796E-03
480.0	1.014E+02	2.735E+03	2.182E+03	7.895E+02	2.306E+01	8.126E+02	5.369E-03	1.809E-03
600.0	3.692E+02	3.661E+03	3.079E+03	1.079E+03	8.393E+01	1.163E+03	5.812E-03	1.815E-03
720.0	7.477E+02	4.564E+03	4.033E+03	1.370E+03	1.700E+02	1.540E+03	6.087E-03	1.818E-03
840.0	1.119E+03	5.452E+03	4.970E+03	1.661E+03	2.544E+02	1.916E+03	5.047E-03	1.822E-03
960.0	1.157E+03	6.276E+03	5.633E+03	1.938E+03	2.631E+02	2.201E+03	3.328E-03	1.513E-03
1080.0	1.157E+03	6.840E+03	6.068E+03	2.146E+03	2.631E+02	2.409E+03	2.187E-03	1.098E-03
1200.0	1.157E+03	7.210E+03	6.355E+03	2.296E+03	2.631E+02	2.559E+03	1.438E-03	7.971E-04
1320.0	1.157E+03	7.454E+03	6.543E+03	2.405E+03	2.631E+02	2.669E+03	9.449E-04	5.786E-04
1440.0	1.157E+03	7.614E+03	6.667E+03	2.485E+03	2.631E+02	2.748E+03	6.210E-04	4.200E-04
1560.0	1.157E+03	7.719E+03	6.748E+03	2.542E+03	2.631E+02	2.805E+03	4.081E-04	3.048E-04
1680.0	1.157E+03	7.788E+03	6.801E+03	2.584E+03	2.631E+02	2.847E+03	2.682E-04	2.213E-04
1800.0	1.157E+03	7.834E+03	6.836E+03	2.614E+03	2.631E+02	2.878E+03	1.763E-04	1.606E-04
1920.0	1.157E+03	7.864E+03	6.859E+03	2.636E+03	2.631E+02	2.900E+03	1.159E-04	1.166E-04
2040.0	1.157E+03	7.883E+03	6.875E+03	2.652E+03	2.631E+02	2.916E+03	7.615E-05	8.461E-05
2160.0	1.157E+03	7.896E+03	6.885E+03	2.664E+03	2.631E+02	2.927E+03	5.004E-05	6.141E-05
2280.0	1.157E+03	7.905E+03	6.891E+03	2.672E+03	2.631E+02	2.936E+03	3.289E-05	4.457E-05
2400.0	1.157E+03	7.910E+03	6.895E+03	2.679E+03	2.631E+02	2.942E+03	2.162E-05	3.235E-05
2520.0	1.157E+03	7.914E+03	6.898E+03	2.683E+03	2.631E+02	2.946E+03	1.421E-05	2.348E-05
2640.0	1.157E+03	7.916E+03	6.900E+03	2.686E+03	2.631E+02	2.949E+03	9.337E-06	1.705E-05
2760.0	1.157E+03	7.918E+03	6.901E+03	2.689E+03	2.631E+02	2.952E+03	6.136E-06	1.237E-05
2880.0	1.157E+03	7.919E+03	6.902E+03	2.690E+03	2.631E+02	2.953E+03	4.033E-06	8.980E-06
3000.0	1.157E+03	7.920E+03	6.903E+03	2.691E+03	2.631E+02	2.955E+03	2.651E-06	6.518E-06
3120.0	1.157E+03	7.920E+03	6.903E+03	2.692E+03	2.631E+02	2.956E+03	1.742E-06	4.731E-06
3240.0	1.157E+03	7.920E+03	6.903E+03	2.693E+03	2.631E+02	2.956E+03	1.145E-06	3.434E-06
3360.0	1.157E+03	7.921E+03	6.903E+03	2.693E+03	2.631E+02	2.957E+03	7.525E-07	2.493E-06
3480.0	1.157E+03	7.921E+03	6.904E+03	2.694E+03	2.631E+02	2.957E+03	4.945E-07	1.809E-06
3600.0	1.157E+03	7.921E+03	6.904E+03	2.694E+03	2.631E+02	2.957E+03	3.250E-07	1.313E-06

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

INLET AIR BLOWER

FLOW RATE = 0.0 ACFM
AMBIENT TEMPERATURE = 80.000 DEG F
AMBIENT PRESSURE = 14.700 PSIA

TIME (SEC)	COMPONENT MASS FLOW RATE (LB/SEC) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
720.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
840.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
960.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1080.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1200.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1320.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1440.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1560.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1680.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1800.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
1920.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2040.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2160.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2280.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2400.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2520.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2640.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2760.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
2880.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3000.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3120.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3240.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3360.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3480.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000
3600.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	80.0000	14.7000

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

COMPARTMENT CONDITIONS

COMPARTMENT VOLUME = 500000. FT**2
U*A PRODUCT = 7.903E+00 BTU/SEC-DEG F
SURFACE TEMPERATURE = 120.0 DEG F
COOLING RATE = 0.000E+00 BTU/SEC

TIME (SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	TEMPERATURE (DEG F)	PRESSURE (PSIA)
	COMPONENT MASS (LB)										
0.0	3.548E+04	0.000E+00	4.630E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	3.240E+04	0.000E+00	8.779E+01	0.000E+00	7.443E+02	0.000E+00	0.000E+00	0.000E+00	2.738E+03	134.0015	14.7871
240.0	3.198E+04	0.000E+00	0.000E+00	0.000E+00	9.270E+02	0.000E+00	0.000E+00	1.551E+03	3.213E+03	135.9653	14.7603
360.0	3.227E+04	0.000E+00	0.000E+00	0.000E+00	9.355E+02	0.000E+00	0.000E+00	3.217E+03	3.088E+03	128.3547	14.7646
480.0	3.244E+04	0.000E+00	0.000E+00	0.000E+00	9.404E+02	0.000E+00	0.000E+00	4.351E+03	3.004E+03	123.7788	14.7667
600.0	3.254E+04	0.000E+00	0.000E+00	0.000E+00	9.433E+02	0.000E+00	0.000E+00	5.130E+03	2.949E+03	120.9825	14.7673
720.0	3.261E+04	0.000E+00	0.000E+00	0.000E+00	9.454E+02	0.000E+00	0.000E+00	5.789E+03	2.915E+03	118.8497	14.7690
840.0	3.245E+04	0.000E+00	0.000E+00	0.000E+00	9.406E+02	0.000E+00	0.000E+00	4.062E+03	2.874E+03	124.2249	14.7705
960.0	3.222E+04	0.000E+00	0.000E+00	0.000E+00	9.339E+02	0.000E+00	0.000E+00	1.589E+03	2.839E+03	131.7506	14.7662
1080.0	3.217E+04	0.000E+00	1.324E+01	0.000E+00	9.033E+02	0.000E+00	0.000E+00	0.000E+00	2.714E+03	134.4666	14.7474
1200.0	3.327E+04	0.000E+00	1.386E+02	0.000E+00	6.568E+02	0.000E+00	0.000E+00	0.000E+00	1.787E+03	118.2330	14.7483
1320.0	3.401E+04	0.000E+00	2.293E+02	0.000E+00	4.765E+02	0.000E+00	0.000E+00	0.000E+00	1.174E+03	108.0553	14.7489
1440.0	3.450E+04	0.000E+00	2.948E+02	0.000E+00	3.451E+02	0.000E+00	0.000E+00	0.000E+00	7.699E+02	101.5999	14.7493
1560.0	3.482E+04	0.000E+00	3.420E+02	0.000E+00	2.498E+02	0.000E+00	0.000E+00	0.000E+00	5.045E+02	97.4747	14.7495
1680.0	3.504E+04	0.000E+00	3.760E+02	0.000E+00	1.806E+02	0.000E+00	0.000E+00	0.000E+00	3.303E+02	94.8434	14.7500
1800.0	3.518E+04	0.000E+00	4.004E+02	0.000E+00	1.306E+02	0.000E+00	0.000E+00	0.000E+00	2.162E+02	93.1303	14.7500
1920.0	3.528E+04	0.000E+00	4.179E+02	0.000E+00	9.436E+01	0.000E+00	0.000E+00	0.000E+00	1.415E+02	92.0248	14.7499
2040.0	3.534E+04	0.000E+00	4.306E+02	0.000E+00	6.818E+01	0.000E+00	0.000E+00	0.000E+00	9.257E+01	91.3101	14.7499
2160.0	3.539E+04	0.000E+00	4.396E+02	0.000E+00	4.926E+01	0.000E+00	0.000E+00	0.000E+00	6.056E+01	90.8509	14.7500
2280.0	3.541E+04	0.000E+00	4.462E+02	0.000E+00	3.559E+01	0.000E+00	0.000E+00	0.000E+00	3.961E+01	90.5526	14.7500
2400.0	3.543E+04	0.000E+00	4.509E+02	0.000E+00	2.571E+01	0.000E+00	0.000E+00	0.000E+00	2.591E+01	90.3666	14.7501
2520.0	3.545E+04	0.000E+00	4.543E+02	0.000E+00	1.857E+01	0.000E+00	0.000E+00	0.000E+00	1.695E+01	90.2413	14.7500
2640.0	3.546E+04	0.000E+00	4.567E+02	0.000E+00	1.342E+01	0.000E+00	0.000E+00	0.000E+00	1.109E+01	90.1598	14.7500
2760.0	3.546E+04	0.000E+00	4.585E+02	0.000E+00	9.690E+00	0.000E+00	0.000E+00	0.000E+00	7.250E+00	90.1064	14.7500
2880.0	3.547E+04	0.000E+00	4.597E+02	0.000E+00	7.000E+00	0.000E+00	0.000E+00	0.000E+00	4.742E+00	90.0666	14.7500
3000.0	3.547E+04	0.000E+00	4.606E+02	0.000E+00	5.056E+00	0.000E+00	0.000E+00	0.000E+00	3.102E+00	90.0404	14.7500
3120.0	3.547E+04	0.000E+00	4.613E+02	0.000E+00	3.652E+00	0.000E+00	0.000E+00	0.000E+00	2.029E+00	90.0272	14.7500
3240.0	3.547E+04	0.000E+00	4.618E+02	0.000E+00	2.638E+00	0.000E+00	0.000E+00	0.000E+00	1.327E+00	90.0272	14.7500
3360.0	3.547E+04	0.000E+00	4.621E+02	0.000E+00	1.906E+00	0.000E+00	0.000E+00	0.000E+00	8.678E-01	90.0142	14.7500
3480.0	3.547E+04	0.000E+00	4.623E+02	0.000E+00	1.377E+00	0.000E+00	0.000E+00	0.000E+00	5.676E-01	90.0142	14.7500
3600.0	3.547E+04	0.000E+00	4.625E+02	0.000E+00	9.943E-01	0.000E+00	0.000E+00	0.000E+00	3.712E-01	90.0142	14.7500

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

SOURCE TERM: UF6 LIQUID

FLASH BASIS: ISENTHALPIC
UF6 MOLECULAR WEIGHT = 352.025

INCRE-MENT	DURATION (SEC)	MASS (LB)	TEMPERATURE (DEG F)	PRESSURE (PSIA)
1	200.0	6709.0	189.600	LIQUID
2	200.0	6639.0	188.700	LIQUID
3	200.0	6538.0	187.300	LIQUID
4	140.0	4728.0	185.100	LIQUID
5	40.0	977.0	183.000	LIQUID
TOTAL	780.0	25591.0		

TIME	COMPONENT MASS FLOW RATE (LB/SEC)										TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S		(DEG F)	(PSIA)
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.637E+01	0.000E+00	1.717E+01	0.000E+00		133.8915	14.7500
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.637E+01	0.000E+00	1.717E+01	0.000E+00		133.8915	14.7500
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.627E+01	0.000E+00	1.693E+01	0.000E+00		133.9108	14.7587
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.627E+01	0.000E+00	1.693E+01	0.000E+00		133.9108	14.7587
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.612E+01	0.000E+00	1.657E+01	0.000E+00		133.9257	14.7654
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.682E+01	0.000E+00	1.695E+01	0.000E+00		133.9298	14.7673
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.682E+01	0.000E+00	1.695E+01	0.000E+00		133.9298	14.7673

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

EXHAUST STREAM (FORCED DRAFT) RESISTANCE TERM = 3.798E-07 PSI-SEC**2/LB/FT**3

TIME	COMPONENT MASS FLOW RATE (LB/SEC)									TEMPERATURE	PRESSURE
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S	(DEG F)	(PSIA)
0.0	9.603E+01	0.000E+00	1.253E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	90.0000	14.7500
120.0	1.157E+02	0.000E+00	3.135E-01	0.000E+00	2.658E+00	0.000E+00	0.000E+00	0.000E+00	9.776E+00	134.0015	14.7871
240.0	9.285E+01	0.000E+00	0.000E+00	0.000E+00	2.691E+00	0.000E+00	0.000E+00	4.502E+00	9.329E+00	135.9653	14.7603
360.0	9.473E+01	0.000E+00	0.000E+00	0.000E+00	2.746E+00	0.000E+00	0.000E+00	9.443E+00	9.063E+00	128.3547	14.7646
480.0	9.528E+01	0.000E+00	0.000E+00	0.000E+00	2.762E+00	0.000E+00	0.000E+00	1.278E+01	8.824E+00	123.7788	14.7667
600.0	9.501E+01	0.000E+00	0.000E+00	0.000E+00	2.754E+00	0.000E+00	0.000E+00	1.498E+01	8.611E+00	120.9825	14.7673
720.0	9.561E+01	0.000E+00	0.000E+00	0.000E+00	2.771E+00	0.000E+00	0.000E+00	1.697E+01	8.545E+00	118.8497	14.7690
840.0	9.848E+01	0.000E+00	0.000E+00	0.000E+00	2.855E+00	0.000E+00	0.000E+00	1.233E+01	8.722E+00	124.2249	14.7705
960.0	9.810E+01	0.000E+00	0.000E+00	0.000E+00	2.844E+00	0.000E+00	0.000E+00	4.838E+00	8.644E+00	131.7506	14.7662
1080.0	8.499E+01	0.000E+00	3.498E-02	0.000E+00	2.386E+00	0.000E+00	0.000E+00	0.000E+00	7.170E+00	134.4666	14.7474
1200.0	8.860E+01	0.000E+00	3.690E-01	0.000E+00	1.749E+00	0.000E+00	0.000E+00	0.000E+00	4.758E+00	118.2330	14.7483
1320.0	9.108E+01	0.000E+00	6.141E-01	0.000E+00	1.276E+00	0.000E+00	0.000E+00	0.000E+00	3.144E+00	108.0553	14.7489
1440.0	9.273E+01	0.000E+00	7.925E-01	0.000E+00	9.278E-01	0.000E+00	0.000E+00	0.000E+00	2.070E+00	101.5999	14.7493
1560.0	9.383E+01	0.000E+00	9.216E-01	0.000E+00	6.730E-01	0.000E+00	0.000E+00	0.000E+00	1.359E+00	97.4747	14.7495
1680.0	9.487E+01	0.000E+00	1.018E+00	0.000E+00	4.890E-01	0.000E+00	0.000E+00	0.000E+00	8.944E-01	94.8434	14.7500
1800.0	9.523E+01	0.000E+00	1.084E+00	0.000E+00	3.534E-01	0.000E+00	0.000E+00	0.000E+00	5.853E-01	93.1303	14.7500
1920.0	9.542E+01	0.000E+00	1.130E+00	0.000E+00	2.552E-01	0.000E+00	0.000E+00	0.000E+00	3.827E-01	92.0248	14.7499
2040.0	9.562E+01	0.000E+00	1.165E+00	0.000E+00	1.845E-01	0.000E+00	0.000E+00	0.000E+00	2.504E-01	91.3101	14.7499
2160.0	9.578E+01	0.000E+00	1.190E+00	0.000E+00	1.333E-01	0.000E+00	0.000E+00	0.000E+00	1.639E-01	90.8509	14.7500
2280.0	9.588E+01	0.000E+00	1.208E+00	0.000E+00	9.635E-02	0.000E+00	0.000E+00	0.000E+00	1.072E-01	90.5526	14.7500
2400.0	9.598E+01	0.000E+00	1.221E+00	0.000E+00	6.963E-02	0.000E+00	0.000E+00	0.000E+00	7.018E-02	90.3666	14.7501
2520.0	9.599E+01	0.000E+00	1.230E+00	0.000E+00	5.029E-02	0.000E+00	0.000E+00	0.000E+00	4.590E-02	90.2413	14.7500
2640.0	9.600E+01	0.000E+00	1.237E+00	0.000E+00	3.632E-02	0.000E+00	0.000E+00	0.000E+00	3.001E-02	90.1598	14.7500
2760.0	9.601E+01	0.000E+00	1.241E+00	0.000E+00	2.624E-02	0.000E+00	0.000E+00	0.000E+00	1.963E-02	90.1064	14.7500
2880.0	9.601E+01	0.000E+00	1.245E+00	0.000E+00	1.895E-02	0.000E+00	0.000E+00	0.000E+00	1.284E-02	90.0666	14.7500
3000.0	9.602E+01	0.000E+00	1.247E+00	0.000E+00	1.369E-02	0.000E+00	0.000E+00	0.000E+00	8.396E-03	90.0404	14.7500
3120.0	9.602E+01	0.000E+00	1.249E+00	0.000E+00	9.887E-03	0.000E+00	0.000E+00	0.000E+00	5.492E-03	90.0272	14.7500
3240.0	9.602E+01	0.000E+00	1.250E+00	0.000E+00	7.142E-03	0.000E+00	0.000E+00	0.000E+00	3.592E-03	90.0272	14.7500
3360.0	9.602E+01	0.000E+00	1.251E+00	0.000E+00	5.159E-03	0.000E+00	0.000E+00	0.000E+00	2.349E-03	90.0142	14.7500
3480.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	3.726E-03	0.000E+00	0.000E+00	0.000E+00	1.536E-03	90.0142	14.7500
3600.0	9.603E+01	0.000E+00	1.252E+00	0.000E+00	2.692E-03	0.000E+00	0.000E+00	0.000E+00	1.005E-03	90.0142	14.7500

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE FALLOUT

DEPOSITION VELOCITY = 0.0330 FT/SEC
DEPOSITION AREA = 12500. FT**2

TIME	COMPONENT MASS FLOW RATE (LB/SEC)								
(SEC)	AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.259E+00
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.651E+00
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.547E+00
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.479E+00
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.433E+00
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.405E+00
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.371E+00
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.342E+00
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.239E+00
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.474E+00
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.684E-01
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.352E-01
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.162E-01
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.725E-01
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.784E-01
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.167E-01
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.637E-02
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.996E-02
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.268E-02
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.138E-02
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.398E-02
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.145E-03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.982E-03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.912E-03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.559E-03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.674E-03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.095E-03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.159E-04
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.683E-04
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.063E-04

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

CONDENSATE ACCUMULATED ON FLOOR

TIME (SEC)	COMPONENT MASS (LB) AIR V	H2O L	H2O V	HF L	HF V	UF6 S	UF6 L	UF6 V	UO2F2 S
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.463E+02
240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.629E+02
360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.744E+02
480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.076E+03
600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.370E+03
720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.660E+03
840.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.947E+03
960.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.230E+03
1080.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.509E+03
1200.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.729E+03
1320.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.874E+03
1440.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.969E+03
1560.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.031E+03
1680.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.072E+03
1800.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.099E+03
1920.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.116E+03
2040.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.128E+03
2160.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.135E+03
2280.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.140E+03
2400.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.143E+03
2520.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.146E+03
2640.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.147E+03
2760.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.148E+03
2880.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.148E+03
3000.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
3120.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
3240.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
3360.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
3480.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03
3600.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+03

TITLE: EX. 5. REPEAT OF EX. 4.1 W/ RELEASE (EX. 2) SEGMENTED

DATA GENERATED BY FODRFT -- A FORCED DRAFT VENTILATION SYSTEM TRANSIENT COMPARTMENT MODEL.

URANIUM AND HF RELEASE SUMMARY AND COMPARTMENT CONCENTRATIONS

TIME (SEC)	CUMULATIVE MATERIAL RELEASED OR FORMED FROM RELEASED MATERIAL (LB)						COMPARTMENT CONCENTRATIONS (LB/FT**3)	
	UF6	UO2F2	TOTAL U	HF	HF FROM UF6	TOTAL HF	URANIUM	HF
0.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120.0	0.000E+00	6.384E+02	4.933E+02	1.709E+02	0.000E+00	1.709E+02	4.231E-03	1.489E-03
240.0	1.913E+02	1.832E+03	1.545E+03	5.041E+02	4.350E+01	5.476E+02	7.063E-03	1.854E-03
360.0	1.039E+03	2.931E+03	2.968E+03	8.296E+02	2.363E+02	1.066E+03	9.123E-03	1.871E-03
480.0	2.379E+03	3.999E+03	4.699E+03	1.159E+03	5.409E+02	1.700E+03	1.053E-02	1.881E-03
600.0	4.053E+03	5.045E+03	6.639E+03	1.490E+03	9.214E+02	2.411E+03	1.150E-02	1.887E-03
720.0	5.978E+03	6.075E+03	8.737E+03	1.822E+03	1.359E+03	3.181E+03	1.233E-02	1.891E-03
840.0	7.887E+03	7.115E+03	1.083E+04	2.161E+03	1.793E+03	3.954E+03	9.936E-03	1.881E-03
960.0	8.892E+03	8.153E+03	1.231E+04	2.501E+03	2.021E+03	4.523E+03	6.536E-03	1.868E-03
1080.0	9.142E+03	9.169E+03	1.327E+04	2.836E+03	2.078E+03	4.915E+03	4.195E-03	1.807E-03
1200.0	9.142E+03	9.876E+03	1.381E+04	3.083E+03	2.078E+03	5.161E+03	2.762E-03	1.314E-03
1320.0	9.142E+03	1.034E+04	1.418E+04	3.263E+03	2.078E+03	5.342E+03	1.814E-03	9.529E-04
1440.0	9.142E+03	1.065E+04	1.441E+04	3.394E+03	2.078E+03	5.473E+03	1.190E-03	6.903E-04
1560.0	9.142E+03	1.086E+04	1.457E+04	3.490E+03	2.078E+03	5.568E+03	7.797E-04	4.995E-04
1680.0	9.142E+03	1.099E+04	1.467E+04	3.559E+03	2.078E+03	5.637E+03	5.106E-04	3.612E-04
1800.0	9.142E+03	1.108E+04	1.474E+04	3.609E+03	2.078E+03	5.687E+03	3.342E-04	2.611E-04
1920.0	9.142E+03	1.113E+04	1.479E+04	3.645E+03	2.078E+03	5.724E+03	2.187E-04	1.887E-04
2040.0	9.142E+03	1.117E+04	1.482E+04	3.671E+03	2.078E+03	5.750E+03	1.431E-04	1.364E-04
2160.0	9.142E+03	1.120E+04	1.483E+04	3.690E+03	2.078E+03	5.769E+03	9.360E-05	9.852E-05
2280.0	9.142E+03	1.121E+04	1.485E+04	3.704E+03	2.078E+03	5.782E+03	6.122E-05	7.118E-05
2400.0	9.142E+03	1.122E+04	1.486E+04	3.714E+03	2.078E+03	5.792E+03	4.005E-05	5.142E-05
2520.0	9.142E+03	1.123E+04	1.486E+04	3.721E+03	2.078E+03	5.799E+03	2.619E-05	3.714E-05
2640.0	9.142E+03	1.123E+04	1.486E+04	3.726E+03	2.078E+03	5.805E+03	1.713E-05	2.683E-05
2760.0	9.142E+03	1.124E+04	1.487E+04	3.730E+03	2.078E+03	5.808E+03	1.121E-05	1.938E-05
2880.0	9.142E+03	1.124E+04	1.487E+04	3.733E+03	2.078E+03	5.811E+03	7.329E-06	1.400E-05
3000.0	9.142E+03	1.124E+04	1.487E+04	3.735E+03	2.078E+03	5.813E+03	4.794E-06	1.011E-05
3120.0	9.142E+03	1.124E+04	1.487E+04	3.736E+03	2.078E+03	5.814E+03	3.135E-06	7.305E-06
3240.0	9.142E+03	1.124E+04	1.487E+04	3.737E+03	2.078E+03	5.815E+03	2.051E-06	5.276E-06
3360.0	9.142E+03	1.124E+04	1.487E+04	3.738E+03	2.078E+03	5.816E+03	1.341E-06	3.811E-06
3480.0	9.142E+03	1.124E+04	1.487E+04	3.738E+03	2.078E+03	5.817E+03	8.772E-07	2.753E-06
3600.0	9.142E+03	1.124E+04	1.487E+04	3.739E+03	2.078E+03	5.817E+03	5.737E-07	1.989E-06