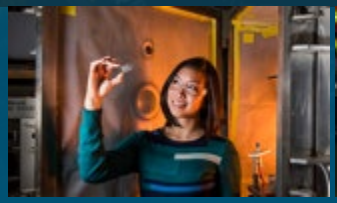
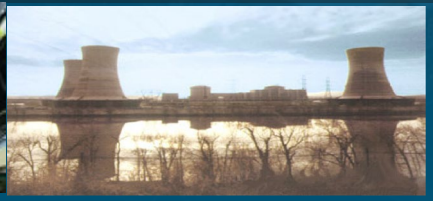
SNAP MELCOR Input Examples





PRESENTED BY

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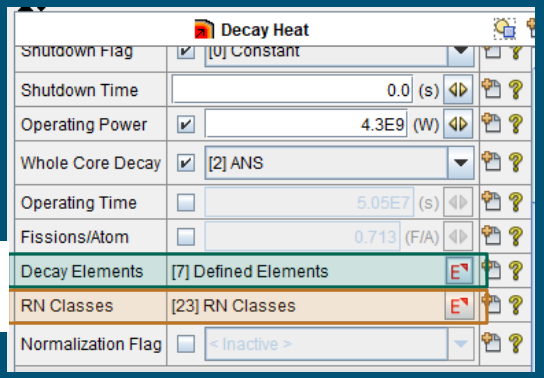
Objectives of Presentation

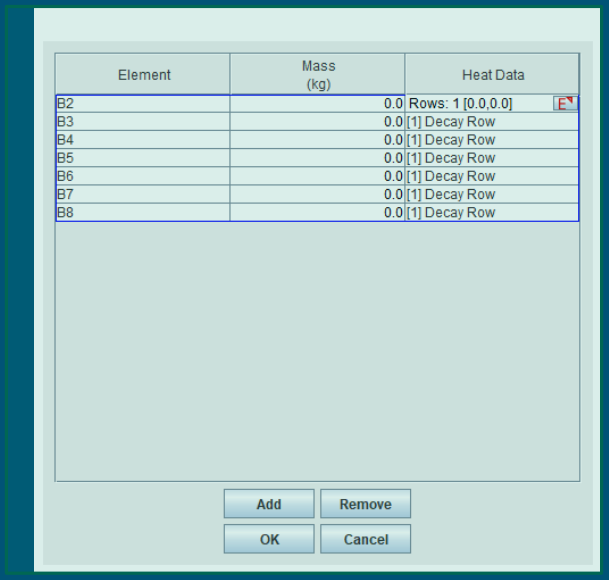
- Provide a review of the SNAP GUI for editing model input
  - Discuss layout of input
  - Provide comparisons with text input
- Unique Considerations for SNAP Input
  - Working with tabular input
  - Making Connections
  - Working with Database Variables
  - Sensitivity Coefficients
  - Comments and Notes

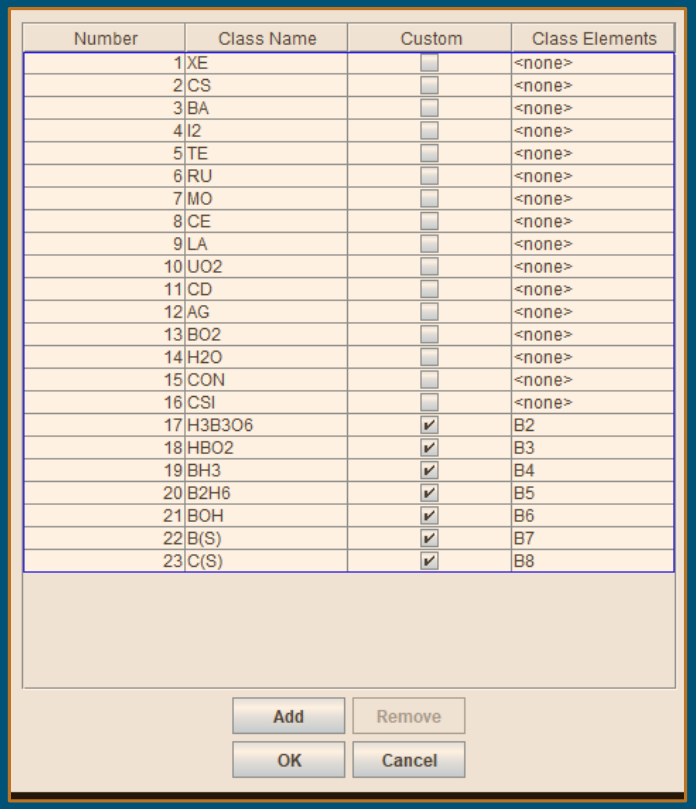
NCG Input

SNAP

RN Classes should be defined before Decay Elements







ASCII

```
DCH_CL  'CS'   DEFAULT
DCH_CL  'BA'   DEFAULT
DCH_CL  'I2'   DEFAULT
DCH_CL  'TE'   DEFAULT
DCH_CL  'RU'   DEFAULT
DCH_CL  'MO'   DEFAULT
DCH_CL  'CE'   DEFAULT
DCH_CL  'LA'   DEFAULT
DCH_CL  'UO2'   DEFAULT
DCH_CL  'CD'   DEFAULT
DCH_CL  'AG'   DEFAULT
DCH_CL  'BO2'   DEFAULT
DCH_CL  'H2O'   DEFAULT
DCH_CL  'CON'   DEFAULT
DCH_CL  'CSI'   DEFAULT
DCH_CL  'H3B3O6'    USER    1 !n        clselm
                                  1         'B2'
DCH_CL  'HBO2'    USER    1 !n        clselm
                                  1         'B3'
DCH_CL   'BH3'    USER    1 !n        clselm
                                  1         'B4'
DCH_CL  'B2H6'    USER    1 !n        clselm
                                  1         'B5'
DCH_CL   'BOH'    USER    1 !n        clselm
                                  1         'B6'
DCH_CL  'B(S)'    USER    1 !n        clselm
                                  1         'B7'
DCH_CL  'C(S)'    USER    1 !n        clselm
                                  1         'B8'
DCH_EL    'B2'    0.0     1 !n        time        dcheat
                                  1         0.0         0.0
DCH_EL    'B3'    0.0     1 !n        time        dcheat
                                  1         0.0         0.0
DCH_EL    'B4'    0.0     1 !n        time        dcheat
                                  1         0.0         0.0
DCH_EL    'B5'    0.0     1 !n        time        dcheat
                                  1         0.0         0.0
DCH_EL    'B6'    0.0     1 !n        time        dcheat
```

RN1 and RN2 Input Combined in SNAP and ASCII

SNAP

Radionuclide

General	Show Dis
Enabled	True / False
Description	<none>
Default Scheme	1.8.6 Standards
Hygroscopic Model	
Convection Option	
Core Map	Core Mappings (0)
Vahe'sa Enter	Valid values
Vahe'sa Release	Valid values
Fuel/Cavity Invent.	Specified Inventories (8)
Cladding Inventory	Specified Inventories (12)
Transport Deposition Scaling	[0] Rows
Define Booth Classes	True / False
Absorption Length	Valid values
Cvol Split	RN Split Data (0)
HS Split	Heatstructure split data ...
Pool Scrubbing	RN scrub data (2)
Filters	RN Filters (2)
Iodine Class	
Spray Partions	Valid values
Reactions	Reaction Sets (0)
Transfers	Transfer Sets (0)
Chem. Enabled	[0] Off
Iodine Pool	Inactive
Visualization Output	None
Dose Input	Dose Input Data (0)
Cable Mass	Valid values
Surface Coatings	Valid values
Aqueous Species	Valid values
Flashing-Jet Model	Valid values
Film Entrainment	Valid values
Pool Concentrate	[0] Ratios Defined

[RN1_DIM] Dimension Record

Enable	True / False
Aerosol Sections	10
Aerosol Cmpts.	2

Release Model

Release Model	
Gap Release	Gap Release Cells (8)
Release Comb.	Class combinations (1)

[RN1_ASP] Aerosol Sectional Parameters

Enable	True / False
Lwr. Aerosol Diam.	1.0E-7 (m)
Upr. Aerosol Diam.	5.0E-5 (m)
Aerosols Density	1000.0 (kg/m³)

Aerosol Coefficients

Aero. Coeff. Opt.	[1] Calculate and ...
Aerosol Coefficent	(-) [0]
Use Aerosol Component Map	True / False
Surface Deposition	Defined surfaces (1)
Intervolume Trans.	Defined flows (5)
Aerosol Sources	Defined aerosol source ...
Resuspension	Resuspension data set ...

[RN1_PT] Conditions for Aerosol Coefficients

Enable	True / False

[RNCFDS] Generated values

Enable	True / False

[RNCFPT] Generated values

Enable	True / False

[RN1_MS00] Misc. Aerosol Dynamics Constants

Enable	True / False
Dyn. Shape Factor	1.0 (-)
Agglomeration Fac.	1.0 (-)
Particle Slip	1.257 (-)
Particle Stick	1.0 (-)
Turb. Dissipation	1.0E-3 (m²/s³)
Conductivity Ratio	0.05 (-)
Accommodation	2.25 (-)
Diffusion Thickness	1.0E-5 (m)

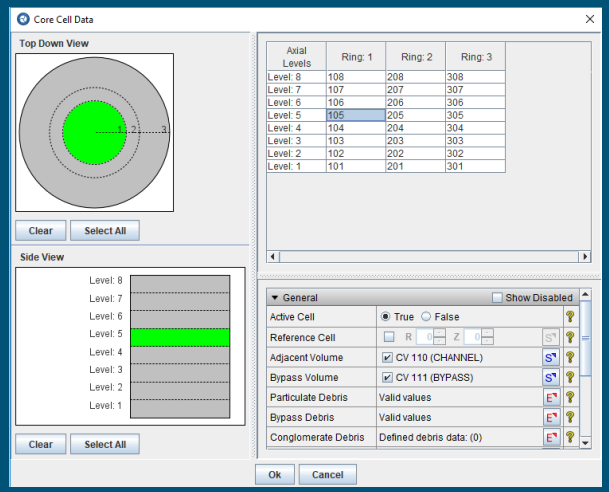
Condensation Evaporation

ASCII

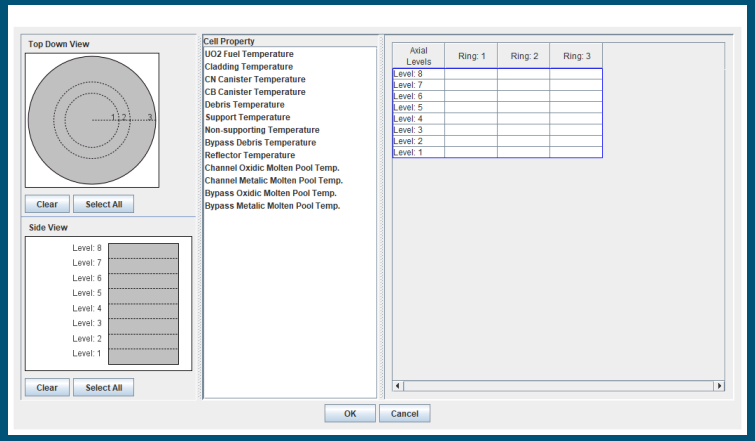
```
RN1_INPUT                0
RN1_DFT                1.86
!                   numsec        numcmp        numcls        numca
RN1_DIM               10             2            23            6
!                   iclnrm
RN1_DCHNORM           NONE
RN1_FPN     8 !()n ir ia ninp irref iarref rinp1 rinp2
RN1_GAP    12 !( n ir ia  ninp irref iarref  rinp1 rinp2
RN1_GAP00   8 !(n             ir            ia        clfail
RN1_CLS  'CsI' 'CSI'    2 !(n          nclsd          xmrat
!                    dmin          dmax          rhonom
RN1_ASP            1.0E-7        5.0E-5        1000.0
!                   icoeff
RN1_ACOEF        CALANDWR
!                      chi         gamma         fslip         stick
RN1_MS00               1.0           1.0         1.257           1.0
!                      chi         gamma         fslip         stick
RN1_MS01             1.0E-3          0.05          2.25        1.0E-5
RN1_DS      1 !(n                ids           isde          ityp
RN1_SET     5 !(n          ivolf         ivolt          elev          are
!                   icaon
RN1_CAF               OFF
RN2_INPUT
RN2_PLS     2 !(n fpcav          name   avent mvent nvent ntyp
!                  fltnam       flttfp    ctype  ikey     gdf xmasg     icvtyp
RN2_FLT   FIL1-CONTVENT 'CONT VENT' AEROSOL VALUE 1000.0   -1.0 'FILTERS'
RN2_FLT   FIL2-CONTVENT 'CONT VENT' FPVAPOR VALUE 1000.0   -1.0 'FILTERS'
RN2_FCL     1 !(n           iclss           ikey           dfc          xmas
!                    age          xmbedi         dhrels         specht
RN2_FVC              0.0          827.35            1.0         711.78
```

COR Package Utilizes Similar Interface for Cell Data

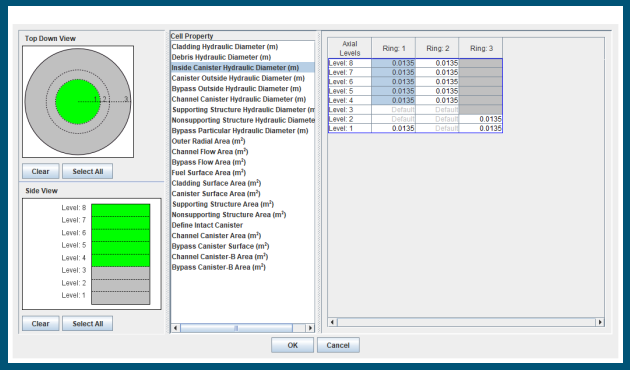
Cell Properties



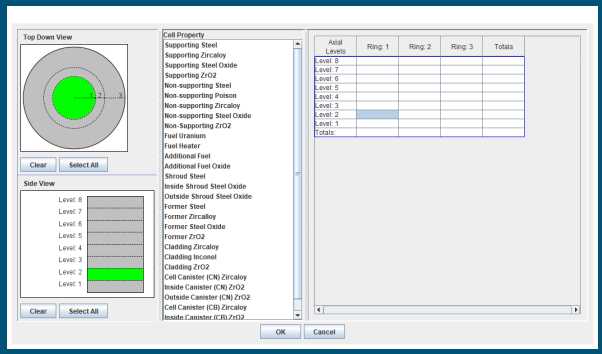
Initial Temperatures



Areas/Hydraulic Diameter



Material Masses



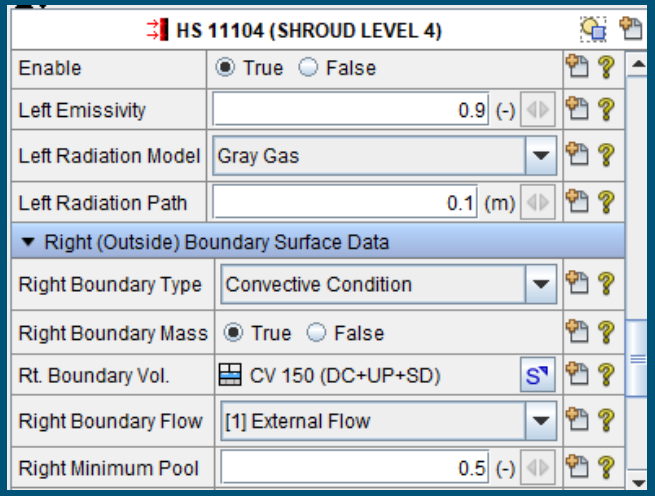
Tabular Input

Implemented as Table

- Tabular Function
- COR Axial Elevations
- COR Radial Rings
- Most COR Cell data
  - Examples
    - Component Material Masses, Surface Areas, Temperatures, hydraulic diameters, flow areas, Cell Radial Ring areas
    - Gap Release Temperatures
    - CV volumes associated with COR cells (Cell Properties)
  - Exceptions
    - PD material masses in channel and bypass
    - Core Blockage Cells
- CVH Volume Altitude tables
- DCH Elements
- RN Classes
- HS nodalizations
- Concrete Composition
- CAV geometry points

Not Implemented as Table

- RN Gap Inventories
- RN Fuel Cavity Inventories
- NCGs
- Material Properties
  - However, MPs can receive data from Tabular Functions defined in the database
- Object information is implemented for each object. Does not allow editing a table of objects like CVs or HSs
  - CV initial conditions
  - HS Boundary volumes and conditions



Use of MS EXCEL

Though SNAP utilizes tables, it is not a spreadsheet. Depending on the table, SNAP has only the most basic functional capabilities of a spreadsheet.

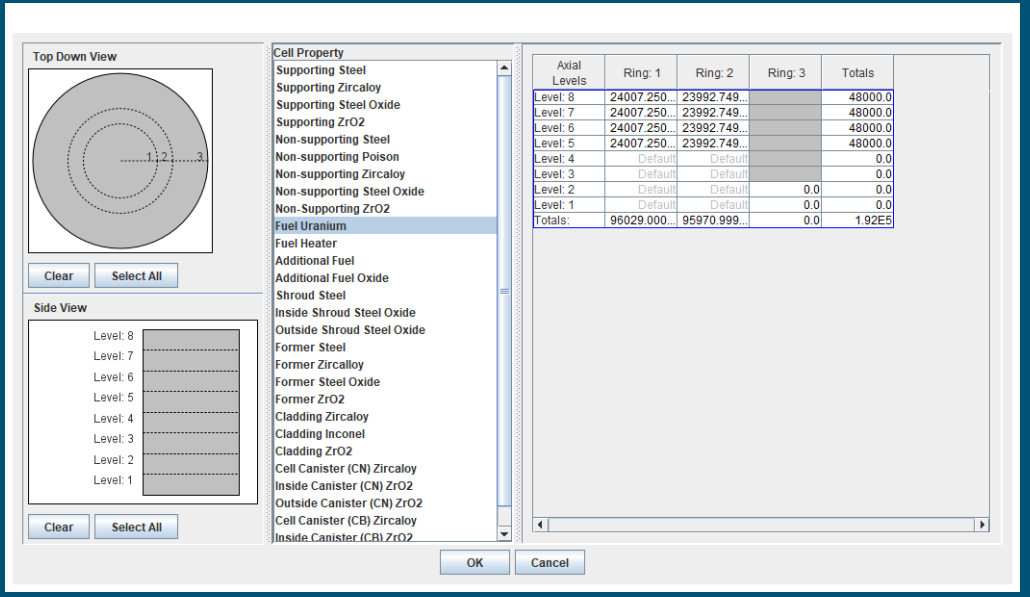
However, as an alternative, companion EXCEL spreadsheets can be used to create workbooks for calculating and documenting table entries.

Many, but not all of SNAP's tables can utilize cut-and-paste data from an EXCEL spreadsheet.

Component	Mass	Area
Fuel Rods		6640
UO2 fuel	192000	
Clad		7840
Zr clad	40960	
Canister		
CN (Zr)	11840	880
CB (Zr)	11840	880
Control Blades		800
Steel	10000	
B4C	1000	
Core Plate		20
Steel	5000	
CRGT		1200
Steel	80000	

NRINGS 3
NAXL 8
RVLH 4
ZLHT 5
Show Volume

			2	2.828	4
			1	2	3
10	8	24007.25	23992.75		0
9	7	24007.25	23992.75		0
8	6	24007.25	23992.75		0
7	5	24007.25	23992.75		0
6	4	0	0		0
5.9	3	0	0		0
5	2	0	0		0
2.95	1	0	0		0



Making Connections

Connections are made graphically from objects on a view window using the connection tool

- Cannot be made from Connections dropdown (right)
- Can be made from flow path, spray or control function menus

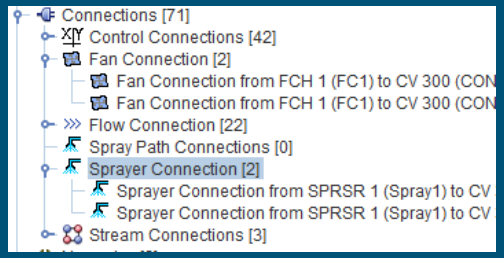
Connection types

- Flow Paths
  - Connects control volumes
- Fan Connections
  - Connects inlet and outlet control volumes to fan cooler
- Spray Connections
  - Connects source pool and target CV for spray
- Spray Path Connections
  - Connects multiple spray paths
- Control Functions
  - Connections to other control functions or control function arguments

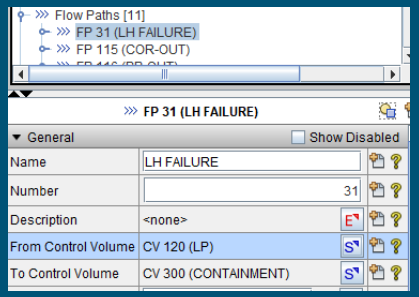
Graphical Connections

- User first drags associated connected objects (control volumes) and connections (Flow paths, sprays, Fan connections, spray paths) into view
- Click on connection tool and cursor changes to cross-hair 
  - Blue dot appears on connection 'cross-hairs' when node is detected and connection can be made
- User assigns node connections.
  - Connection node indicates input/output
  - Selection of object node is generally not important
    - SNAP adjusts connection node to correspond to elevations specified through other input.

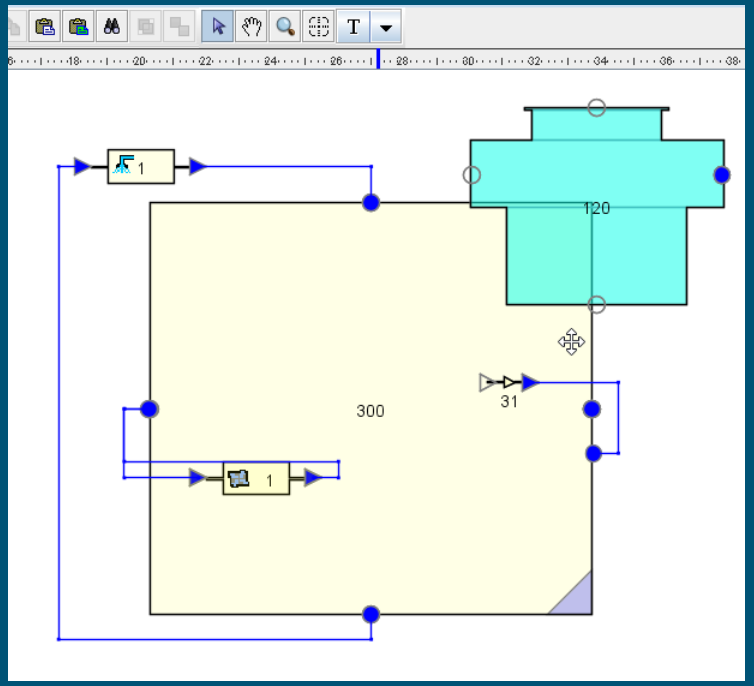
Connection cannot be made from Connections Menu



Connection can be made from Flow Paths, Sprays, and Fan Cooler Menu



Connection can be made graphically



Database Variables (CF arguments available to model)

Control Function arguments must be added to Database Variables before they can be used for input.

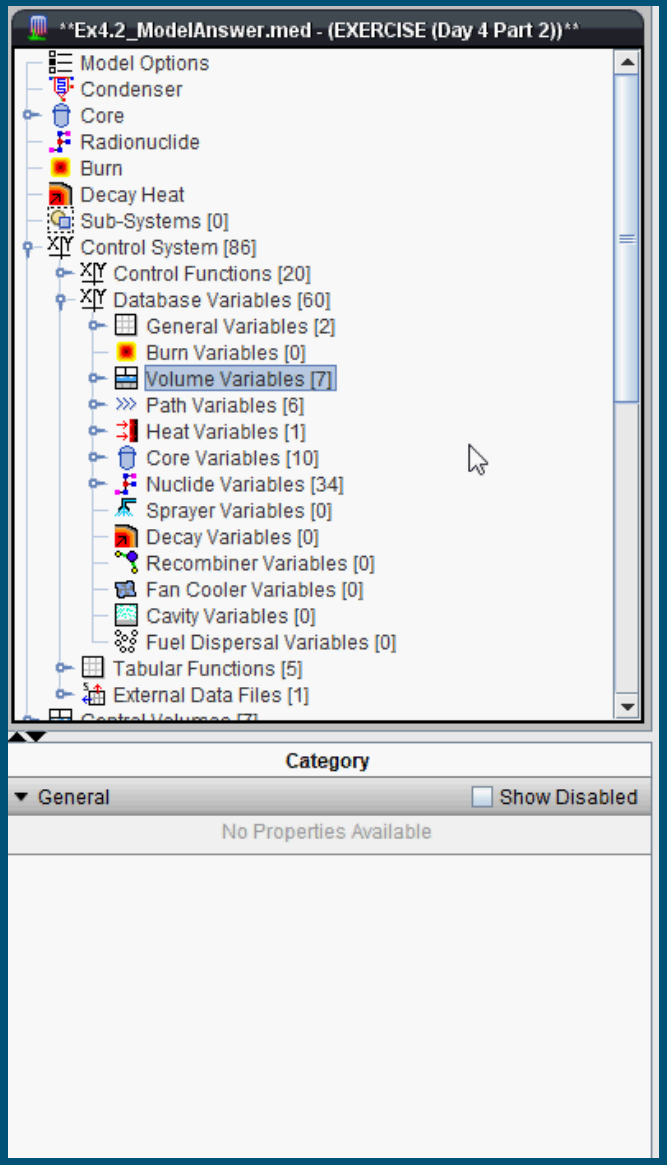
Used as input to control functions

Control Function arguments are organized by package

- General Variables (EXEC)
- Burn Variables (BUR)
- Path Variables (FL)
- Heat Variables (HS)
- Core Variables (COR)
- Nuclide Variable (RN)
- Sprayer Variables (SPR)
- Decay Variables (DCH)
- Recombiner Variables (PAR)
- Fan Cooler Variables (FCL)
- Cavity Variables (CAV)
- Fuel Dispersal Variables (FDI)

Adding a CF argument to the database

- Right Click Package category and select 'New'
- New variable appears in list
- Make selection to MELCOR CF arguments

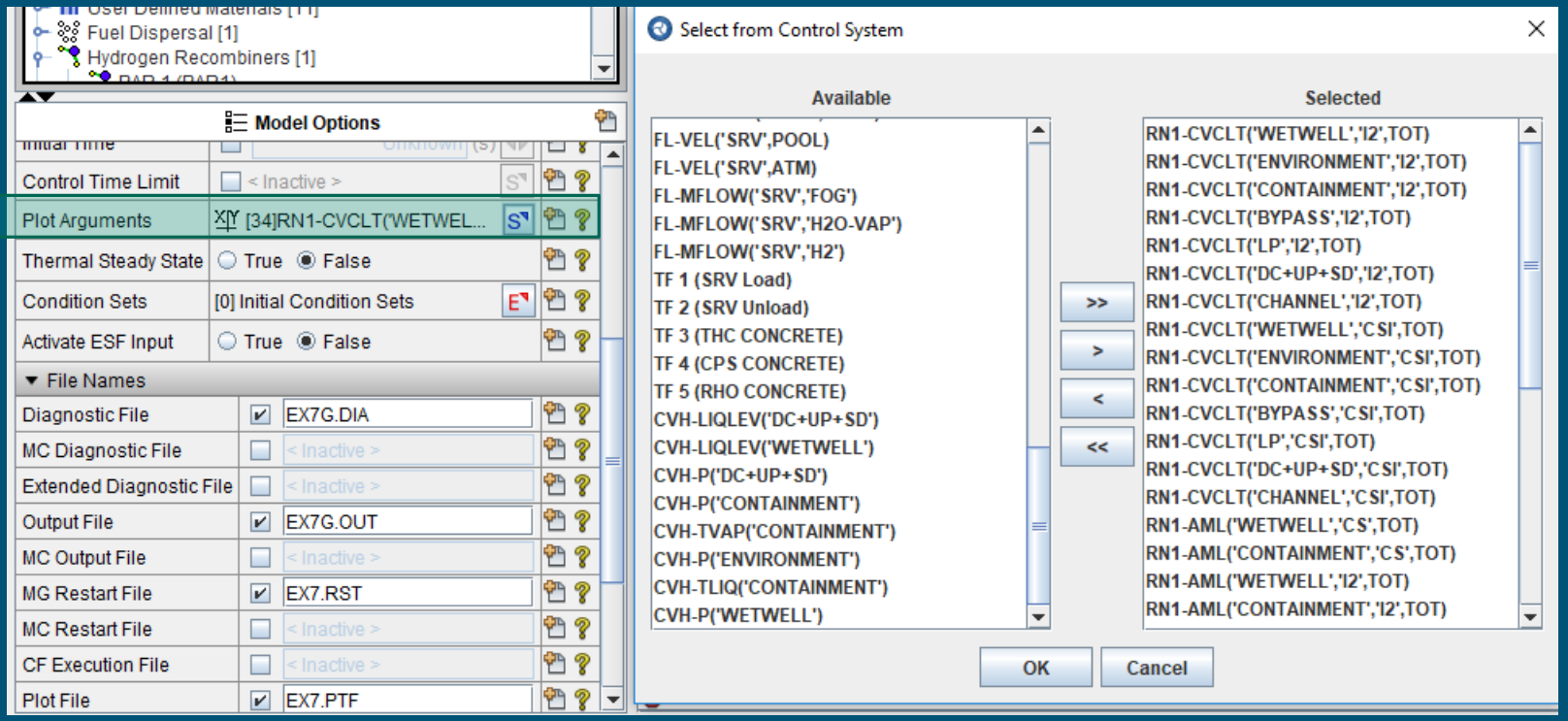


Example: Add swollen liquid level for wetwell to database.

Adding a CF argument to the Plot File

MELCOR ASCII Input:

```
EXEC_PLOT    4
       1 CAV-MASS('CAV7-R.C.',FE)
       2 CAV-MASS('CAV7-R.C.',NI)
       3 CAV-MASS('CAV7-R.C.',U)
       4 CAV-MASS('CAV7-R.C.',ZR)
```

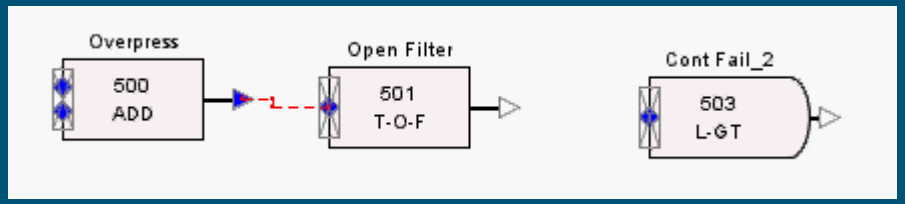


Note that a CF argument must be added to Control System Database before it can be assigned to a plot variable

Control Function connections

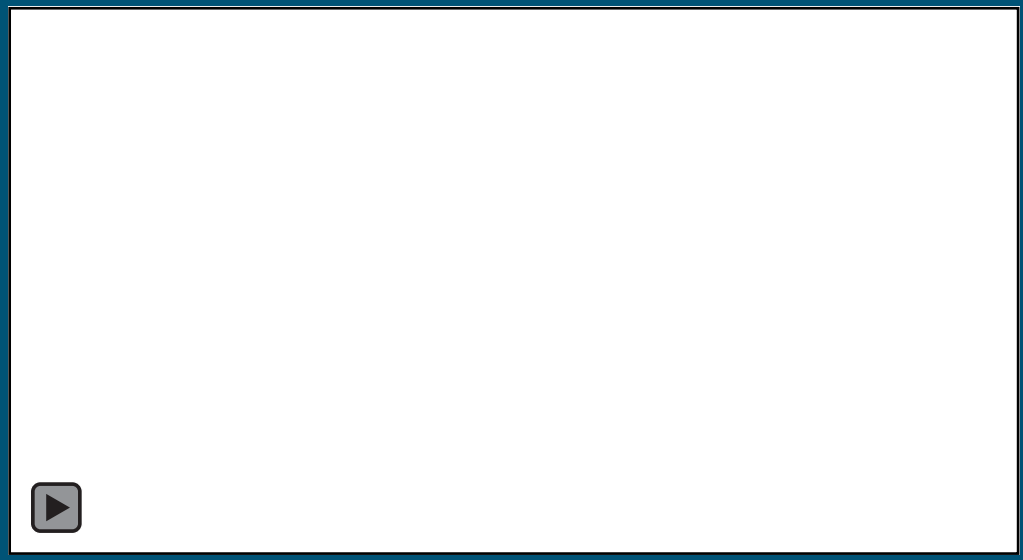
Connecting output from one CF to input of another CF

- Graphically
  - Drag both CF objects to the view and use connection tool
  - Cannot make connection from property window



Connecting control function arguments to the input of a control function

- Drag control function object and all Database variables to view
- Make adjustments to multipliers later from properties window
- Cannot make connection from property window



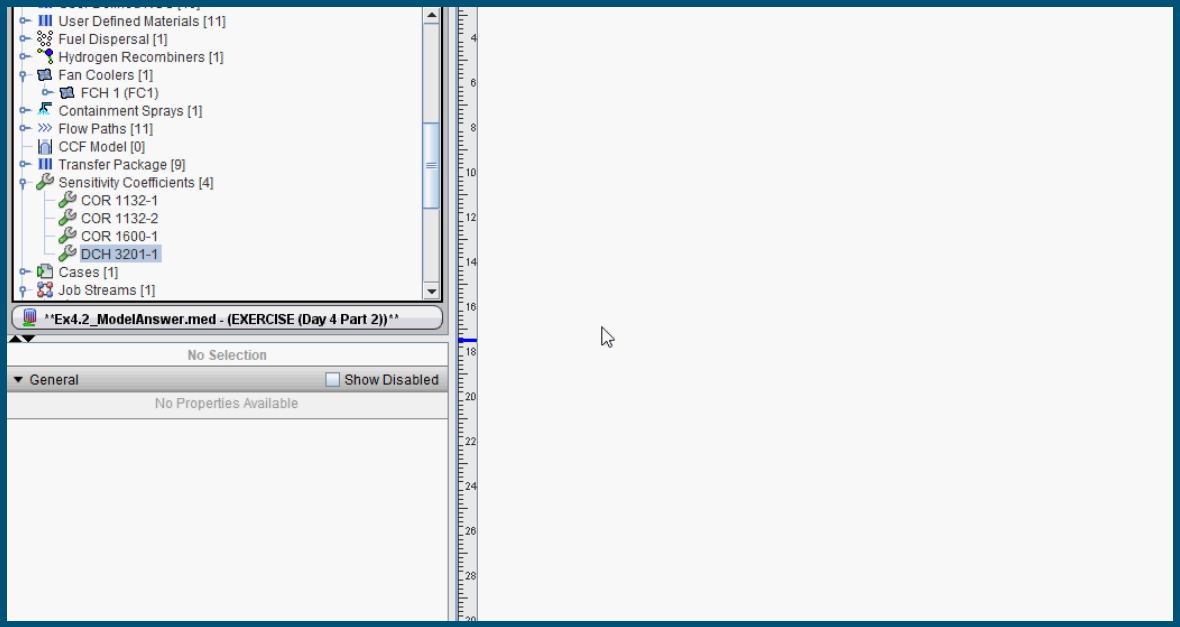
Example: Activate Sprays when containment pressure exceeds 1.2E5 Pa.

Sensitivity Coefficients

MELCOR ASCII

```
1027  CV_PAS SEPARATE OnlyAtm SATURATED   !IPORA, VaporState
1028  CV_PTD TATM   4.380000E+02
1029  CVH_SC   1  !SCnumber    Value        Index
1030  1   4414        5.000000E-01   1
1031  !
1032  FL_INPUT ! FL package start record
1033  !
1034  !-------------------------------------------------------------------------
1035  ! Test section flowpaths
1036  !-------------------------------------------------------------------------
```

SNAP



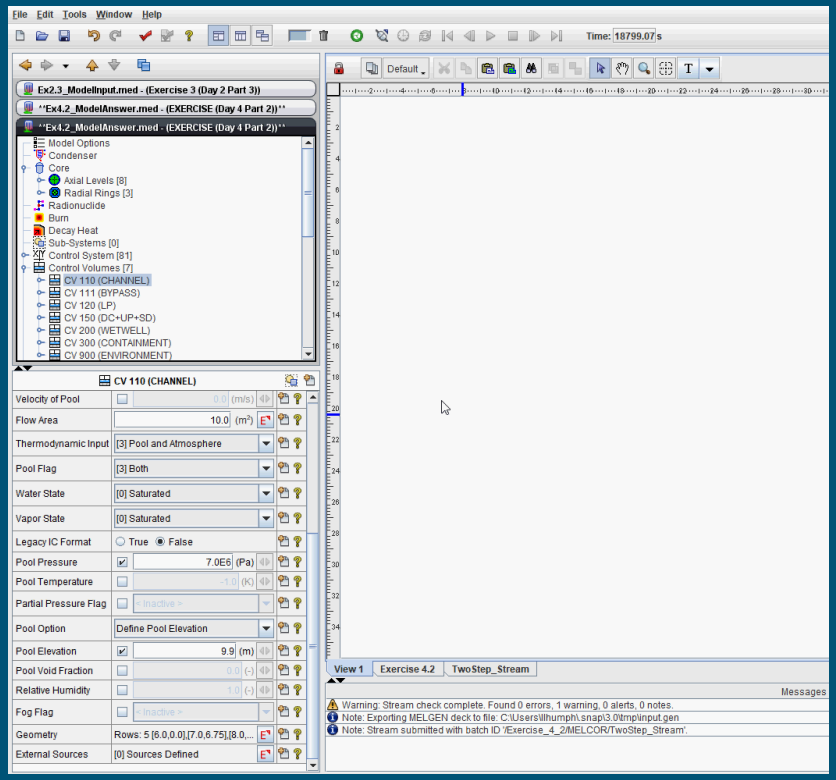
Comments and Notes

MELCOR ASCII

```
!Nodalization from SANDXXXX Page 4-89
! https://svn-melcor.sandia.gov/svn/melcor-II/documentation/trunk/Assessments/ABCOVE/Assessement
HS_ND    9 ! NXVALU NI XVALUE          TEMPIN         MATNAM
           1    1     0.17907000E+01    0.56233000E+03 'SS-3161'
           2    2     0.17970500E+01    0.56233000E+03 'SS-3161'
           3    3     0.18034000E+01    0.56233000E+03 'SS-3161'
           4    4     0.18097500E+01    0.56233000E+03 'SS-3161'
           5    5     0.18161000E+01    0.56233000E+03 'SS-3161'
           6    6     0.18224500E+01    0.56233000E+03 'SS-3161'
           7    7     0.18288000E+01    0.56233000E+03 'SS-3161'
           8    8     0.18351500E+01    0.56233000E+03 'SS-3161'  !Modified to use SS-3161 1/12/2007 by LLH
           9    9     0.18415000E+01    0.56233000E+03
```

- Greater granularity
  - Notes can be attached to single lines in a table
- Active HTML links in some editors

SNAP



- Less granularity
- A single note can be linked to multiple components
- Notes can include pictures
- HTML links are not active
- Notes cannot be printed with ASCII
- Notes Manager