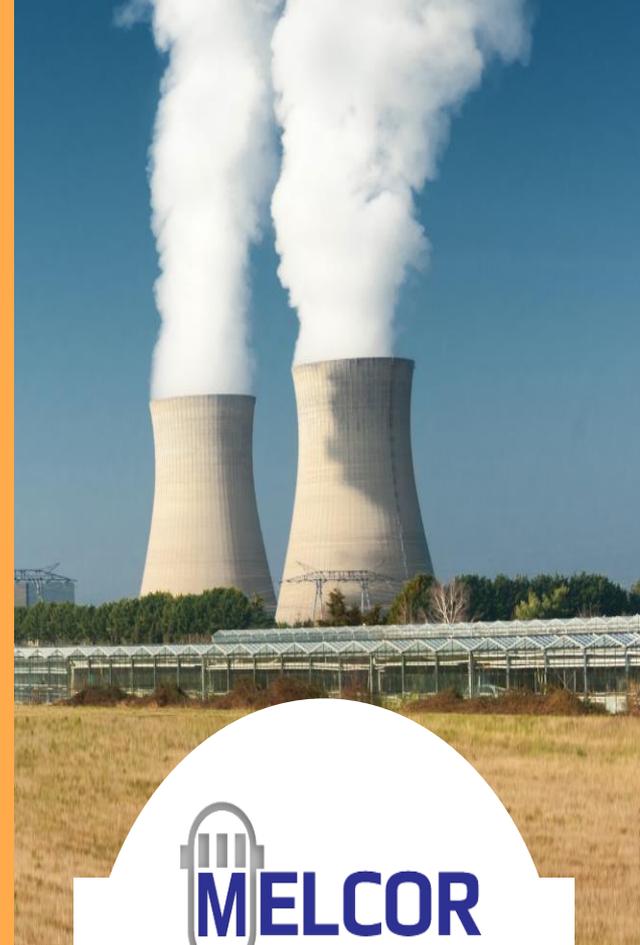




Securing the future of Nuclear Energy



Recent SNAP Development

2024 European MELCOR Users' Group Meeting

April 15th-18th, 2024

Contributions from Don Ulshafer, ISL, Inc.



SAND2024-04212C



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

SNAP Overview

- SNAP Model Editor Introduction
 - Interface
 - GUI vs ASCII
- Post-Processing with SNAP
 - Animations
 - Indicators
- What's new in SNAP



SNAP Model Editor

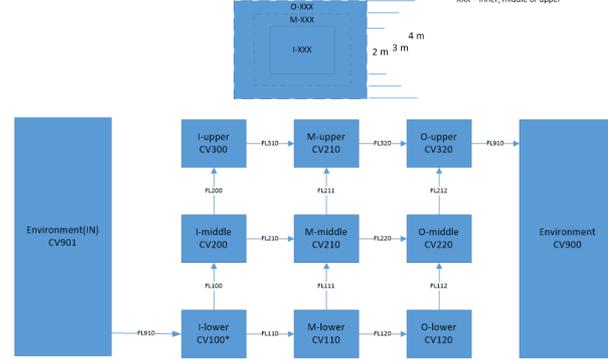
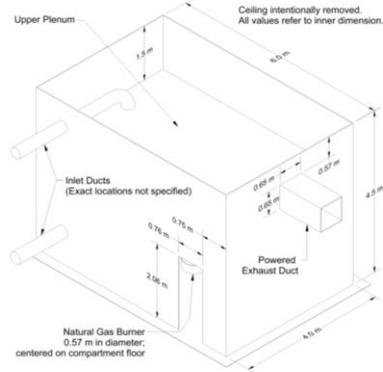


- Model Editor

- Unique plug-ins handle specific model details for a given code (MELCOR, RELAP, etc.)
- Stores both MELGEN and/or MELCOR user input
- Can convert older MELGEN/MELCOR 1.86 input to 2.x
- Import/Export ASCII files
- Built-in Capabilities
 - Support for multiple files & subcomponents
 - Support for user comments
 - Tool/Tips & Helps
 - User manual guidance available
 - ASCII view of model
 - Job scheduler
 - Run jobs in interactive mode (linked to animation)
 - Access to numerics (python, etc.)
 - Integration with GIT
 - Integration with APTPLOT
 - Uncertainty analysis with DAKOTA plugin

SNAP Model Editor utilized significantly in introductory MELCOR workshops to reduce time discussing input syntax

Model Editor Interface



LLNL_model.med - (LLNL Enclosure Experiment_Test 9(9-vol))

- Model Options (EXEC)
- Accumulators (ACC) [0]
- Burn (BUR) {Disabled}
- Condensers (CND)
- Containment Sprayers (SPR) [0]
- Control Systems (CF, TF, EDF) [50]
- Control Volumes (CVH) [11]**
- Core (COR)
- Decay Heat (DCH) {Disabled}
- Ex-vessel Debris Cavities (CAV) [0]
- FL Counter Current Flow Models (FL_CCF) [0]
- Fan Coolers (FCL) [0]
- Flow Paths (FL) [14]
- Fuel Dispersal Interactions (FDI) [0]
- HS Radiation Enclosures (HS_RAD) [0]
- Heat Structures (HS) [13]
- LHC Structure (LHC) {Disabled}
- Materials (MP) [2]
- Noncondensable Gasses (NCG) [6]
- Passive Autocatalytic Recombiners (PAR) [0]
- RadioNuclide (RN) {Disabled}
- Sensitivity Coefficients [0]

Navigator

Control Volume Package

General Show Disabled

Description	<none>
Time to End	<input checked="" type="checkbox"/> 0.0 (s)
Default Scheme	<Inactive>
Allow Cold ATM	<input type="radio"/> True <input checked="" type="radio"/> False
Atmosphere Sound Speed	
Output Sound Speed Table	
Gas Diffusion Model	<Inactive>
Heat Transfer Calculation Option	[0] Off
Use Pool-Atmosphere Interaction Model	<input type="radio"/> True <input checked="" type="radio"/> False

Property View

TwoStep_Stream Control Volumes (CVH) View

Messages

- Note: Loading plugin: SCALE version 3.2.0
- Note: Loading plugin: TRACE Analysis Code version 4.2.7
- Note: Loading plugin: SNAP Uncertainty version 1.7.4
- Note: Loading plugin: GIT Plugin version 2.0.0
- Note: Loading plugin: Assessment and Validation Framework version 3.6.1
- Internal Error: Plugin R52TRACE failed to load: Prerequisite plugin (RELAP version 6.4.4) not found.
- Note: Loading numeric function type: Mathcad Function 1.3.1
- Note: Loading numeric function type: Matlab Function 1.3.1
- Note: Loading numeric function type: Octave Function 1.3.1
- Note: Loading numeric function type: Python Function 1.3.1
- Note: Loaded 4 numeric function types.
- Note: No numeric data store types found.
- Note: Verification complete.
- Note: Opening file C:\Users\dlouie\Desktop\2021_Training\2021_summer_course\Day3\Day3_3-4_Fire_Modeling\...
- Note: Loading C:\Users\dlouie\Desktop\2021_Training\2021_summer_course\Day3\Day3_3-4_Fire_Modeling\l...
- Note: Loaded 1 version control system plugins.
- Note: Open Complete.

Message Window

SNAP

RN Classes should be defined before Decay Elements

Decay Heat

Shutdown Flag	<input checked="" type="checkbox"/> [0] Constant
Shutdown Time	0.0 (s)
Operating Power	<input checked="" type="checkbox"/> 4.3E9 (W)
Whole Core Decay	<input checked="" type="checkbox"/> [2] ANS
Operating Time	5.05E7 (s)
Fissions/Atom	0.713 (F/A)
Decay Elements	[7] Defined Elements
RN Classes	[23] RN Classes
Normalization Flag	<input type="checkbox"/> < Inactive >

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
                        1 0.0 0.0
    
```

Element	Mass (kg)	Heat Data
B2	0.0	Rows: 1 [0.0,0.0]
B3	0.0	[1] Decay Row
B4	0.0	[1] Decay Row
B5	0.0	[1] Decay Row
B6	0.0	[1] Decay Row
B7	0.0	[1] Decay Row
B8	0.0	[1] Decay Row

Number	Class Name	Custom	Class Elements
1	XE	<input type="checkbox"/>	<none>
2	CS	<input type="checkbox"/>	<none>
3	BA	<input type="checkbox"/>	<none>
4	I2	<input type="checkbox"/>	<none>
5	TE	<input type="checkbox"/>	<none>
6	RU	<input type="checkbox"/>	<none>
7	MO	<input type="checkbox"/>	<none>
8	CE	<input type="checkbox"/>	<none>
9	LA	<input type="checkbox"/>	<none>
10	UO2	<input type="checkbox"/>	<none>
11	CD	<input type="checkbox"/>	<none>
12	AG	<input type="checkbox"/>	<none>
13	BO2	<input type="checkbox"/>	<none>
14	H2O	<input type="checkbox"/>	<none>
15	CON	<input type="checkbox"/>	<none>
16	CSI	<input type="checkbox"/>	<none>
17	H3B3O6	<input checked="" type="checkbox"/>	B2
18	HBO2	<input checked="" type="checkbox"/>	B3
19	BH3	<input checked="" type="checkbox"/>	B4
20	B2H6	<input checked="" type="checkbox"/>	B5
21	BOH	<input checked="" type="checkbox"/>	B6
22	B(S)	<input checked="" type="checkbox"/>	B7
23	C(S)	<input checked="" type="checkbox"/>	B8

Post Processing with SNAP

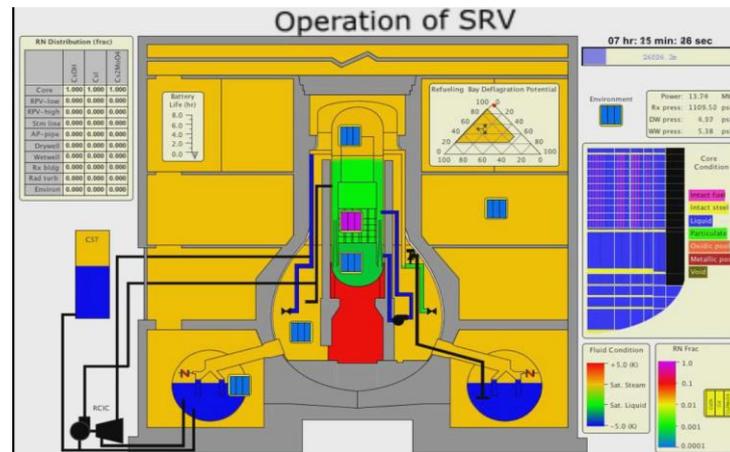
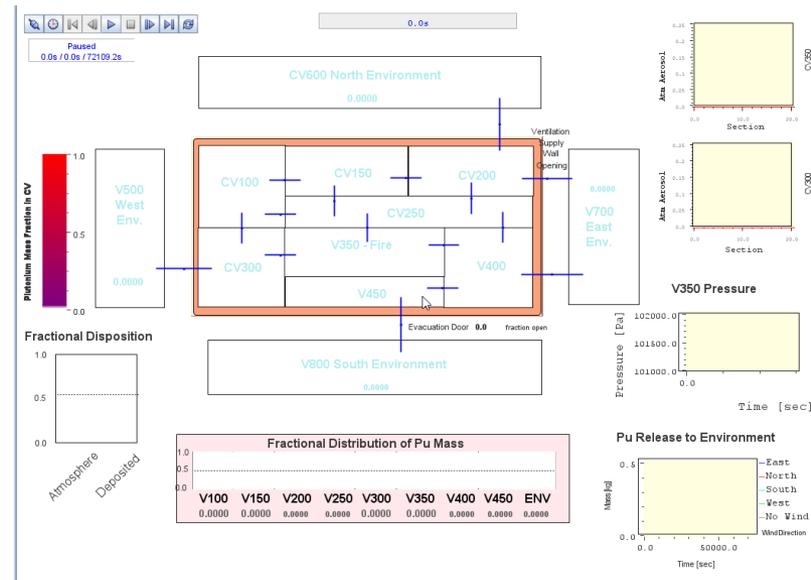


- Animation Model is a separate model from the MELCOR model
 - File>New select Animation model
 - Data connection to the plotfile(s) must be established
 - Animations are displayed in View Port

^^unsaved - (unnamed)^

- Model Options
- Python Data Source
- Data Sources [1]
 - Master (NewSource)
- Color Maps [3]
 - Fluid Condition Color Map
 - Temperature Color Map
 - Generic Color Map
- Plot Definitions [1]
 - unnamed
- Views [1]
 - Default View

SNAP Animation Tool utilized significantly in introductory MELCOR workshops to demonstrate physical models

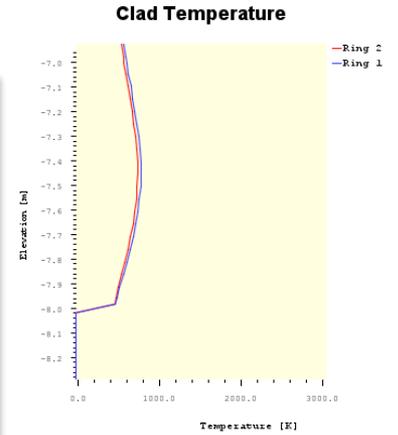
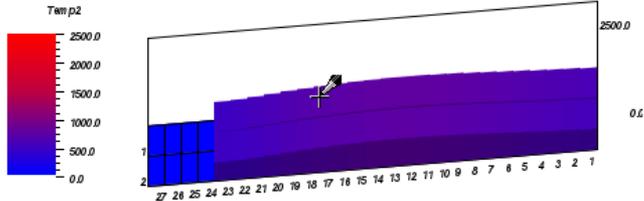


Indicators

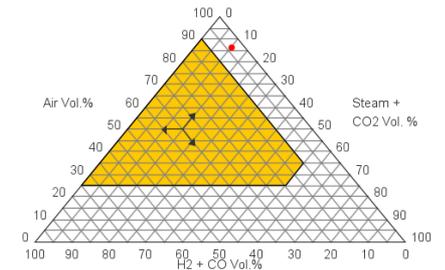
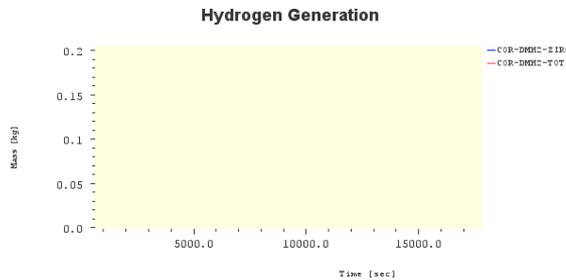
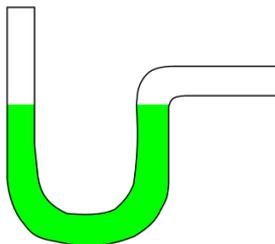
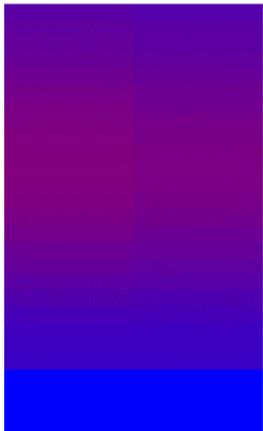
A screenshot of a software interface showing a menu for 'Indicators'. The menu is open, displaying various indicator types. The 'Indicators' menu item is highlighted in blue. Below it, a sub-menu lists the following options:

- 3D Graph
- Analog Dial
- Annunciator
- Axial Map
- AxialPlot
- Data Value
- Deflagration
- Flow Indicator
- Fluid Level
- Linear Dial
- Polygon
- Power-Flow Map
- Python Output Display
- Simple Annunciator
- Strip Plot

Other menu items visible in the background include: Annotation, Color Maps, Plot Definitions, Control System, Interactive, Plant Components, and TRACE Beans.



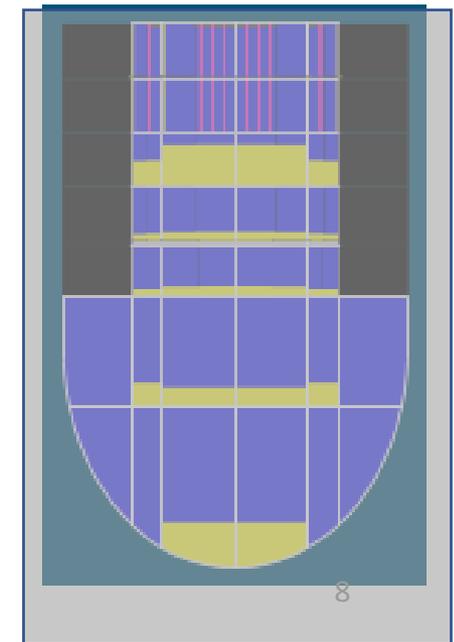
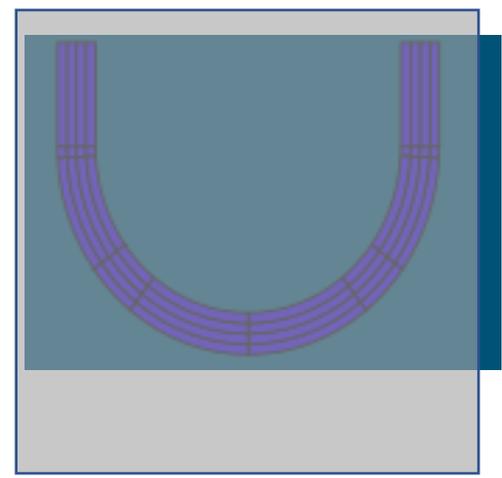
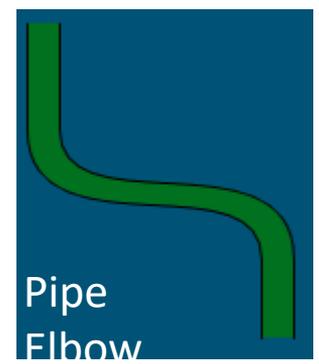
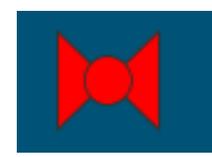
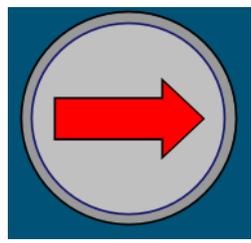
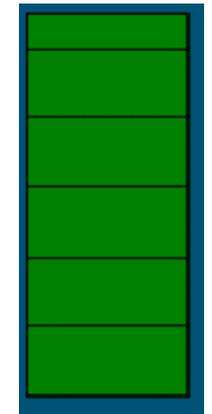
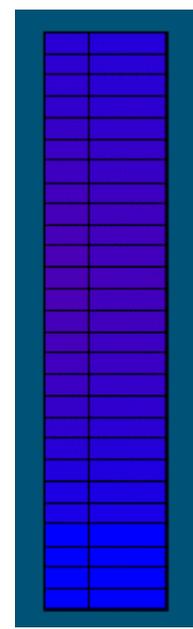
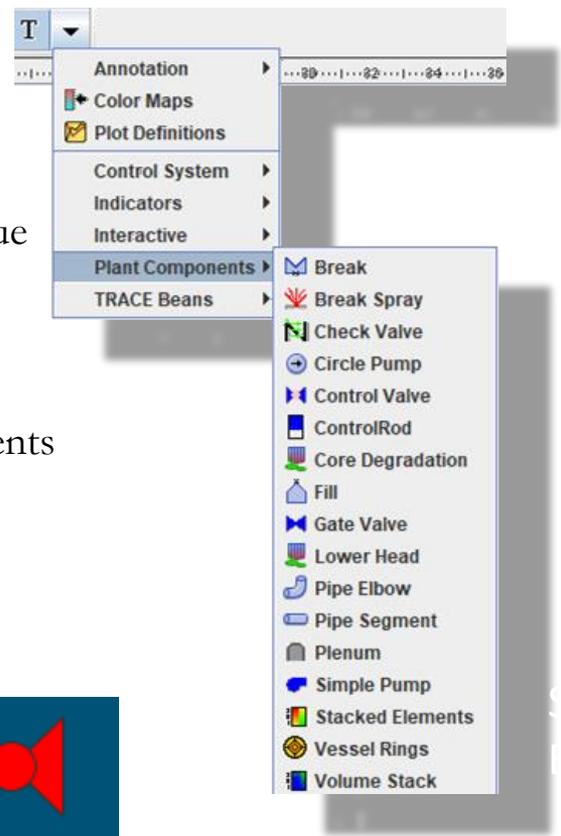
100000.65 Pa



Plant Components

Represents a component

- Some of these components are unique to TRACE or other code.
- Simple Components
 - Sprays, valves, break, pumps
- Simplification of Complex Components
 - Core Degradation component
 - Lower Head component
 - Stacked Elements
 - Volume Stack



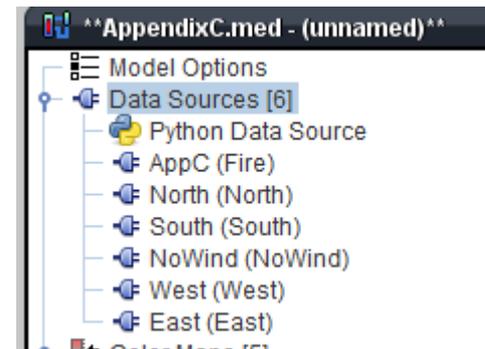
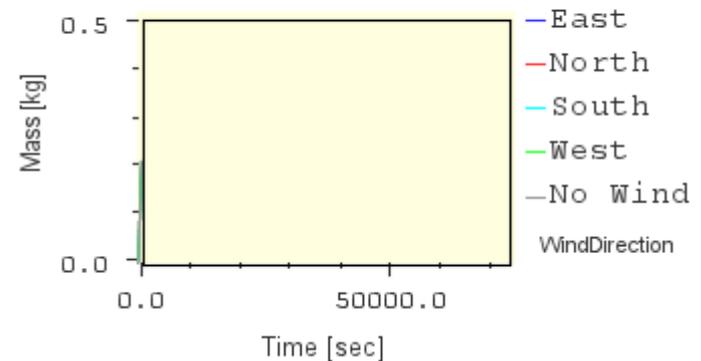
Data Sources

- Attaching a plotfile
 - Data Sources
 - Plot file data
 - Python Data Sources
 - Multiple data sources can be specified
 - One source is designated master and used to determine Tstart, Tend, and time steps
 - Other sources are interpolated between time steps
- Selecting Data Source
 - Click on Master in the Data Source Tree in the Navigator and set the Source Run URL in the Properties to a completed Job
 - Click the Data Connector Icon
- Number of Source Runs
 - Data Source can span multiple plot files assuming they are from sequential restart runs.



- Click Data Connection to make connection to the data source.

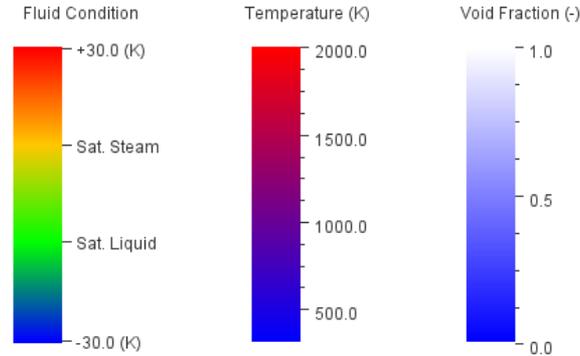
Pu Release to Environment



Data Source	Data Channel	Label	Line Type	Line Width	Line Color	Symbol Type	Symbol Size	Skip Factor
AppC (Fire)	CFVALU...	East	Solid	1	Blue	None	0	0
North (North)	CFVALU...	North	Solid	1	Red	None	0	0
South (South)	CFVALU...	South	Solid	1	Cyan	None	0	0
West (West)	CFVALU...	West	Solid	1	Green	None	0	0
NoWind (NoWind)	CFVALU...	NoWind	Solid	1	Black	None	0	0

Color Maps

- Built-in Color Map Options
 - Fluid Condition Color Map
 - Temperature Color Map
 - Void Fraction Color Map
 - Generic Color Maps



- Creating a Generic Color Map

- Right Click Color Maps in the Navigator>New
- Right Click the new Generic Color Map>Add To View
- Adjust some Properties
 - Set Color Map Type to Generic
 - Specify Dynamic as True
 - To create a pressure color map, set Channel Name Pattern to MELCOR "CVH-P_%V"
 - Review the MELCOR User's Guide to see all the available plot channels
 - %V is a place holder for the components Control Volume number (see notes for a detailed description on its use)

Generic Color Map

▼ General Show Disabled

Name:

Color Map Type:

Paint Background: True False

Minor Ticks Per Major:

Number of Major Ticks:

Dynamic: True False

Segmentation Style:

Color Display Width:

Show Title: True False

Use Custom Title Font: True False

Use Custom Legend Font: True False

Range Segments: [1] Segments

Channel Name Patterns: < none >

Engineering Units: No Units

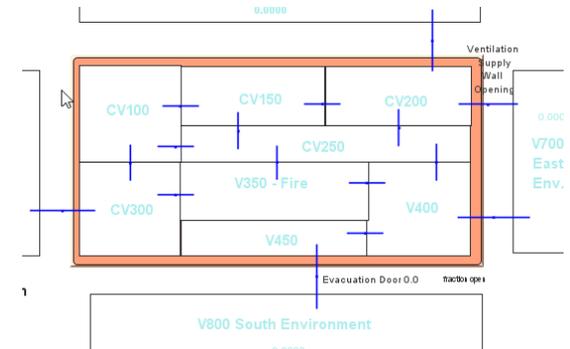
Use Out of Range Low Color: True False

Use Out of Range High Color: True False

Use Non-Linear Scaling: True False

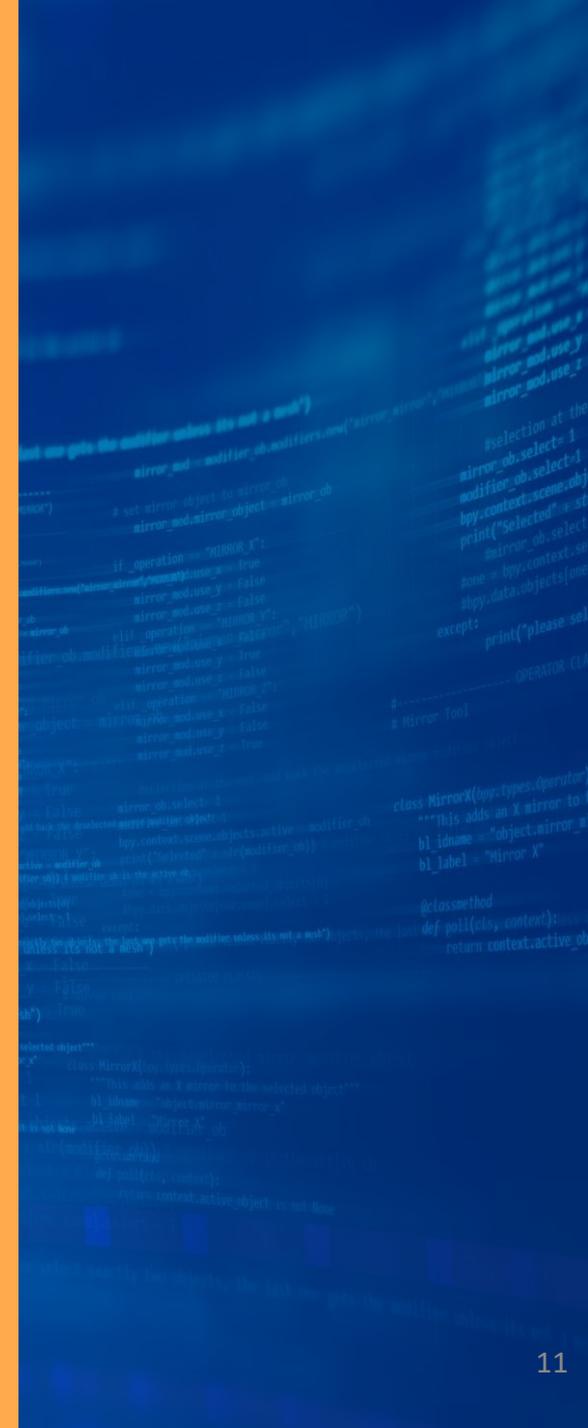
Segment Index	Start Value	End Value	Start Color	End Color
1	0.0	0.02		
2	0.02	1.0		

Buttons: Add, Remove, OK, Cancel



SNAP MELCOR Plug-in: What's New

- Full Support for MELCOR 2.2 r2023.0 Input Specifications
 - New Editors
 - Import/Exporters
- Support for command line arguments on job step configuration
- Improvements to User Interface
 - More Intuitive layout
 - Cleaner look and feel
 - Improved ergonomics
 - Introduction to Automated Testing Framework
- Partial ASCII import & export
- Bug fixes



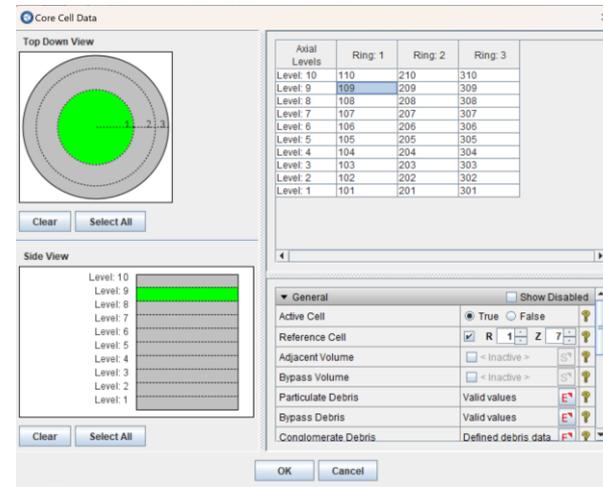
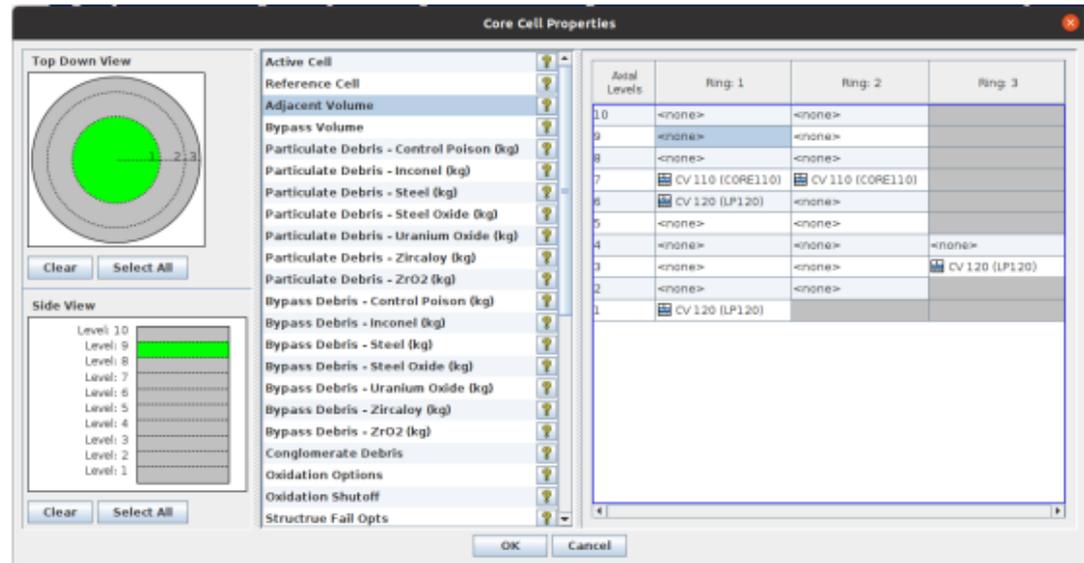
Full support for the following new MELCOR model inputs

Input	Code Package	Location	Property
CV_PDIA	Control Volumes (CVH)	Category Node	User specified pool diameter
NCG_SC	Sensitivity Coefficients	Create Menu	NCG (2090-2099)
FDI_SC	Sensitivity Coefficients	Create Menu	FDI (4602-4699)
COR_BL	Core (COR)	Attribute Group	Beam Length
COR_GOX	Core (COR)	General Property	Oxidation Modeling
COR_MHU	Core (COR)	General Property	Hold-up behavior
COR_CMT2	Core (COR)	Attribute Group	Secondary Materials
COR_CNV	Core (COR)	General Property	Convective Heat Transfer
COR_LHM	Core (COR)	Attribute Group	Melting Model

UI Improvements – Core Properties



- Split Panel Makes Use of Greater Visual Space
 - All Values from All Axial and Radial Levels Displayed
- Graphical Guidance for Users
 - Help Info Accessible Adjacent to Each Property Type
 - Enabling Information Displayed
- Multi-Row/Column Functionality Supported
 - Editable Properties
 - Copy-Pasting



Deprecated Interface

- Data for Multiple HT Paths available (view & edit) from Single View
 - Previously only a single HT path visible/editable at a time
 - Rows can be re-ordered
- Toggle Specification Modes
 - Input by range
 - Input by single cell
- Improved User Interface
 - Column Removal Reduces Crowding
 - Descriptive Enumerations
 - Previously only abbreviated names displayed
 - Simplistic Inline Editors
 - Descriptive Header Tooltips.

Heat Transfer Edit

Specification Format: Individual Cells

Index	From Cell	From Component	From Rod Group	To Cell	To Component	Heat Structure	Heat Structure Side	To Rod Group	Path Type	Path
1	101	Multi-rod Fuel		206	Multi-rod Fuel			1	[1] Constant Radiate	4.0
2	209	Multi-rod Clad		403	Multi-rod Clad			2	[2] Constant Conduct	2.0
3	313	Multi-rod Non-supp...		501	Multi-rod Non-su...			3	[3] Control Radiate	CF 1 (VALVE...
4	208	Fuel		313	Fuel			4	Control Conduct	CF 2 (FRACT...
5	101	Fuel			Heat Structure	HS 10001 (WE...	Left Hand Side		[1] Constant Radiate	6.0
6	101	Fuel			Heat Structure	HS 10002 (DR...	Right Hand Side		[1] Constant Radiate	8.0

OK Cancel

Heat Transfer Edit

Specification Format: Control Function Range

Index	Core Cell From	From Component	From Rod Group	To Component	To Rod Group	Core Cell To	Path Type	Path
1	<none>	Multi-rod Fuel		2	Multi-rod Fuel	1 <none>	[1] Constant Radiate	4.0
2	<none>	Multi-rod Clad		4	Multi-rod Clad	2 <none>	[2] Constant Conduct	2.0
3	<none>	Multi-rod Non-supportin...		5	Multi-rod Non-supp...	3 <none>	[3] Control Radiate	CF 1 (VALVE-OPE...
4	<none>	Fuel			Fuel	<none>	[4] Control Conduct	CF 2 (FRACT-OPE...
5	<none>	Fuel			Heat Structure	<none>	[1] Constant Radiate	6.0
6	<none>	Fuel			Heat Structure	<none>	[1] Constant Radiate	8.0

OK Cancel

Deprecated Interface

Edit Core Heat Transfer

Heat Transfer 1
Heat Transfer 2
Heat Transfer 3
Heat Transfer 4
Heat Transfer 5
Heat Transfer 6

Add Remove

General Show Disabled

Specification Format: Individual Cells

First Component: FU

First Cell: R | 1 | Z | 1

Second Component: FU

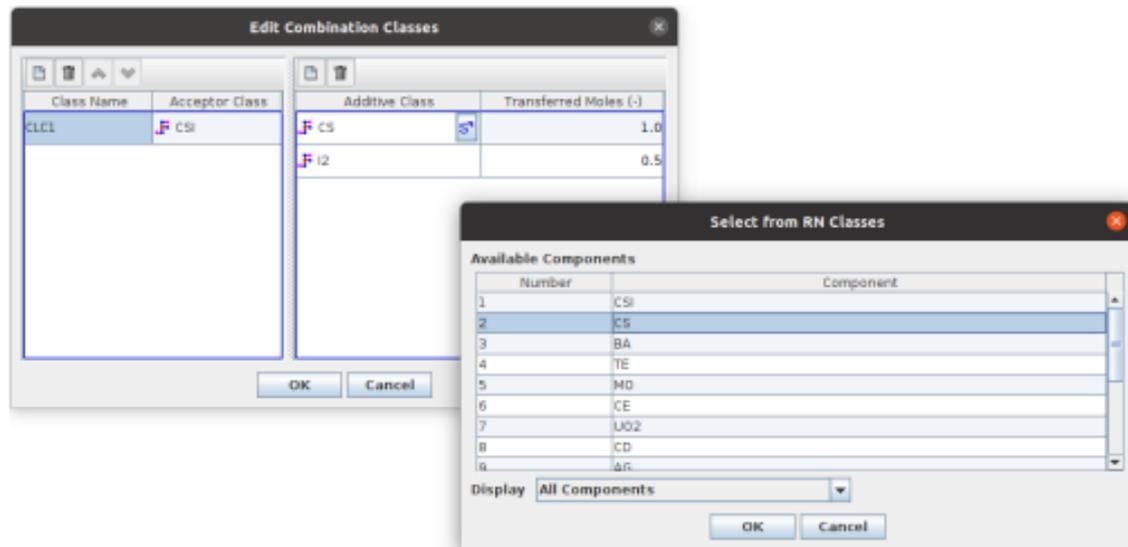
Second Cell: R | 3 | Z | 6

Path Type: [1] Constant Radiate

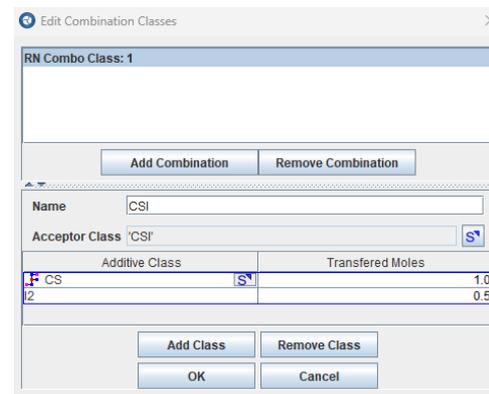
View Factor * Area: 4.0

OK Cancel

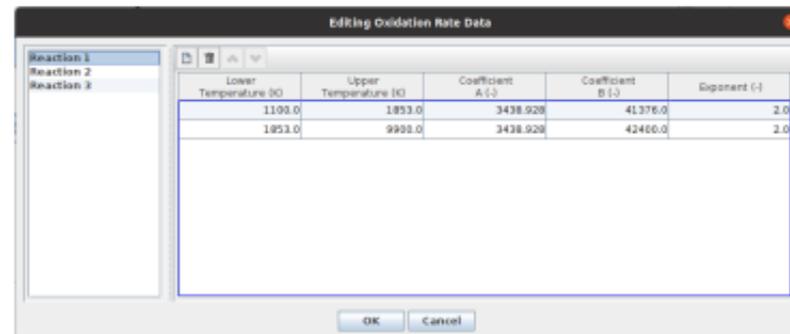
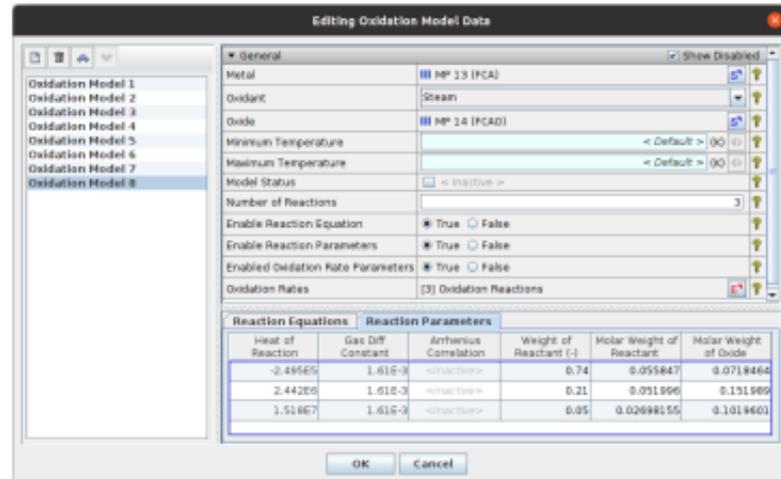
- Multi-Editable Tables
- Additive Class Pane Displayed on Selection of Acceptor Class
- RN Class Selectors
 - Alternatively, Additive and Acceptor Classes Pasting from External Sources
- Simple Toolbar buttons (Add, Remove and Re-order)



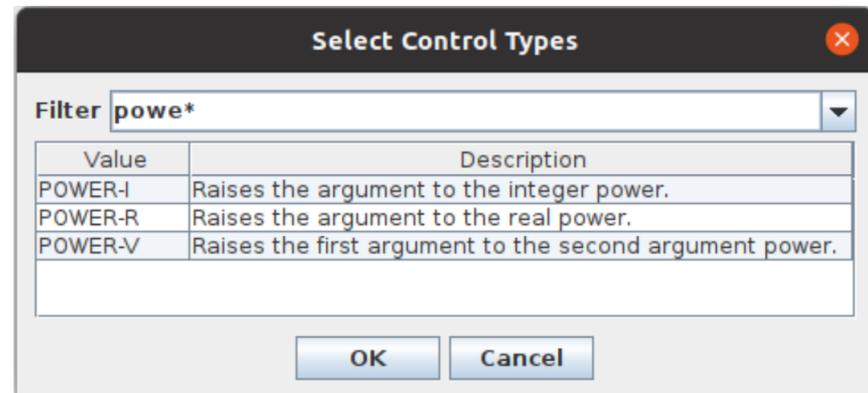
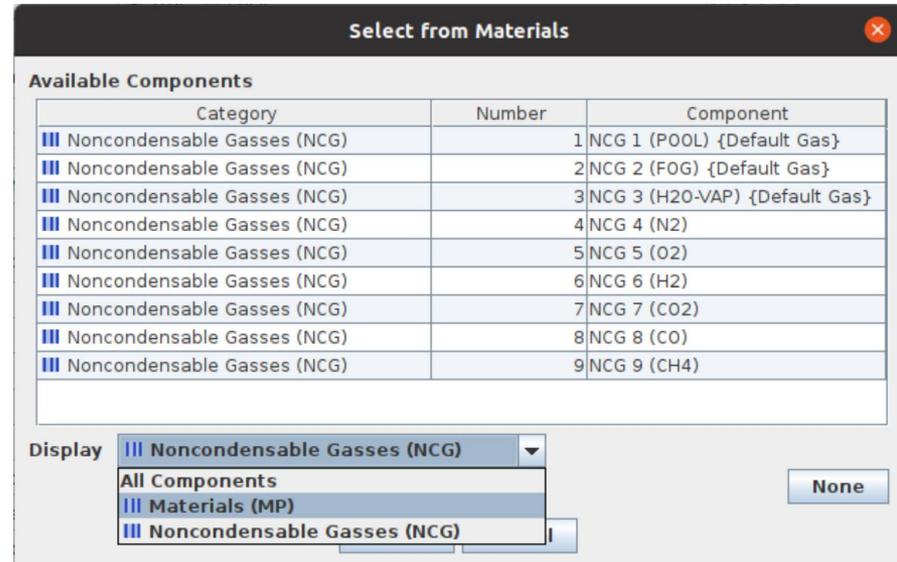
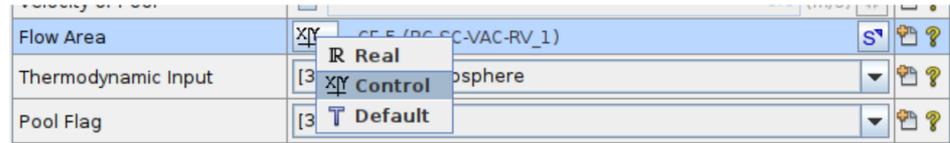
Deprecated
Interface



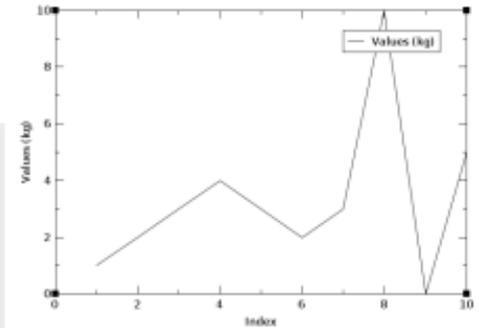
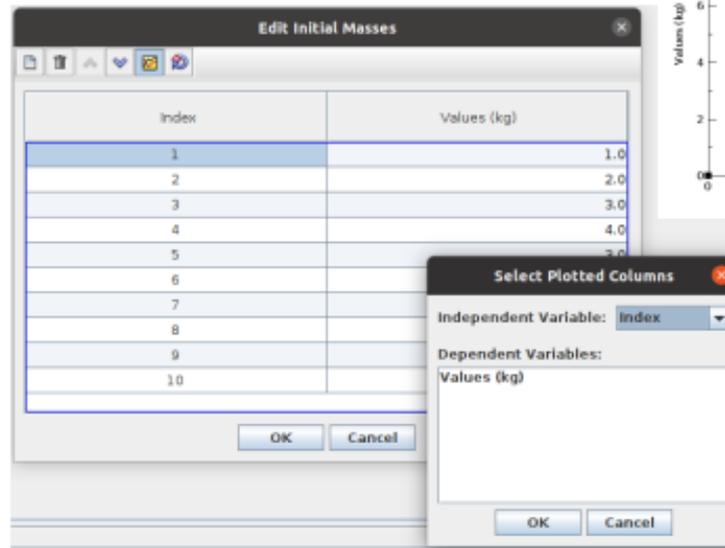
- Define Multiple Oxidation Models
 - Add/Remove/Re-order models
- Oxidation Model Property View
- Enabling Information Display
- Oxidation Rates Property Editor
 - Reactions automatically added
 - Displays oxygen rates for each reaction
 - Add/Remove/Re-order input



- Real vs Control reference property editor
 - Inline mode selection
 - Enter real values
 - Control Function selection
 - Default value mode
- Component Selection Editor
 - Filterable categories
 - None option
- Named Value Selector
 - Filterable
 - Search wildcards



- Real array table editor updates
- Standard for simple real tables
- New toolbar layout of features
- Sort values button
- Orders ascending dependent values
- Plot from Table Button:
- APTPLOT Automatically configured
- Configurable independent and dependent plot variables



- MELGEN/MELCOR Command lines
- Examples:
 - C=xx, DTMAX=xx, N++= xx, NCF= xx, NQE=xx, NT=xx, OW=xx, SCnnnn(m)=xx, SF=xx, ST=xx, TEND=xx, VAR=xx, MAXNCYCLE=xx, NEWNCYCLE=xx, CPUEND=xx
 - See UG (EXEC-UG)
- Supported on 1.8.6 and 2.2 job steps
- Supported for MELGEN & MELCOR separately



The screenshot displays the MELCOR software interface. On the left, a tree view shows the job structure: Job Streams [1] containing 1 component, which contains Stream Steps [2]. The selected step is MELGEN Step 1 (MG_Step), with MELCOR Step 2 (MC_Step) listed below it. The main panel shows the configuration for MELGEN Step 1 (MG_Step). The 'Command Line Arguments' field is populated with the following text:

```
[1] dtmax=10.0  
[2] n++=ON
```

On the right, the 'Application Arguments' dialog box is open, showing a table with one column labeled 'Argument'. The dialog has 'OK' and 'Cancel' buttons at the bottom.

- Retain SNAP Meta Resources

- Notes
- Views
- Cases
- Numerics
- Streams

```
*****  
*          NUMERIC MAP          *  
*****  
!med:/home/dul/Downloads/Control_Volume_Input.med  
!udnc:ri,mc$ri,v:1234.0  
!m: SNAP:Symbolic Nuclear Analysis Package, Version 4.2.0, October 27, 2023  
!m: PLUGIN:MELCOR Version 2.8.4  
!m: CODE:MELCOR Version 2.2  
!m: DATE:2/15/24  
!  
|*****  
|:'FUKUSHIMA UNIT 1'  
|*****  
|!
```

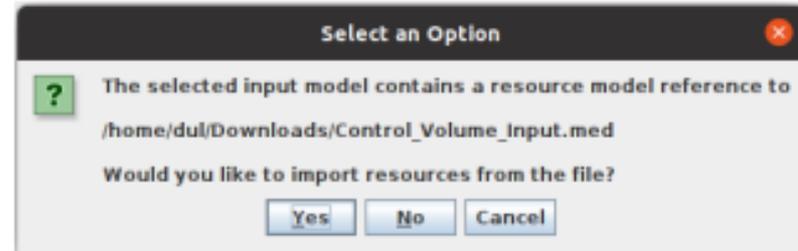
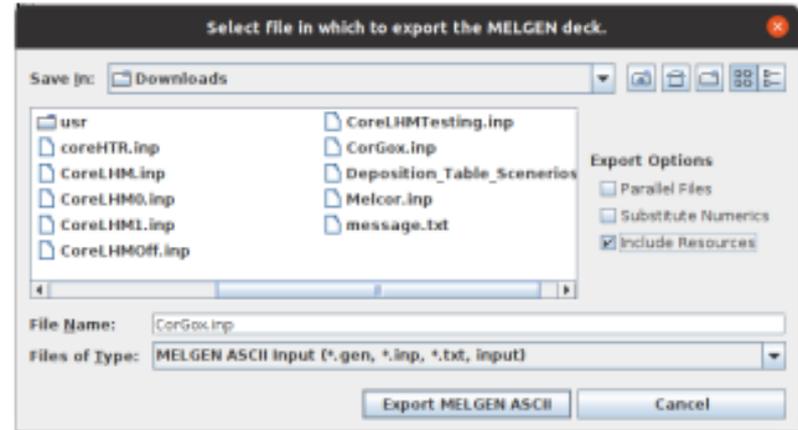
- ASCII Header Mapping Directive

- Externally Modify ASCII

- Notepad++
- Word

- Exportable for MELGEN

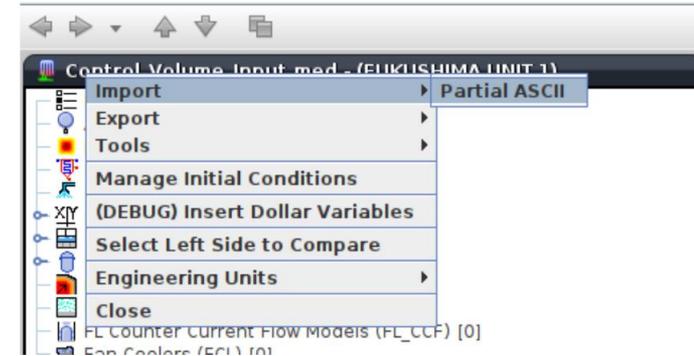
- MELCOR cases permit ASCII modifications



Partial ASCII Import/Export

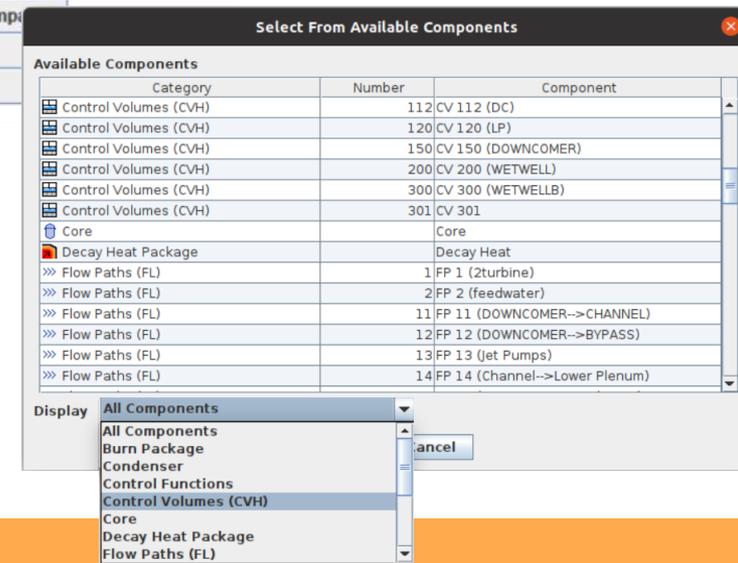
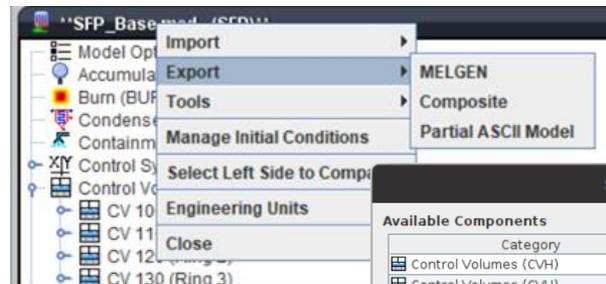


- Import component(s):
 - Replaces existing components if previously defined.
 - Overwritten (deleted) component(s) removed
 - If object number matches but name does not match an existing object then a new object is created rather than replacing
 - Individual or multiple objects can be imported from a file
 - All objects in ASCII file are imported
 - Partial import item off model node

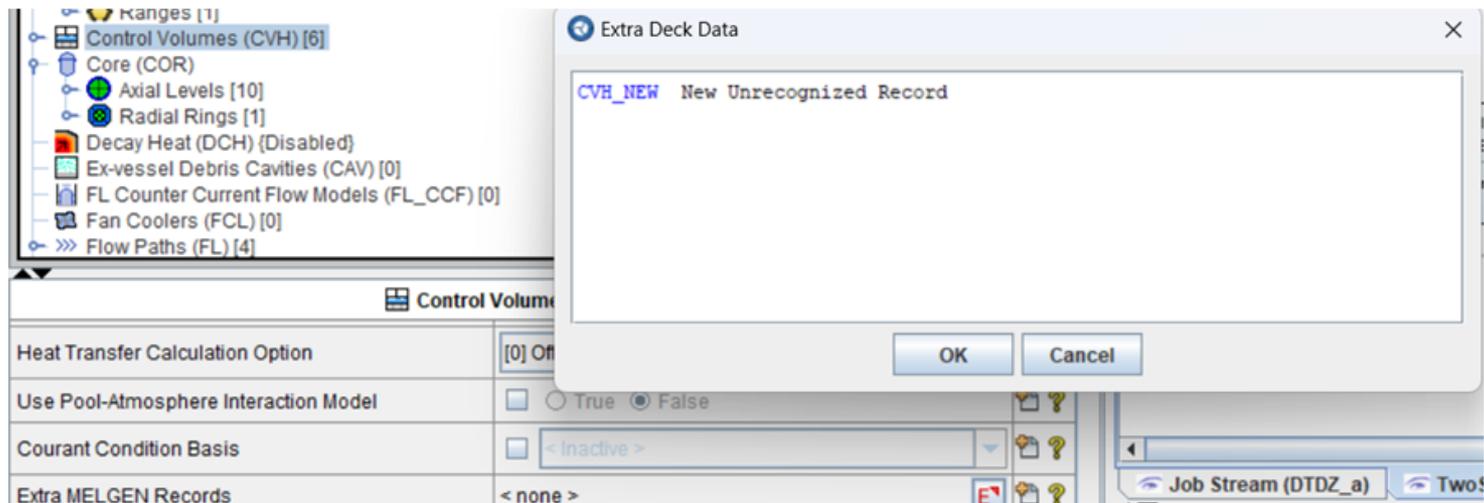


- Export

- Previously only possible by Show ASCII>Copy ASCII for component to Clipboard>Paste into text file.
- Export ASCII of selected components
- Filterable component export UI

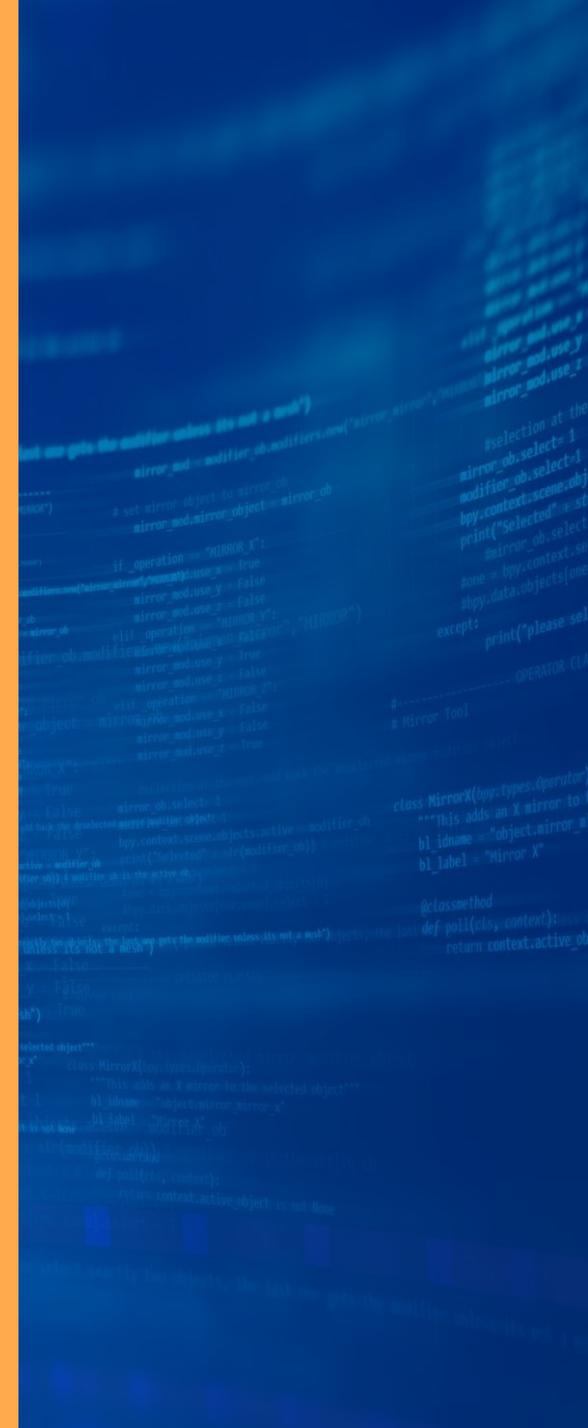


- Need for SNAP to allow unrecognized input records
 - SNAP development lags behind MELCOR development.
 - Inherent consequence of development by 3rd party.
 - Provide Users access to new model features/capabilities within SNAP environment
 - Particularly important for use at Workshops.
- Implementation
 - Extra MELGEN/MELCOR record input can now be specified in SNAP
 - Input for each package.
 - Future development will allow new fields on existing records or new records for MELCOR objects (HS, FL, CVH, ...)



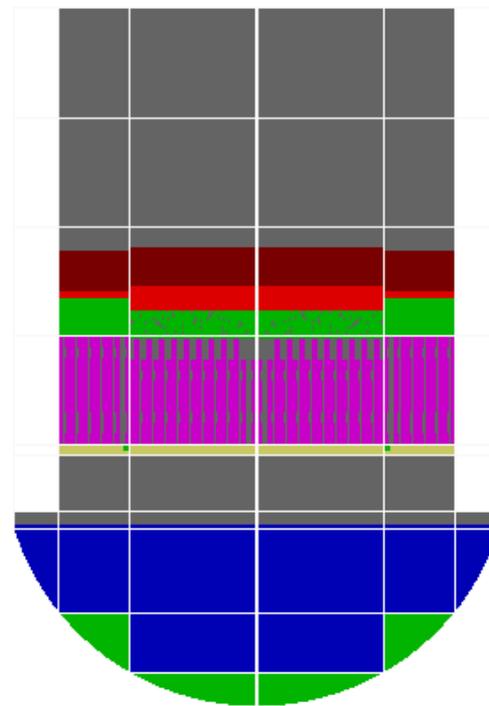
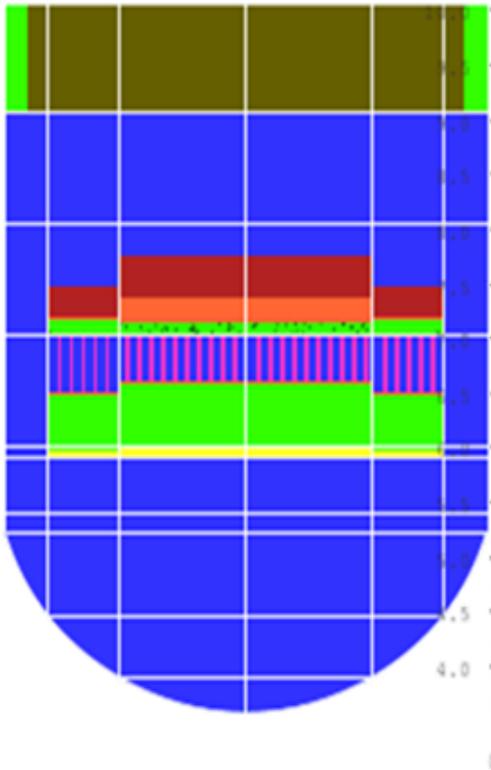
SNL/ISL MELCOR SNAP Discussions

- One week in-person meeting between MELCOR code developer and the GUI plug-in developer
 - February 19 – February 23, 2024
 - Improved alignment between MELCOR and SNAP developers
 - Extremely positive and successful meeting
- Discussions and Topics
 - Latest updates to the MELCOR plug-in
 - New capabilities in SNAP that could be implemented into MELCOR plug-in
 - Recent model developments at Sandia and future GUI support requirements
 - Feedback from MELCOR/SNAP users
 - Discussion on SNAP bugs/issues



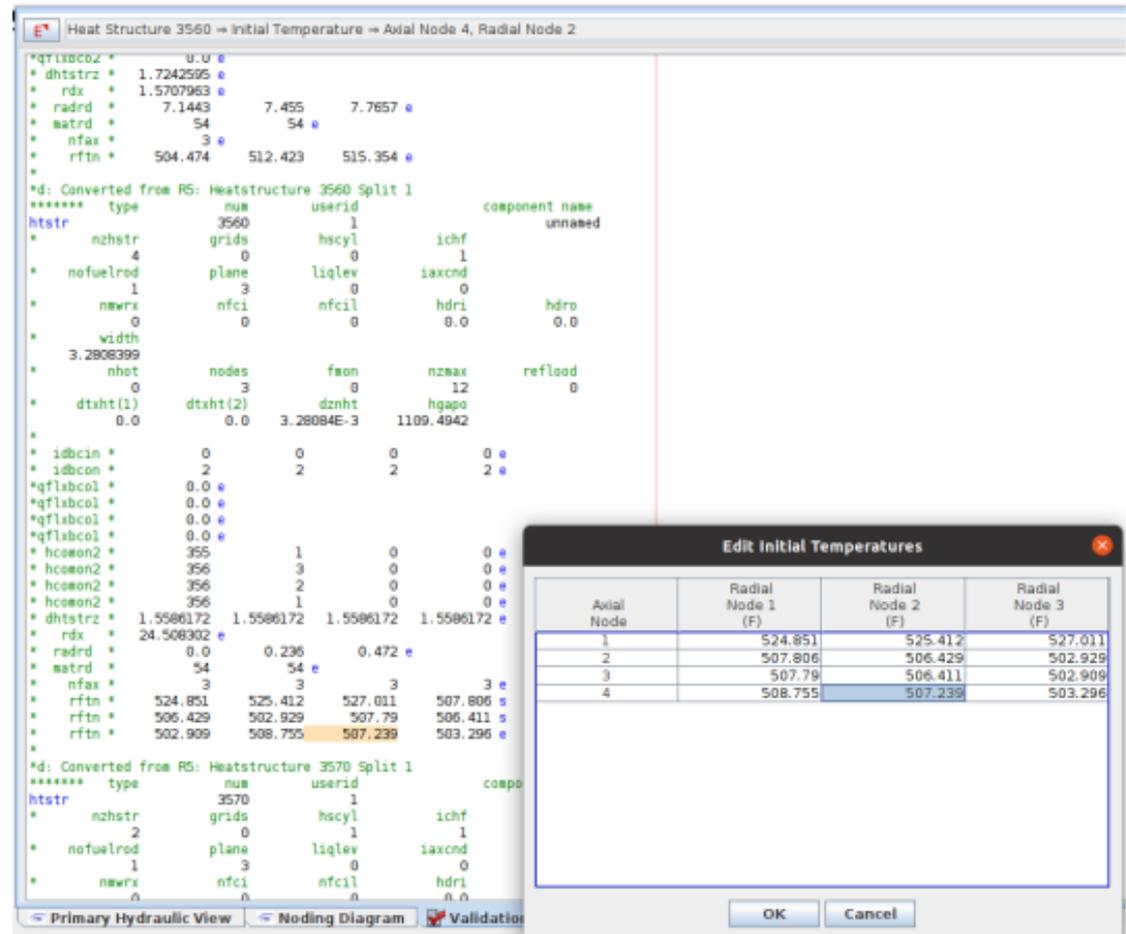
SNAP Degradation Display

PTFREAD/HTML Degradation Display



- SNAP displays null cells as though they were active.
 - SNAP shows PD in upper outer ring which should be null
- Upper levels of MP2 in rings 1 and 2 for SNAP are different where they are approximately the same for HTML.
- HTML displays blocking of conglomerate between fuel rods.
- SNAP is showing large formation of PD on core support plate (likely conglomerate mass)
- Water is below core support plate in HTML and fully flooded in SNAP
- HTML shows relocated PD on lower head

- Full ASCII Model Contents
 - No Export Required
 - Case Data Appended
- ASCII View Highlighting
- Search Capabilities
- Detailed Breadcrumb information
- Quickly Navigate from ASCII view to GUI Edit Location
 - Double-click to Jump
 - Editors Opened
 - Table Cells and Modes Selected
- Available in ASCII views



Future Improvement: Default/Full view of MELCOR Input



- MELCOR is feature rich and allows users access to many input parameters and optional models.
 - Overload of input requirements available to new MELCOR users invites problems with user/effects
 - Though many options are available, the default view should only show that data that is required or frequently modified by the user
 - Optional data should be masked out by default
 - Toggle could hide optional input from view (unless user has made changes to this input)

The image shows two overlapping screenshots of the MELCOR software interface. The left screenshot displays the 'Radionuclide' input panel, which is divided into several sections: 'General', 'Default Scheme', 'Hygroscopic Model', 'Convection Option', 'Core Map', 'Vapour Entry', 'Vapour Release', 'Fuel/Cavity Invent.', 'Cladding Inventory', 'Transport/Deposition Scaling', 'Define Booth Classes', 'Absorption Length', 'Cvol Split', 'HS Split', 'Pool Scrubbing', 'Filters', 'Iodine Class', 'Spray Particles', 'Reactions', 'Transfers', 'Chem. Enabled', 'Iodine Pool', 'Visualization Output', 'Dose Input', 'Cable Mass', 'Surface Coatings', 'Aqueous Species', 'Flashing Jet Model', 'Filter Efficiency', 'Pool Concentrate', and '[RN1_DIM] Dimension Record'. The right screenshot shows the 'Release Model' input panel, including 'Release Model', 'Gap Release', 'Release Comb.', '[RN1_ASP] Aerosol Sectional Parameters', 'Aerosol Coefficients', 'Aerosol Sources', 'Resuspension', '[RN1_PT] Conditions for Aerosol Coefficients', '[RNCFDS] Generated values', '[RNCFRT] Generated values', '[RN1_MS00] Misc. Aerosol Dynamics Constants', and 'Condensation Evaporation'. Several rows in both panels are highlighted with colored boxes (yellow, red, green, blue, pink) to illustrate the complexity and variety of input options.



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