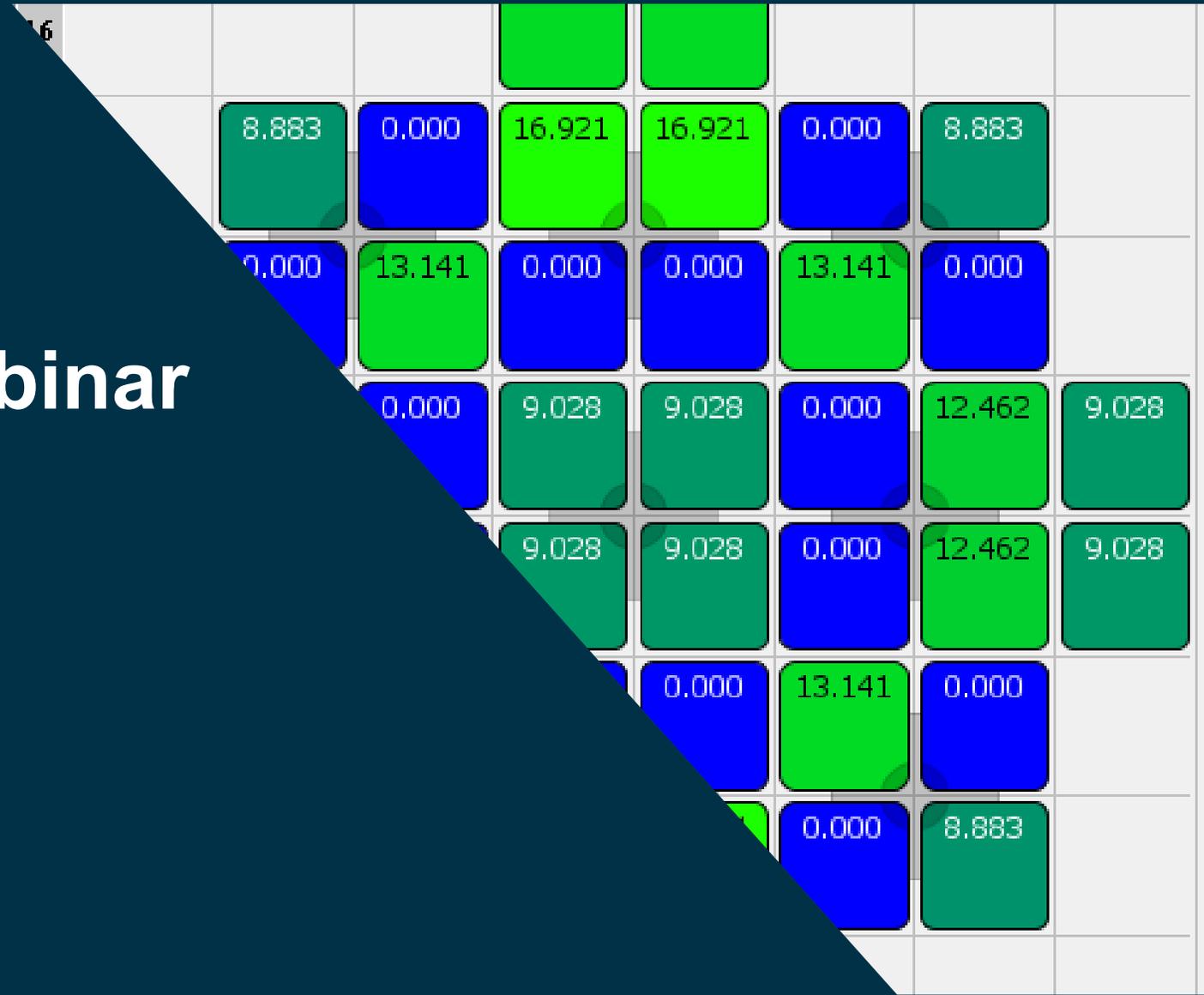


CMSBuilder Webinar 2024

Steven Sutton and Adam Scharf

Studsvik





Background/Introduction

XIMAGE (X/11 Interactive Multicycle Analysis and Graphical Environment) is a Point-and-Click loading pattern design and multicycle scoping tool. XIMAGE couples the neutronics methodology of **SIMULATE** with a strong emphasis on ease-of-use and graphic visualization. Designed to run on Unix workstations using the X11/Motif windowing system.

Separate versions of XIMAGE (BWR) and XIMAGE/SIMAN (PWR) are currently in production.

CMSBuilder is a Point-and-Click loading pattern design tool and single-cycle scoping tool that builds on the user experience developed in XIMAGE over many years of usage. CMSBuilder couples the advanced methodology of **CMS**, emphasizing ease of use and graphic visualization. Designed to run on any OS supported for CMS.

A single version of CMSBuilder supports all LWR technologies.



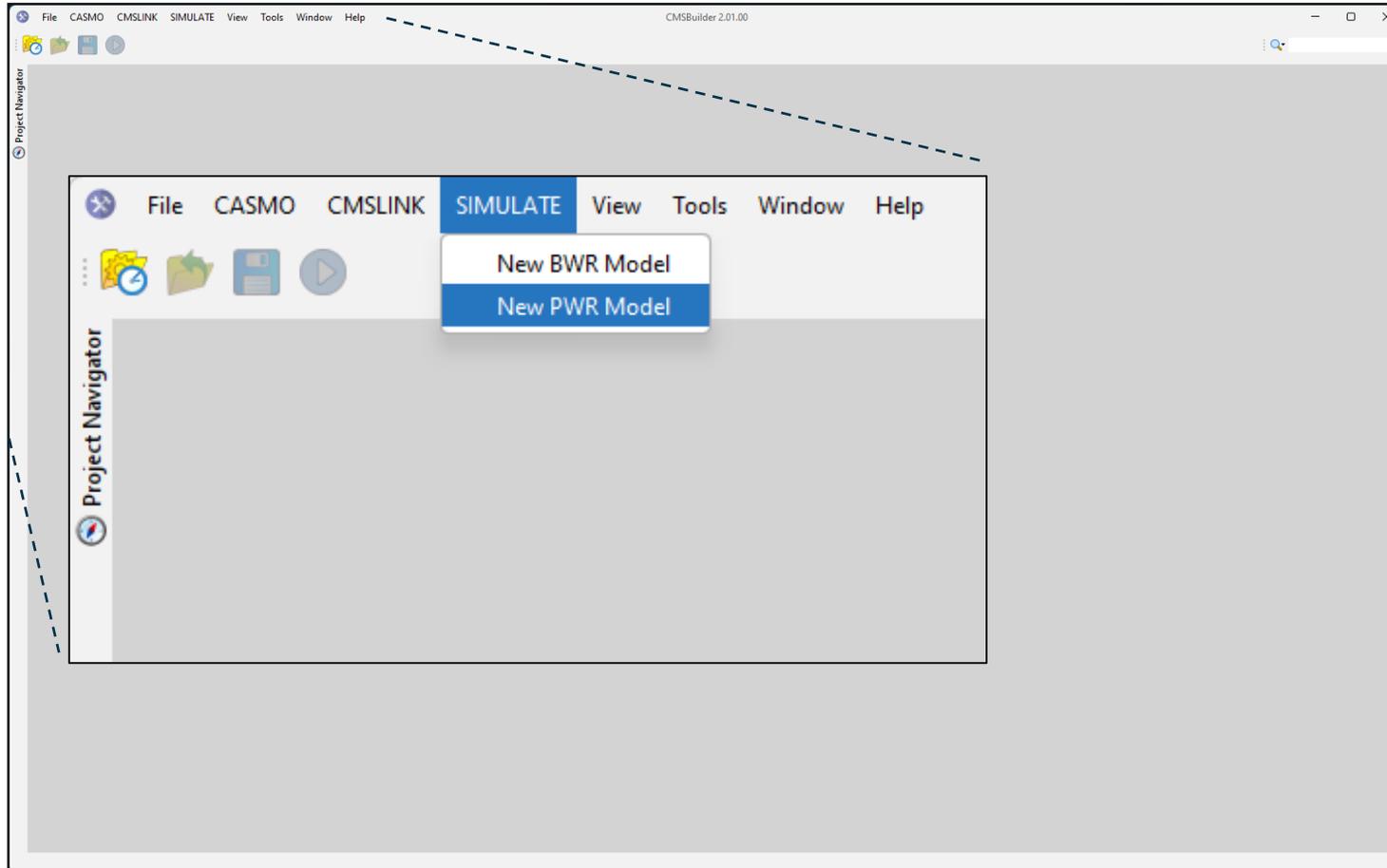
What Is CMSBuilder?

	Assembly Projects (CASMO/CMS-LINK)	Integration	Core Projects (SIMULATE)	
PWR	<ul style="list-style-type: none">-Assembly Design (enrichment, IFBA, WABA, etc.)-Add to CMS library-Merge CMS libraries	<ul style="list-style-type: none">-Introduce new FUEL types from Assembly projects-Automatically generate FUE.ZON and SEG.XXX	<ul style="list-style-type: none">-Base Case ("Jump-in Cycle")-Multiple restarts (n, n-1,...)-Display fuel inventory-Shuffle fuel from pool-Depletion Schedule	Optimization Copernicus
BWR	<ul style="list-style-type: none">-Assembly Design (enrichment, Gd, etc.)-Custom BTFs, LHGRs-Add to CMS library-Merge CMS Libraries		<ul style="list-style-type: none">-Base Case ("Jump-in Cycle")-Multiple restarts (n, n-1,...)-Display fuel inventory-Shuffle fuel from pool-Depletion Schedule	

Features

- Loosely coupled to CMS Base Codes: CASMO, CMSLINK and SIMULATE
- Wizard-driven project creation
- Focused, flexible windowed environment
- Cross platform: Windows, Linux ...
- CASMO
 - Graphical bundle design
- CMSLINK
 - Library consolidation
- SIMULATE
 - On-the-fly fresh fuel design for the core model
 - Point-and-click or drag-and-drop design core design
 - Summary display of fresh and depleted fuel available
 - Flexible cycle depletion
 - Graphical core map with key design parameters
 - Summary display of loading patterns analyzed and cycle depletion
 - Loading pattern library
 - Utilizes CMSView edits for output to HDF5 format

SIMULATE Model



Creating a new
PWR
SIMULATE
modeling
project.

SIMULATE Project Creation Wizard

The screenshot shows a dialog box titled "New PWR SIMULATE model project". On the left, a "Steps" list includes: 1. Name and Location (highlighted), 2. Restart Files, 3. Data Files, 4. Assembly Types, 5. Neutronics, 6. Schedule Units, 7. Sister Control, 8. Control Rods, and 9. Hot Eigenvalue. The main area is titled "Name and Location" and contains the following fields: "Project Name" with the value "MyCore1", "Project Location" with the value "C:\CMSBuilderProjects" and a browse button "...", "Project Folder" with the value "C:\CMSBuilderProjects\MyCore1", "Project File" with the value "MyCore1.hdf5", and "Project Notes" with an empty text area. At the bottom, there are buttons for "< Back", "Next >" (highlighted with a blue border), "Finish", "Cancel", and "Help". The CMSBuilder Cores logo is visible in the bottom left corner of the dialog.

User provides key fuel cycle design parameters, restart files, cross-section "pool" library, and neutronic parameters for SIMULATE using the wizard.

On-the-Fly Fresh Fuel

The screenshot shows the 'New PWR SIMULATE model project' dialog box in CMSBuilder Cores. The 'Steps' list on the left includes: 1. Name and Location, 2. Restart Files, 3. Data Files, 4. Assembly Types (selected), 5. Neutronics, 6. Schedule Units, 7. Sister Control, 8. Control Rods, and 9. Hot Eigenvalue. The 'Assembly Types' section contains a table of available assembly types:

Name ^	Assembly Type	Principle Segment	En
PWRU345C00	10	PWRU345C00	3.4
RADIALREF	1	RADREF	0.01

Below the table are buttons for 'Copy', 'Edit', 'Delete', and 'Import'. The 'Fresh Fuel' section contains a table with columns: 'Initial Loading', 'Name', 'Assembly Type', 'Start Serial', 'Alphanumeric', and a search icon. A 'Delete' button is located below this table. At the bottom of the dialog are buttons for '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'. The CMSBuilder Cores logo is visible in the bottom left corner of the dialog.

Copy an existing assembly type as a template for a new design assembly type.

Define fresh fuel loading quantity for the design cycle.

Fuel Editing

The screenshot shows the 'Assembly Types' step in the CMSBuilder Cores software. The interface is titled 'New PWR SIMULATE model project'. On the left, a 'Steps' list shows the current step is '4. Assembly Types'. The main area is divided into two sections: 'Available Assembly Types' and 'Fresh Fuel'.

Available Assembly Types

Name ^	Assembly Type	Principle Segment	En
PWRU345C00	10	PWRU345C00	3.4
RADIALREF	1	RADREF	0.00

Buttons: Copy Edit Delete Import

Fresh Fuel

Initial Loading	Name	Assembly Type	Start Serial	Alphanumeric
-----------------	------	---------------	--------------	--------------

Buttons: Delete

Navigation buttons at the bottom: < Back, Next >, Finish, Cancel, Help

Edit existing and new fuel types.

Replace segments of previously used fuel assembly types to simulate burnable poison removal or insertion.

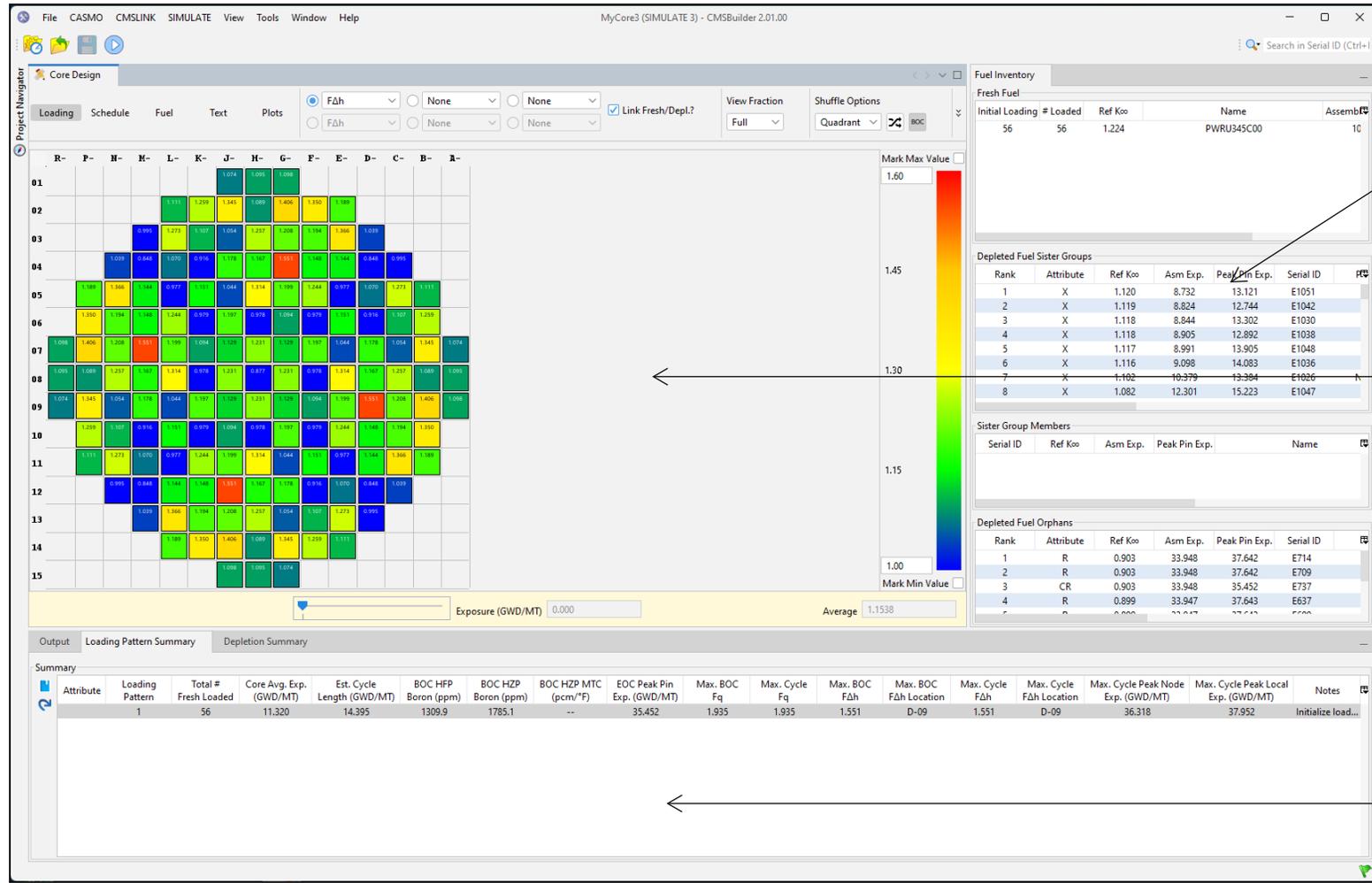
Initiate Model Creation

The screenshot shows the 'New PWR SIMULATE model project' window. On the left, a 'Steps' list includes: 1. Name and Location, 2. Restart Files, 3. Data Files, 4. Assembly Types, 5. Neutronics, 6. Schedule Units, 7. Sister Control, 8. Control Rods, and 9. **Hot Eigenvalue**. The main area is titled 'Hot Eigenvalue' and contains a table with two columns: 'Cycle Exposure (GWD/MT)' and 'Eigenvalue'. The table has two rows: one with '0.000' and '1.000000', and another with '20.000' and '1.000000'. Below the table are 'Add' and 'Delete' buttons. At the bottom left, there is a 'Performing Pool Calculations' progress bar with a green indicator. At the bottom right, there are navigation buttons: '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'. The CMSBuilder logo and 'Cores' text are visible in the bottom left corner.

Cycle Exposure (GWD/MT)	Eigenvalue
0.000	1.000000
20.000	1.000000

Finish to start pool calculations, auto load core, and run the initial BOC case.

CMSBuilder Window Layout



Fuel Inventory

Core Design

Summaries

Core Design Window - Loading

File CASMO CMLINK SIMULATE View Tools Window Help MyCore3 (SIMULATE 3) - CMSBuilder 2.01.00

Core Design

Loading Schedule Fuel Text Plots FΔh Serial None Link Fresh/Depl.? View Fraction Full Shuffle Options Quadrant BOC

Project Navigator

R- P- N- K- L- K- J- H- G- F- E- D- C- B- A-

Core Design

Loading Schedule Fuel Text Plots

Mark Max Value 1.60

Mark Min Value 1.00

Axial Distribution

Exposure (GWD/MT)

7 8 9 10 11 12

12 11 10 9 8 7 6 5 4 3 2 1

1.05 1.08 1.07 1.08 1.09 1.10

K-inf Exposure

Exposure (GWD/MT) 0.000 Average 1.1538

Output Loading Pattern Summary Depletion Summary

Summary

Attribute	Loading Pattern	Total # Fresh Loaded	Core Avg. Exp. (GWD/MT)	Est. Cycle Length (GWD/MT)	BOC HFP Boron (ppm)	BOC HZP Boron (ppm)	BOC HZP MTC (pcm/F)	EOC Peak Pin Exp. (GWD/MT)	Max. BOC Fq	Max. Cycle Fq	Max. BOC FΔh	Max. BOC FΔh Location	Max. Cycle FΔh	Max. Cycle FΔh Location	Max. Cycle Peak Node Exp. (GWD/MT)	Max. Cycle Peak Local Exp. (GWD/MT)	Notes
	1	56	11.320	14.395	1309.9	1785.1	--	35.452	1.935	1.935	1.551	D-09	1.551	D-09	36.318	37.952	Initialize load...

Fuel Inventory

Fresh Fuel

Initial Loading #	# Loaded	Ref Koo	Name	Ass#
56	56	1.224	PWRU345C00	

Depleted Fuel Sister Groups

Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	X	1.120	8.732	13.121	E1051
2	X	1.119	8.824	12.744	E1042
3	X	1.118	8.844	13.302	E1030
4	X	1.118	8.905	12.892	E1038
5	X	1.117	8.991	13.905	E1048
6	X	1.116	9.098	14.083	E1036
7	X	1.102	10.379	13.384	E1026
8	X	1.082	12.301	15.223	E1047

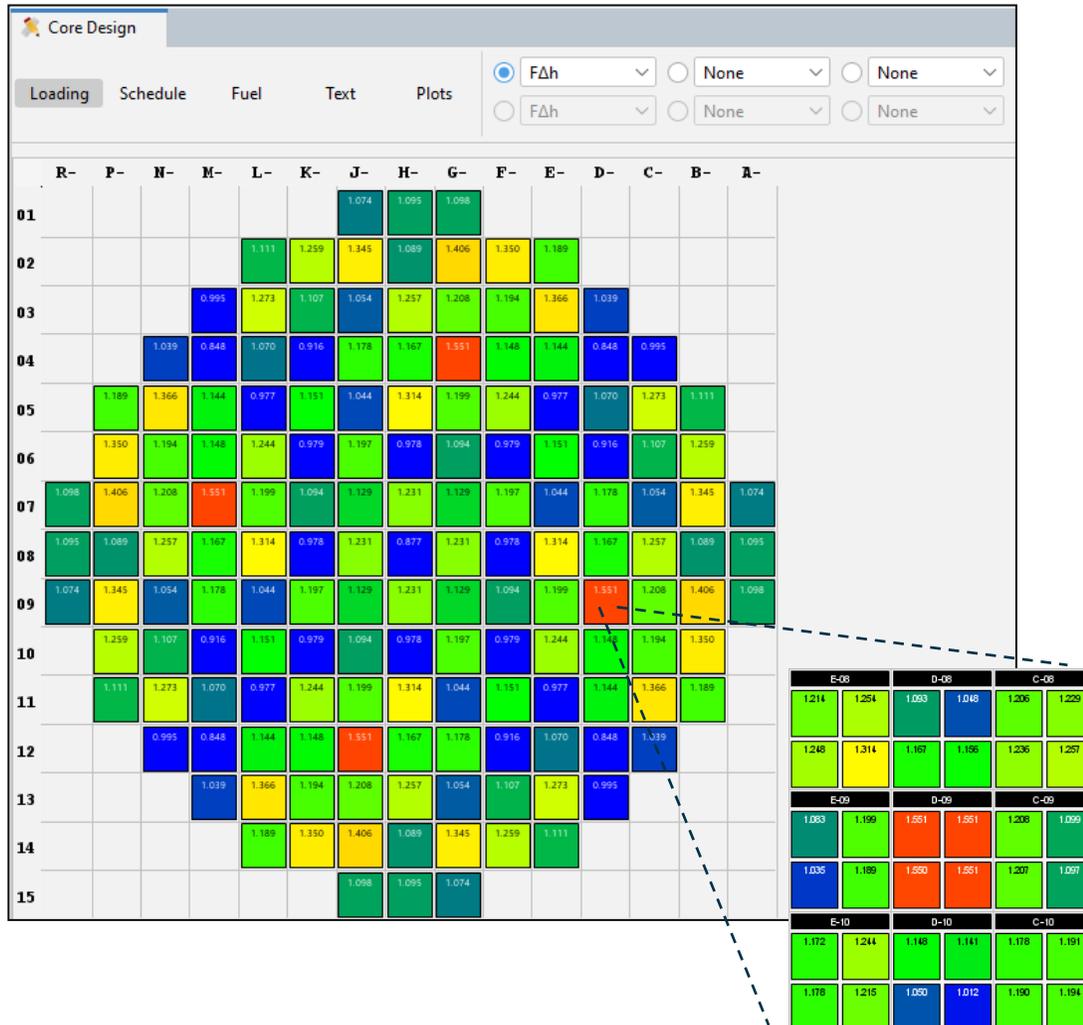
Sister Group Members

Serial ID	Ref Koo	Asm Exp.	Peak Pin Exp.	Name
-----------	---------	----------	---------------	------

Depleted Fuel Orphans

Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	R	0.903	33.948	37.642	E714
2	R	0.903	33.948	37.642	E709

Loading



- Graphical core map with key parameters. Users select up to 3 display items per assembly: Serial ID, Exposure, Power, etc.
- Shuffle fuel
- View radial nodal values (2x2 intranodal mesh)

Core Design Window - Schedule

File CASMO CMLINK SIMULATE View Tools Window Help MyCore3 (SIMULATE 3) - CMSBuilder 2.01.00

Core Design

Project Navigator: Core Design

Loading Schedule Fuel Text Plots

Exposure Step	Exposure (GWD/MT)	Power (% Rated)	Flow (% Rated)	T-Inlet (°F)	Pressure (PSIA)	Rod Banks	Stop	Restart
1	0.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	2.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
3	4.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
4	6.000	100	140	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
5	8.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
6	10.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
7	12.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
8	14.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
9	16.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
10	18.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>

Core Design

Loading Schedule Fuel Text Plots

Operating Conditions

Rated Power (MW) 2799.902 Temp. Specification T-Inlet (°F) Press. Specification Direct Entry

Rated Flow (MLB/HR) 109.276 Temp. Program Press. Program

HZP Inlet Temp (°F) 546.8

End of Cycle Options

HFP Cycle Length Strategy Perform EOL search Coastdown Duration Type No coastdown

EOFP Boron Trigger (ppm) 50.0 Coastdown Power (%) 100 Coastdown Length (GWD/MT) 0.500

EOFP Exp. (GWD/MT) 0.000 Coastdown Flow (%) 100 Post-Coastdown Exp. (GWD/MT) 0.000

Write Coastdown Restart Point?

Showing: 10

Fuel Inventory

Fresh Fuel

Initial Loading #	Loaded	Ref Koo	Name	Assembl
56	56	1.224	PWRU345C00	10

Depleted Fuel Sister Groups

Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	X	1.120	8.732	13.121	E1051
2	X	1.119	8.824	12.744	E1042
3	X	1.118	8.844	13.302	E1030
4	X	1.118	8.905	12.892	E1038
5	X	1.117	8.991	13.905	E1048
6	X	1.116	9.098	14.083	E1036
7	X	1.102	10.379	13.384	E1026
8	X	1.082	12.301	15.223	E1047

Sister Group Members

Serial ID	Ref Koo	Asm Exp.	Peak Pin Exp.	Name
-----------	---------	----------	---------------	------

Depleted Fuel Orphans

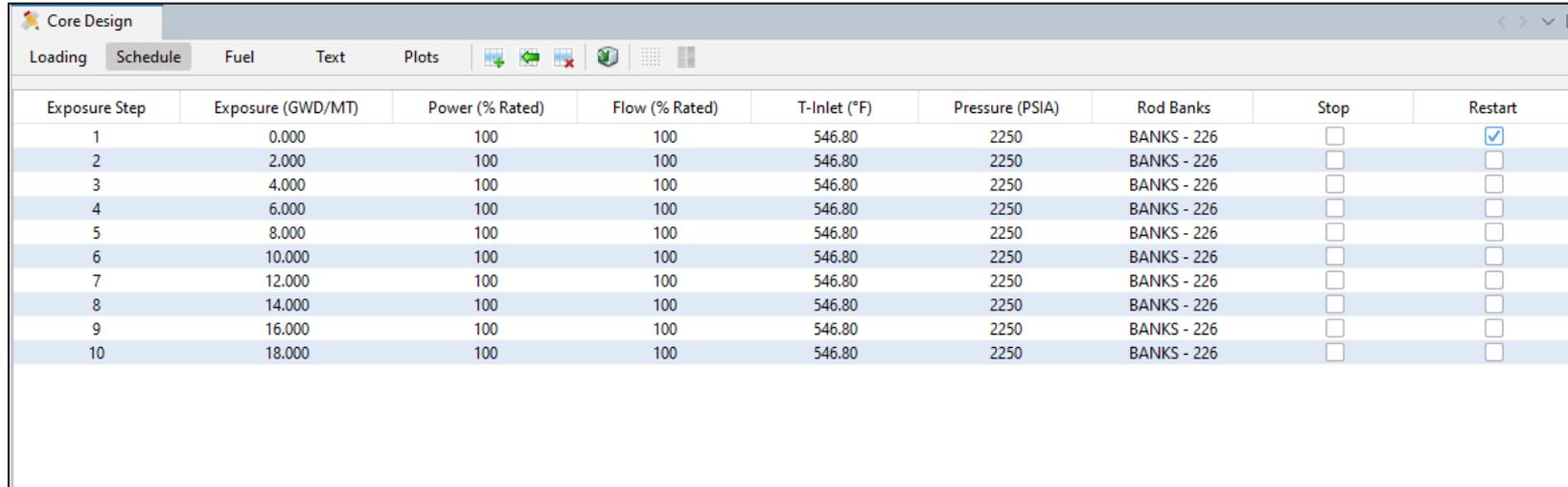
Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	R	0.903	33.948	37.642	E714
2	R	0.903	33.948	37.642	E709
3	CR	0.903	33.948	35.452	E737
4	R	0.899	33.947	37.643	E637

Output Loading Pattern Summary Depletion Summary

Summary

Attribute	Loading Pattern	Total # Fresh Loaded	Core Avg. Exp. (GWD/MT)	Est. Cycle Length (GWD/MT)	BOC HFP Boron (ppm)	BOC HZP Boron (ppm)	BOC HZP MTC (pcm/°F)	EOC Peak Pin Exp. (GWD/MT)	Max. BOC Fq	Max. Cycle Fq	Max. BOC FΔh	Max. BOC FΔh Location	Max. Cycle FΔh	Max. Cycle FΔh Location	Max. Cycle Peak Node Exp. (GWD/MT)	Max. Cycle Peak Local Exp. (GWD/MT)	Notes
	1	56	11.320	14.395	1309.9	1785.1	--	35.452	1.935	1.935	1.551	D-09	1.551	D-09	36.318	37.952	Initialize load...

Schedule



Exposure Step	Exposure (GWD/MT)	Power (% Rated)	Flow (% Rated)	T-Inlet (°F)	Pressure (PSIA)	Rod Banks	Stop	Restart
1	0.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	2.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
3	4.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
4	6.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
5	8.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
6	10.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
7	12.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
8	14.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
9	16.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>
10	18.000	100	100	546.80	2250	BANKS - 226	<input type="checkbox"/>	<input type="checkbox"/>

- Allows users to modify the default depletion schedule
- Modify statepoint conditions, rod banks
- Add stop points
- Import depletion schedule from a restart

Core Design Window – Fuel

The screenshot displays the 'Core Design' software interface for fuel management. The main window is titled 'MyCore3 (SIMULATE 3) - CMSBuilder 2.01.00'. The 'Fuel' tab is active, showing a table of assembly types and a central fuel view.

Assembly Types Table:

Name	Assembly Type	Mechanical Type	Batch Number	Batch Label
PWRU345C00	10	3	10	CYC-10
RADIALREF	1	1	0	

Fuel View: A vertical bar representing the fuel core. The top is labeled 'TOPREF' with a value of 365.76. The bottom is labeled 'BOTREF' with a value of 0.00. The central fuel element is labeled 'PWRU345C00'.

Summary Tables:

Signatures Table:

Name	Number	Enr.	WBA	BAP	BAO	Interpolating
BOTREF	25	3.2	0.0	0	0	
BOTREF	3	0.0	0.0	0	0	
PWRM340C00	21	0.218	0.0	0	0	
PWRNATU	22	3.533	6.0	16	16	
PWRU200C00	4	2.0	0.0	0	0	
PWRU250R12	13	2.5	0.0	0	0	
PWRU250R12	5	2.5	0.71	0	12	
PWRU250R16	14	2.5	0.0	0	0	
PWRU250R16	6	2.5	0.71	0	16	
PWRU250W12	9	2.5	0.71	12	12	
PWRU250W16	11	2.5	0.71	12	12	
PWRU320C00	7	3.2	0.0	0	0	
PWRU320G16	18	3.158	6.0	16	16	

Fuel Inventory - Fresh Fuel Table:

Initial Loading	# Loaded	Ref Koo	Name	Ass
56	56	1.224	PWRU345C00	

Depleted Fuel Sister Groups Table:

Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	X	1.120	8.732	13.121	E1051
2	X	1.119	8.824	12.744	E1042
3	X	1.118	8.844	13.302	E1030
4	X	1.118	8.905	12.892	E1038
5	X	1.117	8.991	13.905	E1048
6	X	1.116	9.098	14.083	E1036
7	X	1.102	10.379	13.384	E1026
8	X	1.082	12.301	15.223	E1047

Sister Group Members Table:

Serial ID	Ref Koo	Asm Exp.	Peak Pin Exp.	Name

Depleted Fuel Orphans Table:

Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID
1	R	0.903	33.948	37.642	E714
2	R	0.903	33.948	37.642	E709

Summary Table:

Attribute	Loading Pattern	Total # Fresh Loaded	Core Avg. Exp. (GWD/MT)	Est. Cycle Length (GWD/MT)	BOC HFP Boron (ppm)	BOC HZP Boron (ppm)	BOC HZP MTC (pcm/F)	EOC Peak Pin Exp. (GWD/MT)	Max. BOC Fq	Max. Cycle Fq	Max. BOC FΔh	Max. BOC FΔh Location	Max. Cycle FΔh	Max. Cycle FΔh Location	Max. Cycle Peak Node Exp. (GWD/MT)	Max. Cycle Peak Local Exp. (GWD/MT)	Notes
1		56	11.320	14.395	1309.9	1785.1	--	35.452	1.935	1.935	1.551	D-09	1.551	D-09	36.318	37.952	Initialize load...

Fuel

Core Design

Loading Schedule **Fuel** Text Plots

Assembly Types

Name ^	Assembly Type	Mechanical Type	Batch Number	Batch Label
PWRU345C00	10	3	10	CYC-10
RADIALREF	1	1	0	

Copy Delete Import

Segments

Name ^	Number	Enr.	WBA	BAP	BAO	Interpolating
BOTREF	25	3.2	0.0	0	0	
BOTREF	3	0.0	0.0	0	0	
PWRM340C00	21	0.218	0.0	0	0	
PWRNATU	22	3.533	6.0	16	16	
PWRU200C00	4	2.0	0.0	0	0	
PWRU250R12	13	2.5	0.0	0	0	
PWRU250R12	5	2.5	0.71	0	12	
PWRU250R16	14	2.5	0.0	0	0	
PWRU250R16	6	2.5	0.71	0	16	
PWRU250W12	9	2.5	0.71	12	12	
PWRU250W16	11	2.5	0.71	12	12	
PWRU320C00	7	3.2	0.0	0	0	
PWRU320G16	18	3.158	6.0	16	16	
PWRU320R16	15	3.2	0.0	0	0	

Copy Delete

Fuel View

365.76

365.76

PWRU345C00

0.00

TOPREF

BOTREF

- Copy an existing assembly type as a template for a new design assembly type.
- Adjust scoping segments
- Remove/Insert burnable poison

Text

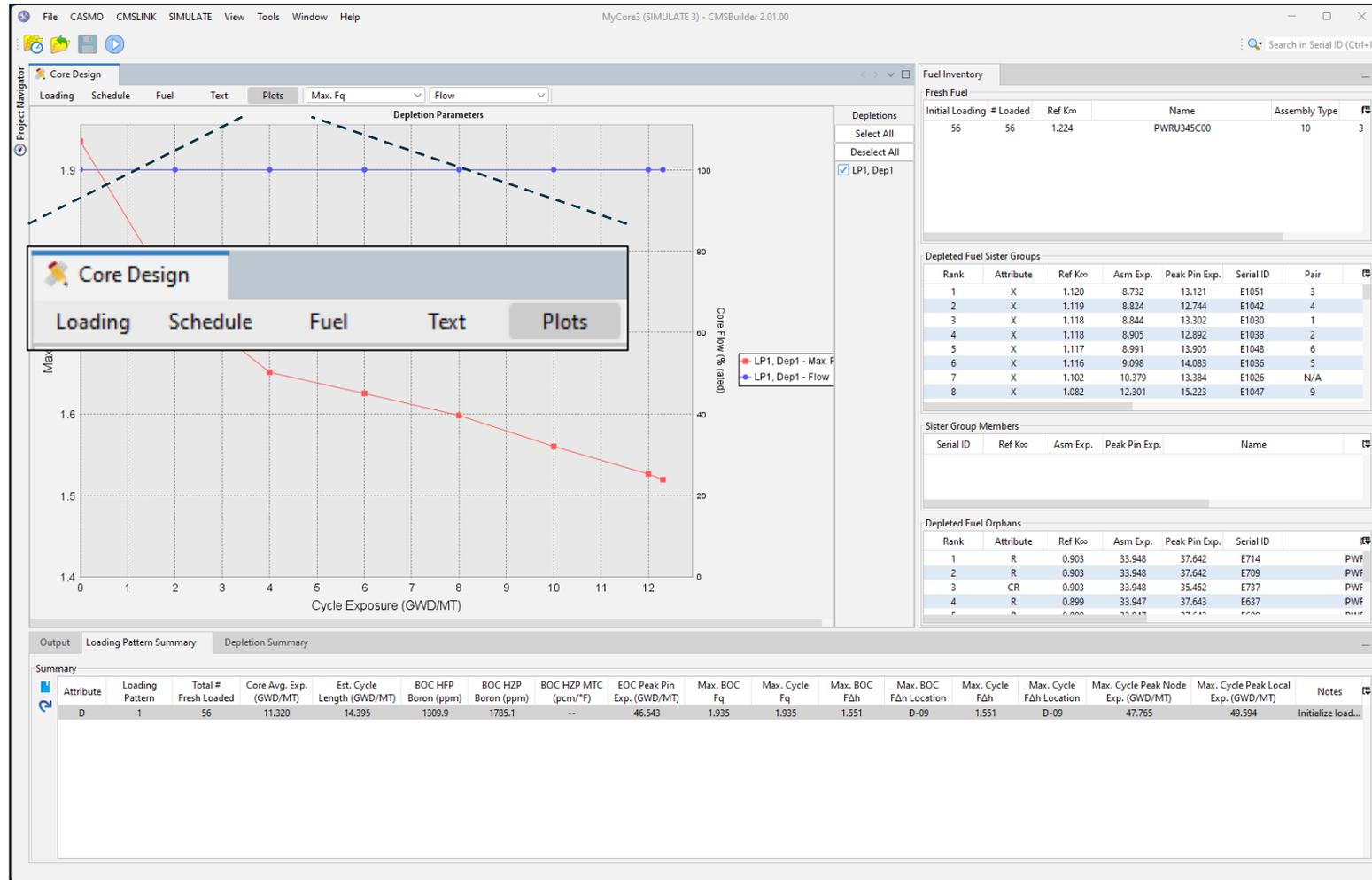
```
Core Design
Loading Schedule Text
*****UGM2018.inp*****
'DIM.PWR' 17,,,1/
'DIM.CAL' 24 4 2 2/
'DIM.DEP' 'EXP' 'SAM' 'HBO' 'HTF' 'HTM' 'PIN' 'MBP' 'HCR' 'FLN'/
'DIM.UNI' 'OLD' 'OLD'/
'COR.SYM' 'ROI'/

'FUE.SER' 6/
1 1
2 1
3 1
4 1
5 1
6 1
7 1 Z045
8 1 Z034
9 1
10 1 Z037
11 1 Z042
12 1
13 1
14 1
15 1
16 1
17 1
0 0

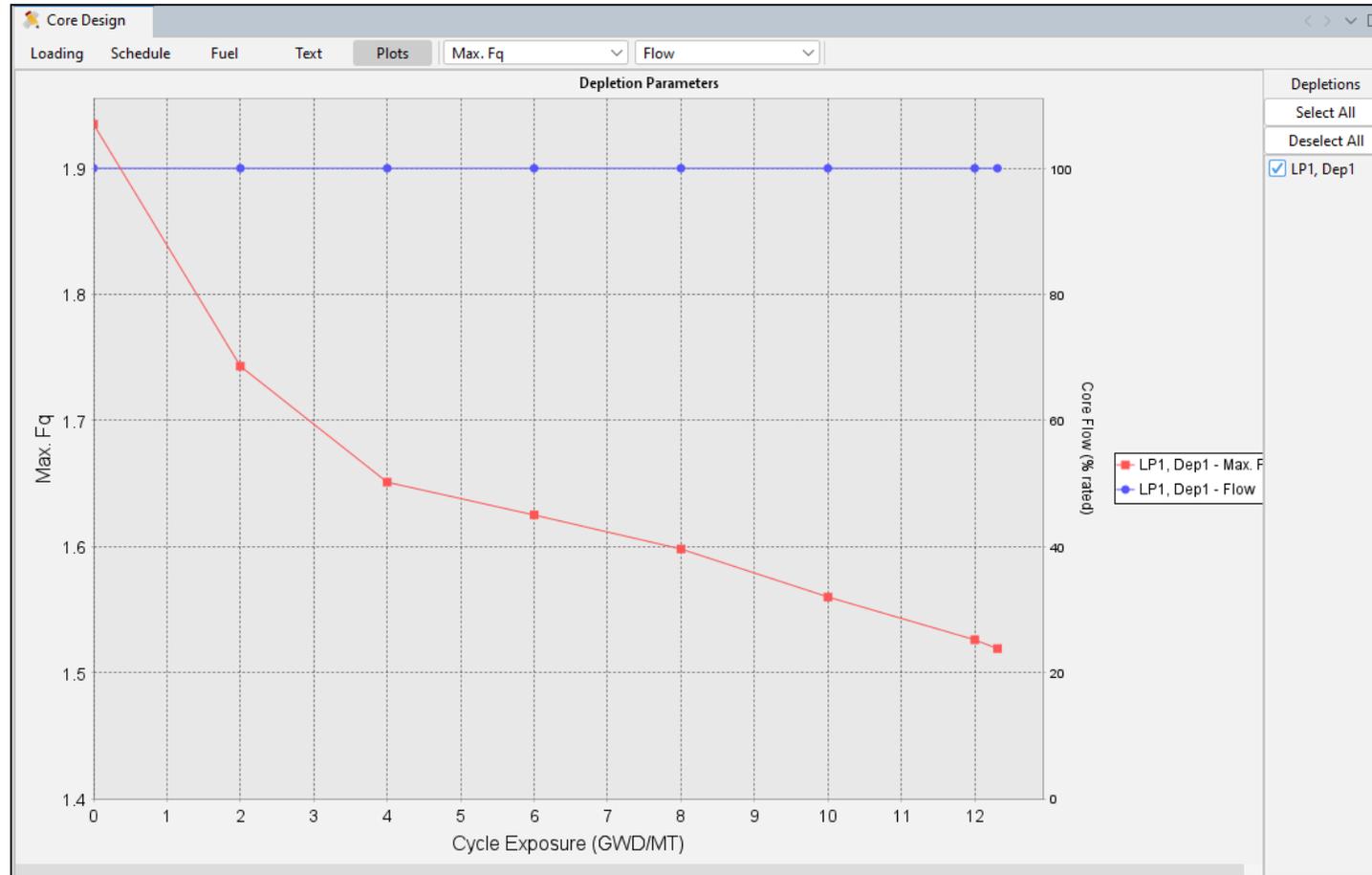
'RES'
's5.m2boc22.res' 0.000
's5.m2eoc21.res' 15.201
's5.m2eoc20.res' 15.182
/
'LIB' 'MP2-Cycle_20_23.lib'/
```

← SIMULATE input

Core Design Window - Plots



Plots



Plot of burnup-dependent core parameters for comparison across core exposures for loading patterns

Fuel Inventory Window

Fresh Fuel						
Initial Loading	# Loaded	Ref Koo	Name	Assembly Type	Enr.	WBA
56	56	1.224	PWRU345C00	10	3.450	0.0000

Depleted Fuel Sister Groups								
Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID	Pair	Name	Assembly Type
1	X	1.120	8.732	13.121	E1051	3	PWRU345C00	10
2	X	1.119	8.824	12.744	E1042	4	PWRU345C00	10
3	X	1.118	8.844	13.302	E1030	1	PWRU345C00	10
4	X	1.118	8.905	12.892	E1038	2	PWRU345C00	10
5	X	1.117	8.991	13.905	E1048	6	PWRU345C00	10
6	X	1.116	9.098	14.083	E1036	5	PWRU345C00	10
7	X	1.102	10.379	13.384	E1026	N/A	PWRU345C00	10
8	X	1.082	12.301	15.223	E1047	9	PWRU345C00	10

Sister Group Members									
Serial ID	Ref Koo	Asm Exp.	Peak Pin Exp.	Name	Enr.	WBA	Mechanical Type	Location	
E1003	1.117	8.991	13.905	PWRU345C00	3.450	0.0000	3	J-06	
E1018	1.117	8.991	13.905	PWRU345C00	3.450	0.0000	3	F-07	
E1048	1.117	8.991	13.905	PWRU345C00	3.450	0.0000	3	G-10	
E1033	1.117	8.991	13.905	PWRU345C00	3.450	0.0000	3	K-09	

Depleted Fuel Orphans								
Rank	Attribute	Ref Koo	Asm Exp.	Peak Pin Exp.	Serial ID	Name	Assembly Type	Enr.
1	R	0.903	33.948	37.642	E714	PWRU345C00	10	3.450
2	R	0.903	33.948	37.642	E709	PWRU345C00	10	3.450
3	CR	0.903	33.948	35.452	E737	PWRU345C00	10	3.450
4	R	0.899	33.947	37.643	E637	PWRU345C00	10	3.450

← Fresh Fuel

← Sister Groups - conceptual groups of fuel positioned in symmetric locations

← Sister Group Members – assemblies comprising selected group

← Orphans – assemblies not part of a sister group (i.e., center assembly)



Loading Pattern and Depletion Summary Windows

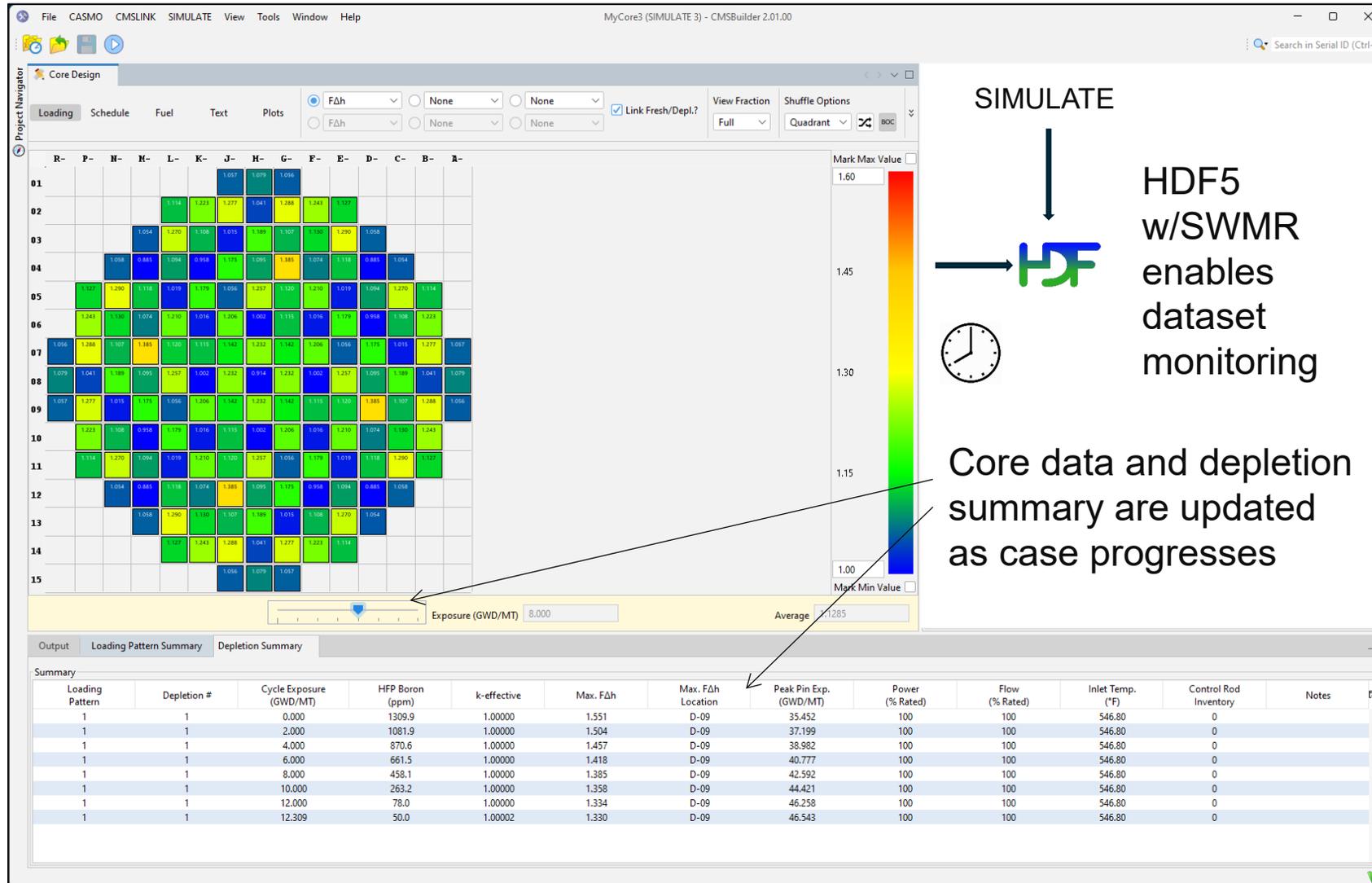
Loading Pattern Summary - During manual shuffle at BOC, this scrolling user configurable list allows a comparison of all loading patterns considered

Summary																	
Attribute	Loading Pattern	Total # Fresh Loaded	Core Avg. Exp. (GWD/MT)	Est. Cycle Length (GWD/MT)	BOC HFP Boron (ppm)	BOC HZP Boron (ppm)	BOC HZP MTC (pcm/°F)	EOC Peak Pin Exp. (GWD/MT)	Max. BOC Fq	Max. Cycle Fq	Max. BOC FΔh	Max. BOC FΔh Location	Max. Cycle FΔh	Max. Cycle FΔh Location	Max. Cycle Peak Node Exp. (GWD/MT)	Max. Cycle Peak Local Exp. (GWD/MT)	Notes
D	1	72	6.858	15.720	1430.5	1899.6	--	32.732	2.114	2.114	1.695	D-08	1.695	D-08	32.869	36.257	Initialize load...
	2	72	6.858	13.593	1430.8	1900.0	--	17.354	2.114	2.114	1.694	D-08	1.694	D-08	18.731	19.939	Quadrant Sy...
	3	72	6.858	13.593	1430.8	1899.9	--	17.354	2.114	2.114	1.695	D-08	1.695	D-08	18.731	19.939	Quadrant Sy...

Depletion Summary - The user configurable list indicates the performance of the core at each statepoint during depletion

Summary												
Loading Pattern	Depletion #	Cycle Exposure (GWD/MT)	HFP Boron (ppm)	k-effective	Max. FΔh	Max. FΔh Location	Peak Pin Exp. (GWD/MT)	Power (% Rated)	Flow (% Rated)	Inlet Temp. (°F)	Control Rod Inventory	Notes
3	1	0.000	1430.8	1.00000	1.695	D-08	17.354	100	100	546.80	0	
3	1	2.000	1183.5	1.00000	1.614	D-08	19.904	100	100	546.80	0	
3	1	4.000	974.5	1.00000	1.553	D-08	22.344	100	100	546.80	0	
3	1	6.000	758.5	1.00000	1.495	D-08	24.704	100	100	546.80	0	
3	1	8.000	550.3	1.00000	1.445	D-08	26.998	100	100	546.80	0	
3	1	10.000	348.8	1.00000	1.401	D-08	29.254	100	100	546.80	0	
3	1	12.000	156.4	1.00000	1.363	D-08	31.495	100	100	546.80	0	
3	1	13.116	50.0	0.99999	1.345	D-08	32.726	100	100	546.80	0	

Realtime Updates



Demo