GE MAAP Model for Level 2 PRA

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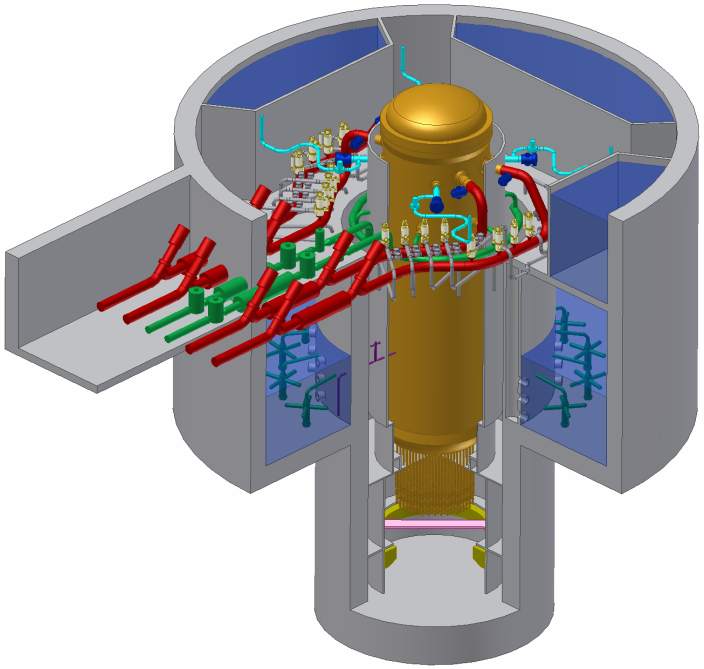
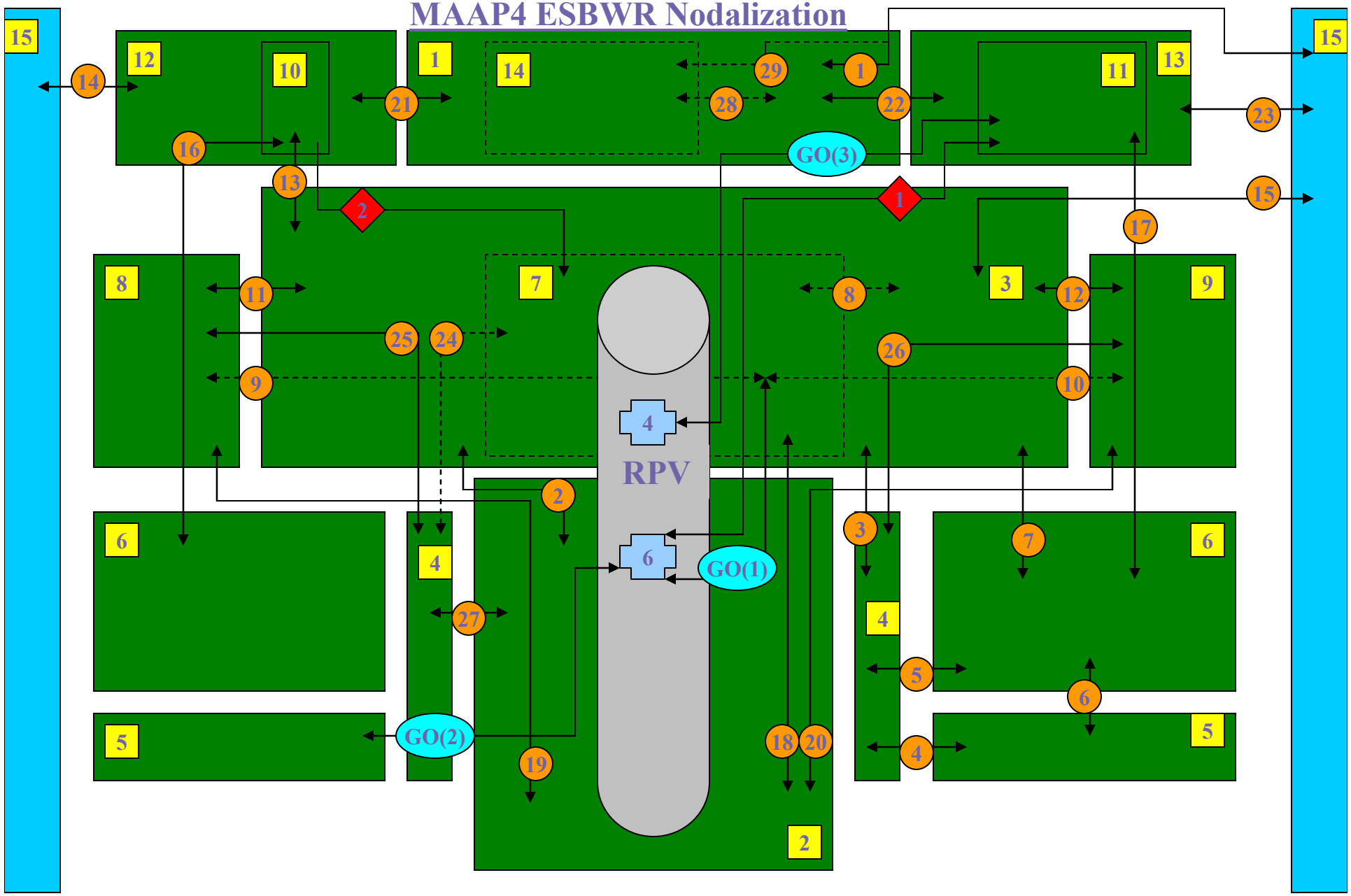


imagination at work

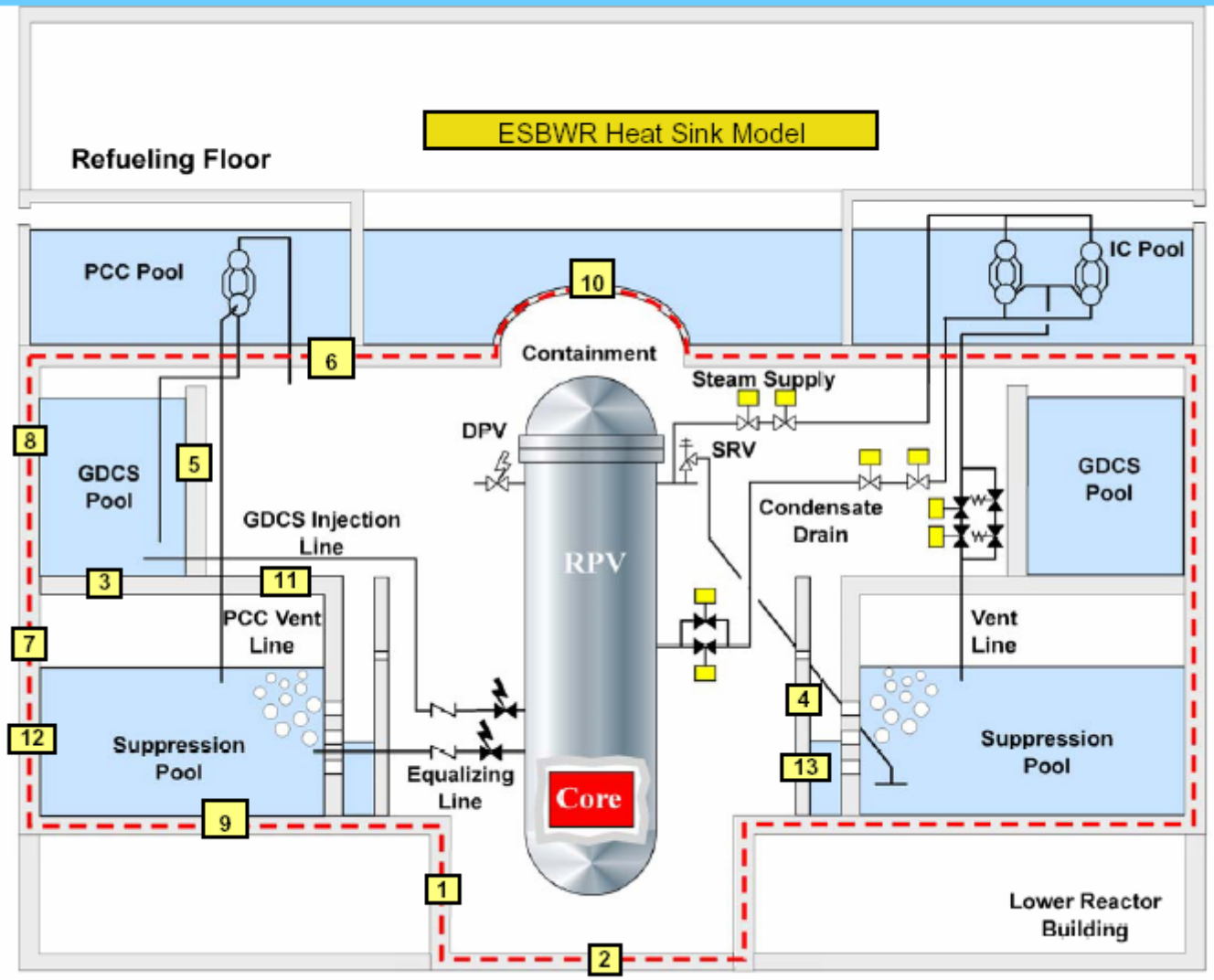
MAAP4 ESBWR Nodalization



Containment Node Definitions

1: Outer pools feeding PCCS pools and ICS pools
2: Lower and middle drywell
3: Upper drywell
4: Drywell downcomer to suppression pool
5: Lower suppression pool serving the lower and middle downcomer vents
6: Upper suppression pool serving the upper downcomer vent and wetwell freeboard
7: Gravity-driven cooling system (GDCS) pool 1
8: Gravity-driven cooling system (GDCS) pool 2
9: Gravity-driven cooling system (GDCS) pool 3
10: Passive containment cooling system (PCCS) heat exchangers
11: Isolation condenser system (ICS) heat exchangers
12: Passive containment cooling system (PCCS) pools
13: Isolation condenser system (ICS) pools
14: Isolated refueling water storage pool above drywell closure head
15: Environment

ESBWR Heat Sink Model



ESBWR MAAP Core Model

13 Axial Nodes

- 10 fuel, 3 other

5 Radial Nodes

End of Life, Equilibrium Core

Chimney Model

- Mass in top guide
- Volume in shroud head

Steady State Comparison

	Design	MAAP
Water in Vessel (kg)	3.71e+5	3.63e+5
Steam Flow (kg/hr)	8.76e+6	8.79e+6
Feed Flow (kg/hr)	8.74e+6	8.79e+6
Pressure (MPa)	7.17	7.19

Good Agreement for These Parameters

Accident Scenario T_DP_nIN

Short or long-term coolant injection to RPV not available

ADS is assumed to be actuated if downcomer water level drops below 11 m.

Heat removal by ICs not credited.

PCC & PCC/IC pool makeup available

GDCS deluge system is also available for injection onto the lower drywell floor.

Key Timing / Values

Depressurization		
	SRV 0.0086 hr	DPV 0.036 hr
Core Uncovered		0.34 hr
Core Exceeds 2500 F		
	Hot Node 0.95 hr	Average 1.82 hr
Start of Core Relocation		1.84 hr
RPV Failure		6.3 hr
Drywell Pressure		5.7 MPa
Decay Heat @ 24 hr		2.48e+7 W
PCCS Heat Removal @ 24 hr		2.15e+7 W
CsI Fraction Released		7.9e-5