

PLCSMF accident analysis using the SPACE code

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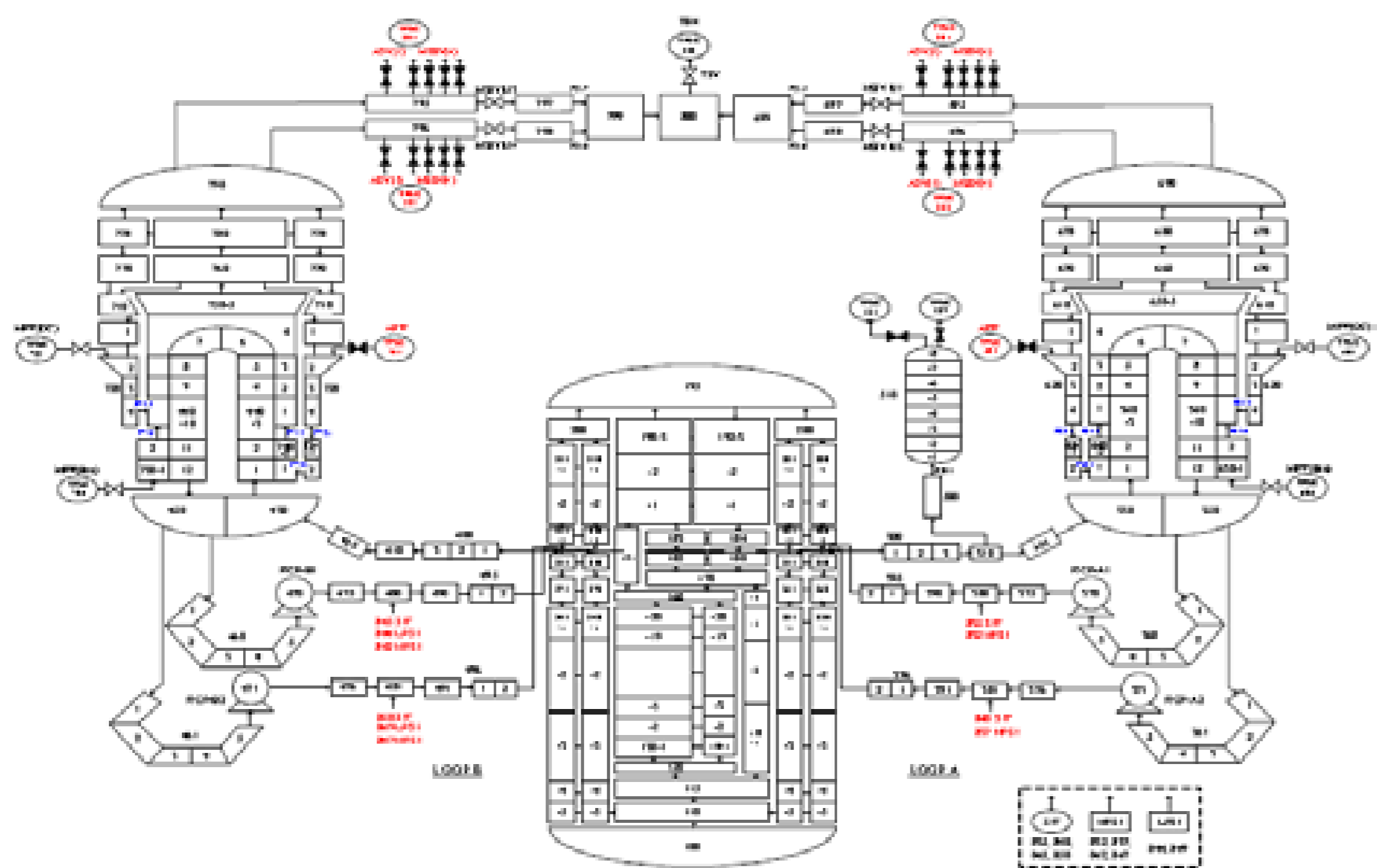
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Introduction

- The PLCSMF(Pressurizer Level Control System MalFunction) accident is the most serious event in terms of pressure of the reactor coolant system and performance of the fuel cladding among all events that can increase inventory of the reactor coolant system
- This study contain the results of the PLCSMF accident calculation using the SPACE code for Hanul nuclear power plant unit 5 and 6

Analysis method

- The computer code used the SPACE 3.22
- SPACE nodalization



SPACE Steady State Analysis Results

	FSAR	SPACE
Core power (MW _e)	2,871.3	2,871.3
Coolant Temp. (K)	565.37	566.9
Coolant Mass Flow (kg/s)	14,643.16	14,709.12
PZR pressure (MPa)	14.68	14.68
PZR volume (m ³)	29.62	29.64

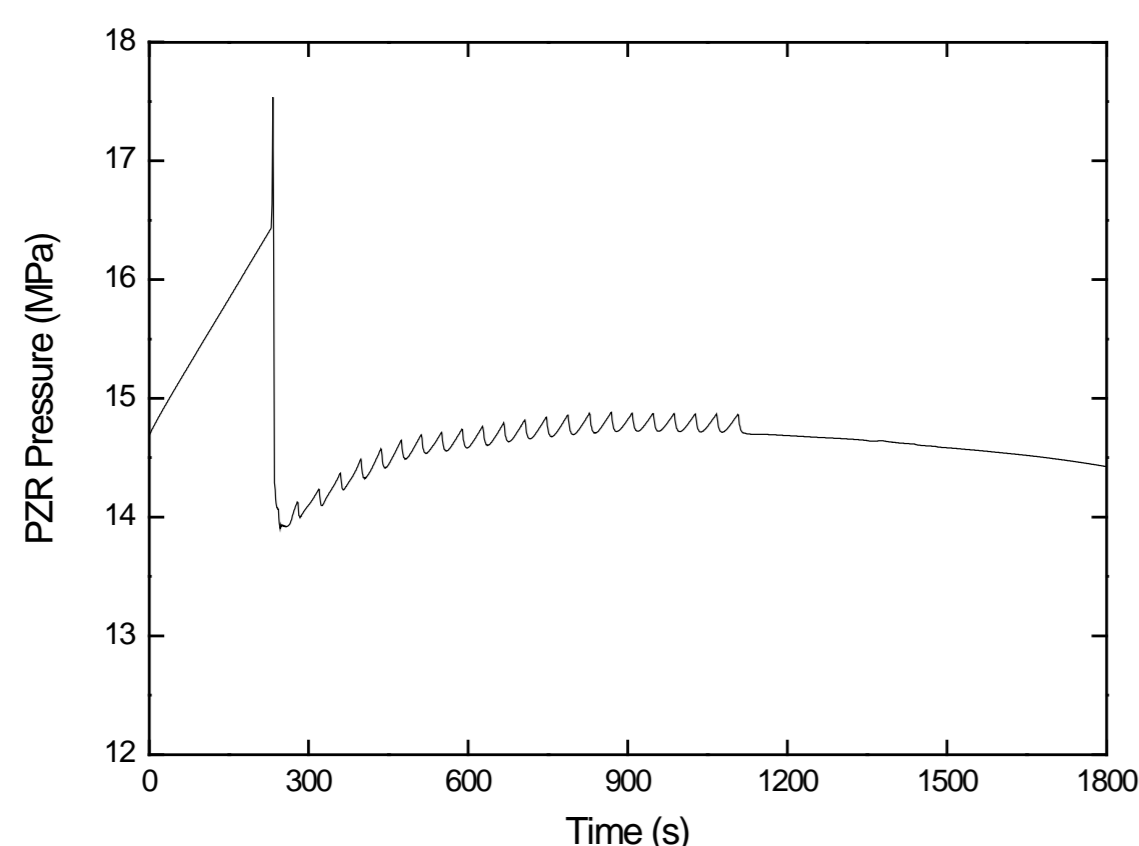
Sequence of event

Time (sec)	Event	Set point
0	CFCV max. open	
228.01	Rx. Trip signal by PZR high pressure	16.42 MPa
229.01	Rx. Trip	
229.11	Turbine trip	
233.02	PSV open	17.51 MPa
233.03	Max. pressure of the RCS	17.54 MPa
236.02	PSV close	14.29 MPa
1104.55	SG level reaches to the AFAS	19.9% WR
1,151.0	Aux. feed start	
1,800.0	Operation cooling	

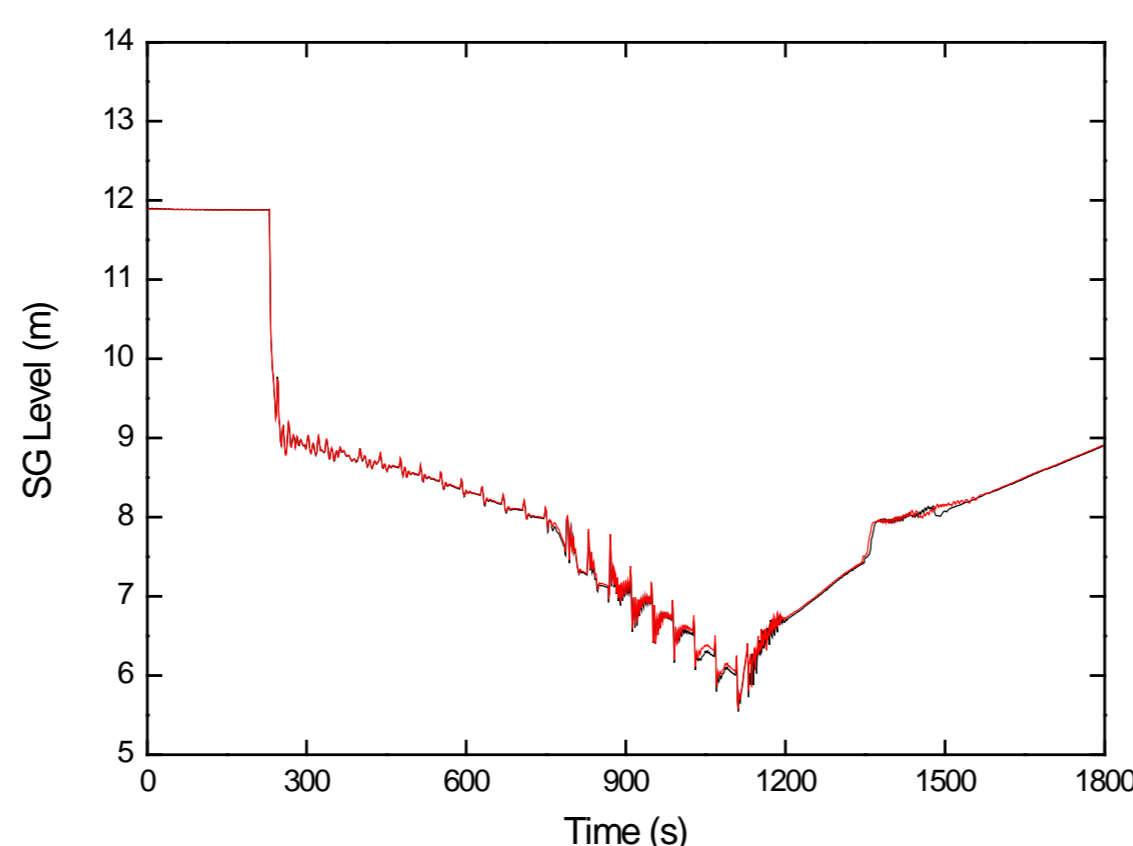
- The PLCSMF event increase the inventory of the reactor coolant system by full opening the charge flow control valve while minimizing the letdown flow rate

Analysis results

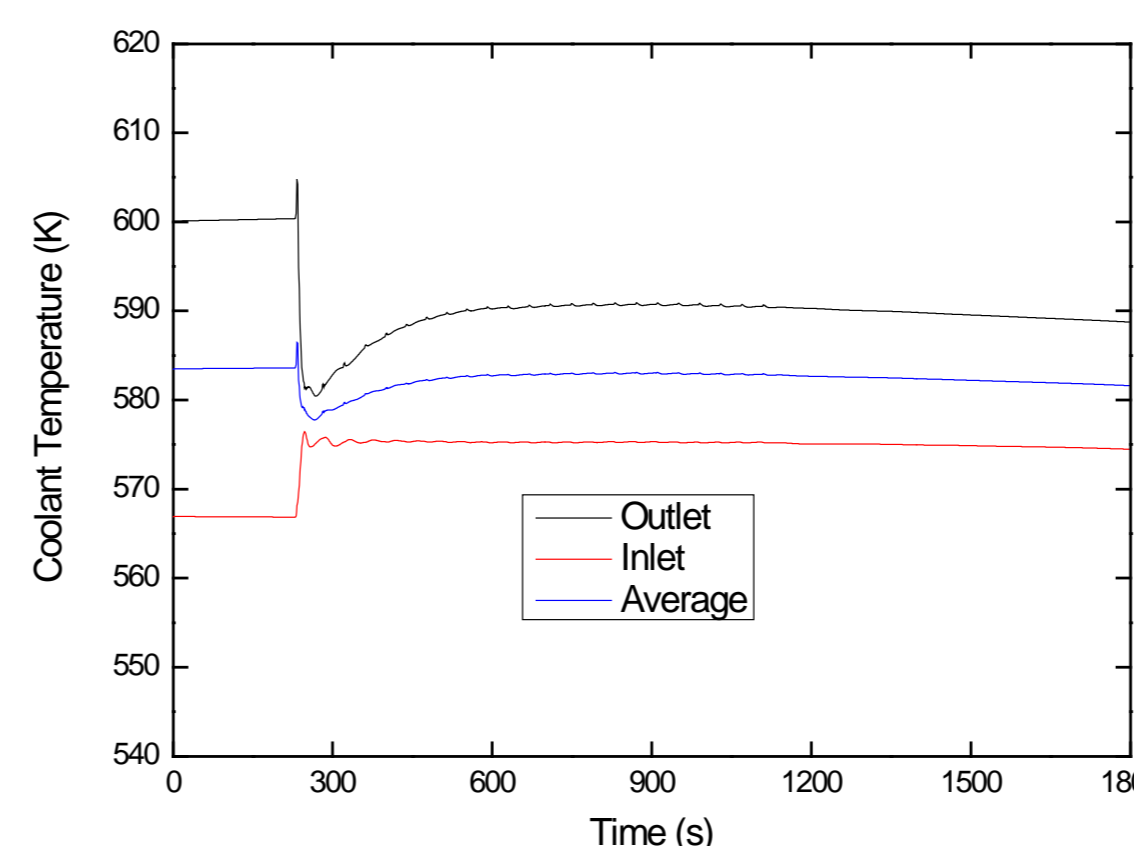
Evaluation Results



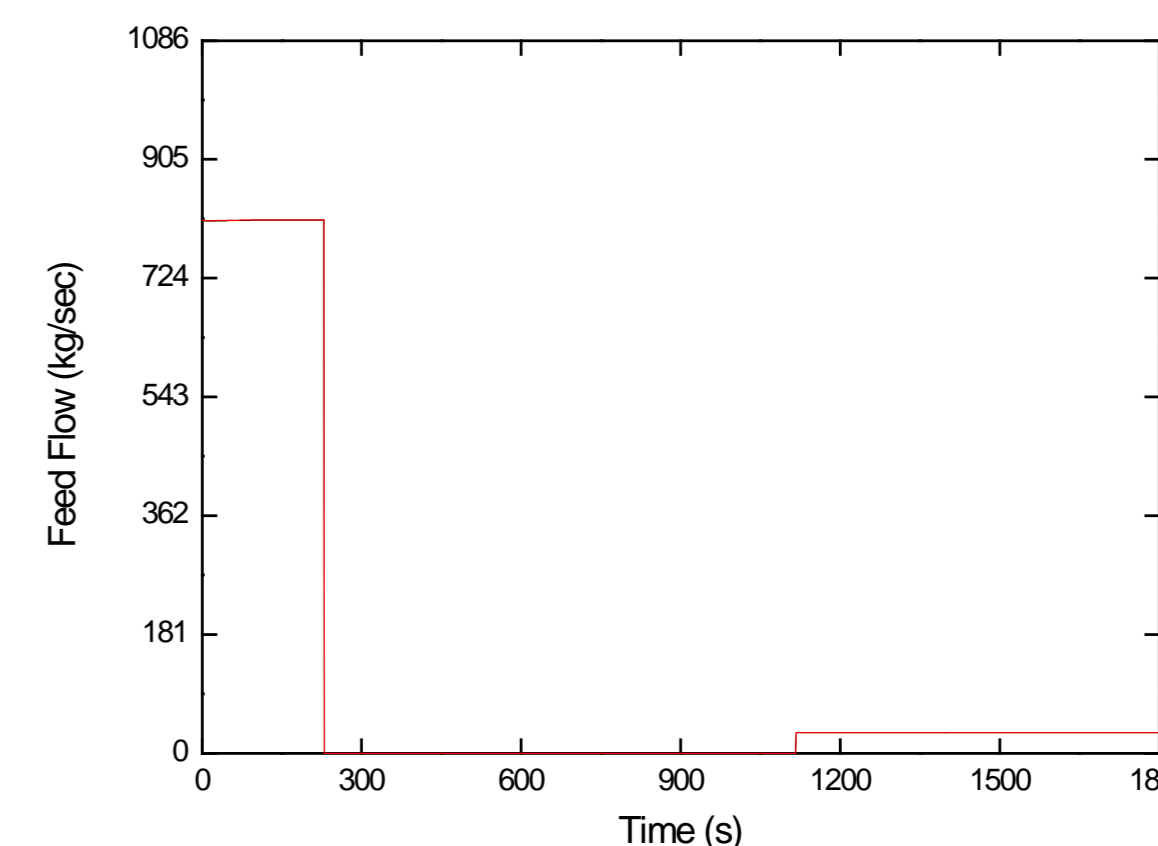
Pressure change of the pressurizer



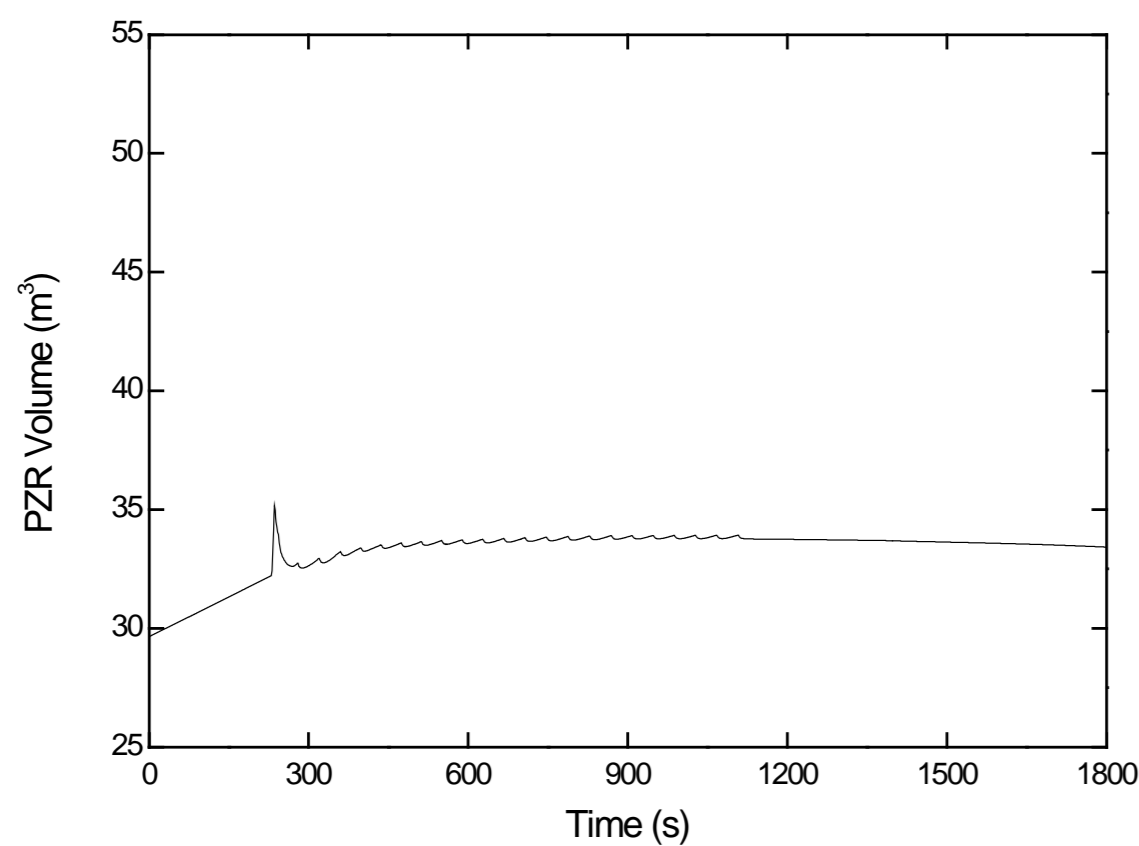
Level change of the steam generator



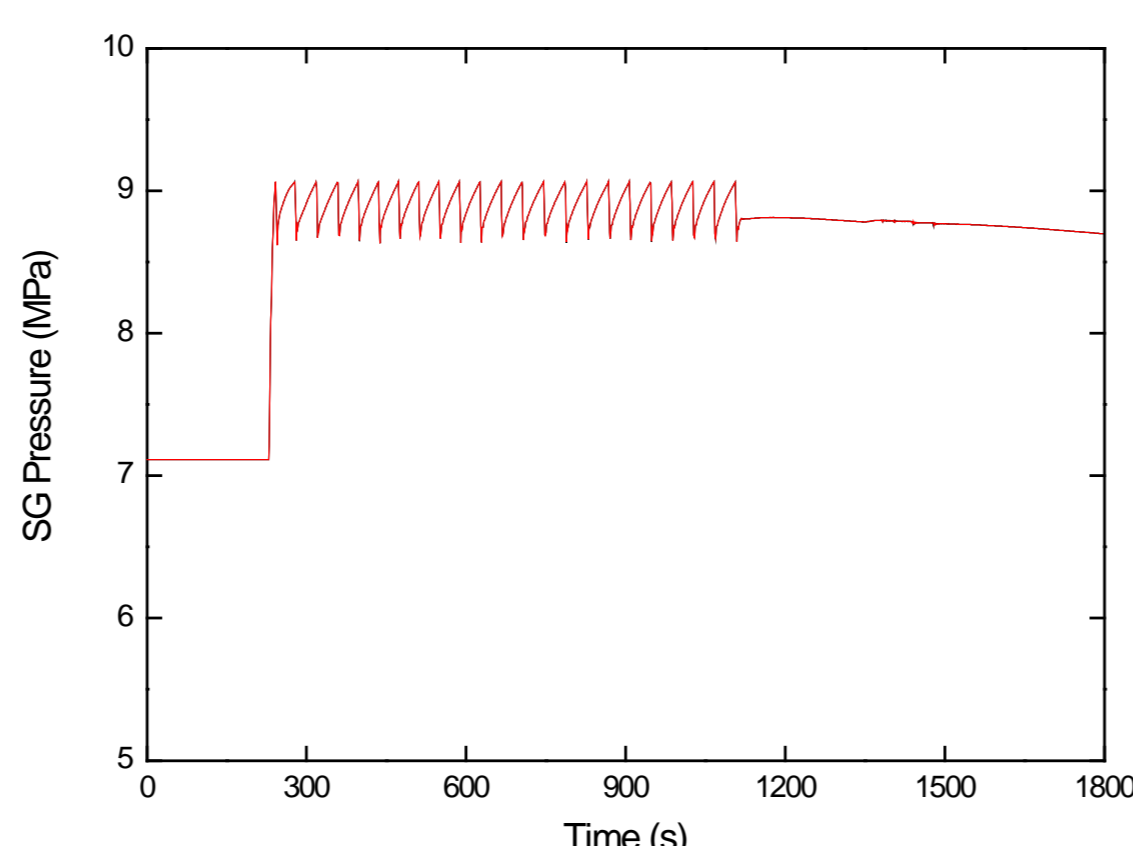
Temperature change of the coolant



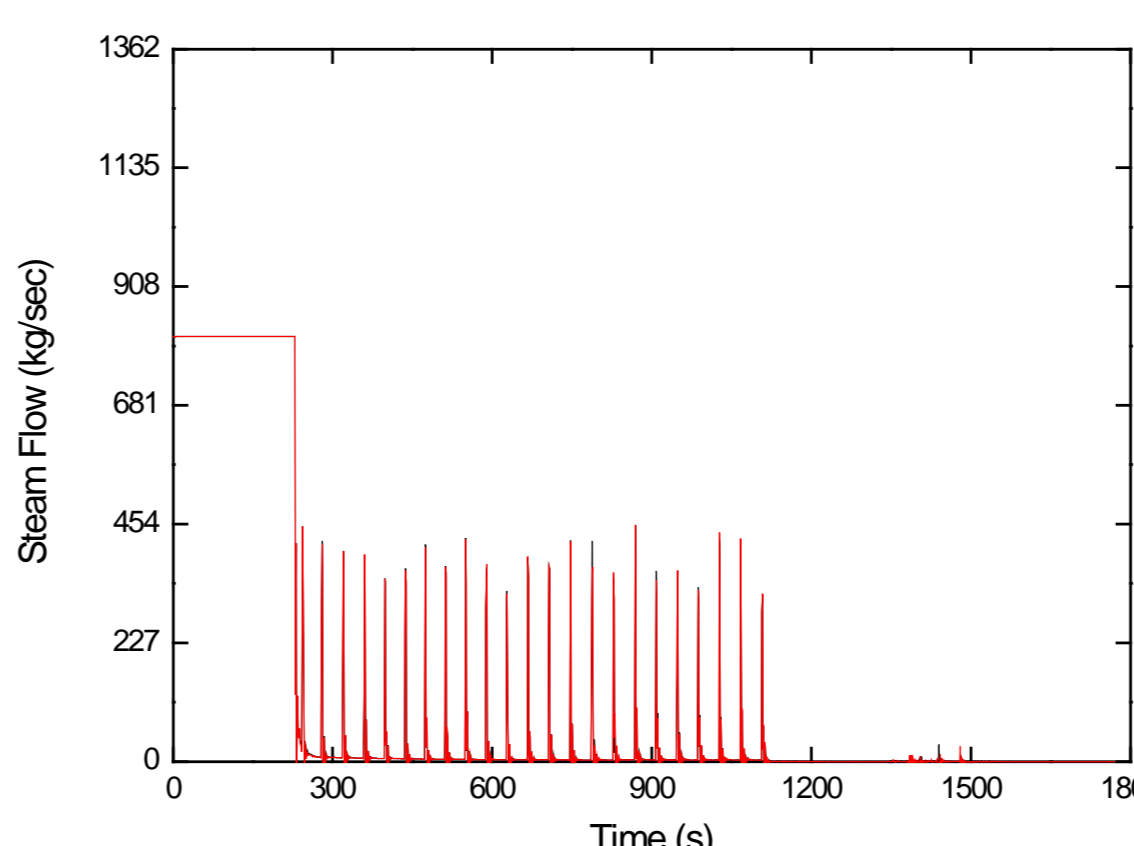
Feed water flow change



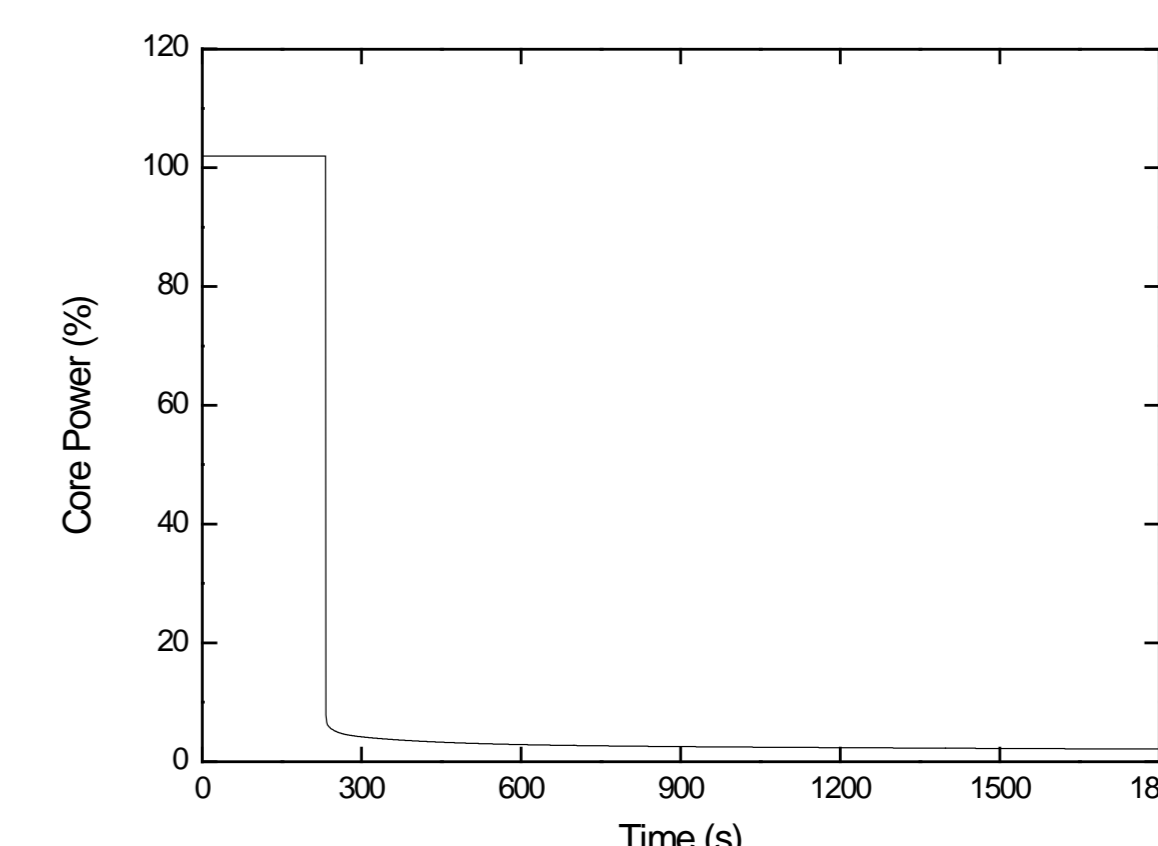
Volume change of the pressurizer



Pressure change of the steam generator



Steam flow change



Reactor power change

- After simulating the PLCSMF event using the SPACE code, the peak pressure of the reactor coolant system reaches 15.54 MPa, which is less than to 18.96 MPa, 110% of the design pressure
- In addition, during this event, the peak pressure of the steam generator reaches 9.07 MPa but is below 9.63 MPa, which is 110% of the design pressure
- This event results in an increase in the pressure of the reactor coolant system due to an increase in the inventory of coolant in the reactor coolant system, which increases the DNBR
- Therefore, the acceptance criteria for fuel performance are met