

Transient Analysis of Loss of Coolant Accident in the KJRR



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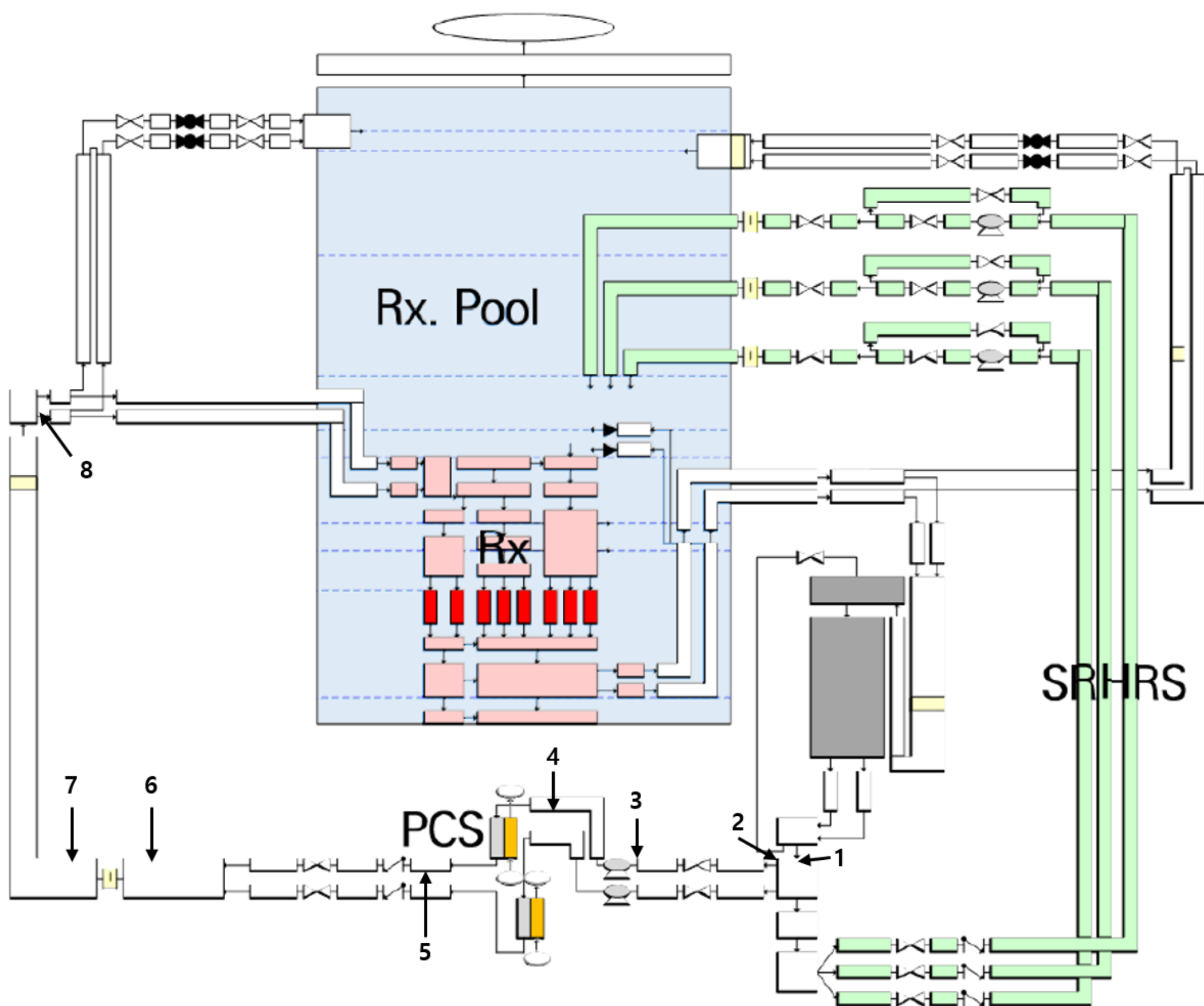
1. Introduction

The Kijang Research Reactor(KJRR) is currently under construction and is intended as a multipurpose research reactor. This study analyzed the loss-of-coolant accident, one of the representative accidents that could occur in the KJRR.

2. Calculation model and method

Kijang Research Reactor

Parameter	Data
Power	15 MW
Type	Open pool type
Fuel Type	U-Mo plate type fuel
Number of Fuel Assembly	22 EA
Number of Fuel Plate	21 EA
Heated Length	600 mm
Channel width	66.6 mm
Channel Gap	2.35 mm
PCS Flow Rate	550~600 kg/s
# of Train of PCS	2 (1 spare)
SRHRS Flow Rate	50~60kg/s
# of Train of SRHRS	3

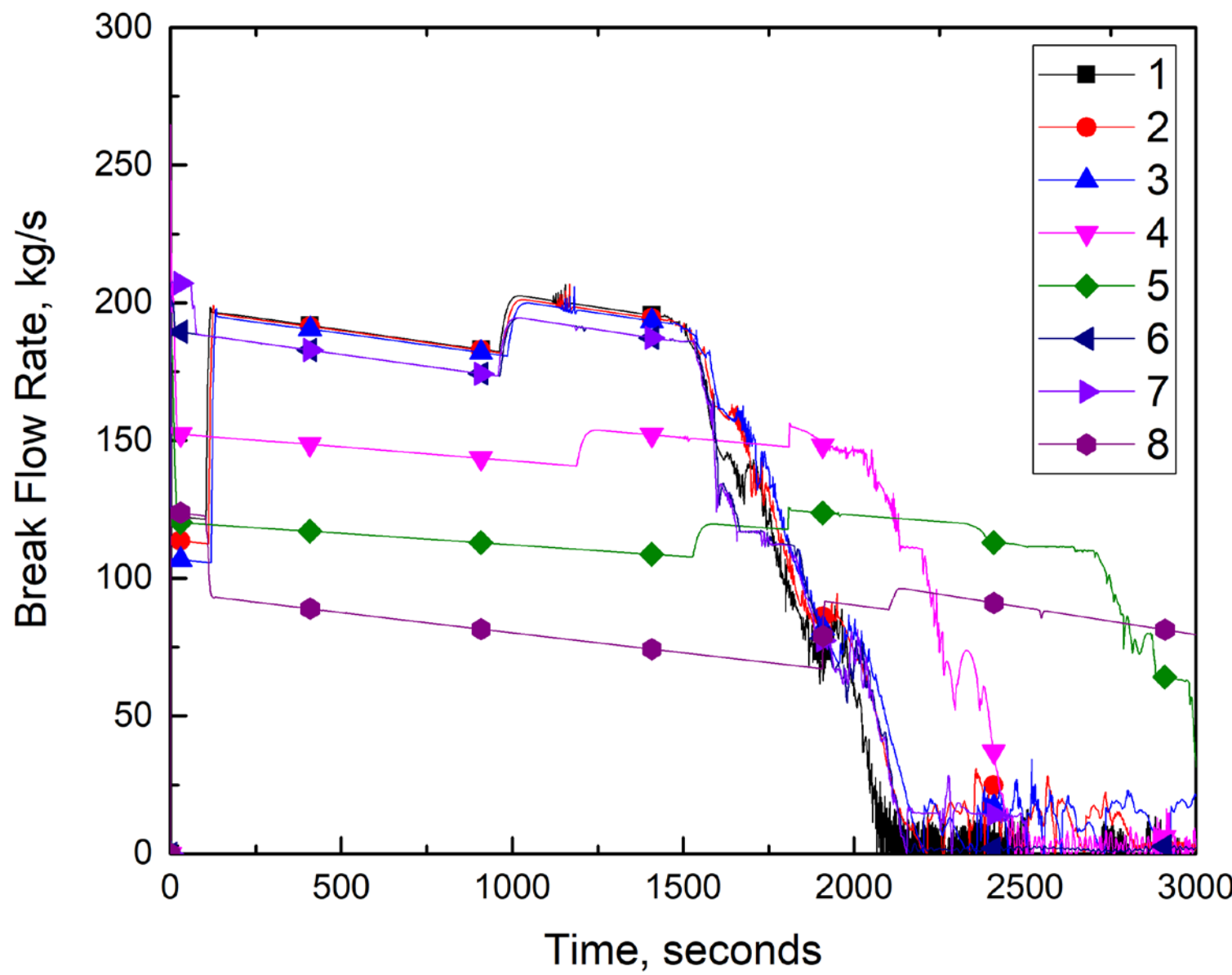


[Modeling of KJRR and LOCA position]

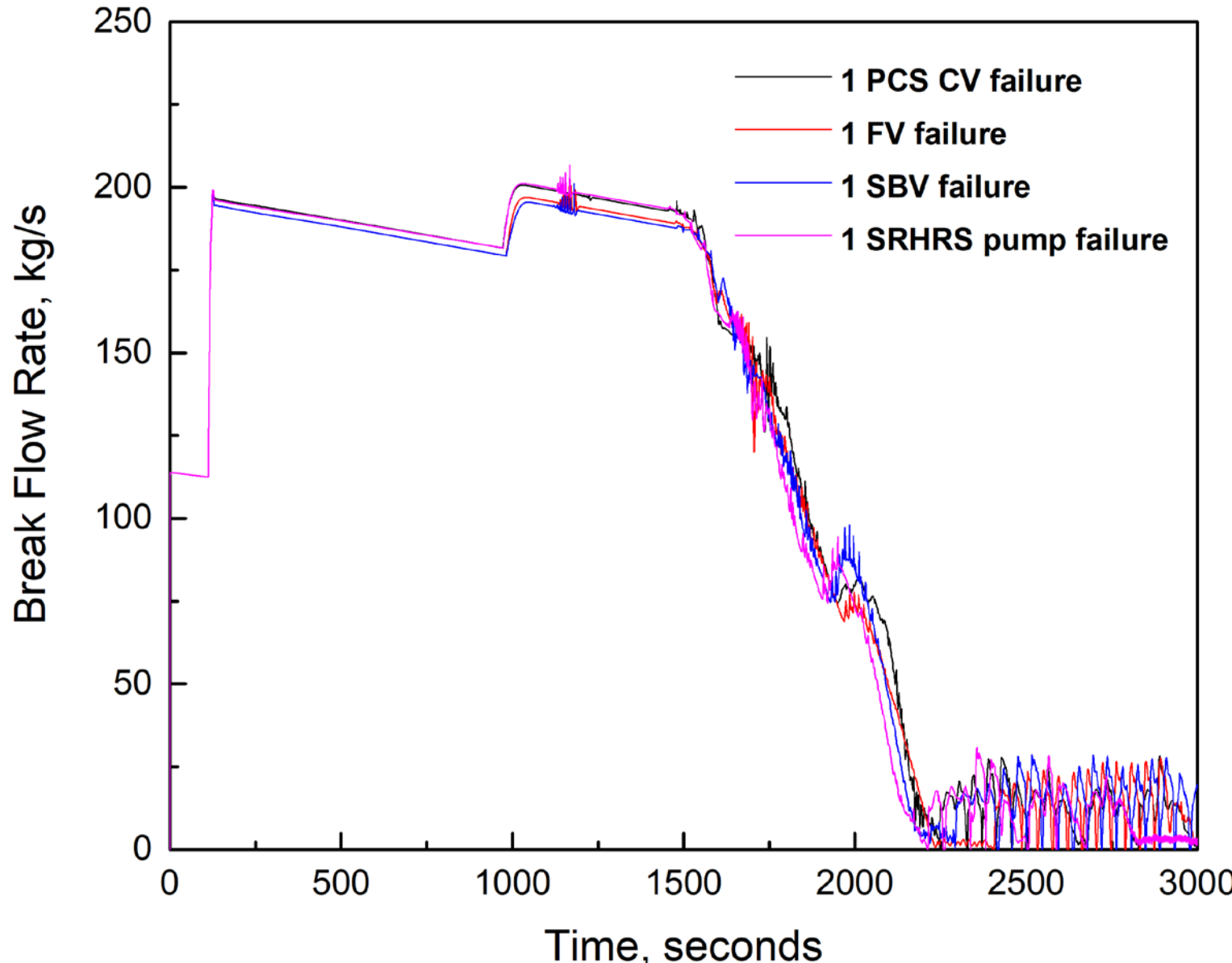
- Modeling of KJRR
 - Using RELAP5/Mod3.3
 - Pool, Reactor, PCS, SRHRS, Siphon Break line, Flap Valve line
 - Non-safety class systems are not included
 - Using conservative value of initial conditions
 - Core : Hot Channel + Average Channel

3. Results

- Break Point Spectrum
 - 8 points are selected
 - Largest breaking flow rate is occurred at section 1,2,3
 - Section 1,2,3 are lowest point of the PCS
- Single Failure Analysis
 - Inlet SBV, Outlet SBV, Check valve, SRHRS pump, Flap valve
 - Not a significant difference between the results

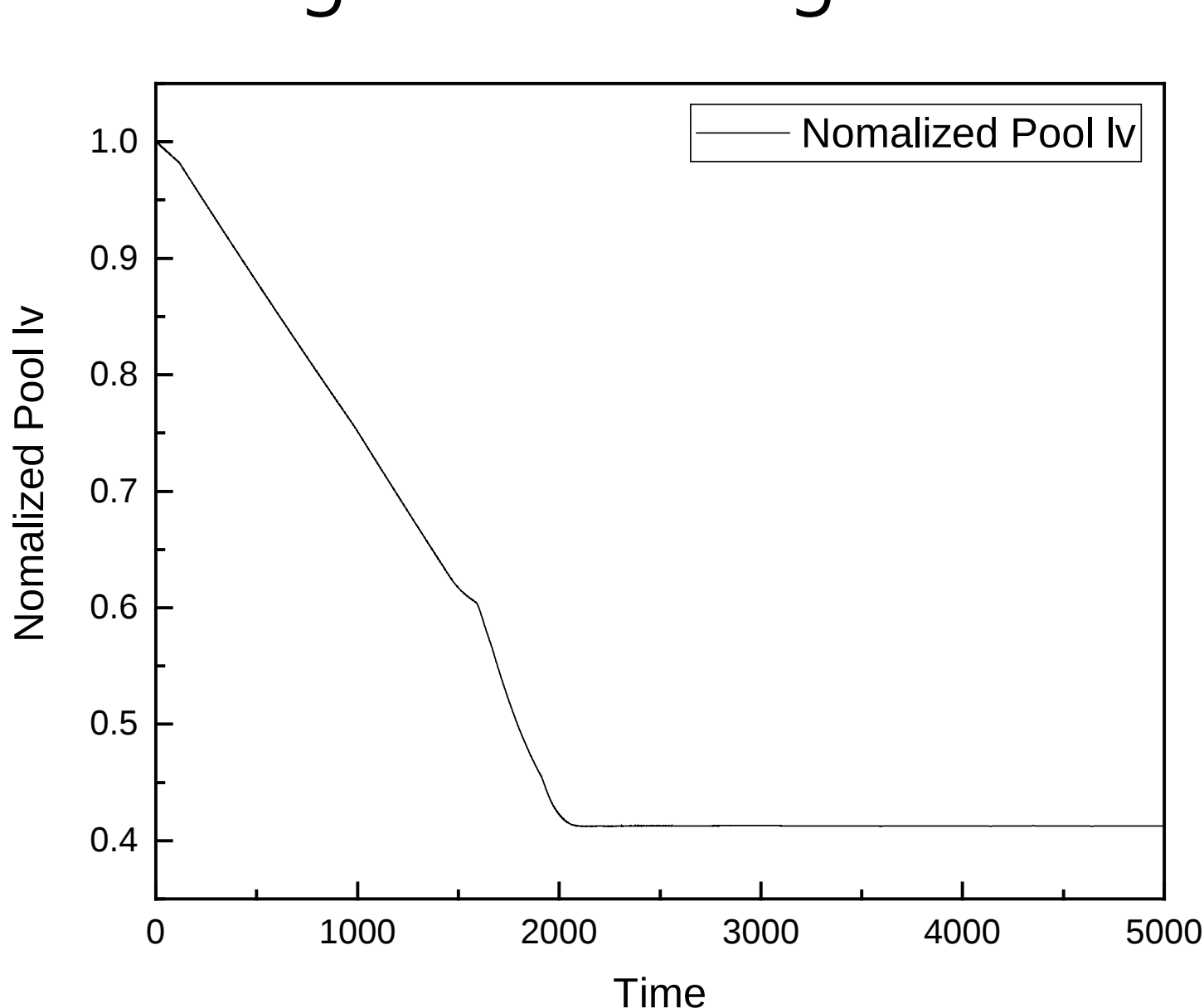


[Break Point Spectrum Results]

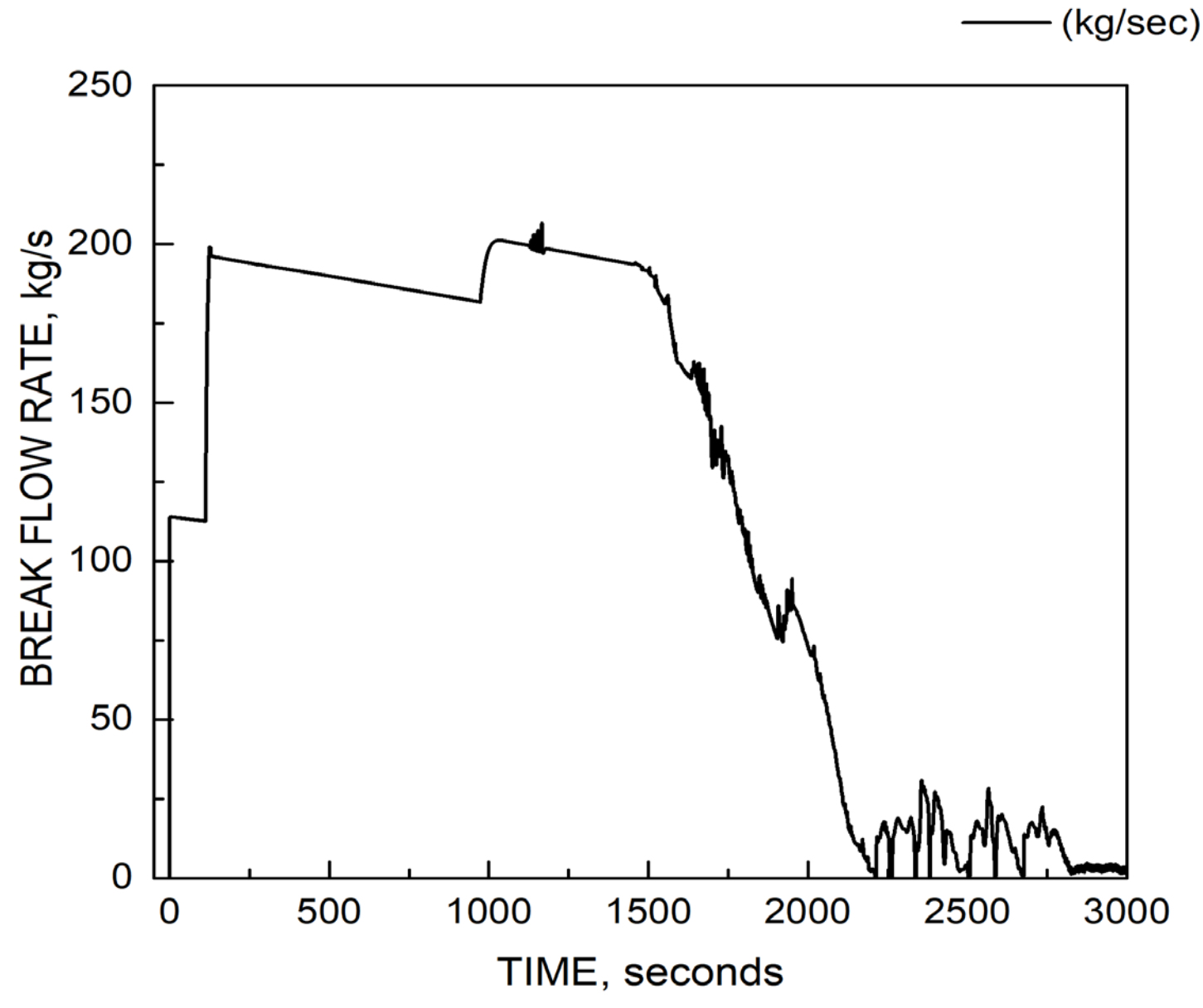


[Single Failure Analysis Results]

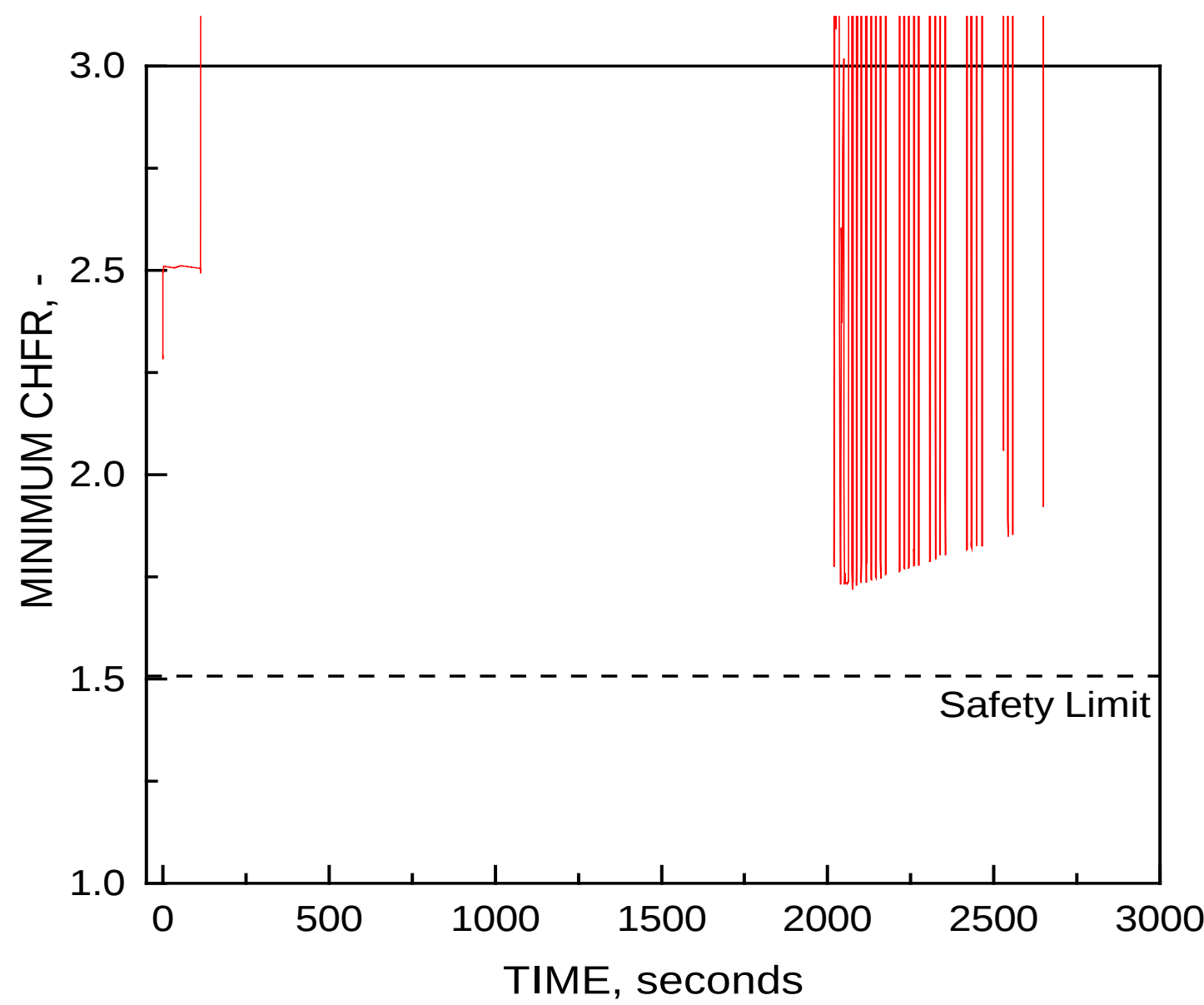
- Modeling of KJRR
 - When a break occurs, the sequence of events is as follows:
 - PCS piping break → Pool level decrease
 - Reactor & PCS Pump shutdown by RPS trip signal
 - SRHRS pump start → Forced convection maintain
 - Siphon break valve open
 - Pool level stabilized
 - Flap valve automatically open → Natural convection
 - Long term cooling



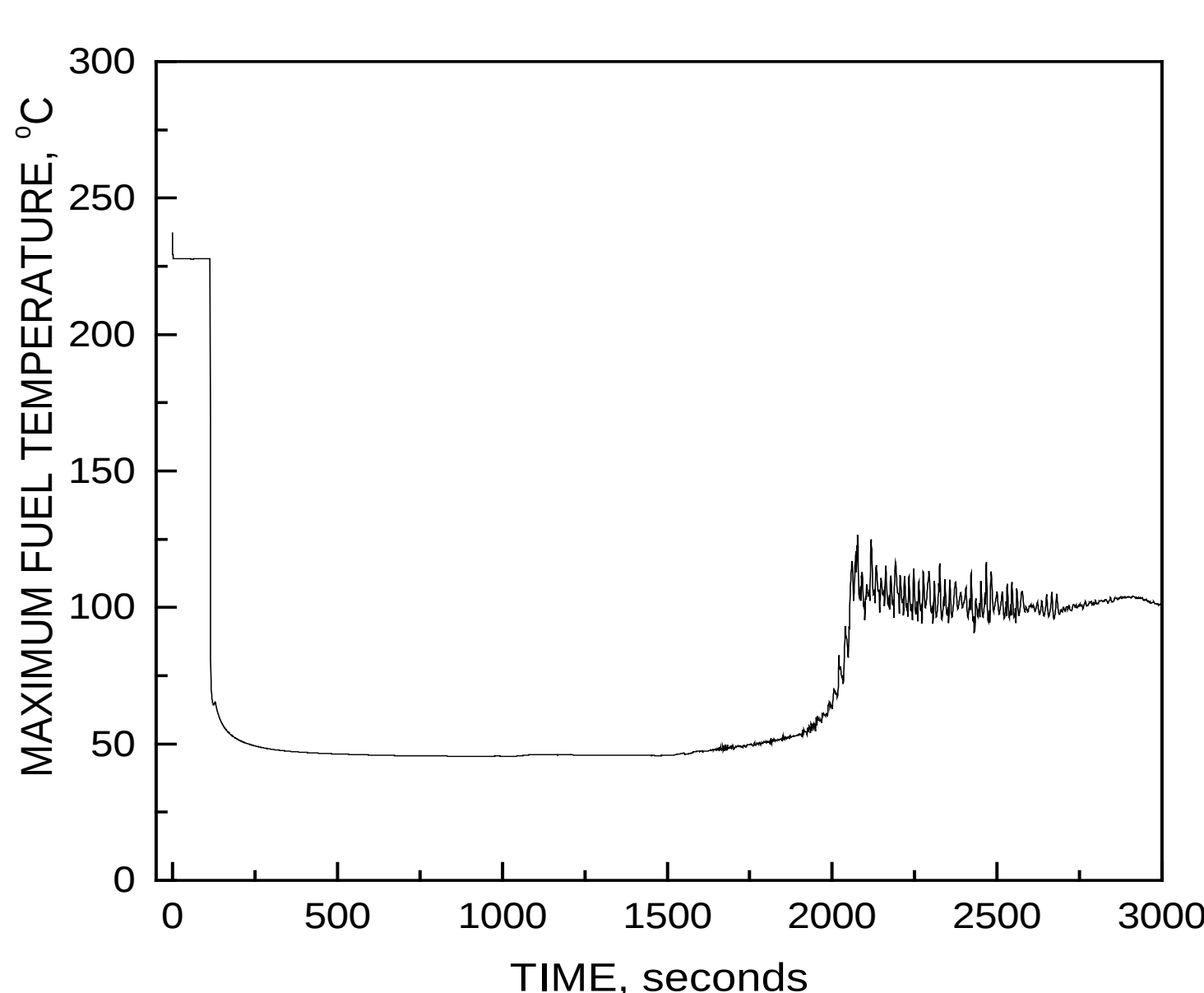
[Normalized Pool level Results]



[Break Flow Rate]



[Critical Heat Flux Ratio]



[Fuel Centerline Temperature]

- Reactor shutdown : CHFR increase & Fuel Temp decrease
- SRHRS shutdown : Forced → Natural convection
- Minimum CHFR is occurred when the system switches from forced to natural convection because of change direction of coolant in channel.

4. Conclusion

A transient analysis using the RELAP5/MOD3.3 program was performed to analyze a LOCA accident in the KJRR. Based on the accident analysis results, the safety of the fuel temperature and the reactor pressure vessel was confirmed from the CHFR perspective.