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Sensitivity Analysis for the Effect of SG Inventory on PAFS Performance

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1. Introduction

- After Fukushima accident, there is a lot of interest and demand for the passive system.
- PAFS (Passive Auxiliary Feedwater System) replaces AWFS.
- As part of analyzing PAFS performance, it is necessary to analyze the effect of SG inventory.
- In this study, PAFS performance was investigated according to SG inventory reduction using PASCAL input model and the SPACE 3.22

2. SPACE Modeling of PASCAL

■ Modeling Features

▶ SG inventory control

- TFBC-101 was opened until the SG water level decreased to the set-point.

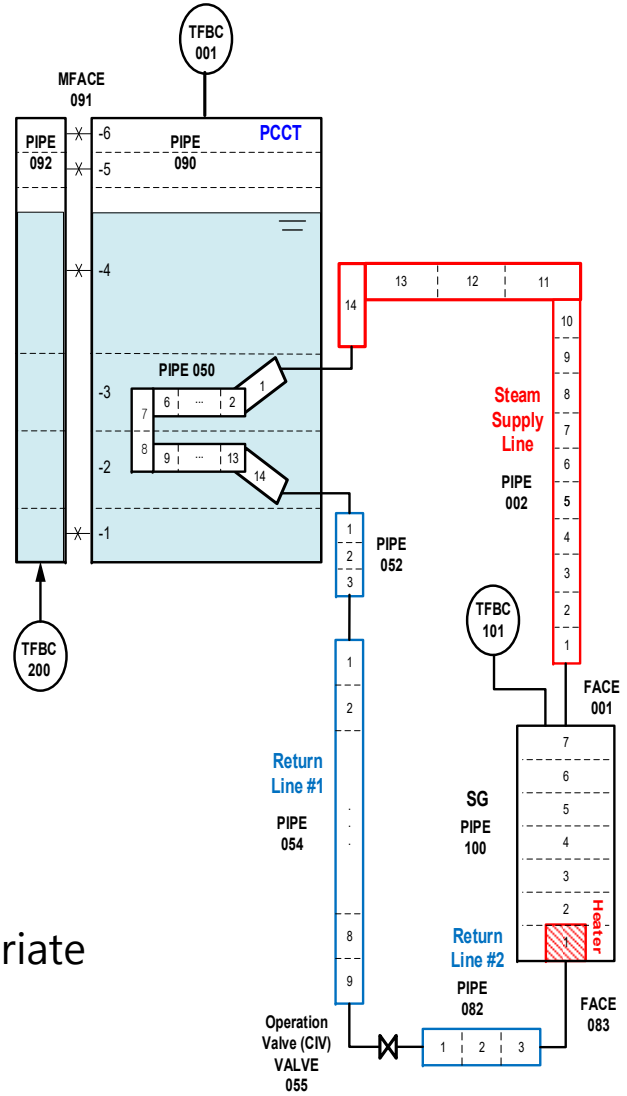
▶ Heater height is low

- Heater was connected only CELL-1 of SG(C100)
- Heater can be submerged in water even if the SG inventory decreases

▶ PCCT water level was maintained at 9.3 m

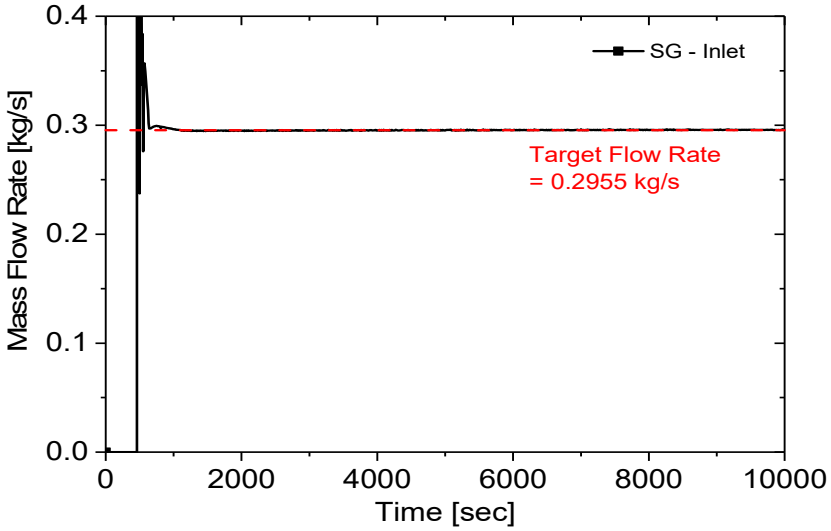
▶ Dialing factor applied on heat transfer model

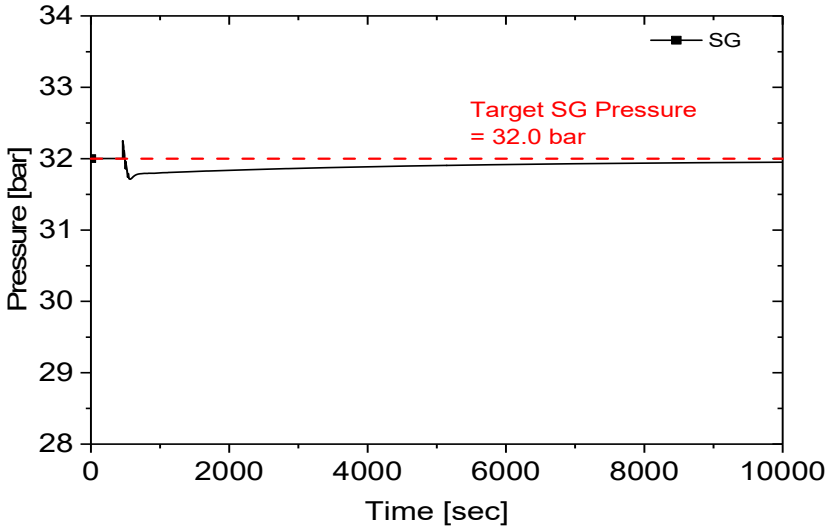
- To match the simulation results(SS-540-P1), appropriate dialing factor was applied on PCHX(PIPE-050)

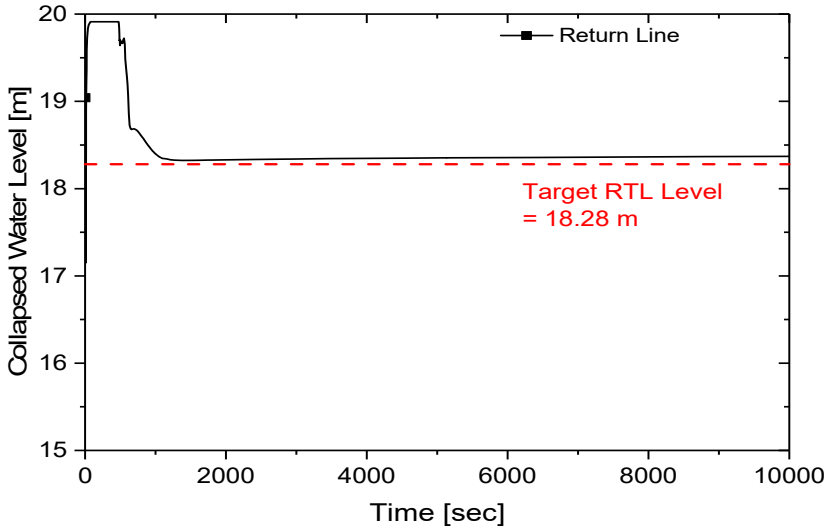


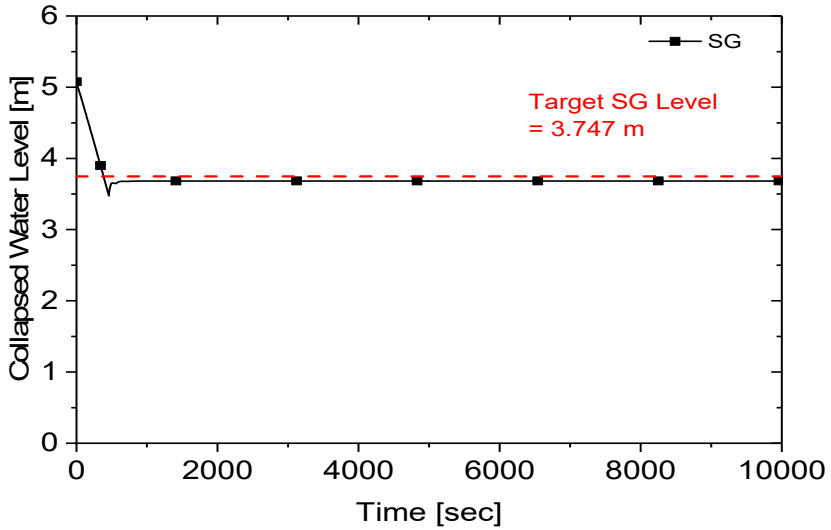
SPACE Nodalization for PASCAL

3. Simulation Results of Reference Input Model







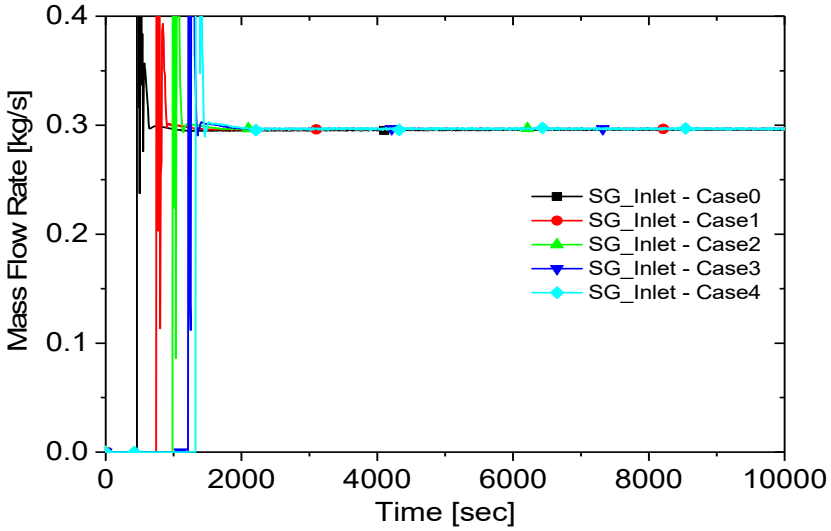


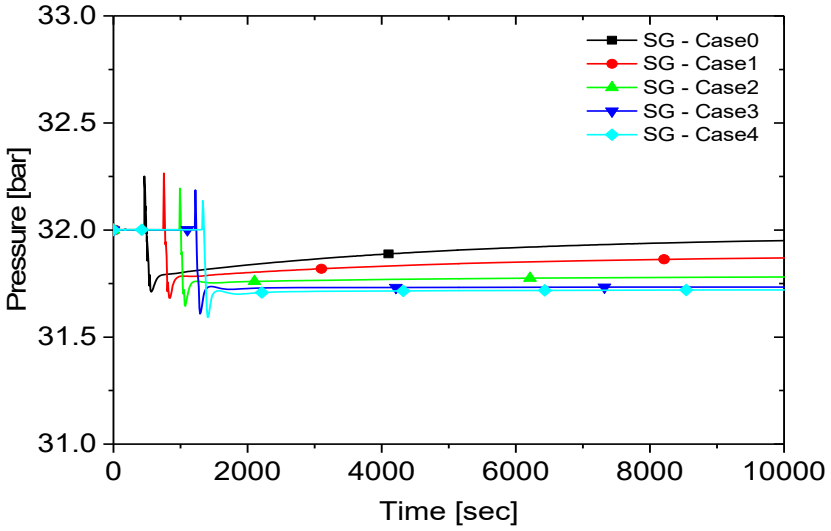
4. Sensitivity Analysis for SG Water Level(1/2)

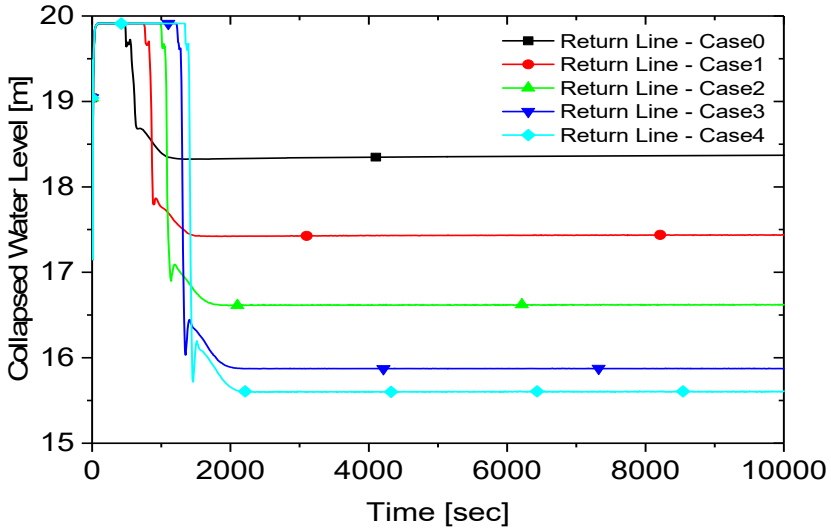
- **SG inventory was controlled by adjusting the PAFS operation set-point**
- **TFBC-101(SG pressure boundary) is opened until PAFS operates**
- **Case 0 is the test condition for the reference input model**

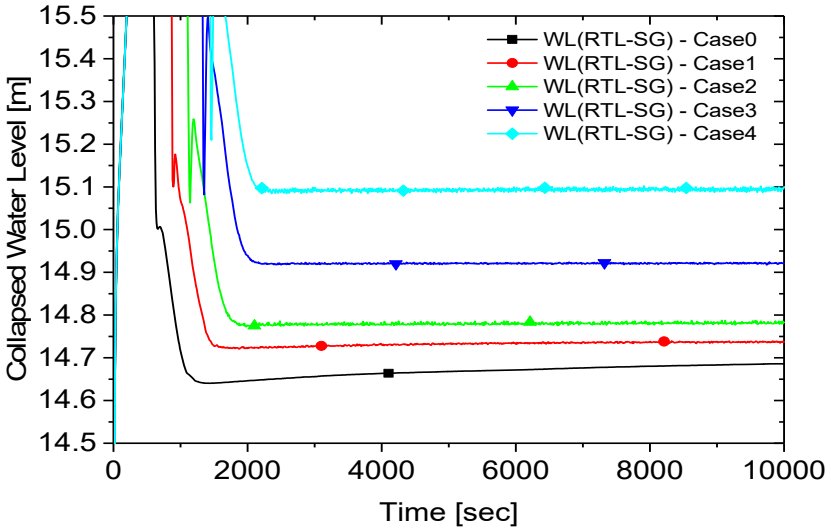
Case #	SG Initial Level [m]	PAFS operation set-point
0	5.076	SG level < 3.747 m
1		SG level < 2.703 m
2		SG level < 1.836 m
3		SG level < 0.950 m
4		SG level < 0.508 m

4. Sensitivity Analysis for SG Water Level(2/2)









5. Conclusion

- **To investigate the effect of the SG inventory on PAFS performance, sensitivity test was performed**

- **Key findings are follows:**
  - **PASCAL flow rates hardly changes even if SG inventory decreases**
  - **As SG inventory decreases, SG pressure and return line water level decreases**
  - **As SG inventory decreases, the water level difference between return line & SG increases**
  - **However, the effect of the SG inventory for the PAFS performance is small**