

WATER TEMPERATURE DISTRIBUTION IN SPENT FUEL STORAGE POOL OF NUCLEAR RESEARCH REACTOR IN INDONESIA

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INTRODUCTION



Lesson learn from SFSP accident: caused by station blackout (SBO), water temperature increase and the rate of the water evaporation increase, resulted to severe accident in FD unit 4.



Indonesian SFSP has maximum capacity of 1458 spent fuel and total heat flux of 4000 Q/cm². The SFSP level of surface water minimal is 3.6 m from the surface of spent fuel.



No research found to measure experimentally the temperature distribution in SFSP RSG GA Siwabessy.

The results will be used as knowledge to determine the water temperature in SFSP during SBO condition.

METHODOLOGY

Temperature sensor used type K thermocouples with error $\pm 0,36\%$.

The measurement point is focused on 2 spent fuel racks and temperature sensor are located on 7 place:

- above the water surface (1),
- at the water surface (2),
- at level -3 m from the water surface (3),
- above the peak of spent fuel (4),
- at the middle of spent fuel (5),
- at water empty space (7),
- in the SFSP building (8).

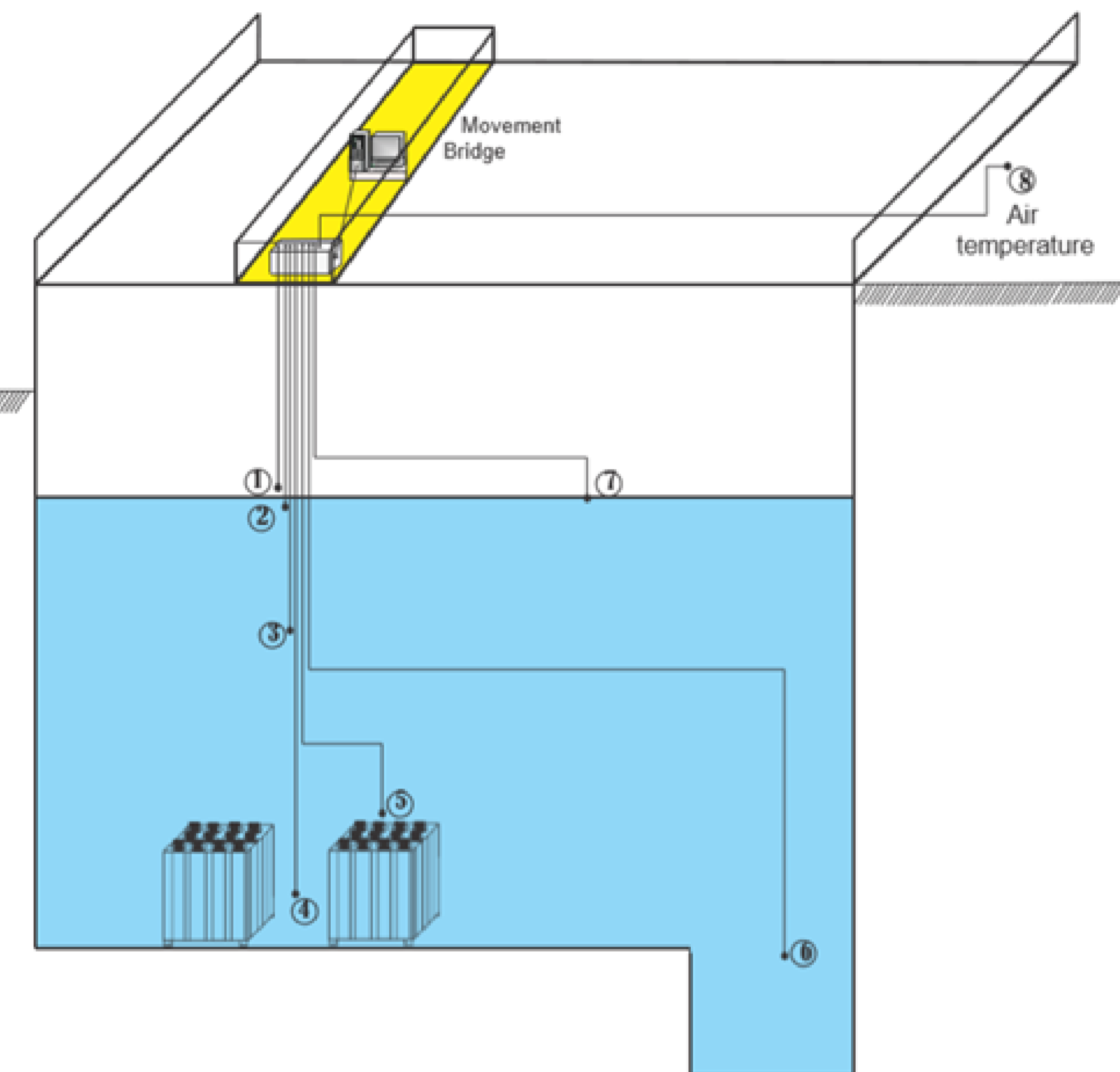


FIG. 1. Experiment setup of SFSP temperature measurement

RESULT AND DISCUSSION

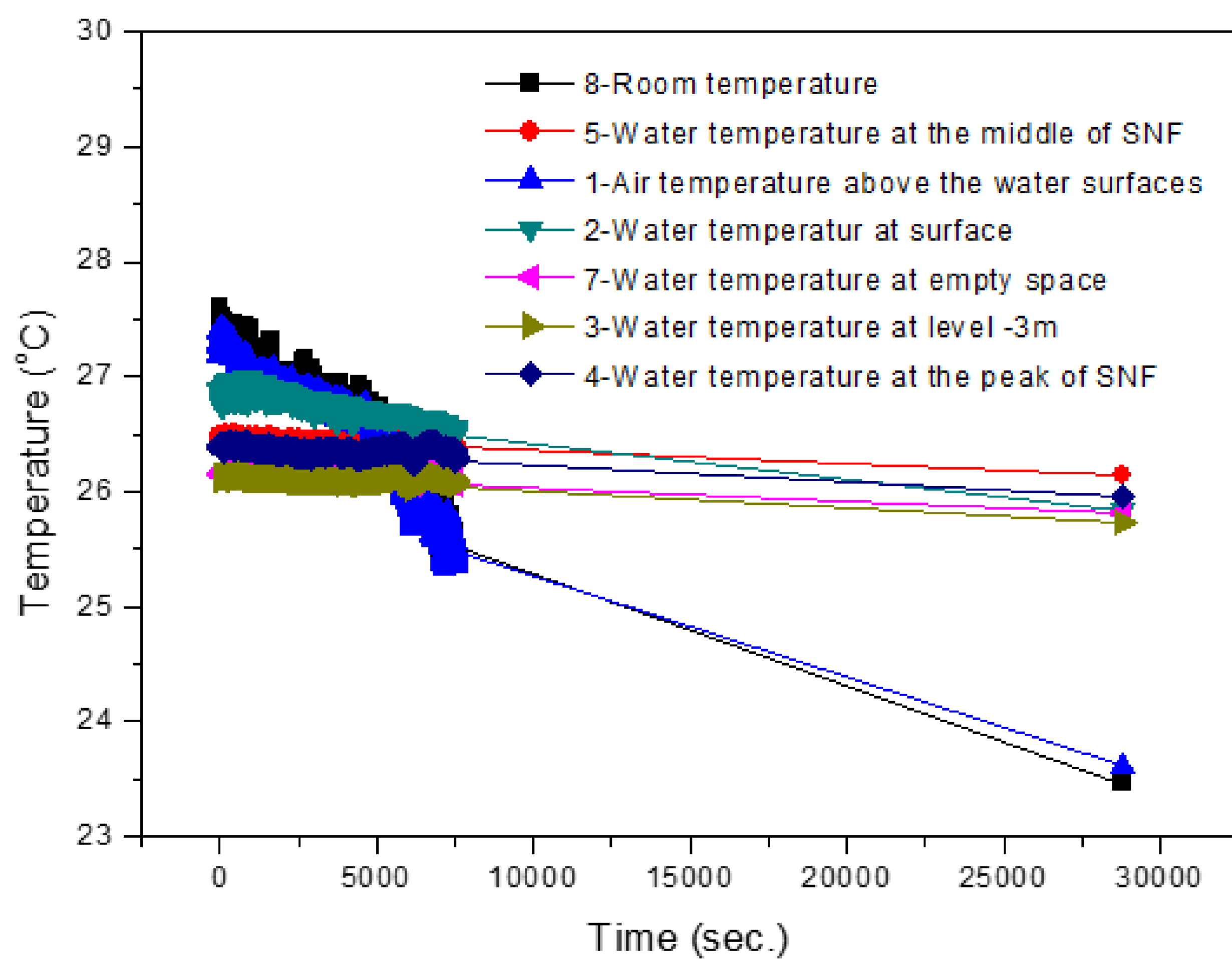


FIG.2. Water temperature distribution in SFSP during operation of VAC

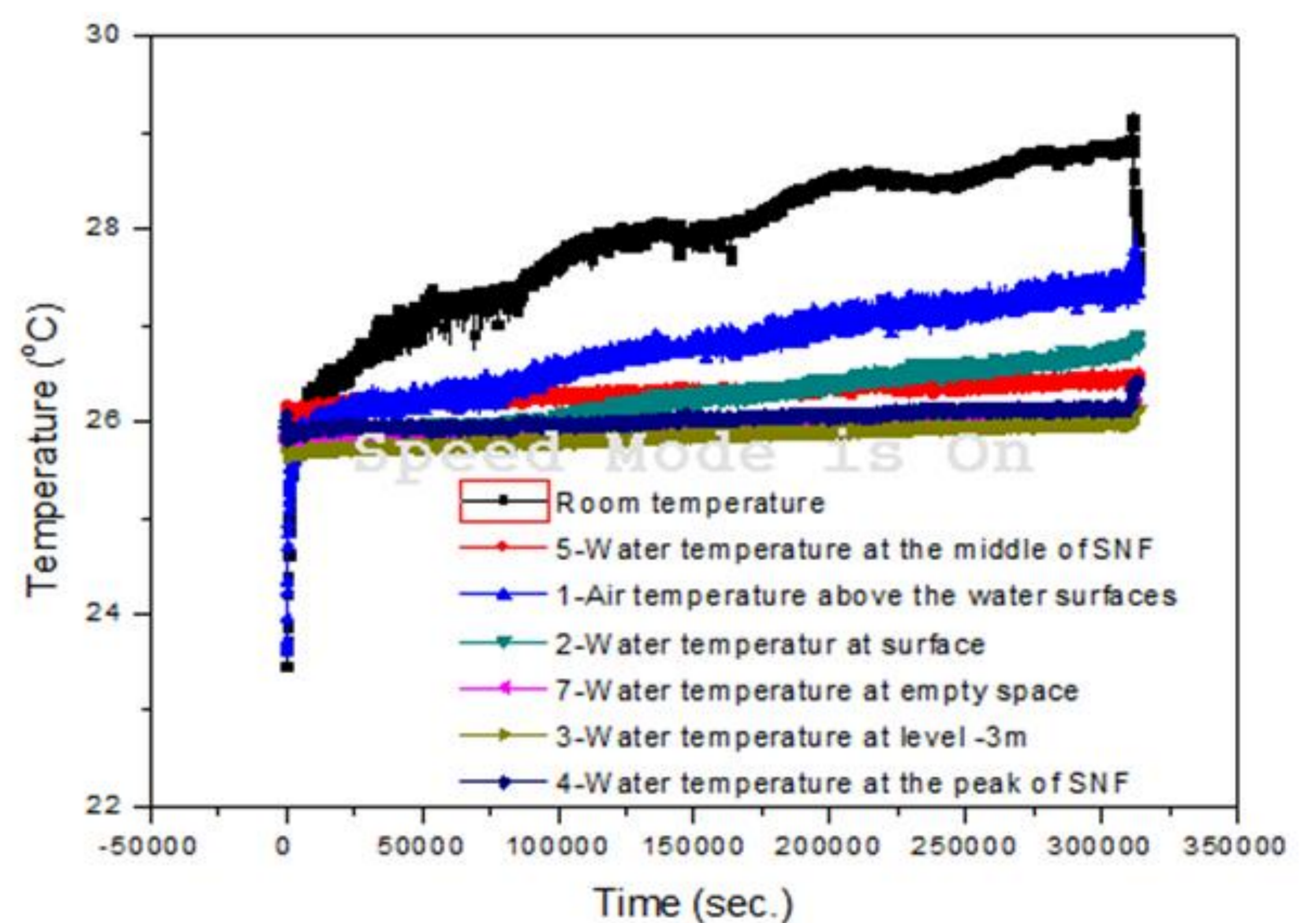


FIG. 3. Temperature distribution in SFSP under SBO condition

CONCLUSIONS

- measurement was carried out on normal conditions (VAC operation) and SBO condition for 87.18 hours.
- SBO conditions are carried out by turning off the SFSP cooling system, VAC system, purification circulation system, all other support systems and by turning off the lighting so that no heat affects the experimental results.
- Result: increase in temperature at all measurement points.
- The highest water temperature reached in 87.18 hours SBO was 26.89°C at SFSP surface water.
- It is still in accordance with the safety requirements (maximum 35°C).
- If there is an SBO in the SFSP RSG GAS for 87.18 hours, the SFSP water temperature will not evaporate excessively and endanger the SNF integrity.

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