

Title	PPOOLEX Experiments on Thermal Stratification and Mixing
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ISBN	978-87-7893-265-5
Date	August 2009
Project	NKS-R / POOL
No. of pages	22 + 8
No. of tables	4 + 1
No. of illustrations	13 + 9
No. of references	7
Abstract	<p>The results of the thermal stratification experiments in 2008 with the PPOOLEX test facility are presented. PPOOLEX is a closed vessel divided into two compartments, dry well and wet well. Extra temperature measurements for capturing different aspects of the investigated phenomena were added before the experiments. The main purpose of the experiment series was to generate verification data for evaluating the capability of GOTHIC code to predict stratification and mixing phenomena.</p> <p>Altogether six experiments were carried out. Heat-up periods of several thousand seconds by steam injection into the dry well compartment and from there into the wet well water pool were recorded. The initial water bulk temperature was 20 °C. Cooling periods of several days were included in three experiments.</p> <p>A large difference between the pool bottom and top layer temperature was measured when small steam flow rates were used. With higher flow rates the mixing effect of steam discharge delayed the start of stratification until the pool bulk temperature exceeded 50 °C. The stratification process was also different in these two cases. With a small flow rate stratification was observed only above and just below the blowdown pipe outlet elevation. With a higher flow rate over a 30 °C temperature difference between the pool bottom and pipe outlet elevation was measured. Elevations above the pipe outlet indicated almost linear rise until the end of steam discharge.</p> <p>During the cooling periods the measurements of the bottom third of the pool first had an increasing trend although there was no heat input from outside. This was due to thermal diffusion downwards from the higher elevations.</p> <p>Heat-up in the gas space of the wet well was quite strong, first due to compression by pressure build-up and then by heat conduction from the hot dry well compartment via the intermediate floor and test vessel walls and by convection from the upper layers of the hot pool water. The gas space temperatures also stratified.</p>

The presence of a boundary layer on the blowdown pipe outer surface was verified by a set of horizontally installed thermocouples with a two millimeters interval. A rising film of water, hotter than the ambient temperature, existed on the pipe surface almost throughout the whole heat-up process.

Key words condensation pool, steam/air blowdown, thermal stratification