Source Term Experimental Research - IPRESCA and OECD/NEA THEMIS Projects

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The precise estimation of the source term from a nuclear power plant is important to support in prevention and/or mitigation of severe accident consequences due to radioactivity release to the environment. For this purpose, continuous validation and further improvement of severe accident analyses codes as well as experimental database for verification & validation of these codes is a necessary prerequisite.

In this context, SNETP-NUGENIA IPRESCA (35 organisations from 15 countries, timeframe 2018 - 2023) and OECD/NEA THEMIS (more than 20 organisations from 14 countries, timeframe 2020 – 2024) projects aim to support experimental research as well as source term modelling by providing input on fission product remobilisation behaviour during a severe accident. IPRESCA project has a specific focus on fission product retention behaviour in water pools ("pool scrubbing"), whereas THEMIS project aims to investigate hydrogen combustion/mitigation (PARs) and source term related issues and provides experimental database under representative "late phase conditions", such as CO, O_2 lean atmosphere, elevated pressure/temperature, steam.

The present paper will provide main outcomes of the concluded IPRESCA activities (e.g. lumped parameter and CFD code benchmarks, consolidation of experimental database) and introduce scope of the planned source term experimental investigations in THEMIS project. The importance of shared data from several experimental facilities operated by IPRESCA partners as well as significance of representative boundary conditions towards reduction of uncertainties in source term calculations will be highlighted with relevant examples. Both projects have been successful in promoting education and training with involvement of several PhDs.