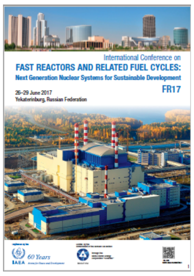

Contribution ID: **335** Type: **ORAL**

Source Term Estimation for Radioactivity Release under Severe Accident Scenarios in Sodium cooled Fast Reactors

Monday, June 26, 2017 3:30 PM (20 minutes)

Due to the inherent characteristics and robust design of Sodium cooled Fast Reactors (SFR), the core disruptive accident (CDA) is considered a very unlikely event. Nevertheless, to confirm the safety of the reactor, one of the hypothetical scenarios arising from the loss of coolant flow coupled with the failure of the shutdown system, referred to as the Unprotected Loss of Flow (ULOF) accident is postulated to serve as a basis for containment design and severe accident management measures. Determination of the corresponding radioactive source term released into the containment is an important initial condition for the assessment of the adequacy of the containment and subsequently the radiological impact at the site. Estimation of the source term for the sodium cooled fast reactors requires computational tools similar to those developed for the assessment of thermal reactor source term. Towards improving the current state of the art for modeling the in-vessel and in-containment source terms IAEA launched the CRP in which participants from nine countries are doing benchmark simulations for the source term estimation with different models and tools. The technical aspects to be addressed are divided into three main parts. First is the in-vessel source term estimation, consisting of risk important fission product distribution in the fuel pins, their release mechanisms into the coolant and subsequent reaction and transport in the coolant and release to the cover gas. Second is the primary system/containment interface source term estimation consisting of models for the cover gas, sodium ejection and radionuclide chemical composition and distribution in the containment. The third part is the estimation of the fission product evolution within the containment considering sodium burning scenarios, aerosol behavior and physical boundary conditions. Towards this a benchmark SFR model has been defined and developed. The input data required for the simulations have been calculated and boundary conditions identified and specified. The paper presents the problem definition, approach and results obtained from the preliminary modeling. The resulting models are expected to provide a more realistic than existing conservative estimates and would further help to identify areas for experimental investigations through sensitivity and uncertainty analysis of the improved integrated models.

Country/Int. Organization

IAEA, Vienna

Primary author: Dr ARUL, JOHN (IGCAR)

Co-author: Dr KRIVENTSEV, Vladimir (IAEA)

Presenter: Dr KRIVENTSEV, Vladimir (IAEA)

Session Classification: 3.2 Core Disruptive Accident

Track Classification: Track 3. Fast Reactor Safety