Contribution ID: **326** Type: **ORAL**

Learning from 1970 and 1980-Era Sodium Fire Experiments

Tuesday, 27 June 2017 14:10 (20 minutes)

The original sodium fast reactor concepts date back to the 1950s and 1960s, and there were large programs in France, Japan, Russia, and the United States in the 1970s and 1980s to design and build commercial-scale SFRs. Many of these programs were abandoned in the 1990s, but a considerable amount of work was done prior to that in order to demonstrate the concepts, and to support the safety cases for the commercial prototypes. There is renewed interest in the sodium fast reactor technology with the advent of Gen-IV concepts developed though the GIF initiative, and safety standards for these designs are higher than they were for the original Gen-III designs. Evaluating the effects of sodium fires in the containment vessel would be an essential part of any modern safety evaluation because beyond the risk of thermal load of the structures and containment overpressure, and the fact that they would be a source of airborne fission products. Validated computational tools able to simulate the in-containment phenomenology are then necessary for a reliable estimation of the source term to the environment in the case of an accident. Many of the fundamental safety questions have already been explored in the past, however, and there is a huge amount of value in re-visiting the experimental and theoretical work that has already been done.

This paper will discuss an effort to retrieve and re-examine experimental work that was carried out in the 1970s and 1980s at the Cadarache research center in France. Different sodium fire programs will be outlined, and will be linked to new theoretical analyses and modeling efforts. As examples, studies on theoretical developments for sodium spray fire combustion, pool fire combustion, combustion product aerosolization, and fission product emission phenomena have been enabled from access to this data. The experimental results have also been used in studies to validate sodium fire modules in the severe accident code ASTEC-Na. This paper will underline how important it is to preserve the knowledge that was generated in the past, and will outline some of the ways that it can still be applied today.

Country/Int. Organization

Institut de Radioprotection et de Sûreté Nucléaire
BP3 13115 StPaulLezDurance, France

Primary author: Dr LEBEL, Luke (Institut de Radioprotection et de Sûreté Nucléaire)

Co-author: Ms GIRAULT, NATHALIE (Institut de Radioprotection et de Sûreté Nucléaire)

Presenter: Dr LEBEL, Luke (Institut de Radioprotection et de Sûreté Nucléaire)

Session Classification: 3.4 Sodium leak/fire and other safety issues

Track Classification: Track 3. Fast Reactor Safety