International Conference on Fast Reactors and Related Fuel Cycles FR22: Sustainable Clean Energy for the Future (CN-291)

Contribution ID: **22** Type: **ORAL**

# A Status of Experimental Program to Achieve In-Vessel Retention during Core Disruptive Accidents of Sodium-Cooled Fast Reactors

*Friday, 22 April 2022 11:06 (12 minutes)*

To achieve in-vessel retention for mitigating the consequences of core disruptive accidents (CDAs) of sodium-cooled fast reactors, controlled material relocation (CMR) has been proposed as an effective safety concept. CMR is not only aiming at eliminating the potential for exceeding prompt criticality events that affect the integrity of the reactor vessel, but also enhancing the potential for the in-vessel cooling of degraded core materials during CDAs. Based on this concept several design measures have been studied, and, to evaluate their effectiveness, experimental evidences to show relocation of molten-core material were required. With this background, a series of experimental program called EAGLE (Experimental Acquisition of Generalized Logic to Eliminate re-criticalities) has been carried out collaboratively over 20 years between Japan Atomic Energy Agency and National Nuclear Center of the Republic of Kazakhstan (NNC/RK) using an out-of-pile and in-pile test facilities of NNC/RK. The EAGLE program is divided into three phases, they are called EAGLE-1, EAGLE-2 and EAGLE-3, to cover whole phase after core-melting begins. The subject for EAGLE-1 and the first half of EAGLE-2 is CMR in the early phase of CDA in which the core melting progresses rapidly driven by positive reactivity insertions. The subject for the later half of EAGLE-2 and whole EAGLE-3 is CMR in the later phase of CDA in which the gradual core melting by decay heat and relocation and cooling of degraded core materials occur. In this paper, the major achievement of the EAGLE program and future plans are presented.

## Country/Int. organization

Japan

## Speaker's email address

kamiyama.kenji@jaea.go.jp

## Speaker's title

Mr

## Affiliation/Organization

Japan Atomic Energy Agency

**Primary author:** Dr KAMIYAMA, KENJI (Japan Atomic Energy Agency)

**Co-authors:** Dr MATSUBA, KENICHI (Japan Atomic Energy Agency); Mr KATO, SHINYA (Japan Atomic Energy Agency); Mr IMAIZUMI, YUYA (Japan Atomic Energy Agency); Dr MUKHAMEDOV, NURZHAN (National Nuclear Center of the Republic of Kazakhstan); Mr AKAYEV, ASSAN (National Nuclear Center of the Republic of Kazakhstan); Mr PAKHNITS, ALEXANDER (National Nuclear Center of the Republic of Kazakhstan); Dr VURIM, ALEXANDER (National Nuclear Center of the Republic of Kazakhstan); Dr BAKLANOV, VIKTOR (National Nuclear Center of the Republic of Kazakhstan)

**Presenter:** Dr KAMIYAMA, KENJI (Japan Atomic Energy Agency)

**Session Classification:** 2.4 Severe Accidents

**Track Classification:** Track 2. Fast Reactor Safety