

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

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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.

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