Use of MELCOR Calculations in the Frame of Level 2 Probabilistic Safety Assessment of the Belgian Plants

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ABSTRACT

In the framework of the Level 2 Probabilistic Safety Assessment project, a generic Accident Progression Event Tree (APET) has been elaborated for all Belgian units in order to evaluate the Containment Performance and the Fission Product release categories during Severe Accidents.

In order to support the quantification of the APET for all the representative Belgian NPPs, accident scenarios are defined taking into account the specific features of those plants. The simulation of the accident sequences is performed with MELCOR 1.8.6 and covers both the full power state of the plant and shutdown states. This set of MELCOR supporting calculations is justified for the phenomenological issues analyzed and quantified within the APET.

This paper presents the application of MELCOR supporting calculations to the APET quantification for the Belgian NPPs. Three axes are investigated: they are related to 1) the selection process of MELCOR supporting calculations for the APET quantification, 2) the purpose of every calculation which is selected, and 3) the quantification of issues supported by MELCOR calculations. For the latter, specific examples – throughout the severe accident progression – of the use of MELCOR calculations during the APET quantification process are tackled.