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# Pipe Whip Transient Analysis of the Ignalina NPP

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The transient analysis of a GDH following a guillotine break at the cap end is carried out. The GDH is one of the most important components for reactor safety, not only during normal operation, but also in case of accidents. Emergency core cooling system piping is connected to the GDH piping such that, during an accident, coolant passes from the GDH into the emergency core cooling system.

The state-of-the-art RELAP5/MOD3 code was used for thermo-hydraulic analysis of the GDH guillotine rupture. For the calculations a complete Ignalina NPP RELAP5 model was used. Guillotine rupture was modelled in an appropriate location with a defined break geometry. All the required parameters were obtained from RELAP5 code for the calculation of reactivity force affecting piping after guillotine break.

A GDH that is propelled into motion after a guillotine break can impact neighboring GDH pipes or the nearest wall of the compartment. Therefore, two cases were investigated:

a) GDH impact on an adjacent GDH and its attached piping;
b) GDH impact on an adjacent reinforced concrete wall.

A whipping RBMK-1500 GDH along with neighboring concrete walls and pipelines were modeled using finite elements. The finite element code NEPTUNE used in this study enables a dynamic pipe whip structural analysis that accommodates large displacements and nonlinear material characteristics. The results of the study indicate that a whipping GDH pipe would not significantly damage adjacent walls or piping and would not result in a propagation of pipe failures.

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