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PROBABILISTIC RISK ASSESSMENT FROM POTENTIAL EXPOSURES TO THE PUBLIC  
APPLIED FOR INNOVATIVE NUCLEAR INSTALLATIONS

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**Abstract**

Potential exposures are those that may occur as a result of unanticipated operational performance or accidents. Potential exposure situations are probabilistic in nature because they depend on uncertain events such as equipment failure, operator errors or external initiators beyond the control of the operator. Consequently, there may exist a range of possible radiological impacts that need to be considered. In this paper a Level 3 Probabilistic Safety Assessment (PSA) for a hypothetical scenario relevant to Innovative Nuclear Energy Systems (INS) was conducted using computer code MACCS (MELCOR Accident Consequence Code Systems). The acceptability of an INS was analyzed taking into account the general requirement that relocation or evacuation measures must not be necessary beyond the site boundary. In addition, deterministic modeling of the accident consequences for the critical meteorological conditions was carried out using the JRODOS decision support system (Real-time On-line Decision Support system for off-site emergency management in Europe). The approach used for dose and risk assessment from potential exposure of accidental releases and their comparison with acceptance criteria are presented. The methodology described can be used as input to the licensing procedure and engineering design considerations to help satisfy relevant health and environmental impact criteria for fission or fusion nuclear installations.

**Keywords:** potential exposure; dose; risk indicators; acceptance criteria; INS; decision making

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