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Probabilistic Risk Assessment for Calculating Health Effects Associated with a Potential Nuclear Accident in the Vicinity of a Nuclear Facility

The study aims to presents the results of a probabilistic risk assessment that was conducted to replicate the MACCS code model and data analysis typical of the South African Nuclear Power Plant (NPP) environment. This was done to determine the potential atmospheric release and consequence of radioactive material for postulated severe accident case based on current NPP configuration. This work was done to aid the South African nuclear regulator to perform independent verification of the code that is employed by the nuclear licence holder. The MACCS code was successfully customised to perform probabilistic risk assessment and the approach and the procedure that can be followed in this development has been fully described elsewhere. Some of the discerning specific data used to perform the assessment included source term, meteorological dataset, site dataset, and other important plant specific datasets to complete the full scope of the Level 3 probabilistic risk assessment.

Radiation exposures and health issues following a nuclear accidents and emergency procedures are of great concern to the public and to the local authorities tasked with emergency preparedness and response with ensuring public health, safety, and well-being. The study presents the results of off-site consequences due to radiation release from a typical NPP sited in South Africa. The analysis of implementing the protective measures to counteracts the health effects anticipated was also taken into consideration. Therefore, the study outlines the full assessment that is done in anticipation and to counteract the risk associated with the release of radioactive material by the aforementioned NPP during postulated severe accident scenario resulting in radiological releases to the site and environment.

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