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A Method for Sizing Emergency Planning Zones around Small Modular Reactors and New Reactor Technologies

Off-site emergency protective actions are the fifth and final level of defence in depth against the consequences of nuclear accidents. The area around the site where pre-planned precautionary or urgent protective actions are ready to be taken in the event of an emergency is the emergency planning zone (EPZ). Stakeholders for small modular reactor (SMR) and advanced reactor technologies have advocated that, considering the risks relative to contemporary large nuclear power plants, the EPZ around SMRs may be reduced in size or outright eliminated. However, past investigations have revealed lack of clarity or uncertainty in the technical criteria that determine the necessary EPZ size. To that end, Canadian Nuclear Laboratories has been developing a decision-making framework to identify the events that should be considered in the off-site planning basis and what is the necessary extent of the urgent protective action planning zone. The proposed method is based on some principals of Level 3 probabilistic safety assessment as well as an evaluation of public health risks in units of adjusted life years. This study develops the method and demonstrates its application with a simplified case study.

Country OR International Organization

Canada

Email address

david.hummel@cnl.ca

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Author: Dr HUMMEL, David (Canadian Nuclear Laboratories)

Co-authors: Mr LEBEL, Luke (Canadian Nuclear Laboratories); Mr CUI, John (Canadian Nuclear Laboratories); Mr CHOUHAN, Sohan (Canadian Nuclear Laboratories)

Presenter: Dr HUMMEL, David (Canadian Nuclear Laboratories)

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