

Nuclear Power Plant Whole-Site Risk

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Abstract

Canadian nuclear utilities regularly and proactively update the nuclear safety analysis for their plants. Such updates were underway at the time of the Fukushima accident in 2011. Fukushima highlighted the importance of multi-unit effects, which are explicitly accounted for in the Probabilistic Safety Analysis (PSA) of multi-unit CANDU stations. Even though the safety analysis and other metrics confirm overall nuclear power plant safety, Fukushima highlighted the need to improve how the overall risk of multi-unit nuclear power plants, or the whole-site risk, is documented and demonstrated to be acceptable.

This paper summarizes whole-site risk considerations, including defence in depth, deterministic safety analysis, and PSA, and how multi-unit effects are explicitly taken into account. The paper addresses aggregation of PSA results for multiple reactors in a station, and for different PSA hazard categories. The paper summarizes the integrated approach to demonstrate and document the adequacy of whole-site risk.

Keywords: PSA, risk, Fukushima, whole-site risk