

표준원전의 운전 경험에 기초한 안전 관련 I&C 부품
신뢰도 데이터베이스 개발
Development of Reliability Database for Safety-Related I&C Component
Based on operating experience of KSNP

장승철, 한상훈, 민경란
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요 약

국내 원전 (영광 3,4 및 울진 3,4 호기)의 안전 관련 I&C 부품에 대해 상업 운전 이후 총 8.63 년간의 현장 운전 이력 자료를 바탕으로 신뢰도 데이터베이스를 구축하였다. 신뢰도 자료는 기기 종류별로 미국의 CE 형 원전의 안전 관련 I&C 부품에 대한 운전 경험과 비교 분석하였다. 그 결과 국내 자료는 상업운전 초기의 자료가 거의 대부분 임에도 불구하고 미국의 CE 노형에 대한 신뢰도 자료에 비해 전반적으로 유사한 것으로 나타났다.

An Adapted Risk Evaluation Methodology Applicable
to both PWRs and CANDUs

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ABSTRACT

An objective of this study is to propose a methodology, which enables to evaluate the risk of the different types of nuclear power plants. The merits and demerits of various nuclear power plants put difficulties in making a consistent regulation to different types of nuclear power plants. In this regard, it is necessary to construct a common objective frame to cover all the sorts of safety characteristics of different plants such as PWRs and CANDUs. In this paper, the design risk for a nuclear power plant is defined as a function of failure frequency, the number density of incidents and the allowable dose limit. It was found that the distribution of the design risk is highly affected by the failure criteria.

To identify the effect of diversity in safety systems, the failure rate of the safety functional group is proposed. In a safety functional group, there are many alternative safety systems. By introducing the index of effectiveness of individual safety system, the natural selection rule of the safety systems in a functional group is developed. This design risk for the safety functional group could cover the single failure criteria of PWRs and multiple failure criteria of CANDUs. Furthermore, the present method could evaluate the various concepts to enhance the safety of the nuclear power plant such as the diversity design, the add-on redundancy, and the passive in a consistent way.