

Containment Evaluation of the KN-12 Transport Cask

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Abstract

The KN-12 transport cask is designed to transport 12 PWR spent nuclear fuel assemblies and to comply with the regulatory requirements for a Type B(U)F package. W.H 14x14, 16x16 and 17x17 fuel assemblies with maximum allowable initial enrichment of 5.0 wt.%, maximum average burn-up of 50000 MWD/MTU and minimum cooling time of 7 years being used in Korea are loaded and subsequently transported under dry and wet conditions. The containment boundary of the KN-12 cask is defined by a cask body, a cask lid, lid bolts with nuts, O-ring seals and a bolted closure lid. The containment vessel for the KN-12 cask consists of a forged thick-walled carbon steel cylindrical body with an integrally-welded carbon steel bottom and is closed by a lid made of stainless steel, which is fastened to the cask body by lid bolts with nuts and sealed by double elastomer O-rings. In the cask lid an opening is closed by a plug with an O-ring seal and covered by the bolted closure lid sealed with an O-ring. The cask must maintain a radioactivity release rate of not more than the regulatory limit for normal transport conditions and for hypothetical accident conditions, as required by the related regulations. The containment requirements of the KN-12 cask are satisfied by maintaining a maximum air reference leak rate of 2.7×10^{-4} ref cm³/sec or a helium leak rate of 3.3×10^{-4} cm³/sec for normal transport conditions and for hypothetical accident conditions.

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PWR 예상방사선원항과 2900MW급 원전 냉각재 핵종농도 비교
The Comparison of Radioactive Source Term(ANSI N18.1) and 2900MW NPP's
Reactor Coolant Activity

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요약

원자력발전소의 예상방사선원항은 발전소로부터 환경으로의 연간 평균방출을 적합성 확인을 위한 기초자료로서 사용되는데, 발전소 배기장치로부터의 방출, 방사성 물질의 액체유출 등은 예상방사선원항을 이용한 것들이다. 본 논문은 현재 진행중인 가동 원전에 대한 주기적안전성평가(PSR)과정에서 파악한 예상방사선원항의 표준값 변천과정과, 설계당시의 예상방사선원항값, 그리고 과거 10년간 운전중에 측정되었던 국내 특정원전의 냉각재 핵종 실측값과 비교하여 예상선원항값과 실제측정값간의 여유도가 어느 정도인지 살펴보았다. 검토결과 최근 10년간 냉각재평균값이 최근의 완화된 선원항(ANSI.N18.1-1999) 보다도 1/5 ~ 1/10 수준으로 상당히 보수적인 값을 유지하고 있는 것으로 나타났다.