'99 춘계학술발표회 논문집
한국원자력학회

한국표준형 원전의 안전주입계통 설계최적화

Optimization of Safety Injection System Design for Korean Standard Nuclear Power Plant

최한림, 이상일, 김택모, 한기수, 송중효, 김철우,
최철진, 서종태, 김도현, 오종필, 오광석, 최해윤, 양재영

한국전력기술주식회사
대전광역시 유성구 덕진동 150

전태주, 안재민

한국전력공사
서울특별시 강남구 삼성동 167

요 약

한국표준형 원전의 안전주입계통의 설계최적화를 위하여 인허가된 해석방법론을 적용하여 사고별로 안전주입계통 주요기기인 고압안전주입펌프, 저압안전주입펌프 및 안전주입탱크의 용량을 각각의 변수로 하여 일련의 범위해석을 수행하였다. 해석결과, 고압안전주입펌프 관련해서는 가압기에 3-train POSRV 계통을 채택하고, 저압안전주입펌프 관련해서는 정지냉각계통의 열교환기 용량증대 또는 NSSS 설계요건 완화를 병행할 경우, 원전의 안전성관점에서 안전주입계통 주요기기의 용량은 표준원전인 울진3,4호기의 설계용량 대비 75%로 축소설계가 가능한 것으로 평가되었다.

Abstract

A series of scoping analyses have been performed, using safety analyses methodology approved from regulatory authorities, for the safety injection system (SIS) of Korean standard nuclear power plant (KSNP) to optimize the designs of the high pressure safety injection pump (HPSIP), the low pressure safety injection pump (LPSIP) and the safety injection tank (SIT). The result of these analyses provides the possibility of reducing the SIS down 75% of current capacity subject to design changes such as adopting a 3-train power operated safety

relief valve (POSRV) system on the pressurizer for HPSIP, and increasing capacity of the heat exchanger of the shutdown cooling system (SCS) or relaxing the design requirements of nuclear steam supply system (NSSS) for LPSIP.

.....

Proceedings of Korean Nuclear Society Spring Meeting,
Pohang, Korea, May 1999.

Evaluation of Analytically Scaled Model for Small Break Loss of Coolant Accident at Low Power

Jin Ho Song, Kyoo Hwan Bae
Korea Atomic Energy Research Institute,
P. O. Box 105, Yusong, Taejon, 305-600, Korea
dosa@nanum.kaeri.re.kr, khbae@nanum.kaeri.re.kr

Abstract

The present paper performs analytical evaluations for the potential distortions caused by the scaled models using RELAP5/MOD3 computer codes. By use of scaling analysis, two scaled models with same volumetric ratio are constructed for Korean Next Generation Reactor (KNGR), which is an advanced light water reactor. The scaling methodology adopted in this paper preserves two-phase natural circulation similarities between prototype and scaled models. One scaled model is at full height with reduced flow area. The other model is at reduced height with reduced flow area. By using appropriate scale factors the RELAP5/MOD3 input models are developed. Then, the transient responses of two ideal scaled models are simulated for Small Break Loss of Coolant Accident (SBLOCA) by using RELAP5/MOD3 computer code. The transient responses of two scaled models are compared with those of the prototype. The results indicate that qualitative and quantitative similarities are well preserved for both models during SBLOCA with different break sizes.