

Estimate on Radionuclide Inventory in Annulus Gas System of Domestic CANDU reactor

손욱*, 강덕원, 김진태
전력연구원
(wsohn@kepri.re.kr*)

Annulus gas system (AGS), which is a space filled by CO₂ gas between Calandria tube and pressure tube of CANDU reactor, prevents heat transport from coolant to moderator. Since one of the major radionuclides in AGS is Ar-41, the estimate on radioactivity for this nuclide is important for radiation protection purpose. Thus, we have calculated the theoretical Ar-41 radioactivity (A_{Ar-41}) from the content of its target atom Ar-40 (m_{Ar-40}) which is introduced into AGS with CO₂ gas as impurity. The calculation gives the following relationship; A_{Ar-41} (Bq/year) = $3 \cdot 10^{16} \times m_{Ar-40}$ (ppm). Therefore, the Ar-40 content of 40 ppm in CO₂ gas, which is a typical case in domestic CANDU reactors, yields the Ar-41 activity of $1.2 \cdot 10^{18}$ Bq/year, showing relatively a good agreement with the experimental one of $1.371 \cdot 10^{18}$ Bq/year.