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for assessing 37Ar emissions from nuclear reactors

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37Ar is an indicator of an underground nuclear explosion. This radioisotope is produced via 40Ca (n, α) 37Ar reaction through neutron activation of 40Ca included in the rocks near to the nuclear explosion location. The relatively long half-life of 35 days compared to CTBT-relevant radioxenon isotopes results into 37Ar activity becoming stronger than radioxenon activity approximately 50 days after detonation. Normal operational releases of 37Ar from nuclear facilities contributes to the atmospheric background. It can be produced via neutron activation of air or of gas dissolved in water. The emissions of this isotope are not regularly measured and very few release data are available. Therefore, the two-step method presented here is more complex than the method the authors had applied previously for assessing 37Ar releases from nuclear research reactors. As the first step, simulations with ORIGEN determine isotopic ratios of 37Ar and an appropriate proxy like 41Ar for which stack release data are available. These ratios are depending on the duration of the irridiation and the intensity of the neutron flux. As second step, the retention time is used to account for the decay between escaping the neutron flux and getting released through the stack.

Promotional text

37Ar is important as indicator of an underground nuclear explosion. Nuclear power plant emissions contribute to the ambient background and needs to be assessed. This presentation describes a method how to achieve this.

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