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the 2014 Baseline for Simulated Activity Concentrations of Four Radioxenon Isotopes at IMS Sites Based on Estimated Annual Releases of Known Sources

Worldwide monitoring of noble gases is an essential part of the verification system of the Comprehensive Nuclear-Test-Ban Treaty as it can provide a direct evidence of the nuclear nature of an underground or underwater explosion. The detection capability of the noble gas network is weakened due to the presence of a worldwide civilian radioxenon background. Improving the understanding of civilian radioxenon sources and their effects on the noble gas systems is crucial. In this study, a baseline radioxenon emission inventory is proposed for all four CTBT relevant radioxenon isotopes for the year 2014. This is based on a literature review for the Medical Isotopes Productions Facilities and Nuclear Power Plants, for which peer-reviewed information on their location and radioxenon emission exists. The radioxenon emission inventory is used together with Atmospheric Transport Modelling to estimate the radioxenon activity concentrations at IMS noble gas systems. The estimations are compared and discussed with regard to the observations of noble gas systems that were operational in 2014. This study is to our knowledge the first attempt to propose an emission inventory for all four CTBT relevant radioxenon isotopes and to compare the resulting estimated activity concentrations with all observations at IMS noble gas systems.

Primary author: GUEIBE, Christophe (Belgian Nuclear Research Centre)

Presenter: GUEIBE, Christophe (Belgian Nuclear Research Centre)

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