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Krypton-85 Monitoring at BfS in Germany and Technical Solutions for Safeguards

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The radioactive noble gas isotope krypton-85 with a half-life of 10.76 years is produced by nuclear fission. The main source of krypton-85 in the atmosphere are releases from reprocessing plants for nuclear fuel in the Northern Hemisphere. This volatile isotope is not retained in such plants and thus a very good indicator for the processing of irradiated nuclear fuel. This includes reprocessing for military purposes. Additionally, Kr-85 could be used as tracer for the validation of Atmospheric Transport Models.

The German Federal Office for Radiation Protection (BfS) operates a noble gas laboratory and a global network which continuously monitors the krypton-85 activity concentrations in ground level air since the 1970s. The atmospheric activity concentration has continuously been increasing since the installation of reprocessing plants for nuclear fuels in the early 1950s until 2003. In the first decades it came mostly from military applications and later from civil reprocessing. Since 2003 the atmospheric krypton-85 background level in the Northern Hemisphere is nearly constant with a value of around 1.5 Bq/m³ in Central Europe. The baseline is superimposed by spikes as a result from discharges of two European reprocessing plants of nuclear fuel, Sellafield and La Hague. The laboratory of the BfS and the techniques used will be presented. Long time series will be discussed and the use of ATM for source location demonstrated.

Country or International Organization

German Federal Office for Radiation Protection

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