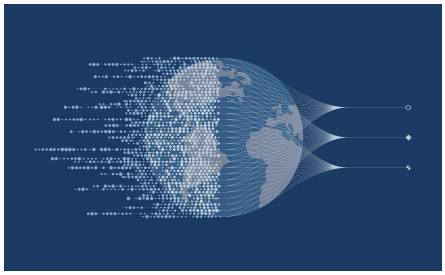

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# of high 135Xe/133Xe isotopic activity ratios at LWRs for nuclear explosion monitoring

Isotopic activity ratios of 135Xe to 133Xe above 5 are considered as an indicator for a possible nuclear test release. High activity ratios of 135Xe to 133Xe in atmospheric air and even 135Xe without simultaneous observation of 133Xe are occasionally observed at IMS noble gas systems. Whenever 135Xe is observed, it must come from a fresh release because its half-life is just 9.2 hours. Despite all efforts, the sources of high 135Xe to 133Xe activity ratios are still not sufficiently well identified and may originate from different source types. This presentation begins with an overview of the 135Xe to 133Xe activity ratios and these isotopes' source strength as they are typically released by various nuclear installations. The most likely source of many high 135Xe observations are LWRs at the time of power ramping up or ramping down. A nuclear reactor core simulation was undertaken to investigate the influence of downtime and other parameters on the 135Xe to 133Xe activity ratios. Conclusions are drawn on what specific scenario might cause the highest ratios and what source term could be expected.

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