

# and Analysis of Anomalous Radioxenon Isotopes

*Thursday, 22 June 2023 11:10 (1 minute)*

The radioxenon signatures of  $^{135}\text{Xe}$ ,  $^{133}\text{Xe}$ ,  $^{133\text{m}}\text{Xe}$ , and  $^{131\text{m}}\text{Xe}$  are the expected and consistently observed radioxenons in the atmosphere. Testing of the Xenon International System at Knoxville, TN resulted in the detection of several previously unobserved radioxenon isotopes in the atmosphere  $^{125}\text{Xe}$ ,  $^{127}\text{Xe}$ ,  $^{129\text{m}}\text{Xe}$ , and  $^{122}\text{Xe}$  (via the decay of  $^{122}\text{I}$ ). These isotopes were periodically detected in the atmosphere from December 2019 until May 2021 when Xenon International concluded its testing. Atmospheric transport modeling suggested that the source of the radioxenons emanated from either Oak Ridge National Laboratory's High Flux Isotope Reactor, their Spallation Neutron Source, or both. The signatures produced by these atypical radioxenons can veil the signatures of the typical four radioxenons and lead to unreliable activity concentration calculations. There are only a few spallation sources and research reactors worldwide, but it may be possible for some of these isotopes be observed in nuclear monitoring systems.

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## Promotional text

This presentation provides new opportunities, insights, and methods for improving nuclear test monitoring and verification by ensuring that all radioxenon background isotopes and sources are considered.

## Oral preference format

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