

Mother and Daughter Radionuclides Related to CTBT for Improving the Detection of a Nuclear Event

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One of the most important issues in radionuclide monitoring technology is the analysis of radionuclide data of the International Monitoring System (IMS). The number and concentration rate of CTBT-relevant detected radionuclides determine the possibility of a nuclear event occurrence in radionuclide monitoring. Fission and activation products being on the standard list of CTBT-relevant radionuclides, decay to nuclides which are stable or unstable. Some of these radionuclides decay to radionuclides which are also among the 83 CTBT relevant radionuclides. Considering the different decay reactions of these radionuclides in mother or daughter states, estimating zero time of a nuclear event can be improved by discriminating these two decays. In this study, CTBT-relevant fission radionuclides that decay to unstable radionuclides, which are among the 83 CTBT-relevant radionuclides, are the focus and their decays over time are investigated using Bateman equations in mother and daughter, and the combination of these states. Then, the ratio of concentration of intended radionuclides to fission radionuclides are obtained for two scenarios including radionuclides detection in daughter state or combination of mother and daughter. Finally, the occurrence probability of nuclear event and its time are evaluated in these two scenarios.

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Promotional text

Improving the detection of nuclear event.
Estimating zero time of nuclear event.
Investigating the ratio of isotopes.

Oral preference format

in-person

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