

Constraints from Transport Times and Minimum Detectable Activity on the Analysis of Low-Activity Samples at CTBT Radionuclide Laboratories

If a radioactive air sample taken at an IMS station is of relevance for a possible event, it is split into half and sent to two different CTBT radionuclide laboratories for further analysis. The radionuclide activity of relevant isotopes detected at the station might be lower than the minimum detectable activity (MDA) at the laboratory once the sample arrives. To estimate the detection probability of a low activity sample, the empirical MDAs of the laboratories and the transport times between the stations and the laboratories must be considered. While the CTBT radionuclide laboratories have MDAs significantly lower than the stations, the detectability of CTBT relevant isotopes with very short half-lives may be affected by their radioactive decay. In this study, empirical station MDAs of seven CTBT relevant radionuclides with short half-lives were compared to the respective MDAs of ten certified CTBT radionuclide laboratories during the radioactive decay. The results were linked to a distribution of empirical sample transport times from stations to laboratories. The comparison indicates that for the short-lived isotopes I-131, Te-132, Mo-99, La-140, and I-133 with low sample activity the selection of the radionuclide laboratory should be based on the sample transport time and the empirical laboratory MDAs.

Primary author: BUHMANN, Erik (Student, University of Hamburg)

Presenter: BUHMANN, Erik (Student, University of Hamburg)

Track Classification: 4. Performance Optimization and Systems Engineering