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-level ^{140}Ba measurements on high-volume air filters using gamma coincidence systems

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It has been proposed that the use of gamma-gamma coincidence methods could lower the detection limit for the detection of certain relevant radionuclides, such as ^{140}Ba . Gamma coincidence measurements have the advantage of significantly lowering the background at the cost of lower overall efficiency. Modelling efforts indicate that a net gain in detection limit can be achieved. Several experiments were designed where small amounts of ^{140}Ba was spiked at 70 mBq and 150 mBq onto high-volume air filters (RASA and Cinderella). These filters were measured on several gamma singles and coincidence systems, both on the surface and in shallow underground laboratories. Initial results show a benefit of coincidence systems over gamma singles when measured in the typical IMS process (24 hours collect, 24 hours decay, 24 hours count). Gamma coincidence methods were able to detect the presence of ^{140}Ba after 24 hours of counting, whereas singles required several days of counting to detect ^{140}Ba . Accurate $^{140}\text{Ba}/^{140}\text{La}$ separation time was also able to be accurately calculated using coincidence methods.

Promotional text

Utilizing advanced gamma spectroscopy methods such as gamma coincidence measurements can increase the sensitivity of the IMS for relevant radionuclides that have decay schemes that emit coincidence gamma rays.

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