

Verification of Sr-90 Determination in Water and Spruce Needles Samples Using IAEA-TEL-2016-04 ALMERA Proficiency Test Samples

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Abstract—Determination of ^{90}Sr in environmental samples has been widely developed with several radioanalytical methods and radiation measurement techniques since ^{90}Sr is one of the most hazardous radionuclides produced from nuclear reactors. Liquid extraction technique using di-(2-ethylhexyl) phosphoric acid (HDEHP) to separate and purify ^{90}Y and Cherenkov counting using liquid scintillation counter to determine ^{90}Y in secular equilibrium to ^{90}Sr was developed and performed at our institute, the Office of Atoms for Peace. The approach is inexpensive, non-laborious, and fast to analyse ^{90}Sr in environmental samples. To validate our analytical performance for the accurate and precise criteria, determination of ^{90}Sr using the IAEA-TEL-2016-04 ALMERA proficiency test samples were performed for statistical evaluation. The experiment used two spiked tap water samples and one naturally contaminated spruce needles sample from Austria collected shortly after the Chernobyl accident. Results showed that all three analyses were successfully passed in terms of both accuracy and precision criteria, obtaining “Accepted” statuses. The two water samples obtained the measured results of 15.54 Bq/kg and 19.76 Bq/kg, which had relative bias 5.68% and -3.63% for the Maximum Acceptable Relative Bias (MARB) 15% and 20%, respectively. And the spruce needles sample obtained the measured results of 21.04 Bq/kg, which had relative bias 23.78% for the MARB 30%. These results confirm our analytical performance of ^{90}Sr determination in water and spruce needles samples using the same developed method.

Keywords—ALMERA proficiency test, Cherenkov counting, determination of ^{90}Sr , environmental samples.