

Contribution ID: 73



Type: Poster

#9-73 Performance Evaluation of the Seafood Radioactivity Inspection System

Tuesday, June 10, 2025 5:05 PM (5 minutes)

In the wake of the Fukushima nuclear accident, global concerns have been raised about the potential contamination of seafood imported from Japan. In particular, the recent release of treated water into the ocean has caused public concern in neighbouring countries. In the Republic of Korea, various organisations carry out inspections of seafood to ensure the safety of the food supply and to guarantee that it does not contain radioactive substances. Most inspection techniques are based on precision analysis, which offers a high level of reliability. This approach requires significant time for pre-processing and measurement, making it unsuitable for rapid decision-making. To overcome these limitations, we have developed Rapid Seafood Radioactivity Inspection Systems (RS-RIS) using polyvinyl toluene (PVT) plastic scintillators and sodium iodide (NaI(Tl)) scintillators, respectively. These instruments are designed to verify whether the regulatory criteria for radioactive materials in seafood (i.e., 100 Bq/kg for 134Cs+137Cs and 131I) are satisfied while maintaining the original form of the food. In this study, a series of test items, conditions, and procedures were selected to evaluate the performance of the developed RS-RIS, and to verify the achievement of the established objectives for each test. The test items were designed to evaluate (1) the accuracy of the activity concentration (Bq/kg) calculated by the RS-RIS, (2) the accuracy of the determination of the presence of radionuclides in seafood, (3) the minimum detectable amount of each radionuclide present in seafood, and (4) the accuracy of the mass measurement of the built-in balance for weighing the samples required to calculate the activity concentration. The precision of the activity concentration was assessed by confirming that the calculated activity concentration (A_exp), determined after uniform distribution of 100 Bq/kg of liquid unsealed source in oysters and measurement for 1 minute, satisfied the 95% confidence interval (i.e., A_exp-1.96 σ <100 Bq/kg<A_exp+1.96 σ). The accuracy of determining the presence of radionuclides was evaluated using false-positive and false-negative rates. The false-positive rate is the probability of incorrectly identifying a sample as containing a nuclide above the threshold (i.e., 100 Bq/kg) when in fact it does not contain any nuclide. The false-negative rate is the probability of incorrectly identifying a sample as not containing a nuclide above the threshold when it does contain one. The performance targets for false-positive and false-negative rates were set at 0.1% and 1 in 60, respectively. The accuracy of the balance was evaluated by calculating the difference between the indicated value and the actual mass of standard weights of 10, 20, and 30 kg. Through various test items (i.e., radioactivity measurement accuracy, nuclide presence accuracy, radioactive substance detection performance, and balance accuracy), it is expected to verify the performance of the RS-RIS as seafood radiation detectors. This study was supported by the Korea Institute of Marine Science & Technology Promotion (KIMST) funded by the Ministry of Oceans and Fisheries, Korea (20210671). It was partly supported by a research grant from Korea Institute of Ocean Science and Technology (PEA0202).

Primary author: Ms SHIN, Jimin (Jeonbuk National University)

Co-authors: Mr LEE, Dowon (Jeonbuk National University); Mr SEO, Hee (Jeonbuk National University); Ms KIM, Soo Mee (Korea Institute of Ocean Science & Technology)

Presenter: Ms SHIN, Jimin (Jeonbuk National University)

Session Classification: #09 - Environmental and Medical Sciences

Track Classification: 09 Environmental and Medical Sciences