

MEASUREMENT OF RADIONUCLIDE CONCENTRATIONS IN JAPANESE FISH REFERENCE MATERIALS PRODUCED IN THE AFTERMATH OF THE FUKUSHIMA NUCLEAR POWER PLANT ACCIDENT

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As part of an ongoing effort to control the amount of radioactive contamination in foodstuffs, a consortium of Japanese organizations have been preparing and characterizing important foodstuffs with radioactive contamination to serve as key reference materials for the numerous laboratories that are responsible for monitoring the level of radionuclides in commercially available foods. Because the Fukushima accident impact is worldwide, the Japan Society for Analytical Chemistry (JSAC) wished to have validation of their CRMs through International Intercomparison Exercises (IICE) involving labs recognized worldwide for their accurate radioactivity measurements. NIST's Radioactivity Group recently participated in an IICE whose objective was to ascertain the ^{134}Cs , ^{137}Cs and ^{40}K activity concentrations in JSAC-prepared fish meat and fish bone ash as well as the ^{90}Sr activity concentration in the fish bone ash.

NIST participated in the certification of fish flesh powder and fish bone ash for their ^{134}Cs and ^{137}Cs activity concentrations. Both non-destructive and destructive analyses were carried out using low-level gamma-ray spectrometry for the quantitative measurement of these radionuclides. Comparisons with reference sources containing known amounts of these same radionuclides in very similar matrices and cylindrical geometries permitted the activity concentrations in the Japanese samples to be determined. The reference sources were prepared by spiking similar blank material with a calibrated mixture of ^{134}Cs and ^{137}Cs . For destructive assays, the original materials were decomposed (fish meat ignited in an electric furnace to burn off organic matter) and dissolved (fish meat ash residue, fish bone ash) to create homogeneous solutions containing the radionuclides. These solutions were measured on the same HPGe gamma spectrometer and compared with solutions of very similar volume and density that contained well-known amounts of the same radionuclides.

The assay of ^{90}Sr concentration in the fish bone ash was based on measurement of Sr-90/Y-90 beta-particle emissions. A detailed procedure for the Sr separation and fraction purification will be discussed. NIST's results will be presented in comparison with the CRM values obtained by the expert Japanese laboratories and NMIs reported results.