Low-Energy Photon Spectroscopy Data in Support of ASTM Method Development

LA-UR-01-5319

Donald E. Dry, Stephanie Boone
Los Alamos National Laboratory, Chemistry Division,
Los Alamos, NM 87545

Abstract

The Isotope and Nuclear Chemistry (C-INC) Radioassay Facility at Los Alamos National Laboratory (LANL) has been in operation since 1948 to measure fission-product and actinide activities from the U.S. weapons testing program. Since the cessation of testing in 1992, the facility has remained in continuous operation by analysis of samples for environmental, bioassay and research projects. In addition to the many gamma spectroscopy systems, two independent planar germanium detectors are employed for measurement of x-rays and low-energy gamma rays. These counters were used to collect data of select isotopes to support the development of a new ASTM Standard, Standard Practice for High-Resolution Low-Energy Photon Spectrometry of Water. This standard is being developed by ASTM Subcommittee D19.04 as a tool for measurement of low-energy gamma-rays and x-rays from approximately 4 keV to 150 keV. This work describes empirical counting results obtained from traceable sources covering the energy range of interest. Specifically, the isotopes used were ^{55}Fe, ^{57}Co, ^{59}Ni, ^{109}Cd, ^{129}I, and ^{241}Am which provide a range of 5.9 to 136 keV. Mixed nuclide sources were also counted and the data was used to obtain coincidence summing corrections. The data and conclusions are presented.