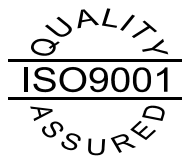


Series 3610—Universal Gamma Scanner

Benefits



- One measurement provides total Assay result combining Pu isotopic ratio analysis using LANL PC/FRAM Code and TGS measurement of U or Pu mass.
- Pu Isotopic Ratio and TGS technique meets both safeguards and WIPP measurement and QA requirements.
- Determines the inventory of U, Pu, and other radio-nuclides in non homogeneous samples including pyrochemical salt residues.
- Provides tomographic maps of absorbers and sources in heterogeneous matrices.
- Measures samples with Am-241 content which cannot be measured by neutron techniques.
- Suitable for measuring Pu Oxide in cans.
- Accuracy and precision sufficient to meet safeguards, shipping and disposal requirements.
- Extends the range of the SGS technique to heterogeneous samples.

Features

- Gamma-ray based NDA technique for the assay of U, Pu and radio-nuclides in waste, based on licensed LANL TGS technology
- Incorporates Plutonium Isotopic Ratio Measurement, Tomographic Gamma Scanner (TGS) and Segmented Gamma Scanner (SGS) in one instrument
- Automated gamma-ray energy calibration
- Transmission corrections are achieved using a Se-75 transmission source to develop a 3-D spatial map of the attenuation coefficient of the sample
- Measurement time is typically less than one hour. Increased accuracy and precision can be achieved by extending measurement time
- Mobile operator control console which is compatible with both Drum TGS and UGS for cans and which can be local or remote from the instrument
- Accuracy is typically better than 10% for measurement of cans and 20% for matrices with average density 2g/cm^3

Description

The Universal Gamma Scanner(UGS) for cans combines the functions of Pu isotopic ratio analysis and Tomographic Gamma Scanner (TGS) in a single automated mobile instrument. The instrument can be used for combined or separate measurements and is intended for use in Safeguards and for waste assay.

Isotopic ratio analysis of Pu is performed using PC/FRAM code developed at the Los Alamos National Laboratory (LANL). An 8k channel spectrum is obtained during the TGS scans and this data is used to obtain the isotopic ratios, including the ratio of U, Am and other radionuclides to Pu. The isotopic ratio result data can be used for safeguards or accountancy purposes or combined with either Pu-240 effective data (from neutron measurements) or specific power data (from calorimetry measurements) to determine total Pu mass.

The second measurement component of the instrument is the transportable Tomographic Gamma Scanner (TGS) which was developed by LANL in the early 1990's for the US DOE. The TGS uses transmission corrected, single photon emission computerised axial tomography to determine the spatial distribution and quantity of radio-nuclides using High Resolution Gamma-ray Spectroscopy (HRGS). The technique represents a considerable advance over the Segmented Gamma Scanner (SGS) technique through the implementation of a sample translation axis in addition to vertical scanning and rotation axes.

A Se-75 transmission source allows the determination of a 3-D spatial map of the attenuation coefficient at any energy by interpolating between the gamma-ray peaks of Se-75 at several energies. Once the attenuation coefficient maps have been established for the sample, emission tomography is used to determine the distribution of selected radioisotopes within the sample. Two pass (transmission followed by emission) measurements are performed.

Also, because the attenuation and source distribution matrix is known more accurately than in an SGS, biases due to matrix and source distributions are significantly reduced. As a result, a single calibration constant can be used for the determination of isotope mass for a wide range of material and matrix types.

Specification

- Automation of 3 axes of motion
- Germanium Coax detector efficiency 25%
- Digital MCA based on the ORTEC DSPec Plus
- Overall instrument envelope: 1520mm long, 710mm wide and 1070mm high
- Variable sample can size to a maximum of 200mm diameter x 350mm (8"x 14") and 20kg in weight
- Ethernet communication from operator computer control console
- 30-200, Ci Se-75 transmission source
- Cd-109 dead time source
- TGS analysis: typically 4800 4k channel spectra for each measurement
- Isotopic Analysis: one 8k channel emission spectrum
- User friendly software runs under windows NT4 and meets Nuclear software QA requirements of NQA-1 (required by WIPP certification)
- Trolley mounted mobile unit for measuring cans