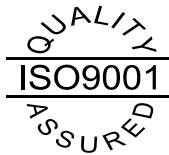


## Series 3800— Tomographic Gamma Scanner



### *Benefits*

- One instrument provides total Assay result combining TGS measurement of U, Pu and other Radionuclides with Pu isotopic ratio analysis using LANL PC/FRAM code
- TGS technique meets both safeguards and WIPP measurement and QA requirements
- Provides tomographic maps of absorbers and sources in heterogeneous matrices
- Extends range of SGS technique to heterogeneous samples. For homogeneous samples the ANTECH TGS can operate as an SGS using ANTECH ARTEMIS-2 software
- A single calibration constant can be employed for each radio nuclide determined due to the bias reduction inherent in the TGS technique
- Measures samples with Am-241 content which cannot be measured with neutron techniques
- Accuracy and precision sufficient to meet safeguards, shipping and disposal requirements

### *Features*

- Gamma-ray based NDA technique for the assay of U, Pu and radio nuclides in waste, based on licensed LANL TGS technology
- Incorporates Tomographic Gamma Scanner (TGS) Segmented Gamma Scanner (SGS) and plutonium Isotopic Ratio Measurement capability in one instrument
- Automatic gamma-ray energy calibration using the Se-75 transmission source
- Transmission corrections are achieved using SE-75 transmission source to develop a 3D spatial map of the attenuation coefficient of the sample
- Manual or automatic drum loading
- Measurement time of typically less than one hour. Increased accuracy and precision can be achieved by extending the measurement time
- Mobile operator control console which is compatible with both Drum TGS and UGS for cans, 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  $2\text{g/cm}^3$ . It is better than 10% for metal scrap matrices

## Description

The transportable Tomographic Gamma Scanner (TGS) was developed by the Los Alamos National Laboratory (LANL) in the early 1990's for the US DOE. The TGS uses transmission corrected, single photon emission computerized 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.

A further advantage of the TGS technique over the SGS is the ability to produce both attenuation coefficient and source (emission) images for each vertical segment of the sample can or drum. Typically the spatial resolution for the emission image is about 6cm for drums and 3 cm for cans.

As 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. Isotopic ratio analysis of Pu is performed using PC/FRAM code. An 8K channel spectrum is obtained for isotopic analysis during the TGS scans.



TGS with conveyor

The TGS Drum Scanner meets both US Nuclear Safeguards and DOE WIPP measurement and QA requirements.

## Specification

- Automation of 3 axes of motion.
- Germanium Coax detector efficiency 50%
- Digital MCA based on the ORTEC DSPec Plus.
- Overall instrument envelope: 1835mm long, 1512mm wide, 1785mm high
- Variable sample drum and can size to a maximum of 400L
- Ethernet communication from operator computer control console.
- 30-200mCi Se075 transmission Source.
- Cd-109 dead time source
- Adjustable collimator (Cans or Drums).
- TGS Analysis: typically 4800 4k channel spectra for each measurement.
- Isotopic Analysis: one 8k channel emission spectrum
- User friendly software runs under Windows NT4, is Y2K compliant and uses Nuclear Software QA requirements of NQA-1 (required for WIPP certification)
- Weight 1200kg
- Dimensions Pillar height 2.2M