NDA SYSTEMS
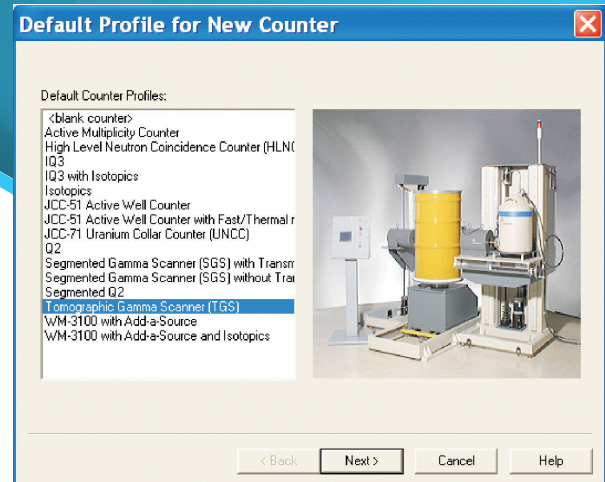
NDA 2000™

Non-Destructive Assay Software

FEATURES

- Supports all Mirion safeguards and waste assay systems

- Supports neutron and gamma-ray assay systems

- Based on the Mirion Genie™ 2000 platform

- Provides full control of data acquisition electronics

- Controls automated assay system operation

- Menu structure for ease of operation

- Customer editable report formats

- Multi-level password control

- Compliant with ISO 9001 and IEEE 730 requirements

- Developed in compliance with the requirements of ISO 9001 and the requirements of CAO QAPP, Document number CAO-94-1012, Rev 3, which specifies the WIPP quality program to be ASME NQA-1-1989, and ASME NQA-2-1990, Part 2.7

- Fully tested and compatible with the latest Windows 10 64-bit operating system

- Allows access to the full range of NDA system data analysis algorithms for challenging NDA measurement applications

DESCRIPTION

The Mirion NDA 2000 software is designed to be a complete acquisition, analysis and archival package for use with all Mirion neutron counters and gamma-ray systems. NDA 2000 software offers fully integrated neutron and gamma-ray analysis for either combined or sequential assay operations. NDA 2000 software is based on the Mirion Genie 2000 format providing the ease and flexibility of operation found in our popular gamma-ray spectroscopy applications. Various counter arrangements, detector arrangements, analysis sequences, hardware control, and reports can be generated from the standard software. This provides the advantage that as the customer's assay requirements change, the software can be easily adapted to handle the new requirements.

ANALYSIS MODES

NDA 2000 supports a variety of analysis types and algorithms to provide flexibility in sample assay. With the Genie 2000 Analysis Sequence Editor it is possible to select which type or types of analysis is to be performed for a given sample. A selection of the system and analysis types supported by NDA 2000 software are given in Table 1 on the following page.

SET UP

NDA 2000 software offers Simplified Start Up through the use of a wizard to step the user through the setup of a neutron or gamma-ray based assay system. For most standard system configurations, default counter profiles exist to facilitate initial system startup.

The user can select an existing counter or create a new one. The wizard then leads the user through the counter setup. The set-up wizard simplifies definition of new container and sample types as well as isotopic and mass reference files.

NDA 2000 | NON-DESTRUCTIVE ASSAY SOFTWARE

Table 1 - Analysis Options and System Types Supported by NDA 2000 software.

Quantitative Gamma-Ray Spectroscopy – Segmented Gamma-Scanning – Tomographic Segmented Gamma-Scanning – Multi-Detector Analysis (Q2) – Transmission Correction – Differential Peak Attenuation Correction
MGA /MGAU/FRAM Isotopics Analysis
Passive Neutron Counting – Totals Neutron Counting – Passive Multiplicity Analysis – Add-A-Source Matrix Correction
Active Neutron Counting – Differential Die-Away – Cf-252 Shuffler Support (future release) – Active Well Coincidence – Active Neutron Collars
Simultaneous Neutron-Gamma Assay – On-Site Laboratory Counters – Integrated Waste Assay System
Automated Drum Handling
Gamma-Ray Box Counting
PNCC Waste Crate Assay System
Automated Waste Assay (AWA) Review

NDA 2000 software provides complete and flexible control of the assay system and its configuration. For example, the software supports Multiple detector geometries allowing (for those systems with the applicable hardware requirements):

- Automated detector positioning.
- Automated attenuator selection and setting.
- Automated selection of configuration specific calibration.
- Container specific efficiency calibrations.
- Support of multiple dosimeters for drum exposure rate measurements.

OPERATIONS
Following setup, operation can be as simple as a single click of the mouse where a full assay sequence is launched requiring little or no operator intervention.

The software accommodates neutron, gamma and integrated data acquisition systems. Integrated gamma-neutron assay sequences can acquire this data simultaneously, sequentially or independently. Following completion of both measurements, the neutron and gamma-ray assay results can be combined automatically even if the measurements were performed days apart.

The Genie 2000 Quality Assurance software, required with NDA 2000 software, provides daily measurement checks on the system performance. The software can be configured to enforce the use of the quality control checks and ensure that system operating parameters such as efficiency, resolution, or background levels are within the desired bounds.

MECHANISM CONTROL
The NDA 2000 software communicates with Mirion's Model 2445 line of GE/Fanuc PLC controllers (support for other PLC models can be provided at additional cost). These are used to control the mechanism and automation function on all recent Mirion waste systems. A standard command format in the applications software allows one set of commands in the NDA 2000 software to perform a variety of mechanical functions based on the programming of the PLC control system.

For systems incorporating a PLC control mechanism control is provided for optional equipment such as:

- Transmission Source Shutters.
- Load Cells for weight measurement.
- Variable attenuator assembly.
- Dosimeters for surface exposure measurements.
- Material handling systems (for example conveyors).
- Turntables.

GENIE 2000 BASED
The heart of the NDA 2000 software is the Mirion Genie 2000 Spectroscopy software package. The NDA 2000 software can utilize all of the features of the Genie 2000 software including:

- The Editors – Nuclide library editor, analysis sequence editor, certificate file editor and MCA input definition editor.
- All Genie 2000 Analysis Algorithms – Peak search and peak locate algorithms, library driven search and analysis algorithms, area correction algorithms, calibration algorithms, nuclide identification algorithms, MDA and Total Measurement Uncertainty algorithms, etc.
- All Genie 2000 QA trending and plotting capabilities.
- All Mirion Instrument Control Bus (ICB) NIM setup, adjustment, and status commands.
- Full storage of all data, setup parameters, calibration parameters, and analysis results in a file structure that facilitates review of data or reanalysis of questionable results.

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MULTI-DETECTOR GAMMA-RAY SYSTEM SUPPORT

NDA 2000 software supports the operation and analysis of multi-detector systems such as the Q2™ and Auto-Q2 system. NDA 2000 software allows the following functionality:

- Acquire data from multi-detector assay systems with simultaneous start/stop of all detectors.
- Analyze spectra from each detector individually.
- Analyze the summed spectra for greater sensitivity.
- Attenuation correction using weight based density measurement.
- Attenuation correction using gamma-ray transmission measurements.
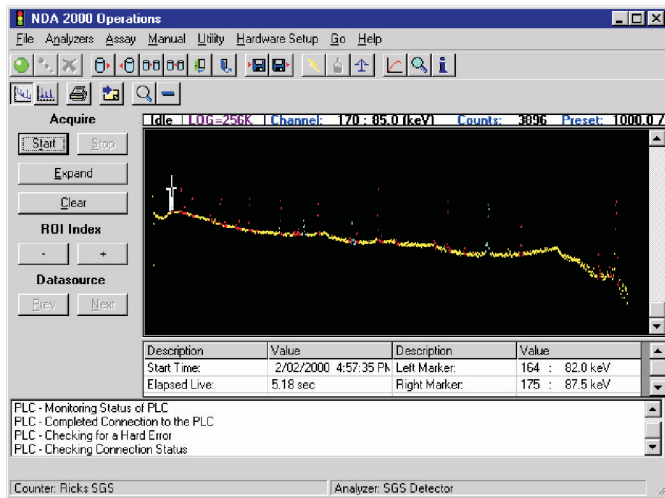- Efficiency calibrations using ISOCS™ software.

Figure 2 – Genie 2000 software capabilities for live display and analysis of gamma-ray spectra.

REPORTS

A variety of standard reports have been created for the standard waste system configurations at Mirion. However, a special feature of Genie 2000 and the NDA 2000 software is the capability for the customer to edit existing or create new report templates which will fit particular site requirements. All report structures can be easily edited in a standard ASCII editor. Any parameter which is stored in the CAM file can be included in a report. In addition, results can be scaled or combined using the basic arithmetic operations of addition, subtraction, multiplication or division.

LOG BOOK

The NDA 2000 software allows storage of key assay results into a Microsoft Access database. Access reports are provided and data reports can be modified from Access. (Note that Microsoft Access is not required but is recommended in order to take full advantage of the software's capabilities).
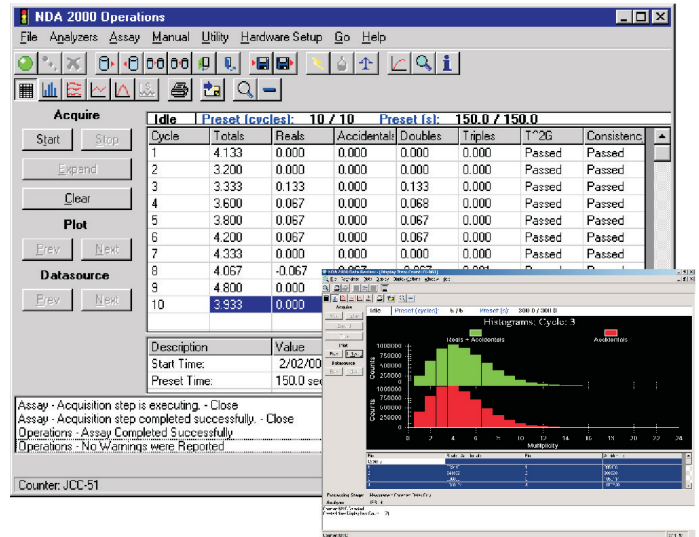
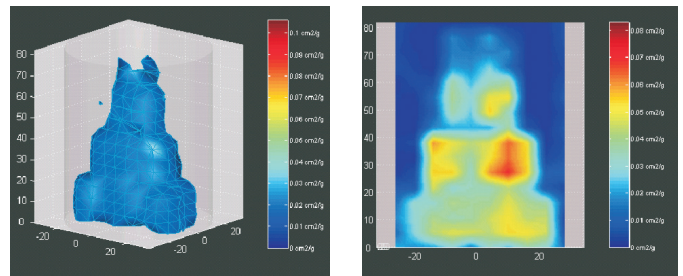Figure 3 – Neutron data may be examined live in tabular or graphical form.

Figure 4 – NDA 2000 software provides full support for the TGS™ Tomographic Gamma System. The TGS viewer provides false color transmission and emission images of the drum contents to facilitate interpretation of results from complex waste streams.

REANALYSIS

Analysis is performed automatically during and following completion of the assay. The data may also be completely reanalyzed using the Data Review menus. Data storage utilizes the Genie CAM file format. Not only are all raw data and results stored but also the parameters used in the analysis. Reanalysis allows the modification of all calibration parameters to provide a powerful tool for expert review of the data. Data files may be reanalyzed one at a time or if many assay results require the same parameter correction, a batch reanalysis capability is provided.

MIRION TECHNOLOGIES

3

TOTAL MEASUREMENT UNCERTAINTY (TMU)

NDA 2000 software calculates a total measurement uncertainty for each assay based on the measured and entered data for the container. The TMU analysis includes error sources such as calibration errors, counting statistics, matrix effects, non-uniform source distribution, non-uniform matrix distribution, self shielding, and multiplication effects. The TMU approach is consistent with that required for waste characterization of drums destined for the WIPP facility. For each application, Mirion works closely with the site team and develops bespoke TMU algorithms as appropriate to ensure all local and project - specific requirements are met.
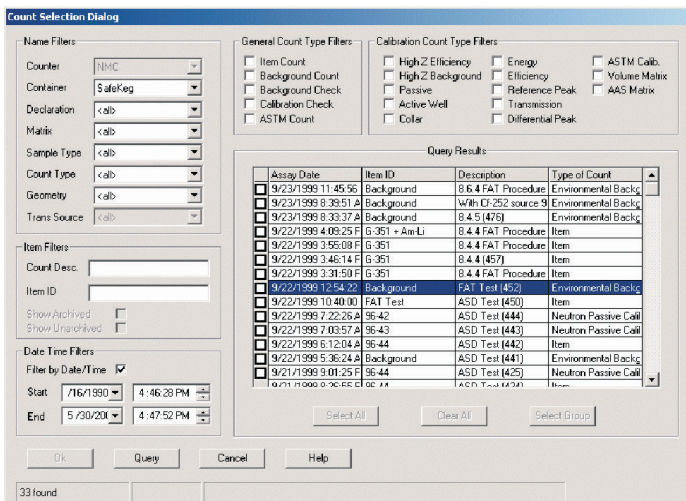

Figure 5 – Full re-analysis capability is provided. NDA 2000 software provides capabilities for reanalysis of individual assay results or large groups of files using the batch reanalysis feature.

SPECIFICATIONS

ORDERING REFERENCES

NDA 2000 software is normally sold in a package with all other required Mirion software. The package is dependent to some extent on the intended use of the software (e.g., neutron only).

NEUTRON ACQUISITION ONLY
- S529 – NDA 2000 Non-Destructive Assay Software
- S500 – Genie 2000 Basic Spectroscopy Package
- S505 – Genie 2000 Quality Assurance Software

GAMMA-RAY ACQUISITION AND INTEGRATED SYSTEMS
- S529 – NDA 2000 Non-Destructive Assay Software
- S500 – Genie 2000 Basic Spectroscopy Package
- S501 – Genie 2000 Gamma Analysis
- S505 – Genie 2000 Quality Assurance Software
- S507 – MGAU™ Software (Optional)
- S508 – MGA™ Software (Optional)
- S573 – ISOCS Software

ISO 9001 SYSTEM CERTIFIED

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