Alpha Spectroscopy Data Management and Analysis Software for the Busy Counting Laboratory

- **A completely integrated and network-ready solution to alpha-spectroscopy needs, large and small**
- **Flexible analysis modes and custom reporting**
- **Microsoft Access® compatible database storage of data and results: Easy LIMS (Laboratory Information Management System) interfacing**
- **QA meets ANSI N42.23 and N13.30**
- **Detector control and status monitoring of up to 256 detectors on a single display**
- **On-line help feature**

AlphaVision-32 V5.3 is the newest evolutionary advance in data management and analysis software for alpha spectroscopy in the "production environment". The design of such a solution requires that it be as easy as possible to make the "same" analysis over and over with replicate samples, but with built-in flexibility for a wide variety of sample types. AlphaVision incorporates flexibility in analysis methods and reporting formats, industry standard data structures and connectivity to LIMS systems, as well as the ability to control multiple (up to 256) detector systems from a single screen operating in the Windows® 2000/XP environment.

While the flexibility of AlphaVision-32 is immense, a set-and-forget design philosophy means that this flexibility is not a hindrance to simple routine operation. According to current Windows convention, the analysis processes are easily customized using a batch "wizard". Once this has been done, analysis sequences are initiated at the click of a mouse.

Complete Sample Management

Key features include:
- Powerful detector control and status for up to 256 detectors on a single display
- Intuitive "point and click" operations for all features; familiar Windows menu and command operations
- "Set and Forget" analysis setups for reliable, consistent analyses
- Dynamic detector, chamber, calibration, and process QA monitoring
- Integrated online help with built-in searchable index
- Flexible reporting capability through Access and Seagate Crystal Reports®
- Unique count-to-MDA preset capability
- Mutiple dilution options:
    - Add tracer to whole sample; analyze whole sample
    - Add tracer to whole sample; analyze aliquot
    - Add tracer to whole sample and make up to 2 dilutions
    - Add tracer to aliquot and analyze aliquot

Database

The Access-compatible database is provided for secure data archival. It is compatible with Crystal Reports, and comes complete with standard reports for Analysis, Calibration, Background, Pulser Tests, and QA/QC. These features are designed to dramatically enhance data handling processes. All spectra, analysis, and QA data are now stored in a database rather than in individual .SPC files. This results in improved data manageability, efficiency, and flexibility. Database management tools are provided.

LIMS Interfacing

The Batch Wizard feature of AlphaVision-32 V5.3 enables automatic transfer of sample information from a LIMS (Laboratory Information Management System). Sample ID, Sample Volume and Mass, Sample Collection Date and Time, Decay Correction Date, Laboratory Preparation Date and more, are easily transferred directly from the LIMS; reducing the risk of transcription error, eliminating a time-consuming step in the sample-data management process, and reducing the overall cost-per-sample. The Access database archive allows extraction and transfer of analytical results back to the LIMS. Integration with a specific LIMS is a simple programming task; details are provided in the AlphaVision-32 V5.3 manual. ORTEC will provide such programming services on request for a modest fee; actual cost will vary according to specific requirements.

Flexible Output Options

Choose the standard reports (Analysis, Background, Calibration, and QA) included with AlphaVision-32 V5.3 or create custom reports using Crystal Reports or Access. A graphical representation of the spectral data is included in the one-page standard reports supplied with the software. All analysis details are included in the Access database for easy, customized reporting needs.

The Report Window.

Library Management

A built-in library editor provides simple creation and editing of calibration, tracer, and analyte libraries. Libraries may be created and downloaded from ORTEC's Nuclide Navigator III (optional) or created directly from the Master Library included with AlphaVision-32.
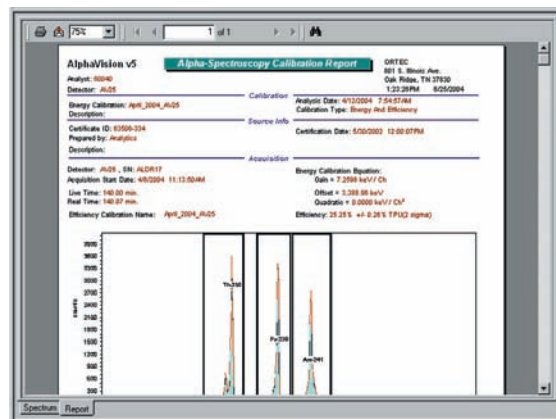
Security

AlphaVision-32 V5.3 offers a data-management and hardware-operation security process that enables a system manager to restrict users' access at an appropriate level; QA data, analysis data, editing of tracers, controls and calibration source data and archive processes.
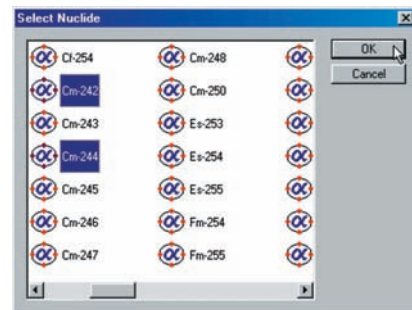
Analysis Methods

AlphaVision-32 V5.3 has immense built-in analysis flexibility, including:
- Region-of-Interest (ROI) or peak search and fit spectrum analysis
- Interactive or "production" analysis modes
- Internal or external tracers; No-tracer analyses
- Sample and tracer decay corrections
- Tracer contamination correction
- Background analyses with blank subtraction option
- Choice of Flexible Detection Limit Formalisms
- Detector quality control analyses
- Process quality control analyses
- User defined sample analyses
- Flexible Calibrations with Calibration Explorer for easy review

Select Library Nuclides with a Few Mouse Clicks.

Peak Finding and Area Determination

Peak Area Determination by Region-of-Interest (ROI)

The region-of-interest (ROI) analysis technique is the primary method for spectrum analysis when the peak locations and shapes are well-known and reproducible. This analysis technique provides integration of counts between a start and end channel and includes user options for background count subtraction and peak location (calibration) adjustment based on tracer peak location and width. ROI's may be specified in energy or in channels; analysis of spectra gathered on detectors with differences in gain/offset and number of channels are handled easily by this means.

Peak Area Determination by Peak Search

AlphaVision-32 V5.3 offers a choice of peak search and fit algorithms. The methods enable deconvolution and analysis of complex spectra with accuracy and reliability. There are two peak search algorithms to choose from: Mariscotti 2nd Derivative[1] and Top-Hat Correlation[2].

In addition, a library-driven peak fit technique adds user (library) provided nuclide information to assist in the most complex deconvolutions.

Interactive Spectral Analysis mode allows an easy way to modify regions of interest and update analysis results.

Sample Activity Calculation

Once the peak area has been determined, either via ROI analysis or as a result of the peak search (library search) techniques, the sample activity is calculated using one of two methods:

Absolute Analysis

With the detector efficiency known, the sample activity is calculated directly from the analyte peak areas, with no correction for an internal tracer. Manual chemical recovery values, (i.e., from an external tracer), can be added by the user.

Relative or "Tracer" Analysis

Using the relative analysis technique, the sample results are modified by the ratio of tracer activity found to the tracer activity added. This calculation is performed concurrently with the analysis and is completely automatic. Chemical recovery values can be tracked by the built-in QA features, and tracer contaminants which may affect analyte results can be automatically subtracted during the analysis.

Tracer analysis options include Internal or External (non-alpha-emitting) tracers, corrections for tracer contamination and tracer decay. Multiple dilution options are provided to allow for flexibility when tracer and sample are mixed and in what way. (aliquot or total).

Flexible Detection Limit Calculation Options

AlphaVision-32 V5.3 includes the capability for Minimum Detectable Activity (MDA) and Critical Level (Lc) calculations using (user selectable) background or batch blank options. The user can select a default ANSI N13.30 equation or choose the general Currie equation for estimating the detection limits. The standard analysis report displays MDA and Lc based on ANSI N13.30 and N42.23 in user-defined units.

System Calibration

AlphaVision-32 V5.3 provides energy and efficiency calibrations, based upon calibration standards. The calibration process may be done interactively (a manual calibration), or automated according to user needs. The calibration is written to the Access compatible database and may be browsed using the calibration Explorer. Calibration data records include the record Name, acquisition Date, Calibration ID, Gain, Offset, and Efficiency. A complete history of calibration analyses and results for each detector is simply displayed. For analyses in which an internal tracer is used, the efficiency calibration can be used to determine the chemical recovery factor.

Interactive Spectral Analysis

Graphical review and built-in plot generation provide advanced tools for spectral reanalysis. Analysis (initial), Reanalysis (create a new analysis), Update Analysis (update/overwrite information or analysis parameters for an analyzed spectrum) are all provided. For ROI analysis, a built-in interactive reanalysis tool provides graphical adjustment of analysis regions by energy or by channel. Peak search and fit parameters may be adjusted to create a new analysis for comparison or to update a current analysis.
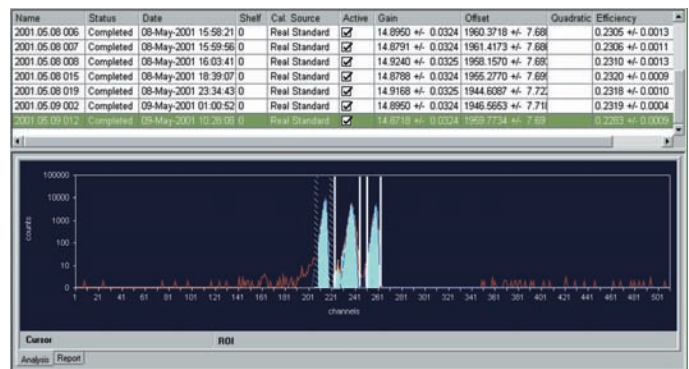
Calibration Explorer Panel.
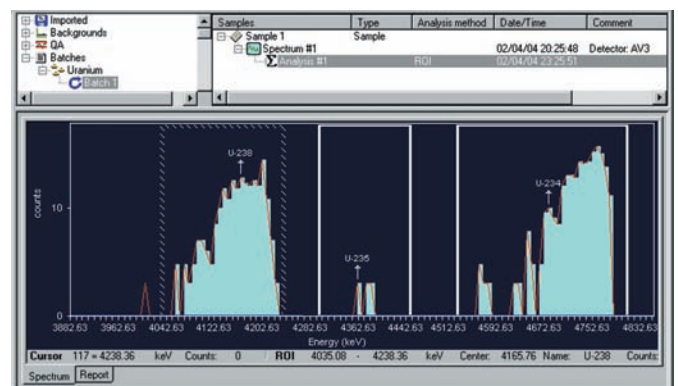
Reanalysis is Complete, All ROIs have Shifted, and the Analysis Date has Updated.

Quality Assurance

Built-in Quality Assurance provides the tools needed to meet the QA recommendations of ANSI N42.23 and ANSI N13.30. Dynamic built-in control charting and QA reporting features can monitor and trend the entire analysis process with warning and alarm limits, control charts, and tabular reports for any or all of the following:

- Chamber Background
- Energy and Efficiency Calibration
- Standard Sample Activity
- Control Sample Activity
- Reagent Blank Activity
- Tracer Peak Shape
- Chemical Recovery
- Pulser Amplitude and Width
- Detector Bias (OCTÊTE PC®, OCTÊTE™-Plus and Oxford Oasis™)
- Sample Chamber Pressure (OCTÊTE PC, OCTÊTE-Plus and Oxford Oasis)

QA Panel, Detectors Tab.

QA monitors are easily tailored to specific laboratory needs. Control charts by week, month, quarter, or user-defined date range, with warning and alarm limits displayed on each chart are available. Each chart may be viewed interactively, allowing examination of data from any monitored parameter. A QA "date tool" enables the user to instantly produce a historical snapshot of detector performance.

Prerequisites

Any ORTEC MCB. Recommended MCB's include: 920-8, 920-16, 920E, OCTÊTE-PC, and OCTÊTE-Plus. Alpha chambers, such as: 576A, 676, AlphaKing, Soloist, TC256, Canberra 7401/7404 supported through ORTEC MCB's. Also supports Oxford Oasis.

AlphaVision-32 V5.3 requires the Windows 2000 or XP operating systems.

Any computer capable of running the above stated operating systems.

Ordering Information

Model	Description
A36-B32	AlphaVision-32 V5.3 standalone or first network copy (includes documentation and Binary Use License)
A36-G32	Additional documentation for A36-B32
A36-K32	Upgrade from A36-BI to A36-B32
A36-K32-D	Upgrade from A26-BI to A36-B32 or A36-N32
A36-N32	Multiple user add-on (includes BUL, disks, and documentation)
A36-U32	Update for A36-B32 or A36-N32 (requires BUL from any version of AlphaVision-B32)

Example: For a three-station network, order one copy of A36-B32 and two copies of A36-N32.
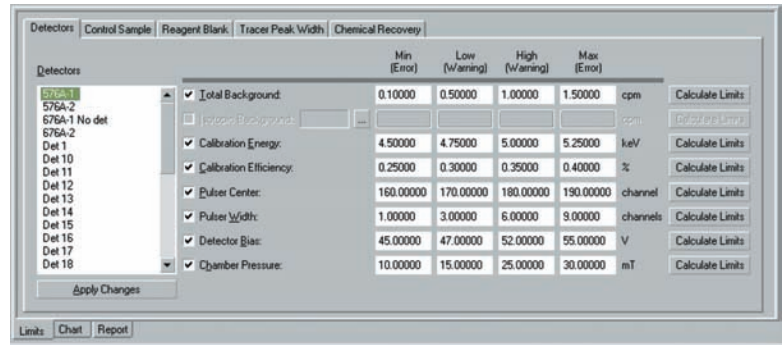
[1]M.A. Mariscotti. "A Method for Automatic Identification of Peaks in the Presence of Background and its Application to Spectrum Analysis," *Nuclear Instruments and Methods* 50, 309–320 (1967).

[2]K. Debertin and R.G. Helmer. *Gamma- and X-Ray Spectrometry with Semiconductor Detectors*, Elsevier Science, 1988.

(If peak shapes are well-controlled (through good sample preparation) the Top-Hat method is likely to yield better results than the Mariscotti method in which peak width is a free parameter.)

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