ORTEC®

FoodGuard-2™

Food and Water Contamination Monitoring System for Microsoft® Windows® 7

System User's Manual

Software Version 1

FOR HARDWARE SETUP, SEE
THE FOODGUARD-2 SYSTEM
INSTALLATION GUIDE (P/N 932550)

Advanced Measurement Technology, Inc.

a/k/a/ ORTEC®, a subsidiary of AMETEK®, Inc.

WARRANTY

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NOTE!

We assume that you are thoroughly familiar with Microsoft®
Windows® usage and terminology. If you are not fully acquainted
with the Windows environment, including the use of the mouse,
please take time to familiarize yourself with a few simple
Windows applications before proceeding.

1. INTRODUCTION

The FoodGuard-2 laboratory workstation is an easy-to-use system based on standard, high-resolution ORTEC gamma-ray spectroscopy components. It is ideal for the precision determination of radioactive contamination in food, water, or other environmental samples, due to accident or terrorist incident. It uses a cryogenically cooled, high-purity germanium (HPGe) detector to quantify the gamma-ray-emitting radionuclides in food, water, and environmental samples in Bq/kg or Bq/L. The system complies with current required detection limits for monitoring of food samples. It can also be used in any area of high-resolution gamma-ray spectroscopy. The system is complete, pre-calibrated, and configured when delivered.[1]

FoodGuard-2 consists of a high-purity germanium (HPGe) detector in a lead shield, a DSPEC Pro® multichannel analyzer/buffer (MCB), and a PC running under Microsoft® Windows® 7. The turnkey system includes a 60-day, full-feature, trial license for our GammaVision®-32 Gamma-Ray Spectrum Analysis and MCA Emulator (A66-B32). GammaVision and the optional ANGLE Advanced Efficiency Calibration Software let you create calibrations for different sample compositions and system geometries.

Samples are measured by placing the material of interest in a 2 liter Marinelli beaker. The beaker is then placed on the detector in the shield. The operator enters the identification data for each sample on the FoodGuard-2 software's data screens. The software collects the data, analyzes the spectrum using our workhorse WAN-32 analysis engine, checks the results against allowable limits, and prints the report. The spectra and reports are also saved on the PC. Samples that exceed user-defined alarm limits are noted onscreen and in the report.

There are two workflow divisions in the FoodGuard-2 software:

- **Administrator Mode** — Password-protected system configuration and reporting functions. These functions include setup of sampling locations, sample types, test laboratory code(s), radionuclide libraries and alarm limits, and report contents (Sections 3.2 and 3.3); running calibration checks on the detector (Chapter 3.4); and generating reports on sampling results (Section 3.5) and measurement statistics (Section 3.6).

- **Operator Mode** — No password is required to access the sample measurement function. Chapter 2 provides quick-reference instructions followed by a more detailed discussion.

For additional information on the system hardware, software, and options, see their respective user's manuals or consult your ORTEC representative. For details on the WAN-32 analysis engine, see the accompanying GammaVision user's manual.

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[1]Some users will prefer to expand existing systems, so the components can also be ordered individually.

For in-depth discussions of food monitoring, monitoring standards, methods, and equipment, visit the "Food, Water, and Environmental Monitoring" webpage at our website, www.ortec-online.com.

1.1. Installation

For hardware and software installation, see the accompanying FoodGuard-2 *System Installation Guide* (P/N 932550).

1.2. General System Information

The specifications for the hardware and software in your FoodGuard-2 system[2] can be found in the respective components' user manuals, and at our website, www.ortec-online.com.

1.2.1. Files, Filenaming Conventions, and Data Backup

All files generated during a sample measurement have the same base filename (see Section 1.2.1.2).

File Type	File Name(s)	Description
Sample measurement database	STATREC-2.DAT	Contains the analysis results for each sample measurement. The report for a sample is generated using its entry in STATREC-2.DAT plus the .JPG image of its spectrum.
Spectrum and analysis files	.SPC, .UFO, .XML	Each sample measurement generates an ORTEC .SPC-format spectrum file, its corresponding .UFO analysis results file, and an .XML file.
Library files	.LIB	Default and user-defined nuclide library files can be edited with GammaVision's library editor tool or in our optional NuclideNavigator®-III program.
Report files	.HTML, .JPG	Each sample measurement creates an .HTML report paired with a .JPG image of the spectrum. Can be read in any web browser or word processor.
Reports in portable document format	.PDF	Optional report format, can be viewed with Adobe® Reader® or any other PDF reader utility.
Alarm limits	Limits.config	.XML file contains the limits for all factory-supplied and user-created **Limits Libraries**.

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[2]Components and specifications subject to change without notice.

File Type	File Name(s)	Description
All other system parameters	Parameters.config	.XML file contains all other setup parameters, including the entries on the Parameters tab and current Setup tab entries.
Calibration check files	CalCheck.SPC, CalCheck.UFO	The ORTEC .SPC-format spectrum file and corresponding .UFO analysis results file for the current calibration.
[Analysis settings]	Default.Fdf	This file controls the analysis engine. Its contents are fixed.
[Diagnostic files]	Wan32.rpt, CalChk.rpt	—

If you update or uninstall the FoodGuard-2 software, only the software application files are removed. *All analysis and spectrum files, user-created calibration and limits library files, and reports remain on your PC.* In keeping with best practices, we recommend that you back up your data periodically, and especially before updating or uninstalling FoodGuard-2.

1.2.1.1. Backing Up FoodGuard-2 Data Files

The easiest way to back up your files is to capture the entire C:\User\FoodGuard-2 folder, along with any user-created calibration (.CLB) files. This preserves the folder names and relationships. After backup, you may (1) delete records from the STATREC-2.DAT file as described in Section 3.6.1; or (2) exit the program, delete the STATREC-2.DAT file, and restart the program. In the latter case, FoodGuard-2 will automatically create a new, empty STATREC-2.DAT file. ***There is no undo for these deletions***.

1.2.1.2. File Names and Sample Code Format

All the files for a particular measurement share the same 24-character[3] base filename, formatted as follows. This is also the required format for **Sample Codes** (Section 3.3.4).

$$[SN]-[LC]-[YYYYMMDDhhmm]-[DC]-[nn]$$

where SN is the 2-character Sample Name code, LC is the 2-character Location Code, YYYYMMDDhhmm is the sample collection date and time, DC is the 2-character Department Code, and nn is the 2-digit *sequence number* defined in the next paragraph.[4]

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[3]Invalid characters are < > : " / \ | ? . * (angle brackets, colon, double quote, slashes, pipe, question mark, period, asterisk).

[4]Location and Department codes must be predefined on the Parameters tab(Section 3.2). Sample Name codes must be predefined on the Alarm Setup page of the Setup tab, as described in Chapter 3.3.

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Sequence Number

This is a "bookkeeping" number that ensures each sample measurement has a unique base filename. It comes into play in two cases: (1) when you use the **Keep Counting** feature during a sample measurement (page 12 in Section 2.3); and (2) when you receive a group of samples marked with the same collection date and time, and are using the **Sample Code** data entry method (Section 3.3.4).

Sequence numbers range from 00 through 99. When auto-assigned by the system, they are assigned consecutively and automatically roll over after 99. When drawing up the list of **Sample Codes** an operator will manually enter, you can assign sequence numbers in any order. Samples can then be measured in any order, regardless of the sequence number.

1.2.2. Factory Default DSPEC Pro Settings

The data acquisition settings for the DSPEC Pro MCB are factory-set as follows. ***Do not change any hardware settings, including the detector high voltage, or the system will not perform according to design specifications***. If you are using the ORTEC ANGLE or GammaVision program to create alternative calibrations for your system, be sure to use the factory default settings for your system. For more information, contact your ORTEC representative or our Global Service Center.

- Conversion gain   16k channels
- Upper-level discriminator   16000
- Lower-level discriminator   200
- Coarse gain $4\times$
- Fine gain   As needed to position the 1332.5 keV peak of ^{60}Co in channel 7277 $\pm$40.
- Rise time   12 µs
- Flattop width   1 µs

1.3. Manual Contents

- Chapter 2 gives quick-reference instructions on sample measurements, then provides more detailed information on the procedure.

- Chapter 3 covers all password-protected, administrative software configuration steps.

A PDF-format copy of this manual is also on the installation CD.

2. MEASURING SAMPLES (OPERATOR MODE)

This chapter jumps directly to the instructions for routine sample measurements. Before you can measure samples, the FoodGuard-2 system must be set up and calibrated according to the instructions in Chapter 3. Setup requires password access.

2.1. System Startup

To start the software, enter **foodg** in the "search programs and files" box, then click on the **FoodGuard-2** search result; or open the Windows Start menu and click on **FoodGuard**, then **FoodGuard-2** (Fig. 1). The software takes 5–15 seconds to initialize. If the detector high voltage is not already on (if, for instance, the DSPEC Pro has been powered off since the last work session), it will automatically turn on and stabilize for 30 seconds before samples can be measured.
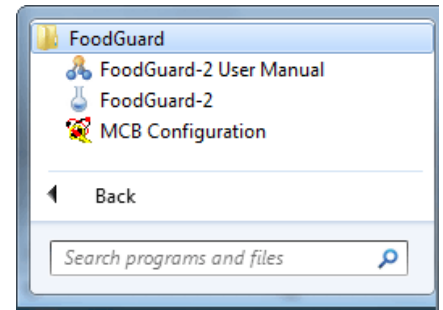

Fig. 1. Start FoodGuard-2.

FoodGuard-2 always opens on the Run screen (Fig. 2), which displays the current sample measurement settings, which are pre-configured on the Setup tab (setup requires a password).
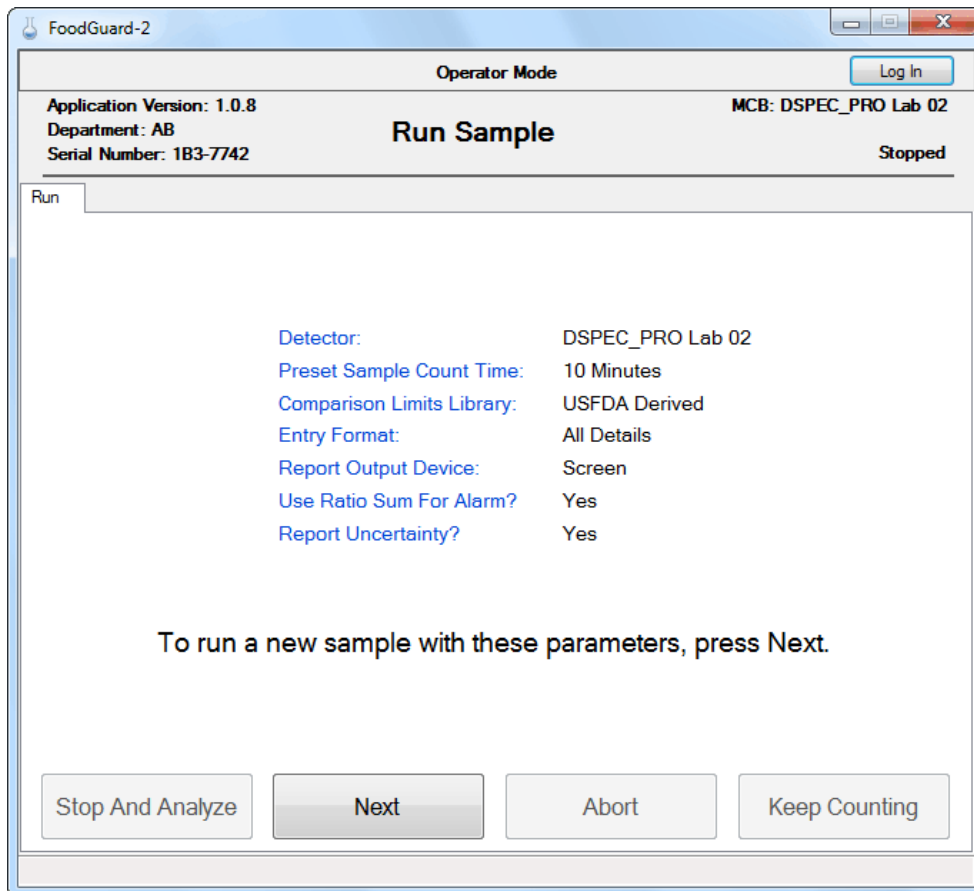

Fig. 2. The Opening Screen (always opens on the Run tab).

NOTE On startup, if the Run screen displays a red "Detector is not ready" message, make sure the DSPEC Pro is powered on, and confirm all detector and USB cabling. If you do not have a password, exit and restart the FoodGuard-2 software to clear the error message. If you have a password, click on the Setup tab and switch immediately back to the Run tab.

2.2. Quick Reference: Daily Work Flow

This section lists the basic steps for measuring sample radiation with FoodGuard-2. These stpes assume the system is fully configured, the detector is cooled to operating temperature, and the detector high voltage is on. For details on sample measurement, including illustrations, see the following section.

☞ Prepare the sample in a 2 L Marinelli beaker.

☞ Put the sample beaker on the detector in the shield and close the lid.

☞ On the **Run** tab, click on **Next** to accept the counting parameter summary shown on the screen[5] and move to the run setup screen.

☞ For easy data entry, the Run setup screen remembers all the previous measurement's settings except the date, time, and comments.

— If this is an **All Details** count, on the next screen select the **Sample Type**, **Sample Name**, **Sample Location**, **Operator**, **Collection** date and time, **Sample Weight**, **Food Origin**, and optional **Comments** (up to 500 characters). You may also have the option of choosing the detector **Calibration** file.

— If this is a **Sample Code** count, on the next screen enter the **Operator**, the 24-character **Sample Code**, the **Sample Weight**, **Food Origin**, and optional **Comments** (up to 500 characters). You may also have the option of choosing the detector **Calibration** file. Be sure each sample has a unique code. If you accidentally re-use the preceding code, you will create two measurements with the same 24-character identifier. The Reports page will show both measurements; but all of the spectrum, analysis, and report files for the first measurement will be overwritten with the data from the second measurement.

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[5]Setting the counting parameters requires password access.

In both cases, it is important that you enter the correct codes because they are used to catalog the results for later studies and to locate records for reporting.

☞   When you are satisfied with your selections, click on **Next** to begin the count. FoodGuard-2 will collect the spectrum for the preset time. During the measurement, the screen will display a spectrum window and progress bar.

☞   At the end of the count, the data will be analyzed, a report will be generated, and the results will be displayed on the Run tab. If the report is being displayed onscreen, you may leave the report window open from sample to sample, if you wish. For instructions on using the **Abort**, **Stop And Analyze**, and **Keep Counting** buttons, and the spectrum window controls, see page 11.

☞   Any activity above the alarm limits will be posted in red on the status bar at the bottom of the FoodGuard-2 window, and noted in the "alarm" column on the report.

☞   Click on **Next** to return to the counting parameter summary screen and prepare for the next sample.

2.3. Detailed Instructions

NOTE On startup, if the Run screen displays a red "Detector is not ready" message, make sure the DSPEC Pro is powered on, and confirm all detector and USB cabling. If you do not have a password, exit and restart the FoodGuard-2 software to clear the error message. If you have a password, click on the Setup tab and switch immediately back to the Run tab.
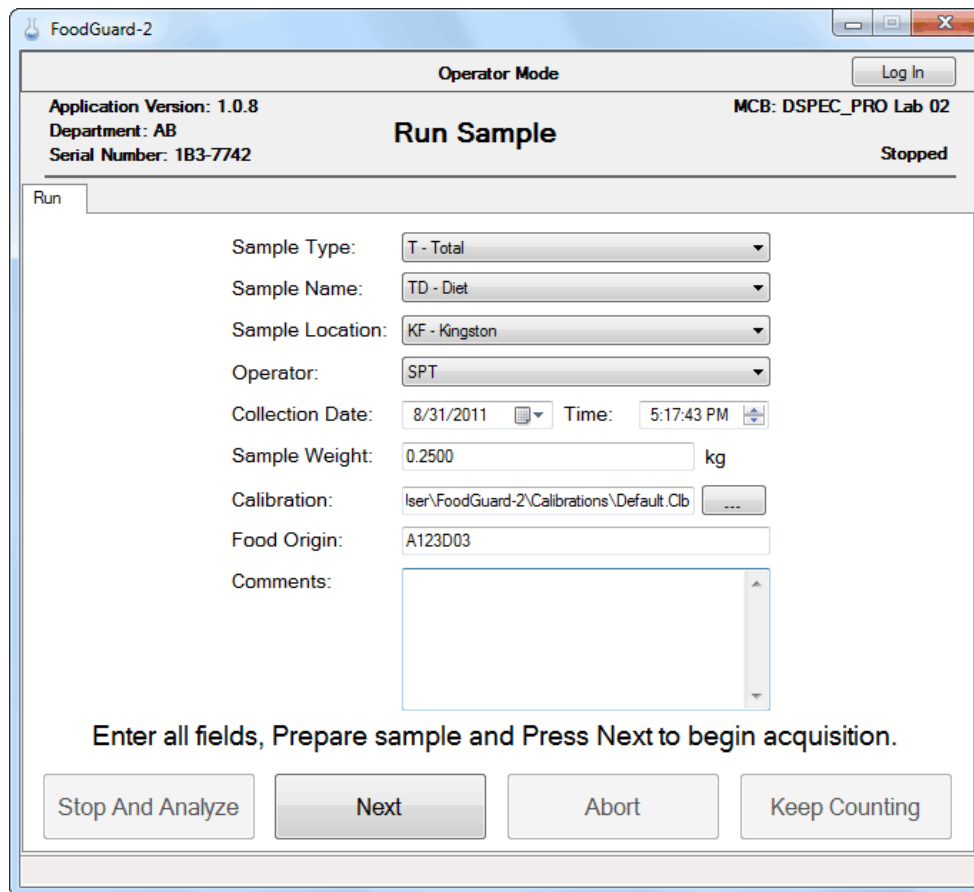
If for any reason the DSPEC Pro's high voltage is off, it will automatically turn on, then stabilize for 30 seconds.

1) Click on **Next** to accept the counting parameter summary (Fig. 3) and move to the run setup screen.
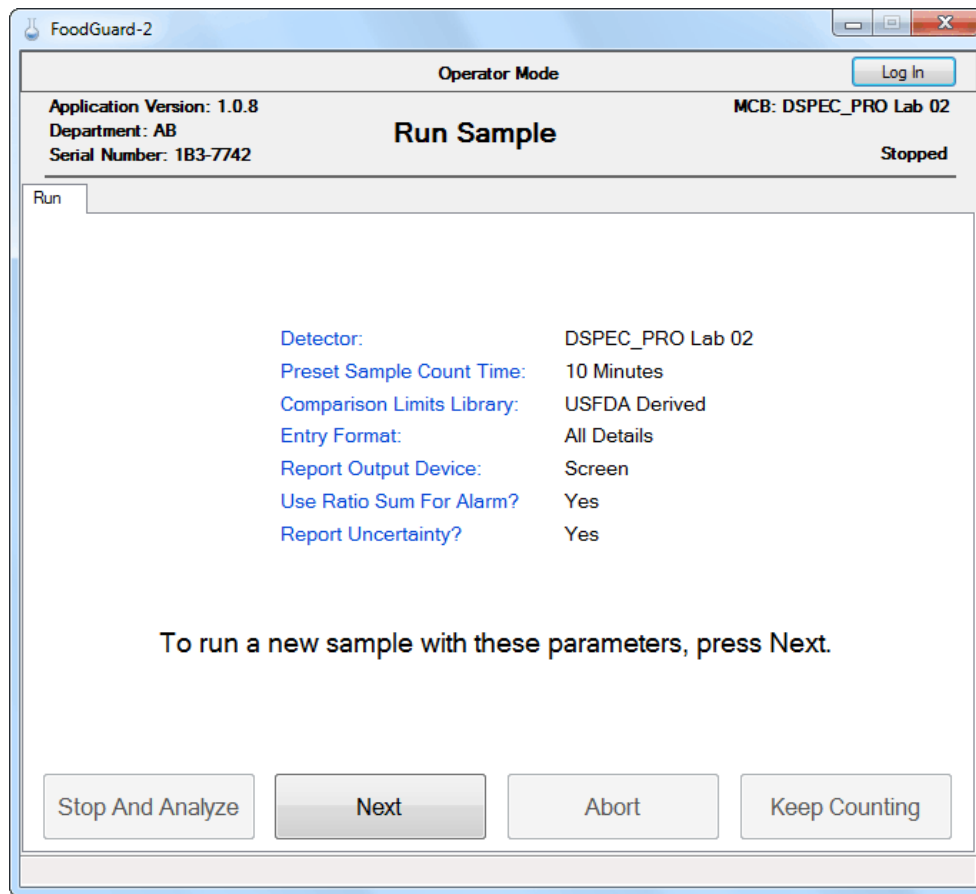
Fig. 3. Click "Next" Accept the Sample Count Parameters.
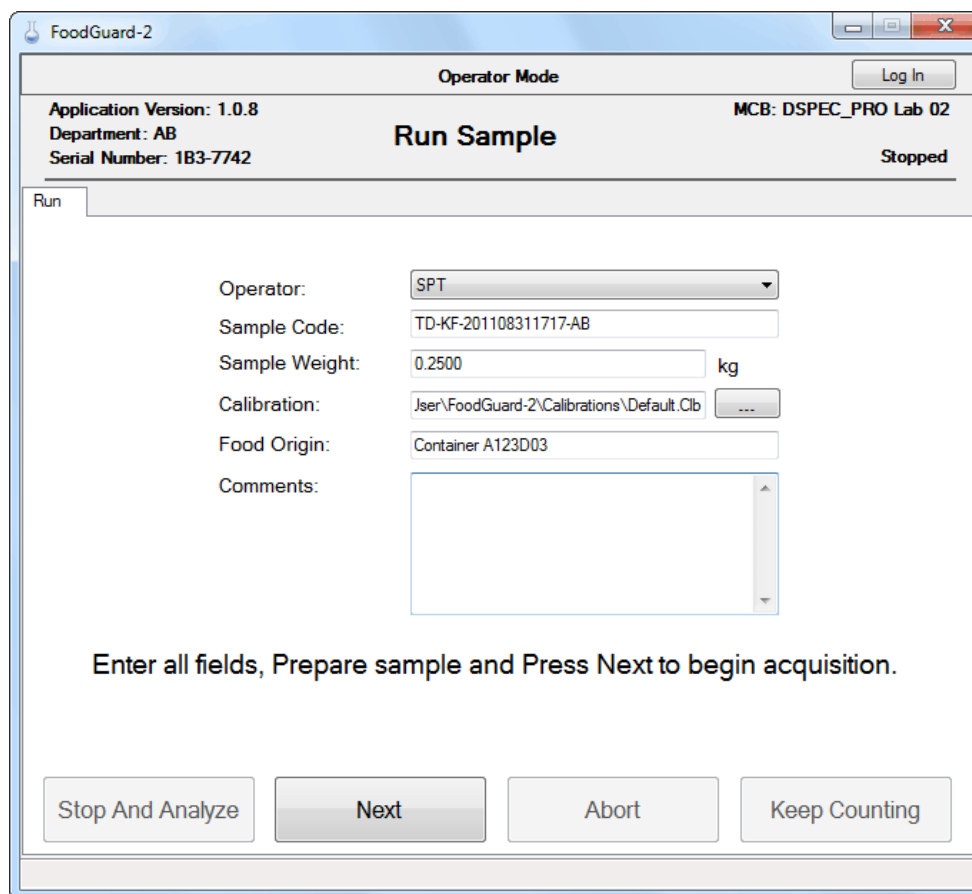
2) The appearance of the run setup screen will depend on the currently selected **Entry Format**. In both cases, the run setup page will remember all the previous measurement's settings except the date, time, and comments.

- If this is an **All Details** count, the screen will appear as shown in Fig. 4. Select the **Sample Type**, **Sample Name**, **Sample Location**, **Operator**, **Collection** date and time, **Sample Weight**, **Food Origin**, and optional **Comments** (up to 500 characters). You may also have the option of choosing the detector **Calibration** file.[6]

Fig. 4. The "All Details" Entry Format.

- Figure 5 shows the screen for a **Sample Code** count. Sample codes must contain 24 characters, formatted as described in Section 1.2.1.2. Enter the **Operator**, **Sample Code**, **Sample Weight**, **Food Origin**, and optional **Comments** (up to 500 characters). You may also have the option of choosing the detector **Calibration** file.[6]

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[6]If your system is not set up to use multiple calibration files, the **Calibration** field shown in Figs. 4 and 5 will not be displayed.

Fig. 5. The "Sample Code" Entry Format.

Be sure each sample has a unique code. If you accidentally re-use the preceding code, you will create two measurements with the same 24-character identifier. The Reports page will show both measurements; but all of the spectrum, analysis, and report files for the first measurement will be overwritten with the data from the second measurement.

IMPORTANT

In both cases, it is important that you enter the correct codes because they are used to catalog the results for later studies and to locate records for reporting. Suppose you assign a sample code that contains an incorrect sample collection date — for example, May 23, 2011 at 12:00:00, when the sample was actually collected in June and not May. If you then run a Sampling Statistics Report for all samples collected in June 2011, this record will not be retrieved.

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3) When you are satisfied with your selections, click on **Next** to begin the count. FoodGuard-2 will collect the spectrum for the preset time. During the measurement, the screen will display a spectrum window (Fig. 6) and progress bar.
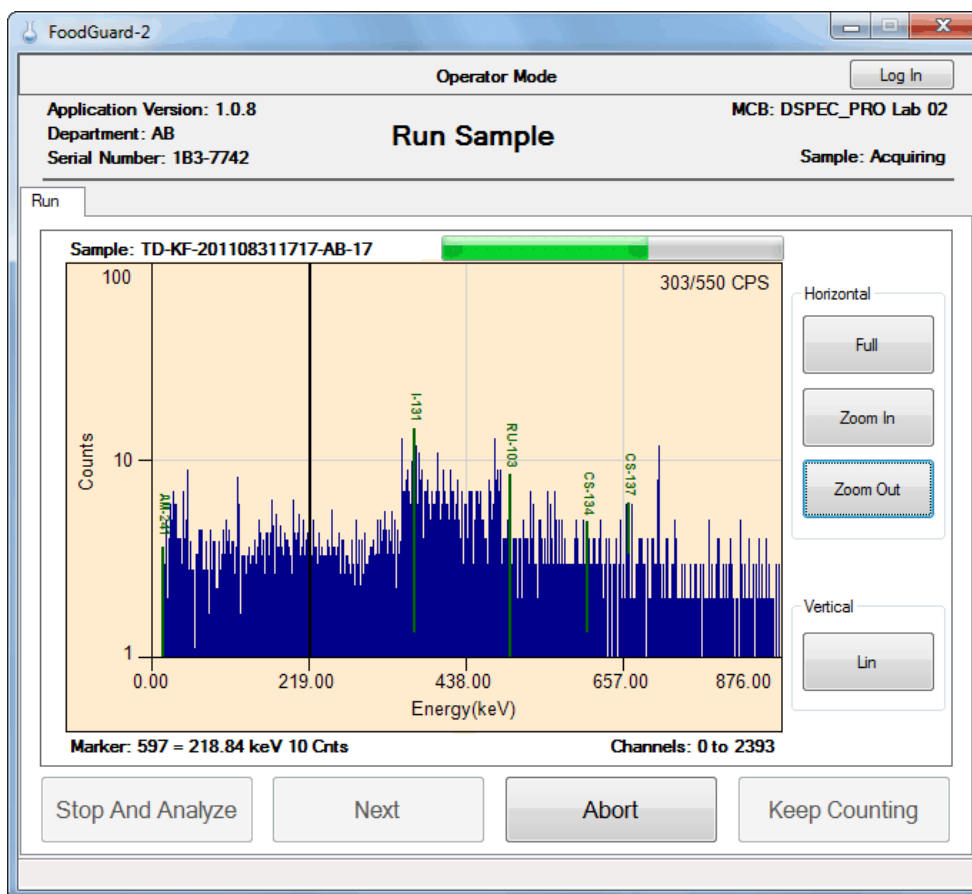
Fig. 6. Sample Measurement In Progress.

If signal from the DSPEC Pro to the PC is interrupted during acquisition, the run aborts and the program returns you to the initial Run screen (Fig. 4), which displays a red "communication error" message. Restore all connections and power, and exit and restart FoodGuard-2.[7] If the Run tab indicates the system is ready, re-run the sample.

4) At the end of the count, the data will be analyzed, the results recorded in the STATREC-2.DAT file in the C:\User\FoodGuard-2 folder, a report generated, and the results displayed on the Run tab as shown in Fig. 8. If your system is set up to display reports onscreen, you may leave the report window open from sample to sample.

● **Abort** — Click this button to interrupt the measurement without generating an analysis and report, then confirm that you wish to stop.

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[7]Alternatively, if you have password access, you do not need to exit and restart the software. Instead, you can log in, switch briefly to the Setup tab then back to the Run tab. If the Run tab indicates the system is ready, re-run the sample.

- **Stop And Analyze** (high count rate) — If the sample exceeds the Maximum Input Count Rate set by the system administrator, the count rate readout in the upper-right corner of the spectrum window will be red instead of black (Fig. 7), and the **Stop and Analyze** button will activate. You can either allow the measurement to continue for the preset time, or stop it early and generate an analysis and report.

- **Keep Counting** — Click on this button to extend a sample's count time. The additional count time is half of the current preset time (e.g., if the current count preset is 10 minutes, **Keep Counting** will count for 5 minutes).

- **Spectrum Window** — This window includes a vertical *marker* (cursor) with a corresponding channel and energy readout. Click on a channel in the spectrum to view its information. The **Zoom In/Out** buttons center the new view on the current marker position. **Full** returns you to the complete 16k-channel view. The **Log/Lin** button toggles between a logarithmic and linear vertical scale.[8] As long as you remain on the Run tab, the spectrum window remembers its most recent settings.


Fig. 7.

5) After the run, the Run tab will display a results screen recapping the main count parameters, e.g., Sample Code, Origin, Counting Time (live time), Limits Library, and detector Input Count Rate (Fig. 8). It will also list the alarms (if any) and Ratio Sum (if marked on the Setup tab). There is no way to return to this screen once you move away from it; after that, you must generate a report to see the results.

6) Any activity above the alarm limits will be posted in red on the status bar at the bottom of the program window, and noted in the "alarm" column on the report. Figures 9 and 10 illustrate the corresponding sample report; this same format is used for the full-format report generated from the Report tab (Section 3.5).

7) The spectrum will be saved as an ORTEC .SPC-format file in the folder C:\User\FoodGuard-2\ Spectra. If the system is configured to save reports to disk, the report files will be saved in C:\User\FoodGuard-2\Reports, along with a .JPG image of the spectrum. The 24-character filename format is described in Section 1.2.1.2.

8) Click on **Next** to return to the counting parameter summary screen and prepare for the next sample.

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[8]Note also that if you have used GammaVision to set any regions of interest (ROIs) for this detector, they will be displayed in a contrasting color in the spectrum window. They have no effect on how FoodGuard-2 operates, and can be ignored.
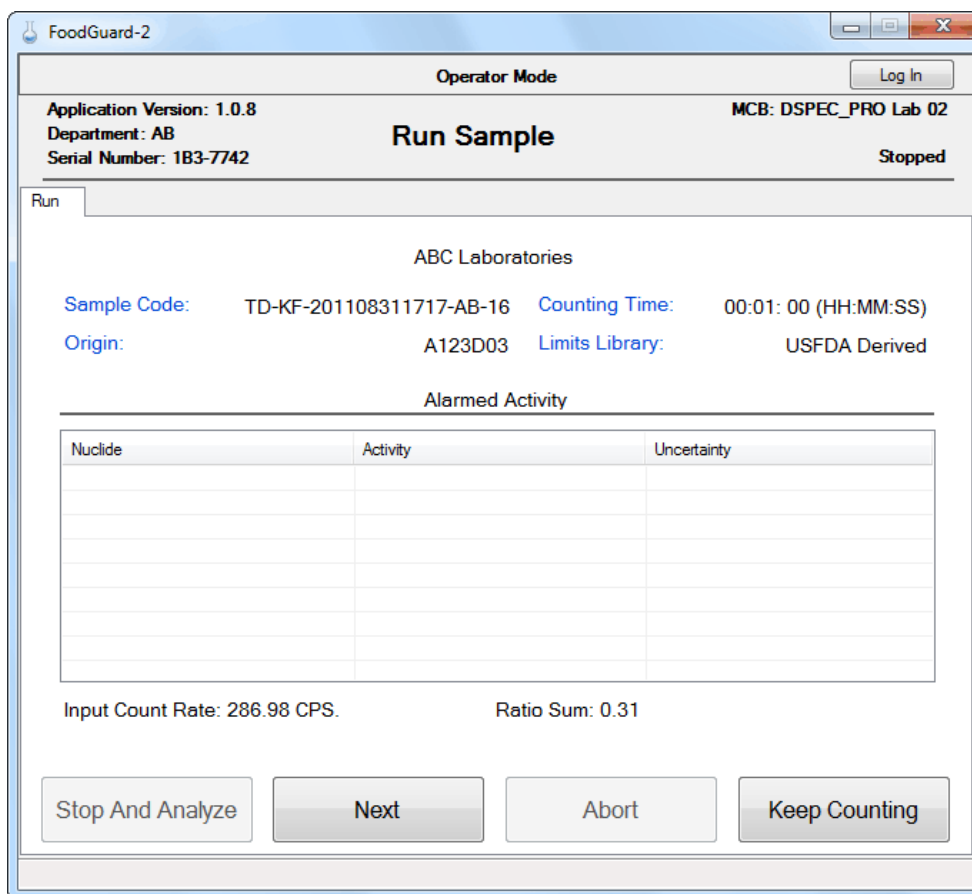
Fig. 8. Sample Result Screen.

2.4. Run Tab Notes for Administrators

● You can switch to the Parameters, Setup, Report, and Measurement Statistics tabs while the count is in progress (access is read-only). However, you can only go to the Calibration Check tab by aborting the measurement.

● You can generate Report tab reports while sample measurement is in progress (however, see the notes on the **Report Header** feature at the start of Section 3.5). If you are viewing a report onscreen when the current sample measurement ends, the current sample's report will "bump" the older report. You can also generate reports during a calibration check.

● You can also generate Measurement Statistics reports during a sample measurement or calibration check. However, until you close the Measurement Statistics report window, you cannot access the FoodGuard-2 window.
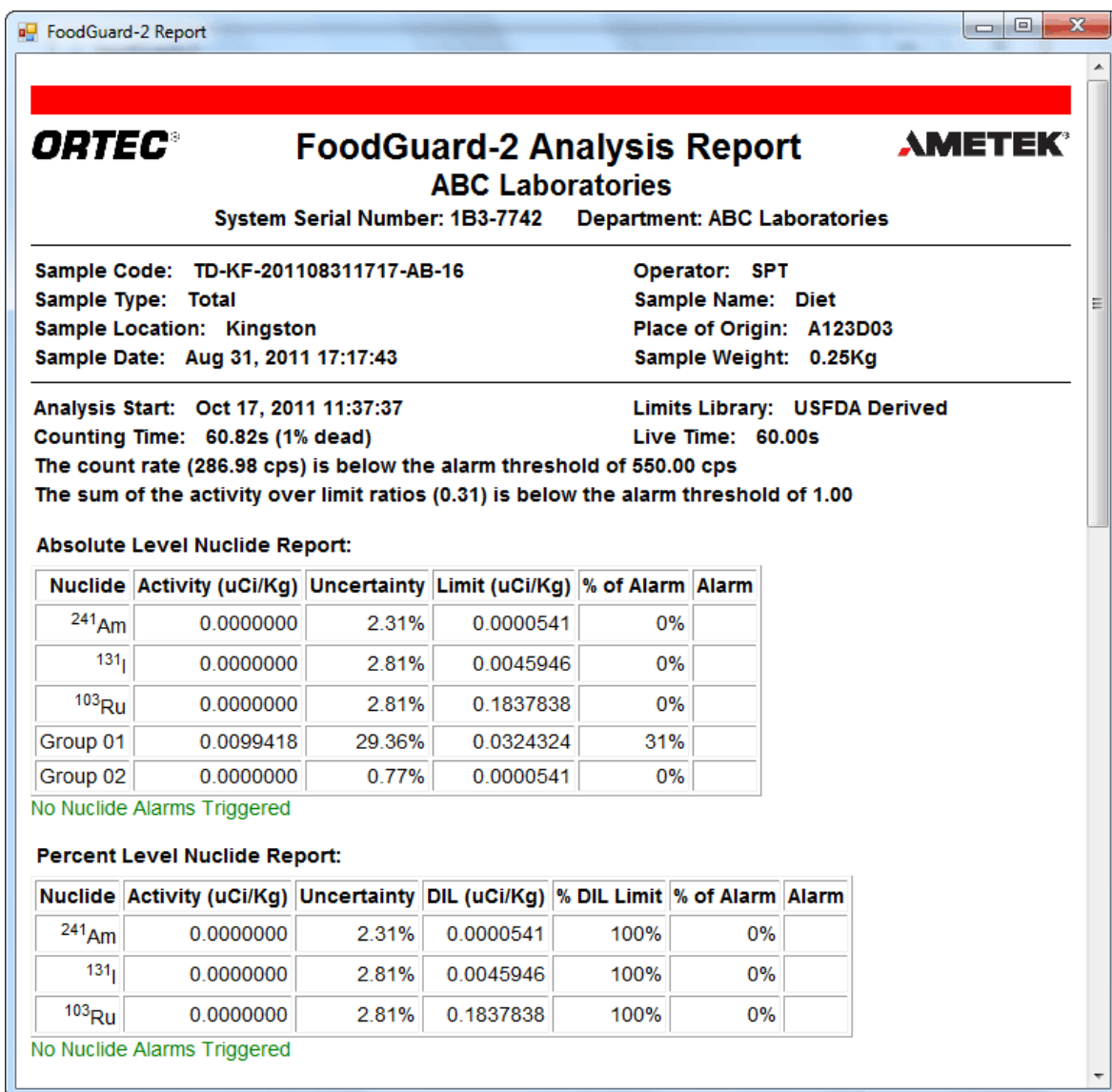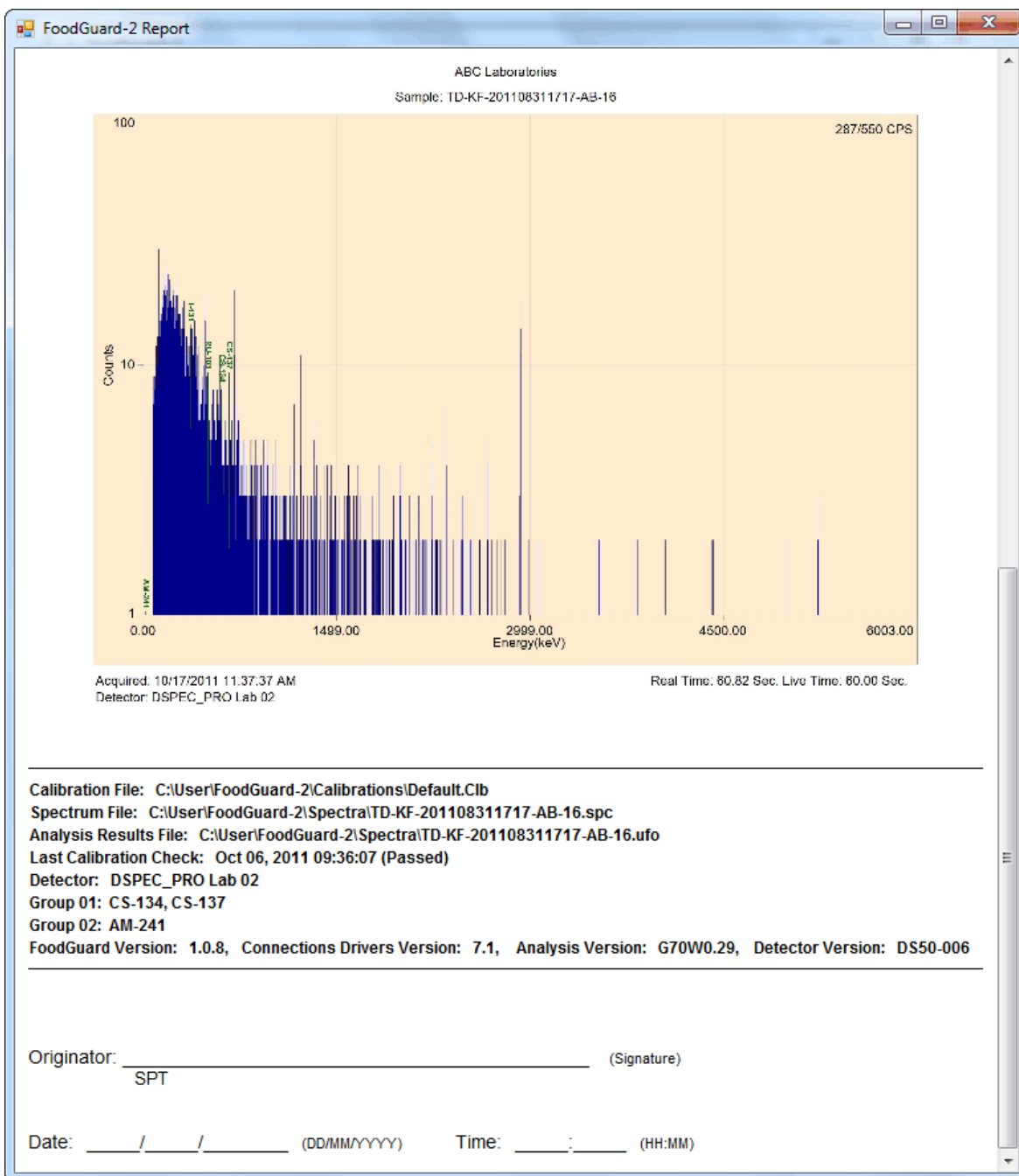
Fig. 9. Sample Report, Page 1 of 2.

Fig. 10. Sample Report, Page 2 of 2.

3. ADMINISTRATOR MODE

3.1. Software Startup

To start FoodGuard-2, enter **foodg** in the "search programs and files" box, then click on the **FoodGuard-2** search result; or open the Windows Start menu and click on **FoodGuard**, then **FoodGuard-2** (Fig. 11). The software typically takes 5–15 seconds to initialize. If the detector high voltage is not already on (if, for instance, the DSPEC Pro has been powered off since the last work session), it will automatically turn on, then stabilize for 30 seconds before measurements can be performed.
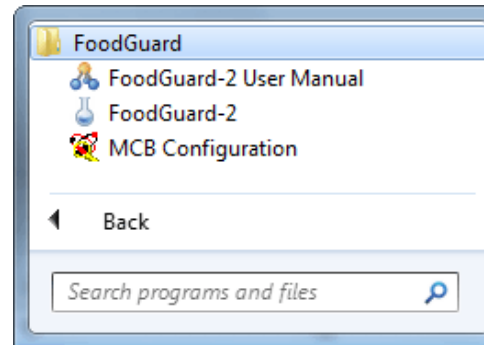

Fig. 11. Start FoodGuard-2.

First Use After Installation — The program always opens on the Run tab. Factory-configured systems will already have the initial settings — detector, calibration file, calibration source activity, and at least one sampling location and department code — predefined. In this case, on first use, you should see no red status messages in the lower part of the Run and Calibration Check screens (unless, for instance, the DSPEC Pro is not powered on or the USB cable is not connected). If this is a customer-installed system, see the accompanying *System Installation Guide*.

Subsequent Use — Figure 12 shows a typical example of the Run tab on startup, after all first-use or factory-setup steps are completed. If all sample types, alarm limits, and other system parameters have already been entered, you are ready to begin measuring samples as described in Chapter 2.

3.1.1. Log-In with Password

The Parameters, Setup, Calibration Check, Report, and Measurement Statistics tabs are used to maintain the settings that govern and evaluate system operation. These screens are password-protected to prevent unintended changes. Click the **Log In** button to open the password dialog (Fig. 13). The password can contain any mix of characters (except system special characters) and is case-sensitive. The default password is ORTEC (all uppercase).

NOTE *To "re-lock" FoodGuard-2 for subsequent users, just click the **Log Out** button.*

The **Update Password** command on the Setup screen (Section 3.3.6) lets you change or remove the password.
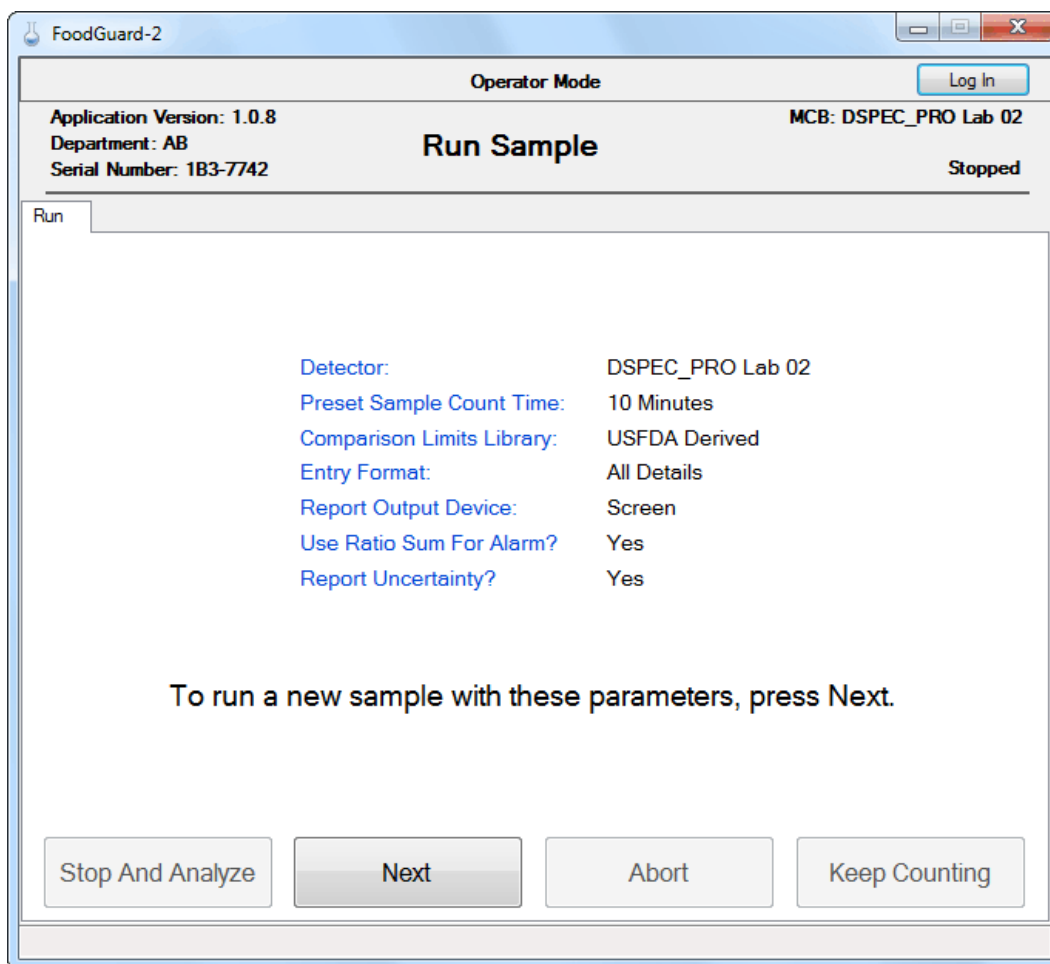
Fig. 12. The Opening Screen, Ready For Counting (always opens on the Run tab).
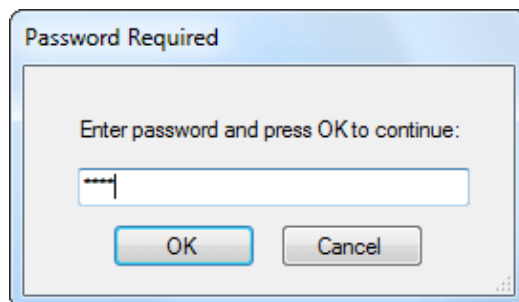
Fig. 13. Enter the Password to Access Administrator Mode.

3.2. Parameters

This screen (Fig. 14) is used to define the top-level identifiers for your organization and sampling locations. It is typically configured first because other screens require some of the codes defined here. (For example, a **Department Code** must be defined before you can complete the Setup screen.) If you purchased a turnkey system, at least one **Sample Location** and **Department Code** have been predefined. You may modify or delete them as needed.
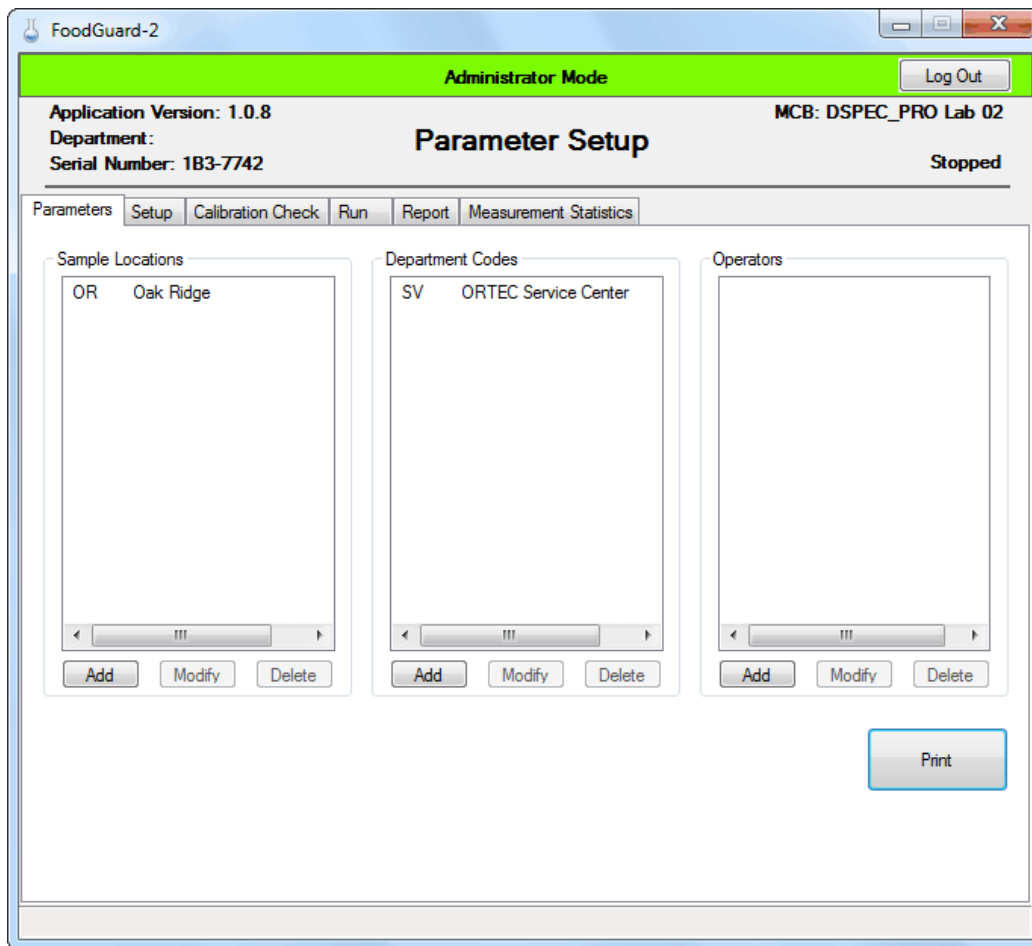
Fig. 14. Initial Parameters Screen.

The codes on this screen cannot use system special characters; see Section 1.2.1.2.

Add — Click on this button to create a new entry for the corresponding parameter type. A data entry dialog will open. Figs. 15 and 16 respectively show the Add Sample Location and Add System Operator dialogs. Enter the required field(s) and click on **OK**.

● The **Sample Locations** and **Department Codes** fields require a 2-character **Code** and a **Description**.

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- **Operators** entries can be of any length.

Modify — To edit an existing value, click to highlight the entry, then click on **Update** to open a dialog similar to the Add dialog. Click on **OK** to accept the modified value.

Delete — To remove an entry, click to highlight it, then click on **Delete**. There is no "undo" for this operation, but restoring an accidentally deleted value is easy.

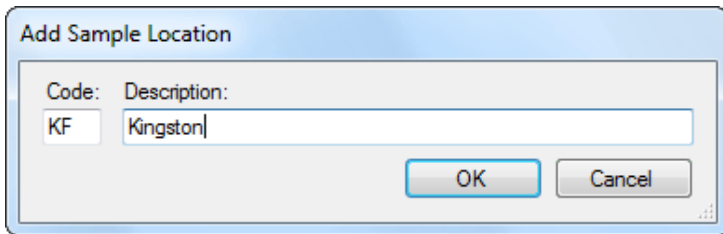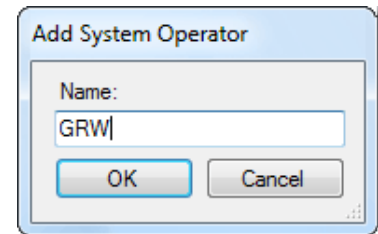**Fig. 15. Add a New Sample Location.**

Fig. 16. Add a New Operator.

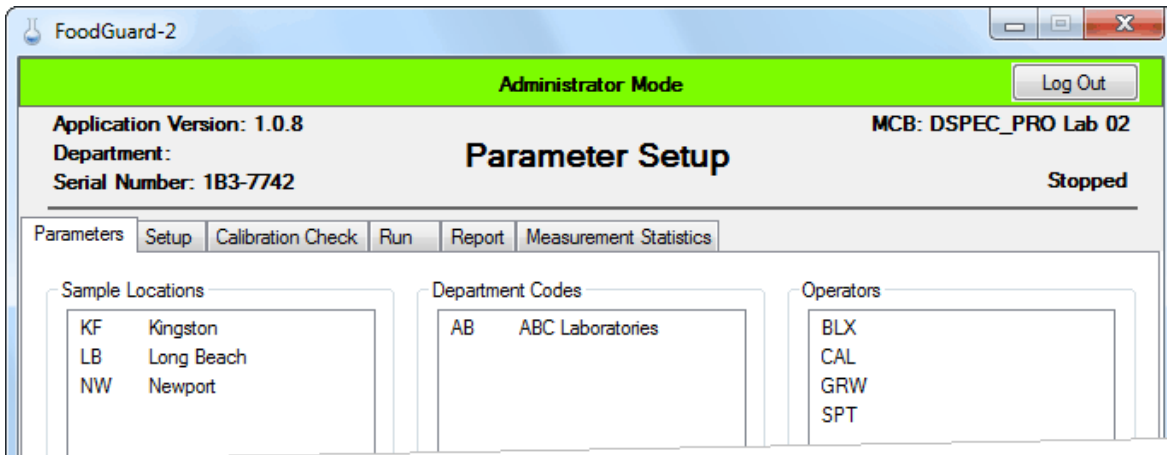Figure 17 shows an example of a more fully configured Parameters screen.

Fig. 17. Parameters Screen with User Values Entered.

3.3. Setup

Use the Setup screen to:

- Select the **Detector** to be used; the calibration file; the counting preset for sample measurements and calibration checks; the activity of the system's ^{40}K calibration checksource (this value is set at the factory for turnkey systems); data entry and reporting preferences; and administrative data including the **Department Code**, the system **Serial Number**, and the desired **Report Header** for the current set of measurements.

- Update or remove the **Supervisor Password**.

- Select alarm thresholds based on input count rate and the sum of net counts for all monitored radionuclides.

- Access the underlying **Alarm Setup** screen (Section 3.3.7) to select, create, and/or modify the **Limits Library** to be used for sample analysis; and set the radiation alarm limits for each sample type, radionuclide, and/or radionuclide group.

NOTE   The values on this screen can be changed at any time except during data acquisition. There is no "undo," and the changes take effect immediately.

If you wish, you can **Print** a report that reflects the entries on this screen (except the password). This will open a report window that provides several basic viewing tools. Click on the report window's **Close** button to return to this screen.

Figure 18 shows an example Setup screen.

3.3.1. Detector, Checksource, and Calibration Settings

If your system was factory-configured, the **Detector** droplist is already populated and your **Detector** is pre-selected. If the Run tab is displaying the red "Detector is not ready" message, check that the DSPEC Pro is turned on and connected to the PC. Otherwise, you must run the MCB Configuration program as described in the *System Installation Guide*, then return here and select the detector from the list.

In factory-configured systems, the detector has already been calibrated, and the default **Calibration File**, Default.Clb, has been pre-selected from the C:\User\FoodGuard-2\Calibrations folder. For customer-installed systems, or if you created alternative calibrations for your system with the optional ANGLE or GammaVision programs, select the .Clb file for that calibration.
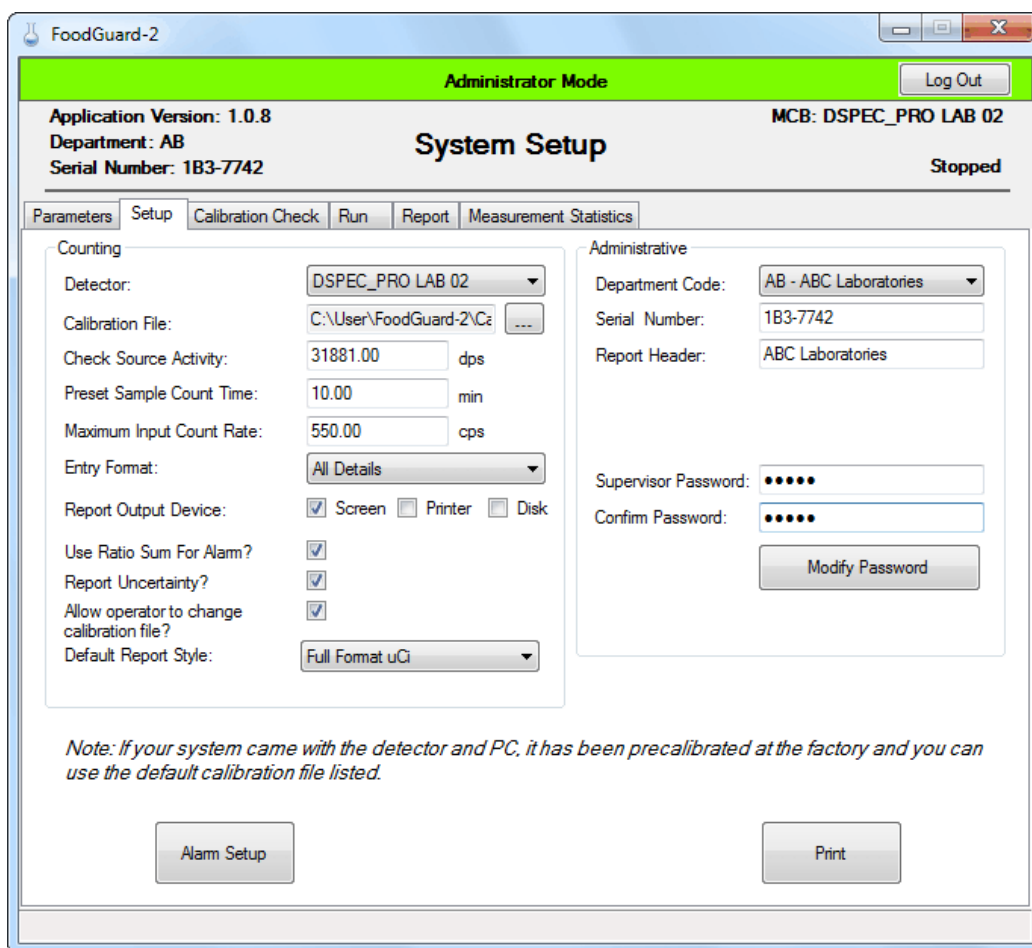
Fig. 18. The Setup Screen with User Values Entered.

Multiple calibrations — If you have created one or more calibrations, you can either allow the operator to choose among the various calibration files, or restrict the operator to a pre-selected calibration.

- To permit a choice, mark the **Allow operator to change calibration file?** checkbox.

- To use only one calibration, browse to the location of the alternative calibration, select the desired **Calibration File**, and leave the "allow operator to change" checkbox unmarked.

The Calibration Check function (Section 3.4) requires the [40]K checksource included with your system. The **Check Source Activity** for your system's checksource is entered at the factory, and is also listed on the checksource beaker. As noted elsewhere, do not swap components, including the checksource, between different FoodGuard-2 systems.

3.3.2. Count Preset

The **Preset Sample Count Time** entered here is used for both the Calibration Check and sample measurements on the Run tab. It cannot be changed on those tabs. However, you can change it here at any time, and the Run tab allows operators to extend the sample count time with the **Keep Counting** button (see page 11).

3.3.3. Maximum Input Count Rate Alarm

If the maximum input count rate, in counts per second (cps), exceeds the value in this field, a red alarm message is displayed on the status line at the bottom of the FoodGuard-2 screen, and in the spectrum window (see Fig. 7).

3.3.4. Entry Format

The **Entry Format** determines the data fields the operator must complete before starting each sample measurement. The left and right sides of Fig. 19 compare the Run screen fields for the **All Details** and **Sample Code** choices, respectively. (Note that if your system is not set up to use multiple calibration files, the **Calibration** field will not be displayed.)

Fig. 19. Comparison of "All Details" and "Sample Code" Data Entry on Run Screen.

- **All Details** — In this mode, the operator chooses from multiple sample parameter droplists before the measurement, and enters the sample weight and food origin fields. The droplist selections for each sample are included in the reports and are also concatenated to form the name of each analysis record.

● **Sample Code** — This mode bypasses the multiple droplists. Instead the operator works from *a prepared list of samples*, each identified by a unique 24-character **Sample Code**. This code forms the name of each analysis record, and is translated into sample details for the report. The Sample Code is formatted as described in Section 1.2.1.2.

3.3.5. Report Settings

3.3.5.1. Administrative Information

FoodGuard-2 requires that you define at least one **Department Code** on the Parameters tab, then select it here. The optional system **Serial Number** ties all sample reports to this system.

Unlike the **Department Code** and **Serial Number**, the **Report Header** entry *is not saved with the sample analysis*. It affects only the (viewed) onscreen and (saved) .PDF reports generated from the Run and Report tabs. The **Report Header** currently entered here is displayed or saved.

3.3.5.2. Report Output Device

These options let you choose whether to view the results report onscreen, print the report with the Windows default printer, or save the report as a .PDF file in C:\User\ FoodGuard-2\Reports. In all cases, an .HTML report file is also saved in the \Reports folder. Each .HTML file is paired with a .JPG of the sample spectrum. All files for a particular sample share the same base filename, as discussed in Section 1.2.1.2.

3.3.5.3. Default Report Style

Choose whether to report activity in Bq or μCi, and select the full or short report format. Both formats list the analysis results for all nuclides in the limits library. In addition, the full format report includes the spectrum and system data.

3.3.5.4. Use Ratio Sum For Alarm?

If you mark **Yes**, the absolute level (**AL**) reporting values entered on the Alarm screen (Section 3.3.7) are used to calculate a Ratio Sum for each measurement of a food type. The Ratio Sum is calculated by summing the (net count rate / AL) values for all nuclides for a food type. An alarm is generated if the Ratio Sum is greater than 1.0 and the **Use Ratio Sum For Alarm?** option is marked **Yes**.

3.3.5.5. Report Uncertainty?

Mark this checkbox to report the uncertainty for the sample. This is the combined random and systematic error as calculated by the WAN-32 analysis engine. For more information on this calculation, see the "Analysis" chapter in the accompanying GammaVision user's manual.

3.3.6. Update Password

As noted earlier, the default password is ORTEC (all uppercase). To change it, password, simply type a new entry in the **Supervisor Password** and **Confirm Password** fields, then click on **Update Password**. The next time FoodGuard-2 is started, the new password will go into effect. Passwords can be any mix of characters (except special system characters) and are *case-sensitive.*

To remove the password, delete the password from both fields and click on **Update Password**. When the password screen opens, simply click on **OK**.

NOTE   *There is no master password.* If you change the password and subsequently lose it, you must contact your ORTEC representative or our Global Service Center for assistance.

3.3.7. Alarm Setup

Click on the **Alarm Setup** button to display the screen shown in Fig. 20. It allows you to choose a default **Limits Library** or create your own; tailor a limits library's list of radionuclides; and set alarm thresholds for individual radionuclides and/or radionuclide groups. You can change the limits and alarm reporting options at any time. Settings are used until you change them again. There is no "undo," and the changes take effect immediately.

Samples that exceed alarm limits trigger a message on the status line at the bottom of the FoodGuard-2 screen and are displayed in the Alarms column on the reports. (See Fig. 9 on page 14.)

- Choose the **Limits Library** to be used for sample analysis by selecting it from the droplist.

- Choose the desired **Alarm Reporting** option based on the nature of the sample., e.g., **Absolute Level** vs. **Percent**; and the **Units** (kg or L).

- Optionally **Print** a hardcopy of the current settings.

- If you are satisfied with the current settings for this library, simply click on the **System Setup** button to return to the Setup tab's main screen (or click on any other tab).

- To edit a limits library or create a new one, see Sections 3.3.7.1 and 3.3.7.2, respectively.
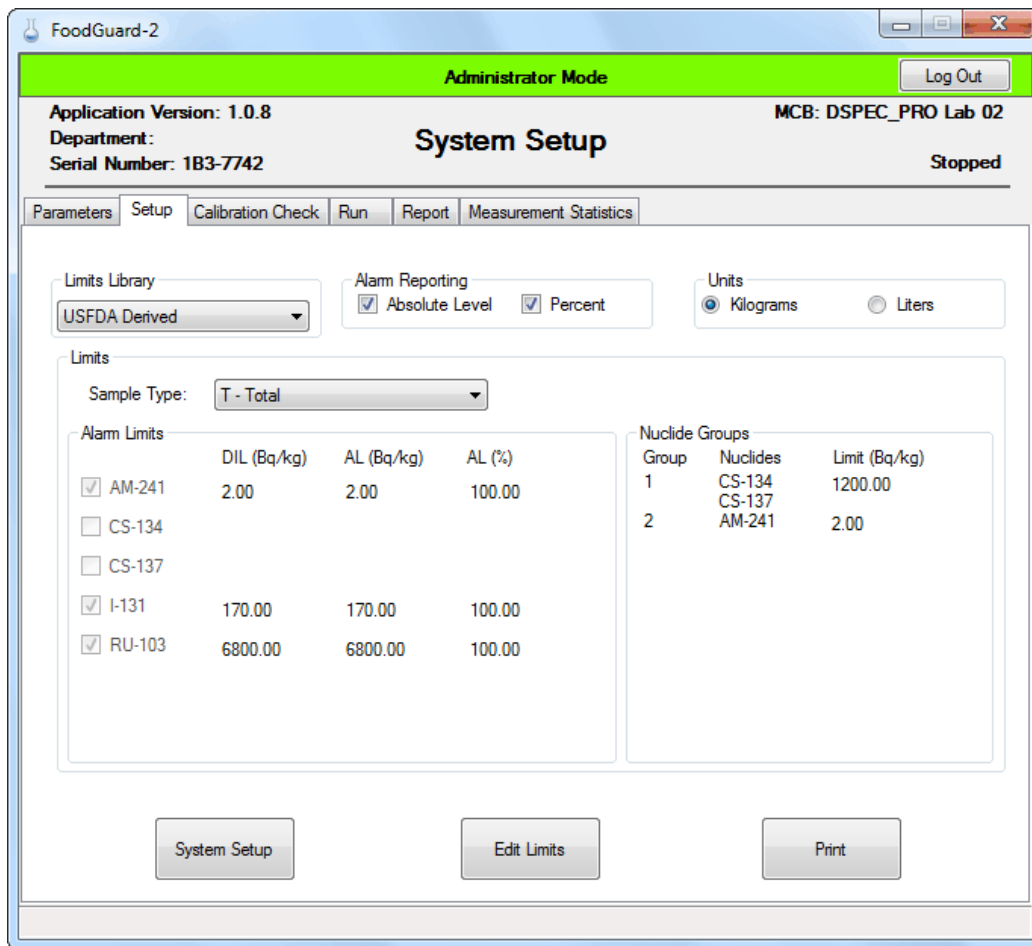
Fig. 20. Selecting the USFDA Derived Limits Library.

3.3.7.1. Modifying a Limits Library

● Choose a limits library from the droplist. This will display the radionuclides in this library, their **Alarm Limits**, and the limits for any **Nuclide Groups** defined for this library.

● Click on **Edit Limits** to open the dialog shown in Fig. 21.

Sample Types and Names

To **Add** a sample type and sample name, click on the **Edit Sample Types/Names...** button to open the dialog shown in Fig. 22. Figures 23 and 24 show the respective dialogs for adding a new **Sample Type** and **Sample Name**.

● **Sample Type** requires a 1-character **Code** and a **Description**.
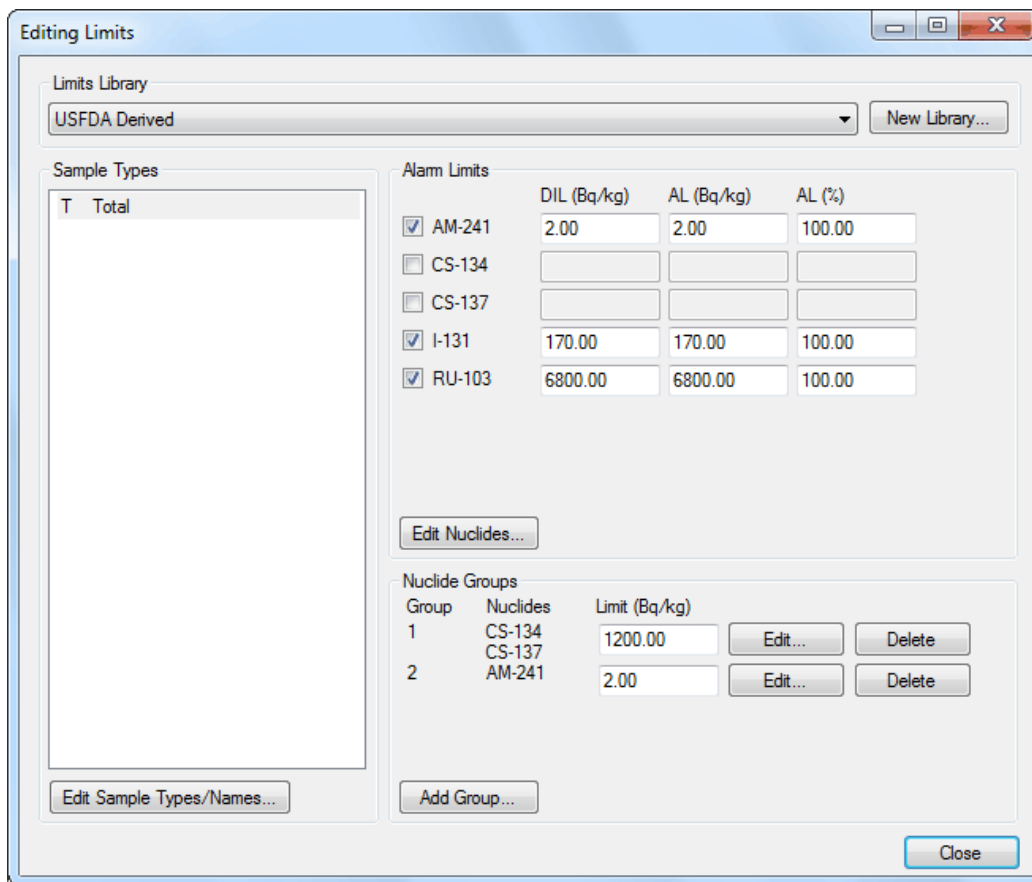
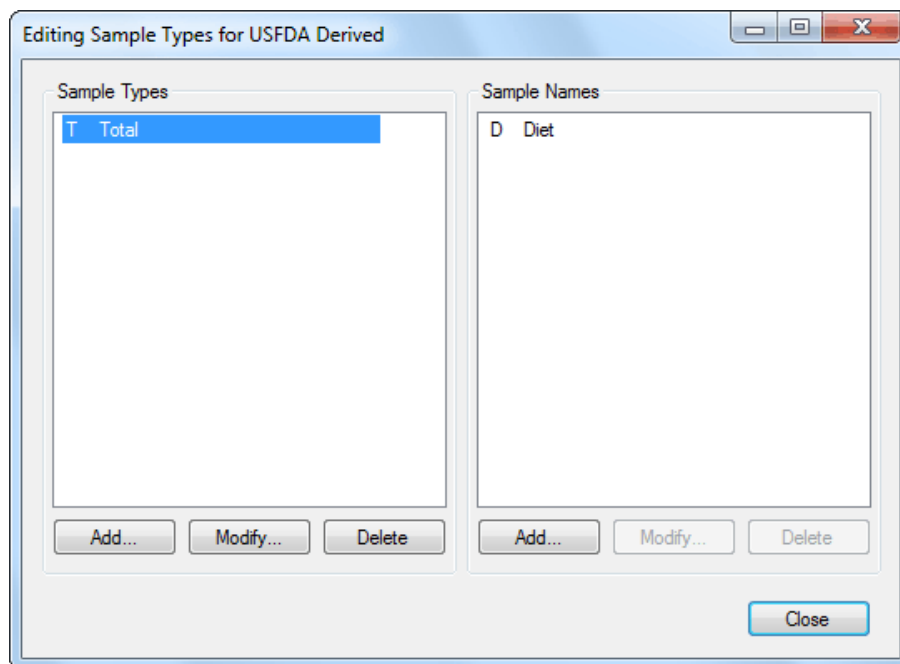**Fig. 21. Edit Library Sample Types, Radionuclides, and Alarm Limits.**

Fig. 22. The Editing Sample Types Dialog.

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Fig. 23. Add a New Sample Type.

Fig. 24. Add a New Sample Name.

- **Sample Names** (Fig. 24) requires you to select a Sample Type code, then enter a 1-character "sub-class" code. For example, for a sample type C - Citrus fruits, you might wish to define Sample Names for specific types of citrus fruit (e.g., L for Lemons).

- To **Modify** an existing value, click to highlight it, then click on **Update** to open a dialog similar to the Add dialog. Click on **OK** to accept the modified value.

  NOTE Keep in mind that when you modify a **Sample Type**, the old Sample Type code will no longer be available on the Sampling Statistics and Measurement Statistics screens. You can still use the Report tab to view analysis reports for samples run using the older Sample Type code, and they will still be reported on the Daily Summary report for the day on which they were measured.

- To **Delete** an entry, click to highlight it, then click on **Delete**. There is no "undo" for this operation, but restoring an accidentally deleted value is easy.

- Click on **Close** to return to the Alarm Limits screen.

Edit Nuclides

To add or remove radionuclides from this library, click on the **Edit Nuclides...** button to open the dialog shown in Fig. 25. The **Selected Nuclides** column shows the current library. Click to high-light one or more **Available Nuclides**, then click > to add them to the library; or click to highlight one or more **Selected Nuclides**, then click < to remove them from the library.

NOTE If you change the nuclides in a limits library, only the current limits library nuclides will be available as search parameters on the Sampling Statistics and Measurement Statistics screens. You can still use the Report tab to view the original analysis parameters, limits library, and other settings.

Alarm Limits

To add or change **Alarm Limits** for individual nuclides in this library, mark the checkbox for the desired nuclide(es) and enter the alarm values.

- **DIL (Bq/kg** or **Bq/L**)   Enter the FDA Defined Intervention Level (DIL) for each radionuclide, according to the food type parameters.

- **AL**   Absolute level reporting (in Bq/kg or Bq/L). An alarm is generated if the net count rate is greater than the **AL** value entered here.

    NOTE   The values entered in the **AL** row are used for the Ratio Sum alarm (configured on the Setup screen; Section 3.3.5.4). The Ratio Sum is calculated by summing the (net count rate / AL) values for all nuclides. An alarm is generated if the Ratio Sum is greater than 1.0 and the **Use Ratio Sum For Alarm?** option on the Setup page is marked.

Fig. 25. Add or Remove Nuclides.

- **AL (%)**   Percent reporting. An alarm is generated if (net count rate / DIL) $\times$ 100 is greater than the **AL (%)** value entered here.

Nuclide Groups

The **Nuclide Groups** are displayed in the lower-right section of the Editing Limits dialog (Fig. 21). This feature allows you to report the combined activities of nuclides in the limits library, and set alarm thresholds for these groupings. Nuclide group alarms are based only on activity (Bq), to a maximum of 10000 Bq per group. The same nuclide can be used in multiple groups. Enter alarm thresholds in the **Limits** fields, **Edit** the list of nuclides in each group, **Delete** a group, or click on **Add Group...** to define additional groups.

NOTE   If you change the number of nuclide groups or the nuclides within one or more groups, only the current limits library nuclides will be available as search parameters on the Sampling Statistics and Measurement Statistics screens. You can still use the Report tab to view the original analysis parameters, limits library, and other settings.
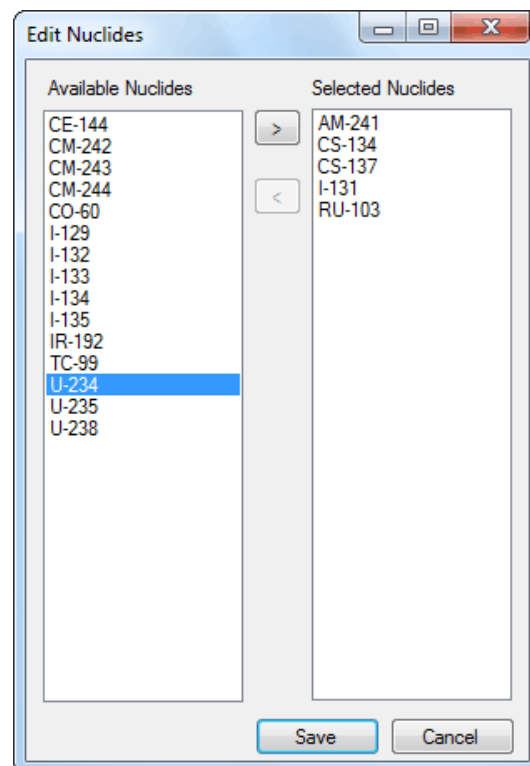
3.3.7.2. Creating a Limits Library

To create a new library, open the Editing Limits dialog (Fig. 21) and click on the **New Library...** button. This will open the dialog shown in Fig. 26. Enter a new **Name**; click to highlight one or more **Available Nuclides**, then click the > button to add them to the library; and click **OK**.

Follow the procedures in the preceding section to define sample types and names, alarm limits, nuclide groups, and other settings.

3.3.7.3. Restoring Default Library Limits

This release of FoodGuard-2 includes the following default limits libraries

- Health Canada Derived
- CODEX Derived
- World Health Organization Derived
- USFDA Derived
- Japan Derived

Fig. 26. Create a New Limits Library.

Each has a corresponding library (.LIB) file in the `C:\User\FoodGuard-2\Libraries` folder. If you modify a default limits library then wish to restore its original settings: delete the `.LIB` file for that limits library, back up the `C:\User\FoodGuard-2` folder, then uninstall and reinstall the FoodGuard-2 software. Default libraries that have not been modified will be overwritten, and missing default libraries will be reinstalled. All of your data records, modified default libraries, user-defined libraries and calibrations, spectra, reports, analysis files, and password will be retained.

3.4. Calibration Check

System calibration is extremely important for good results. Your FoodGuard-2 system is calibrated before shipping. However, the calibration should be checked from time to time to confirm the detector is functioning to system specifications and to your site operation plan.

This section guides you through a quick, straightforward calibration check that requires the ^{40}K checksource beaker shipped with your system. If your system was factory-configured, you need only choose how long to count the ^{40}K checksource. Its activity should already be entered on the Setup tab.
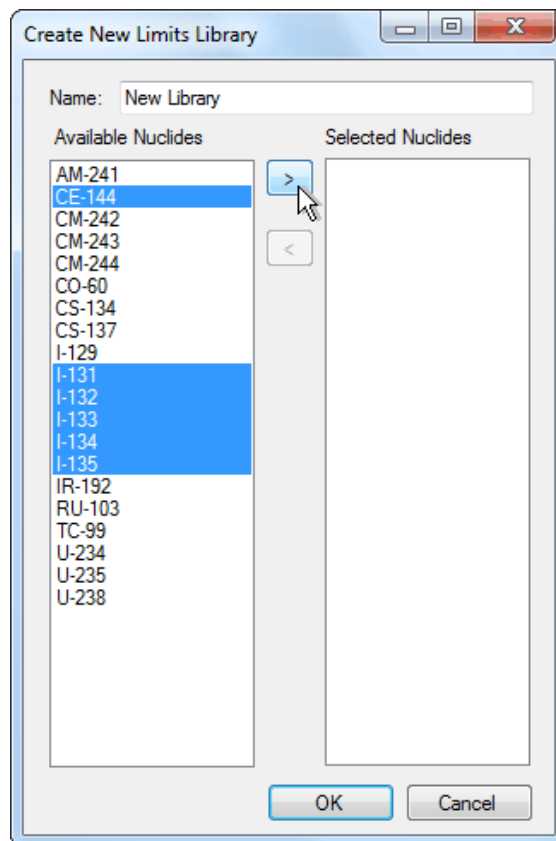

IMPORTANT

Factory testing and calibration was performed on this combination of components, and the results are included on the accompanying system test results sheet. These components should always be used together. (To amplify this point: *do not swap components, such as the* ^{40}K *checksource beaker, with other FoodGuard-2 systems*.)

NOTE Experienced users may wish to use our GammaVision and/or ANGLE software to create alternative calibration files for different sample compositions or measurement geometries. Consult with your ORTEC representative or our Global Service Center for more information.

Figure 27 shows the Calibration Check screen. It shows the date and time of the most recent calibration check; the current system settings, including the current **Count Time** preset; and the results from the most recent calibration check.
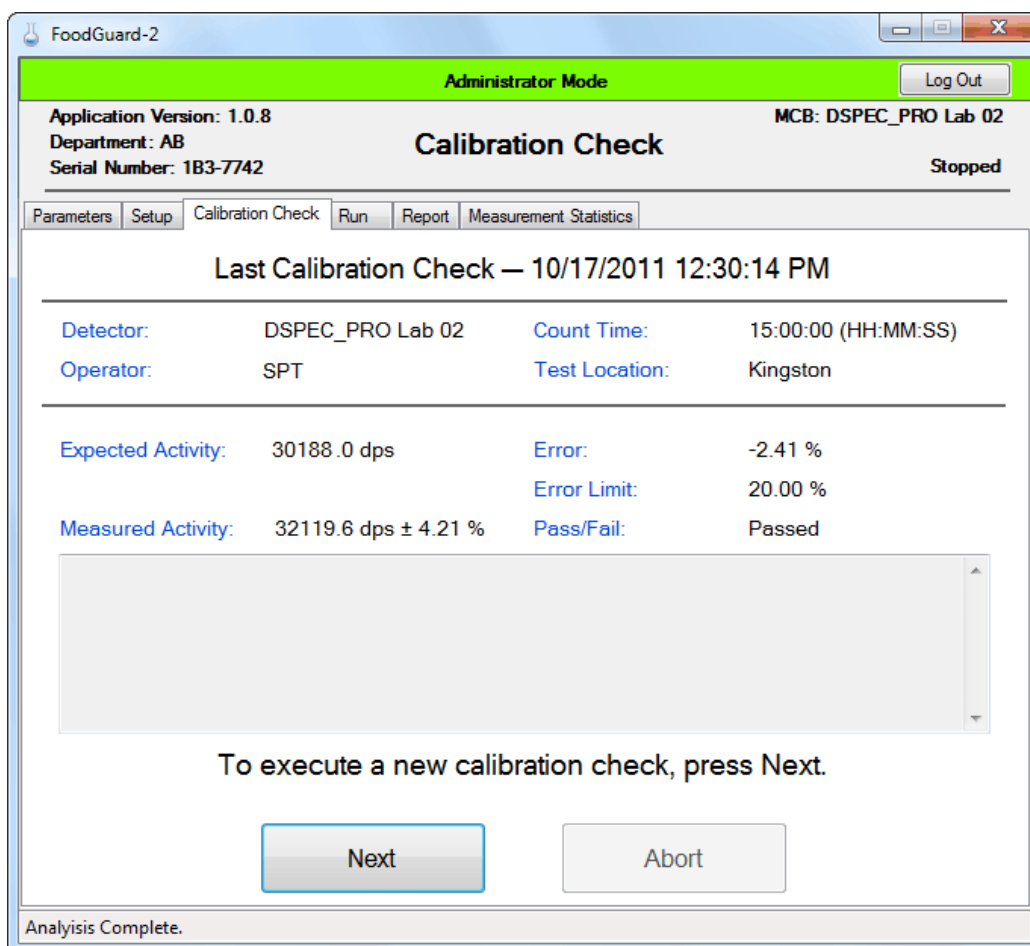
Fig. 27. Calibration Check Screen (showing most recent results).

- Adjust the count time preset on the Setup tab as needed, then return here. Typically, 10–15 minutes is sufficient.

- Put the ^{40}K checksource beaker on the detector in the shield, close the lid, and click on **Next** to display the setup screen shown in Fig. 28.

Fig. 28. Enter Data for Calibration Check.

- Select the site **Location** and **Operator**, enter the desired error (± %), optionally enter a **Comment**, then click on **Next** to start acquisition.

  If signal from the DSPEC Pro to the PC is interrupted during acquisition, the acquisition aborts and the program returns you to the initial Calibration Check screen (Fig. 27). Switch briefly to the Setup tab then back to the Run tab. If the Run tab indicates the system is ready, re-run the sample.

● Figure 29 shows a typical calibration check in progress. (Note that the spectrum view is zoomed in on the 1461 keV peak of ^{40}K.) The features and tools on this screen are discussed in the "Spectrum Window" paragraph on page 12.
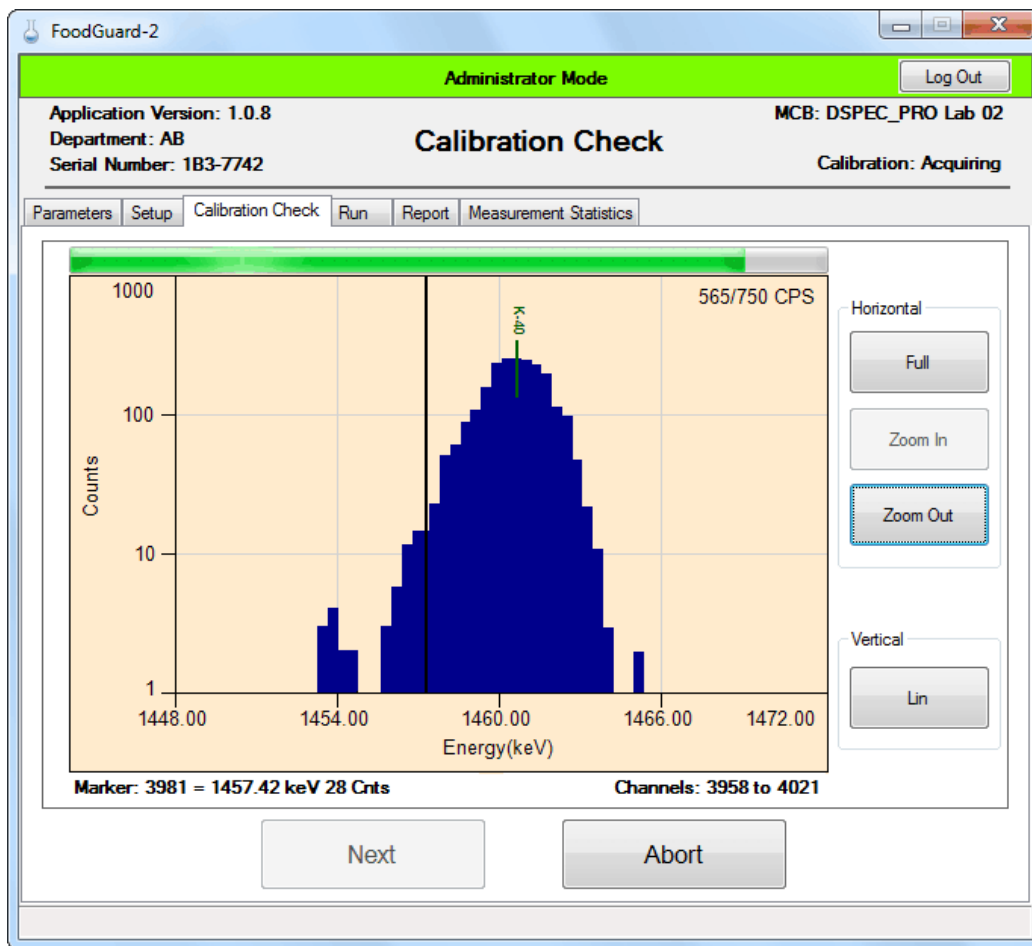

Fig. 29. Calibration Check In Progress.

● At the end of the count time, FoodGuard-2 will analyze the activity, determine if it falls within the **Error Limit**, and post the results as Passed or Failed on the results screen (refer back to Fig. 27).

NOTE   *If a calibration check fails, you can still perform sample measurements.* The failed status is noted on any subsequent sample measurement reports until the next successful calibration check is performed. Make sure you are using the correct ^{40}K checksource beaker and that its **Check Source Activity** value is correctly entered on the Setup tab, consider increasing the **Preset Sample Count Time** on the Setup tab, and repeat the calibration check. For further assistance, consult your ORTEC representative or our Global Service Center.

3.5. Report

Use this screen (Fig. 30) to generate sample measurement reports in full or short format, with activities reported in either Bq or µCi per unit measure. The analysis data in each report is based on the setup and alarm limits used during data collection. However, the sample's original report header entry is not saved with the analysis record; the **Report Header** currently entered on the Setup tab is used onscreen and in saved .PDF reports (Section 3.3.5.1). Thus, when viewing or saving reports from older measurements, you can edit the current **Report Header** on the Setup tab as needed for the older analyses.
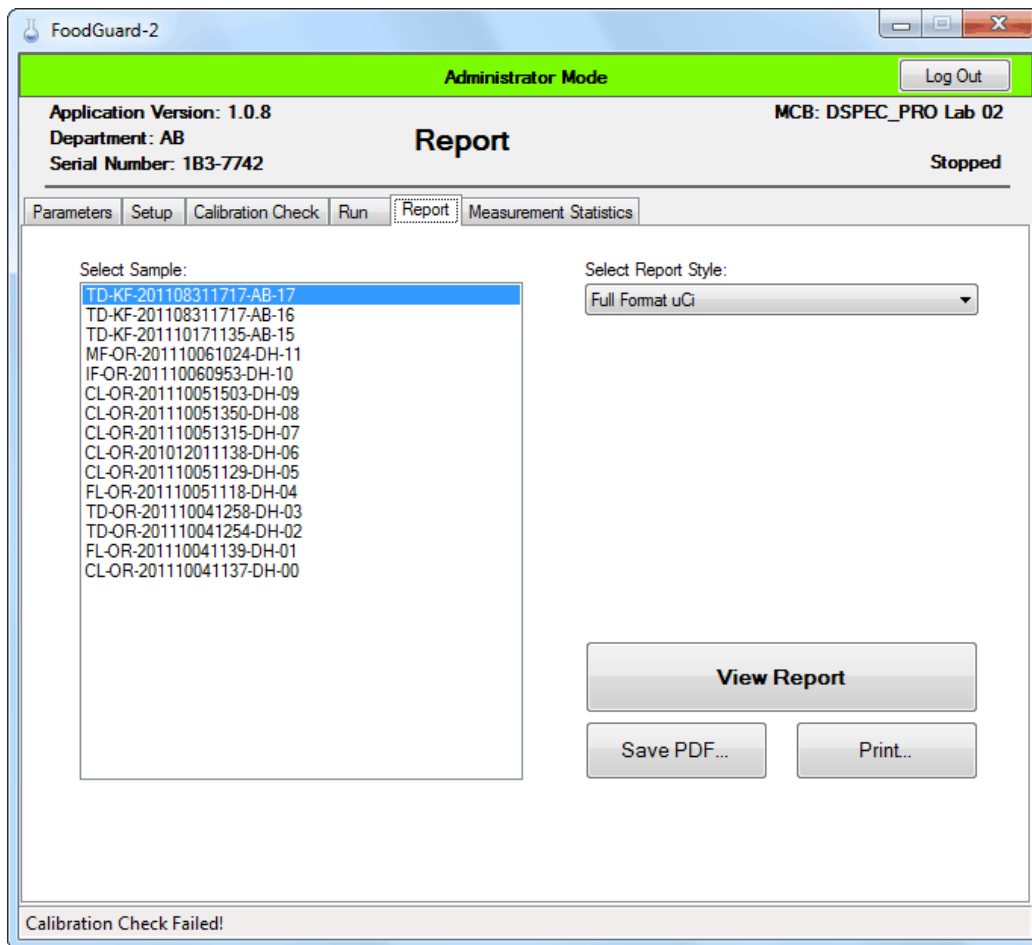

Fig. 30. The Report Tab.

Click to highlight a sample, choose a report format from the droplist, then click on **View Report**.

Figures 9 (page 14) and 10 (page 15) illustrate the full-format report. The short report contains only the information shown in Fig. 9; and the Originator (operator), Date, and Time fields from Fig. 10.

The **Save PDF...** option saves the report in .PDF format with the 24-character sample code as the base filename. Reports are saved to C:\User\FoodGuard-2\Reports. If a .PDF file for this sample already exists, you will be given the choice of overwriting it or canceling. If you choose to overwrite, the **Report Header** currently entered on the Setup tab will be used.

3.6. Measurement Statistics / Delete Records

Whereas the Report tab allows you to generate reports for individual samples, this tab (Fig. 31) provides sampling summaries by time, sample type, and radionuclide(s).

- **Daily Summary** — A summary of the samples analyzed on a specified day, by nuclide.

- **Sampling Statistics** — Breakdown of samples by sample type for a specified range of dates.

- **Measurement Statistics** — Activity summaries by sample type and date range for one or all nuclides.

The last option on the droplist allows you to **Delete Records**. This is discussed in Section 3.6.1.
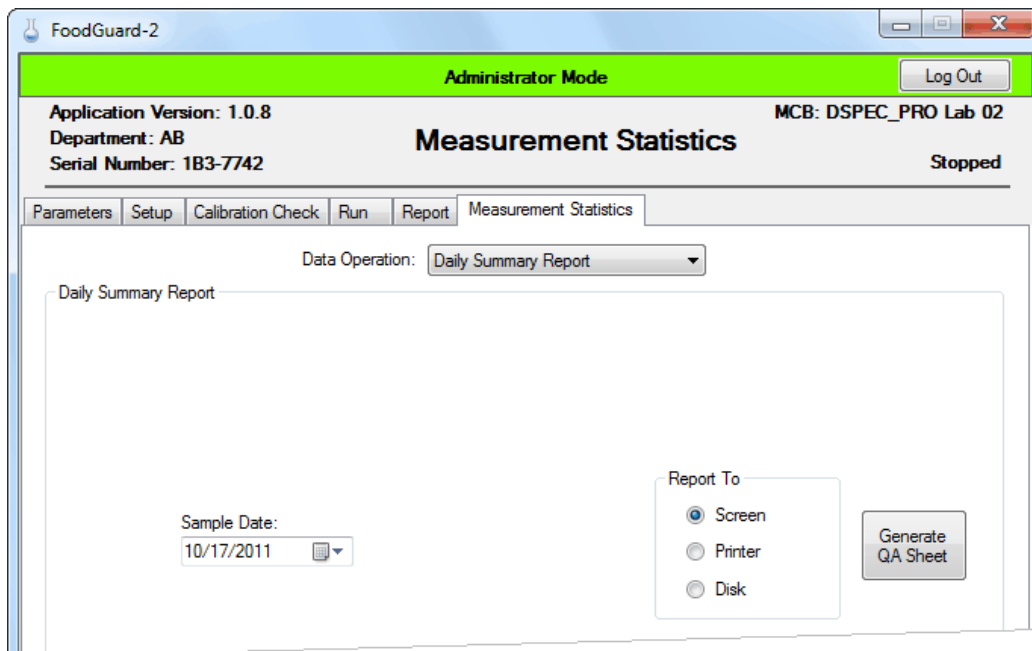
Fig. 31. Choose a Date for the Daily Summary Report.

Figure 32 shows the screens for the Sampling Statistics and Measurement Statistics reports.
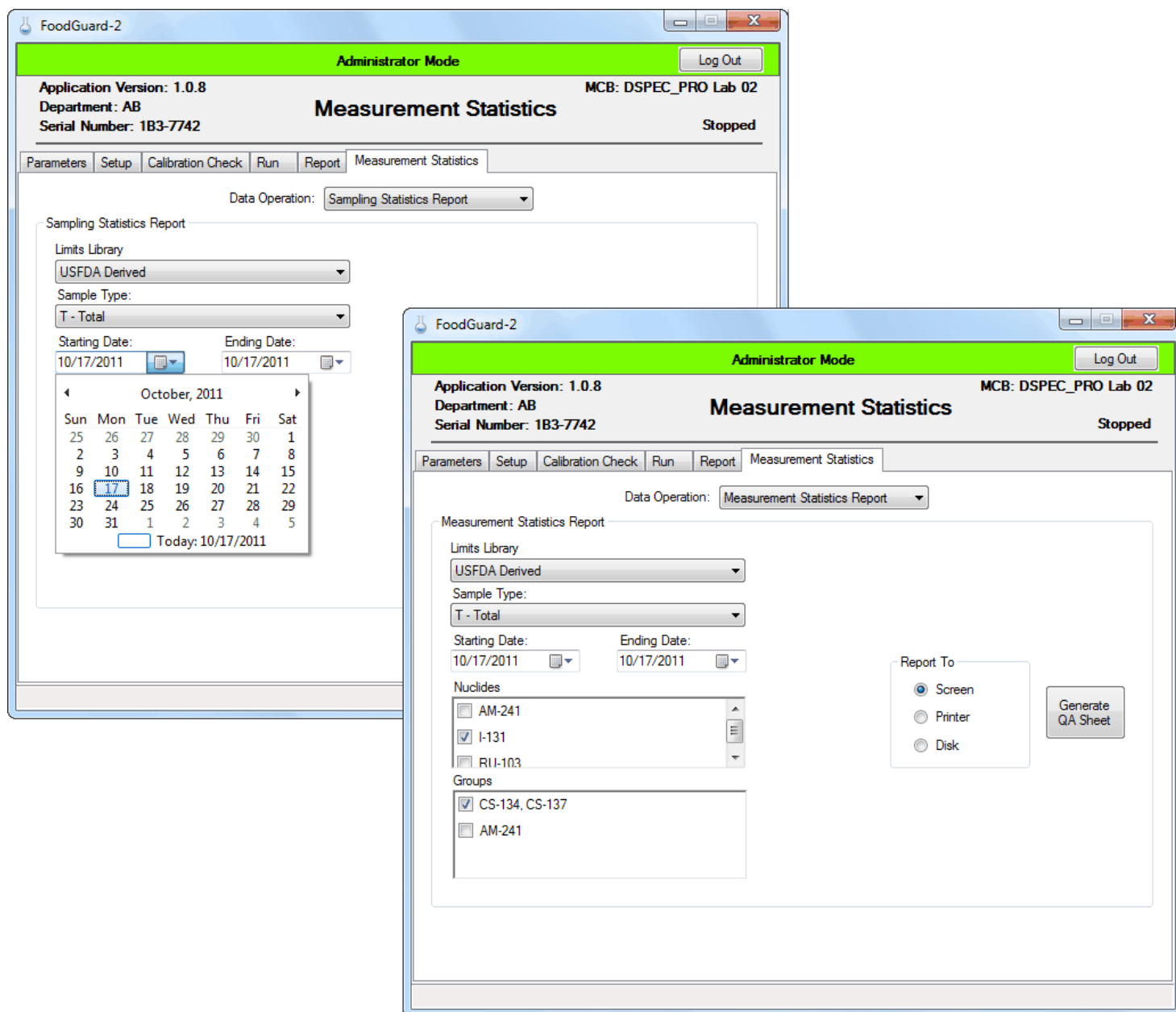
Fig. 32. Sampling Statistics and Measurement Statistics Report Screens.

IMPORTANT The Starting Date and End Date fields allow you to select the **Sampling period** that appears on the report. These dates refer to the *sample collection date and time*, as distinguished from the **Sampling date**, which is the date and time the sample was measured for radiation with FoodGuard-2.[9]

---

[9]This is the start-acquisition time captured in the .SPC spectrum file for the measurement.

For measurements using 24-character Sample Codes (see page 9 and Fig. 5), FoodGuard-2 reads the YYYYMMDDhhmm string in the sample code as the *sample collection date and time*, whether or not it is correct. If a sample is assigned an incorrect date, its **Sampling period** date will also be incorrect.

- Note that if a **Sample Type** has been used for sample measurement and then modified (Section 3.3.7.1), the old Sample Type code will no longer be available on the Sampling Statistics and Measurement Statistics screens. Samples run using the older Sample Type code will still be reported on the Daily Summary report for the day on which they were measured.

- The same holds true for changes to the radionuclides or radionuclide groups in a limits library (Section 3.3.7.1).

In both cases, you can still use the Report tab to view the original codes, radionuclides, radio-nuclide groups, and other analysis information.

Figure 33 compares the Daily Summary, Sampling Statistics, and Measurement Statistics reports.

```
                          ABC Laboratories

                  Contamination Monitoring Result by
                Food/Water Contamination Monitoring System

From : AB - ABC Laboratories
Serial No. : 1B3-7742
=============================================================================
Measurement Date : 31 / 08 / 2011
                   DD / MM / YYYY
=============================================================================
Limits library: USFDA Derived
Sample type: T - Total
-----------------------------------------------------------------------------
Sample Code             AM-241      I-131      RU-103    Group 01    Group 02
--------------------- ----------- ----------- ---------- ---------- ----------
TD-KF-201108311713-AB      0.0         0.0        0.0       515.7        0.0
TD-KF-201108311717-AB      0.0        12.5        0.0       488.1        0.0
TD-KF-201108311722-AB      0.0         0.0        0.0      3419.8*       0.0


* An alarm was triggered.

Total number of samples: 3
No. of samples with alarm triggered: 1
=============================================================================

Originator : _____ Post : _____
               (Name & Signature)

Date : __ / __ / ____    Time : __ : __
        DD / MM / YYYY           HH : MM
```

```
                          ABC Laboratories

                Food/Water Contamination Monitoring System
                        Sample Statistics Report

Department Code : AB - ABC Laboratories
Serial No. : 1B3-7742
=============================================================================
SampleType : Total
Sampling Period : 30 / 08 / 2011 to 31 / 08 / 2011
                  DD / MM / YYYY    DD / MM / YYYY
=============================================================================
Sample Name                    Sampling Location           Sampling Date
-----------------------------  ---------------------------  --------------
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     30 / 08 / 2011
Diet                           Kingston                     31 / 08 / 2011
Diet                           Kingston                     31 / 08 / 2011
Diet                           Kingston                     31 / 08 / 2011

Total number of samples : 10
```

```
                          ABC Laboratories

                Food/Water Contamination Monitoring System
                       Measurement Statistics Report

Department Code : AB - ABC Laboratories
Serial No. : 1B3-7742
=============================================================================
SampleType : Total
Sampling Period : 31 / 08 / 2011 to 31 / 08 / 2011
                  DD / MM / YYYY    DD / MM / YYYY
=============================================================================
Radionuclide : RU-103

Sample                Sample               Sampling         Activity     Alarm
 Name                 Location             Date             (Bq/Kg)    Triggered
--------------------  --------------------  --------------  ----------  ----------
Diet                  Kingston              31 / 08 / 2011       0.0       N
Diet                  Kingston              31 / 08 / 2011       0.0       N
Diet                  Kingston              31 / 08 / 2011       0.0       N
=============================================================================
Radionuclide : Group 02

Sample                Sample               Sampling         Activity     Alarm
 Name                 Location             Date             (Bq/Kg)    Triggered
--------------------  --------------------  --------------  ----------  ----------
Diet                  Kingston              31 / 08 / 2011       0.0       N
Diet                  Kingston              31 / 08 / 2011       0.0       N
Diet                  Kingston              31 / 08 / 2011       0.0       N

Total number of samples : 3




                             page 1 of 1
```

page 1 of 1   1 of 1

**Fig. 33. Daily Summary, Sampling Statistics, and Measurement Statistics Reports.**

3.6.1. Deleting Records

This lets you choose one or more records in the current records database file, STATREC.DAT, delete them, and simultaneously append them to the STATREC.DAT.BAK file. Both STATREC files are located in the C:\User\Foodguard-2 folder. ***There is no "undo" for this operation.*** Figure 34 illustrates the selection and deletion of five records.
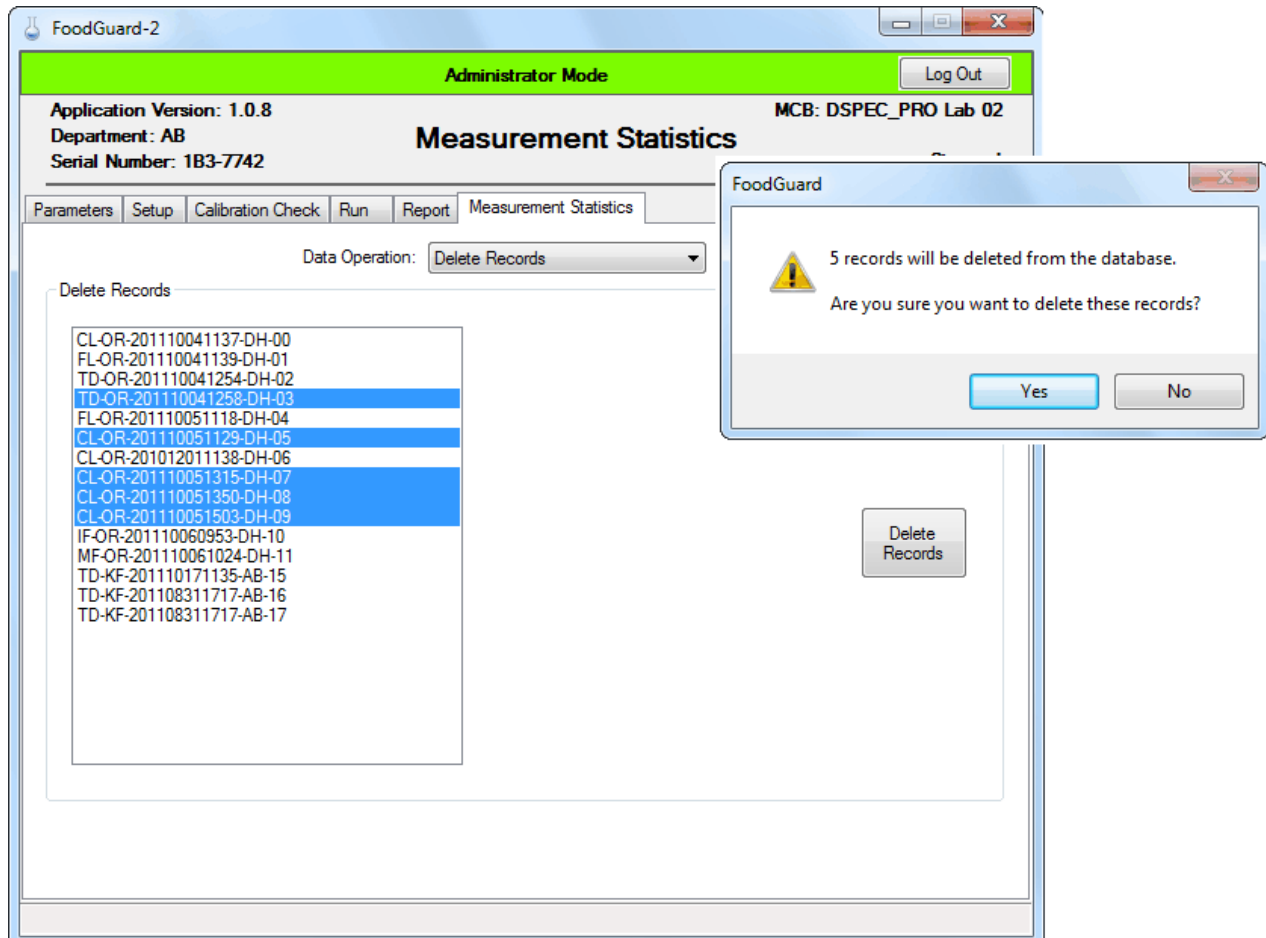
Fig. 34. Select Records for Deletion.

A message on the status bar at the bottom of the program window confirms the deletion and transfer (Fig. 35).
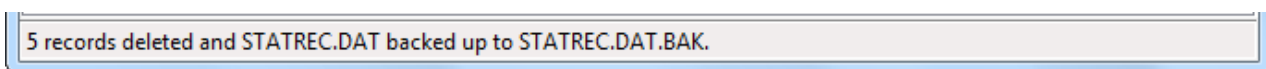
Fig. 35. Records Deleted and Moved to Backup File.

NOTE   It is possible to view the deleted records in the .BAK backup file, *but to guarantee data integrity, be sure to backup both STATREC files first.* Temporarily rename your current STATREC.DAT records database file (for example, STATREC.DAT.SAFE), rename the backup file as STATREC.DAT, then exit and restart the program. FoodGuard-2 will now recognize the renamed backup file as the current records database. Use the Report screen features to access the deleted records. Finally, be sure to restore both STATREC files to their original names, then exit and restart the FoodGuard-2 program.