# Genie-FieldPro

V1.0 7088658B

## User's Manual

ISO 9001 SYSTEM CERTIFIED
MERIDEN CT
ATLANTA GA
OAK RIDGE TN
CONCORD ON

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# Notes

# 1. Introduction

Genie-FieldPro software is a powerful user interface for streamlined and simplified gamma spectroscopy sample counting. Built on top of the Genie acquisition and analysis platform, Genie-FieldPro is designed for maximum usability by field technicians to quickly and confidently analyze samples for gamma radiation, regardless of their spectroscopy knowledge level.

Genie-FieldPro software allows users to identify a sample geometry by two customizable drop down selections (Geometry and Contents/Matrix). A Count is initiated by simply entering a sample ID number and selecting start. The count time, calibration, and analysis parameters are linked to the selection of the geometry and are automatically executed with the count. To improve traceability and confidence, the user is prompted to take a photo of the sample at the conclusion of the count. This photo is then saved alongside the spectrum file. In addition, GPS information can automatically be associated with a sample count for measurements performed out of doors.

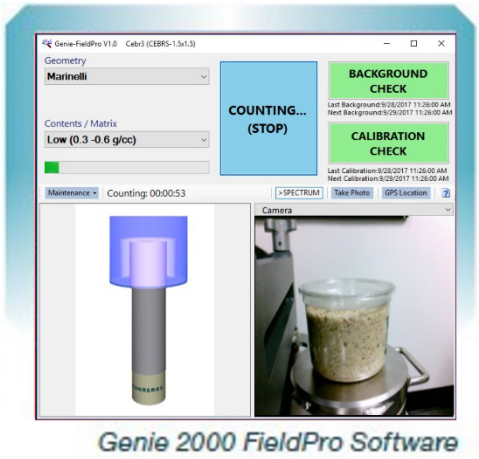



Figure 1: Genie-FieldPro Software

The user interface is completed with a calibration check and background check feature. These buttons will launch a pre-configured count sequence and report a pass or fail result. Failure will lock the system from further sample counting unless the check is successfully passed. The software also will maintain a schedule of when the calibration or background check is next due, and enforce the user to complete and pass these checks by locking out the system until these are executed and cleared.

The Genie-FieldPro count and analysis configuration is all managed by a password-protected user database accessible from the main screen. Administrators can add new counting configurations as necessary by simply specifying a new geometry and matrix combination. Each counting configuration uses a Genie analysis sequence file (*.ASF) for analysis and a Genie calibration (*.CAL) file for efficiency calibration. Therefore, no radiation sources are required for efficiency calibration. Counting duration can be defined either by real or live time, or by a count-to-MDA option. Each geometry also can be associated with an image file (such as *.PNG) to display a visual representation of the selected geometry on the main screen.

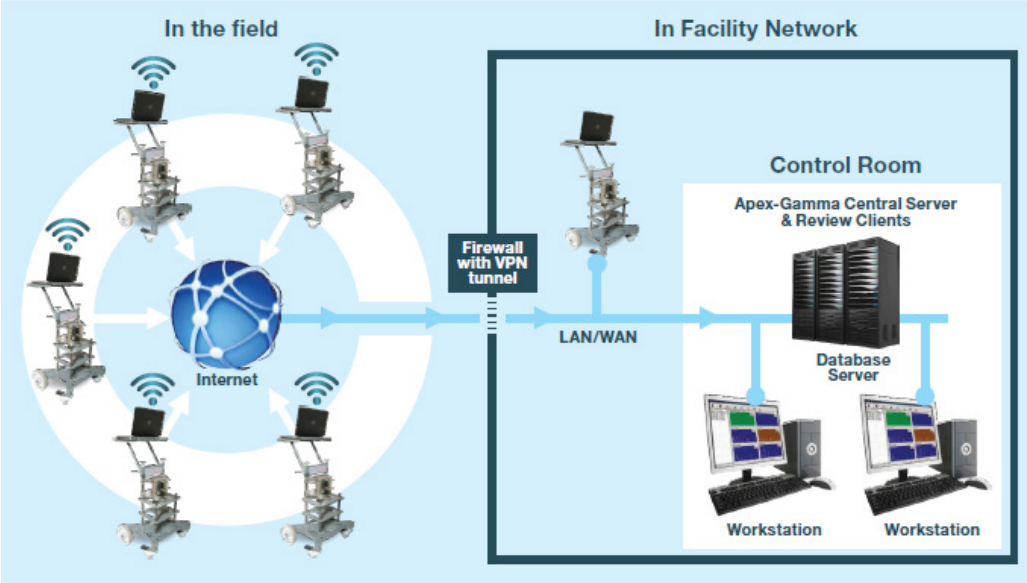



Figure 1: Example of a fleet of Genie-FieldPro remote monitoring systems with Apex-Gamma as a central review station

Genie-FieldPro can operate as a standalone system, or it can also be combined with a remote Apex-Gamma application for data review and archival at a central location. Genie-FieldPro includes a file transfer utility to queue up and relay spectral data to a specified network location, where the Apex-Gamma Sample-Import utility can collect this data and prepare it for processing in the robust Apex-Gamma data review application.

Genie-FieldPro is designed to be the front-end operating system of the TRACS Transportable Radiation Analysis Counting System. However, it can also provide a simple and intuitive user interface for any scintillation detector-based gamma spectroscopy system using the Osprey Digital Tube Base as the MCA.

This user manual will define the basic operations of Genie-FieldPro, describe the configuration and installation procedures for the software, and provide some information about how the calibration and background checks operate as well as recommended operations.

# 2. Basic Genie-FieldPro Operations

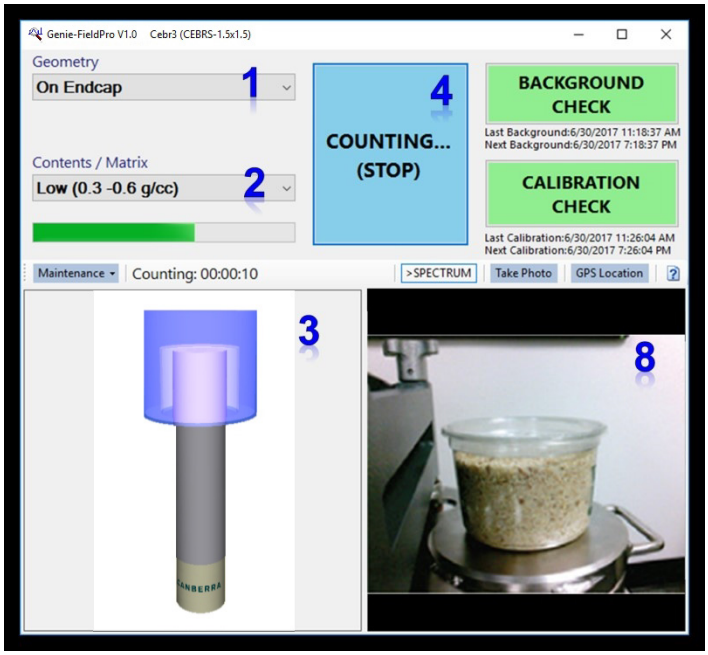
The Genie-FieldPro user has three functions that can be completed from the main page: Counting a Sample, performing a background check, and performing a calibration check.

Genie-FieldPro is launched by selecting the following icon: 

The Genie-FieldPro application will open the detector file (Genie MCA Input Definition) identified as the active detector configuration in the Configuration view. The detector high voltage will automatically be enabled based on the Genie MID definition. Please note: The detector must have been previously loaded into Genie runtime database and energy calibration performed prior to launching Genie-FieldPro. This is discussed in more detail in the Software Configuration section of this manual.

## Counting a Sample:

1. Select the appropriate Geometry for your sample from the dropdown list.
2. Select the appropriate Contents / Matrix selection from the dropdown list.
3. Review the image displayed in the lower left screen. Confirm this matches your sample configuration.
4. Position your sample or detector to the correct counting location. Once confirmed, press **COUNT SAMPLE**.



5. Populate the Sample Information pop up with a representative Sample ID number. If you do not have one, you may use "Auto Generate" to create a unique number. Optionally add a description for the measurement in the "Sample Description" field, and press **Proceed** to continue.

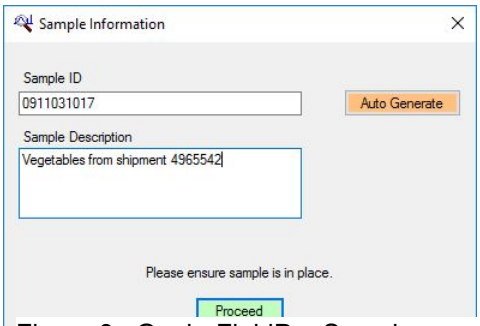


Figure 3: Genie-FieldPro Sample Information Dialog

6. The count will begin. During this time, the "Count" button will indicate a count in progress, and the progress bar will fill from left to right.
   You may also toggle to the "Spectrum" to view the spectrum acquisition directly.

7. When the count is complete, the analysis associated with the count will be immediately performed, and a report will appear with a summary result of "CLEAR" or "ABOVE ACTION LEVEL". Nuclides analyzed will have individual results like "clear", "EXCEEDS ACTION LEVEL" or "MDA too high" on the report.

8. After dismissing the report, you will be prompted to take a photo of the sample. Align the camera viewing angle with the sample and select TAKE PHOTO. This image will be saved with the same file name as the spectrum measurement but with the extension *.JPG.

Note: If a camera is not enabled, you will not be prompted with this message.

## Performing a Background Check

To initiate a background check, first ensure there are no sources or samples in the proximity of your detector. Then, simply press the **BACKGROUND CHECK** button on the main screen. This button will turn yellow during the duration of the count. At the conclusion of the count, an automatic analysis will be performed.

- If successful, the Background Check button will turn green, and the "Last Background" and "Next Background" times will be updated.

- If the background check fails, the button will remain red and the sample counts cannot be performed. The background check may be executed again; however, it will not turn green until there is a successful background check.

A background check must also be performed by the date / time listed as "Next Background". If this time is exceeded without a successful background check, the button will turn red and the sample counts will be prevented.

## Performing a Calibration Check

To initiate a calibration check, first place the system calibration check source in the specific geometry defined for your system. Then, press the **CALIBRATION CHECK** button on the main screen. This button will turn yellow during the duration of the count. At the conclusion of the count, an automatic analysis will be performed.

- If successful, the Calibration Count button will turn green, and the "Last Calibration" and "Next Calibration" times will be updated.

- If the calibration check fails, the button will remain red and the sample counts cannot be performed. The calibration check may be executed again; however, it will not turn green until there is a successful calibration check.

A calibration check must also be performed by the date / time listed as "Next Calibration". If this time is exceeded without a successful calibration check, the button will turn red and the sample counts will be prevented.

# 3. Software Configuration

There are four key parts of the system to configure to ensure proper sample collection and flow of data from the portable monitor system all the way into Apex-Gamma sample management system. The initial configuration shows examples of several probes, containers and sample types. It is expected that users would have custom configurations tailored for their application needs. Some of the key steps are defined here in case users want to modify or extend the configuration. There are also descriptions of key naming conventions used to ensure that sample data flows from the Genie-FieldPro software all the way to the Apex-Gamma database.

## Genie-FieldPro Software Configuration

### Genie Detector Configuration

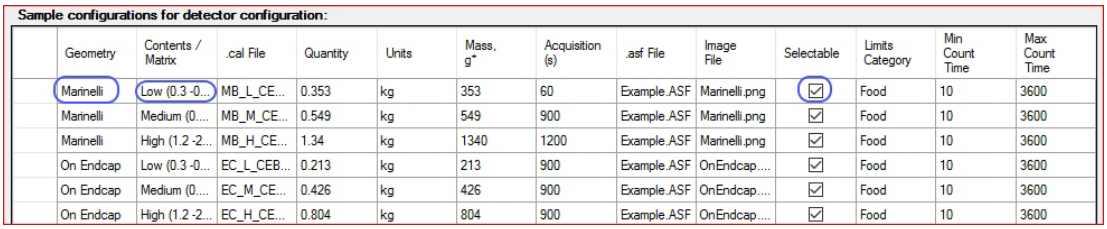
To allow the Genie-FieldPro software to communicate with the MCA and detector, the Genie-2000 MCA Input Definition editor is used to tell the software how to communicate via USB to the MCA. This can be configured at the Canberra factory and shipped to the customer. Details of how this configuration can be performed are documented in the Genie-2000 user manual and the Osprey DTB manual. (The Osprey is the MCA typically used for such applications).

An initial energy calibration must be performed on the detector using Genie. This file is saved in the Genie directory for use within the Genie-FieldPro software.

### Genie-FieldPro Configuration (Maintenance Menu)

When you start the Genie-FieldPro software on the laptop, the main screen will have a menu button in the middle labeled “Maintenance”. Clicking on this will display a drop down menu. These operations are described in more detail in Chapter 8, *Genie-FieldPro Configuration*, on page 31. There are some key things that are specific to the interface with Apex-Gamma that are important to know.

On the Configuration Screen, the middle section contains all the different sample geometries you expect to count. The three key fields are circled in Figure 5



Sample configurations for detector configuration:

| | Geometry | Contents / Matrix | .cal File | Quantity | Units | Mass, g* | Acquisition (s) | .asf File | Image File | Selectable | Limits Category | Min Count Time | Max Count Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Marinelli | Low (0.3 -0... | MB_L_CE... | 0.353 | kg | 353 | 60 | Example.ASF | Marinelli.png | ☑ | Food | 10 | 3600 |
| | Marinelli | Medium (0.... | MB_M_CE... | 0.549 | kg | 549 | 900 | Example.ASF | Marinelli.png | ☑ | Food | 10 | 3600 |
| | Marinelli | High (1.2 -2... | MB_H_CE... | 1.34 | kg | 1340 | 1200 | Example.ASF | Marinelli.png | ☑ | Food | 10 | 3600 |
| | On Endcap | Low (0.3 -0... | EC_L_CEB... | 0.213 | kg | 213 | 900 | Example.ASF | OnEndcap.... | ☑ | Food | 10 | 3600 |
| | On Endcap | Medium (0.... | EC_M_CE... | 0.426 | kg | 426 | 900 | Example.ASF | OnEndcap.... | ☑ | Food | 10 | 3600 |
| | On Endcap | High (1.2 -2... | EC_H_CE... | 0.804 | kg | 804 | 900 | Example.ASF | OnEndcap.... | ☑ | Food | 10 | 3600 |

Figure 4 - Genie-FieldPro Sample Configuration Screen

- **Geometry & Contents / Matrix:** the names you specify for these two fields must match a Geometry Name that is defined within Apex-Gamma. The geometry name must exactly match these two names concatenated together with a space in-between. For example, if your container geometry is called “16 oz Deli” and the sample contents is called “Grains”, then you will need a geometry defined in Apex-Gamma named “16 oz Deli Grains”. For more details, see the Apex-Gamma configuration section of this chapter.

- **Selectable:** you must ensure that the selectable checkbox is set in order for the user to be able to use the configurations you created. You can create many different configurations but only keep the key 2 or 3 configurations active to simplify the user interface.

## File Transfer Manager (FTM) Configuration

The File Transfer Manager (FTM) is a program that runs on the laptop of the Counting system. It transfers sample files to the Apex-Gamma Server from a directory on the laptop where Genie-FieldPro stores them.

To configure the location where FTM will move sample files, click on the FTM icon which is in the Windows Tray area near the clock (low right size of your screen as shown in Figure 6). Click on the Genie-FieldPro icon to pop up a menu. Select “Parameters Setup” to access the screen discussed in the following section.

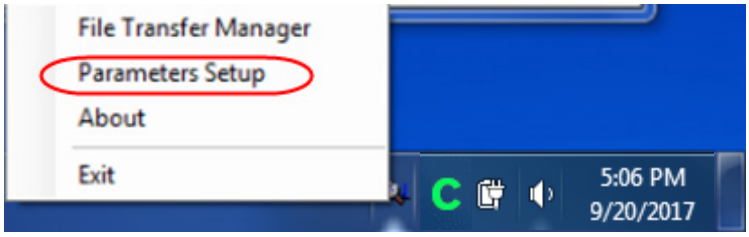



Figure 5 - File Transfer Manager Menu

### Parameters Setup

This dialog allows you to change the destination of where sample data files are copied. Typically, these are set to a shared folder on the Apex-Gamma server computer in which the Auto Import utility is watching for new data. **Figure 7** shows the configuration dialog.

Copying directly to a shared directory on the Apex-Gamma server from a Counting system PC would require the computer to use VPN software. This would allow it to create a secure connection across the Internet and then be able to talk directly to the Apex-Gamma server computer. If you do not have VPN software, these directories should be set to a local directory on the laptop computer. Then you could use a separate program to transfer the files using some other technique such as sending files via FTP or through email. Either way, the FTM must be configured to copy new sample files to a new location.

- **CAM Files Repository:** Specify the full path to where you want the CAM file copied. CAM files are the spectral files for each sample count and they have a file extension of .CNF.

- **Report Files Repository:** Specify the full path to where you want the Genie-FieldPro text reports to be copied. These reports are automatically generated by the Genie-FieldPro software and might be useful when reviewing samples within Apex. This essentially preserves some information about the analysis done on the Counting system.

- **Photo Files Repository:** Specify the full path to where you want the sample photos to be placed. Each sample that is counted can have a photo associated with it. Copying these to the Apex-Server allows them to be reviewed in case of unusual analysis results. Looking at the picture could help identify a problem such as a half-filled sample container, or misidentified contents.

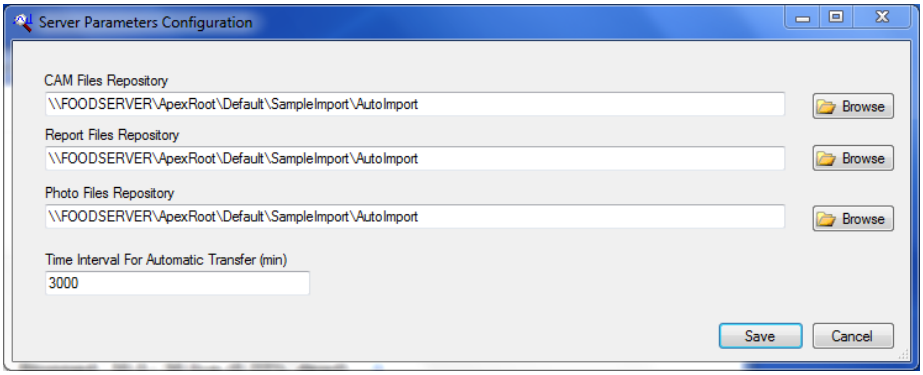



Figure 6 - File Transfer manager Parameters Setup

## Auto Sample Import Configuration

The auto sample import process runs on the Apex-Gamma server and it imports sample data from files that have been transmitted from one or more remote monitors. This process looks to see where the XML import location is configured in Apex and uses that to look for new sample files. The XML import location is configured using the Apex Setup utility.

Figure 8 shows the key buttons and screens in the Apex Setup utility:

1. Click on the “Server” button

2. Next click on the “Facility” tab. This will show you a list of Facilities defined in the Apex database.

3. The sample import is configured to work off the default facility click the row in the table with the name of “Default”.

4. Next, click the “Advanced” button. This will pop up a dialog that lets you set a variety of parameters for the facility that is selected.

5. In the “Path Name” drop down control, choose the “Sample Import XML Files” option.

6. Set the path to where you want the sample import process to look for a subdirectory called AutoImport that will contain new files.

That is the only setting you need to change for Sample Import. Be sure that the FTM is putting files in this directory.

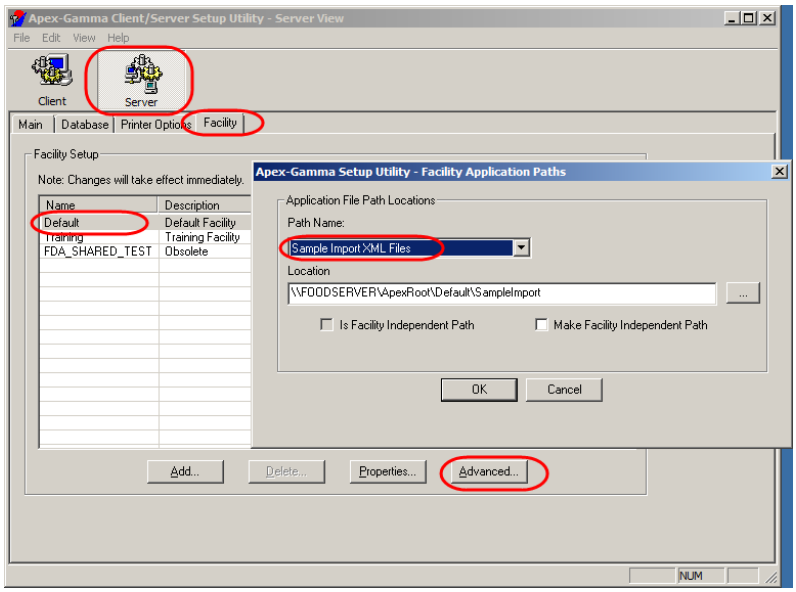



Figure 7 - Apex Setup - Sample Import Location

### Manual Sample Import

To import sample data files into Apex Gamma, launch the Auto Sample Import function by running the following executable: C:\canberra\Apex\exefiles\Autoimport.exe.

It is recommended that you create a shortcut to C:\canberra\Apex\exefiles\Autoimport.exe and then double click on the shortcut to import the sample data files into Apex-Gamma.

## Apex-Gamma Configuration

In order for Apex to properly import samples and automatically reanalyze them during import from one or more counting systems, you need to configure it properly.

### Define a Detector for each Counting system

There must be a detector defined in Apex-Gamma for each counting system you will deploy in the field. As samples are imported, they must be associated with a detector so you should define a detector that represents each counting system. The name you give this detector must match the “Detector Name” field specified in the Genie-FieldPro software in the Detector Configurations settings in Maintenance.

Note: The detector names for each monitor need to be unique. For example, the detector for the first counting system could be MONITOR1, the next one could be MONITOR2, and so on.

## Define Geometries

For each sample Geometry and Contents/Matrix combination, you will need to define a Geometry in Apex Gamma. The name of each Geometry in Apex Gamma must precisely be a concatenation of the Genie-FieldPro names for the container Geometry and the sample Contents / Matrix, separated by one space.

For example if you have a Geometry defined in Genie-FieldPro called “16 oz Deli” and you have 3 Contents/Matrix options for this container named “Grains”, “Vegetables”, and “Liquid-Meats”, then you would create 3 geometries in Apex-Gamma named:

- 16 oz Deli Grains
- 16 oz Deli Vegetables
- 16 oz Deli Liquid-Meats

For the QA counts, you will need to define a Geometry for each in Apex as well. However, the geometries are per detector. The name of each geometry must be the concatenation of the Detector name, a space, and the value of the Name element of the corresponding AutoImportSettings.xml configuration.

For example if you have a Detector defined in one Genie-FieldPro installation called “MONITOR1”, another Genie-FieldPro installation with a Detector called “MONITOR2”, Detector definitions in Apex Gamma for both “MONITOR1” and “MONITOR2”, a BgdCheckTemplate configuration with a Name value of “BgdCheck”, and a CalCheckTemplate configuration with a Name value of “CalCheck”, then you would create 4 geometries in Apex named:

- MONITOR1 BgdCheck
- MONITOR1 CalCheck
- MONITOR2 BgdCheck
- MONITOR2 CalCheck

Note: You must create a QAF template file in Apex-Gamma prior to loading in QA counts from a remote monitor.

## Import Efficiency Calibrations

You then need to import LabSOCS efficiency calibrations using the calibration screen and the Efficiency tab. You must import the calibration that models the sample geometry and contents/matrix you will be counting.

You must also approve the efficiency calibration before Apex can use it. The efficiency file you import for a specific geometry and remote counting system detector will be used to reanalyze every sample that is imported which matches the geometry and detector names.

Background Check counts do not require efficiency calibrations, but you do need to import an efficiency calibration for the Calibration Check geometry of each detector.

## Create Sample Procedures

You must create a sample procedure for every geometry that the remote system will be using. The name of the procedure must match exactly the name of the Geometry you defined in Apex earlier. For example, if you created a Geometry called “16 oz Deli Grain” you will need to create a procedure with that same exact name. This procedure will be used to automatically reanalyze imported samples that match this criterion. This is true for the QA counts as well. For example, for a Detector named “MONITOR2” and the default QA AutoImport configuration Name values, you must create procedures named “MONITOR2 BgdCheck” and “MONITOR2 CalCheck”.

## Create Sample Templates

You must next create a sample template for every sample procedure you created. You do this by going to the Sample definition screen and defining a sample with a name that exactly matches the Geometry name. For example, if you had a Geometry called “16 oz Deli Grain”, you would also have created a Sample Procedure with that same name, and now you will define a sample with that same name.

These template sample definitions will sit in the sample queue forever. They will be used to find what counting procedure to use for samples that are being imported. If AutoImport finds a match between the geometry and contents found inside the count file and the name of a template sample definition, it will then use the procedure defined in the sample template definition to reanalyze the file.

## Additional Notes:

- Apex-Gamma Gamma Total option is not supported with the auto-import utility. It is not recommended to use this in conjunction with the Remote Monitor system.

- To assist in troubleshooting Apex-Gamma AutoImport, execute the following steps:

  a. Review the Logs subdirectory directory of the AutoImport directory of the Apex-Gamma system. The presence of new files is an initial indicator that an error has occurred.

  b. Execute a search in the Apex-Gamma Data Review view to see if a sample definition was imported at all. If found, the error most likely occurred during the reanalysis during import. Press the Reanalyze button to begin troubleshooting the analysis problem. Note: the AutoImportErrors.txt file may contain an error such as "IDispatch error" in the case of some analysis errors, such as QATransfer or QAAnalyze errors.

  c. If the sample definition is not found in the list of all acquired samples in the Apex-Gamma Data Review search, examine the time-stamped entries at the end of the AutoImportErrors.txt file in the Logs directory. Look for aspects of the Apex Gamma configuration that do not match the file for which import is failing in order to identify and correct the error.

# 4. Genie-FieldPro Main User Interface

This chapter introduces you to the parts of the Genie-FieldPro user interface where you can perform sample measurements as well as perform quality control counts on your system.

To start Genie-FieldPro from the Windows desktop, open the Start menu and type to search for “Launch Genie-FieldPro.exe”.

The main window (Figure 10) now appears.

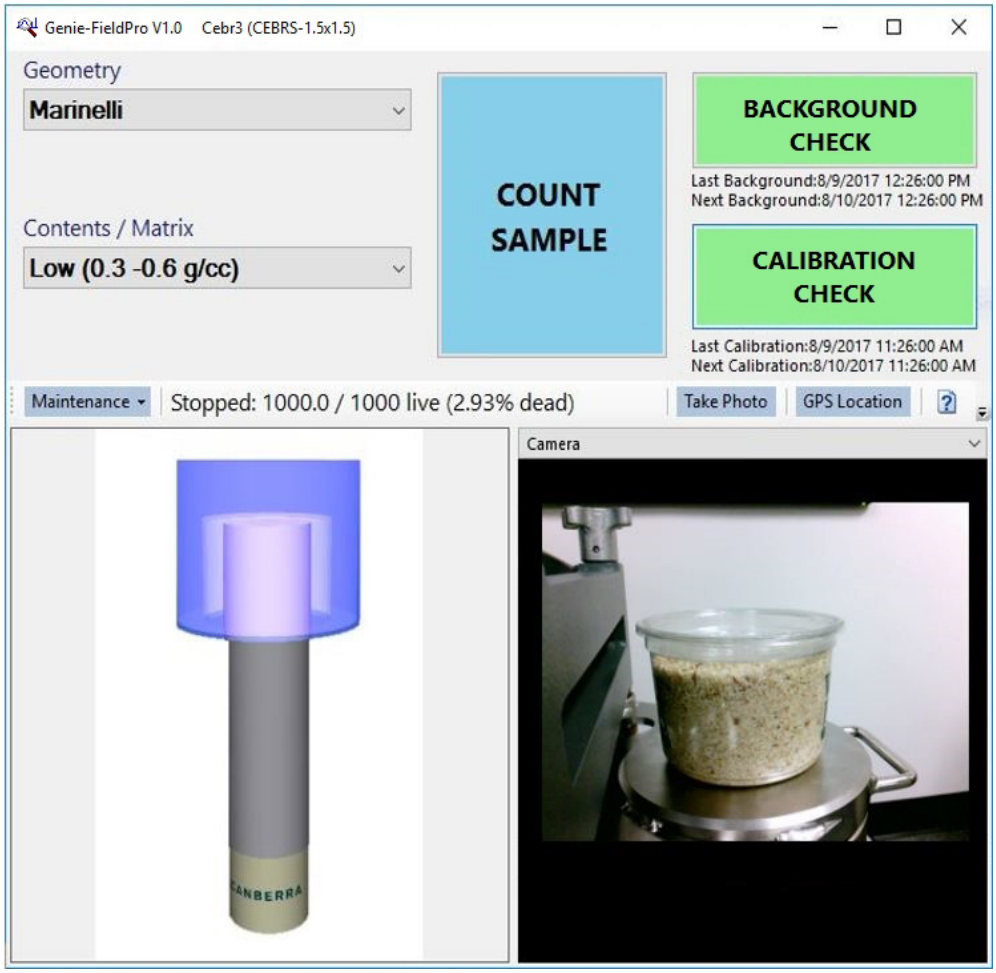



Figure 8: Main User Interface

The main window consists of the following components:

- Drop down menu for sample geometry or container.
- Drop down menu for sample matrix / contents.
- **Count Sample:** button for initiating a sample measurement
- **Background Check:** button for initiating a background check count.
- **Calibration Check:** button for initiating a system calibration check
- **Maintenance:** this is a drop-down menu (see *Maintenance* on page 6).
- **Status Bar:** To the right of the Maintenance menu is an area that shows elapsed and current time presented with dead time on a bar.
- **Help:** You can access the user's Manual by clicking on the help button ().
- Image representing the detector-sample configuration.
- Image of what a selected camera (if available) can see. This is used to take a photo of each sample being measured. This can provide a record of characteristics like container contents and fill height. User will be prompted to take a picture after the count is complete.
- **SPECTRUM/IMAGE:** button to toggle between display of images and the acquired spectrum. Images shown above, spectrum shown below.

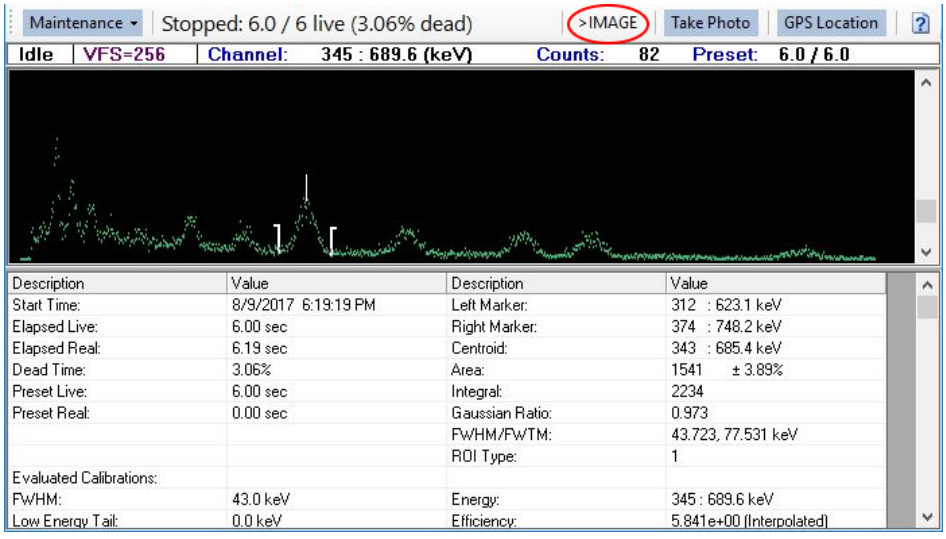



Figure 9 Spectrum View

- **Take Photo:** Button to take snapshot of immediate camera view as an image file with a name that corresponds to the last sample measurement data file. For filled containers, it is recommended to take the photo from the side of the sample rather than looking down on the sample from above. The side view gives an indication of fill level of the sample container.

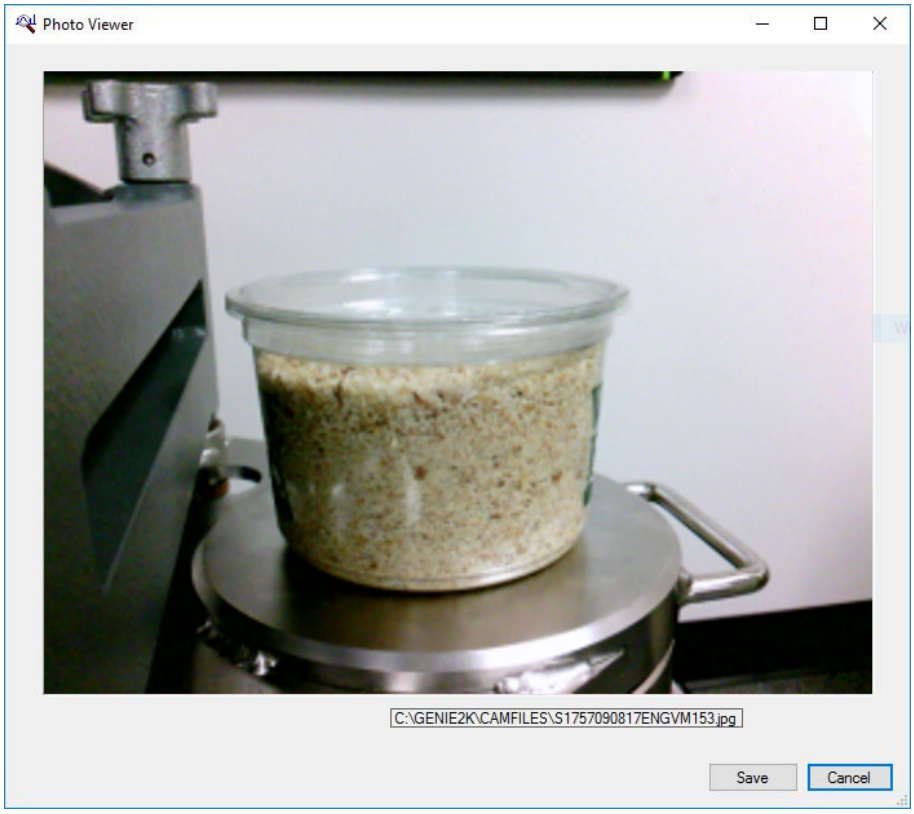



Figure 10 – Photo Viewer Dialog

## Sample Counting

To begin counting a sample, perform the following steps:

1. Select the container type from the Geometry drop down list – a visual representation of the container on the detector is shown for guidance purposes. (The detector in use is indicated in the title bar and changeable in the Configuration view, if needed.)

2. Select the container contents from the **Matrix / Contents** drop down list.

3. Initiate a count by pressing the **Count Sample** button.

4. The Sample Information dialog appears as shown in the figure below. Populate a Sample ID number and, optionally, a sample description.

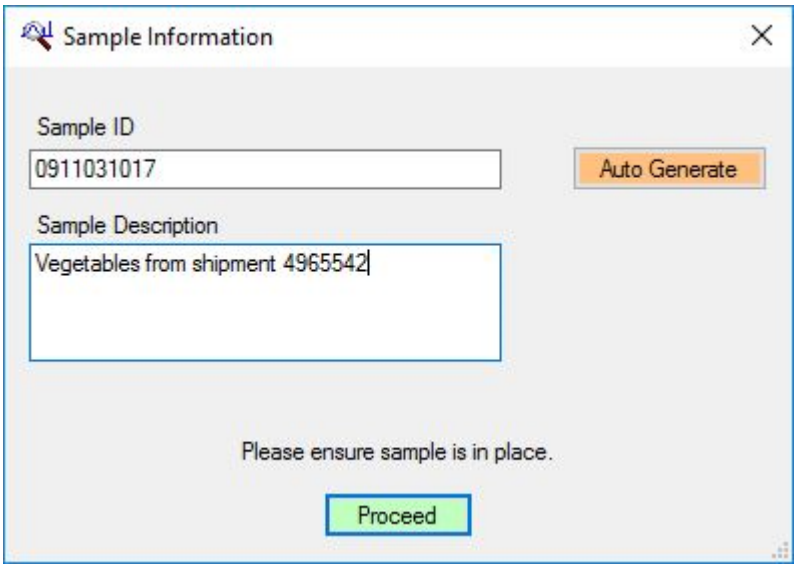



Figure 11 – Entering the Sample Information

5. Position the sample and/or detector.

6. Enter the sample information and press **Proceed**.

7. The **Count Sample** button changes to 'Counting…(Stop).' The count initiates. Note that any existing spectral data will be cleared.

After the count is completed, the application will prompt the user to position the sample and take a picture of it. This picture will be recorded with the other sample data files. Sample pictures are stored as JPEG formatted files. Report files are stored as .txt files. The spectral data and results are stored in the GENIE2K\CAMFILES directory as a file named with the format S<sample_ID><computer_name>.cnf. The .jpg and .txt file names will use the same convention, but differ only in the file name extension.

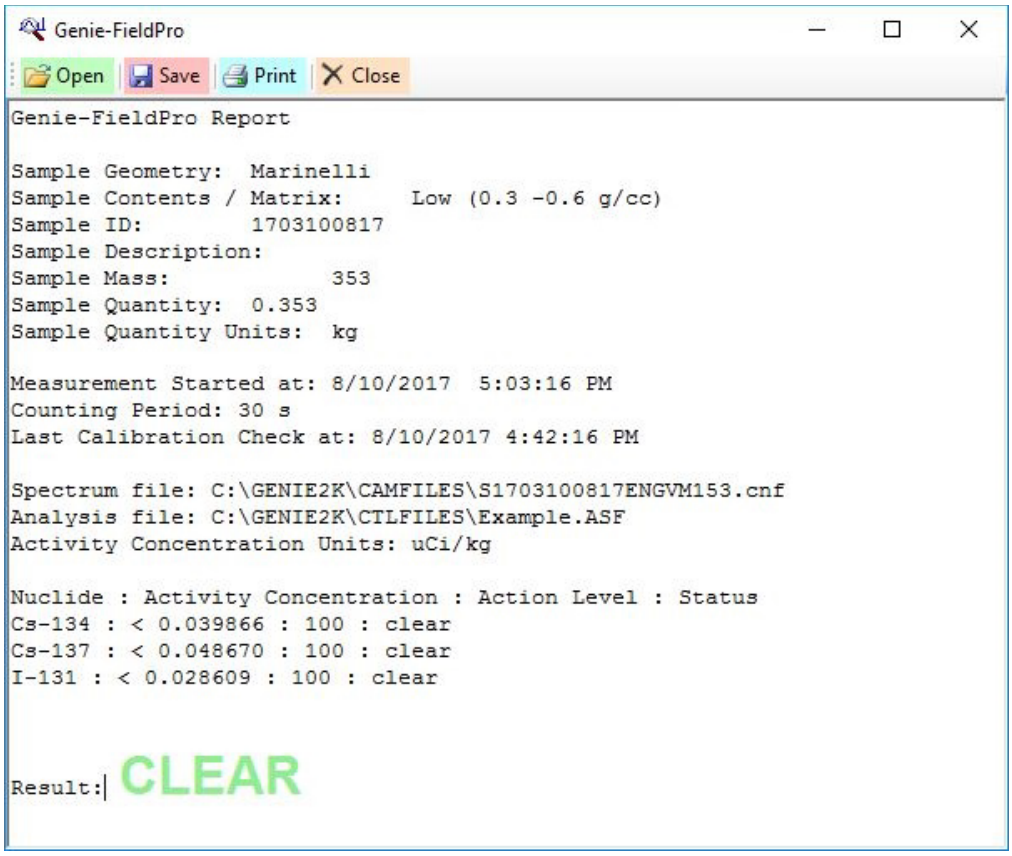



Figure 12 – Sample Count Measurement Report

## Calibration Check

The User Interface includes a **Calibration Check** button that is used to initiate calibration check measurements. The button is red if the calibration check is past due.

Under the button are the following labels:

- Last calibration check time and date
- Next calibration check due time and date

The maximum allowable time between calibration check measurements is set on the configuration screen (see the "Detector Configuration" section of the *Configuration* screen on page 33). The length of the calibration check count and the standard source certificate file used are also set there.

Note: The Calibration Check count can be aborted (stopped) during the count by pressing the **Calibration Check** button.

To perform a calibration check, you must:

1. Press the Calibration Check button.

2. A dialog prompts you to place the standard sample into position, e.g. in a shielded sample chamber. Press OK and wait for the count to complete. Note that any existing spectral data will be cleared. The Calibration Check button label changes to 'Checking…(Stop)' and the button's background color changes to yellow.

At the end of the count period, the system automatically compares the centroid and count rate values to the certificate and, if possible, automatically makes small corrections to the energy calibration (equation) in order to maintain the system. (This analysis is described in more detail in the section entitled "*Genie-FieldPro Calibration Analysis*".) A calibration report is saved as a plain text file, with the naming convention: C<hour><minute><day><month><year><computer_name>.txt. The Calibration Check button's background color changes to green if the calibration is within tolerance and red if not. Like sample counts files, the data (*.cnf) and report (*.txt) files have similar names differing only in the file name extension.

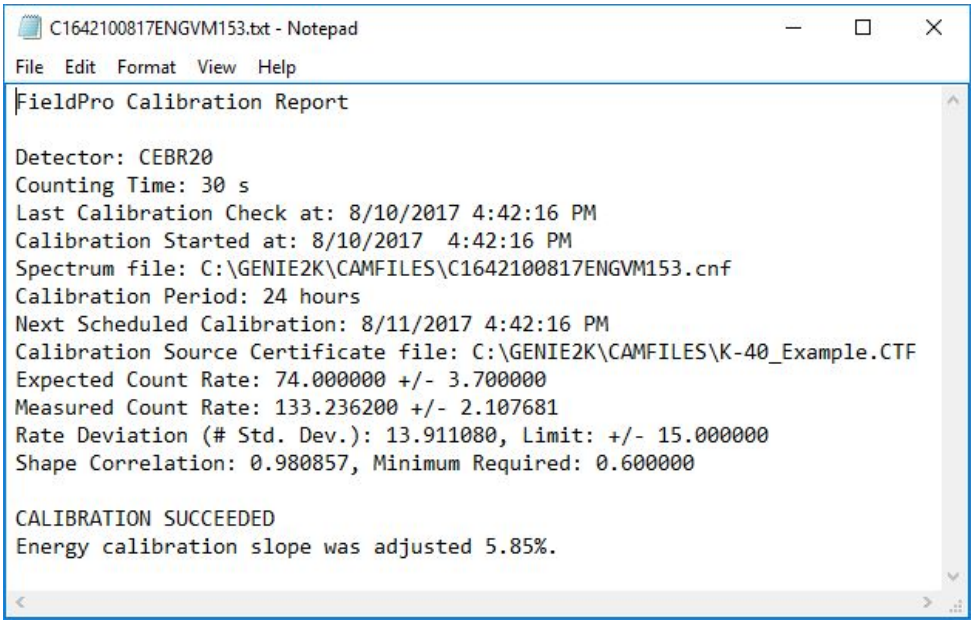



Figure 13 Example Calibration Check Report Opened with Windows Notepad

## Background Check

The User Interface includes a **Background Check** button that is used to initiate counts that test for unacceptably high activity in the absence of a sample. Interaction is similar to the Calibration Check button. The button is red if the background check is past due.

Under the button are the following labels:

- Last passing background check time and date

- Next background check due time and date

The maximum allowable time between background verifications is set on the configuration screen (see the "Detector Configuration" section of the *Configuration* screen on page 33). The length of the background check count and the quality assurance file (.qaf) used are also set there.

Note: The Background Check count can be aborted (stopped) during the count by pressing the **Background Check** button again.

To perform a background check, simply press the Background Check button. When the count is complete, parameters specified in the .qaf file ( previously, via the Genie Quality Assurance Editor) will be transferred to the file and the success of the "last measurement" test will be indicated by a green background color of the button and updating of the "Last Background" and "Next Background" values.

Genie-FieldPro does not automatically generate a report following the execution of the Background Check function. To review the Background Check measurement in more detail, use the Genie Quality Assurance Editor to open the .qaf file. Click on Results > Report > Last Measurement to see a report as shown in Figure 16. For more details, consult the Genie Quality Assurance User's Manual.

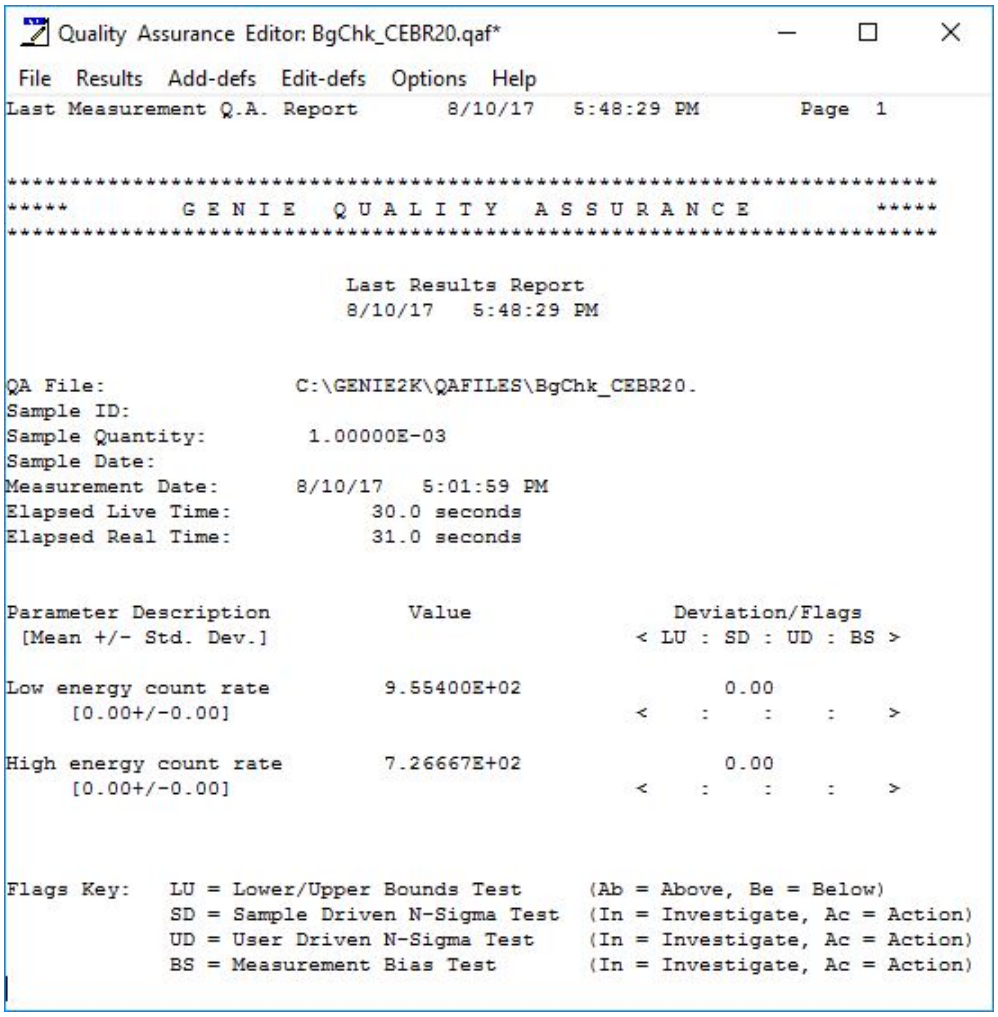



Figure 14 Example Report Generated with Quality Assurance Editor Application

## Maintenance Menu

The Maintenance menu is accessed by clicking on the down arrow on the Maintenance toolbar button. The maintenance menu allows the user to access the following three functions: Password Maintenance, Log Viewer, and Configuration editor.

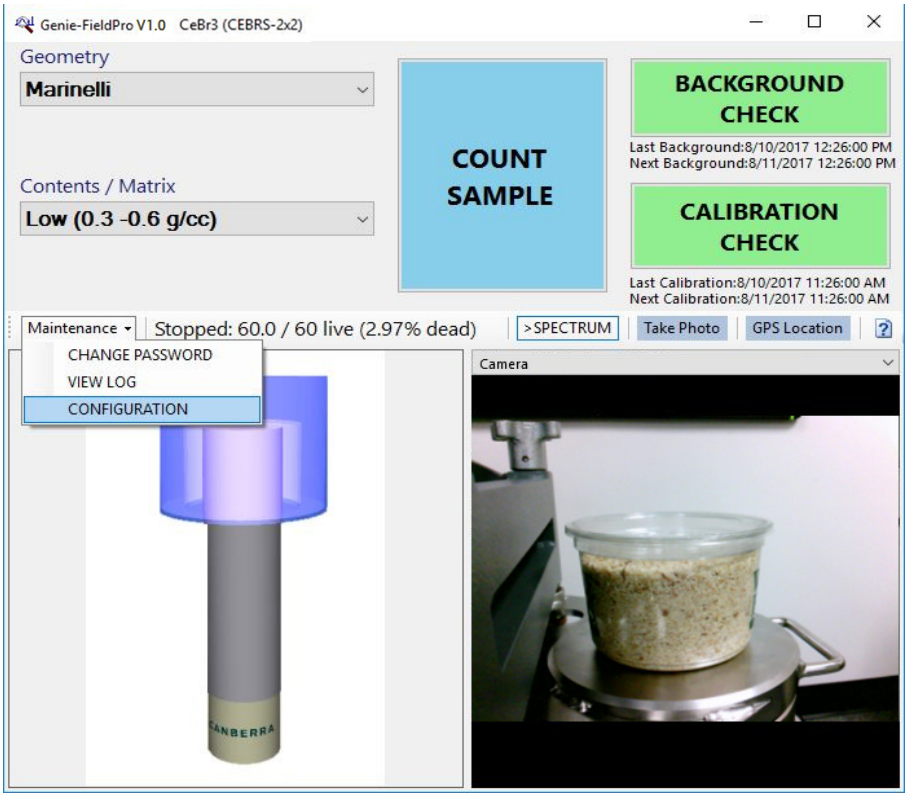



Figure 15 – Main User Interface Showing Maintenance Menu

**Change Password** – Changes the password that restricts access to the Configuration screen.

Note that the default password is blank. A blank password results in no password protection of access to the Configuration screen.

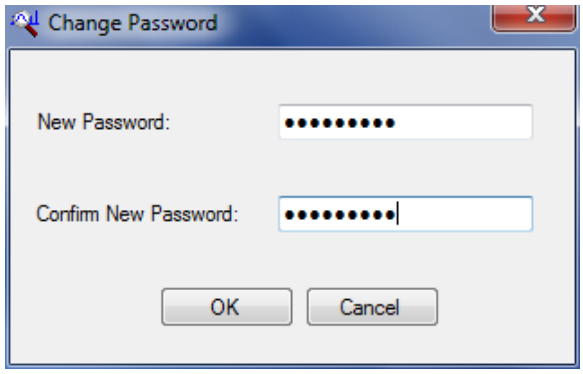



Figure 16 - Change Password Screen

**View Log** – Brings up the event log which is used to log actions taken within Genie-FieldPro. This view includes options for printing, saving, and opening other log files. Note that there is a new log file generated for every application session (i.e. from launch to closing) and there is no automatic deletion of these files, which are located in GENIE2K\Genie-FieldPro\Logs. The file of interest may be found by date – either via the date encoded in the file name or by examining the "Date modified" field in a standard Windows Explorer view.

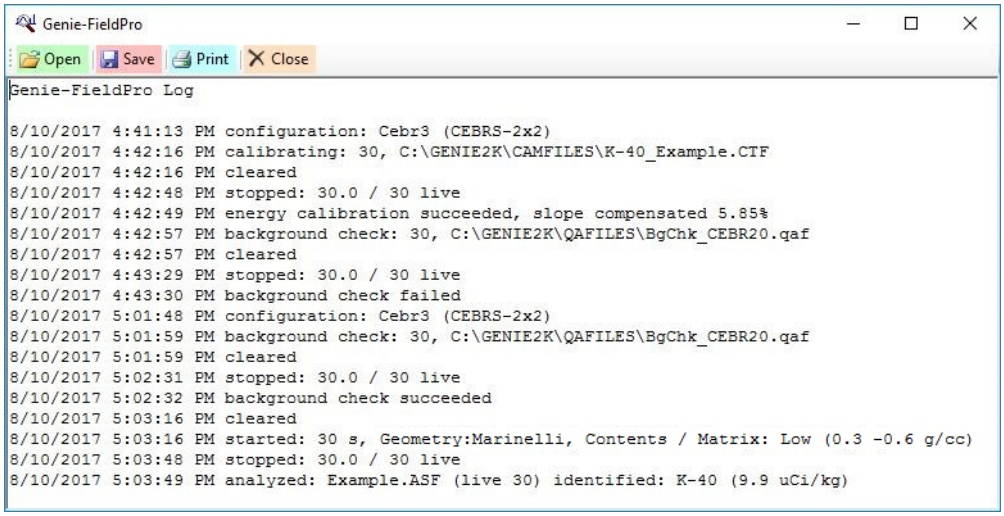



Figure 17 – Log View

## GPS Location

Genie-FieldPro can store a single latitude, longitude position and save it into every measurement. Since standard GPS receivers do not work indoors, a common way to use this would be to open this dialog while outdoors (in an area with sufficient exposure to GPS satellites), press the Acquire button, wait for the Latitude and Longitude fields to show new data, then press the Save Location button to save the position to the database file that Genie-FieldPro maintains. Another potential use would be to determine the coordinates from a mapping website (in a web browser) or a mobile phone app, enter them manually in the fields, and press "Save Location".

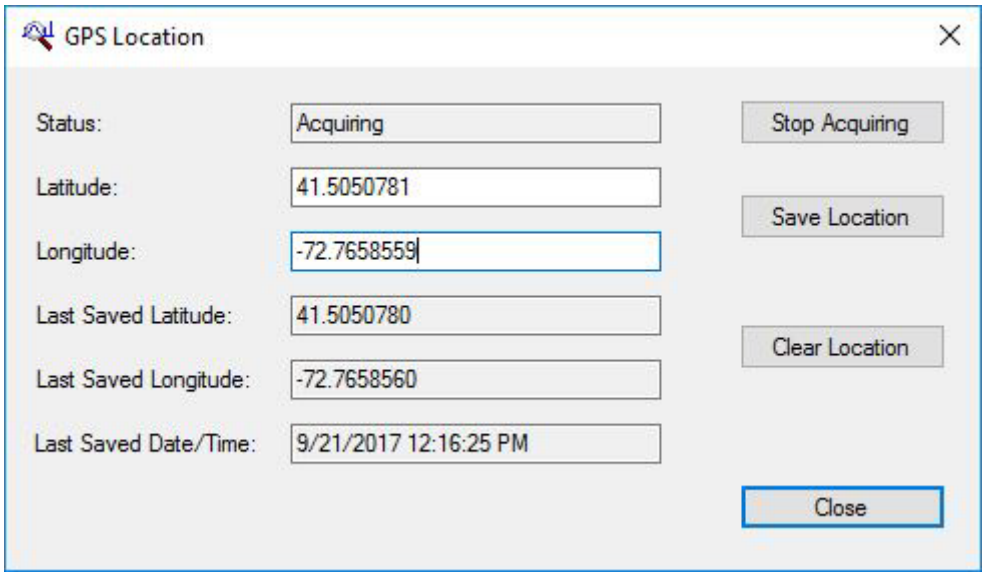



Figure 18 - GPS Location Dialog

- To erase the stored value, press "Clear Location" to have Genie-FieldPro set the longitude and latitude values to 0 in the database.
- Degrees are used, with negative values representing the Southern hemisphere for latitude or Western hemisphere for longitude.
- The values may be entered manually by a user or acquired from a connected GPS receiver.
- If using a GPS receiver, it must be capable of posting standard NMEA 0183 RMC messages at 4800 baud on a configured Windows COM port. If an error occurs in accessing the COM port (specified on the Configuration view), the "Acquire" button will be disabled. Note that Windows does not allow two programs to simultaneously access COM ports, so if there is a need to monitor a GPS device outside of Genie-FieldPro, ensure that the "GPS Location" windows is not actively acquiring GPS data, and vice versa.
- The values are retrievable via program scripts or report templates from the CAM_G_SGPSLATITUDE and CAM_G_SGPSLONGITUD parameters as 64-bit floating point numbers.

# 5. Genie-FieldPro Calibration Analysis

The Genie-FieldPro Calibration Check uses a unique algorithm to best ensure your detector system is operating reliably with a single measurement. The calibration check will monitor the spectrum peak shape (resolution), energy (centroid location), and efficiency (count rate). In the case of a minor gain shift in your spectrum, this algorithm will adjust your detector energy calibration to ensure the best quality results.

## Calibration Check Configuration

The following parameters can be used to adjust the performance of the calibration check algorithm:

- .cal File for Cal Check: This Genie calibration file is used as reference for the expected energy, shape, and efficiency calibration of the spectrum. The efficiency calibration must be appropriate for the geometry of the calibration check source.

- Cal Check (s): This determines how long the calibration count acquisition is in seconds. A longer count will result in stronger statistics and lower uncertainties. If the calibration source is weak, this may need to be extended.

- .CTF File: This Genie certificate file is used to identify both the expected nuclide energy lines and the emission rate of the calibration check source. It is important to consider which nuclides lines to include in this file, as all the lines listed will be evaluated during the calibration check. The best performance is obtained using a nuclide with one dominate energy line. In this case, only one energy line should be listed in the CTF file. Alternately, multiple energy lines may be used if they are well separated in energy. It is not recommended to use a check source with multiple strong energy lines in a similar energy region.

- Cal Sigma Limit: The Cal Sigma limit is maximum number of standard deviations between the measured and expected calibration check peak areas to validate a successful calibration check. The expected calibration counts are based on the emission rates specified in the calibration certificate. If your reference data (calibration file and certificate file) or your measured spectrum have smaller uncertainties, this will result in a smaller standard deviation value and a lower effective tolerance for deviation between the expected and measured spectrum. Conversely, if your reference data or measured spectrum have very high uncertainties, the standard deviations will be large and a wider range of absolute deviation will be tolerated. Typical limit values might range from 4 to 10, with a default value of 8.

- Correlation Limit: The correlation limit is in terms of the Pearson's correlation coefficient, which is effectively a measure of how well the measured spectrum and expected response (the simulated spectrum) compare. This is especially useful in evaluating the shape and energy calibration of your spectrum. This value ranges from 0 to 1. A correlation limit of 1 is the most stringent value. A correlation limit of 0 is effectively disabling the calibration check function. Typical limit values might range from 0.3 to 0.9, with a default value of 0.6.

## Calibration Check Algorithm

The automated analysis method processes the measured spectrum, elapsed live time, energy calibration, peak shape calibration, efficiency calibration and check source certificate file to estimate the best current energy calibration slope term. The engine uses the measured spectrum, energy and peak shape calibration to perform peak erosion baseline estimation to separate the measured peak spectrum from the underlying continuum. The certificate data is then used in conjunction with the energy, shape and efficiency calibrations to generate an expected peak response model that can be compared to the measured peak spectrum. The energy calibration slope term is varied in very small discrete steps over a range from 50% below to 50% above the initial value. At each step, the peak model is compared to the measured peak spectrum by calculating a Pearson's normalized correlation coefficient. The highest correlation must meet or exceed the specified correlation limit. The total measured peak counts in the regions corresponding to the certificate peak regions when the energy calibration slope term yields the highest correlation is compared to the expected total counts. The expected total counts are obtained by summing all of the certificate emission rates times respective peak efficiencies and the live time. The ratio between the total measured peak counts and the expected certificate peak counts in terms of total number of standard deviations must be less than the specified sigma limit. If both the correlation limit and sigma limit are met, the analysis is deemed successful and the new energy calibration slope term is applied.

In summary, the automated calibration check analysis performs:

- Baseline estimation of measured spectrum to get measured peak spectrum.
- Iteratively step through the range of candidate energy calibration slope terms.
  - -50% to +50% of the initial value.
  - Generate expected certificate peak models at each step.
  - Calculate shape correlation coefficient between each model and the peak spectrum at each step.
- Select the energy calibration slope term with highest correlation.

- If highest correlation achieves the specified correlation limit, continue.
- At the candidate energy calibration slope, tally all of the measured peak counts in the certificate peak regions.
- Tally of all of the expected peak counts per the certificate, live time and efficiency calibration.
- If the ratio of the difference between the expected and measured peak counts to the total standard deviation is less than the specified sigma limit, continue.
- If both the correlation limit and sigma limit are satisfied, the analysis is successful – apply the energy calibration slope term with the highest correlation. The energy calibration is saved in the detector MID file.

# 6. Genie-FieldPro Sample Data Analysis

Genie-FieldPro is designed to be a general purpose counting application. To help you get started, a number of example files have been pre-populated in the software. These files will help the user understand the operations of the software and facilitated training operations. These are described in Appendix B. However, it is highly recommended that dedicated data analysis files be generated and configured for your particular application.

For a given sample analysis, the following data files are required: Detector MID file, geometry efficiency file, analysis sequence file, count time, and if desired a Limits Category evaluation. The user also has the option to utilize a massimetric efficiency calibration, in which case the mass will also be required. In addition, the detector must have satisfactory calibration check and background check status.

The Detector MID file will contain the necessary energy calibration and shape calibration that is used for the data analysis. The rest of the sample analysis options are associated with a particular Geometry and Matrix/Contents selection.

## Analysis Sequence File

The sample analysis is executed at the conclusion of the count, and is defined by the Genie Analysis Sequence File (ASF) that is associated with the Geometry and Matrix/Contents selection. The ASF calls on Genie algorithms to process the spectrum taken during measurement and produce a result. The ASF is invoked by the Genie-FieldPro software and requires no actions from the user to function properly.

The ASF typically includes five basic analysis steps: Peak Locate, Peak Area, Efficiency Correction, Nuclide Identification, and Minimum Detectable Activity. Each of these steps are customizable by the user in Genie to optimize the analysis for a particular application. For nuclide reporting and limits reporting, all these steps must be included in the ASF and the nuclide library should be consistent with the target nuclides being analyzed.

- The Efficiency Correction applies the efficiency calibration file that corresponds to the selected geometry in Genie-FieldPro to the measurement. This crucial step insures that the calculated activities of each nuclide correspond to the true rate. **If the incorrect sample geometry is chosen for a measurement the reported activities will be inaccurate.**

- The Nuclide Identification step incorporates the peak analysis with the efficiency calibration and calculates the activity of each nuclide in the embedded Genie nuclide library (NLB) referenced in the ASF. These values, if above the Minimum Detectable Activity, are then reported on the results screen.

- The Minimum Detectable Activity (MDA) step performs an analysis on the spectrum which determines how much of a particular nuclide must be present in order to achieve a statistically significant identification. The MDA is quoted in the report, instead of measured activity concentration, for any nuclide for which there is not significant measured activity.

More detail on the analysis steps can be obtained in the *Genie Operations Manual* and the *Genie Customization Tools Manual*. An example ASF file is provided for general applications.

## Efficiency Calibration

One of the strengths of Genie-FieldPro is the ability to easily match an efficiency calibration with a particular measurement selection. This is defined in the .CAL File section of the Sample Configuration screen. The *.CAL file can be generated in Genie using either a user-measured spectrum or an ISOCS created efficiency calibration. Then, it is loaded into the sample configuration dialog and automatically used with this measurement. The uncertainties in the efficiency calibration are propagated through the sample analysis and are included in the final activity results.

To use an ISOCS generated efficiency calibration, perform the following steps:

1. Create a geometry in Genie Geometry Composer, using the generic characterization for the appropriate detector type. Validate the geometry and generate the efficiency data points to create an *.ECC file.

2. Open Genie 2000 and select **Calibrate | Efficiency | By ISOCS/LabSOCS** and browse to the *.ECC file. In the Calibrate by ISOCS/LabSOCS: Select Efficiency Option screen, choose either “Efficiency” or “Efficiency * Mass”. The second option will generate a Massimetric efficiency, which is discussed in more detail below.

3. On the “Calibrate by ISOCS/LabSOCS: Efficiency Results” screen, select **Store** and name the *.CAL file. Point to this file in Genie-FieldPro configuration editor.

## Mass Parameter

The Mass parameter on the Configuration screen is only used with massimetric efficiency calibrations. These calibrations are created in Genie when selecting “Efficiency*Mass” in the “Calibration by ISOCS/LabSOCS” option, and have an internal EFCALVERS parameter value that starts with the text “MASS”. Otherwise, the Mass parameter on the Configuration screen is ignored for standard efficiency calibrations.

Massimetric efficiency calibrations generate intermediate activity concentrations that are in units of activity per grams while standard efficiency calibrations generate intermediate values that resemble total activity per whole sample. Genie-FieldPro divides the user-specified Quantity by the Mass parameter when a tagged massimetric efficiency calibration is in use. This allows reporting of the final activity concentrations in terms of the user-specified Units, regardless of the type of efficiency calibration.

## Nuclide Activity Concentration Limits

Genie-FieldPro software can be configured for routine analysis of particular nuclides. This is particularly useful for screening applications. A common example is screening for I-131, Cs-137, and Cs-134 in food samples.

The user can create a "Limits Category" to group a particular set of nuclides for common analysis, which can be associated with a given sample configuration by specifying this in its "Limits Category" column. Then, the user will define the category in the "Nuclide activity concentration limits" section with the nuclides, nuclide limit threshold, and target MDA to be met for each nuclide. Two thresholds may be defined in an entry of the Nuclide activity concentration limits table: maximum activity concentration and minimum detectability.

At the conclusion of the measurement count and analysis, the measured activity concentration of a nuclide will be compared against the nuclide limit threshold. If it is above, it will signal "EXCEEDS ACTION LEVEL" on the report. If it is below the threshold but within three standard deviations, "EXCEEDS ACTION LEVEL with + 3 Std. Dev." on the report. If it is below that, it will report "clear" on the report. It will also report "MDA too high" if the nuclide is not identified and the count time is not sufficient to determine the presence of the nuclide at the predefined MDA.

The following is an example of the limits analysis:

A standard Genie-FieldPro analysis performed with a particular analysis sequence file determines the activity and MDA (minimum detectable activity) results for nuclides such as Cs-134, Cs-137 and I-131. Activity must meet or exceed MDA to be considered valid. For each nuclide the activity concentration is calculated to give:

- Cs-134 activity concentration ± 1 standard deviation or MDA concentration.
- Cs-137 activity concentration ± 1 standard deviation or MDA concentration.
- I-131 activity concentration ± 1 standard deviation or MDA concentration.

Concentrations are calculated by dividing the activity (or MDA) by the sample quantity and are given in the quantity units specified.

If the Acquisition setup option (located at the top of the Configuration screen) is configured for "Count to MDA" then Genie-FieldPro can continue an acquisition until the MDA for the nuclides indicated by the Limits Category selection are met. The nuclides must be present in the library used in the Analysis Sequence File. The acquisition will not exceed the maximum count time even if the MDA is not met. Likewise, the acquisition time will not be less than the Min Count Time even if the MDA is met faster.

# 7. Genie-FieldPro Results Report

On completion of a sample count and analysis, a results report is presented to the user. In addition, a plain text copy is saved as a .txt file with a name and location corresponding to the spectrum file (*.cnf) and (optionally) the photo (*.jpg) file. The following information is presented in the report:

### Header

Genie-FieldPro Report

### Sample Information

- Geometry.
- Contents / Matrix.
- ID.
- Description.
- Mass, if a massimetric efficiency calibration is used.
- Quantity.
- Quantity Units.

### Measurement Information

- Date and time of measurement initiation.
- Counting period.
- Last valid calibration check.

Note that if a valid calibration check did not exist for the measurement then an indication is shown on the measurement report.

### Analysis Information

- Analysis Sequence File.
- Activity Concentration Units.

### Results Information

- Row for each of the nuclides in the nuclide category of the sample configuration.
- For each nuclide: Activity concentration result (either an MDA or a result with 1 standard deviation uncertainty quoted).
- For each nuclide: Associated activity concentration action level.
- For each nuclide: result against action level. This will specify if the result is above the action level, or if the result + 3sd (in the case of a measured activity) is above the action level. In either case this will cause an overall result of 'Above Action Level'.
- Overall result (either 'Clear' or 'Above Action Level'): if any of the three nuclide action levels are exceeded then the overall result will be 'Above Action Level'.

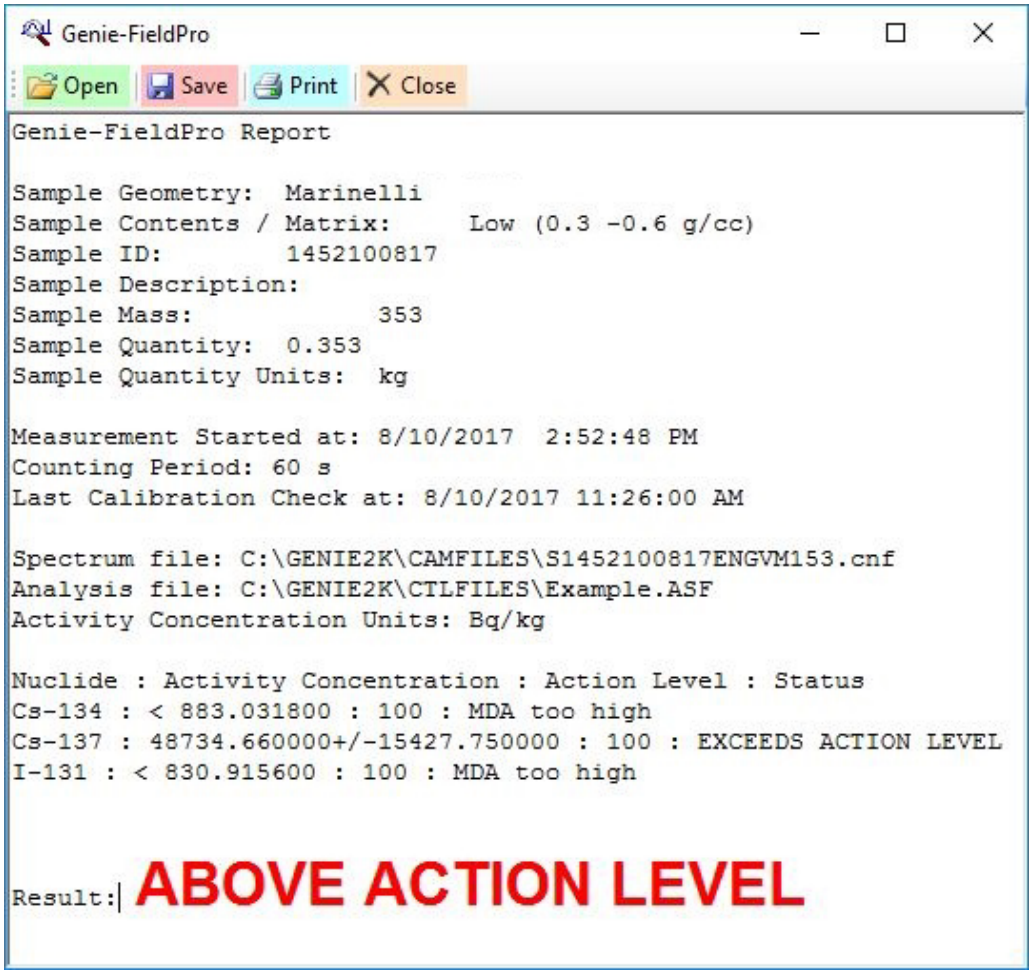



Figure 19 – Sample Count Report

# 8. Genie-FieldPro Configuration

The Configuration view may be selected from the drop-down Maintenance menu on the toolbar.

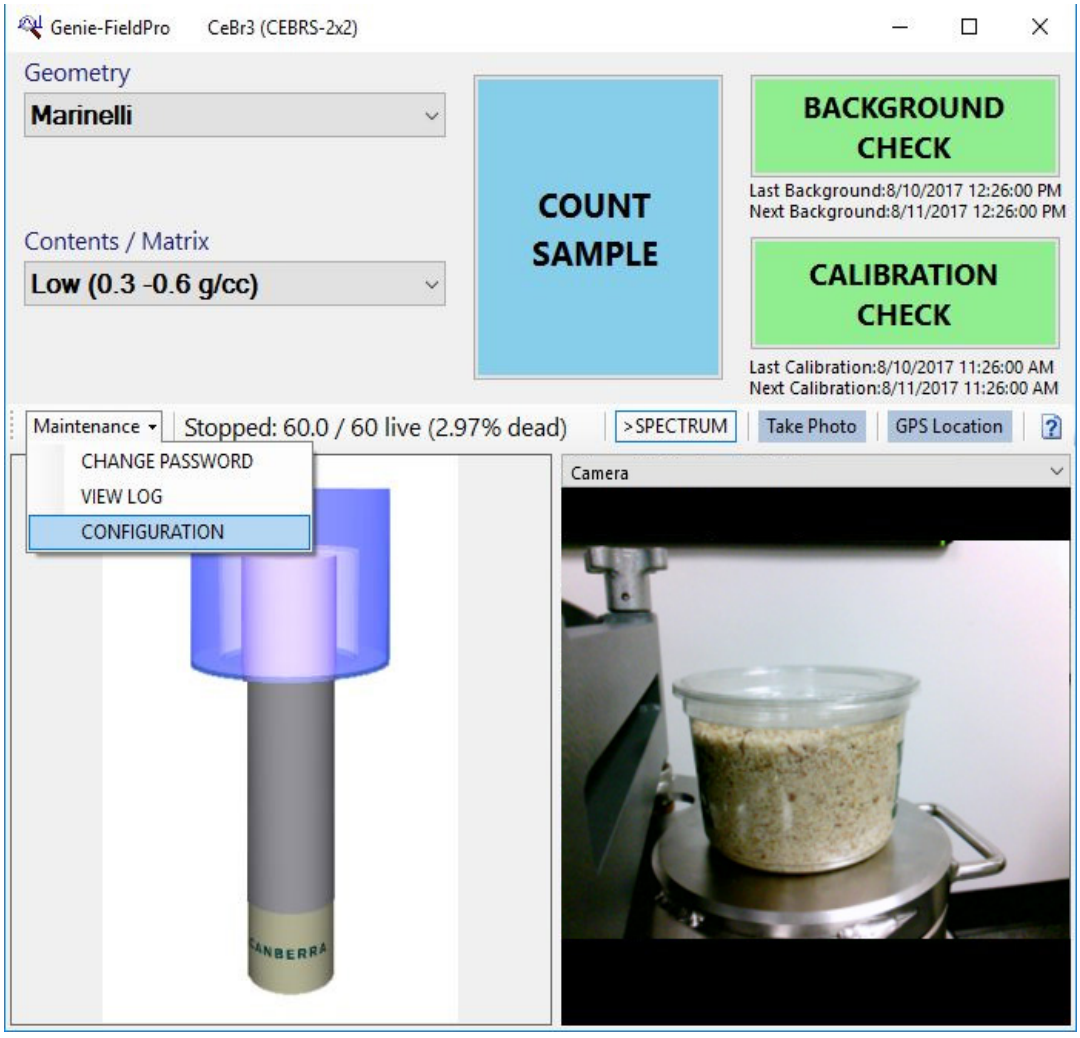



Figure 20 – Main User Interface Showing Maintenance Menu

The **Configuration** menu option opens a screen with the following options. Note that the cells that require file paths require either full path specifications or just file names, when the files are located in the default directories used by Genie-FieldPro. These directories are themselves based on the default directories used by Genie-2000. A default Genie-2000 installation uses the following directories.

C:\GENIE2K\CALFILES for calibration (.cal) files

C:\GENIE2K\CAMFILES for certificate (.ctf) and spectral data (.cnf) files

C:\GENIE2K\CTLFILES for analysis sequence (.asf) files

C:\GENIE2K\QAFILES for quality assurance (.qaf) files

In addition, the default directory for Genie-FieldPro image files is C:\GENIE2K\Genie-FieldPro\Images.

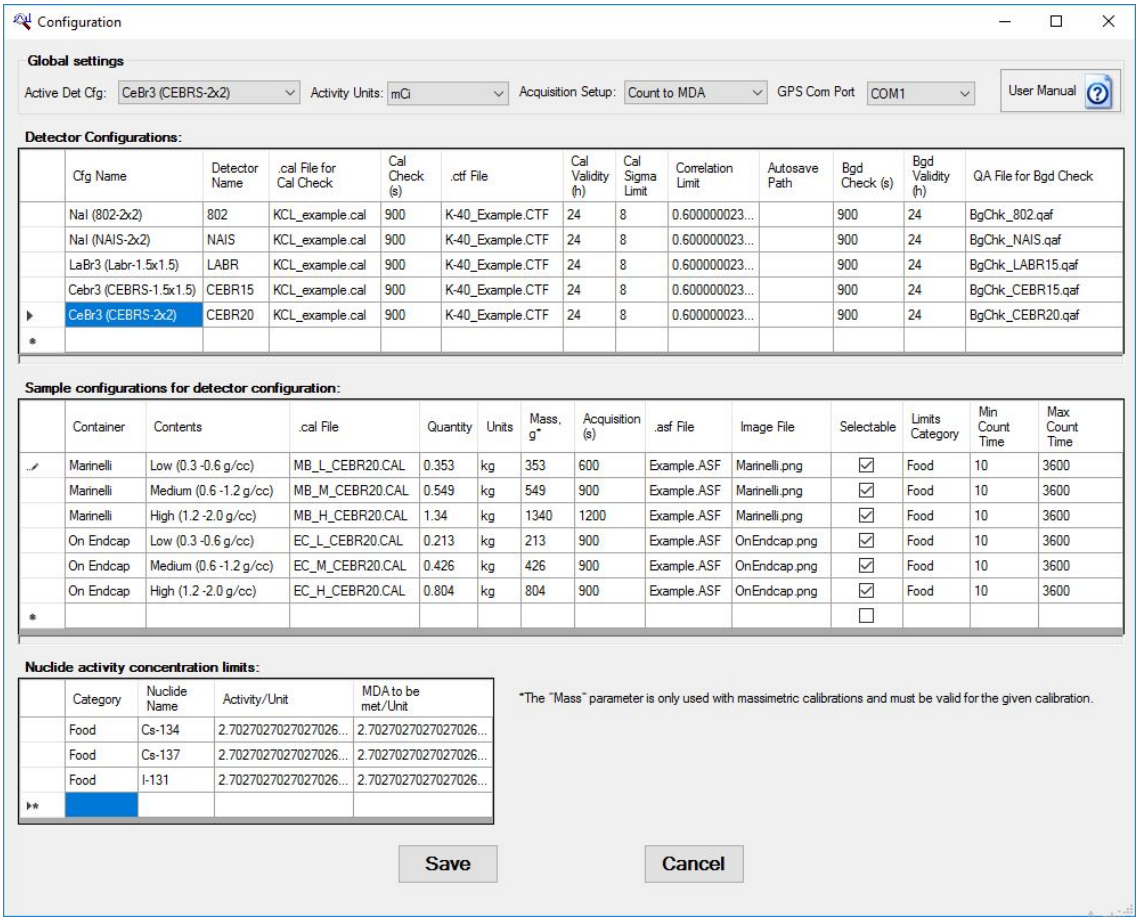



Figure 21 – Configuration View

### Global Settings

Active Det Cfg: active detector configuration.

Activity Units: for calculating and reporting the activity concentration results.

Acquisition Setup: designates whether fixed time or Count to MDA mode is used for sample counts.

GPS COM Port: Indicates which computer port to listen to for the Genie-FieldPro GPS functionality.

### Detector Configuration

Cfg Name: detector configuration name.

Detector Name: valid MCA input definition name, as specified via Genie-2000 MCA Input Definition Editor.

.cal File for Cal Check: file from which an efficiency calibration will be imported.

Cal Check(s): the duration of measurement, in seconds.

.ctf File: file with certificate information that includes the target energy and emission rate for the K-40 calibration check peak.

Cal Validity (h): number of hours for which a system is considered validated after a successful calibration check.

Cal Sigma Limit: maximum number of standard deviations between the measured and expected calibration check peak areas to validate a successful calibration check. The expected calibration counts are based on the emission rates specified in the calibration certificate. Typical limit values might range from 4 to 10, with a default value of 8.

Correlation Limit: minimum correlation coefficient that will validate a successful calibration check. The correlation coefficient value ranges from 0 to 1 and is a measure of how closely the calibration spectrum matches the shape of the calibration certificate peak model. Typical limit values might range from 0.3 to 0.9, with a default value of 0.6. The Sigma Limit is also used to validate the calibration check.

Autosave Path: full directory path and an optional filename prefix. This will be appended by an incremented integer for the storage of sample count data.

Bgd Check (s): the duration of measurement, in seconds.

Bgd Validity (h): number of hours for which a system is considered validated after a successful background check.

QA File for Bgd Check: Genie Quality Assurance data file

### Sample Configuration for Detector Configuration

Note: The visible sample (count) configurations only apply to the highlighted detector configuration in the Detector Configurations table. Highlighting a different detector configuration results in the display of a different set of sample configurations.

Geometry: container in which a remote monitor sample is measured.

Contents / Matrix: a sample category based on density, usually with a representative remote monitor type in the name.

.cal File: file containing an efficiency calibration.

Quantity: amount of sample in terms of the quantity Units. This should correspond to the Mass value for the factory default sample count configurations as long as the Units parameter is a unit of mass.

Units: quantity units used to represent the quantity of sample and activity concentration; for example “kg”.

Mass, g: mass in grams, preset for each specific sample configuration to give the correct activity concentration. This is only used with massimetric efficiency calibrations.

Acquisition (s); measurement period in seconds.

.asf File: analysis sequence file.

Image File: path of file containing an image that represents the container. Double-click to see a list of acceptable file types.

Selectable: whether or not this sample configuration will be displayed in the main screen's Contents / Matrix drop-down list.

Limits Category: category name that corresponds to a set of limits from the Nuclide Activity Concentration Limits table.

Min Count Time: minimum acquisition time in seconds when Acquisition Setup mode is set to Count to MDA.

Max Count Time: maximum acquisition time in seconds when Acquisition Setup mode is set to Count to MDA.

### Nuclide Activity Concentration Limits

Category: name used to group a set of limits together; for reference by sample configurations.

Nuclide Name: name that (exactly) matches a nuclide name in the (.nlb) nuclide library file specified in the analysis sequence.

Activity/Unit: activity concentration action level, in terms of global activity units per sample configuration quantity units.

MDA to be met / Unit: Target MDA when Acquisition Setup mode is set to Count to MDA. "Unit" refers to the sample configuration "Units" designation. (Activity units are as defined in the global "Activity Units" setting.)

# 9. Genie-FieldPro File Transfer Manager (FTM)

The Genie-FieldPro File Transfer Manager is a program that runs in the background on the remote monitor laptop. If a shortcut to the program is placed in a Windows Startup folder, it will start when you start up the computer. When running, there is an icon in the Windows system notification tray - which is near the clock in the lower right of your screen. Clicking on this icon will bring up a menu. If you choose "File Transfer Manager" from the menu you will see the main screen for this application as shown in Figure 24. This shows a list of all sample files generated by Genie-FieldPro for the samples that have been counted but not sent to the Apex-Gamma Server yet at the time the display is opened.

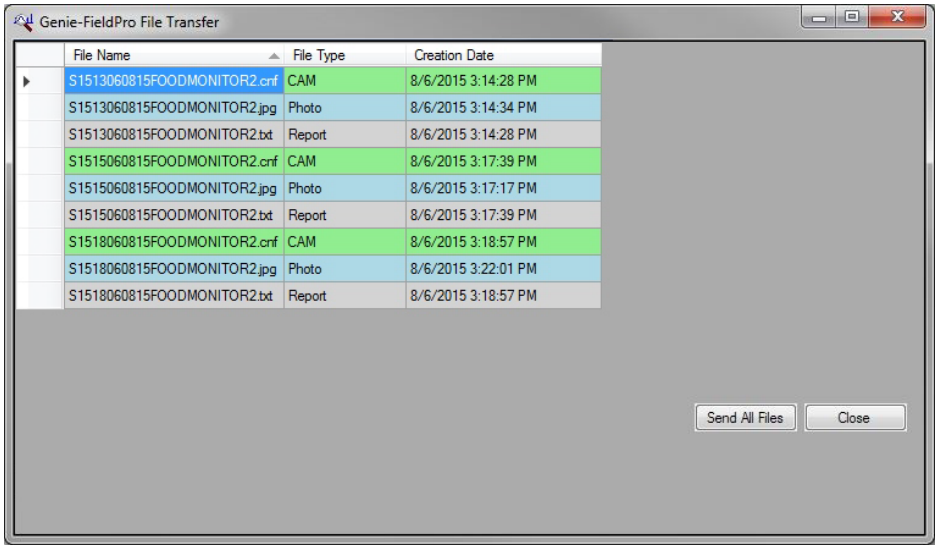



Figure 22 - Genie-FieldPro File Transfer Main Screen

The configuration of this utility allows you to have it periodically try to send sample files to the Apex Server. It first checks if a network connection is made such that it can transfer data to the Apex Server. If it can't make this connection, it will wait another interval.

If it is able to copy files to the configured destination location, it will display a progress dialog showing which files it's moving and overall status.

You can start a transfer immediately by clicking the "Send File" button. This will force a transfer to be attempted even before the full time period elapses.

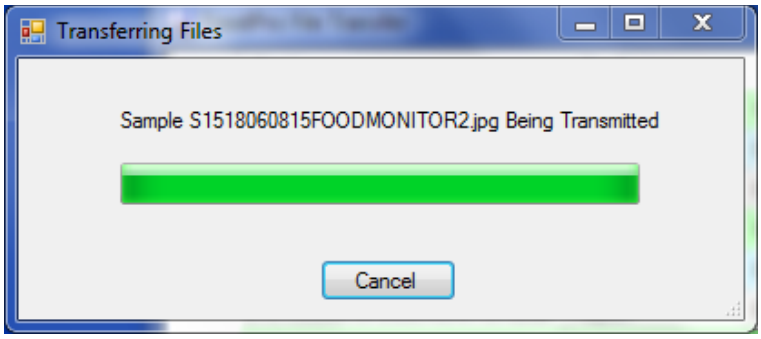



Figure 23 - File Manager Progress Bar

When the file transfer is complete, a message box as shown in **Figure 26** will appear stating how many files were transferred to the destination location.

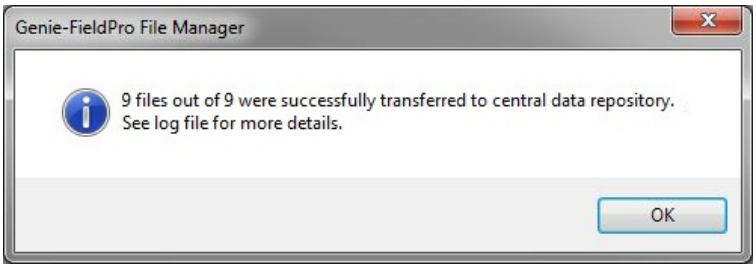



Figure 24 - File Transfer Completed Message

# 10. Apex-Gamma Operation

When Apex-Gamma is used with Genie-FieldPro as part of a fleet solution, Apex-Gamma is mainly used as a sample review tool. You would use Apex-Gamma to do the following:

- Review imported samples
- Reanalyze imported samples
- Review QA data for each monitor

To use Apex-Gamma with Genie-FieldPro, the Genie-FieldPro File Transfer Manager and Apex-Gamma AutoImport Add-on must have been installed and configured on their respective systems. Then, once you configure the detector, Geometries, Efficiency Calibrations, Procedures and Sample Templates, you will be able to see samples that have been automatically imported.

The Data Review view in Apex-Gamma enables to you quickly search and find samples you are interested in. Here you can set certain search criteria to narrow down the samples you are looking for such as by filter on the remote monitor name, or a specific Geometry. Figure 27 - Apex-Gamma Data Review Search Screen shows you the search screen and how you can filter on samples from a specific Remote Monitor by choosing its detector name such as “MONITOR2”.

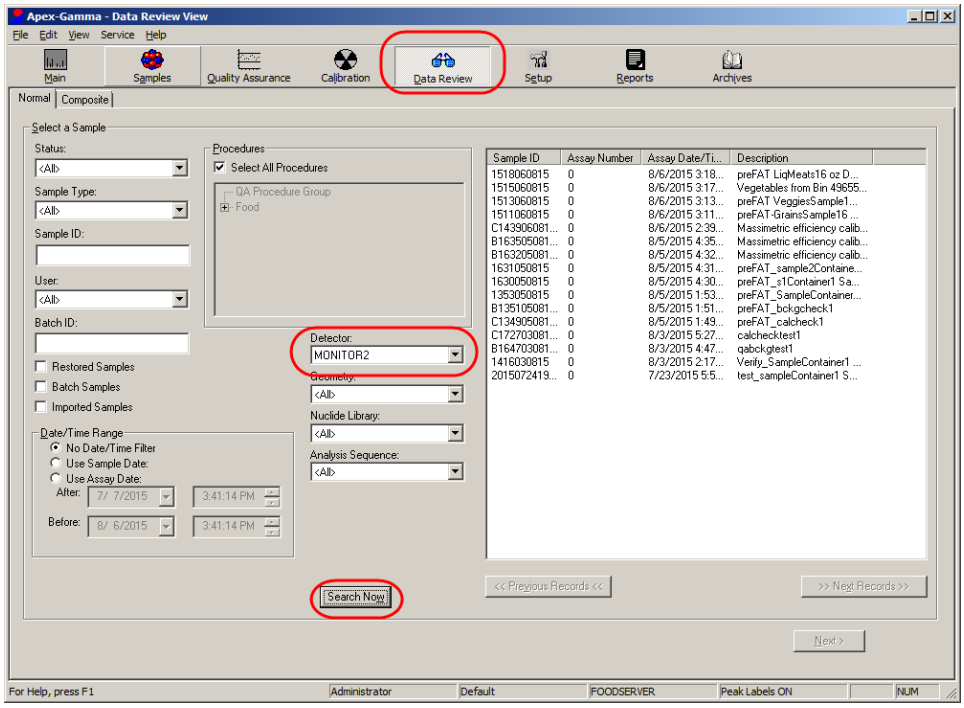



Figure 25 - Apex-Gamma Data Review Search Screen

From the Apex-Gamma search results, you can view any sample in more detail by double clicking on it in the list. Doing this will show you the Sample Review screen shown in Figure 28. Here you can look at the spectral data, review the analysis report, reanalyze the sample, mark the sample as having been reviewed, and many other tasks.

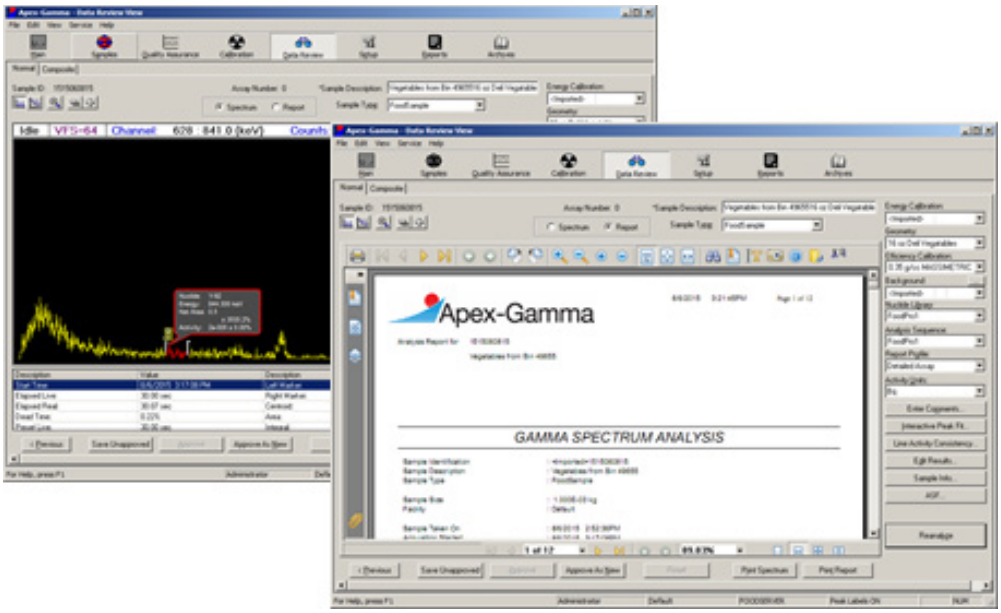



Figure 26 - Apex-Gamma Data Review Screens

You will not be able to count samples from within Apex-Gamma on any of the remote Monitors. You will always need to initiate counts from the remote Monitors and have them transfer the files to the server for Import.

By default, the remote monitor detectors in Apex-Gamma will show up in Red because Apex-Gamma will not be able to access them directly. You may hide these detectors from the main Apex-Gamma screen by holding the SHIFT key while you click the OK button on the Apex Login screen. Another alternative if you prefer to not have red detectors on the main screen is to change the red background color to something less bright such as grey.

# A. Software Installation

This appendix describes the Genie-FieldPro software installation and setup process.

There are three distinct applications in Genie-FieldPro: the client, File Transfer Manager, and AutoImport. The client application, named "Genie-FieldPro", is for executing basic measurement and automated analysis operations on the counting system. The File Transfer Manager also executes on the client computer; its purpose is copying the output files from the main client application to a remote location, usually to a directory shared on a network and associated with an Apex Gamma installation. AutoImport is a utility program that imports the measurement data in these files into an Apex Gamma database, which affords more sophisticated reanalysis and tracking.

## Computer Specifications

Genie-FieldPro Software has minimal requirements. The Genie Basic Spectroscopy and Apex Gamma applications each require greater resources than Genie-FieldPro so those sets of requirements should be considered primarily. However, Genie-FieldPro does have the following additional requirements.

- 1024 x 768 video resolution or greater.
- Windows 10 (64-bit), Build 1511 or later.

## Other Hardware Specifications

Genie-FieldPro is qualified for use with a CANBERRA Osprey multichannel analyzer. There are also the following options.

- Optional: USB or integrated camera.
- Optional: GPS device that can broadcast NMEA GPRMC sentences over a COM port at 4800 baud.

## Installing Genie-FieldPro Client Software

The following steps describe how to install the Genie-FieldPro client and File Transfer Manager onto a 64-bit Microsoft Windows 10 system. See Appendix A, *Software Installation*, of the *Genie Spectroscopy Software Operations Manual* for further details on installing Genie software.

1. Install the Genie Spectroscopy software. Genie/Genie-Lite are installed by default based on the type of license. The installation of a pdf file reading application is strongly recommended for the Genie FieldPro software. The Genie FieldPro help button provides easy access to a pdf of this user manual, but there must be a default pdf reading application present on the system. The Genie Spectroscopy software offers includes useful pdf files as well.

2. Connect an Osprey MCA. Note that any Osprey IP address changes require corresponding changes in the MID.

3. You will need to load an “MCA Input Definition” for your MCA with the Genie MID editor in order to perform counts/checks in Genie-FieldPro. The “Input Name” in the MID should match the “Detector Name” field on the Configuration view of Genie-FieldPro. For more information on MID files, please see the Genie Operations manual.

4. Install Genie-FieldPro by clicking the down arrow next to the X and select the Genie-FieldPro option.

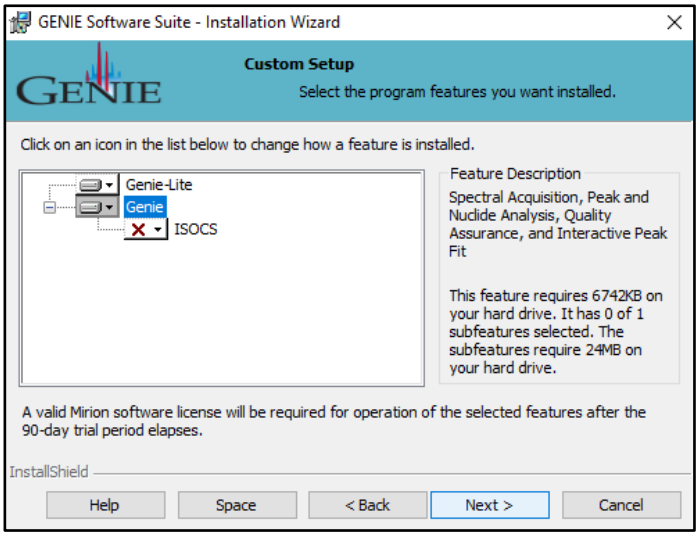



Figure 27 Select Genie-FieldPro

4. Launch Genie-FieldPro. Select the correct detector configuration if not already selected by default. Change the Detector Name to match the MID, if necessary. Execute a calibration check to automatically adjust the energy calibration.

## Installing Apex-Gamma AutoImport Software

See Appendix A, *Software Installation*, of the *Apex-Gamma Lab Productivity Suite User’s Manual* for further details on installing Apex-Gamma Server or Apex-Gamma Desktop software.

# B. Advanced Considerations and Troubleshooting Tips

- The FileTransferManager.exe application in the C:\GENIE2K\FieldPro directory may be configured to run automatically in multiple ways. For example, a shortcut to it may be put in a Startup folder within the Windows Start menu, or the Windows Task Scheduler may be used to launch it according to certain triggers by a user account that is granted the appropriate permissions via the Local Security Policy console. Note that some uses of Windows Task Scheduler may result in the execution of this application in a manner that will result in the expected repeating file transfers but will not allow access to the user interface. In this case, the Windows Task Manager may be used to kill the process if necessary.

- Remember that the Windows account used to launch the FileTransferManager.exe program must have 'write' access to the directories to which it should transfer files. For example, if there is a local (non-domain) user account named “FieldTech” on the server which is granted write permission to a network share like the Apex Gamma file share \\ApexGammaServer\ApexRoot, then a local (non-domain) user account named "FieldTech" with the same password on a Remote Monitor laptop should be able to transfer files to locations within the share.

- A 'real' working detector definition created in Apex Gamma to connect to a remote monitor MCA will incur a significant delay in starting up the Apex Gamma client application when the remote monitor is no longer reachable. One workaround is to change the corresponding row in the [CI_APEX].[dbo].[CI_PXD_DETECTOR] table in the database such that the [REMOTECOMPUTERNAME] value is not a real PC network name. This will lead to a red background on the main MCA view but the timeout at application startup will be short.

- If there is a need for the client laptop and the server to communicate via a network configuration that does not provide typical services for network name resolution (such as connecting the two directly to each other with an Ethernet cable), be sure that sufficient mechanisms are put in place, e.g. c:\windows\system32\drivers\etc\LMHOSTS.

- If there are multiple network interfaces on the client laptop or server, be sure that the NICs to be used for them to communicate with each other are at the top of the order of preferred network adapters. In Windows 10, this ability to prioritize network adapters is hidden. To find it, open the Network and Sharing Center view (e.g. in Windows Explorer). Select “Change adapter settings” and then select Organize > Layout > Menu Bar. Select Advanced > Advanced Settings. Make sure the network interface needed is at the top of the list in the “Connections:” view on the Adapters and Bindings tab. If there still seems to be a communication problem, carefully create the following Windows Registry key on the server and set the value to the network name of the server:

HKEY_LOCAL_MACHINE\Software\Wow6432Node\Canberra Industries Inc.\Apex\Server\MachineName

Note: when network communication settings are changed, it is a good practice to reboot the machines involved.

- In some configurations, you may need to specify which NIC is used for the Virtual Data Manager to communicate with the MCA. This setting is available (when there are multiple NICs) by right clicking on the VDM tray application icon.

- If MCA communication errors occur due to operations timing out, consider carefully editing the SAD_TIMEOUT and HDW_STATUS in the Windows Registry as per Appendix B of the Genie-2000 Operations Manual.

- For FileTransferManager.exe troubleshooting, try to open each path, while logged in to Windows as the appropriate Windows user, from Windows Explorer to verify 'read' permissions for the path. Create a dummy file to verify 'write' permissions.

- The only elements of the AutoImportSettings.xml file that one should consider changing, if necessary, are the following:

  /AutoImportSettings/Facility

  /AutoImportSettings/User

  /AutoImportSettings/BasicTemplate/FULL_SAMPLE/SAMPLETYPE

  /AutoImportSettings/CalCheckTemplate/Name

  /AutoImportSettings/CalCheckTemplate/FULL_SAMPLE/SAMPLETYPE

  /AutoImportSettings/BgdCheckTemplate/Name

  /AutoImportSettings/BgdCheckTemplate/FULL_SAMPLE/SAMPLETYPE

- For AutoImport.exe troubleshooting, try to open the AutoImport path, while logged in to Windows as the appropriate Windows user, from Windows Explorer to verify 'read' permissions for the path. Create a dummy file to verify 'write' permissions. Also, one may open a Windows Command Prompt window as this user and execute “C:\Canberra\Apex\Exefiles\AutoImport.exe console”. This will result in some visible text output in the console window that may give clues about progression of the program.

- Restoration of default Genie-FieldPro configuration: Consider reinstallation of the application if complete reversion to all default application settings is acceptable. Another possibility is to simply replace the cfg.sqlite file with the version in the original installation package. Keep in mind that one may contact the Canberra Service department for assistance with complicated scenarios.

- Application Error Log: If an error state occurs in the application, information will likely be written to a plain text file named Genie-FieldProError.txt in the GENIE2K\Genie-FieldPro directory.

# C. Genie-FieldPro Example Files

Genie-FieldPro is designed to be a general purpose counting application. To help you get started, a number of example files have been pre-populated in the software. These files will help the user understand the operations of the software and facilitated training operations. However, it is highly recommended that dedicated data analysis files be generated and configured for your particular application.

### Detector Configurations

Genie-FieldPro is pre-populated with the detector configurations for 5 common scintillator detectors. In order to use these configurations, you must create a Genie 2000 MCA Input Definition (MID) with the indicated Input Name and perform an energy and shape calibration in Genie 2000 for that detector. The following detector configurations are included:

- NAI (802-2x2): This is the Canberra model 802-2x2 Sodium Iodide (NaI) probe with crystal size 2 inches in diameter by 2 inches thick. The MID input name is 802.
- NAI (NAIS-2x2): This is the Canberra model NAIS-2x2 stabilized Sodium Iodide (NaI) probe with crystal size 2 inches in diameter by 2 inches thick. The MID input name is NAIS.
- LaBr3 (LaBr-1.5x1.5): This is the Canberra model LABR-1.5x1.5 Lanthanum Bromide (LaBr3) probe with crystal size 1.5 inches in diameter by 1.5 inches thick. The MID input name is LABR.
- CeBr3 (CEBRS-1.5x1.5): This is the Canberra model CEBRS-1.5x1.5 Stabilized Cerium Bromide (CeBr3) probe with crystal size 1.5 inches in diameter by 1.5 inches thick. The MID input name is CEBR15.
- CeBr3 (CEBRS-2x2): This is the Canberra model CEBRS-2x2 Stabilized Cerium Bromide (CeBr3) probe with crystal size 2 inches in diameter by 2 inches thick. The MID input name is CEBR20.

Each detector configuration also has a Genie 2000 Quality Assurance QAF file populated for the background check.

### Example Geometries

Genie-FieldPro includes two types of default geometries. These are a 0.78 L Marinelli beaker of water and a 0.473 L container of cellulose (as may be expected for food materials) placed on the endcap. Figure 29 below provides the dimensions of these geometries. For each detector type, these geometries were evaluated at the following densities: 0.45 g/cc, 0.9 g/cc, and 1.7 g/cc. The 0.45 g/cc density is associated with the "Low (03.-0.6 g/cc)" option, the 0.9 g/cc density is associated with the "Medium (0.6-1.2 g/cc)" option, and the 1.7 g/cc density is associated with the "High (1.2-0.6 g/cc)" option. The uncertainty on these efficiency calibrations are +/- 30%, and were evaluated to be sufficient to capture the bias introduced by selecting a density that is at the bound of the listed density range when compared to the actual calibration density. For each geometry, the massimetric calibration model was used.

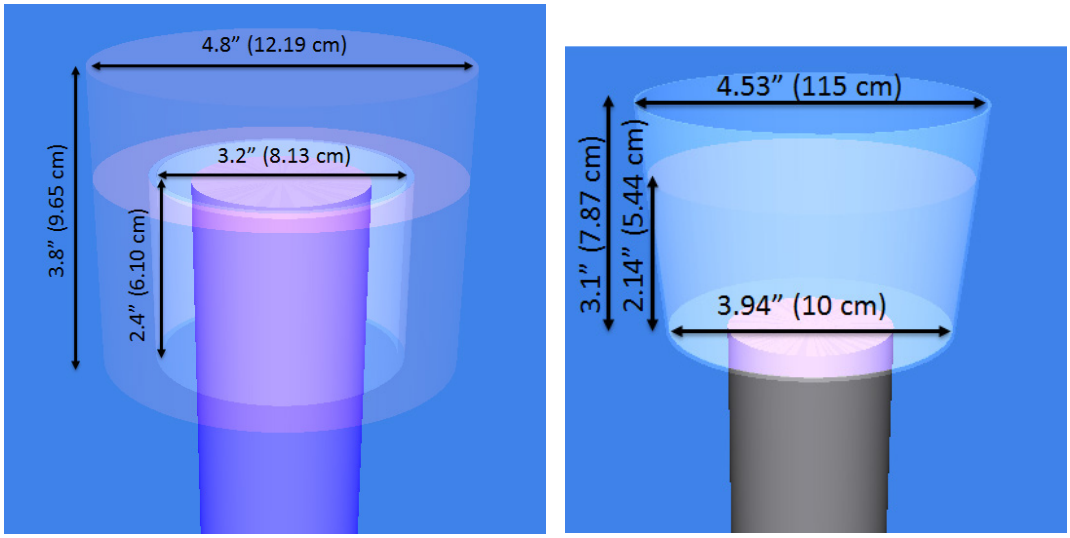



Figure 28: Schematic dimensions of the "Marinelli" sample geometry (Left) and "On Endcap" sample geometry (right)

### Nuclide Limits Category

The Genie-FieldPro software is populated with a default nuclide limits category called "Food". This includes Cs-137, Cs-137, and I-131, which are generally agreed to be the most important gamma-emitting radionuclides of interest following a release from a uranium-fueled reactor to the environment. In Genie-FieldPro, these limits are listed as 100 Bq/kg and MDA 50 Bq/kg, assuming the units listed in the sample configuration are kilograms (otherwise, the Nuclide limits and MDAs will be 100 Bq/unit and 50 Bq/unit respectively). However, it is important to note that these are nominal values, and should be updated to reflect the local regulations.

### Analysis Files

Genie-FieldPro includes the example analysis sequence file Example.ASF.  This file includes the following steps:  Peak Search and Peak Analysis, Efficiency correction, Nuclide Identification with Interference Correction, and MDA.  The library used is Example.nlb, which is appropriate to use with the Food Limits category.

Also included are an example CTF file and QAF files.  The K-40_Example.CTF file uses a single nuclide energy line at 1460 keV to perform a background check on the K-40 line. The activity of this certificate file is nominal and should be updated with the activity of your available K-40 check source

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Revised 04 Nov 16

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