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**Checklist Procedure
for Instrumentation**

Fork Detector Measurement System Software

Fork Detector Measurement System Software

December 2012

Preparation and Review:

Review:

Manager, SGTS/TTR

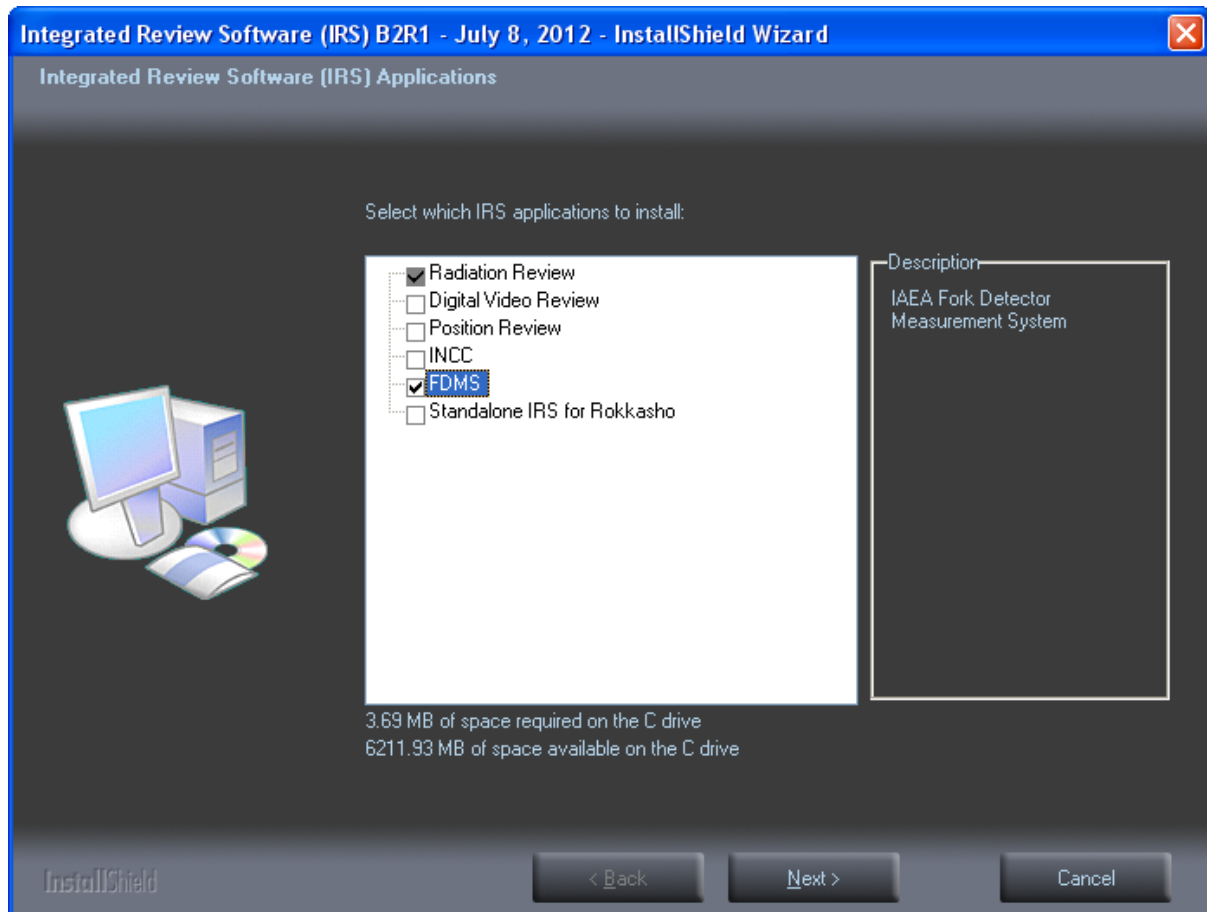
Approval:

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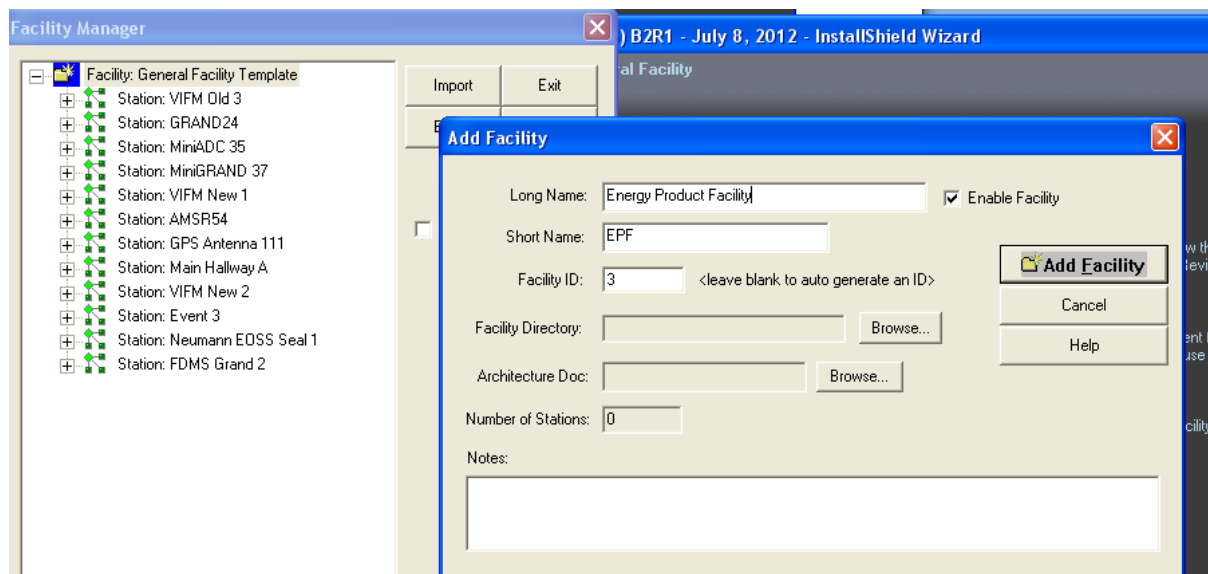
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Installing FDMS with Radiation Review, Configuring a Facility

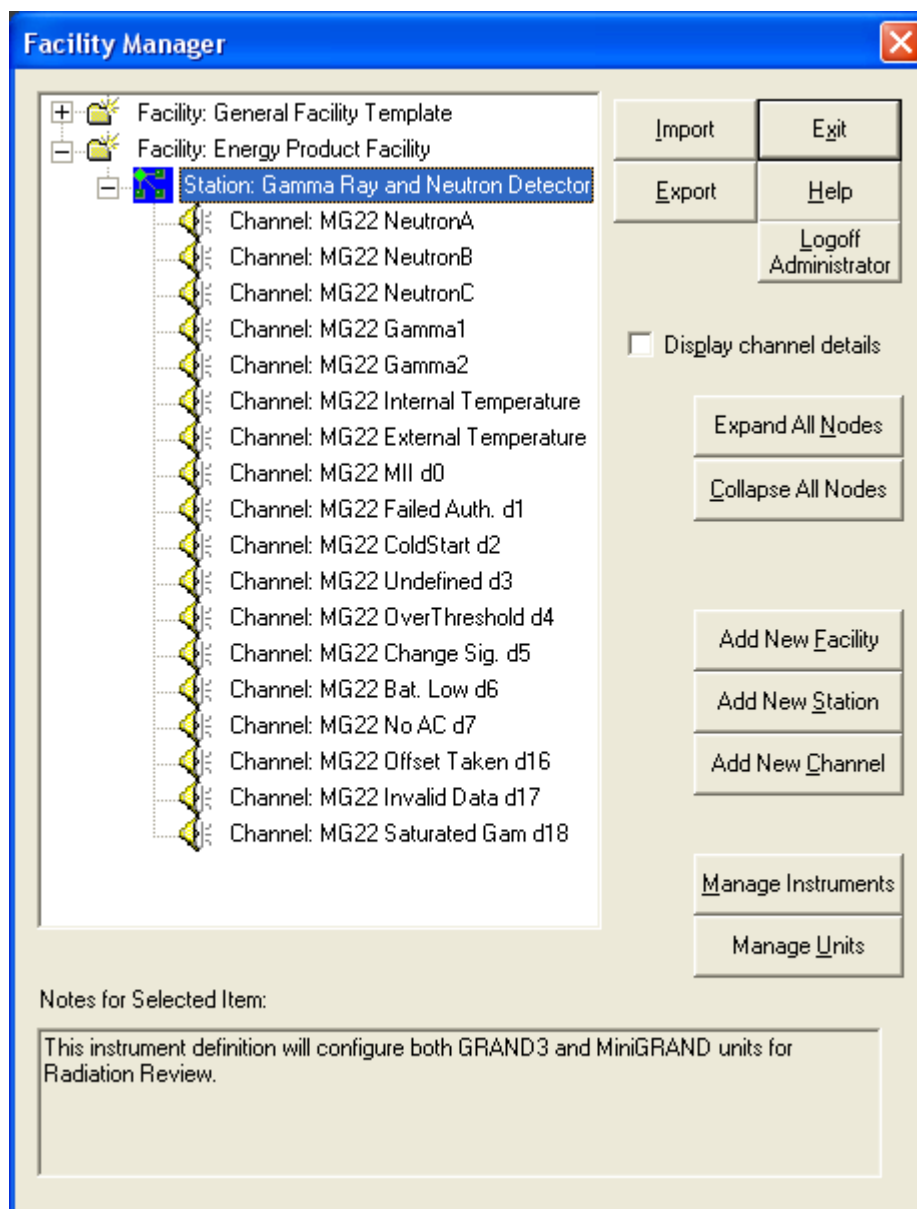
Invoke the installer from physical media, (a CD), or an electronic distribution, per the instructions found in IRS Installation Guide6.



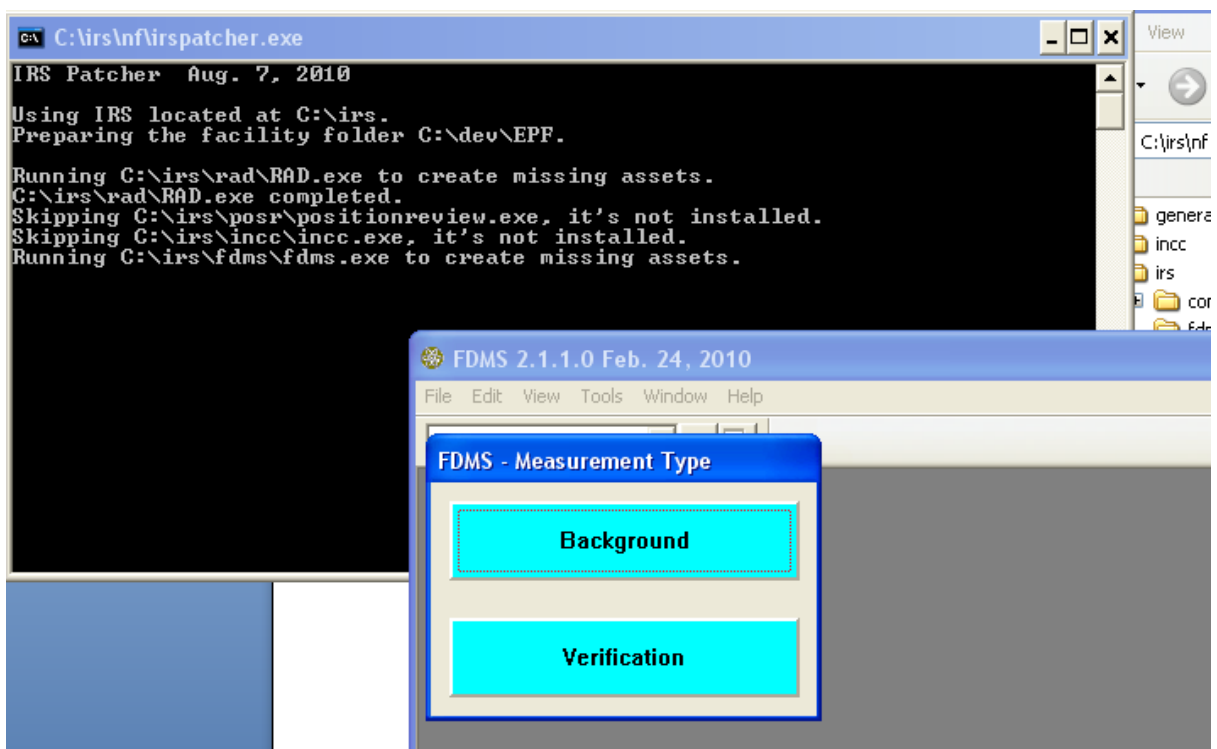
When prompted, create a new facility using the “Facility Manager’ tool.



Within the “Facility Manager” tool, define one or more GRAND/MiniGRAND stations (instruments) with appropriate channel definitions, corresponding to the facility’s expected instrumentation. A facility expert at headquarters should provide or enter this information.



After creating the facility and exiting the installer and facility manager, go to the installation location and run the IRS “patcher” tool (See IRS Release Note¹¹ § Aug. 7, 2010). Each tool installed (typically at least RAD and FDMS), will automatically run, forcing the creation of associated facility configuration assets on the installation machine.




```

C:\ C:\irs\Inflirspatcher.exe
Preparing the facility folder C:\dev\EPF.

Running C:\irs\rad\RAD.exe to create missing assets.
C:\irs\rad\RAD.exe completed.
Skipping C:\irs\posr\posr.exe, it's not installed.
Skipping C:\irs\incc\incc.exe, it's not installed.
Running C:\irs\fdms\fdms.exe to create missing assets.
C:\irs\fdms\fdms.exe completed.
Skipping C:\irs\dvr\dvr.exe, it's not installed.

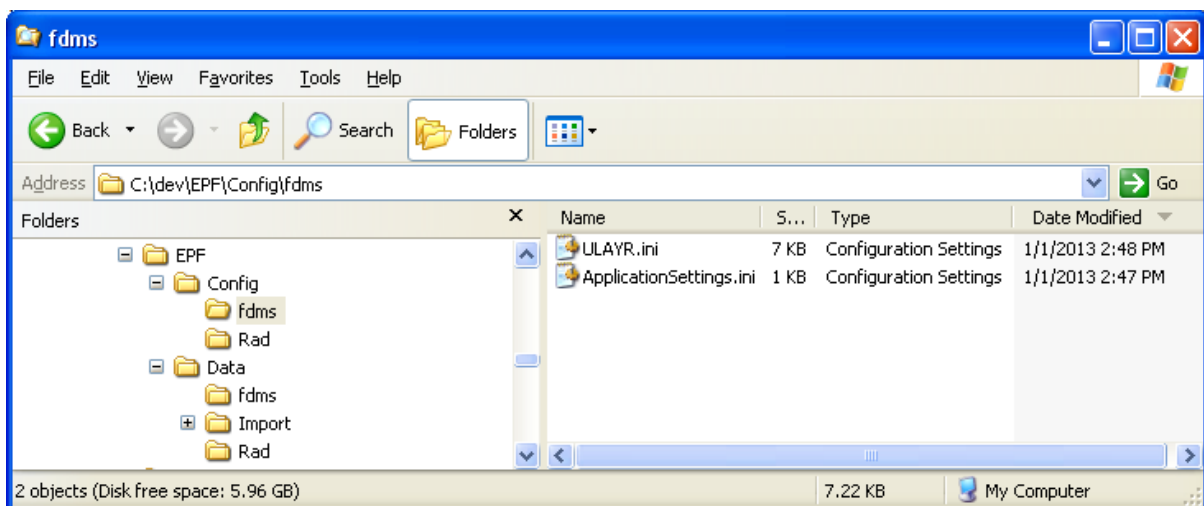
Patching files in the facility folder C:\dev\EPF.

Examining C:\dev\EPF\config\rad\RAD.ini
-- No change to C:\dev\EPF\config\rad\RAD.ini
posr is not installed, skipping C:\dev\EPF\config\posr\posr.ini
incc is not installed, skipping C:\dev\EPF\config\incc\incc.ini
Examining C:\dev\EPF\config\fdms\ULAYR.ini
-- No change to C:\dev\EPF\config\fdms\ULAYR.ini
Examining C:\irs\fdms\fdms.ini
-- No change to C:\irs\fdms\fdms.ini
dvr is not installed, skipping C:\dev\EPF\config\dvr\dvr.ini
dvr is not installed, skipping C:\irs\dvr\dvr.ini

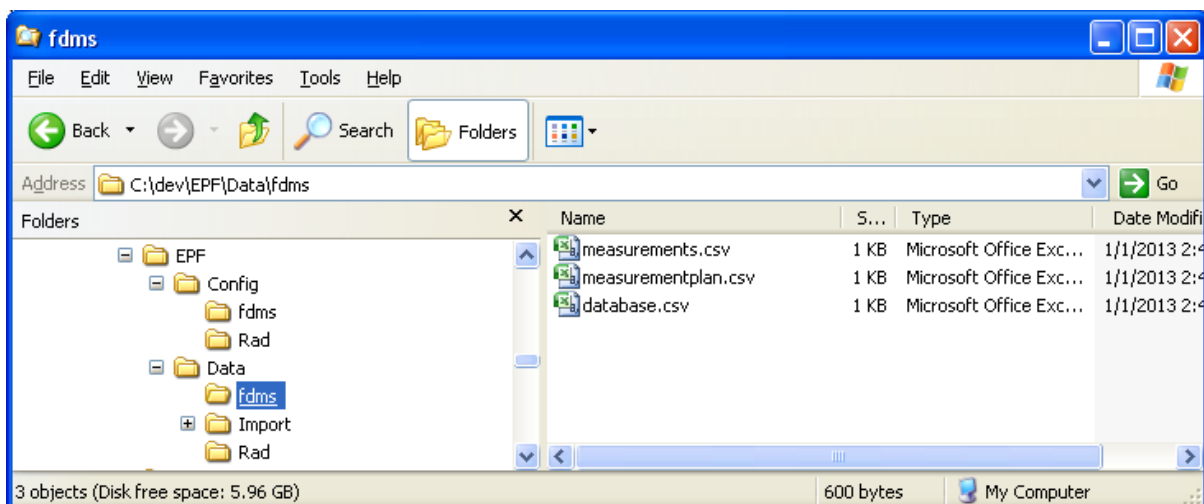
Patching completed.
Press the Enter key to close the IRS Patcher . . .

```

Location of FDMS facility config files



Location of FDMS M, MP and DB files



Checking FDMS for operational completeness

Files

FDMS must have available the csv files, that is, the 'database' (DB), Measurements (M) and Measurement plan (MP) files. The file content description for each file is found at *FDMS Reference Manual7, § Data (MP, M, and DB) file format, page 14*.

The expected paths for these three files are found in the file FDMS.ini, found in the \irs\fdms installation folder. See the *FDMS Reference Manual7, page 8*, for details on the contents of the FDMS.ini file.

COM Port Communications

For attended measurements, FDMS must have access to a COM port, and the COM port must be capable of standard serial communications with the miniGRAND electronics of the Fork Detector system.

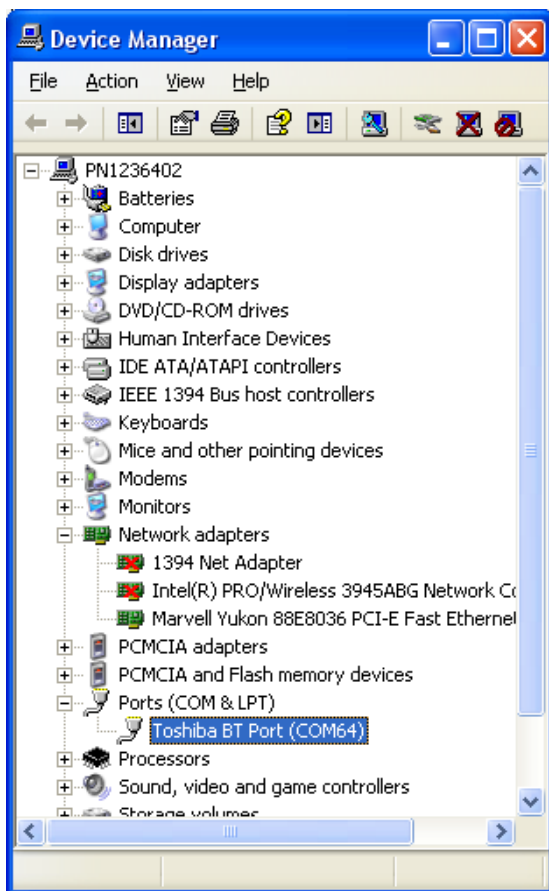


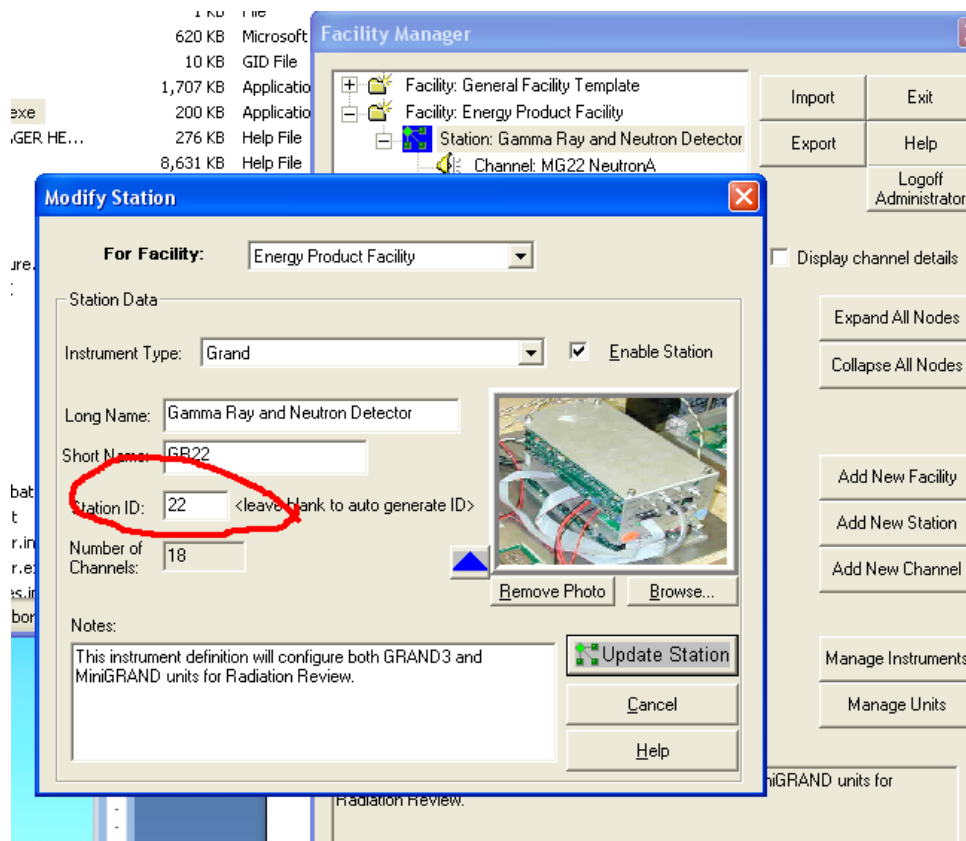
Figure 1 Port identification via the Windows Device Manager

Check and verify the settings in the FDMS.ini file under the [GRAND] section for correctness. The COM port definition there must match one of that shown in the Windows Device Manager Ports listing. See *MiniGRAND User Manual*¹³ and *Multi-Instrument Collect User's Manual* 8 for full details on instrumentation configuration, diagnostics and use.

Radiation Review integration

For unattended processing of miniGRAND data files, as collected by the MIC software, FDMS must have a properly defined facility configuration with correct miniGRAND instrumentation definitions.

Confirm the station id for the Fork Detector miniGRAND is correctly defined for the FDMS facility.



Check acquisition and collection status from MIC

MIC collects data, unattended, from miniGRAND instrumentation, including Fork Detectors, for later review in Radiation Review and subsequent analysis in FDMS. This section is taken from the *Radiation Review Checklist Procedure*¹²

Checklist Procedure

RADIATION REVIEW – Check Acquisition and Collection System Status from MIC









This option is used to verify that the radiation instruments in the UNARM system, the network, and MIC are operating as expected.

1. If necessary, maximize the MIC Main Dialog window. The MIC Main Dialog window will be displayed.
2. Assess MIC button colors and icons. The meaning of the colors is provided in the table below.

INSTRUMENT SUPPORT OBJECT COLOUR	INSTRUMENT STATUS
Green	Normal state of the instrument.
Gray	MIC is not currently gathering information from the associated instrument, although the instrument may still be gathering data from its sensor and storing the data in the instrument's local battery backed up memory if it has one.
Yellow	A command has been sent from MIC to the instrument and MIC is waiting for a response.
Red	When there is a communications problem between MIC and the instrument the background of the colored button is changed to red.
White	FLASHING to previous color. The disk is full or the instrument has a failure which is causing data loss
Cyan	Some instruments cannot respond to MIC during initialization. This is a wait state that MIC may enter for a short period to allow the instrument to finish initializing.

Checklist Procedure

3. Determine each instrument's state of health based on its button's color and the icon displayed. The meaning of the icons indicating state of health is provided in the table below.

ICON	ICON MEANING
 Square	One or more of the tabbed pages have a data item out of tolerance or a configuration mismatch
 Clock	The difference between MIC's time and the instrument's time is greater than the user set tolerance
 Flag:	MIC has sent and resent a command with no acceptable response and consequently commanded a long break reset in an attempt to reinitialize the instrument or a Hard Checksum Error occurred
 Bell	The instrument is currently reporting a "Measurement Interval of Interest" or equivalent
 Face	The instrument has reported either a power problem or a battery backed up memory problem
 Floppy Disk & Flashing:	MIC has stopped writing to disk and talking to the instrument. This can be caused by the hard drive being too full, the maximum use of the hard drive set too low, or disk write failure.
 Skull and Cross Bones	The instrument has repeatedly failed to respond to commands and long break resets. MIC will attempt to reset it every 15 minutes or instrument is in a state which is causing DATA LOSS.
 Bomb: Configuration Error.	Instrument support object could not connect to communications object. Edit the MIC.INI file or delete the instrument object and recreate it to correct this problem.

4. If there is a problem, diagnose the problem or gather data that would be reported later to a technician.
5. If any button is RED, report the problem to an IAEA technician.

Preparing unattended data for FDMS with Radiation Review

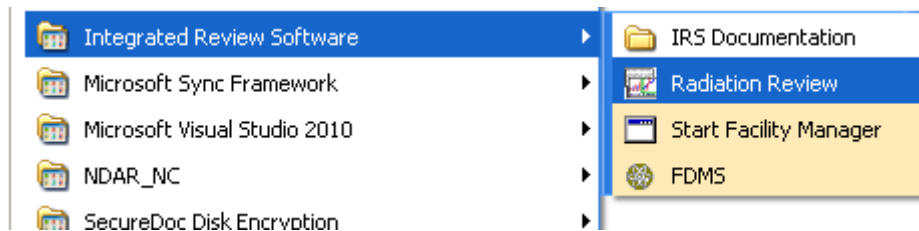


Figure 2 Starting Radiation Review from the Windows Start Menu

Importing Data into Radiation Review

Raw measurement data is collected by unattended measurement acquisition software using GRAND and miniGRAND instruments. This raw data is initially available as .BID files. For more information on the data collection process, see *Multi-Instrument Collect User's Manual* 8. This document is found on the B2R1 CD, under the Collect folder, and under C:\MIC after installing the MIC software..

To import .BID data files into RAD, select the "Import" menu item and then "Import All ...". See Figure 3.

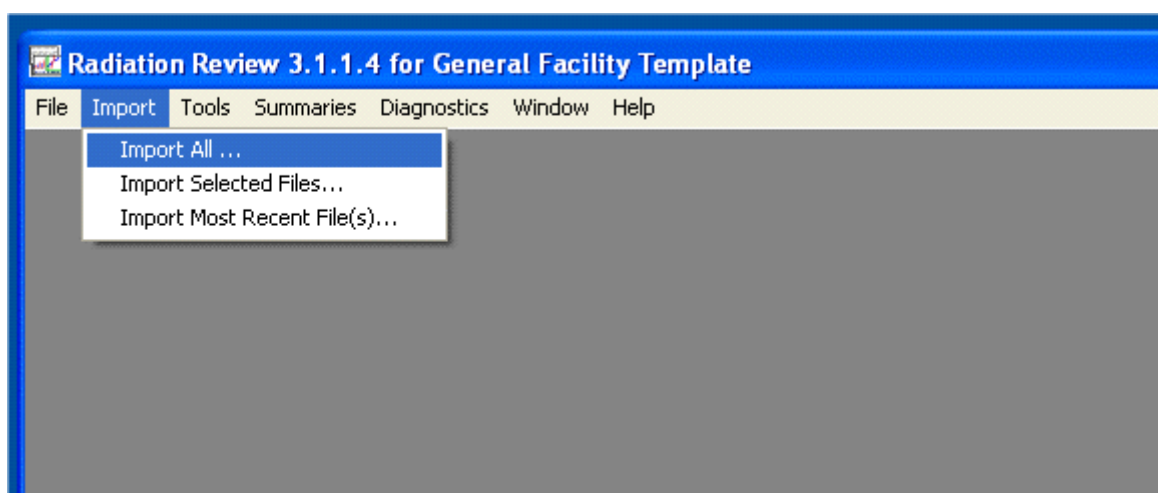


Figure 3 The Radiation Review "Import All ..." Menu Item

A dialog appears (see Figure 4). Use this dialog to browse to the location of the BID files. Sample files are supplied with the ESP8 FDMS installation. They are found in the facility data folder for FDMS. For the rest of this document, these sample files are the source of data. Assume also for the purposes of illustration that the facility is named 'general' and the data and configuration folders and files for 'general' is installed at c:\general. The ESP 8 installation created this set of folders and files as part of the installation process.

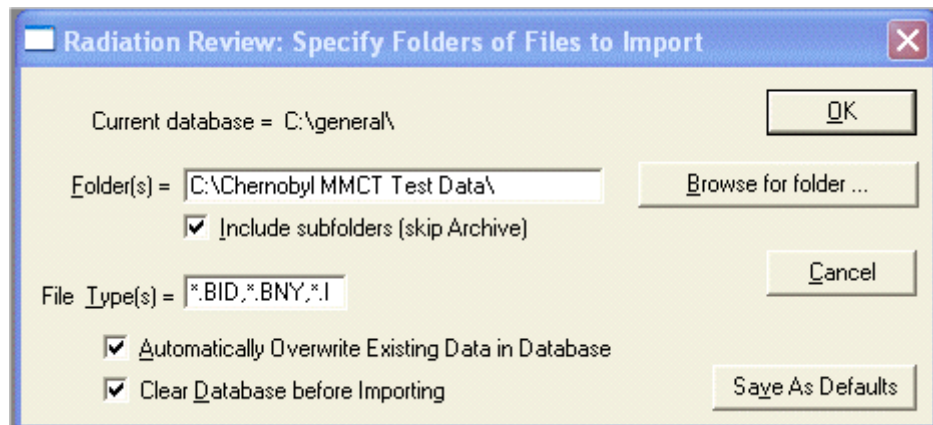


Figure 4 Import Folder Specification

Select the 'Browse for folder ...' button, and navigate to the supplied sample files, at "c:\general\data\fdms\BID Sample Data". See Figure 5 and Figure 6.

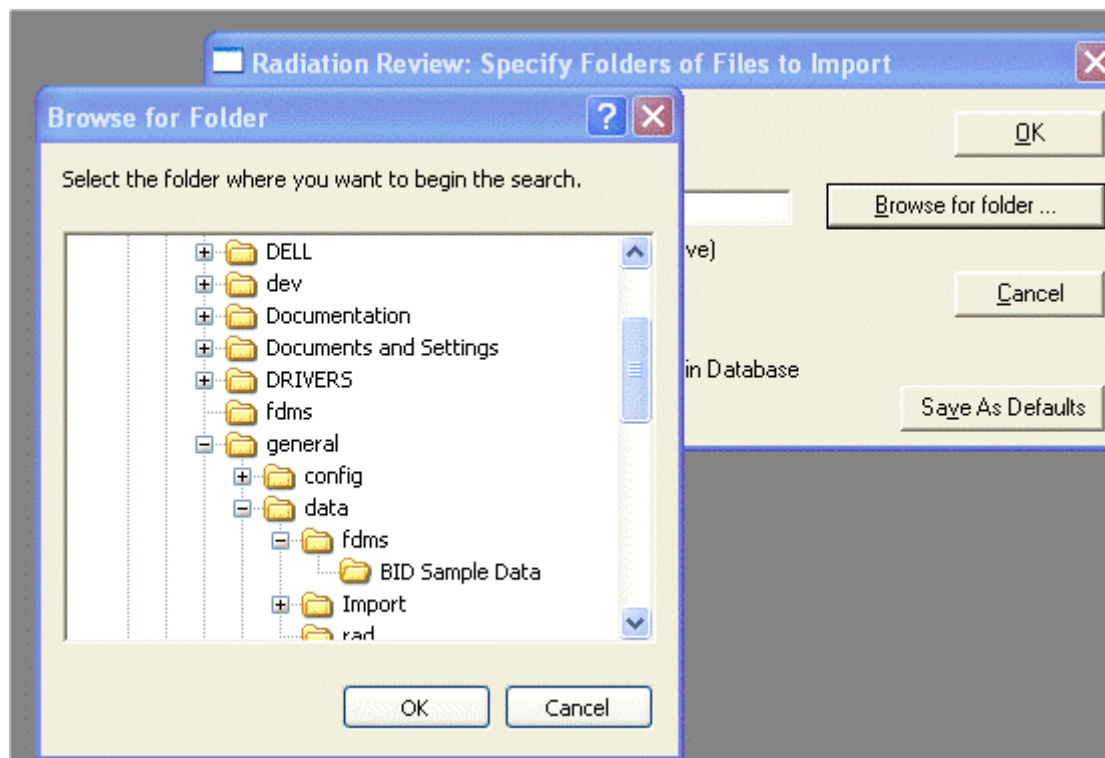


Figure 5 Browsing to the BID Sample Data Folder

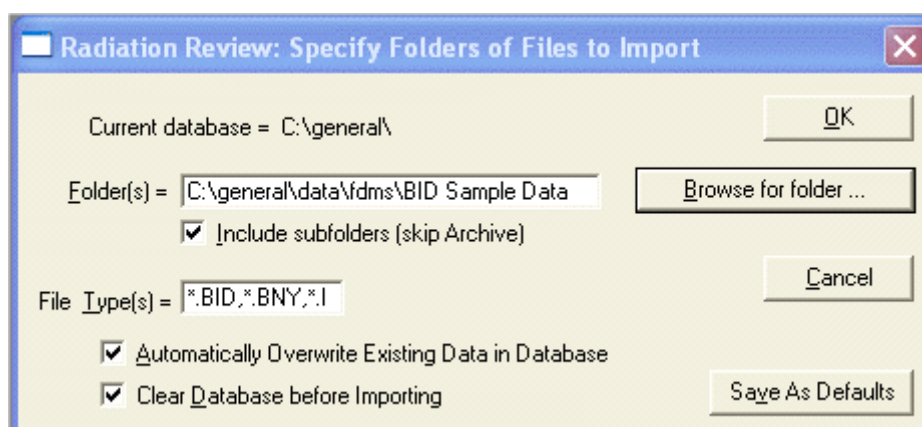


Figure 6 Import Parameters are Ready

If you have chosen to clear the database prior to the import operation, acknowledge the removal of preexisting data in the RAD database. See Figure 7.

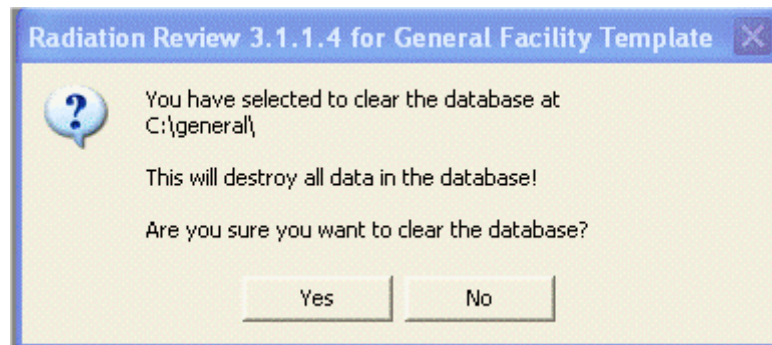


Figure 7 Affirming Database Clearing

The data import starts. RAD displays a progress bar and a textual display indicating the data importation progress. See Figure 8.

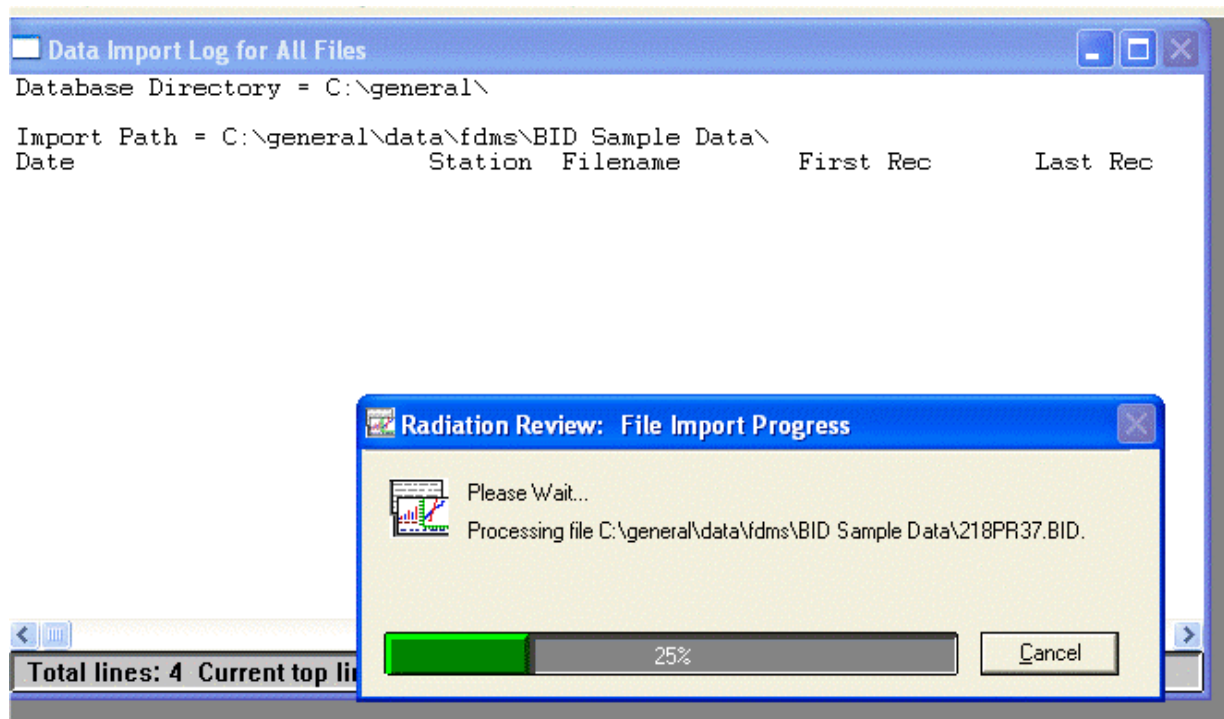
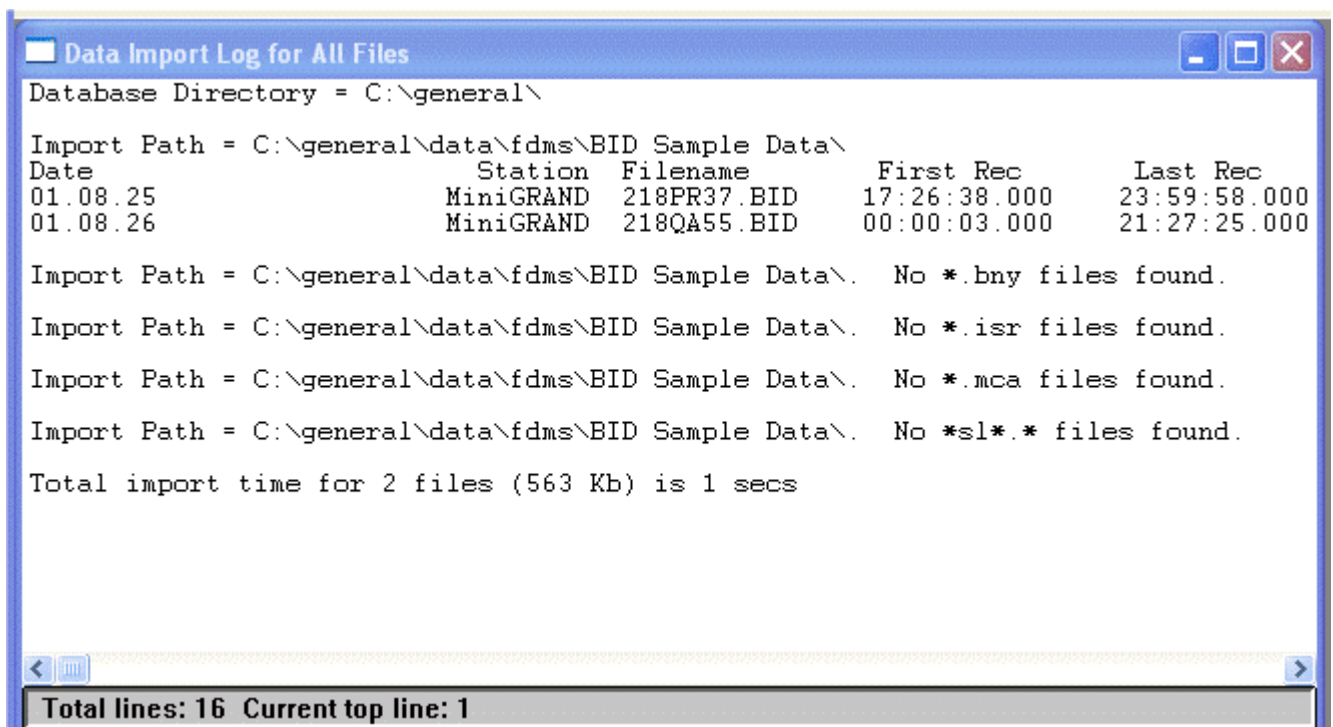


Figure 8 Radiation Review Data Import Progress

The results of the import operation are shown in Figure 9 below. In our example, two BID files were found with data from a MiniGRAND. Next, measurement events are determined from the imported data.



```
Data Import Log for All Files
Database Directory = C:\general\
Import Path = C:\general\data\fdms\BID Sample Data\
Date      Station  Filename      First Rec      Last Rec
01.08.25   MiniGRAND  218PR37.BID   17:26:38.000   23:59:58.000
01.08.26   MiniGRAND  218QA55.BID   00:00:03.000   21:27:25.000

Import Path = C:\general\data\fdms\BID Sample Data\ No *.bny files found.
Import Path = C:\general\data\fdms\BID Sample Data\ No *.isr files found.
Import Path = C:\general\data\fdms\BID Sample Data\ No *.mca files found.
Import Path = C:\general\data\fdms\BID Sample Data\ No *.sl*. files found.
Total import time for 2 files (563 Kb) is 1 secs

Total lines: 16 Current top line: 1
```

Figure 9 Radiation Review Data Import Log

Finding events in Radiation Review

A review of the imported data is first made by using the RAD graph. Events corresponding to radiation peaks are quickly identified and characterized. Reviewing the data in this manner will provide an indication of the quality, number of events of interest, and strength of the measurements relative to the measured background radiation. From this review a minimal threshold for event detection may be determined. That value will be used in the next step.

Figure 10 shows how the RAD graph tool is invoked.

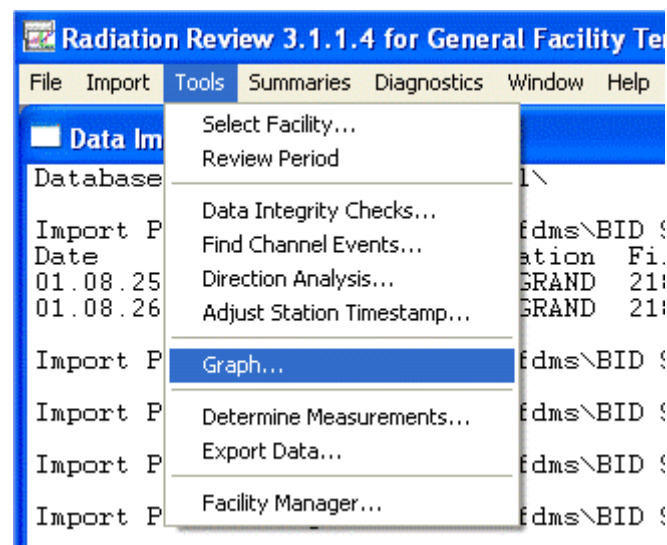


Figure 10 Radiation Review “Tools” “Graph...” Menu Item

Figure 11 below shows a time span of the data imported into RAD. Notice the easily discernible peaks in Neutron channels A and B, and Gamma channel 1. Also notice that Neutron channel C has no data, and the Gamma 2 data is useless noise.

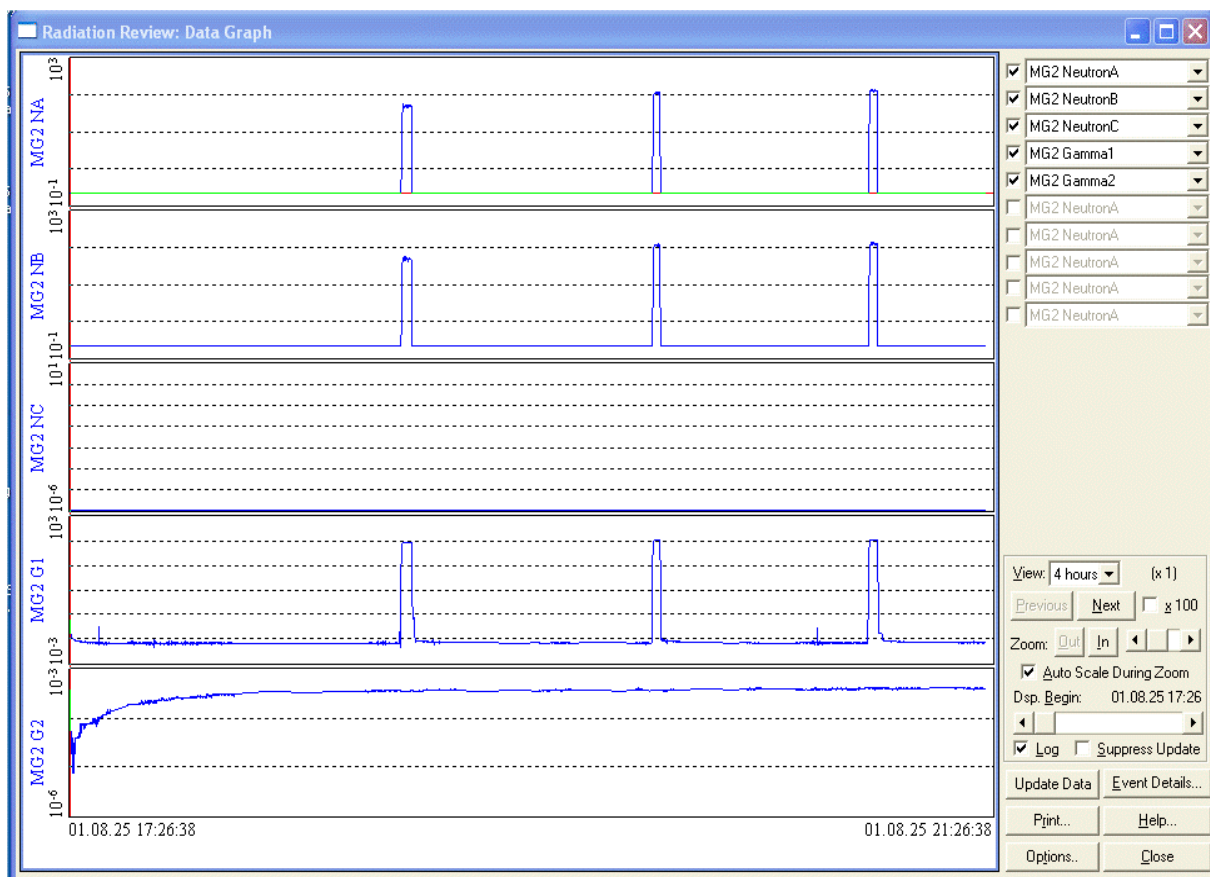


Figure 11 Graph View of Imported Data

Select a peak (See Figure 12) and determine a good value relative to the background for threshold detection. In this case, Neutron Channel A provides good data, and a review of the peaks shows that a value of about 20 up to 75 will give a strong indication of a radiation detection event.

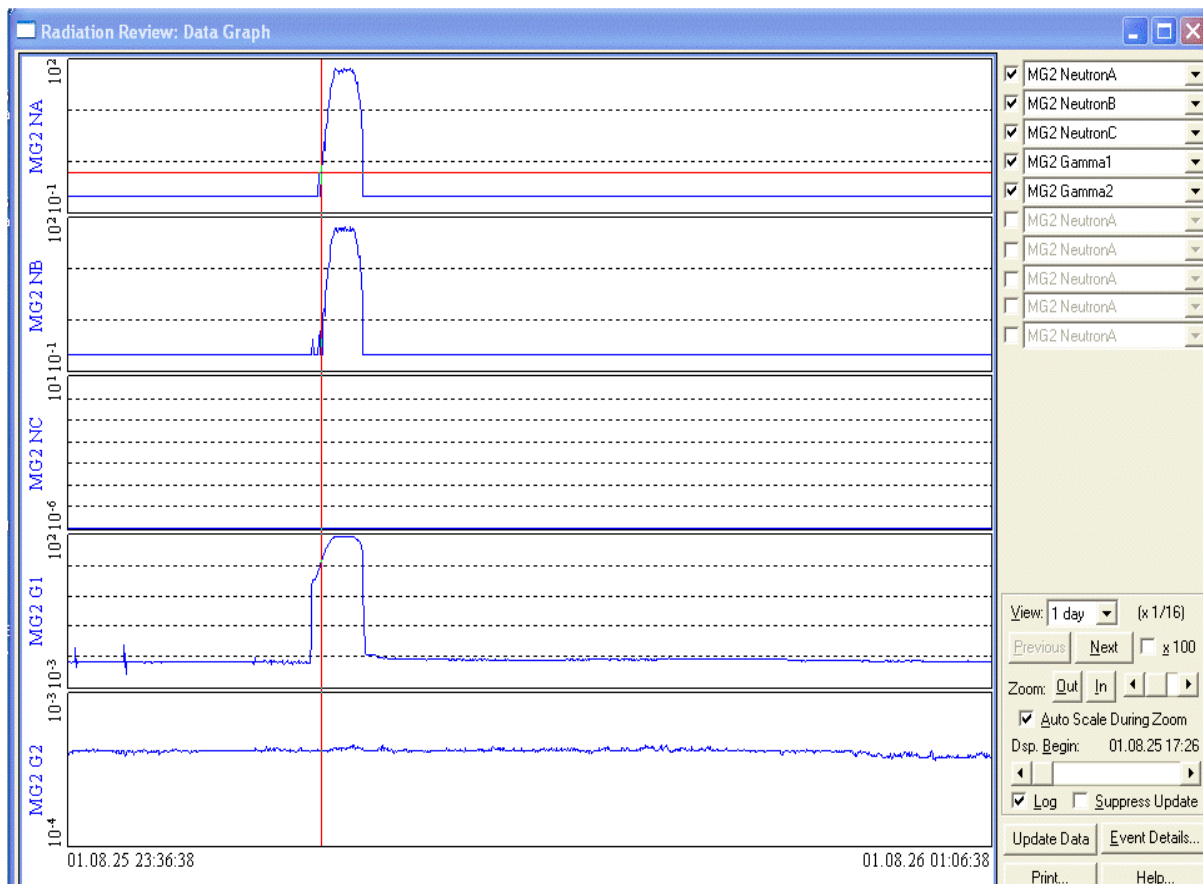


Figure 12 Examining a Radiation Peak on the Graph

With a good heuristic value for threshold detection at hand, start the 'Find Channel Events' operation by selecting the 'Find Channel Events...' menu item from the RAD 'Tools' menu. (Figure 13)

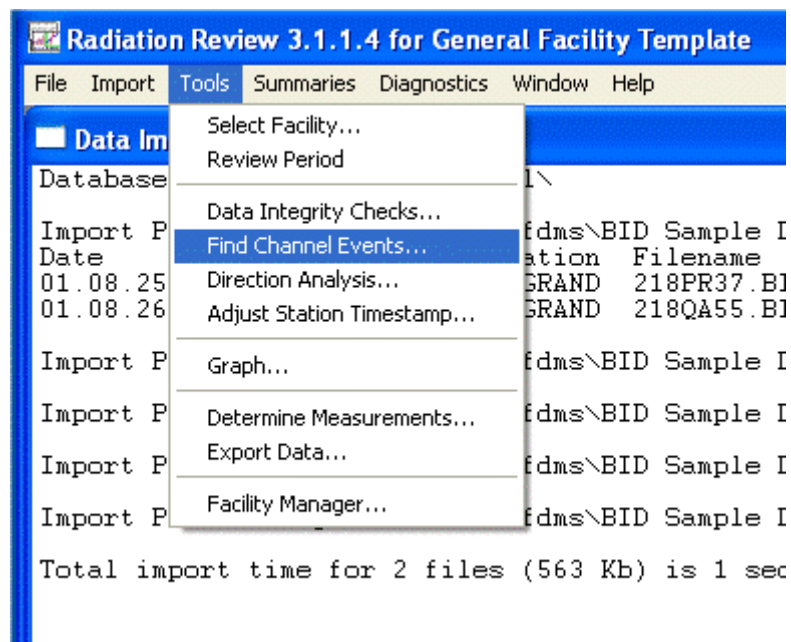


Figure 13 The “Find Channel Events...” Menu Item

The 'Find Channel Events' Parameters dialog (Figure 14) is used to specify the station and channels, and the threshold diction limits and technique for automatically detecting events in eh measurement data. In this example, we will scroll down the list of channels available in the RAD database to find the miniGRAND Neutron Channel A.

Radiation Review: Find Channel Events Parameters

Facility = General Facility Template

Current Database = 01.08.25 to 01.08.26

Database Interval = 2 days

Search Start Date/Time = 08/25/2001 05:26 PM

Search Time Interval = 2 days

Peak width = 1 Algorithm = Threshold

☒ Clear all Channel Events from database ☐ Smooth Data

☐ Write file for IR

Select channels to search:

Select	Channel	Threshold	Background
<input checked="" type="checkbox"/>	VIFM ABC Channel 1	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 2	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 3	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 4	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 5	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 6	0.000	0.000
<input type="checkbox"/>	VIFM ABC Channel 7	0.000	0.000

☐ Create log file ☐ Diagnostic print points

Figure 14 Choosing Channels to Analyze for Events

Here (Figure 15) MG2 NeutronA is selected. No other channels are selected. The detection threshold has been set at 25.00. Select “OK” to start threshold detection.

The screenshot shows a software window with a table of channels and their settings. At the top, there are checkboxes for "Clear all Channel Events from database" (checked), "Write file for IR" (unchecked), and "Smooth Data" (unchecked). Below these are buttons for "Select All" and "Deselect All". The table has four columns: "Select", "Channel", "Threshold", and "Background". The "MG2 NeutronA" row is selected, indicated by a yellow square with a black 'X' in the "Select" column and a black border around the "25.000" value in the "Threshold" column. Other channels listed are G24 No AC d7, MG2 NeutronB, MG2 NeutronC, MG2 Gamma1, and MG2 Gamma2, all with a threshold of 0.000. At the bottom, there are checkboxes for "Create log file" (unchecked) and "Diagnostic print points" (unchecked), and a "Save As Defaults" button.

Select	Channel	Threshold	Background
<input type="checkbox"/>	G24 No AC d7	0.000	0.000
<input checked="" type="checkbox"/>	MG2 NeutronA	25.000	0.000
<input type="checkbox"/>	MG2 NeutronB	0.000	0.000
<input type="checkbox"/>	MG2 NeutronC	0.000	0.000
<input type="checkbox"/>	MG2 Gamma1	0.000	0.000
<input type="checkbox"/>	MG2 Gamma2	0.000	0.000

Figure 15 Selecting a Channel and Setting the Peak Threshold Value

The detection processing is displayed in Figure 16. The results show that 22 events were detected, as shown in Figure 17.

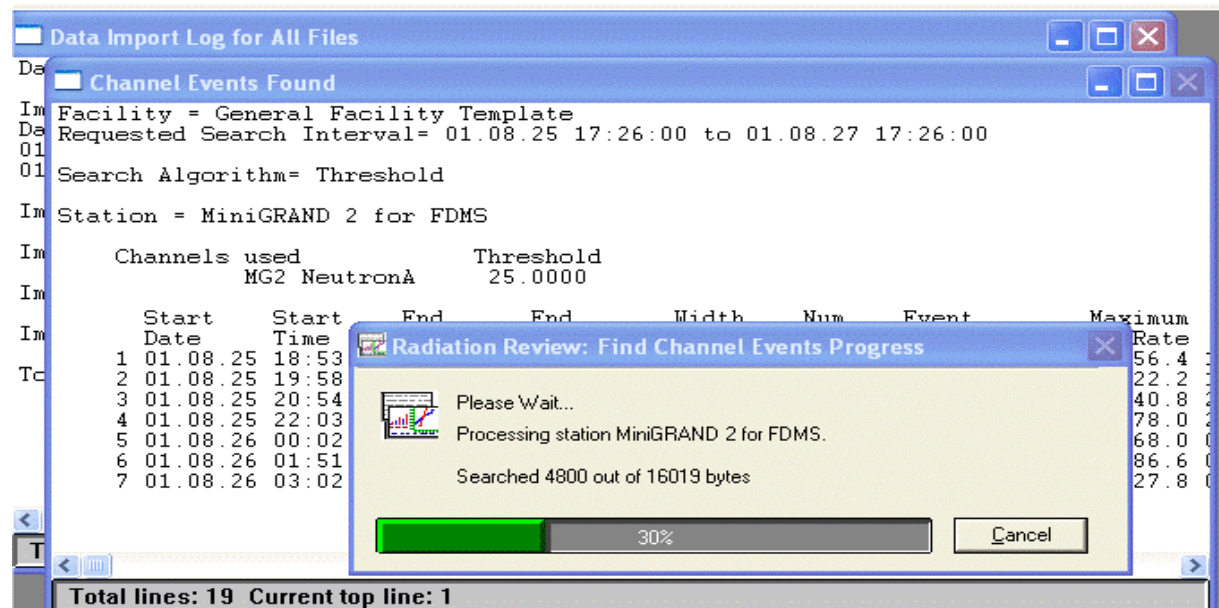


Figure 16 Threshold Detection Progress

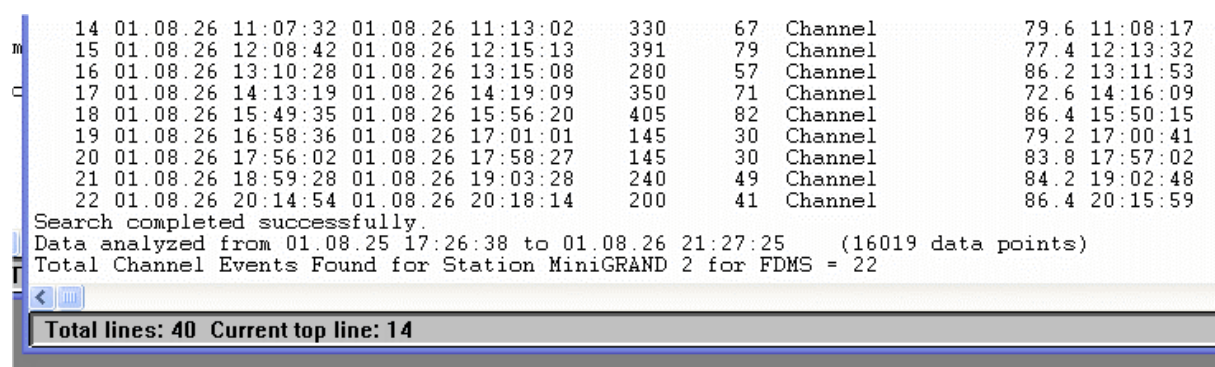


Figure 17 Threshold Detection Results

A review of the graph shows the detected events highlighted in pink in the A channel. It looks good. (Figure 18)

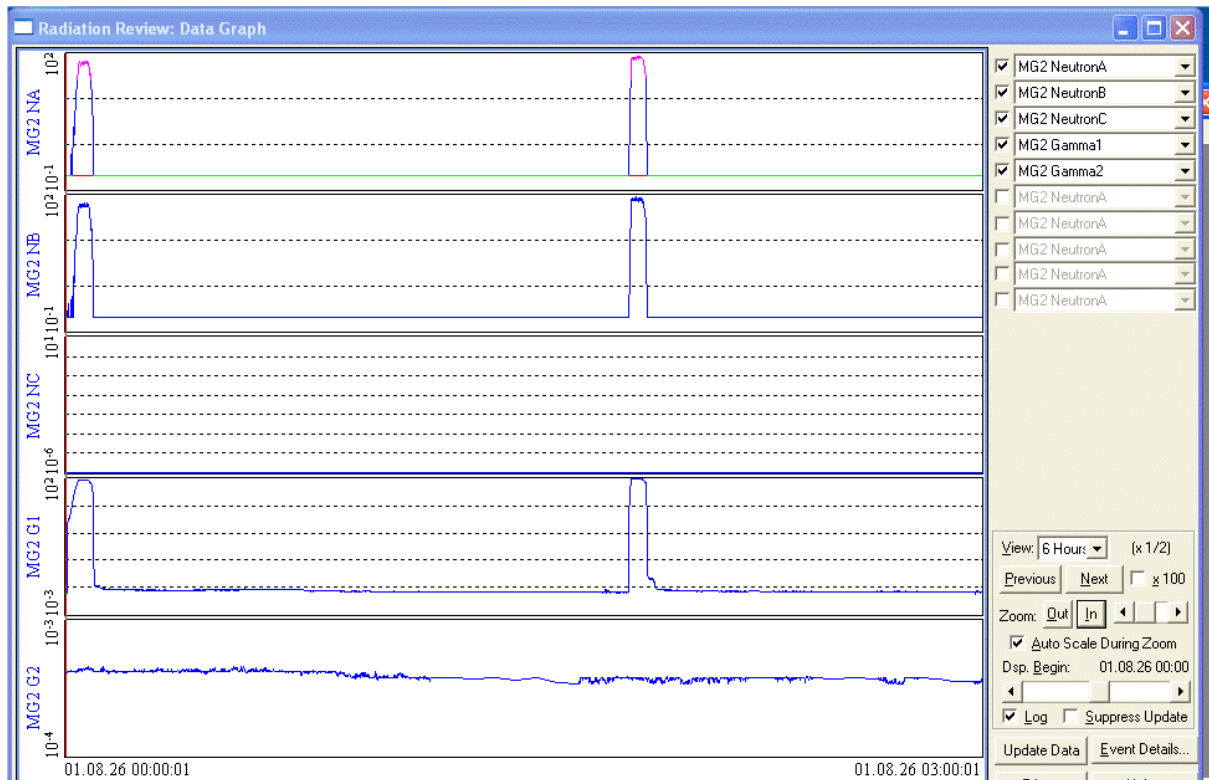


Figure 18 Reviewing the Marked Events in the Graph

Preparing Radiation Review measurement events for export to FDMS

The detected events need to be identified with an ID that corresponds to the Assembly ID used by FDMS. In our example, IDs MIC-01 through MIC-22 will be used. Using the Event Details dialog, the event ID can be added. The event area can be modified, and the event type can be specified.

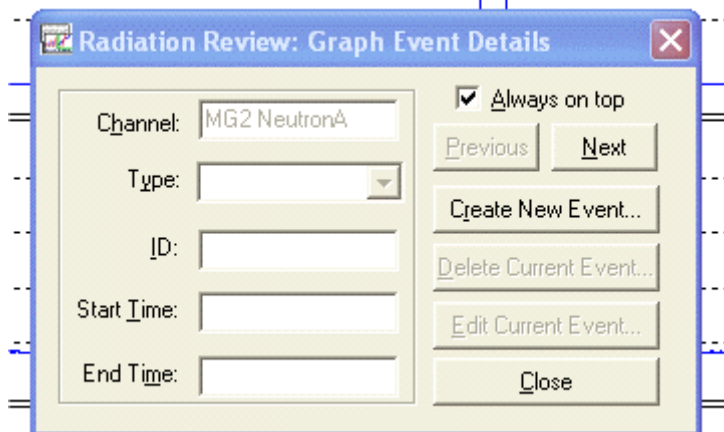


Figure 19 The Graph Event Details Dialog

Figure 20 shows an event selected, with the Event Details dialog ready for editing.

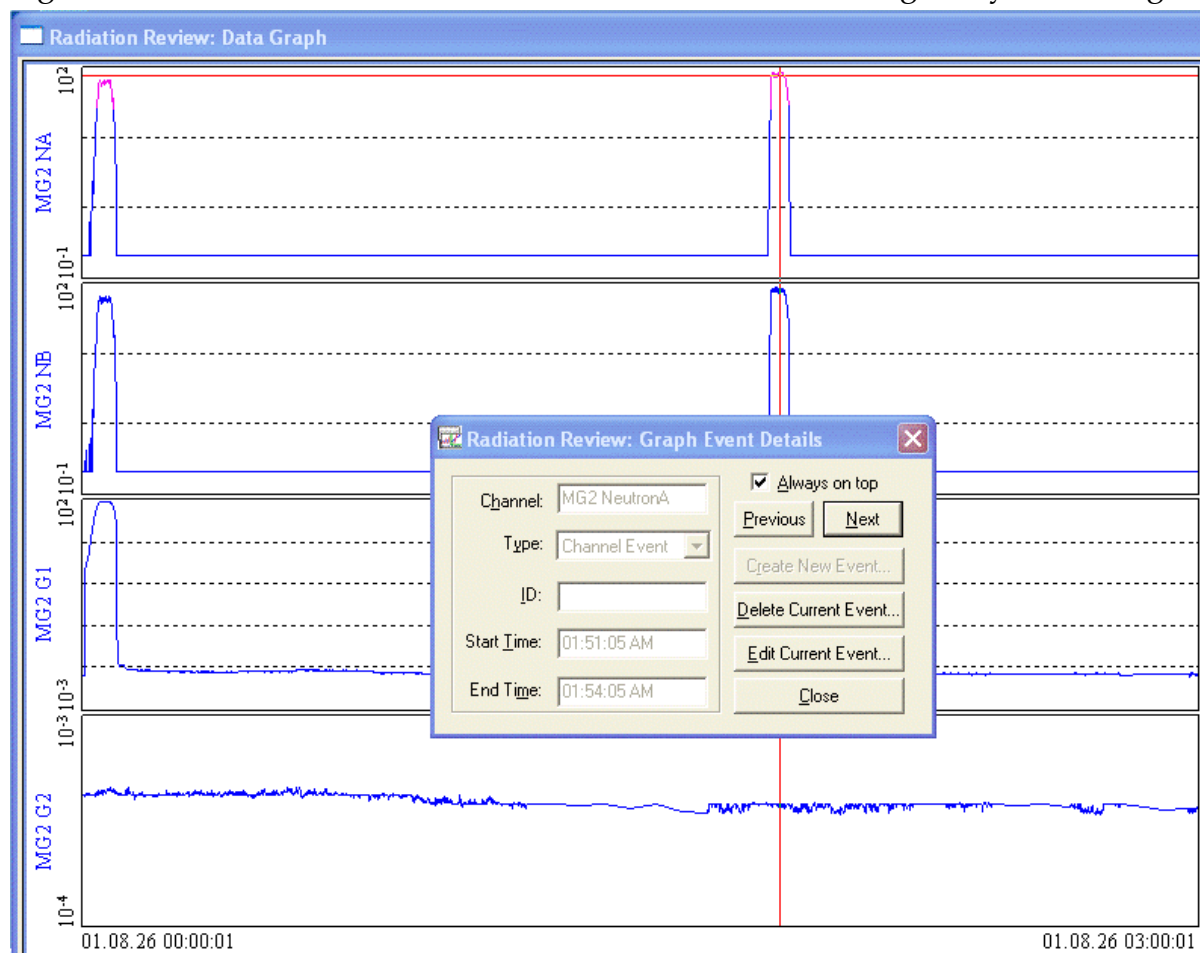


Figure 20 Editing an Event using the Graph Event Details Dialog

Background events.

New in RAD for this release is the creation of background events. FDMS can use a background measurement to adjust the results of a cycle or assembly measurement. The RAD Event Details dialog is used to create an event of type background. Select an arbitrary area of a graph, choose the Background Event type, and save the changes.

Figures 21 through 27 show the creation of a background event prior to the 5th event in the data. The event is created and the area adjusted to correspond only with background. The event is named BKG 5.

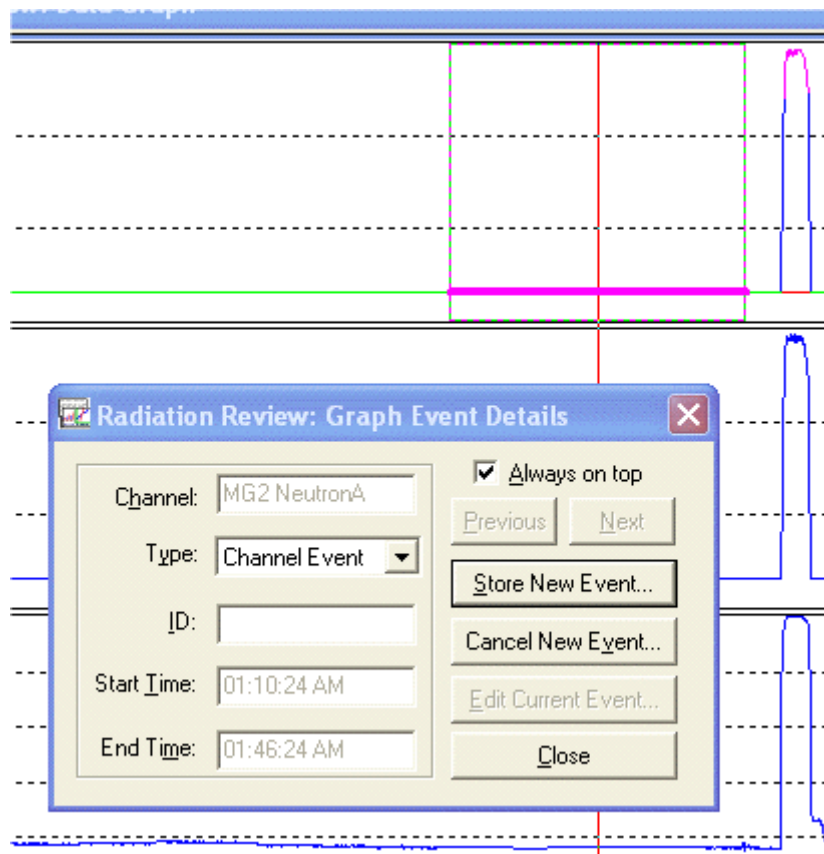


Figure 21 Marking an Area for a New Event.

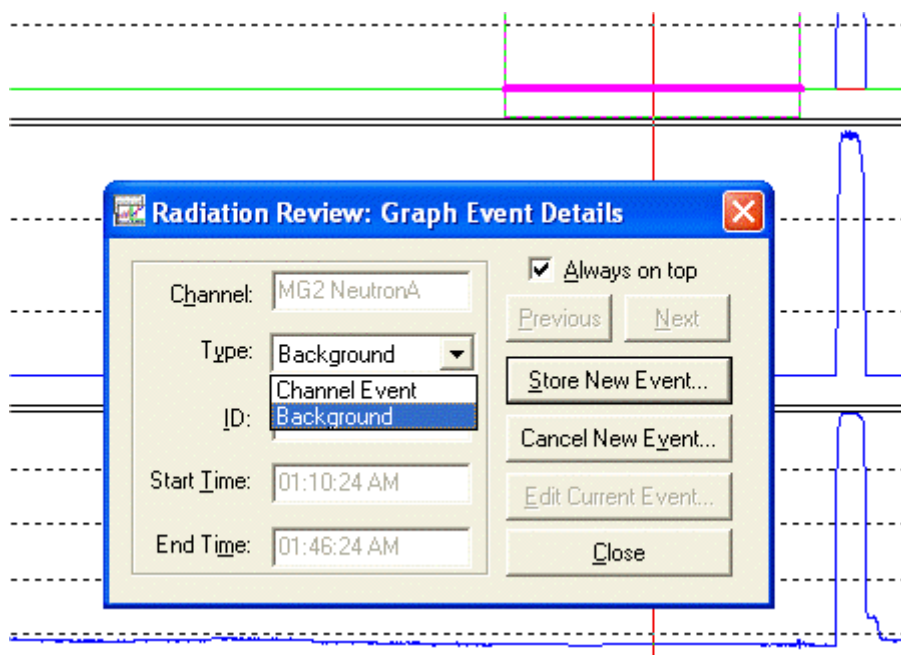


Figure 22 Setting the Background Event Type

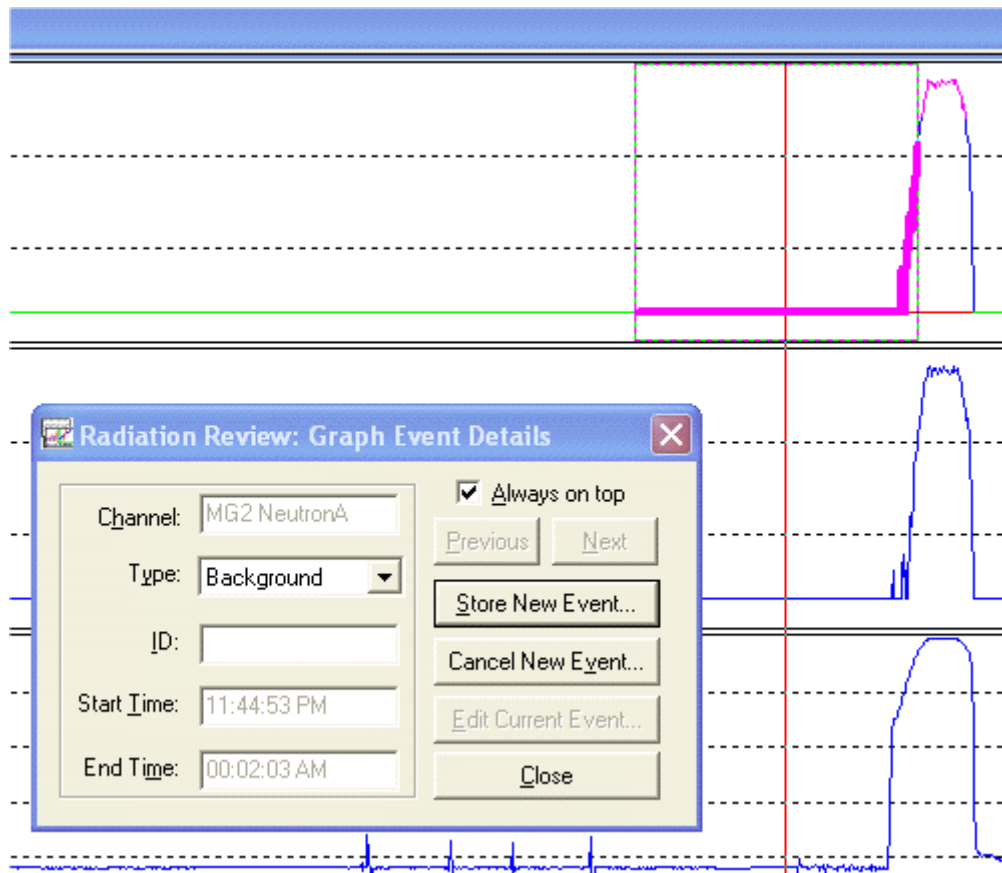


Figure 23 Adjusting the Area Selection

Type:	Background	Store New Event Cancel New Event Edit Current Event Close
ID:	BKG 5	
Start Time:	11:44:53 PM	
End Time:	00:02:03 AM	

Figure 24 Give the Event the Name “BKG 5”

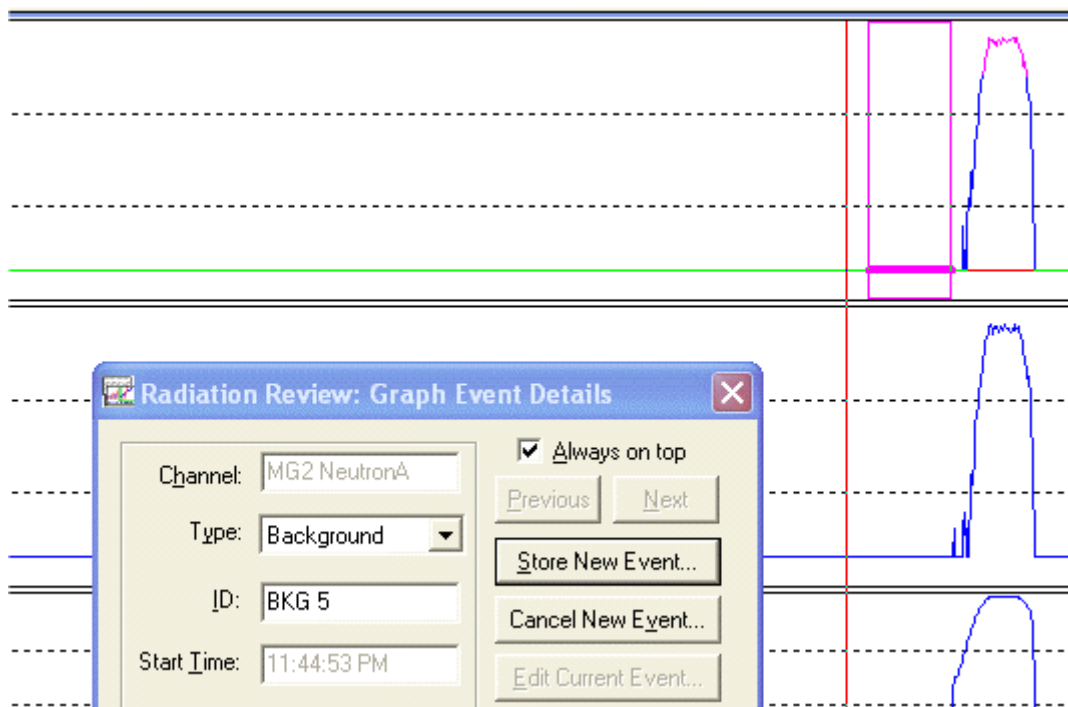


Figure 25 The Background Event “BKG 5” is ready

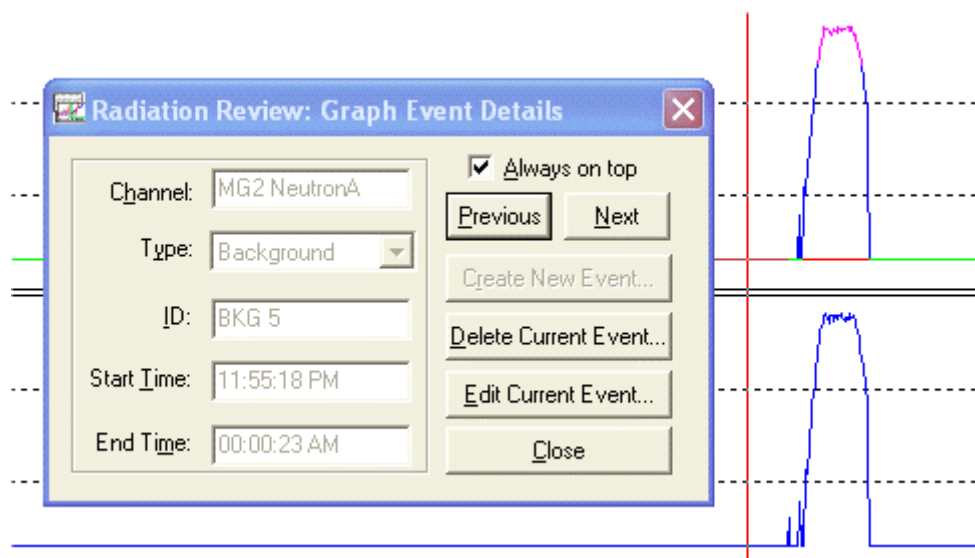


Figure 26 Background Event has been saved

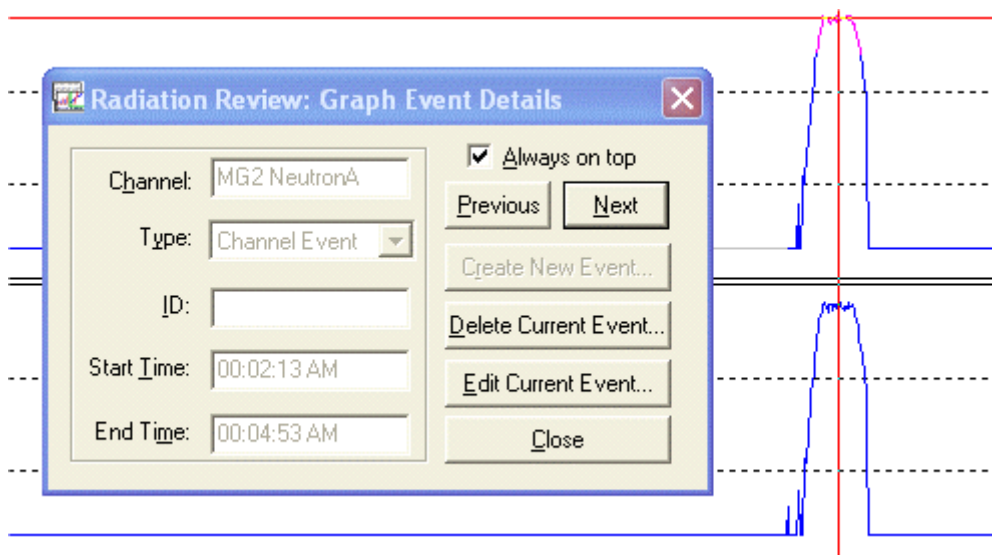


Figure 27 Move to the Next Channel Event

Additional background events can be created as necessary. During the import processing of FDMS, multiple background measurements can be used. When a measurement is analyzed the background measurement corresponding to the closest in time is used in the analysis.

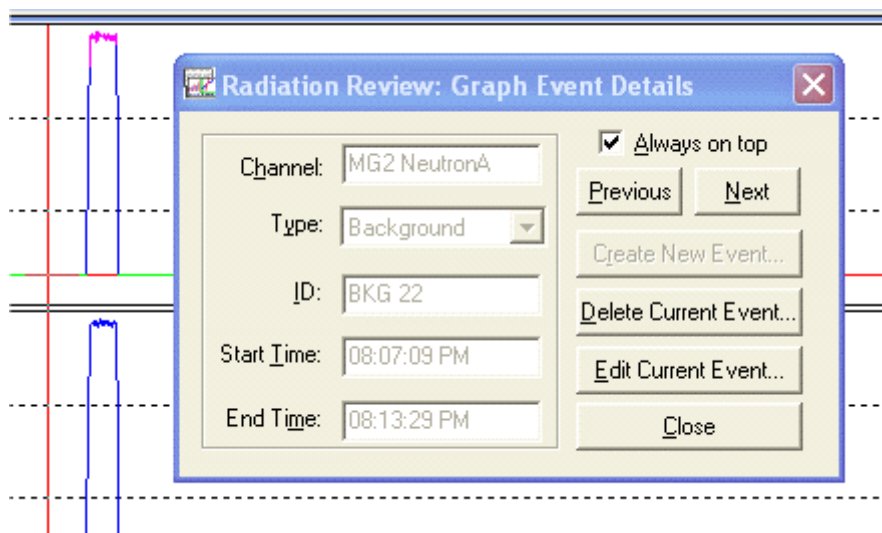


Figure 28 Another Background Event

Exporting Radiation Review measurement events to FDMS

After events have been identified, edited and marked, the events may be exported for use by FDMS. A shared file is created detailing the chosen events. FDMS refers to this file during the import process. To export from RAD, open the Export Data dialog from the 'Tools' 'Export Data...' menu item.

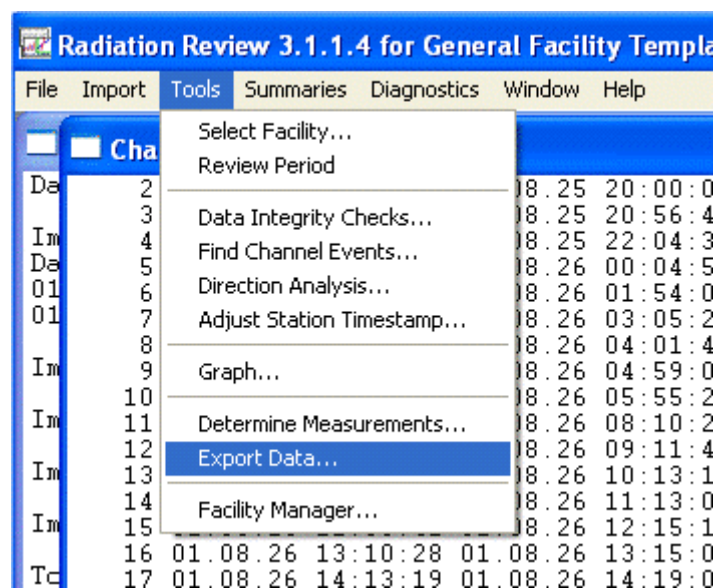


Figure 29 The “Tools” “Export Data...” Menu Item

In the “Export Data” dialog, you select the types of measurements to export, and the stations or detectors that are the source of the events. FDMS uses the “Write XML file” export option. INCC uses the “Write NCC files” option, and Integrated Review uses the “Write IR file” option.

For FDMS, (see Figure 31)

1. Choose both Static Background and Channel Event to export.
2. Make sure that the “Write XML file” option is selected.
3. Select the detector that corresponds to the events that were identified in the previous steps.
4. Select OK to export.

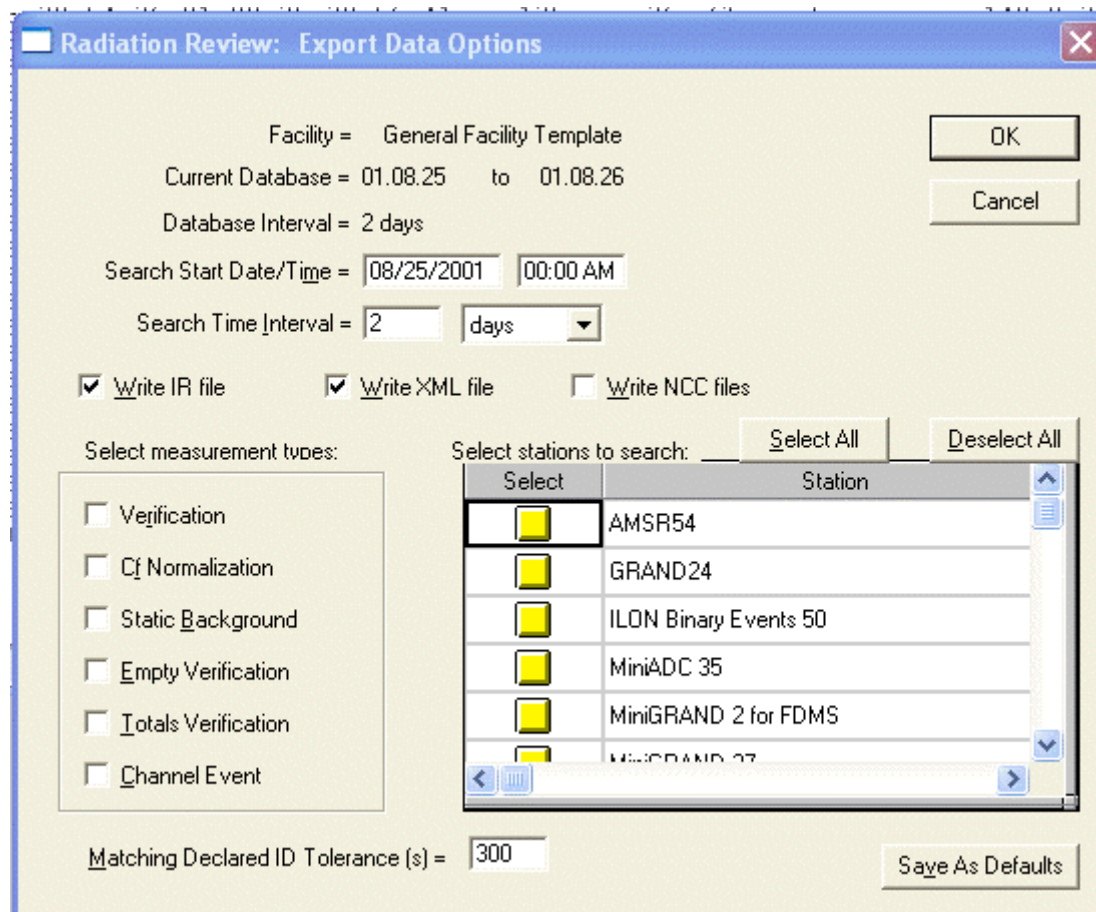


Figure 30 The Export Data Options Dialog

Radiation Review: Export Data Options

Facility = General Facility Template

Current Database = 01.08.25 to 01.08.26

Database Interval = 2 days

Search Start Date/Time = 08/25/2001 00:00 AM

Search Time Interval = 2 days

☒ Write IR file ☒ Write XML file ☐ Write NCC files

Select measurement types:

- ☐ Verification
- ☐ Cf Normalization
- ☒ Static Background
- ☐ Empty Verification
- ☐ Totals Verification
- ☒ Channel Event

Select stations to search: Select All Deselect All

Select	Station
<input type="checkbox"/>	AMSR54
<input type="checkbox"/>	GRAND24
<input type="checkbox"/>	ILON Binary Events 50
<input type="checkbox"/>	MiniADC 35
<input checked="" type="checkbox"/>	MiniGRAND 2 for FDMS
<input type="checkbox"/>	MiniGRAND 37

Matching Declared ID Tolerance (s) = 300

OK Cancel Save As Defaults

Figure 31 Selecting Background and Channel Events for a Channel

After selecting 'OK', a new dialog with a list of all Background and Channel events is presented in an editable tabular format. Here you may enter the unique Assembly IDs corresponding to each measurement event of interest. Select 'OK' to create the external XML file used by FDMS to obtain the specified event data for analysis. Figure 31, Figure 32, and Figure 33 show the editing process. Figure 34 show the progress indicator during the export processing.

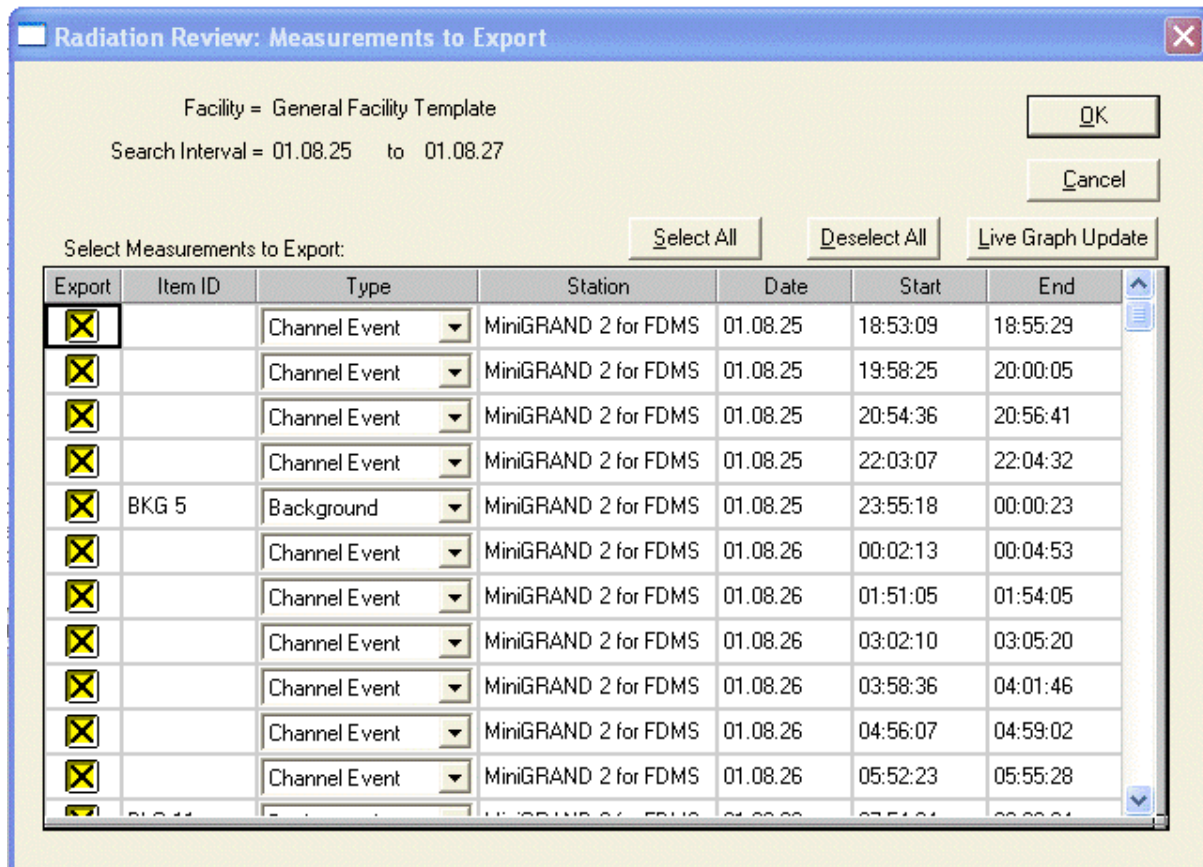


Figure 32 The Table of Events to Export

Radiation Review: Measurements to Export

Facility = General Facility Template

Search Interval = 01.08.25 to 01.08.27

OK Cancel

Select Measurements to Export: Select All Deselect All Live Graph Update

Export	Item ID	Type	Station	Date	Start	End
<input checked="" type="checkbox"/>	MIC-08	Channel Event	MiniGRAND 2 for FDMS	01.08.26	03:58:36	04:01:46
<input checked="" type="checkbox"/>		Channel Event	MiniGRAND 2 for FDMS	01.08.26	04:56:07	04:59:02
<input checked="" type="checkbox"/>		Channel Event	MiniGRAND 2 for FDMS	01.08.26	05:52:23	05:55:28
<input checked="" type="checkbox"/>	BKG 11	Background	MiniGRAND 2 for FDMS	01.08.26	07:54:34	08:03:34
<input checked="" type="checkbox"/>	MIC-11	Channel Event	MiniGRAND 2 for FDMS	01.08.26	08:05:59	08:10:24
<input checked="" type="checkbox"/>	MIC-12	Channel Event	MiniGRAND 2 for FDMS	01.08.26	09:07:30	09:11:45
<input checked="" type="checkbox"/>	MIC-13	Channel Event	MiniGRAND 2 for FDMS	01.08.26	10:06:46	10:13:11
<input checked="" type="checkbox"/>	MIC-14	Channel Event	MiniGRAND 2 for FDMS	01.08.26	11:07:32	11:13:02
<input checked="" type="checkbox"/>	MIC-15	Channel Event	MiniGRAND 2 for FDMS	01.08.26	12:08:42	12:15:13
<input checked="" type="checkbox"/>	MIC-16	Channel Event	MiniGRAND 2 for FDMS	01.08.26	13:10:28	13:15:08
<input checked="" type="checkbox"/>	MIC-17	Channel Event	MiniGRAND 2 for FDMS	01.08.26	14:13:19	14:19:09

Figure 33 Editing Individual Events

Data Exported

Facility = General Facility Template

Requested Search Interval= 01.08.25 00:00:00 to 01.08.27 00:00:00

The following events were exported:

Item ID	Event Type	Station	Dir	Date	Start Time
MIC-01	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	01.08.25
MIC-02	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	01.08.25
MIC-03	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	01.08.25
MIC-04	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	01.08.25
BKG 5	Background			01.08.25	01.08.25
MIC-05	Channel			01.08.26	01.08.26
MIC-06	Channel			01.08.26	01.08.26
MIC-08	Channel			01.08.26	01.08.26
MIC-08	Channel			01.08.26	01.08.26
MIC-08	Channel			01.08.26	01.08.26
MIC-08	Channel			01.08.26	01.08.26
BKG 11	Background			01.08.26	01.08.26
MIC-11	Channel			01.08.26	01.08.26
MIC-12	Channel			01.08.26	01.08.26
MIC-13	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	01.08.26

Total lines: 33 Current top line: 1

Radiation Review 3.1.1.4 for General Facility Template

Export of data finished.

OK

Figure 34 Data Export Results

A log similar to this example is made during the export processing.

Facility = General Facility Template
Requested Search Interval= 01.08.25 00:00:00 to 01.08.27 00:00:00

The following events were exported:

Item ID	Event Type	Station	Dir	Date	Start Time	End Time	Filename
4IC-01	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	18:53:09	18:55:29	C:\general\data\RadFdms.xml
4IC-02	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	19:58:25	20:00:05	C:\general\data\RadFdms.xml
4IC-03	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	20:54:36	20:56:41	C:\general\data\RadFdms.xml
4IC-04	Channel Event	MiniGRAND 2 for FDMS	None	01.08.25	22:03:07	22:04:32	C:\general\data\RadFdms.xml
3KG 5	Background	MiniGRAND 2 for FDMS	None	01.08.25	23:55:18	00:00:23	C:\general\data\RadFdms.xml
4IC-05	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	00:02:13	00:04:53	C:\general\data\RadFdms.xml
4IC-06	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	01:51:05	01:54:05	C:\general\data\RadFdms.xml
4IC-08	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	03:02:10	03:05:20	C:\general\data\RadFdms.xml
	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	03:58:36	04:01:46	C:\general\data\RadFdms.xml
	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	04:56:07	04:59:02	C:\general\data\RadFdms.xml
	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	05:52:23	05:55:28	C:\general\data\RadFdms.xml
3KG 11	Background	MiniGRAND 2 for FDMS	None	01.08.26	07:54:34	08:03:34	C:\general\data\RadFdms.xml
4IC-11	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	08:05:59	08:10:24	C:\general\data\RadFdms.xml
4IC-12	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	09:07:30	09:11:45	C:\general\data\RadFdms.xml
4IC-13	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	10:06:46	10:13:11	C:\general\data\RadFdms.xml
4IC-14	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	11:07:32	11:13:02	C:\general\data\RadFdms.xml
4IC-15	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	12:08:42	12:15:13	C:\general\data\RadFdms.xml
4IC-16	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	13:10:28	13:15:08	C:\general\data\RadFdms.xml
4IC-17	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	14:13:19	14:19:09	C:\general\data\RadFdms.xml
3KG 19	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	15:49:35	15:56:20	C:\general\data\RadFdms.xml
	Background	MiniGRAND 2 for FDMS	None	01.08.26	16:51:41	16:57:01	C:\general\data\RadFdms.xml
4IC-19	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	16:58:36	17:01:01	C:\general\data\RadFdms.xml
4IC-20	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	17:56:02	17:58:27	C:\general\data\RadFdms.xml
4IC-21	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	18:59:28	19:03:28	C:\general\data\RadFdms.xml
3KG 22	Background	MiniGRAND 2 for FDMS	None	01.08.26	20:07:09	20:13:29	C:\general\data\RadFdms.xml
4IC-22	Channel Event	MiniGRAND 2 for FDMS	None	01.08.26	20:14:54	20:18:14	C:\general\data\RadFdms.xml

Figure 35 Data Export Summary Log

References

1. J. Longo et al., *Fork Detector Measurement Software (Version 2.1.1.0)* LA-CC-03-02 (Feb. 24, 2010), *packaged within* Integrated Review Software, LA-CC-10-095 (July 8, 2012).
2. J. Lestone, J. Longo, *Fork Detector Measurement Software User Guide (Version 2.1.1.0)*, Safeguards Science and Technology Group N-1, Los Alamos National Laboratory, LA-UR-05-9043 (December 1, 2005).
3. J. Longo, *Quick User Instructions for FDMS 2.0. A Description of the New Unattended Measurement Features of the Fork Detector Measurement System*, Safeguards Science and Technology Group N-1, Los Alamos National Laboratory (March 12, 2005).
4. J. Lestone, J. Longo, *Fork Detector Measurement System (FDMS), Quick User Instructions for the Second Field Testable Version of the Software (Version 1.02)*, Safeguards Science and Technology Group NIS-5, Los Alamos National Laboratory (November 7, 2003).
5. S. Klosterbuer, *Radiation Review User Manual*, Safeguards Science and Technology Group N-1, Los Alamos National Laboratory report LA-UR-99-1965 (December 1, 2004).
6. S. Klosterbuer, H. Nordquist, *Integrated Review Software Installation Manual*, Safeguards Science and Technology Group N-1, Los Alamos National Laboratory report LA-UR-04-8626 (February 25, 2005).
7. J. Longo, J. Lestone, *Reference Manual for Instrumentation, Fork Detector Measurement System*, Software Safeguards Science and Technology Group NEN-1, Los Alamos National Laboratory report LA-UR 13-20601 (Jan. 23, 2013).
8. D. Pelowitz, P. Moore, T. Wenz, J. Longo, W. Hansen, *Multi-Instrument Collect User's Manual*, Safeguards Science and Technology Group NEN-1, Los Alamos National Laboratory report LA-UR-13-20425 (July 8, 2012).
9. J. Longo, et al., *Unattended and Remote Monitoring Software Baseline 2 Revision 1*, Safeguards Science and Technology Group NEN-1, Los Alamos National Laboratory LA-CC 10-095, (Jan. 23, 2013).
10. J. Longo, *B2R1 Version Description Document, Revision 18*, Safeguards Science and Technology Group NEN-1, Los Alamos National Laboratory report LA-UR-13-20424, (Jan. 23, 2013).
11. J. Longo, J. Montoya, *B2R1 IRS Installer Release Note*, Safeguards Science and Technology Group NEN-1, Los Alamos National Laboratory report LA-UR 10-6377 (rev. July 8, 2012).
12. C. Carroll, *Checklist Procedure for Instrumentation, Radiation Review*, Division of Technical Support, Department of Safeguards, IAEA, (Apr. 2005).
13. R. Parker and S. Klosterbuer, *MiniGRAND User Manual* (01.12), Safeguards Science and Technology Group N-1, Los Alamos National Laboratory report LA-UR-05-7643 (Feb. 2008).