OPERATING PROCEDURE

REACh™

WMG-P-122

Rev. 2

October 2024

Prepared by:

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Table of Contents

Revision History

Date	Reason For Changes	Revision	Software Version
5/2/2023	First version of software operating procedure.	0	1.1.0
12/5/2023	Added support for A400 detector.	1	1.3
10/4/2024	Inclusion of MDA/MDC functions	2	1.5

Reviews and Approvals

Revision 2	
Preparer	**Signature**
D. Michael Kershman	Michael Kershman Michael Kershman (Oct 16, 2024 10:09 EDT)

Technical Review	**Signature**
Sean Kelly, Jr.	Sean Kelly Jr. Sean Kelly Jr. (Oct 18, 2024 13:32 EDT)

QA Review	**Signature**
Heather Sullivan	Heather Sullivan Heather Sullivan (Oct 18, 2024 16:57 EDT)

Requirements

REACh™ is a web-based application which requires an active internet connection and a modern, Chromium-based web browser (for example *Microsoft Edge* or *Google Chrome*).

An active RADMAN™ subscription and user account are required to connect to REACh™.

Login

REACh™ is accessible from the following URL:

https://reach.radman.com

Enter your RADMAN™ username and password in the login screen (*figure 1*) to access REACh™.

Figure 1

Selecting your REACh™ Detector

If you currently have access to more than one type of REACh™ detector, you may be prompted to select which one you are currently using. This is important because it determines what survey information will be made available.

You can switch the current detector at any time by clicking on your username in the navigation menu and selecting *Switch Detectors*.

Landing Page & Navigation

The next page shown is the landing page. This page contains links to learn more about various features of the REACh™ software. If you have any additional questions, please contact WMG.

Contact WMG

ReachInfo@wmginc.com
www.wmginc.com
(914) 736 7100

To access the various features of the application, click the menu options in the navigation menu at the top of the screen (*figure 2*).

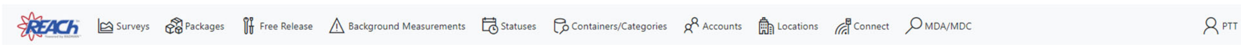


Figure 2

Each of these options will be explained below.

Managing your RadHand 600 Pro REACh™ Detector

Operation of the RadHand 600 Pro REACh™ detector requires various information which can be managed from the REACh™ application.

Generate and save QR codes to connect to your Wi-Fi network

By clicking the **Connect** menu option from the navigation menu (*figure 2*), you may create, save, and print QR codes which allow the REACh™ detector device to connect to your Wi-Fi network.

Click the **New QR code** button to display the Wi-Fi QR Code Generator form (*figure 3*).

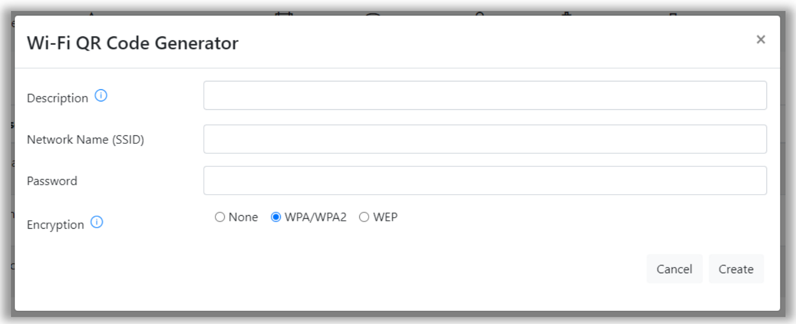


Figure 3

After entering the appropriate network name (or *SSID*) and password, click **Create** to generate the QR code (*figure 4*). This QR code may be scanned by the REACh™ detector device, saved for use in the future, or printed.

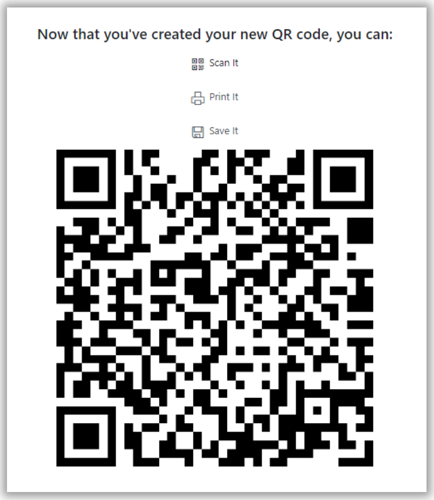


Figure 4

Managing Accounts

Several accounts and their associated operator tags will be provided to you. These accounts can be modified by editing the account name, associated email address, and their *Enabled* status.

Because operator tags must be generated by WMG, accounts cannot be added or removed at this time.

Managing Locations

The REACh™ detector device will allow you to associate a location with each survey. To manage this list, you must first define location types (example types shown in *figure 5*).

List of location types

Id	Name	Description	Priority	Parent
1	Outside	Anywhere outside	1	
33	NPPs	Nuclear Power Plants	1	
65	Offices	Any type of Office Space	1	
84	Parking Lots	Any type of parking lot	1	
87	Conferences	Any type of Conference	1	
88	Hotels	Any type of Hotel	0	

Figure 5

Each location must have an associated location type.

Importing RADMAN™ Locations

Instead of re-creating a list of site locations, you can import existing locations from your RADMAN™ database by clicking the **Import from RADMAN** button (*figure 6)*.

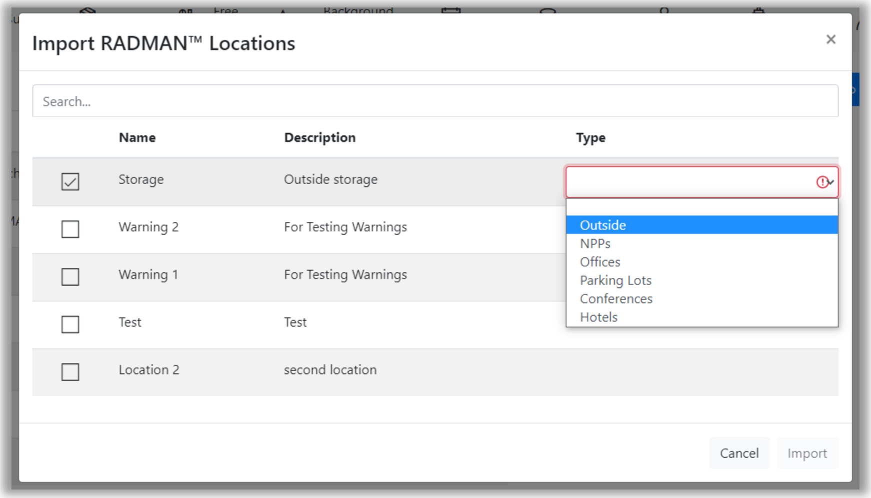


Figure 6

Each imported location must be assigned a location type. **Note:** duplicate location names are possible, so ensure only the desired locations are selected.

Managing Containers and Categories

The REACh™ detector device will allow you to associate a container or category with each survey. Containers/Categories are a general description of what you are surveying; they may describe a container, geometry, or purpose (for example, background measurement).

As with locations, you may import a list of RADMAN™ containers into the list of containers and categories.

Managing Statuses

The REACh™ detector device will allow you to associate a status with each surveyed item. This status may be used to sort, filter, or group the list of surveyed items and their results.

Tasks & Surveys

Clicking the **Surveys** menu option on the navigation menu (*figure 2*) will display a dropdown with two options: **Manage Tasks** and **View Surveys**.

Manage Tasks

Before you can perform surveys, you must create and assign active tasks. Each task will be associated with an account and the name of the task should be the name of the item which will be surveyed.

HOW TO: Add a new task

Click the **Manage Tasks** menu option (*figure 7*). Select the account you wish to assign the task to, enter a new task name and hit the Enter key. The new task will automatically be saved to the database.

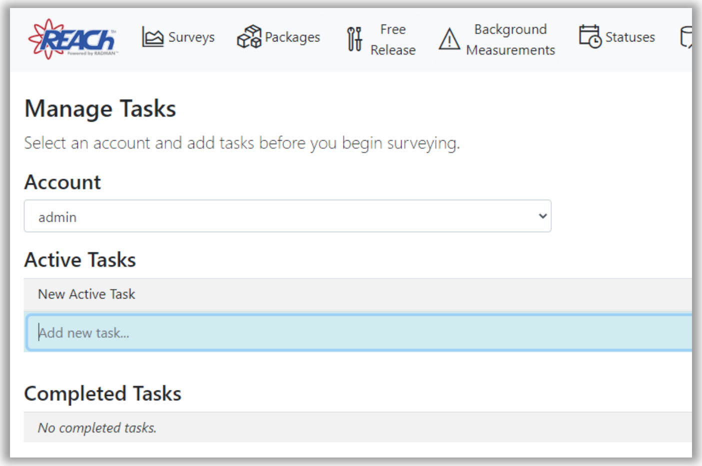


Figure 7

New tasks will be available on the REACh™ detector device the next time you login or synchronize.

View Surveys

After completing surveys with the REACh™ detector device, click the **View Surveys** menu option to display a list of all surveyed items (*figure 8*).

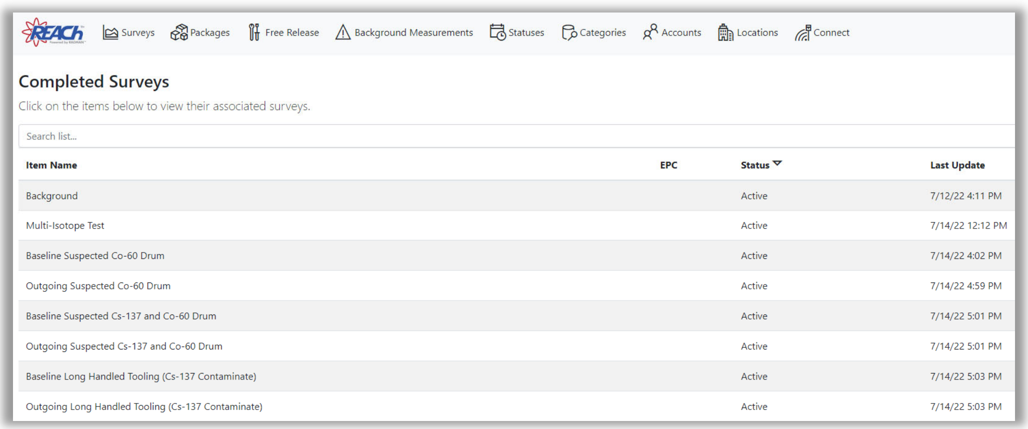


Figure 8

Search and sort the list to find the surveyed item(s) you are looking for. The Item Name will be the same as the Task you selected when completing the survey.

Click any of the surveyed items to view a detailed list of the readings (*figure 9*). This report includes identified nuclides, dose rates, and gamma spec charts for every reading taken.

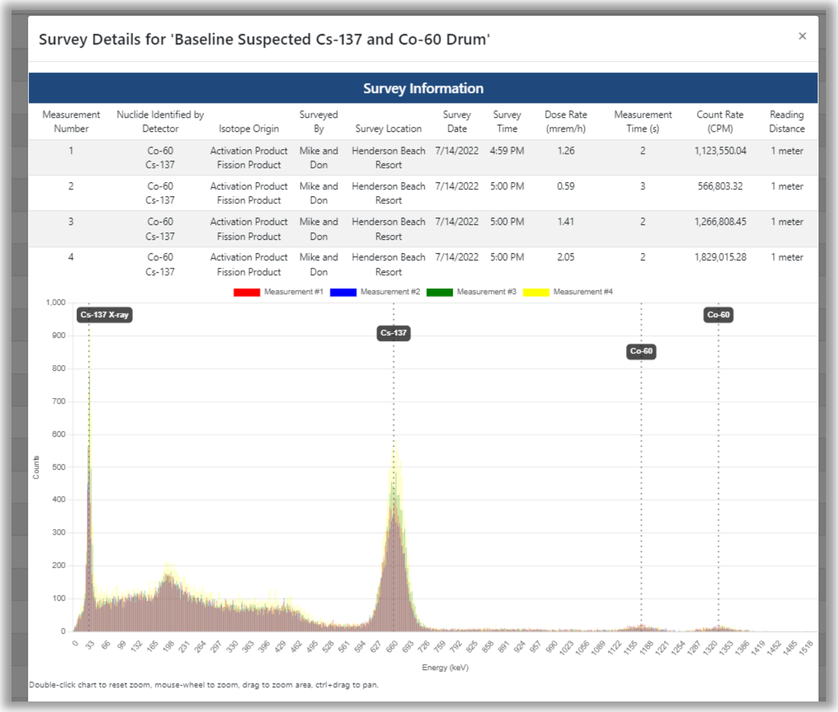


Figure 9

Managing your A400 REACh™ Detector

Operation of the A400 REACh™ detector requires various information which can be managed from the REACh™ application and then synced to the device using the **REACh™ Driver** application.

Managing Items & locations

Items & locations are the discrete items and locations which are to be surveyed with the REACh™ detector. They must be **Enabled** in order to sync to the device.

Managing Technicians

Technicians are the users who will be operating the device. They must be **Enabled** in order to sync to the device.

Managing Nuclide Libraries

With the A400 REACh™ detector, you have the ability to define custom nuclide libraries for identification, or to use one of the pre-set libraries provided by WMG. (*See Appendix A for a list of pre-set libraries.)*

In the Library tab of the navigation menu, you may select which library is the currently active one. The next time you sync the REACh™ detector, the device will be updated to use the active library.

You may clone the pre-set libraries and make changes, you may create a new library from scratch, or you may import a RADMAN™ sample or distribution to create a new library.

All libraries, no matter how they are created, will operate the same way.

Viewing Surveys

Clicking the Surveys option in the navigation menu will show a list of all completed surveys. This will include the item/location which was surveyed, which technician performed the survey, and other important information.

If you'd like to view all surveys for a specific item or location, click the Group surveys by item/location checkbox at the top.

You may edit the surveys to change the item/location or technician, if data was entered in error.

You may also permanently delete a survey. This operation cannot be undone.

Note: by default, only surveys performed in the last 30 days are shown. Open the filter selection to change the start and end date shown.

Background Measurement Location

The **Background Measurements** menu option (*figure 2*) will allow you to manage a list of background measurement locations and to assign surveys to those locations.

HOW TO: Create a background measurement location

Click the **New measurement location** button to show the creation form (*figure 10*). This form allows you to enter a name and description for a specific location and to associate an existing survey.

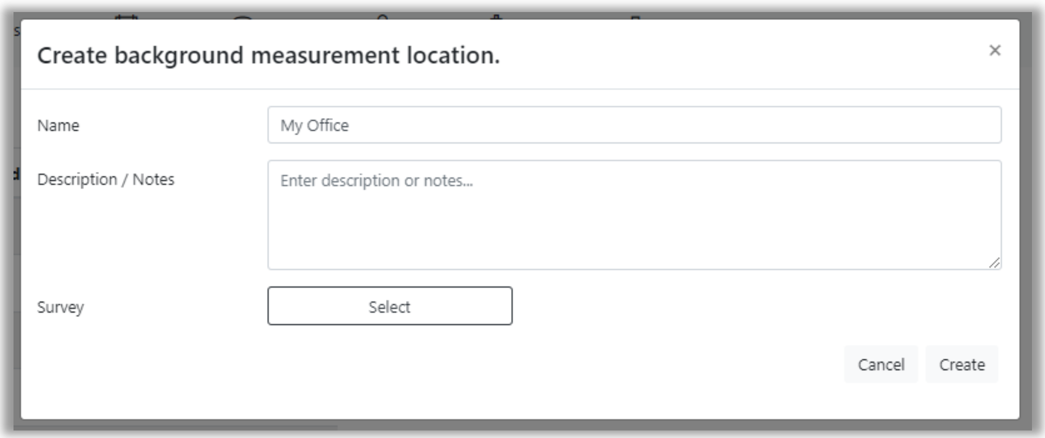


Figure 10

Click the **Select** button to view a list of available surveys (*figure 11*).

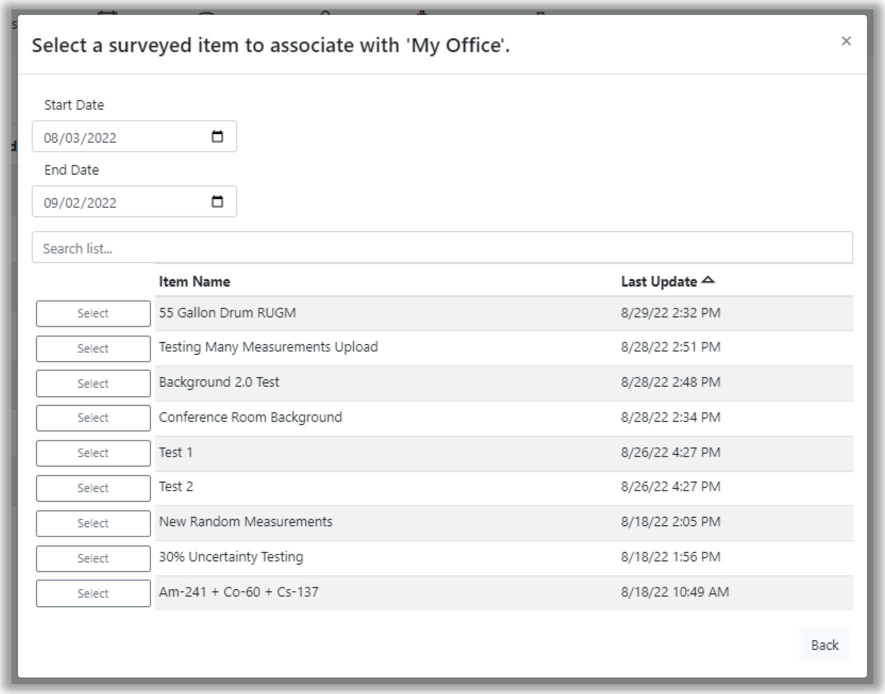


Figure 11

Note: by default, only surveys performed within the last thirty (30) days are shown. Modify the **Start Date** and **End Date** selection to view additional surveys taken at earlier dates.

When you have found the appropriate item, click the **Select** button beside the item name. This will display the confirmation dialog (*figure 12*).

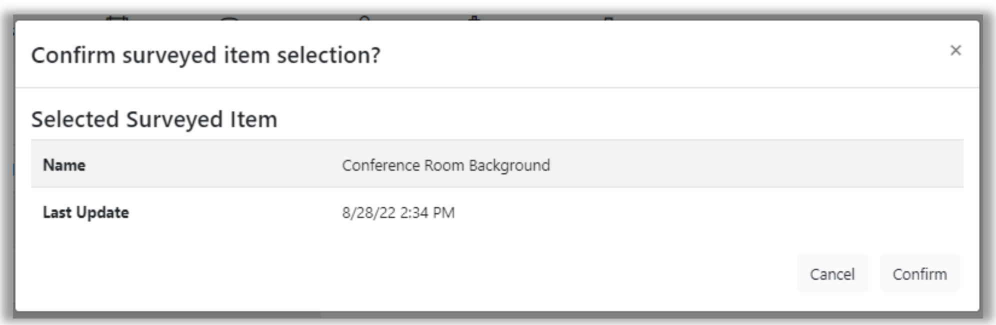


Figure 12

Confirm that you have selected the correct surveyed item and the creation form will be shown again, this time with the Survey selected (*figure 13*).

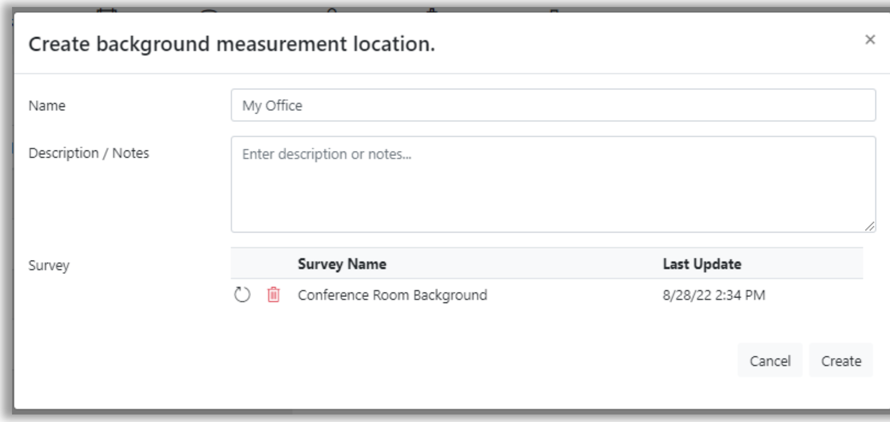


Figure 13

You can now click **Create** and the new background measurement location will be added to the list.

MDA / MDC

MDA / MDC Reports Table:

To view MDA / MDC reports, click the MDA / MDC button in the top ribbon. This will take you to a list of MDA / MDC reports in tabular format (**Note:** If the report utilized manually entered MDA / MDC values, there will be no associated surveys / measurements for the report and the table columns for the survey will indicate '---' for the values). Each MDA / MDC report will be listed in its row with columns summarizing the following data:

- Name
- Detector Type
- Background Survey Name
- Survey Name
- Weight (g)
- Volume (cm^3)

Note: If the report utilized did not contain user entered weights or volumes, these columns will indicate it as such by marking them '---'.

In addition, at the right side of the row for each MDA / MDC report, there will be several icons:

- **Preview Reports**: allows user to preview the report based on information previously entered and saved, and
- **Delete**: allows users to delete MDA / MDC reports

Creating an MDA / MDC Report:

From the top right corner of the MDA / MDC Report List page you can click a +New Report button to open an MDA / MDC Report add screen. The screen will have the following inputs for the user to enter or select:

- **Name:** Users will enter the name of the or description of MDA / MDA report,
- **Unit of Measure:** Provides user with a drop-down list of available units (nCi, uCi, mCi, Ci, uCi/g, uCi/cm^3)
- **Report Mode (MDA / MDC):**
    - If the unit selected is nCi, uCi, mCi, or Ci, the report mode will be set to MDA. The weight (g) and volume (cm^3) fields will be optional.
    - If the unit selected is uCi/g or uCi/cm^3, the report mode will be set to MDC. If uCi/g was selected, the weight field is required. If uCi/cm^3 was selected the volume field will be required.
- Weight (g)
- Volume (cm^3)
- Instrument Serial Number (optional)
- Instrument Calibration Due Date (optional)
- **MDA / MDC Method (Either manual or calculated):** Allows user to either enter their desired MDA / MDC values or have REACh™ calculate them.
    - If Manual Entry is selected, the user will be provided with a table. The table will list all available gamma emitting radionuclides for the selected detector type with a field to manually enter the MDA / MDC value for the radionuclide. The user can select a RADMAN™ distribution to automatically create the list of radionuclides as opposed to manually selecting the desired radionuclides.
    - If Calculated is selected, drop-down lists are shown for background measurements and surveyed item measurements. The user can select a background measurement or surveyed item measurement to be used in the calculations. Instead of selecting a surveyed item measurement, the user can enter or select the desired acquisition time and acquisitions distance for the MDA / MDC calculation.

MDA / MDC values are calculated using fixed acquisition times. The user can either select a surveyed item measurement which will use the survey acquisition time, or they can enter a fixed time value to determine the MDA / MDC.

Near the bottom of the add screen, there is a drop down list with the following preset times (seconds): 1, 5, 10, 15, 30, 45, 60, 90, 120, 300, 450, 600, 750, 900, 1200, 1500, and 1800.

The user may also add comments or notes which will appear on the report at the bottom of the add screen.

Additional requirements:

In order for the MDA / MDC calculations to automatically be performed, a background measurement is required. Additionally, you can either select a surveyed item measurement to populate several fields automatically (e.g., acquisition distance, acquisition time, radionuclides, etc.), or manually select these fields. Upon generating the MDA / MDC report, REACh™ will calculate the MDA / MDC values for all radionuclides selected for a given report.

At any point during the MDA / MDC report process, the user can save their progress. Only the Name is required to save.

After all applicable fields have been saved for a new MDA / MDC report, users can preview MDA / MDC reports.

Upon previewing the MDA / MDC report, a PDF of the report will open in a new browser window.

Free Release Items & Equipment

The **Free Release** menu option (*figure 2*) will show a list of all free release items & equipment, allow you to generate free release reports, and add new items or equipment.

HOW TO: Create free release items and equipment

Click the **New item or equipment** button to open the creation form (*figure 14*).

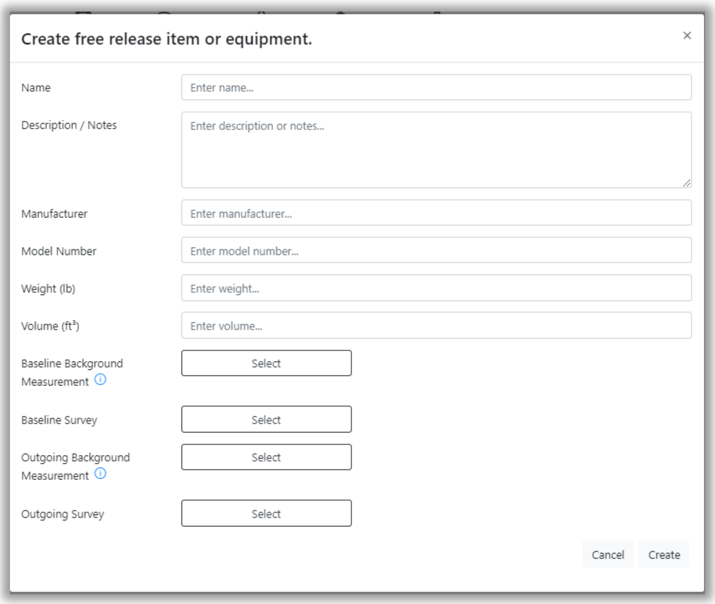


Figure 14

You must enter a new, unique name but all other inputs are optional.

Previewing Reports

When a free release item or equipment has both a Baseline Background Measurement and a Baseline Survey selected, you may generate the Free Release Baseline report.

When the Outgoing Background Measurement and the Outgoing Survey have been selected, you may generate the Free Release Outgoing report. When both the Baseline and Outgoing reports are available, you may then generate the Comparison report.

To see which reports are available for a specific item, click the Preview Reports icon on the list of free release items & equipment (*figure 15*).

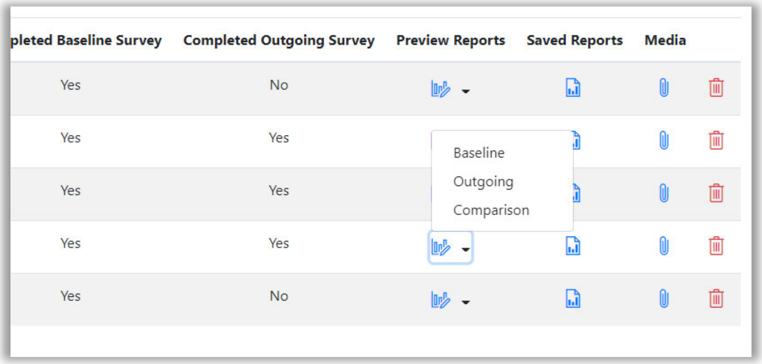


Figure 15

Each of the reports will allow you to input additional information after generating the report. Some information is optional but some (such as the REACh™ Instrument Serial Number and Calibration Due Date) are required (*figure 16*).

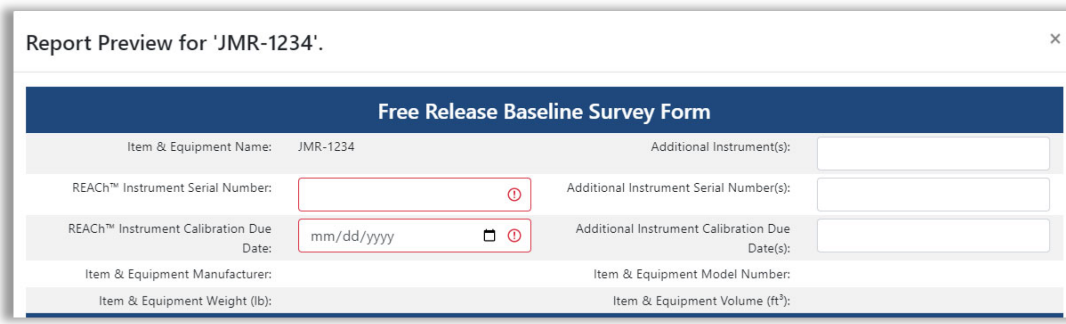


Figure 16

The reports will also list all associated readings for the selected item. You may select which readings to include in the final report by clicking the edit icon in the title of the Measurement Information list (*figure 17*).

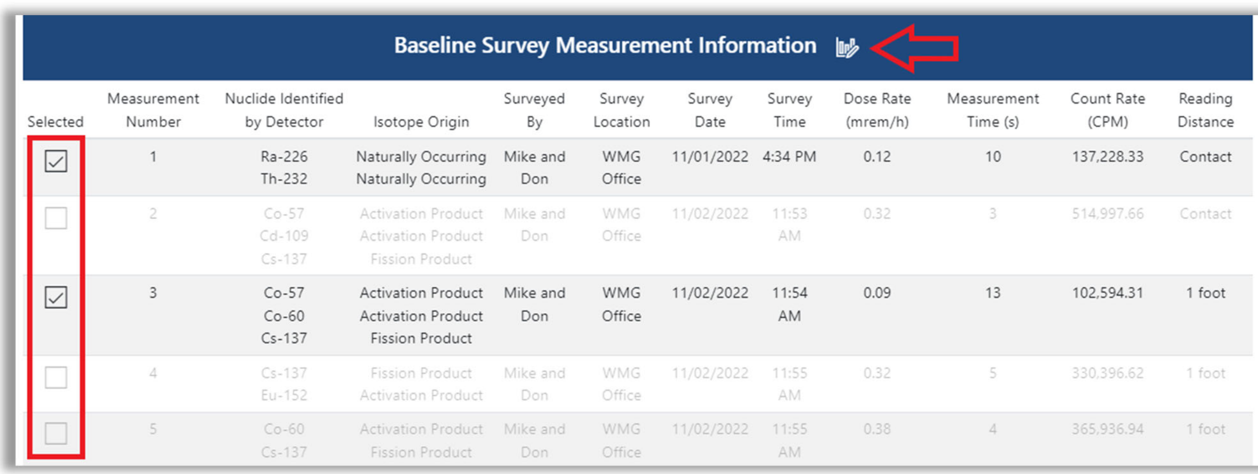


Figure 17

Comparison Report Notes

The Comparison Report will compare background measurements and survey information between the baseline and outgoing reports. If any anomalies are identified, the Comparison Report will indicate them.

If *figure 18* (below), the outgoing survey measurements have identified Cs-137 which was not identified during the baseline survey. Because of this anomaly, the identified nuclides have been highlighted red.

Additionally, outgoing survey measurement #2 has a count rate outside of the expected range: ±50% of the median of all selected measurements. As a result, the count rate is highlighted red.

Baseline Survey Measurement Information

Measurement Number	Nuclide Identified by Detector	Isotope Origin	Surveyed By	Survey Location	Survey Date	Survey Time	Dose Rate (mrem/h)	Measurement Time (s)	Count Rate (CPM)	Reading Distance
1	NORM	---	Mike and Don	Rad Shipping (MA3)	07/21/2022	11:04 AM	1.348E-3	516	2,367.99	1 foot
2	K-40	Naturally Occurring	Mike and Don	Rad Shipping (MA3)	07/21/2022	11:15 AM	1.354E-3	548	2,227.78	General Area

Outgoing Background Survey Information

Measurement Number	Nuclide Identified by Detector	Isotope Origin	Surveyed By	Survey Location	Survey Date	Survey Time	Dose Rate (mrem/h)	Measurement Time (s)	Count Rate (CPM)	Reading Distance
---	NORM	---	Mike and Don	Rad Shipping (MA3)	07/21/2022	10:57 AM	1.378E-3	300	2,389.83	General Area

Outgoing Survey Measurement Information

Measurement Number	Nuclide Identified by Detector	Isotope Origin	Surveyed By	Survey Location	Survey Date	Survey Time	Dose Rate (mrem/h)	Measurement Time (s)	Count Rate (CPM)	Reading Distance
1	Cs-137	Fission Product	Mike and Don	Henderson Beach Resort	07/12/2022	4:02 PM	0.19	7	203,783.88	Contact
2	Cs-137	Fission Product	Mike and Don	Henderson Beach Resort	07/12/2022	4:02 PM	1.57	2	1,522,237.07	Contact
3	Cs-137	Fission Product	Mike and Don	Henderson Beach Resort	07/12/2022	4:03 PM	0.16	10	172,227.38	Contact

Figure 18

Below the survey information, a set of informative notes will be displayed (*figure 19*).

Comparison Summary Notes

Comparison Summary Note	Description
1	Note that Outgoing Survey Measurement 2 and Measurement 6 had a count rate outside of the expected range and were indicated as such.
	Measurement(s) which are outside the expected range should be investigated and the cause should be documented (e.g., nearby external source, baseline localized contamination, self shielding, etc.).
2	Note that Baseline Surveys identified Ra-226 whereas no Outgoing Surveys did. Ra-226 was indicated as such.
3	Note that Outgoing Surveys identified Cs-137 whereas no Baseline Surveys did. Cs-137 was indicated as such.
	Baseline or Outgoing Surveys with nuclides indicated due to presence in one but not both surveys should be investigated and documented.
4	This is a user-entered note!!
Add New Note	Enter new note and hit enter...

Figure 19

The presence of any anomalous nuclides or count rates will be indicated here (as well as the above tables). The user may also click the note icon beside the title to type their own notes to be included in the final report.

Saving Reports

While viewing any of the Free Release report previews, you may click the **Save** button. Doing so will create a PDF copy of the current report and save it. You may view or download any previously saved reports (*figure 20*) by clicking the **Saved Reports** icon from the list of free release items & equipment.

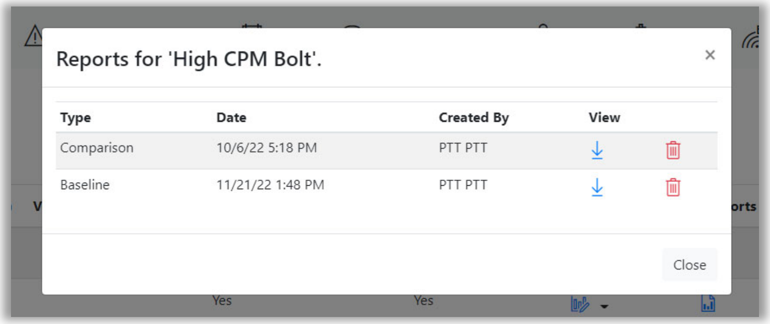


Figure 20

Managing Packages

From the **Packages** menu option (*figure 2*), you may create, update, characterize, and export packages. The Packages page is separated into different tabs (*figure 21*) based on the status of the individual package.

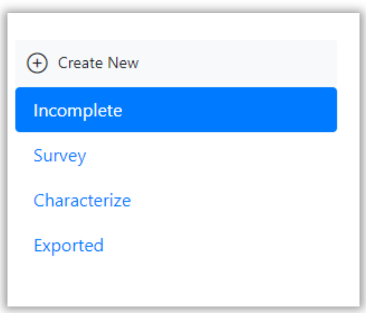


Figure 21

Any package which is missing information (such as *weight* or *waste form*) necessary to characterize will appear in the **Incomplete** tab.

Note: to determine what information is required, click the package to open the **View Package** modal. All required input fields will be highlighted red when blank or invalid (*figure 22*).

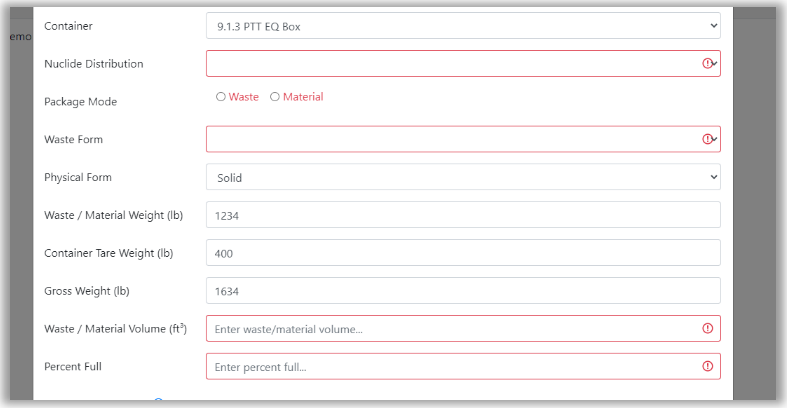


Figure 22

Once a package has all required information, but does not yet have associated survey data, it will appear in the **Survey** tab.

Note: it is not required to enter all required information before surveying. Packages which have survey data but do *not* have all required information entered will appear in the **Incomplete** tab.

A package which has all required information and also has associated survey data will appear in the **Characterize** tab. From there it can be characterized and exported to RADMAN™.

Package Properties

Below is a list of all available package properties and how they are expected to be used. If you have any questions regarding these properties and how they affect characterization and classification, please contact WMG.

Contact WMG

ReachInfo@wmginc.com
www.wmginc.com
(914) 736 7100

Property Name	Explanation / Usage
Name / Description	Enter a unique, descriptive name for the package. This will be the package name once exported to RADMAN™.
Serial Number	Optional. Enter the serial number of the container or liner.
Barcode / EPC	Optional. Enter a barcode, EPC, or RFID code to uniquely identify the package. The REACh™ detector will be able to read and store survey results associated with the barcode, EPC, or RFID code.
Surveyed Item	Select the surveyed item which contains the readings for this package.
Background Measurement	Optional. Select the appropriate background measurement to pair with the survey data. This will be used to adjust dose rates for more accurate characterization.
Container	Select the RADMAN™ container which describes this packaging. This geometry is necessary to create the model for characterization.
Nuclide Distribution	Select the RADMAN™ nuclide distribution (or *waste stream*) which most accurately reflects the radioactive contents of the package.
Package Mode	Describe whether this is waste or material.
Waste Form	Describe the constitution of the waste or material in the package. This is necessary to perform geometry correction on the survey results.
Physical Form	Describe the physical state of the waste or material in the package.
Waste / Material Weight	The net weight of the waste or material within the container.
Container Tare Weight	The empty weight of the container.
Gross Weight	The waste / material weight plus the container tare weight.
Waste / Material Volume	The net volume of the waste or material within the container. This is required to calculate source density during characterization.
Percent Full	The estimated fill height (in percent) of the container. This is important for modeling the source during characterization.
Natural Material / Ore	Apply different exempt limits if this package contains natural material / ore with naturally-occurring radioactive isotopes.
Activated Metal	Apply different NRC Part 61 limits if this package contains activated metal.
Manifest Notes	Describe the container, waste, and solidification media for this package. This information is required and will be displayed on the NRC Form 541.
Dose Rates	Describe the maximum dose rates for the package. This is necessary for accurate DOT classification.

	Note: the three-meter dose rate is of the unshielded source. If left blank, this will be calculated during characterization.
Dose-to-Curie Override	*Advanced.* The user may calculate this value using advanced source modeling software (such as MegaShield™ or MCNP) and then input here to override the normal characterization.
Manual Dose Rates	If the survey was performed using a collimated or shielded detector (such as required for a high activity source), the user should input separate, unshielded, dose rates for characterization. Using collimated or shielded dose rates for characterization will not produce accurate results.
Characterization Options	Allow the user to input contamination values for surface contaminated objects (SCO).
Notes	Free form text field which may be used for any additional information relating to this package. The contents of this field will be attached to the exported package as a txt file.

Characterization

Once all required package information is entered and survey results have been associated, the package may be characterized.

From the **Characterize** tab of the **Packages** page, click the **Characterize** icon beside the package (see *figure 23*).

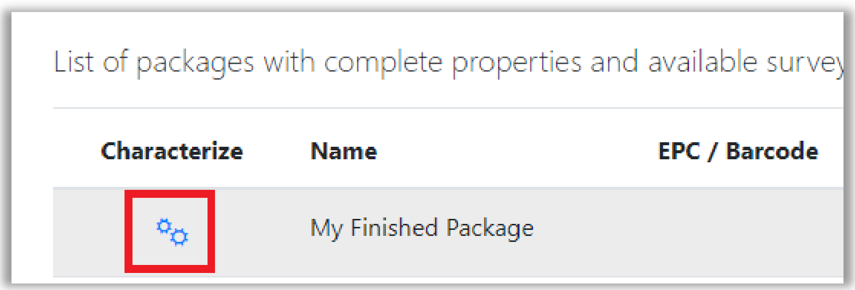


Figure 23

Clicking this icon will display the Characterization modal (*figure 24*).

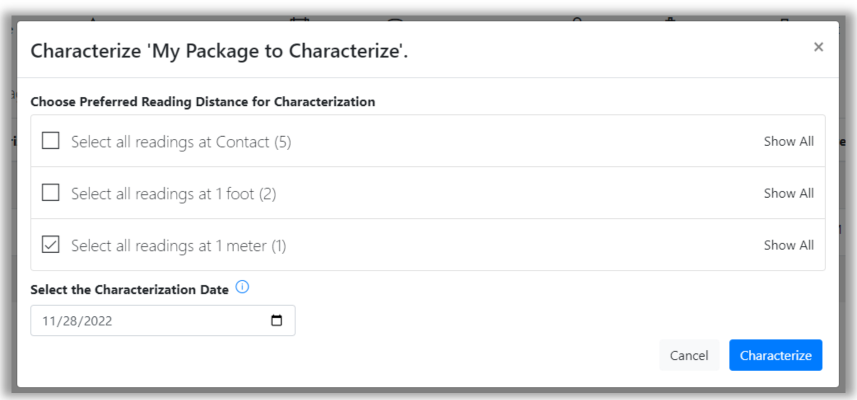


Figure 24

The user must select which readings to use for characterization. By default, all readings taken at one meter will be selected. If no readings were taken at one meter, no readings will be selected.

Note: only readings from the same distance may be selected. For instance, you may not select some readings at one meter, and other readings at one foot.

Click the Show All button to display the full list of readings at a given distance. This will allow you to select a subset of readings for characterization (*figure 25*).

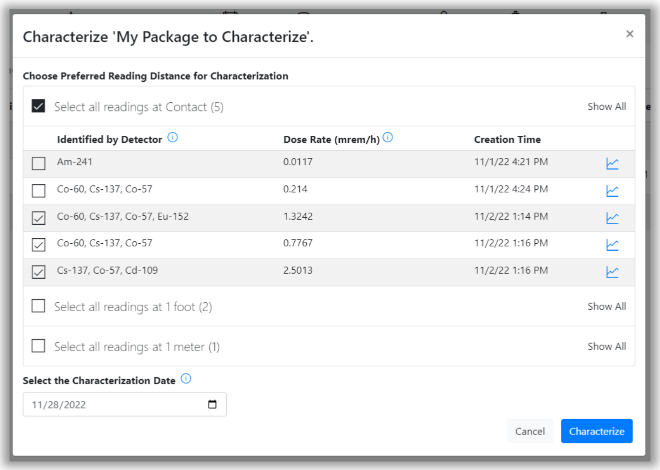
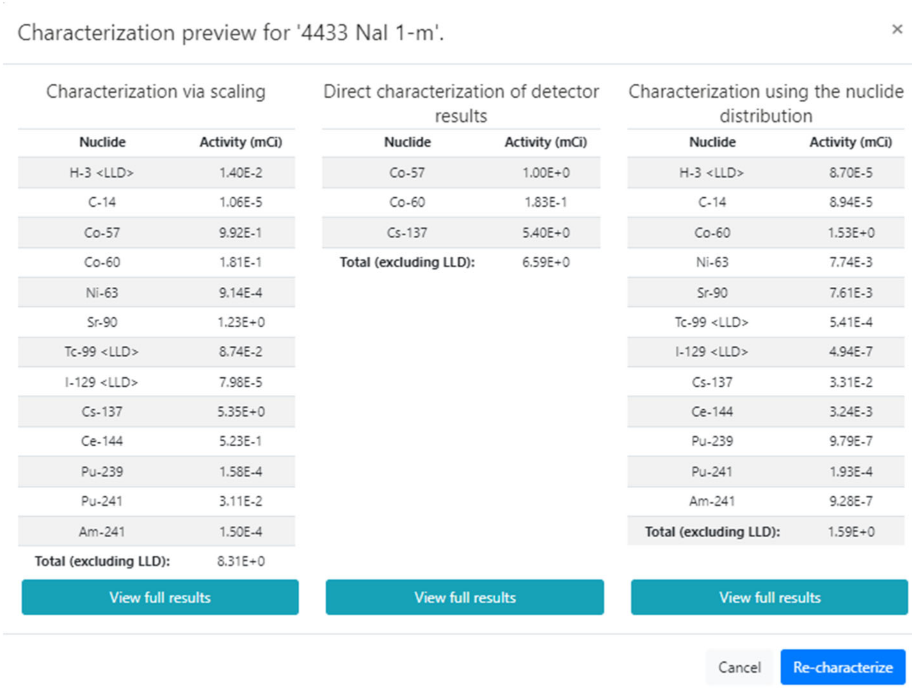


Figure 25

Next, select a characterization date. All nuclide activities will be decayed from the survey date to this date. When you're happy with the selections, click the **Characterize** button to generate and display the results.

When the results pop up, you will have three options (see figure 26 below):

- **Characterize via scaling:** Radionuclides quantified by the detector, and scaling in radionuclides from the distribution.
- **Direct characterization of detector results:** Radionuclides are quantified from the detector results.
- **Characterization using the nuclide distribution:** Radionuclides from distribution are determined using the detector dose rates (Gross Gamma).



Characterization preview for '4433 NaI 1-m'.

Characterization via scaling

Nuclide	Activity (mCi)
H-3 <LLD>	1.40E-2
C-14	1.06E-5
Co-57	9.92E-1
Co-60	1.81E-1
Ni-63	9.14E-4
Sr-90	1.23E+0
Tc-99 <LLD>	8.74E-2
I-129 <LLD>	7.98E-5
Cs-137	5.35E+0
Ce-144	5.23E-1
Pu-239	1.58E-4
Pu-241	3.11E-2
Am-241	1.50E-4
Total (excluding LLD):	8.31E+0

View full results

Direct characterization of detector results

Nuclide	Activity (mCi)
Co-57	1.00E+0
Co-60	1.83E-1
Cs-137	5.40E+0
Total (excluding LLD):	6.59E+0

View full results

Characterization using the nuclide distribution

Nuclide	Activity (mCi)
H-3 <LLD>	8.70E-5
C-14	8.94E-5
Co-60	1.53E+0
Ni-63	7.74E-3
Sr-90	7.61E-3
Tc-99 <LLD>	5.41E-4
I-129 <LLD>	4.94E-7
Cs-137	3.31E-2
Ce-144	3.24E-3
Pu-239	9.79E-7
Pu-241	1.93E-4
Am-241	9.28E-7
Total (excluding LLD):	1.59E+0

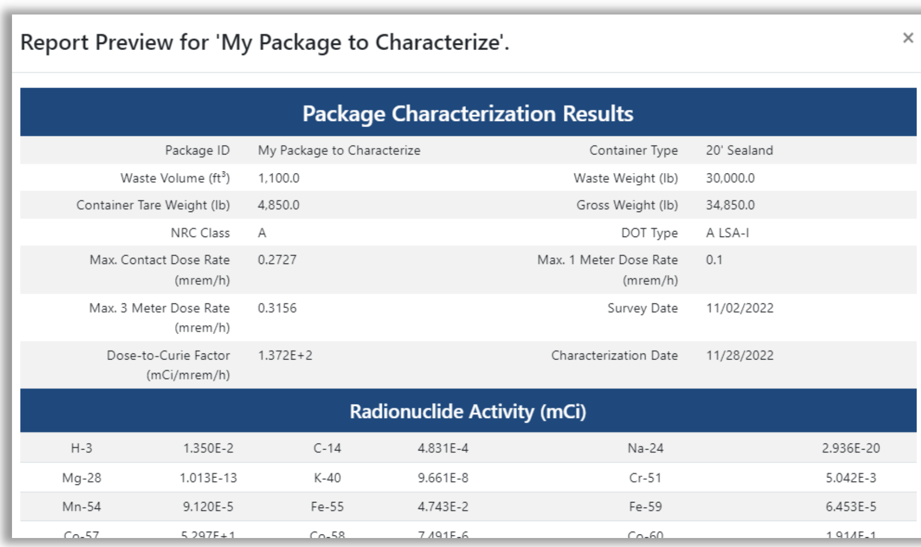
View full results

Cancel Re-characterize

Figure 26

Characterization Results

Select the chosen method for characterization to view the full characterization results. Generating the results may take several seconds. Once complete, you will see the package Characterization Results Report preview (*figure 27*).



Report Preview for 'My Package to Characterize'.

Package Characterization Results

Package ID	My Package to Characterize	Container Type	20' Sealand
Waste Volume (ft³)	1,100.0	Waste Weight (lb)	30,000.0
Container Tare Weight (lb)	4,850.0	Gross Weight (lb)	34,850.0
NRC Class	A	DOT Type	A LSA-I
Max. Contact Dose Rate (mrem/h)	0.2727	Max. 1 Meter Dose Rate (mrem/h)	0.1
Max. 3 Meter Dose Rate (mrem/h)	0.3156	Survey Date	11/02/2022
Dose-to-Curie Factor (mCi/mrem/h)	1.372E+2	Characterization Date	11/28/2022

Radionuclide Activity (mCi)

H-3	1.350E-2	C-14	4.831E-4	Na-24	2.936E-20
Mg-28	1.013E-13	K-40	9.661E-8	Cr-51	5.042E-3
Mn-54	9.120E-5	Fe-55	4.743E-2	Fe-59	6.453E-5
Co-57	5.297E+1	Co-58	7.491E-6	Co-60	1.914E-1

Figure 26

The results will include the most relevant package properties in the first table. This includes weights, volumes, the NRC Class (for waste), the DOT Type, and the entered (or calculated) dose rates.

The next table will include all radionuclide activity measured in millicuries (mCi). If radionuclides were scaled from the radionuclide distribution or calculated using Gross Gamma, they will be included here with their scaled activities.

The next section provides the gamma dose rates at the characterization distance chosen, followed by a section with the measured gamma spectrum. At the bottom of the gamma spectrum report preview is a checkbox for attaching the full report to the package after export. This checkbox is checked by default and will attach a pdf version of the report to the REACh™ package and the exported packaged in RADMAN™ upon exporting.

At the bottom there are buttons to Cancel out of the characterization, Print the characterization report, Return to the Characterization Preview to select a different method of characterization, Compare to MDA / MDC which allows the user to compare the results to an MDA / MDC report of their choosing, and Export to RADMAN™ which will export the characterized package to RADMAN™.

If the user decides to use the MDA / MDC Comparison, REACh™ will compare calculated activities to the MDA / MDC and if the activity / concentration is less than the MDA / MDC the report will indicate this. The user may save the comparison report and the MDA / MDC report as attachments to the REACh™ package.

At the bottom of the comparison report the user can Cancel, returning the user to the characterization report or Continue, which will recharacterize the package using the MDA / MDC from the comparison report.

- For scaled gamma emitters, if the calculated value of a radionuclide is greater than the MDA / MDC then it will be included and the value used will be the value of the MDA / MDC, not the calculated value (except for base-scaling nuclides).
- For scaled gamma emitters, if the value is less than the MDA / MDC then the nuclide will not be included in the characterization (except for base-scaling nuclides).

When exported, the comparison report and the MDA/MDC report will be attached to the exported package. If the package is unexported, the attachments will remain attached.

Dose Rates

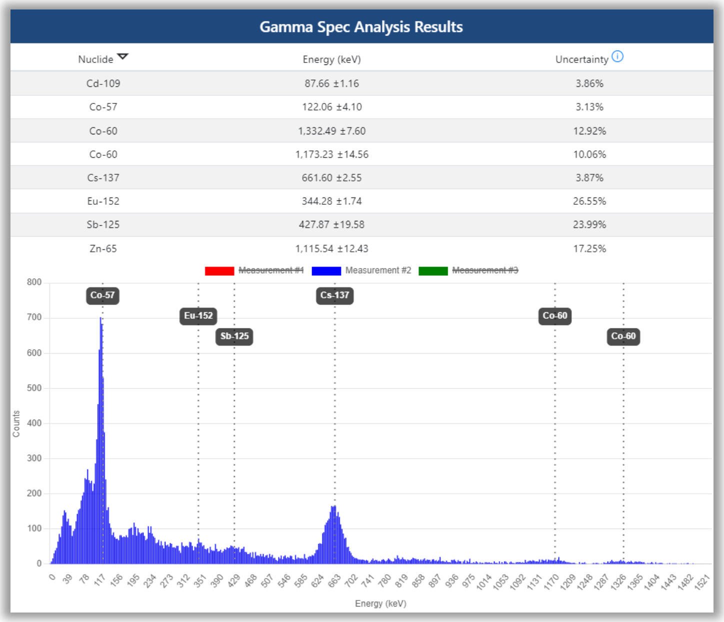
The next table will display all dose rates used for characterization (*figure 28*) and the survey reading distance. If a background measurement was associated with the package, the background dose rate will also be shown, and the average net dose rate (the gross dose rates minus the background dose rate) will be used for characterization. **NOTE:** only the gross dose rates will be exported to RADMAN™.

Gross Dose Rates (mrem/h)				
Background Dose Rate				
9.46E-3				
Characterization Distance (in): 1				
0.14	0.388	0.302	0.317	0.108
			Average dose rate (net):	0.241 ⓘ

Figure 27

Gamma Spec Analysis

The next table will display the gamma spec analysis results (*figure 29*). This table lists all radionuclide energy peaks identified by the REACh™ detector, their energy (incl. energy error) and the uncertainty. Any results below 30% uncertainty are excluded from characterization. A chart showing the raw gamma spec information will also be shown, with labels for each identified peak.



Gamma Spec Analysis Results

Nuclide	Energy (keV)	Uncertainty
Cd-109	87.66 ±1.16	3.86%
Co-57	122.06 ±4.10	3.13%
Co-60	1,332.49 ±7.60	12.92%
Co-60	1,173.23 ±14.56	10.06%
Cs-137	661.60 ±2.55	3.87%
Eu-152	344.28 ±1.74	26.55%
Sb-125	427.87 ±19.58	23.99%
Zn-65	1,115.54 ±12.43	17.25%

Figure 28

Clicking the **Print** button will generate and display a PDF version of this report for your files.

Export

After the characterization results have been generated, you may click the **Export to RADMAN™** button. This will create a copy of the REACh™ sample, distribution, and gross gamma package in your RADMAN™ database, just as if you entered the information yourself.

The **Exported** tab on the **Packages** page will show a list of all packages which have been exported to RADMAN™. Exported packages may not be modified in REACh™ but their characterization results may still be shown. **Note:** results shown from the **Exported** tab will include changes made to the package *after* being exported.

Clicking the **Unexport** icon will show a confirmation popup (figure 30) and allow the user to archive the RADMAN™ package and move the REACh™ package back to **Characterize**. This can be helpful if you need to modify any of the properties used for characterization.

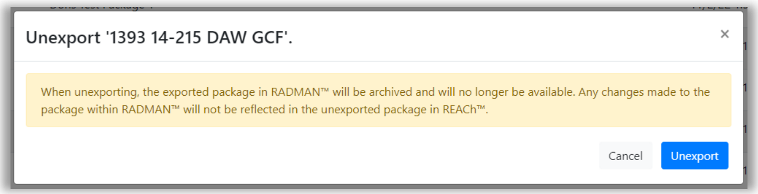

Unexport '1393 14-215 DAW GCF'.
×
When unexporting, the exported package in RADMAN™ will be archived and will no longer be available. Any changes made to the package within RADMAN™ will not be reflected in the unexported package in REACh™.
Cancel
Unexport

Figure 30

Appendix A

The following are the pre-set nuclide libraries available for use with your A400 REACh™ detector.

Nuclear Power Default	
K-40	Nb-95
Cr-51	Ag-110m
Mn-54	Cd-109
Co-57	Sn-113
Co-58	Sb-125
Co-60	Cs-134
Fe-59	Cs-137
Zn-65	Eu-152
Nb-94	Np-237
Zr-95	Am-241

Medical Default
F-18
Cr-51
Ga-67
Mo-99
Tc-99m
In-111
I-123
I-131
Xe-133
Tl-201

Advanced Default		
Na-22	Se-75	Sm-153
K-40	Br-82	W-187
K-42	Zr-95	Ir-192
Ar-41	Nb-95	Tl-201
Cr-51	Tc-99m	Ra-226
Mn-54	Ag-110m	Th-232
Mn-56	In-111	U-235
Co-57	I-131	U-238
Co-58	Sb-124	Np-237
Co-60	Ba-133	Pu-239
Fe-59	Cs-134	Pu-240
Zn-65	Cs-137	Am-241
Ga-67	Eu-152	

Security Default		
F-18	In-111	Tl-201
Na-22	I-123	Tl-202
K-40	I-131	Ra-226
Mn-54	Ba-133	U-232
Co-57	Xe-133	U-233
Co-60	Cs-134	U-235
Zn-65	Cs-137	U-238
Ga-67	Ce-144	Np-237
Se-75	Eu-152	Pu-239
Mo-99	Sm-153	Am-241
Cd-109	Eu-154	
Pd-103	Ir-192	