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NATIONAL LABORATORY

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Watchmen 3.3.0 Users Guide

Revision 9

September 2023

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JB Chapman
MF Mayer
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U.S. DEPARTMENT OF ENERGY

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Revision Log

Watchmen 2 User Guide

Rev. No.	Date	Describe Changes	Pages Changed
0	5/06/2016	Original Issued	NA
1	7/22/2016	General Improvements	Throughout
2	1/11/2017	Additions: Status Indicators and notifications, RRR/ARR, Trending, Graphing, Calculations	Throughout
3	3/24/2017	Watchmen software fixes and enhancements, XECON calculations	Throughout
4	8/18/2017	Interactive Particulate	Throughout
5	9/16/2020	User authentication and user interface revamped	Throughout
6	9/15/2021	Performance Monitoring, Meta-Stable Interference analysis and multiple detector background analysis results	Throughout
7	1/25/2022	Additions: World, Calibration Dropdown Updates: Ad Hoc Query Tool, Performance Monitoring, Sample Review Panels, Stations	Throughout
8	9/15/2022	Additions: Measurement tags, recalculations and reparsing, filter of inactive stations, downloading measurement PHD, transpose improperly imported 2D histograms, Updates: Searching, Station Health, Live View, Administration, improvements to custom indicator configuration and measurement logging	Throughout
9	9/20/2023	Additions: Chart Download Dialog Updates: Users, Menu, 2D Histogram, Measurement Information, Ad Hoc Query Tool, Isotope Analyzer	Throughout

Acronyms and Abbreviations

2D	Two-dimensional
ARR	Automatic Radionuclide Report
CSV	comma-separated value
FWHM	full width at half maximum
ID	identification
IDC	International Data Centre
IMS	International Monitoring System
MDA	minimum detectable activity
MDC	minimum detectable concentration
MITER	Meta-stable Interference
PDF	Portable Document Format
PHD	pulse height data
PNNL	Pacific Northwest National Laboratory
QC	quality control
RN	radionuclide
ROI	region of interest
RRR	Reviewed Radionuclide Report
SAUNA	Swedish Automatic Unit for Noble gas Acquisition
SOH	state of health
sccm	standard cubic centimeters

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1.0 Watchmen

Watchmen is a research software application developed by Pacific Northwest National Laboratory (PNNL) that incorporates the scientific and operational expertise for reviewing data from treaty monitoring radionuclide stations. The radionuclide stations are part of the International Monitoring System (IMS), a worldwide network to monitor for nuclear explosions. The data the IMS produces are critical to determine if a radionuclide release event is from a nuclear explosion. Stations deliver their measurements and system status to the International Data Centre (IDC), which forwards it via email to all subscribers. Watchmen is capable of processing data from several radioxenon station types.

Screening of data in Watchmen may be done by several different users such as radionuclide analysts, evaluators, and data quality experts. This guide assists those users in navigating the application. The term Watchmen is used generically throughout this document to refer to any of the various components in the software application. The user interface that is viewed with a web browser is the primary focus of this user guide. Other components include a database to store measurements and state of health (SOH) data; and the data loader that monitors incoming emails, parses the data, populates the database, does the initial analysis, and routes data for review.

1.1 Product Functions

The Watchmen software is a toolset for monitoring station performance and diagnosing problems. It also provides basic screening of radioxenon measurements. In support of this goal, the software is equipped with tools for monitoring SOH data.

The primary functions of the software at the time of this report are:

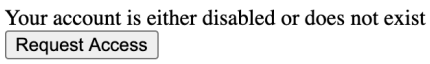
- Graphical display of radionuclide measurements
- Data analysis to calculate estimated concentrations and minimum-detectable-concentrations (MDCs) for radionuclides
- Automated radioxenon
- Ability to trend measurement analysis results
- Ability to facilitate a review process for radionuclide measurements, including the ability to escalate
- Ability to override the station-provided energy gain calibration as part of data quality review processes for cases when the energy calibration is suspect
- SOH functionality, including ability to monitor specific status indicators of any station's health.
- Ability to monitor quality control (QC) performance

2.0 Viewer

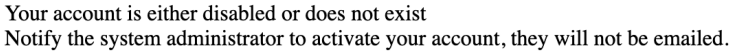
2.1 Logging In

Navigate in a web browser (Chrome or Firefox) to the Watchmen site. Ask an administrator for the URL. It will be in the form of https://servername/webviewer2, with *servername* as a placeholder for the name of the server or machine.

After authenticating as prompted (most likely by selecting a certificate from a smartcard) you will be prompted to request an account the first time you access the site.



Click “Request Access” to create a disabled account in your name.



Then, contact an administrator (Director of Operations) of Watchmen to have your account enabled.

They will not know you have requested access unless you inform them. Likewise, they will not be able to activate your account unless you click “Request Access”.

2.2 Dashboard

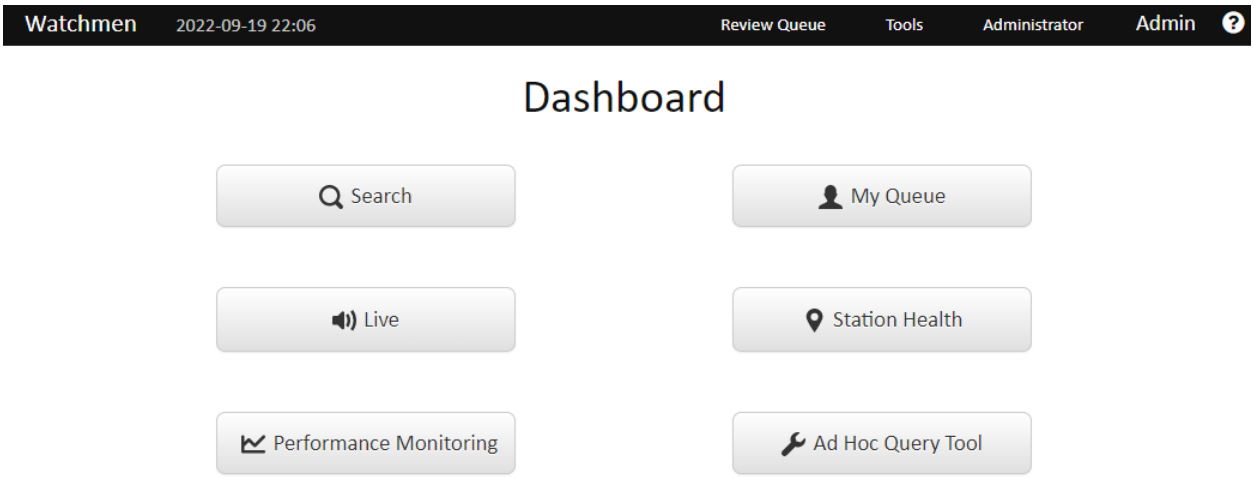


Figure 2-1. Watchmen Web GUI landing page

The first screen you will see is the dashboard which gives quick access to the most used tools in Watchmen.

2.3 Menu

Along the top of the screen is a menu.

Figure 2-2. Watchmen menu ribbon

This menu gives quick access to review your queue and all the tools available in Watchmen. If you are Director of Operations, you also see an Administrator option allowing configuration of stations and users.

By clicking their username on the menu, the user can update their Display Name and Email.

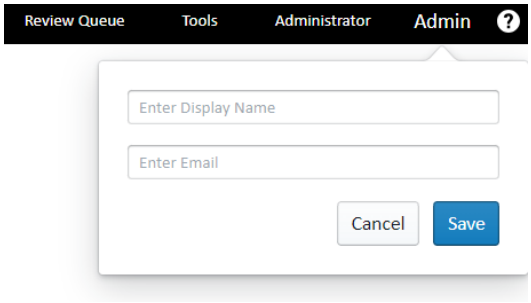
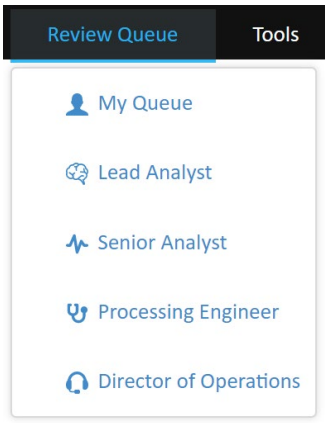


Figure 2-3. Updating name & email from menu

2.4 Review Queue

You can access your own review queue and the queues for any roles you possess from the “Review Queue” menu or by selecting the user on the search page. The dashboard also includes a quick link to your queue.



The review queue holds all the measurements assigned to the user or role. Releasing or reassigning a measurement to another role removes it from the original queue

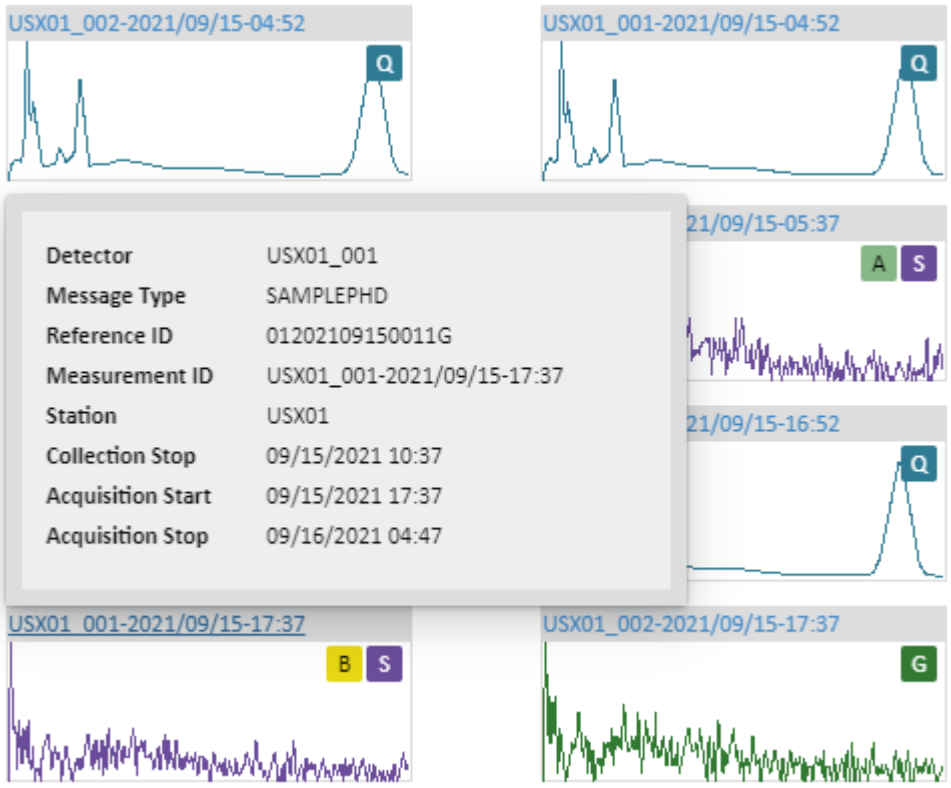
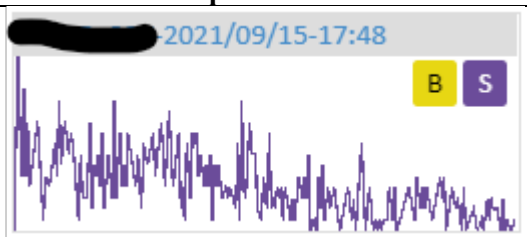
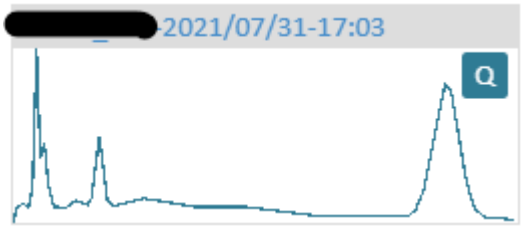
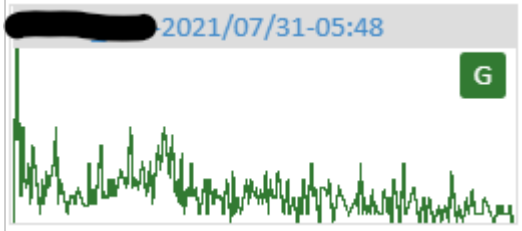
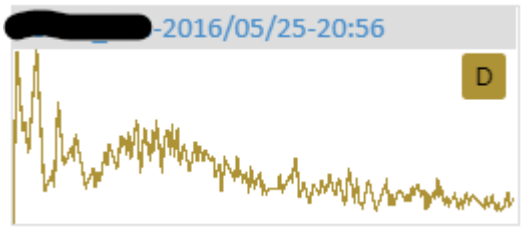
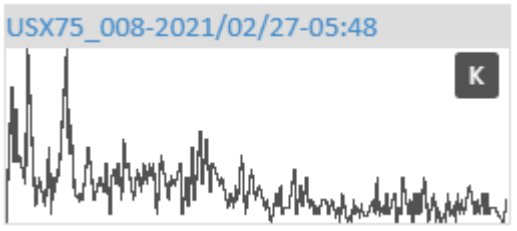


Figure 2-. Hover to view sample details

2.5 Thumbnails

On the review and search pages where the thumbnails are displayed, different types of files are color coded for a visual representation (Table 2.1).

Table 2-1. Thumbnails

Measurement Type	Color	Example Thumbnail
Sample	Purple	
Quality Control (QC)	Blue	
Gas Background	Green	
Detector Background	Yellow	
Spike/Calibration	Black	

3.0 Searching

Watchmen retrieves measurements from its own database; it is not possible to search for IMS measurements that have not been processed by Watchmen. Measurements can be searched by using any combination of the following criteria:

- Station
- Detector
- Type (measurement type)
- Acquisition Start FROM and TO date range
- Assigned to (for review)
- Quality (review quality)
- Category
- Tags
- ID (Sample Reference Identification or Measurement ID)
- Preliminaries (toggle to set to exclude, only "FULL" measurements are returned)

NOTE: Quality and Assigned To are mutually exclusive because once reviewed and given a quality, it is no longer assigned to anyone.

The primary set of criteria are "Station," "Detector," "Type," "Acquisition Start" and "Assigned To," which are immediately visible upon arriving at the search page. The second set of criteria is "Quality," "Category", "Tags", "ID," and "Preliminaries," which can be displayed by clicking the ellipses button ( ) at the upper right. When searching by "ID", the operator may use the Sample Reference ID (e.g., 01888888882342G) or the Measurement ID (e.g., ABC01_001-2016/04/08-15:16). Searching on these IDs may have multiple results if the operator toggles "Preliminaries" to included (default is excluded) or if the IMS retransmitted an altered measurement.

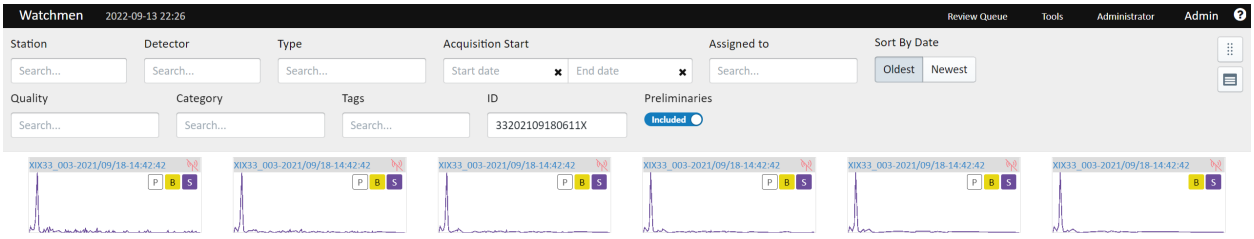


Figure 3-1. Search Criteria Query

As criteria are entered, the results are filtered. Once you have selected a measurement, the address bar of the browser will also include the Watchmen-generated ID that uniquely identifies the measurement in the database. Sending someone the URL in the address bar of the measurement you are viewing will allow them to see the same measurement and search criteria without inputting the values manually.

Figure 3-2. URL with Search Criteria Query

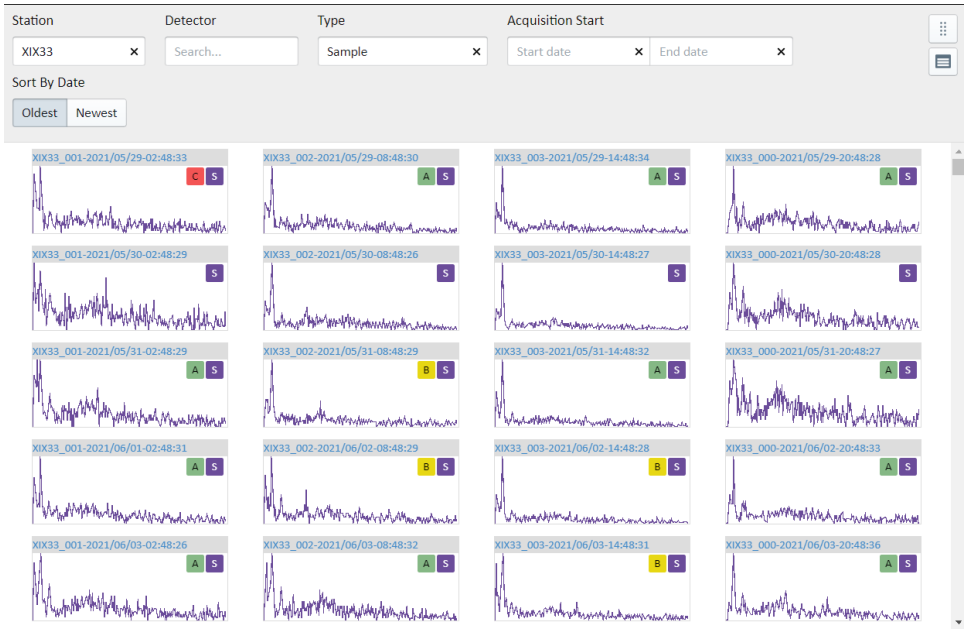


Figure 3-3. Search Results, Grid View

The default view of the search results is a grid layout (Figure 3-3). The results can instead be viewed as a list (Figure 3-4), by clicking the layout button (/) in the upper right corner, just below the ellipse button. Click the layout button again to change the view back to a grid.

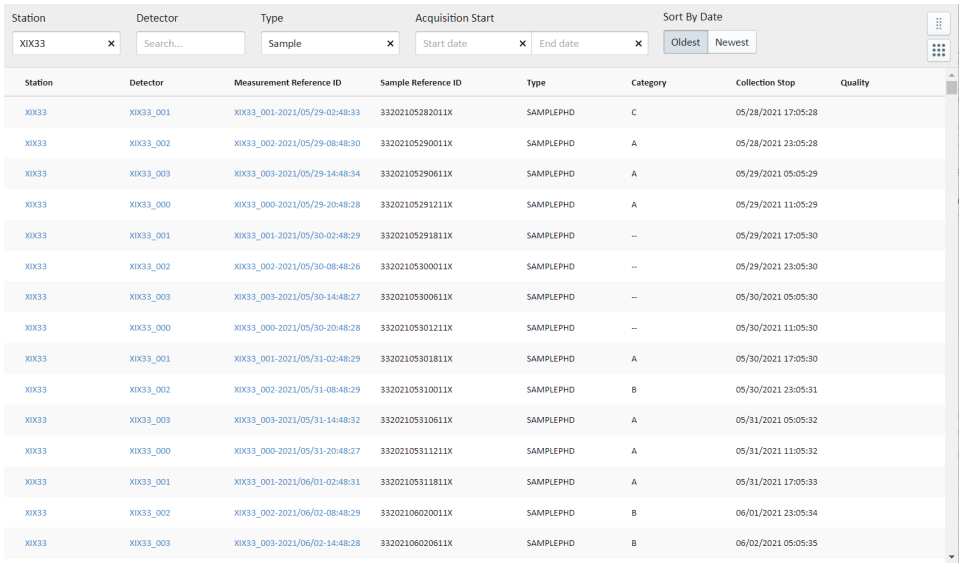


Figure 3-4. Search Results, List View

Once the desired measurement has been found, click on the thumbnail in the grid view, or the Measurement Reference ID in the list view, to view the Sample Review Panel (see section 3.1 for details).

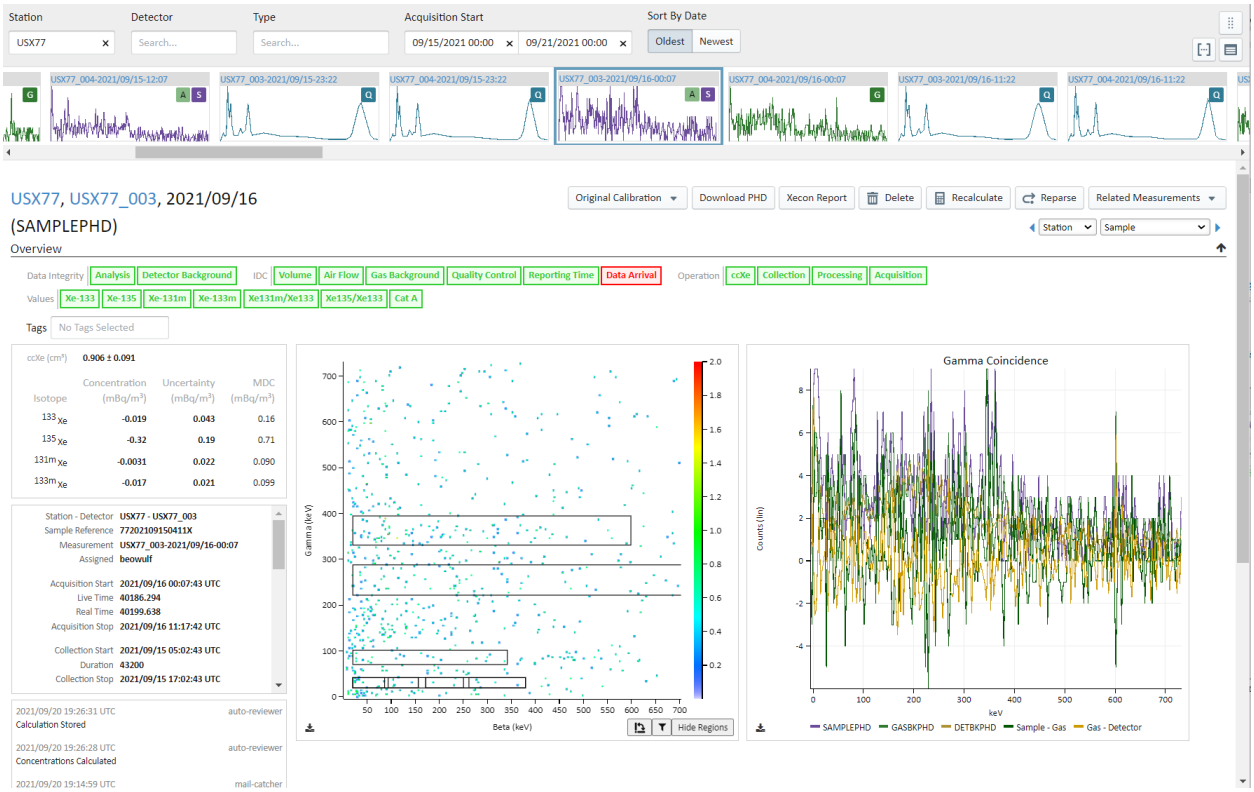


Figure 3-5. Search Results, Sample Review Panel

3.1 Sample Review Panels

3.1.1 Sample Review at a Glance

Selecting a sample with a single left-click of the mouse in the search will bring up the Sample Review Panel (Figure 3-5). The interface will display the Sample Review Panel for the selected measurement below the list of measurements matching the current search criteria. The selected measurement is indicated in the list by a blue outline around the tile. You can scan other measurement tiles in the list using the horizontal scrollbar under the list. To bring the selected measurement tile back into view, click on the focus button ([...]) next to the layout button.

The Sample Review Panel provides detailed information (e.g., activity concentration, measurement times, etc.) on the currently selected sample along with the associated detector and gas background measurements if the sample is from a beta-gamma type station. The measurement review layout displays the Detector name and Acquisition Start date at the top along with action buttons. The action buttons include Xecon Report (section 3.1.2), Delete, Recalculate (section 3.1.3); Related Measurements (section 3.1.4); and Measurement Navigation Control (section 3.1.6).

WARNING: The Delete button will delete the measurement and its analysis from the database.[1]

Next, the Overview panel contains the status indicators, Spectrum chart, two-dimensional (2D) histogram (if a beta-gamma sample), a table with information about the measurement, and log entries. Following the Overview is the Trend panel (if a beta-gamma sample), the All Spectra panel (if a beta-gamma sample), Calibration panel, and finally the Review panel.

While the interface contains a similar layout for all measurements, the populated information will vary depending on the station and calculation type. Figure 3-6 shows an example sample from a Swedish Automatic Unit for Noble gas Acquisition (SAUNA) station.

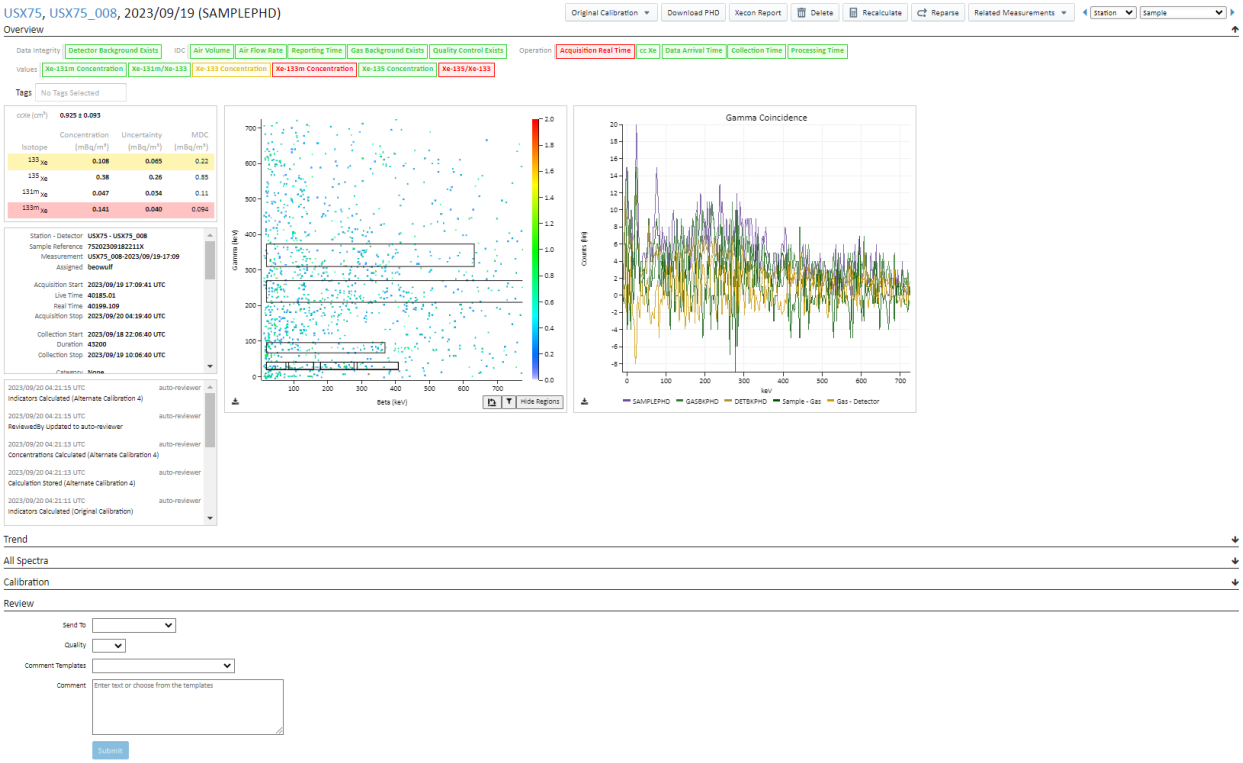


Figure 3-6. SAUNA Review

The overview contains the 2D histogram with beta energy (in keV) on the x-axis and the gamma energy (in channel) on the y-axis (Figure 3-7). Units may be shown in kilo-electron Volts (keV) by clicking on the axis label. Regions of interest (ROIs) are outlined with the rectangular bars on the graph. The ROIs can be turned off or on by clicking the “Hide Regions” and “Show Regions” buttons respectively. The box is bolded when regions are turned on.

[1] Data can only be recovered by locating the original file in the archive and placing the file in the incoming directory for re-ingesting and re-analysis by Mothman.

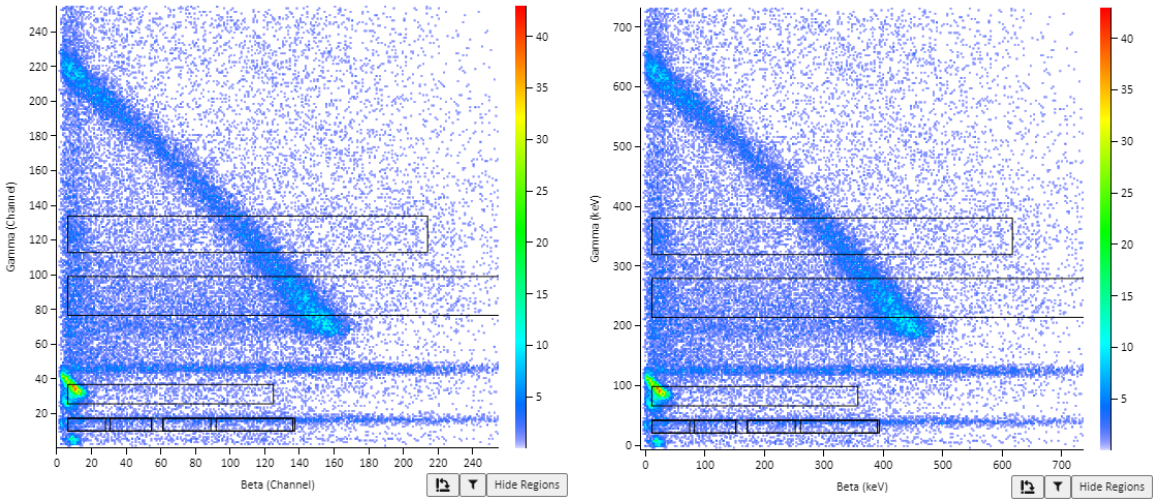


Figure 3-7 2D Histogram

Individual ROIs can be turned off or on by clicking the filter icon (which is only visible when the "Hide Regions" option is available) and selecting them from the list regions. If only some of the ROIs are being displayed and the user clicks "Hide Regions", the subsequent use of the "Show Regions" button will restore all the regions (does not preserve previous filtering).

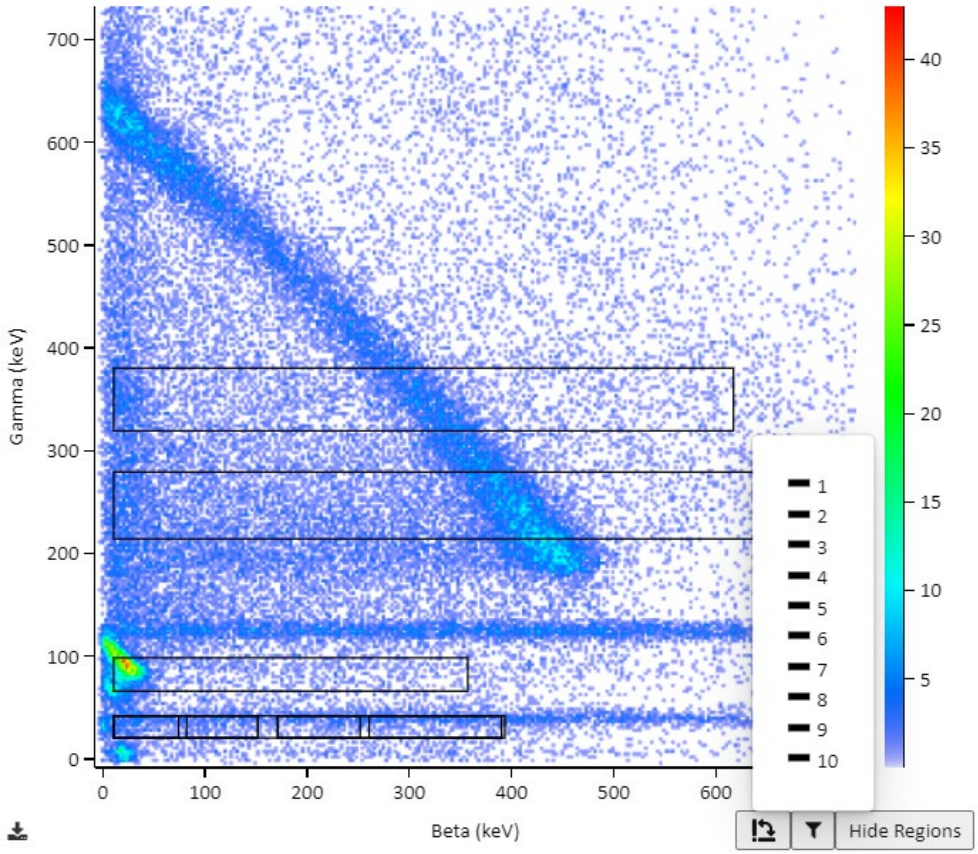


Figure 3-8 2D Histogram Region Selection

The ROIs are used to compute the four reported radioxenon isotopes (^{131m}Xe, ^{133m}Xe, ^{133}Xe, and ^{135}Xe).

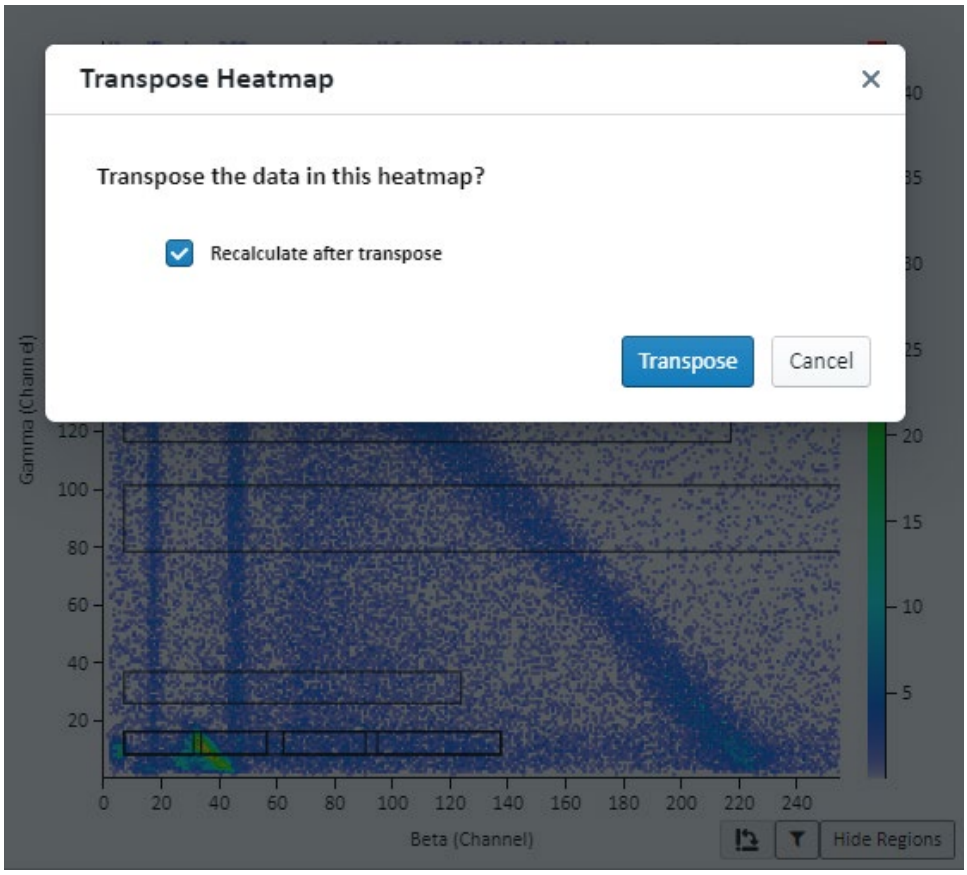


Figure 3-9. Transposing 2D Histogram

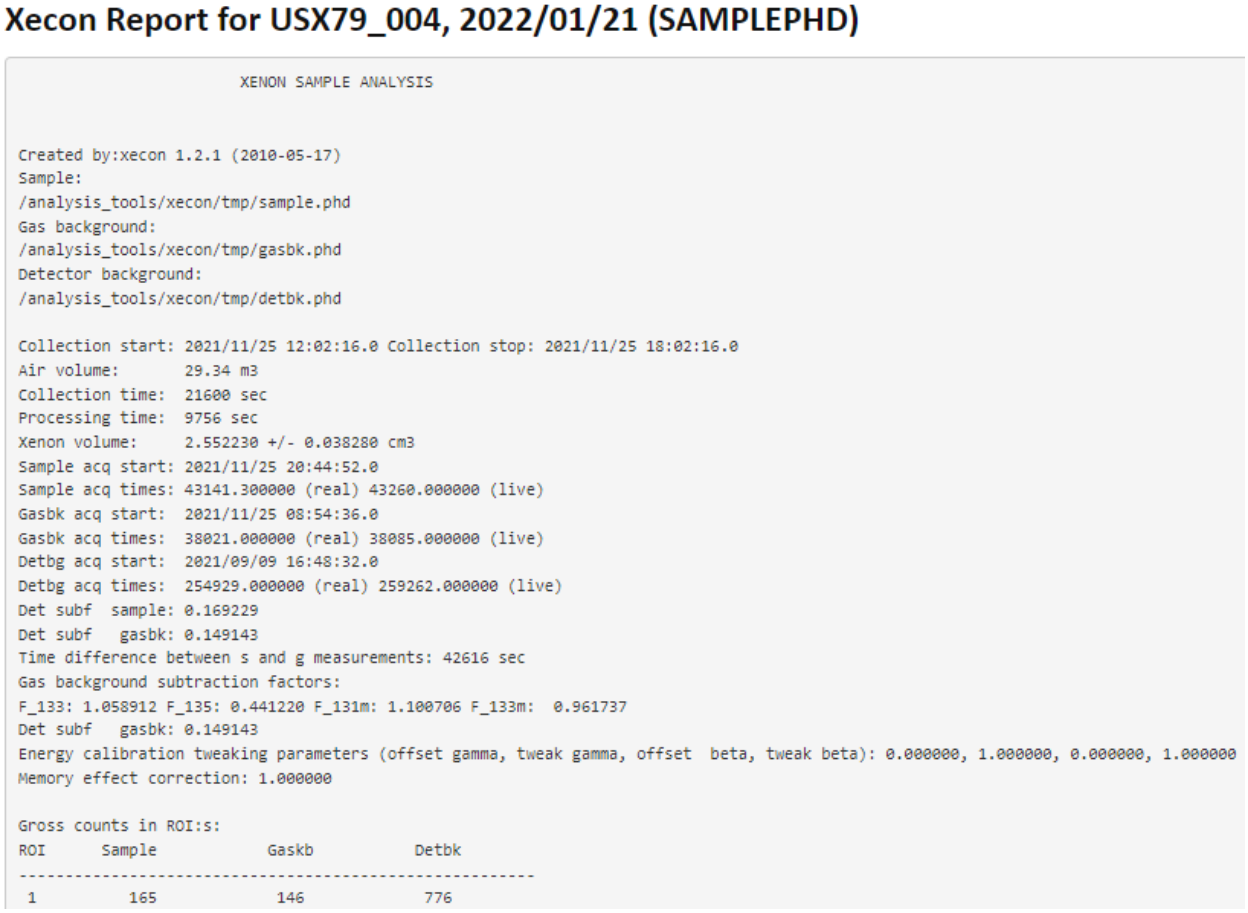
In previous versions of Watchmen, histogram data for the beta and gamma axes may have been transposed. To correct, the transpose button, located to the left of the filter icon, can be clicked to transpose the data in the histogram and optionally recalculate the measurement after the transpose is complete (see Figure 3-9).

3.1.2 XECON Report

You can perform XECON calculations and generate a textual report on your selected sample. Clicking on the "Xecon Report" button (Figure 3-10) will open a new tab will showing the XECON Report (Figure 3-11).

NOTE: XECON version 1.2.1 is used by the software.

Figure 3-10. XECON Report Button



Xecon Report for USX79_004, 2022/01/21 (SAMPLEPHD)

```
                    XENON SAMPLE ANALYSIS


Created by:xecon 1.2.1 (2010-05-17)
Sample:
/analysis_tools/xecon/tmp/sample.phd
Gas background:
/analysis_tools/xecon/tmp/gasbk.phd
Detector background:
/analysis_tools/xecon/tmp/detbk.phd

Collection start: 2021/11/25 12:02:16.0 Collection stop: 2021/11/25 18:02:16.0
Air volume:       29.34 m3
Collection time:  21600 sec
Processing time:  9756 sec
Xenon volume:     2.552230 +/- 0.038280 cm3
Sample acq start: 2021/11/25 20:44:52.0
Sample acq times: 43141.300000 (real) 43260.000000 (live)
Gasbk acq start:  2021/11/25 08:54:36.0
Gasbk acq times:  38021.000000 (real) 38085.000000 (live)
Detbg acq start:  2021/09/09 16:48:32.0
Detbg acq times:  254929.000000 (real) 259262.000000 (live)
Det subf  sample: 0.169229
Det subf   gasbk: 0.149143
Time difference between s and g measurements: 42616 sec
Gas background subtraction factors:
F_133: 1.058912 F_135: 0.441220 F_131m: 1.100706 F_133m:  0.961737
Det subf   gasbk: 0.149143
Energy calibration tweaking parameters (offset gamma, tweak gamma, offset  beta, tweak beta): 0.000000, 1.000000, 0.000000, 1.000000
Memory effect correction: 1.000000

Gross counts in ROI:s:
ROI      Sample           Gaskb          Detbk
-----------------------------------------------------
 1         165            146            776
```

Figure 3-11. XECON Report

3.1.3 Recalculate

If a detector's energy coefficients have been changed (see section 11.3), the new calculations are not automatically applied to measurements that were already in your review queue, as new coefficients are only applied to samples that are inserted to the database after the coefficients were applied or if you click Recalculate. If the coefficients have been changed recently, select the Recalculate button (Figure 3-12) to apply the new calculations.

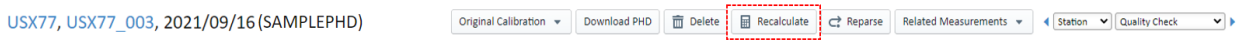


Figure 3-12. Recalculate Button

When the recalculation completes, the status indicators, isotopes value table, and chart data on the Sample Review page are refreshed automatically.[2] The recalculation is recorded in the measurement log.

NOTE: This change is permanent, and the measurement will be stored in the database with the revised calculations. In addition, when the calculations are rerun, the sample will be assigned back to the default reviewer for the station, which may be a different review queue if the measurement had been assigned to a lead analyst for review.

[2] Does not currently auto-refresh the category within the search results

3.1.4 Reparse

If it is suspected that a measurement was improperly imported, it is possible to request the file be reparsed and readded to the database. Reparsing a measurement's archived source file can be triggered by clicking the Reparse button (Figure 3-13).

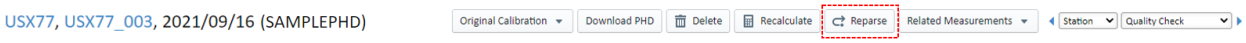


Figure 3-13. Reparse Button

Clicking the button adds the measurement to the reparse queue. When the reviewer begins the reparse, it will find the archived source file using the location stored in the database or by looking in the archive root directory. When the archived source file is located, the file is reparsed and the measurement is updated in the database according to the values from the reparse. When the reparse is complete, the reparse is recorded in the measurement log, and the measurement is then queued for recalculation. See section 11.2.3.3 for instructions on reparsing measurements from the Station page.

3.1.5 Related Measurements

Once you have selected a measurement, you can navigate to any of its related measurements (Backgrounds, Quality Checks, or Preliminaries) by using the Related Measurements drop-down menu located on the right side of the screen (see Figure 3-14). If there are no related measurements in the database, the drop-down menu will be disabled. Selecting a measurement in the Related Samples list will take you to the selected measurement.

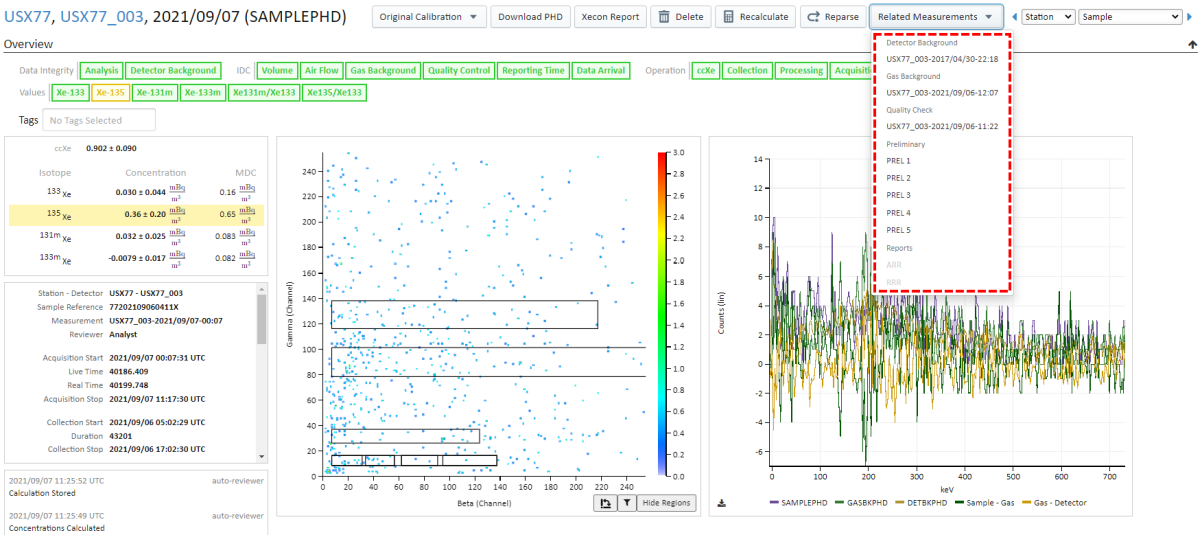


Figure 3-14. Related Measurements

3.1.6 Calibration Dropdown

The calibration dropdown can be used to view the sample with a calculation from a custom calibration. The ROIs, Indicators, Isotopes, Trend Panel, and Calibration Panel all update when switching to a custom calibration. The calibration is disabled in the dropdown if there is no calculation for the

calibration. If a calibration is disabled, the ‘Recalculate’ button can be used to generate a calculation for the calibration.

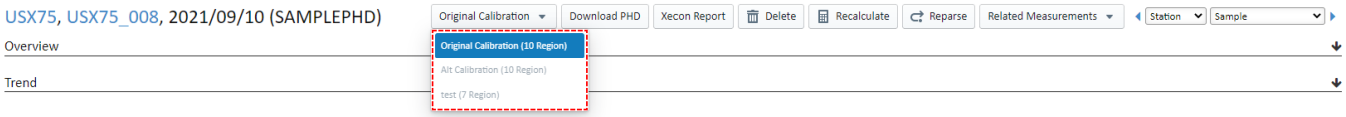


Figure 3-15. Calibration Dropdown with Custom Calibration

3.1.7 Automatic Radionuclide Report and Reviewed Radionuclide Report Views (currently not available)

Automatic Radionuclide Report (ARR) and Reviewed Radionuclide Report (RRR) views are available from the Related Measurements menu. If an ARR or RRR is available, it will be clickable. Otherwise, they will be grayed out if they do not exist. Once you click on the ARR or RRR (see Figure 3-14), the web browser window will navigate to the detailed ARR or RRR data.

The detailed ARR or RRR displays the report information along with a percent difference comparison to the Watchmen MDC calculations. If the calculation difference is greater than 5%, the difference is highlighted in red. You can also export the MDC calculations to comma-separated value (CSV) format—indicated by the “Download Summary” link. See Figure 3-16—the MDC comparison section is outlined in blue.

Radionuclide Report Comparison - ARR

Creation Date: 2016/12/26 17:51:09 UTC
Sample Arrival Time: 2016/12/26 17:40:03 UTC
Time difference from receipt of raw data to report creation: 0d 0h 11m 6s

Sample Information

Station ID:	USX74	Detector Code:	USX74_006
Authenticated:	NO		
Station Location:	Ashland, KS, USA		
Detector Description:	Detector #6 for USX74 Noble Gas Test Station.		
System Technology:	SAUNA		
Sample Reference ID:	74201612251111G		
Sample ID:	3907557		
Stable Xe Volume:	1.07 mL	Sample Type:	Gas
Collection Start:	2016/12/25 11:19:41 UTC	Sampling Time:	0d 12h 0m 2s
Collection Stop:	2016/12/25 23:19:43 UTC	Processing Time:	0d 7h 13m 42s
Acquisition Start:	2016/12/26 06:33:25 UTC	Acquisition Time:	0d 10h 58m 17s
Acquisition Stop:	2016/12/26 17:31:42 UTC		

Measurement Categorization

Categorization Legend

Level A	=	Clean spectrum - No Xenon is present in the sample.
Level B	=	Xenon detection within the typical range for the station.
Level C	=	Anomalous Xenon detection.

Isotope Category

Isotope	Nuclide detected	Abnormal_limit *(mBq/m3)*	Category
^{131m}Xe	NO	1.61e-1	A
^{133m}Xe	NO	1.24e-1	A
^{133}Xe	NO	3.70e-1	A
^{135}Xe	NO	9.62e-1	A

Spectrum Category: A

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon Level in Xenon sample

Nuclide	Half-Life	Area	%RelErr

Radon counts in Xenon sample: 93

Xenon Isotopes

Net Count Calculation Analysis Method
Beowulf Tolerance Threshold: 5%

Download summary:

			Conc (mBq/m3)			MDC			
Nuclide	Half-Life	LC	IDC	Beowulf	% Diff	IDC	Beowulf	% Diff	%RelErr
^{131m}Xe	1.03e+6	4.00e-2	< LC	5.13e-2	N/A	1.00e-1	1.54e-1	5.36e+1	N/A
^{133m}Xe	1.89e+5	4.00e-2	< LC	5.30e-2	N/A	1.10e-1	1.30e-1	1.85e+1	N/A
^{133}Xe	4.53e+5	9.00e-2	< LC	8.77e-3	N/A	1.90e-1	2.07e-1	9.07	N/A
^{135}Xe	3.29e+4	3.90e-1	< LC	9.52e-1	N/A	8.20e-1	7.33e-1	1.06e+1	N/A

Processing Specific Parameters and Results

Method 1 (Net Count Calculation)

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	^{214}Pb	2.17e+1	1.04e+2	1.49e+1	N/A	N/A

Figure 3-16. ARR/RRR details with MDC comparison outlined in blue

3.1.8 Measurement Navigation Control

Once you have selected a measurement, it is possible to navigate to measurements on the same station or detector using the Measurement Navigation Control located on the right side of the screen (see Figure 3-17). You can specify if you would like to navigate based on the Station or Detector (the leftmost drop-down menu) as well as the type of measurement (rightmost drop-down menu). Arrows on either side of the navigation control will navigate to the previous (leftmost arrow) or next (rightmost arrow) measurement chronologically when clicked. If there is no measurement available, the arrows are disabled.

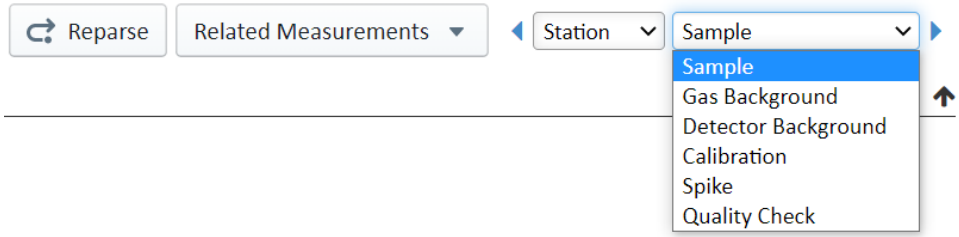


Figure 3-17. Measurement Navigation Control

3.1.9 Status Indicators

Multiple status indicators, such as xenon volume (ccXe), acquisition time and data arrival time, xenon activity and isotope ratios, and the presence of related measurements, are displayed on the top of the Overview section in the Sample Review Panel. The indicators are categorized by Operation, Values, and Data Integrity. These status indicators display as red, yellow, or green. If they are green, they are collapsed by default. To expand collapsed indicators, click on the category. Hover over the indicator with your mouse to display a pop-up with additional details such as bounds for the parameter. The concentrations listed in the overview panel also contain color-coded information that corresponds to the status indicators.

- Data Integrity
    - Analysis
        - Red – Calculations are missing.
        - Green – Calculations are completed.
    - Detector Background
        - Red – A detector background file is not present.
        - Yellow – A detector background file is outdated.
        - Green – A detector background file is present.
- IDC
    - Gas Background (on compatible station types)
        - Red – A gas background file is not present.
        - Yellow – A gas background is outdated.

        - Green – A gas background file is present.
    - Quality Control – The quality control (QC) status lights for the Sample files are controlled by reviewing the corresponding QC file (Figure 3-18).
        - Red – All other conditions, including the corresponding QC files are not present.
        - Yellow – The corresponding QC files were present and have not been reviewed yet or were not marked as a good file.
        - Green – The corresponding QC files were present and reviewed as good.
    - Report Time
    - Data Arrival - Within the time specified by the indicator
- Operation
    - ccXe – Cubic centimeters of xenon (setpoint is based on SAUNA ideal of 1 sccm/24hr)
        - Red– Volume of xenon is greater than 0.5 sccm from the set point
        - Yellow – Volume of xenon is between 0.25-05 sccm from the setpoint
        - Green – Volume of xenon is within 0.25 sccm of setpoint
    - Collection
        - Red– Difference from expected collection time is greater than 2%
        - Yellow – Difference from expected collection time is between 1-2%
        - Green – Difference from expected collection time is less than 1%
    - Processing
        - Red – Difference from expected processing time is greater than 2%
        - Yellow – Difference from expected processing time is between 1-2%
        - Green – Difference from expected processing time is less than 1%
    - Acquisition Real Time - Within the tolerance for the station and sample type
- Values
    - Xe133 – Red, yellow, green to show Above, Above Half, or Below MDC (respectively)
    - Xe135 – Red, yellow, green to show Above, Above Half, or Below MDC (respectively)
    - Xe131m – Red, yellow, green to show Above, Above Half, or Below MDC (respectively)
    - Xe133m – Red, yellow, green to show Above, Above Half, or Below MDC (respectively)
    - 131m/133 Ratio – Red, yellow, green to show if the ratio of the isotopes is below the minimum detectable concentration. Additional information about concentration displayed.
    - 135/133 Ratio – Red, green to show if the ratio of the isotopes is below the minimum detectable concentration. Additional information about concentration is displayed.
- Gas – Detector – Detects levels of counts and coincidence.

- Measurement information (Figure 3-19) – The metadata associated with the file collection such as acquisition time and station. The IDs for the corresponding gas and detector background files are also displayed. This information is displayed in the scrollable pane.

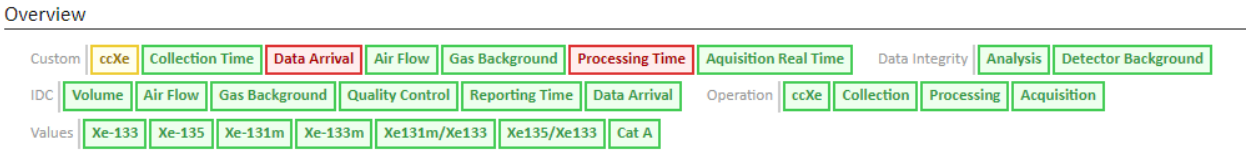


Figure 3-18. Status Indicators

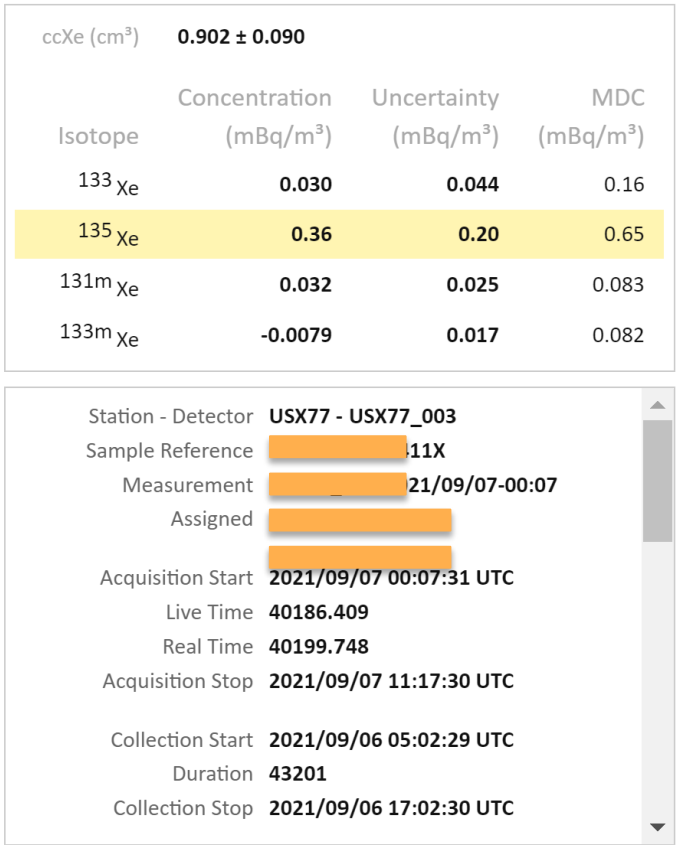


Figure 3-19. Measurement Information

3.1.10 Chart Features

The charts throughout the interface have a built-in zoom feature. With the mouse cursor over an area of interest in a chart, hold the ALT key and scroll to zoom in or out. You can hold ALT+SHIFT and scroll to zoom only the x-axis, or ALT+CTRL and mouse-scroll to zoom only in the y-axis. You also can click-and-drag to zoom into an area of interest. Once zoomed in, you can right-click to zoom back out. Points in trend graphs (Figure 3-20) are clickable and linked to the measurement. Clicking the point will navigate to the sample measured.

The small download icon ( ) may be used to download the data to an image or CSV file. Selecting the download icon will open a dialog with options to download an image of the chart with enhanced resolution or download a CSV of the data for the chart. One or both options can be downloaded at once.

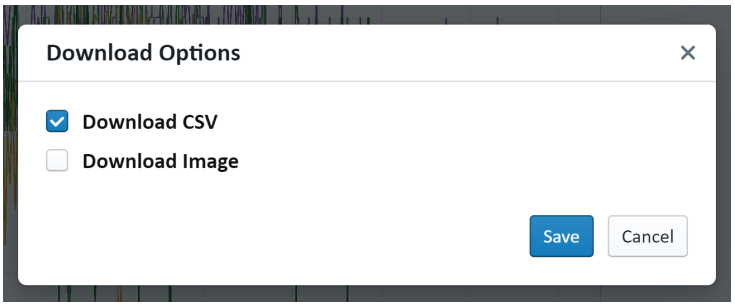


Figure 3-20. Chart Download Dialog

Click on the y-axis to toggle between log and linear.

Each chart legend controls which data are displayed on the chart. Click on an item in the chart legend to turn the display of that specific data on and off.

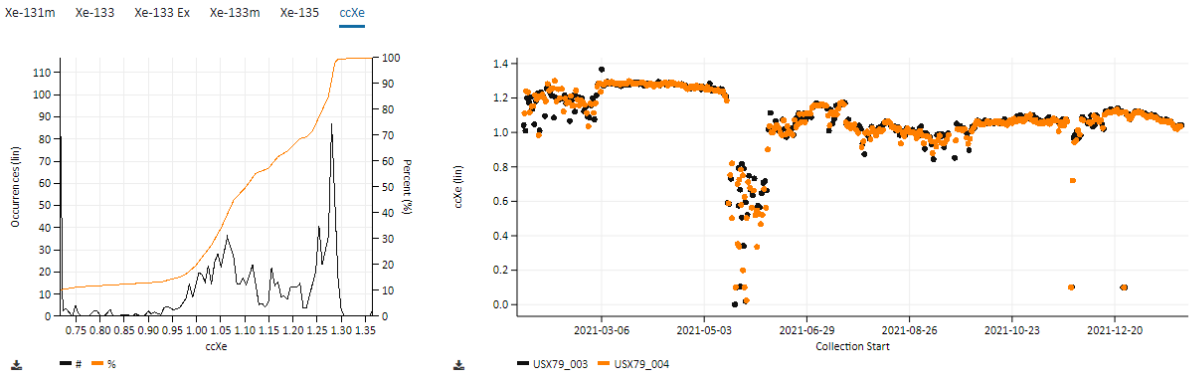


Figure 3-21. Chart Features

3.1.10.1 Chart Panels

There are two detailed charting panels, Trend and All Spectra. After selecting a measurement, the data from the different charts may be viewed by selecting the different tabs within these panels.

3.1.11 Station Frequencies and Trends

Two different displays for station frequencies and trends are supported in the Watchmen viewer - the frequency histogram and the trend over time plot as seen in Figure 3-22. The frequency histogram shows the frequency of the activity concentrations for each of the four radioxenon isotopes as well as the volumes of xenon for the samples. The trend data provide a different presentation of the same data to illustrate trends in the data over time. Both the frequency and trend data are shown together.

Two methods exist to display the frequency and trend data from a station. Firstly, the trends data is displayed along with the measurement information automatically (if available) on the search and review screens. The second is in the Station application and is described in section 9.2.

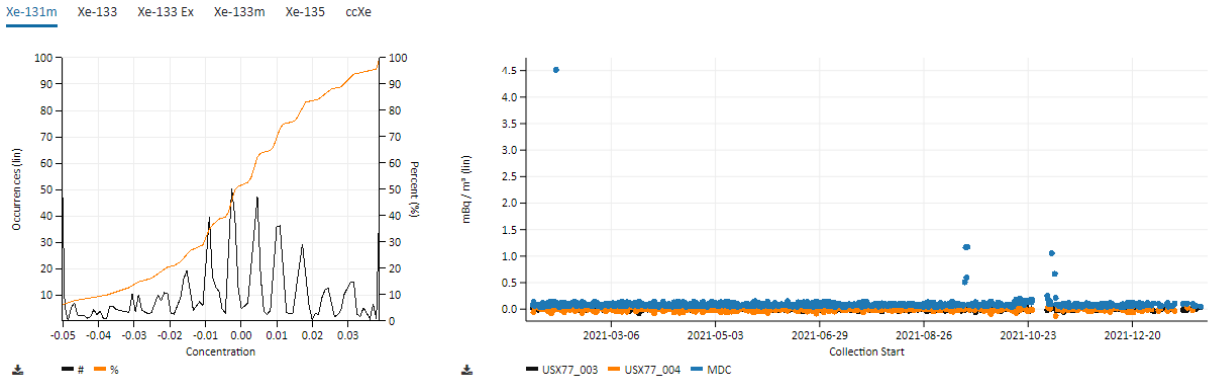


Figure 3-22. Trend Panel

3.1.12 All Spectra

The All Spectra panel (Figure 3-23) shows different views of the selected measurement, indicated by the tabs. You can toggle the Normal and History tabs. Normal shows current measurement data from all relevant measurements. History shows aggregated data from the detector over one day, one week, and one month. See section 3.1.10 for additional information on the chart features. The All Spectra panel contains the following tabs of graphs:

- Gamma Coincidence Spectrum: only gamma energy values where the gamma and beta spectra are in coincidence are displayed on the coincidence beta spectrum.
- Beta Coincidence Spectrum: only beta energy values where the beta and gamma spectra are in coincidence are displayed on the coincidence beta spectrum.
- Region 4 – Beta Coincidence: 30-keV Gamma, Coincidence Beta Spectrum: the plot is similar to the coincidence beta spectrum chart previously described; however, only coincidence data in the 30keV gamma region of interest are displayed.
- Gamma Singles Spectrum: The entire detector response for the gamma detector is displayed on the singles gamma spectrum. All values, including background are displayed without a coincidence being required.
- Beta Singles Spectrum: The entire detector response for the beta detector is displayed on the singles beta spectrum. All values, including background are displayed without a coincidence being required.

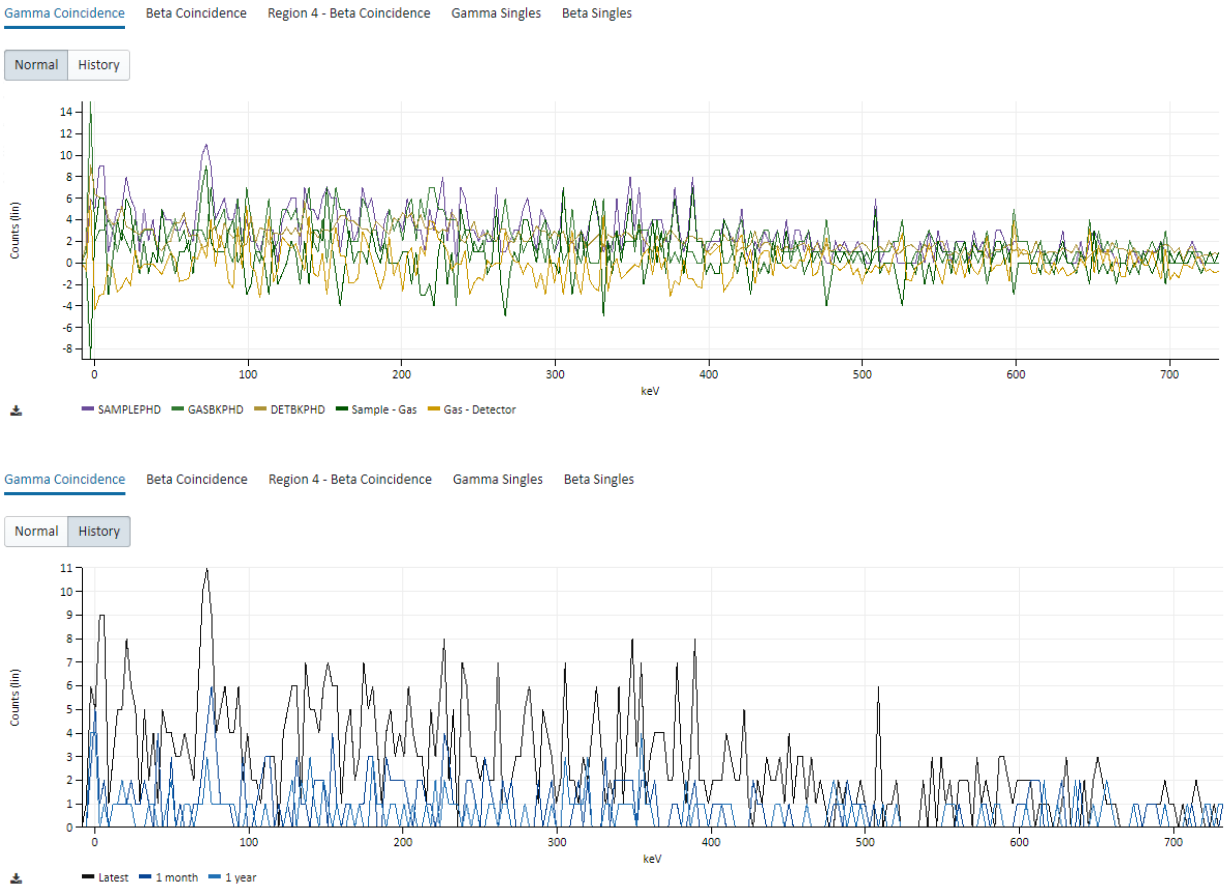


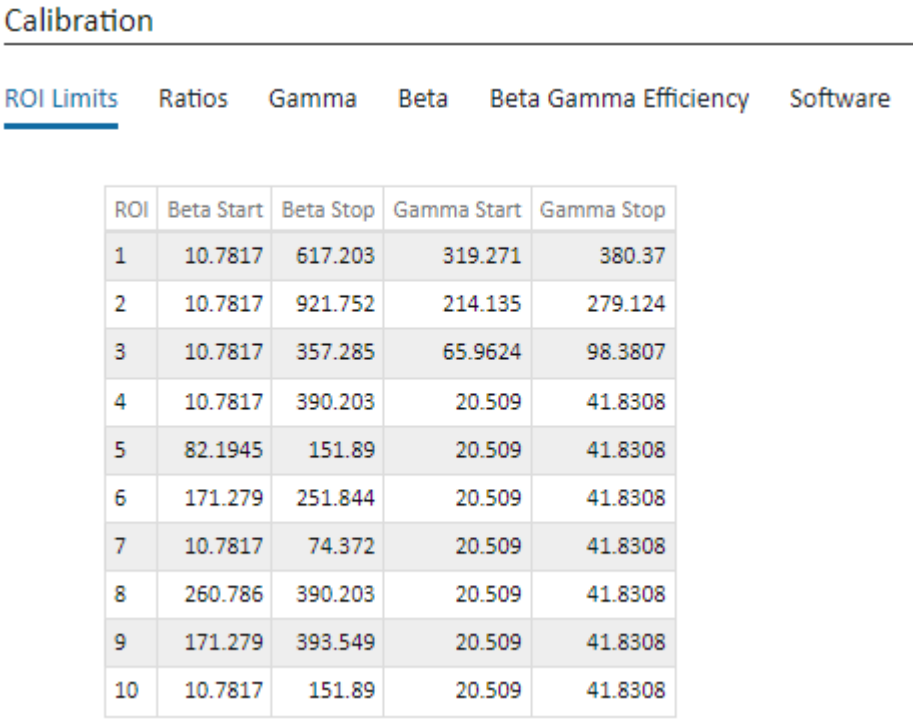
Figure 3-23. All Spectra Panel Beta-gamma Measurements (Normal/History View)

3.1.13 Calibration Panel

The values from the header for each file are displayed on the calibration panel (Figure 3-24). Select the type of values from the tabs.

- ROI Limits – The region of interest (ROI) limits for beta and gamma
- Ratios – The interference ratios for each region of interest
- Gamma
    - Efficiency - The gamma energy, efficiency, and efficiency uncertainty
    - Energies – The gamma energy, channel, and channel uncertainty
    - Resolutions – The gamma energy, full width at half maximum (FWHM), and FWHM uncertainty
- Beta
    - Energies - The beta energy, channel, channel uncertainty, and decay mode
    - Resolution - Beta energy, FWHM, and FWHM Uncertainty

- Beta Gamma Efficiency – ROI, nuclide name, and efficiency with uncertainty.



ROI	Beta Start	Beta Stop	Gamma Start	Gamma Stop
1	10.7817	617.203	319.271	380.37
2	10.7817	921.752	214.135	279.124
3	10.7817	357.285	65.9624	98.3807
4	10.7817	390.203	20.509	41.8308
5	82.1945	151.89	20.509	41.8308
6	171.279	251.844	20.509	41.8308
7	10.7817	74.372	20.509	41.8308
8	260.786	390.203	20.509	41.8308
9	171.279	393.549	20.509	41.8308
10	10.7817	151.89	20.509	41.8308

Figure 3-24. Calibration Panel

3.1.14 Review Panel

Review and promote functions enable analysts to read and submit reviews and promote measurements for review by others. To complete the review on a sample, find the review panel at the bottom of the selected measurement user interface. You can also press <AccessKey>+R to jump to the review panel, <AccessKey> is typically Alt, Alt+Shift, or Ctrl+Alt, depending on the browser used.[3] The review panel is the last panel in all measurement user interfaces. This panel contains the interface shown in Figure 3-25.

Use the "Send To" drop-down menu to assign the measurement to another user, or the "Quality" drop-down menu to complete a review.

The process of sample review is intended to be completed in chronological order. If it is completed in this order, then the QC file corresponding to the Sample file will always be reviewed first, thus changing the status lights to the expected status when reviewing the Sample file. The QC review should include a check of the energy calibration and acquisition time to verify that the results were as expected. See section 3.1.14 of this guide for additional information on modifying the energy calibration if the QC review reveals results that need to be modified.

[3] https://developer.mozilla.org/en-US/docs/Web/HTML/Global_attributes/accesskey

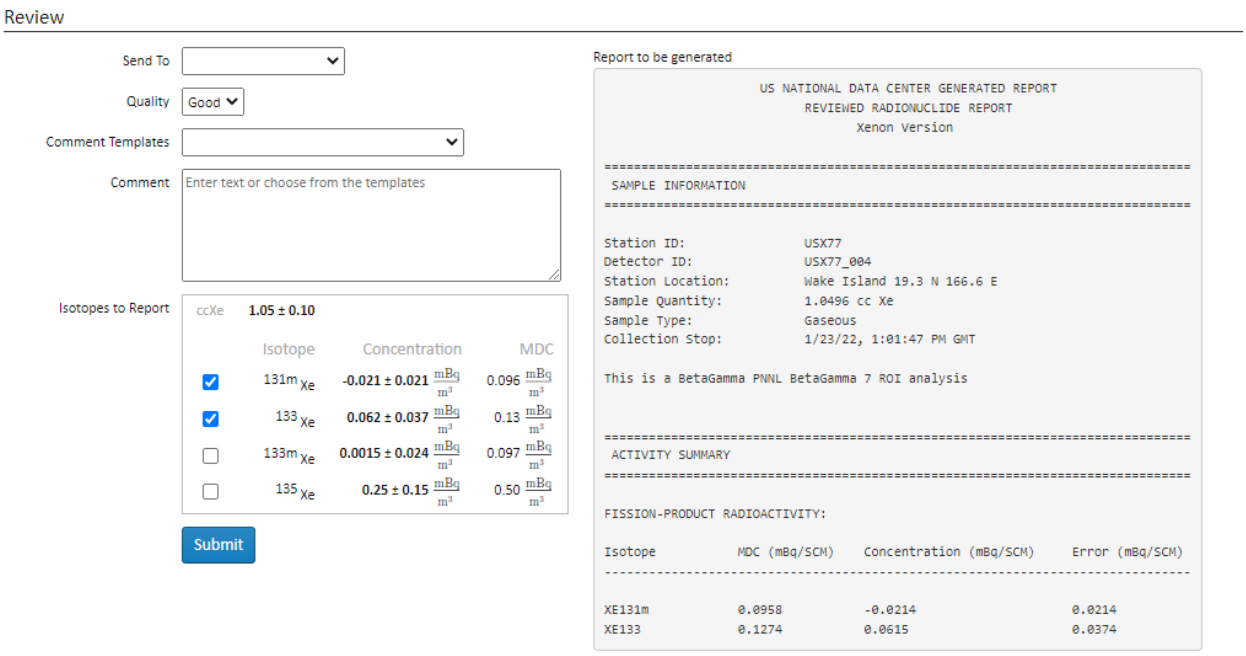


Figure 3-25. Review Panel

3.1.15 Assigning Tags to a Measurement

Users can assign tags to a measurement by clicking the tags multiselect which is located below the status indicators. They can select or deselect any number of tags. They can filter the tags by typing within the tags multiselect.

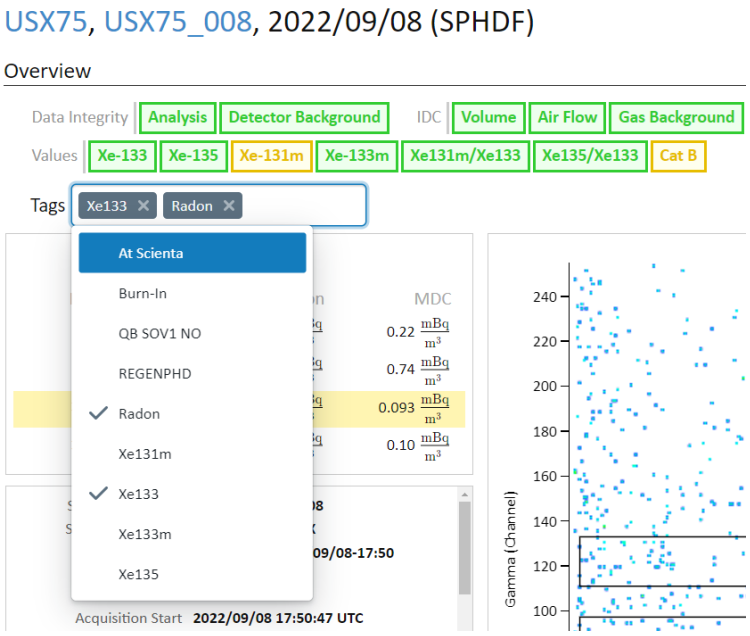


Figure 3-26. Assigning Tags to Measurement

3.2 Completing a Review – Alternative One

One alternative is to pass the measurement to another user for review using the choices in the Send To drop-down menu. This drop-down menu contains the roles of "Lead Analyst," "Senior Analyst," "Process Engineer," and "Director of Operations." Users are mapped to the roles of "Lead Analyst," "Senior Analyst," etc., through the "Manage Users" application (see section 9.3). After selecting the role from the drop-down menu, click the "Submit" button to transfer the spectra from your queue to the selected role.

3.3 Completing a Review – Alternative Two

The second alternative for a review is to complete the review by selecting a choice from the "Quality" drop-down menu of "Good," "Warn," or "Bad."

A comment may be entered for either passing spectra or completing the quality review. The comments and results of the review are logged and subsequently displayed in the log. Some frequently used comments have been included in the "Comment Templates" drop-down menu. Select one of these if desired and then additional text may be entered.

3.4 Selecting Isotope Checkboxes

The Isotope checkboxes at the bottom of the Review page may be pre-selected depending on the calculations. These selections may be changed by checking or unchecking the box. If a checkbox is selected, the Reviewed Radionuclide Report will be generated for preview, and saved to the file system upon submission. If no checkboxes are selected, the comment and action status will still be logged, but no Reviewed Radionuclide Report will be saved.

Checkboxes appear in the Isotopes to Report section once a Quality selection is picked. These checkboxes may or may not appear, depending on the measurement type.

3.5 Submitting the Review

After completing the review options, click the Submit button to complete the review.

3.6 QC Control Survey

The analysts reviewing the files can determine if they need to modify the energy calibration to change the gain in cases where the energy of peaks do not line up with known energy values (Figure 3-27).

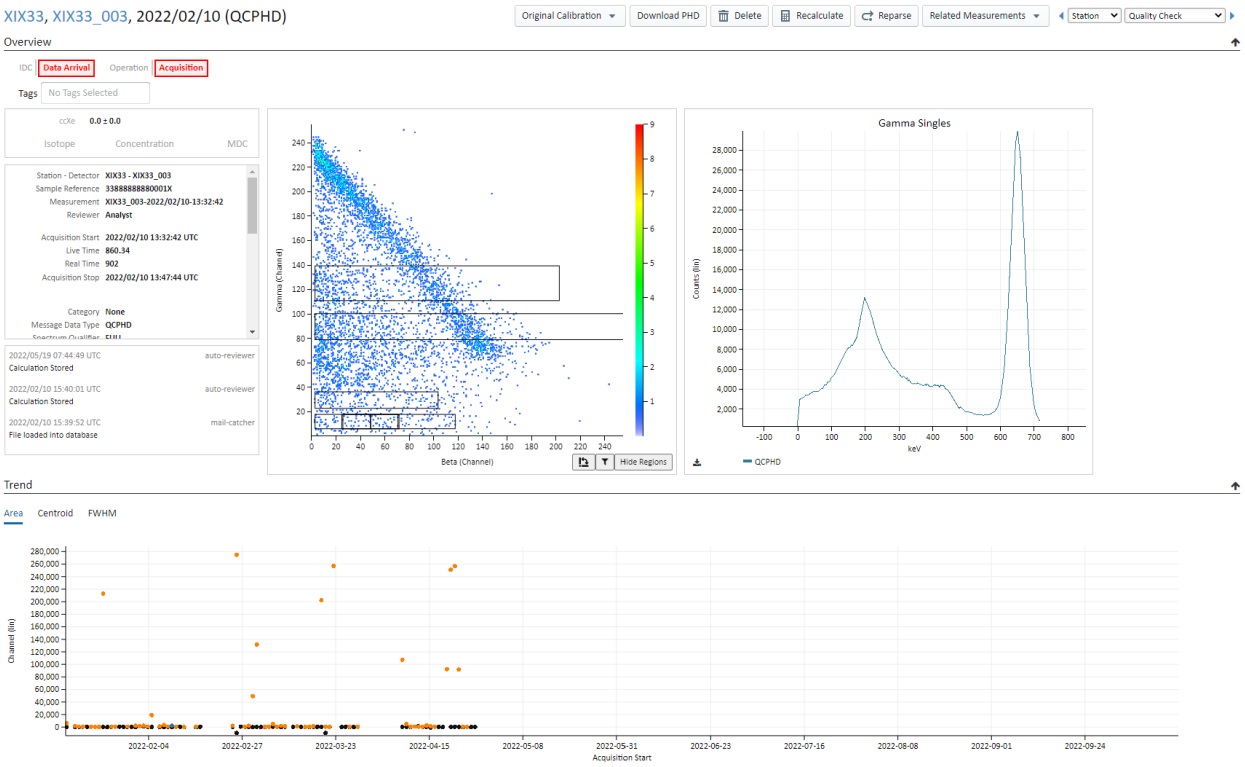


Figure 3-27. QC Control Survey

Normally when the QC file is in the review queue and has been opened from the review queue, the analyst will verify that the Log Entries shows the automatic peak fitting was successful (log displays QC Peaks & Coefficients Calculated as shown in Figure 3-27), and that the peaks are as expected in the plot. The analyst will then click the Review Sample link to review the QC files in a process similar to the sample files.

The trend chart located at the bottom of the QC Review Normal page displays the peak centroids, area, and resolution over time for the QC files. A more comprehensive analysis may be accomplished by utilizing the Performance Monitoring tool.

4.0 Performance Monitoring

The Performance Monitoring module provides a tool for charting data collected from a single station-detector pair over long periods of time. To select data, analysists must select a detector, a file type, and a data range. Analysts may optionally select a station. If a station is selected, the list of detectors is limited to detectors associated with that station. When viewing Quality Check data, the cesium-137 decay correction feature is available and enabled by default. If correction is not desired, such as when viewing data from a system which uses isotopes other than cesium-137, it can be disabled using the toggle switch. The Get Data button will become enabled when all required fields are filled out. Clicking it will fetch the data with the given parameters and display it on a series of charts.

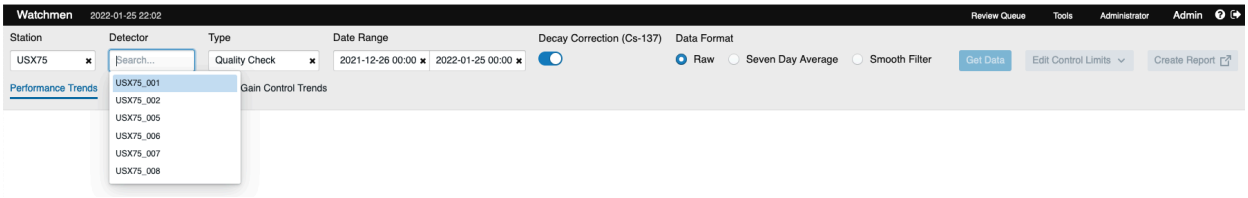


Figure 4-1. Performance Monitoring

After the data has loaded, it is displayed on several charts across three tabs. All the charts share several common features: Each chart supports zooming and panning as well as hiding of individual series (see section 3.1.8 for details). Clicking on a data point will open the measurement associated with that data point in a new tab. The data on each chart can be filtered. The Raw filter displays all selected data. The Seven Day Average plots the mean of each seven-day period within the selected time range. And the Smooth Filter smooths the selected data using the Savitzky-Golay filtering algorithm.

4.1 Performance Trends

The Performance Trends tab is the default tab. It contains five charts: Coincidence, Singles, Compton Scatter Intercepts, Compton Scatter Intercept Resolution, and Channel Coefficients. If there is no data to display on a given chart, it will be inactive and display the message “No data found”. This feature can be seen on the Channel Coefficients chart in the screenshot below.

Figure 4-2. Performance Trends tab

4.2 Count Rate Control Trends

The Count Rate Control Trends tab displays one chart for beta total singles, one for gamma total singles, and then one coincidence chart for each ROI. Each chart displays a single series. While these charts display data that is also on the Performance Trends tab, they also control limits. The default control limits are ±2 standard deviations (2σ) and ±3 standard deviations (3σ). Lines at 2σ are orange, while those at 3σ are red. When data points violate one or more limits, a warning is generated, and the background of that data point is highlighted with the color of the highest priority limit violated. In the screen shot below, the data point violated the 2σ limit but not the 3σ limit, so its background is highlighted orange. The total number of warnings for all charts on this tab is indicated next to the tab's name.

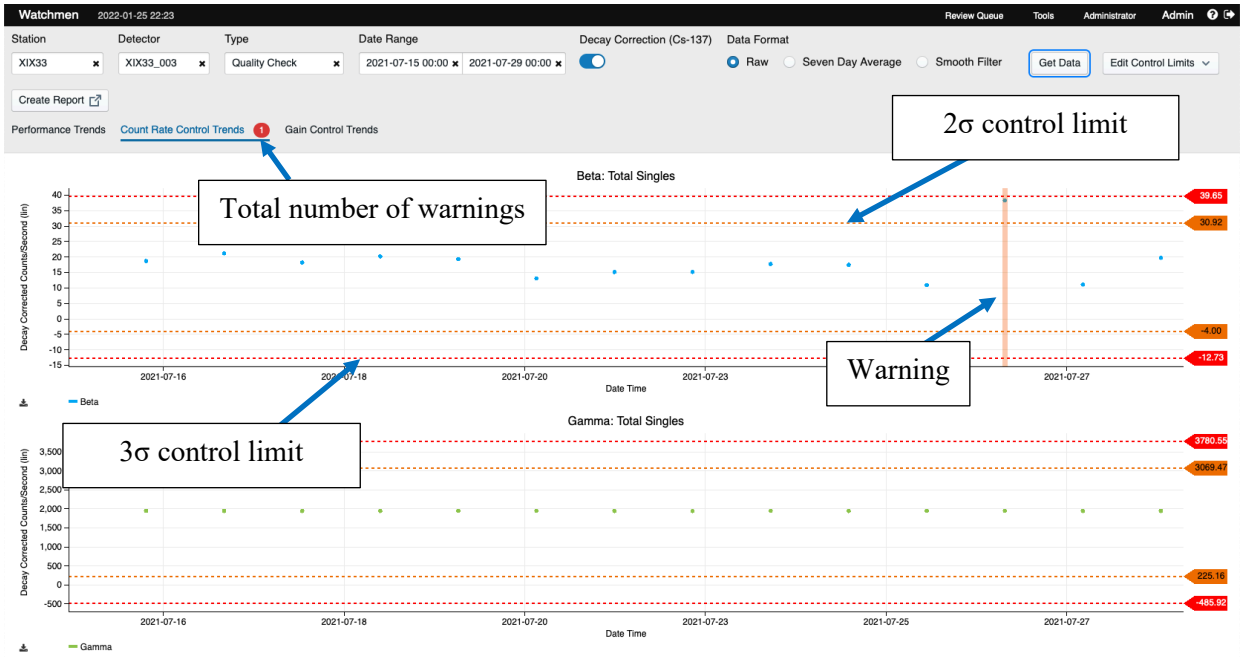


Figure 4-3. Count Rate Control Trends tab

4.3 Gain Control Trends

The Gain Control Trends tab displays charts for beta and gamma Compton scatter intercepts and beta and gamma Compton scatter intercept resolutions. Each chart displays just one data series. The Compton scatter intercepts charts also have control limits. By default, these are static values. Like the Gain Control Trends tab, when data points violate one or more limits, a warning is generated, and the background of that data point is highlighted with the color of the highest priority limit violated. In the screen shot below, the data has violated the more extreme limit, so the warning is red. Note that when adjacent data points both exceed the same limit(s), only one warning is generated. Thus, the chart below contains only one warning. The total number of warnings for all charts on this tab is indicated next to the tab's name.

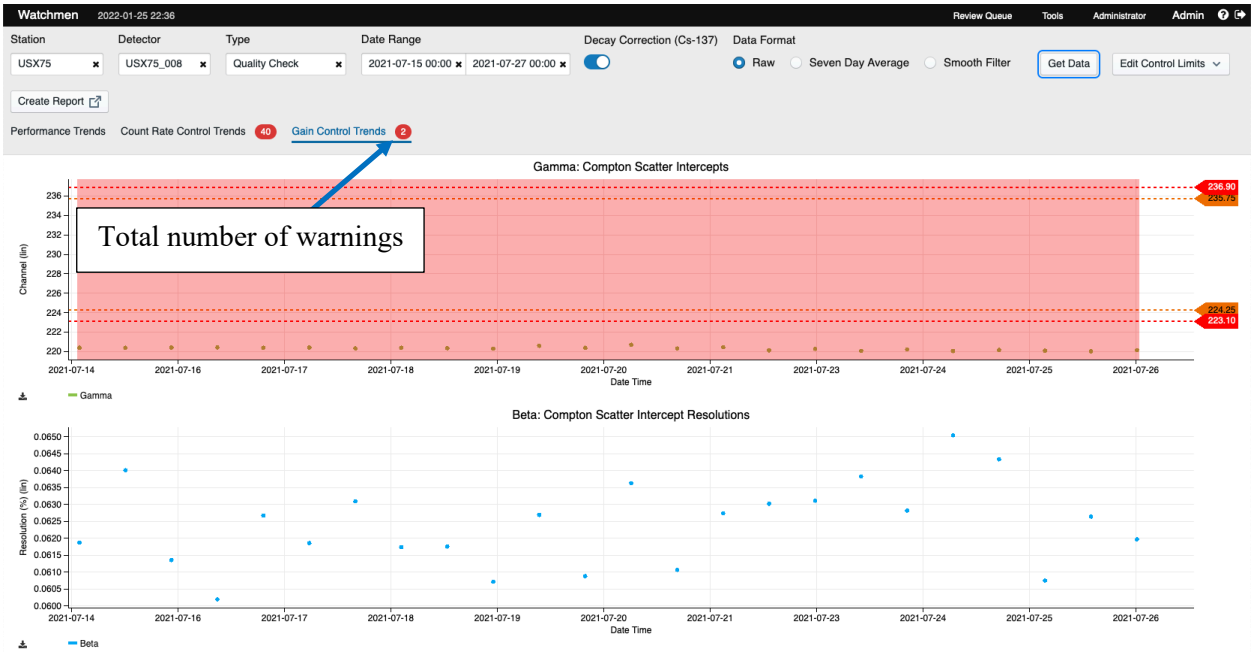


Figure 4-4. Gain Control Trends tab

4.4 Editing Control Limits

Details for the control limits on the Count Rate Control Trends and Gain Control Trends tabs can be viewed by clicking the Edit Control Limits button. The resulting table is populated with the control limits from the currently selected tab. Thus, to view control limits associated with charts on the Count Rate Control Trends tab, one must have the Count Rate Control Trends tab selected.

To create a new limit, select an existing control limit in the table or enter values into the control limits editor without selecting a control limit. When done, click Add to add the new limit to the table. To update a limit, select it in the table, modify any values, and click Update. An individual control limit can be deleted by clicking the 🗑 icon in its row. After changing the control limits, the charts and the warnings displayed on them will be updated. Note that any changes to control limits are *not* persistent. When the page is refreshed or new data is requested, any changes made to control limits are lost. If you would like to go back to the default limits, simply click the Get Data button.

In the screenshot below, a custom warning has been added to the beta total singles chart.

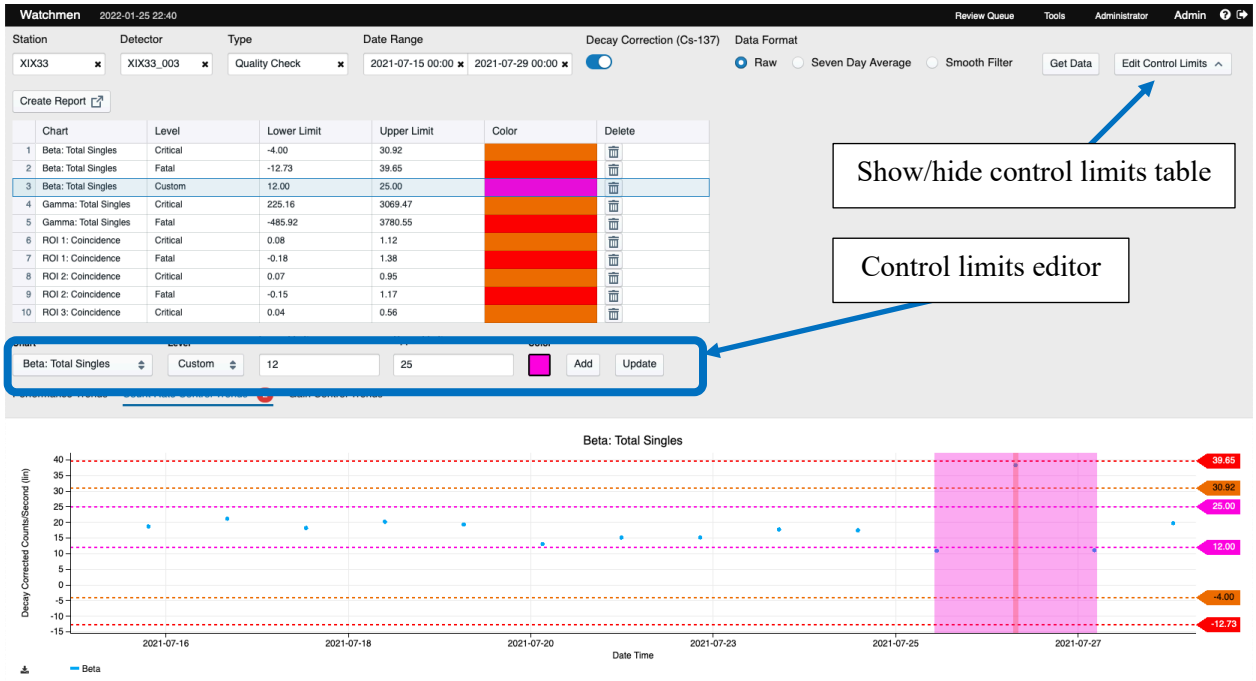


Figure 4-5. Editing control limits

4.5 Creating Reports

To create a monitoring report which contains the current data, click the Create Report button. This will open a new page with the same data in the same charts, but the layout is optimized for printing. Note that changes made to control limits *are* reflected on the monitoring report page. The parameters used to select the data are always included in the report. Additional notes can be entered in the Report Notes box using the Markdown language. When done reviewing and annotating, the report can be printed to a hard copy or a PDF using the browser's built-in print feature.

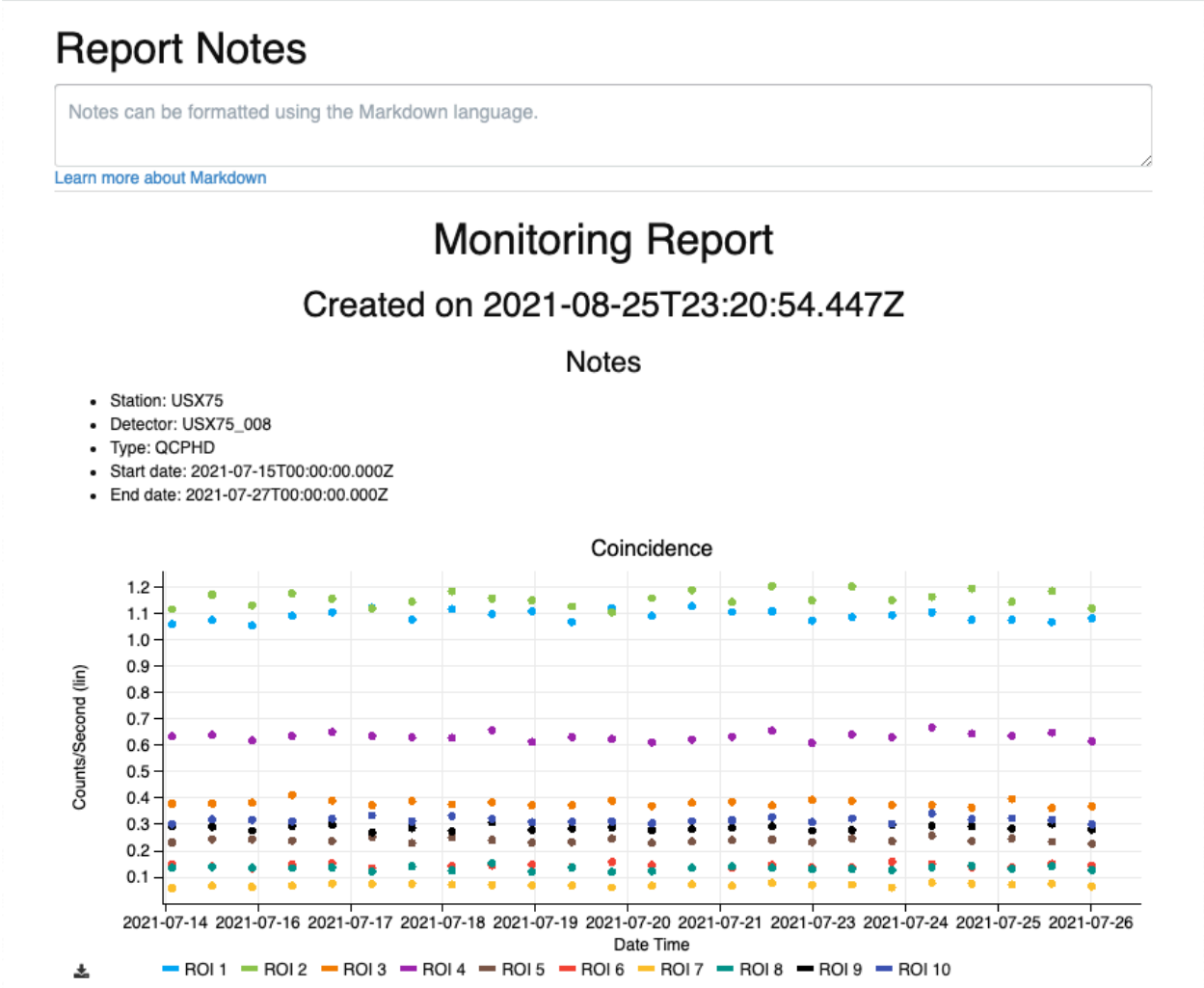


Figure 4-6. Performance Monitoring Report

5.0 Isotope Analyzer

The Isotope Analyzer module provides a charting tool for RN Evaluators to compare sample data with data from known sources or models, to determine or rule out possible sources of the radionuclide release. The Isotope Analyzer module allows the evaluators to select models and specify model parameters, select sample data of interest, and to configure one or more charts displaying model and sample data. A number of graphing options are available, including plotting isotopes and isotope ratios with respect to time, plotting ratios of isotopes (triple isotope plots), selecting the isotopes produced at a number of hold up times and irradiation times for different types of nuclear reactors and medical isotope production facilities, and allowing the user to add relevant samples collected on particulate and radioxenon systems. This provides a graphical comparison of real data sets to data sets from models.

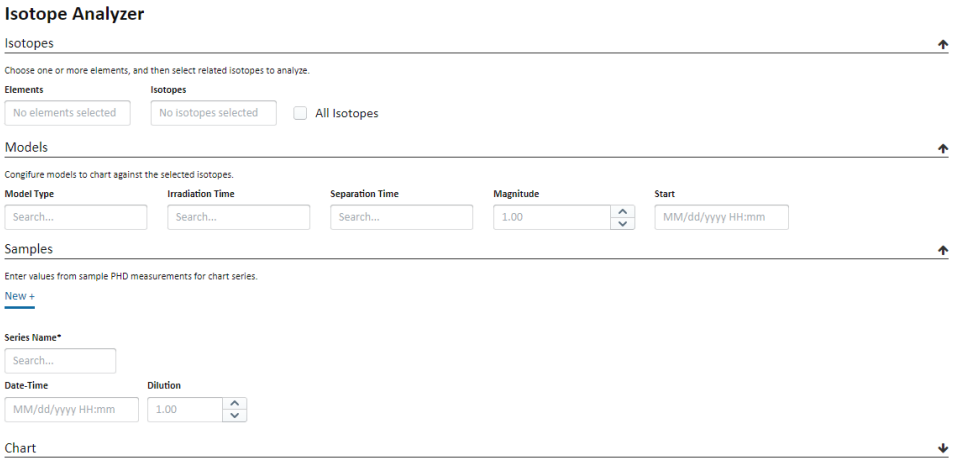


Figure 5-1. Isotope Analyzer

The first step to using Isotope Analyzer is choosing the isotope(s) of interest in the Isotopes panel. The chosen isotope(s) will be available for plotting on the charts and will have a column when entering data. First choose elements to load the list of isotopes. Isotopes can be added or removed at any time. Removing an isotope will delete all hand entered activities for that isotope.

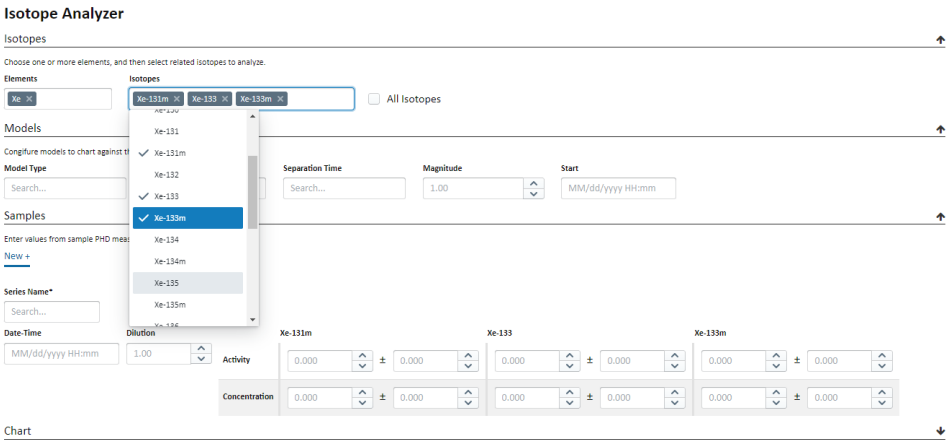


Figure 5-2. Isotope selector

After choosing isotopes you are interested in, there are multiple models in the Models panel that can be selected to compare against data from sample measurements. The dropdowns allow the user to select a model. The magnitude of the model can be adjusted for comparison with the sample data. This will be apparent on charts with an axis in the Activity Domain. The start time of the model can be adjusted to match with charts that are measured with Time. Click the download button to export the configured model. Click the delete button to remove the model configuration.

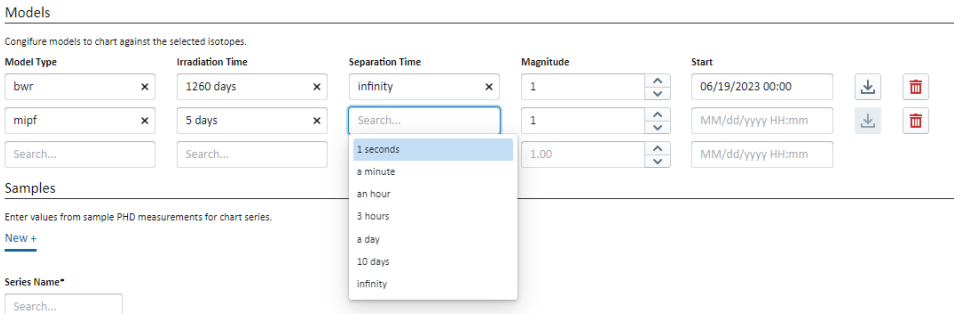


Figure 5-3. Model selection and parameters

After choosing models, sample measurements can be entered for the selected isotopes as series in the Samples panel. Data from separate locations or equipment can be entered as different series. If you have multiple measurements from the same piece of equipment, you can enter each and record the time of the measurement.

Sample data series must be named in order to plot them in the chart. A name can be selected from the Series Name dropdown, or a custom name can be used by typing it in the input and pressing the Enter key. Once entered, the name appears in a tabs header that can be used to switch between series in the Samples panel.

The Date-Time input is used to set the date of the measurements. Dilution can be adjusted to normalize the entered values. The dilution value is a multiplier that scales the values up or down in the charts. An example of the use of dilution would be to normalize activities measurements to concentration values by accounting for sample size.

Values for measurements may be entered as activities and as concentrations by entering them in the respective row. Uncertainties can be entered for each measurement. Values of measurements and uncertainties can be entered in base-10 formatting or scientific notation.

To start a new series, click the New + tab. To remove a series and all of its sample measurement data, click the delete button next to the Series Name field. To remove a row within a series, click the delete button to the right of that row.

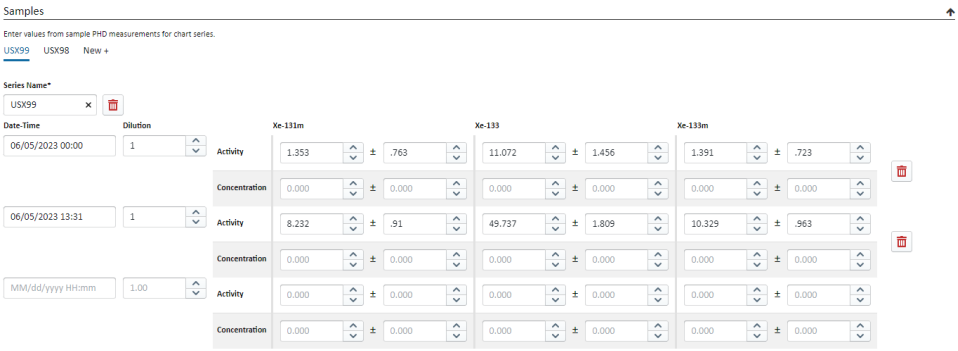


Figure 5-. Series parameters

After models are chosen and the data has been entered, charts can be created in the Charts panel to confirm the models represent the dataset. The Charts panel is initially closed – click the panel's title bar to expand the panel.

To plot the models and sample data in a chart, choose the configuration and parameter for each axis. It is important to note that while Ratio vs Ratio plots may match a model, it is possible that Activity vs Time or Activity vs Activity may not match a model. When that occurs, it implies the model does not represent the entered data.

Uncertainties entered for sample data are displayed in the chart as gray bars.

To export a chart's data, click the download button in the bottom-left corner of the chart. Click the Add Chart button below the chart to add another chart. Click the delete button at the top-right of the chart to remove the chart. The first chart can't be removed but can be cleared by clicking the reset button at the top-right of the chart.

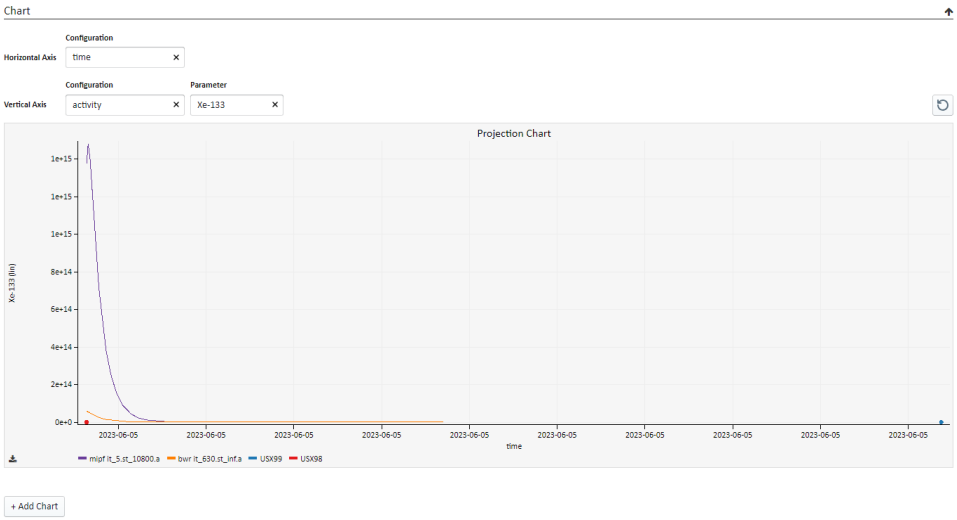


Figure 5-4. Isotope Analyzer plotting

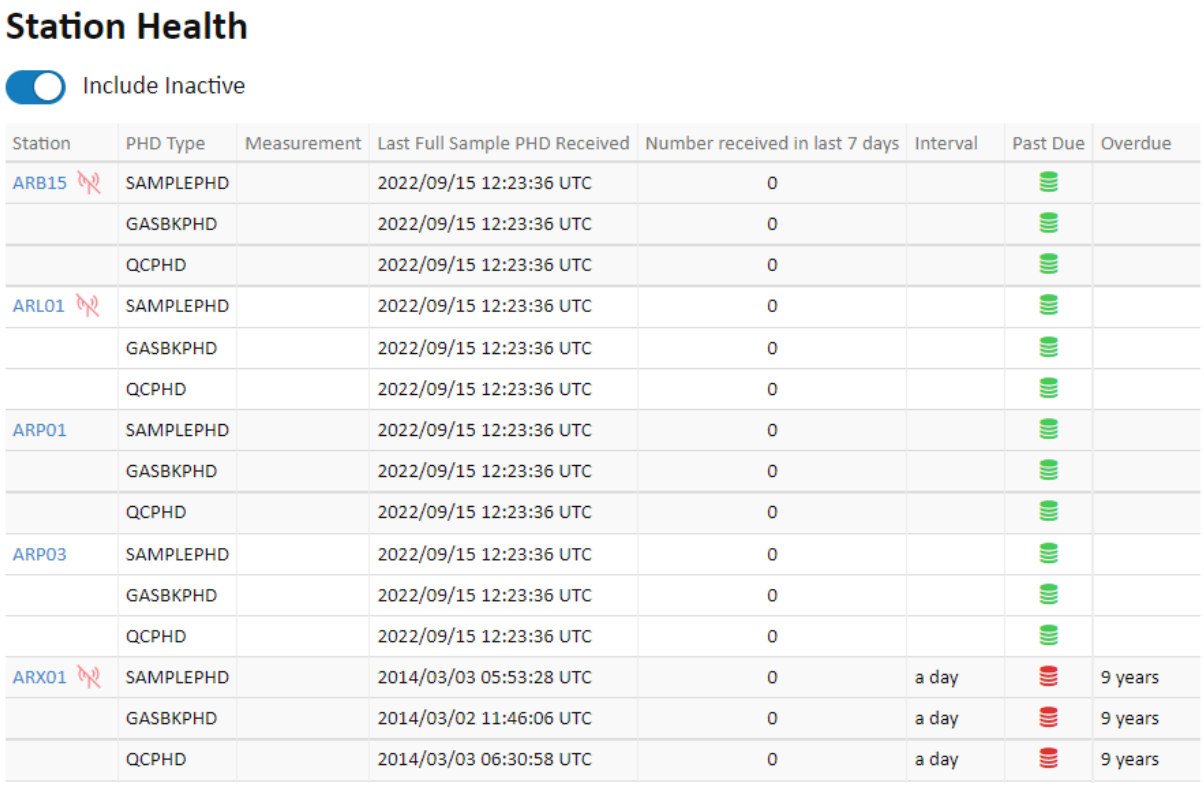
Figure 5-5. Multi-isotope plot

6.0 Station Health

6.1 Station Health Page

The Station Health page is an overview of station health categorized by the measurement type (Sample PHD, Gas Background PHD, and Quality Check PHD). It displays tabular information of each station's health based on its measurements. The health metrics are cubic centimeters of xenon, quality indicator (Good, Fair, or Bad status), Last Full Sample PHD received date, number of measurements received in the last seven days, measurement reception interval (time span based), indication of past due measurement (red is past due, green is on time), and the time span of the past due measurement. For details, see Figure 6-1.

Toggle the Include Inactive switch to show or hide inactive stations. Inactive stations are marked by the following icon ( ).



Station	PHD Type	Measurement	Last Full Sample PHD Received	Number received in last 7 days	Interval	Past Due	Overdue
ARB15	SAMPLEPHD		2022/09/15 12:23:36 UTC	0			
	GASBKPHD		2022/09/15 12:23:36 UTC	0			
	QCPHD		2022/09/15 12:23:36 UTC	0			
ARL01	SAMPLEPHD		2022/09/15 12:23:36 UTC	0			
	GASBKPHD		2022/09/15 12:23:36 UTC	0			
	QCPHD		2022/09/15 12:23:36 UTC	0			
ARP01	SAMPLEPHD		2022/09/15 12:23:36 UTC	0			
	GASBKPHD		2022/09/15 12:23:36 UTC	0			
	QCPHD		2022/09/15 12:23:36 UTC	0			
ARP03	SAMPLEPHD		2022/09/15 12:23:36 UTC	0			
	GASBKPHD		2022/09/15 12:23:36 UTC	0			
	QCPHD		2022/09/15 12:23:36 UTC	0			
ARX01	SAMPLEPHD		2014/03/03 05:53:28 UTC	0	a day		9 years
	GASBKPHD		2014/03/02 11:46:06 UTC	0	a day		9 years
	QCPHD		2014/03/03 06:30:58 UTC	0	a day		9 years

Figure 6-1. Station Health Application

7.0 Live View

Live View page provides a current display of the latest 10 measurements sent to Watchmen within the last 2 hours. The page automatically refreshes every 30 seconds to keep date current.

Each measurement has some metadata along with a spectra thumbnail. You can hover over the spectra just as in the Search applications to get extra details (Figure 7-1). The Live View also displays the status indicators (section 3.1.9). You can click on the spectra to navigate to the measurement in the Search application (section 3.0). Toggle the switch to show or hide measurements from inactive stations. Measurements from inactive stations are marked by the following icon ( ).

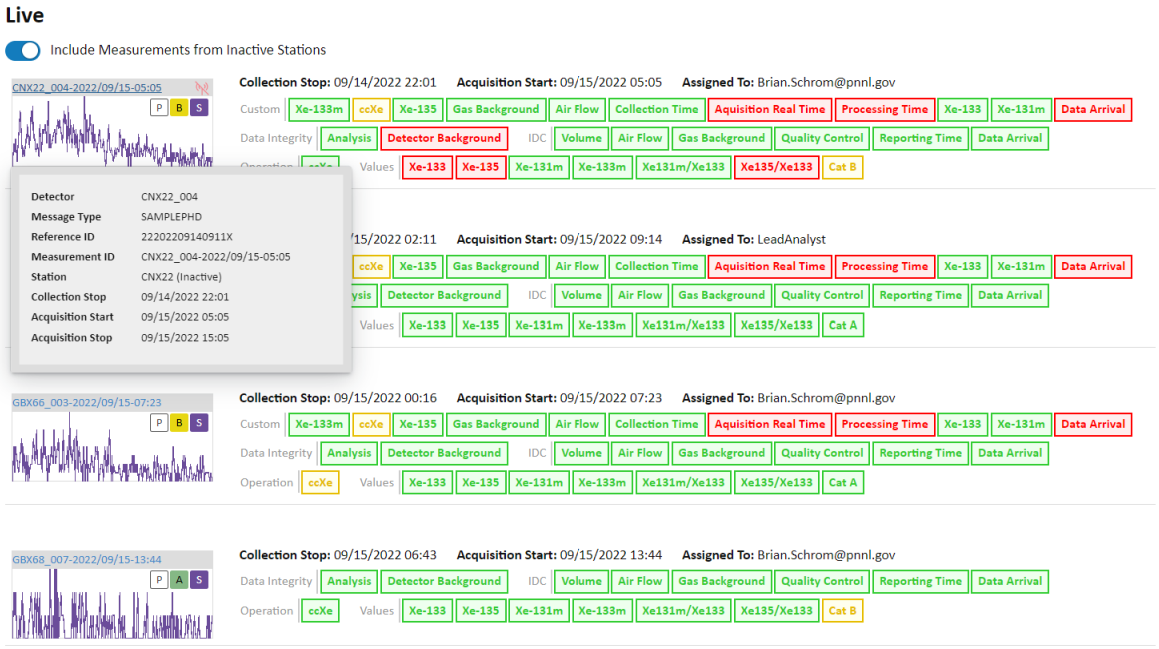


Figure 7-1. Live View Application

8.0 Station Performance Overview

The Station Performance overview page gives an overall view of Watchmen's stations and their performance. The overview is based on a historical view of quality indicators. The three statuses for any indicator are Bad, Fair, and Good. The graph displays the worst-performing indicator in any given time frame—that is an indicator that is in Bad state will override a Good or Fair indicator. By default, the chart displays all stations' performance over the past 30 days with the stations ordered alphabetically. There is one horizontal row of data per detector. Note that gaps will appear when no data is present for a detector. A station's current performance is based on the most recent quality indicator's status. A user can optionally change the time frame to display historical performance. If a station or detector has no data for the selected time frame, it will not appear in the graph at all. The set of stations for which data is visible can also be filtered by station type. The status legend at the top of the screen shows the count in each status marker (see Figure 8-1).

Users may interact with the chart by zooming and panning in the same ways as other Watchmen charts. Clicking a specific data bar will open the station detail page for the related station in a new tab.

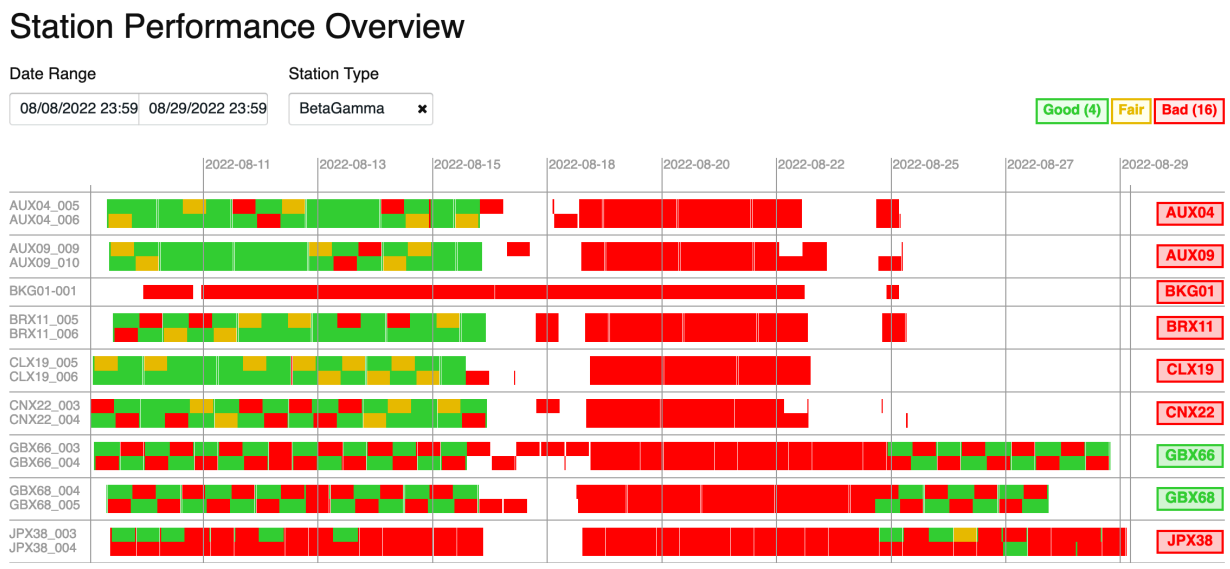


Figure 8-1. Station Performance

9.0 Ad Hoc Query Tool

The Ad Hoc Query Tool allows the user to compare data from different stations and detectors. Data from the same detector but with different variables can also be compared. Upon entering the Ad Hoc Query Tool page, the user will be met with three empty fields to select the Station, Detector and Variable to plot. There is also a date range selector on the right-hand side that defaults to the range of a year.

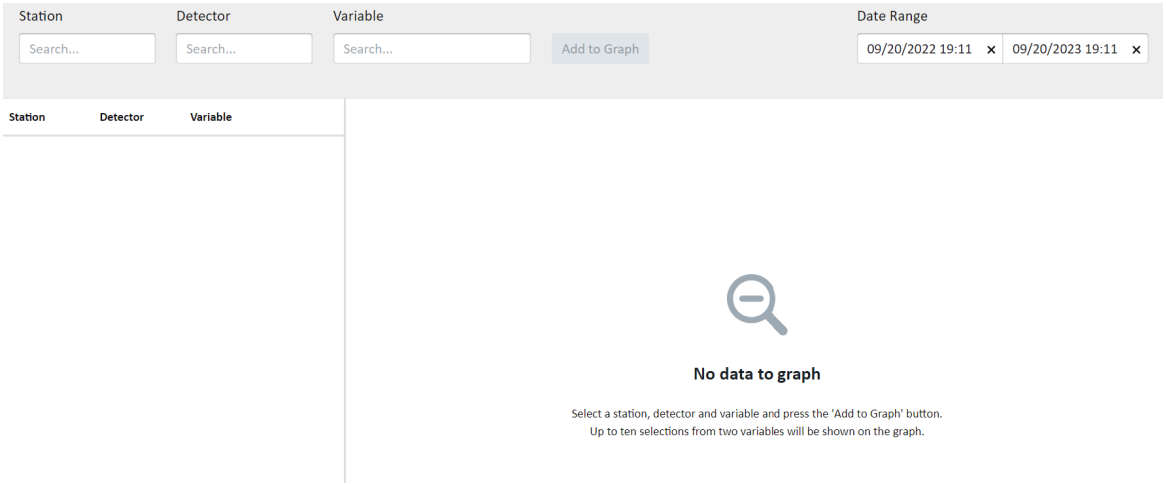


Figure 9-1. Initial Ad Hoc Query Tool Page

Once all the fields are filled out the user can then press the "Add to Graph" button. If the data exists, it will be plotted on a graph.

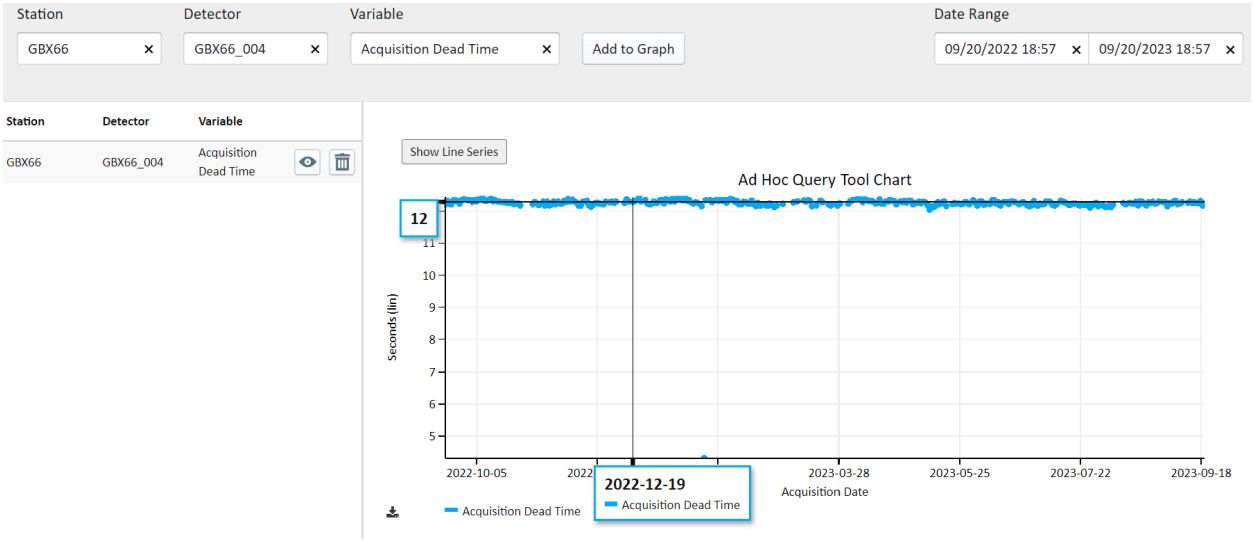


Figure 9-2. Plotting a Single Variable

The user can plot data from two different variables and up to 10 selections at a time. Selections with the same variable will be represented by the same axis on the graph. Variables can be removed by pressing the "trash" button to remove that entry from the table. The visibility of variables on the graph can be toggled with the "eye" button.

Figure 9-3. Plotting Multiple Variables

Clicking a point on the graph will open a link to the associated measurement in a new tab. The date range can also be adjusted at any time to update the time span for the data shown on the graph.

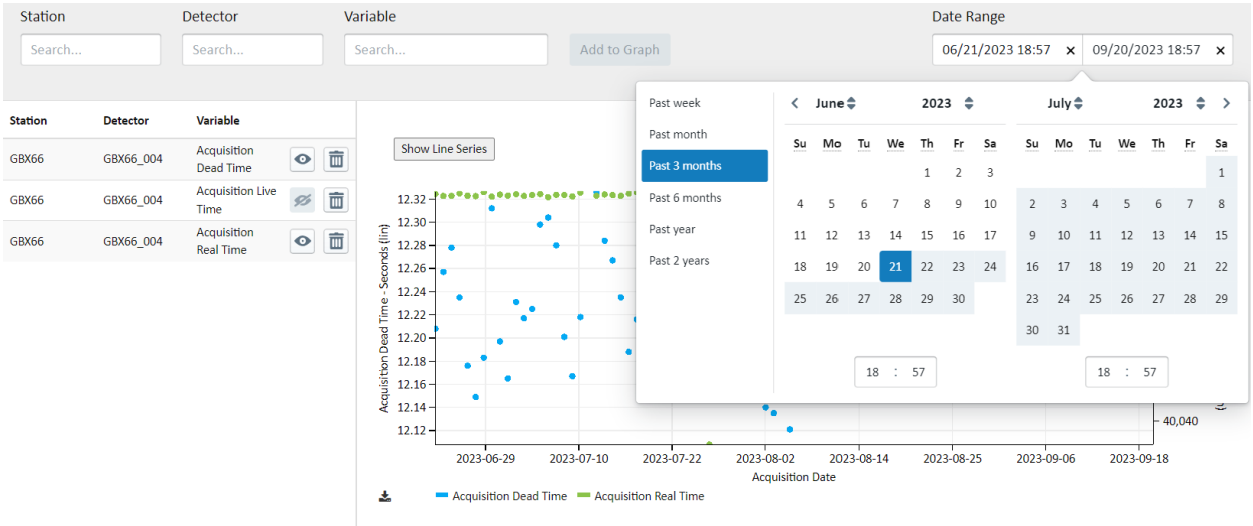


Figure 9-4. Adjusting the Date Range

The user can toggle between a line or scatter series for the chart by pressing the button on the top left of the graph. They can also use the download button on the bottom left to export the data to a CSV.

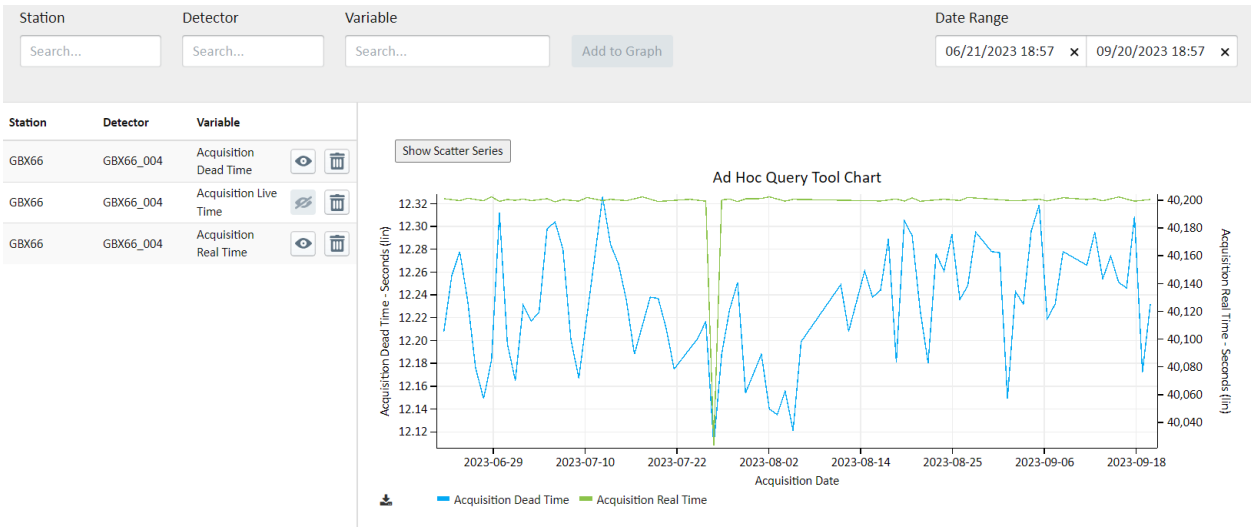


Figure 9-5. Line Series Toggled

There is a moving range chart below the main chart which shows the absolute difference between each value compared to the previous value.

Figure 9-6. Moving Range Chart

10.0 World

The World page displays where stations are located around the world along with approximate locations of nuclear and medical facilities that may emit radiation. Each type of site is displayed on its own layer. Clicking on the name of a layer in the box at the top right of the screen toggles that layer's visibility. Clicking on a marker will display information about that station or facility. Note that some facilities are very close to each other, and it may be difficult to distinguish them from one another when zoomed far out.

A station's location must be updated manually by a user with administrator privileges. This can be done by navigating to the Stations page, selecting a station, clicking the Edit Station button, and adjusting the Latitude and Longitude fields.

Figure 10-1. World Page

11.0 Administration

The administrative functions previously contained in a separate interface are now included in the Navigation. To open, select the administrative option of interest from the menu. The options are:

- Pending Reviews
- Stations
- Indicator Configuration.
- Users

11.1 Pending Reviews

The Pending Reviews page allows an administrator to view measurements that haven't been reviewed. It shows unreviewed measurements in a view similar to the Search page list view (see section 3.0). The page also can be used to change who is assigned to review a measurement. A go-to-search button ( ) opens the Search page filtered to the same measurements as on the Pending Reviews page.

On the Pending Reviews page, measurements can be selected by clicking the checkbox or anywhere in the row that's not a link. To select multiple adjacent measurements: 1) press and hold shift and then 2) click the first and last measurements in the range.

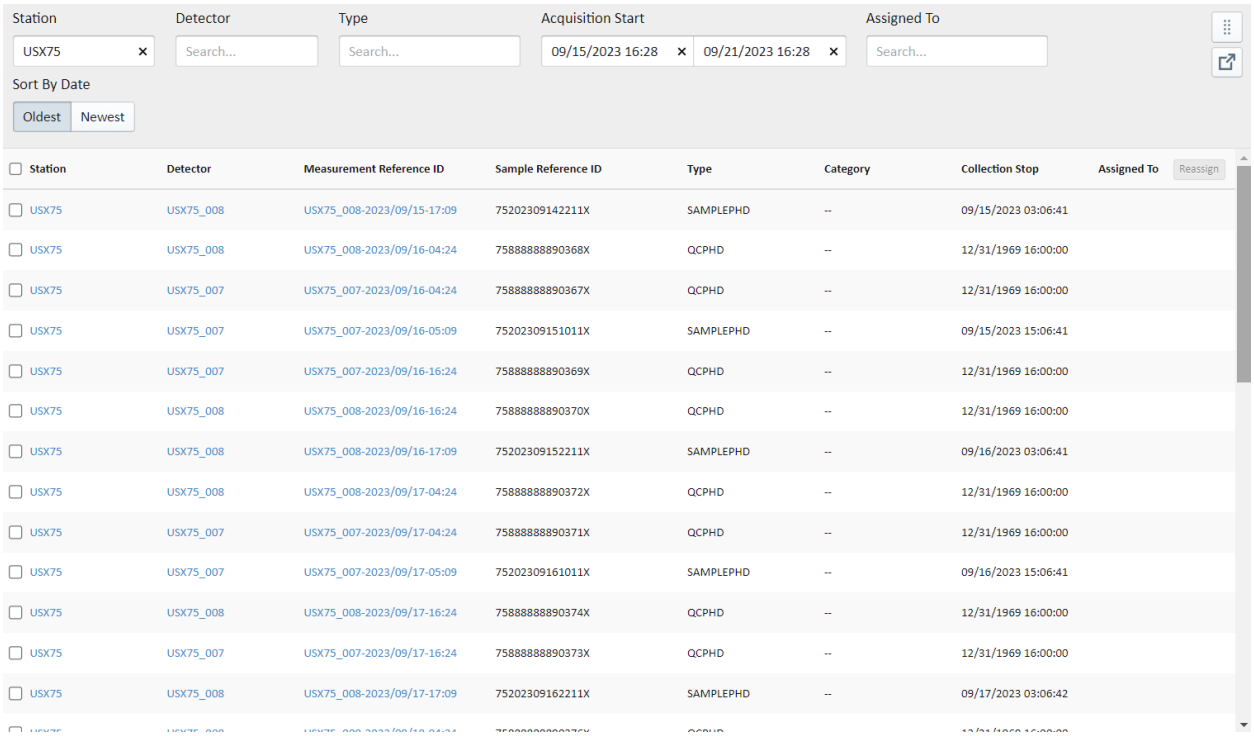


Figure 11-1 Pending Reviews Application

To change a station's measurement review to a different user, set the desired Station, select the row of the measurement that you are reassigning, and click the Reassign button. In the pop-up dialog, select the new user from the drop-down menu.

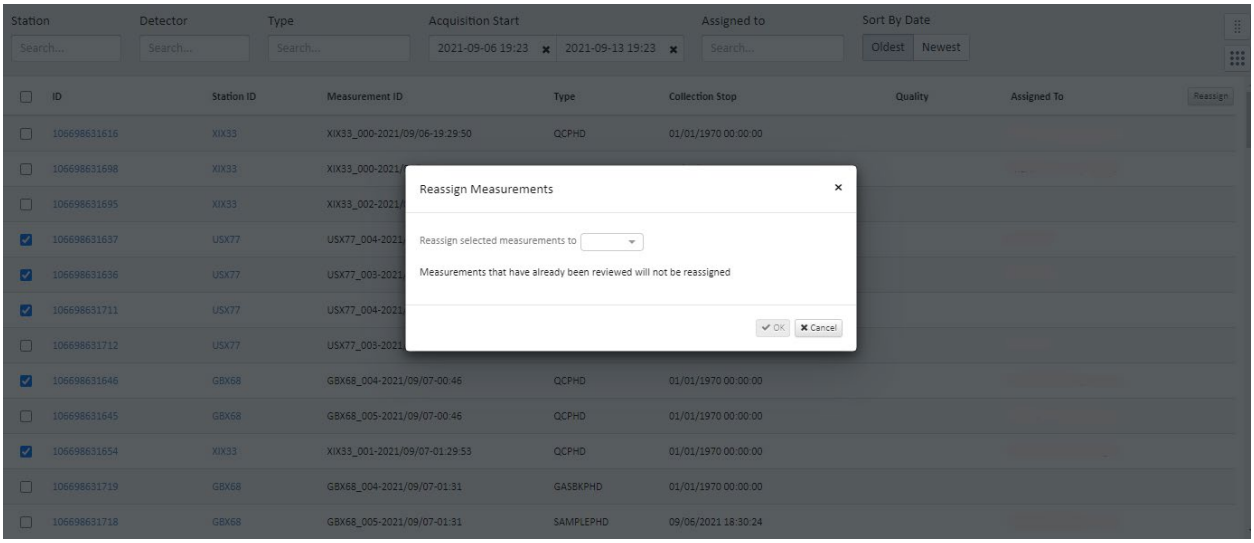


Figure 11-2. Reassigning Measurements Dialog

11.2 Stations

The Stations page lists all stations currently in the Watchmen database. The table displays the Station Code, Country Code, and Station Type of each station and can be filtered accordingly. Toggle the Include Inactive switch to show or hide inactive stations. Inactive stations are marked by the following icon ( ).

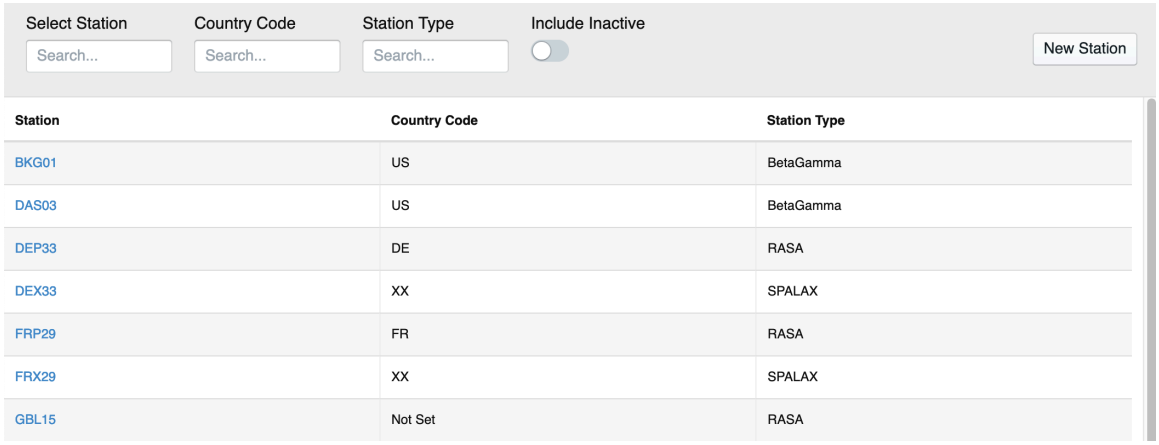


Figure 11-3. Station Table

11.2.1 Adding New Stations

There are two methods for adding new stations to the database, automated (via Mothman) and manual (via the Stations page)

11.2.1.1 Automatic Adding a New Station

When Mothman receives a measurement for a station which doesn't exist in the database, a basic entry is added to the database. Because PHD measurements generally don't contain enough information to establish which analysis method is appropriate, the automatically added station's measurement will not be analyzed. Any new stations will be filtered to the top of the stations list. Additionally, a bell icon will be added to the Administrator's menu, and the Station menu item to notify administrative users that a station is waiting to be configured. An Administrator my finish configuring a station by clicking the Edit button and assigning values to the required fields. After clicking 'Done' to save edits, the administrative notifications will be turned off, and Mothman will begin to analyze any queued measurements.

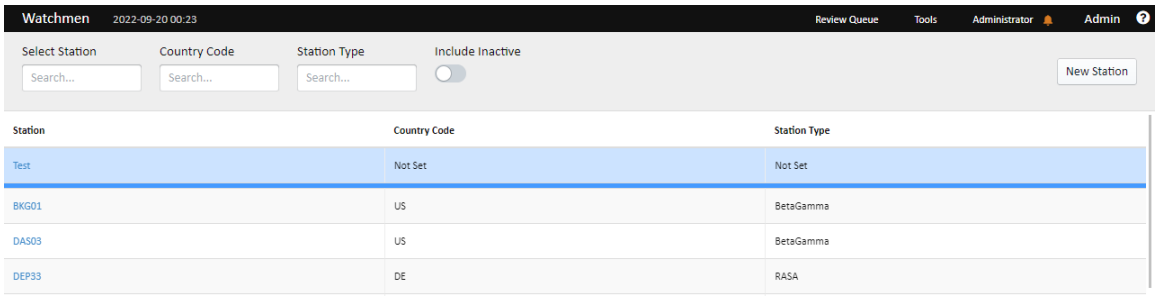


Figure 11-4. Station Table with Automatically Added Station Identified

11.2.1.2 Manually Adding a New Station

In the upper right, there is a button to add a New Station. On the New Station required fields are marked with a red asterisk. Once completed, clicking Done will open the Station page for the new station (which will mostly be empty, because no data will have been found in the database). To return to the Station list, click the 'X' in the select Station field to remove the filter.

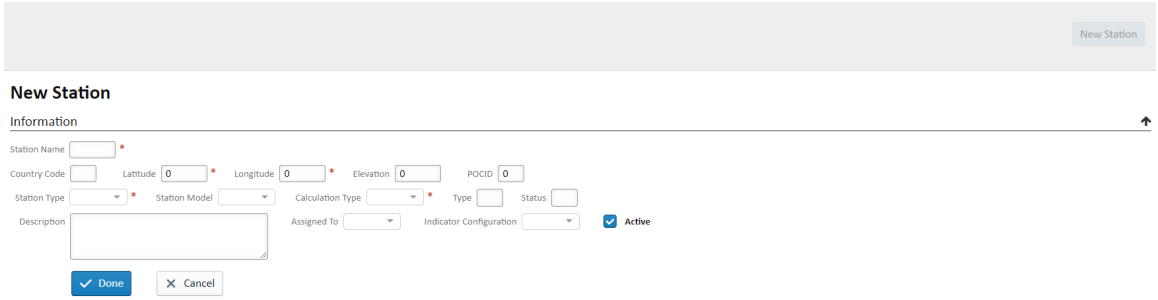


Figure 11-5. New Station Dialog

11.2.2 Editing a Station

Press the Edit Station button to edit a station. Station Type and Calculation Type must be specified in order for analysis to be performed on stations' measurement files. An indicator configuration must be selected for indicators to be calculated. Latitude and Longitude must be set to values other than 0:0 to be display on map. Press Done to save the changes.

While editing a station the Active checkbox can be unchecked to mark a station as inactive. Marking a station as inactive prevents the station from showing up on the default views of the Stations, Station Health, and Live pages. Inactive stations can still be displayed on those pages if the user toggles Include Inactive.

A station may only be assigned to one reviewer. The stations should be assigned to users with a role of Analyst. If a change in station assignments is made, any measurements loaded for stations assigned to users after a change has been made will start appearing on the Pending Reviews page for the changed user. However, already assigned reviews will not be affected.

11.2.3 Viewing Station Details

Clicking on a station's code in the Station list will open the Station page (Figure 11-6) for that station. This page shows information about a station including pending measurement recalculations and reparsings, connected detectors, assigned tags, indicator group overrides, data trends, and indicator quality.

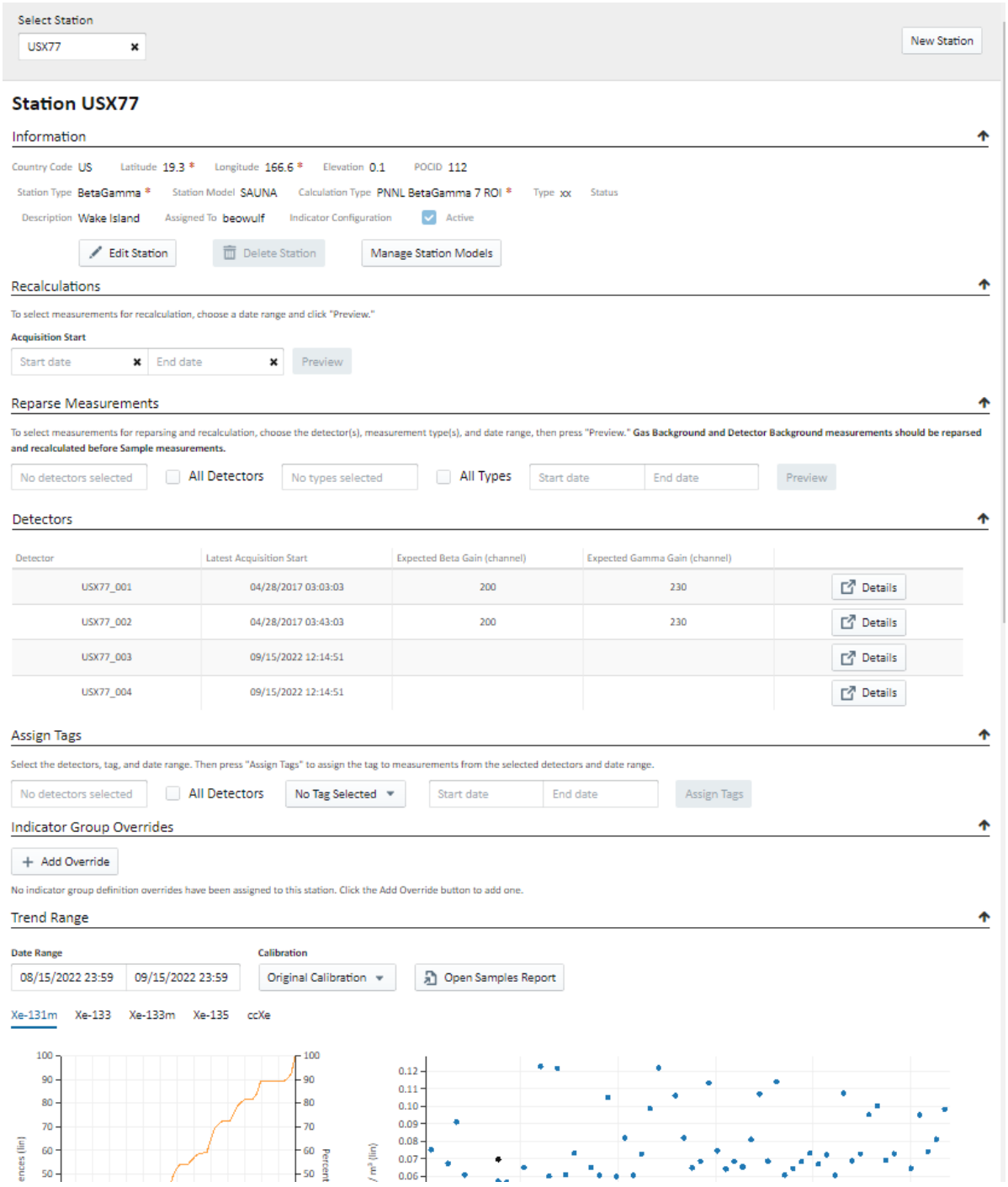


Figure 11-6. Station Page

11.2.3.1 Information Panel

The information panel allows viewing and editing of basic station information such as location, type, and assignee. To edit the station information, click the Edit Station button at the bottom of the information panel. Make the desired changes, and then click the Done button to save the changes or the Cancel button to cancel.

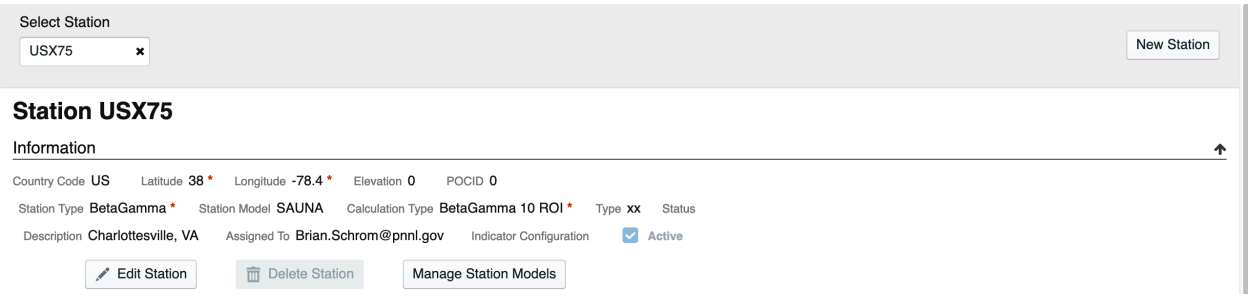


Figure 11-7. Station Information Panel

11.2.3.2 Recalculations Panel

The recalculations panel (Figure 11-8) allows users to queue measurements for recalculation and view the number of measurements in the queue.

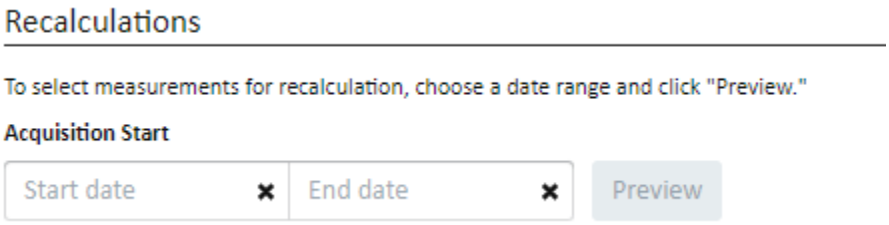


Figure 11-8. Recalculations Panel

To add measurements to the queue, select a date range and then click Preview. A dialog box (Figure 11-9) appears indicating how many measurements would be recalculated, how many measurements are already in the queue for recalculation, and how long it may take to complete the recalculations, including the ones already in the queue and the ones being selected.

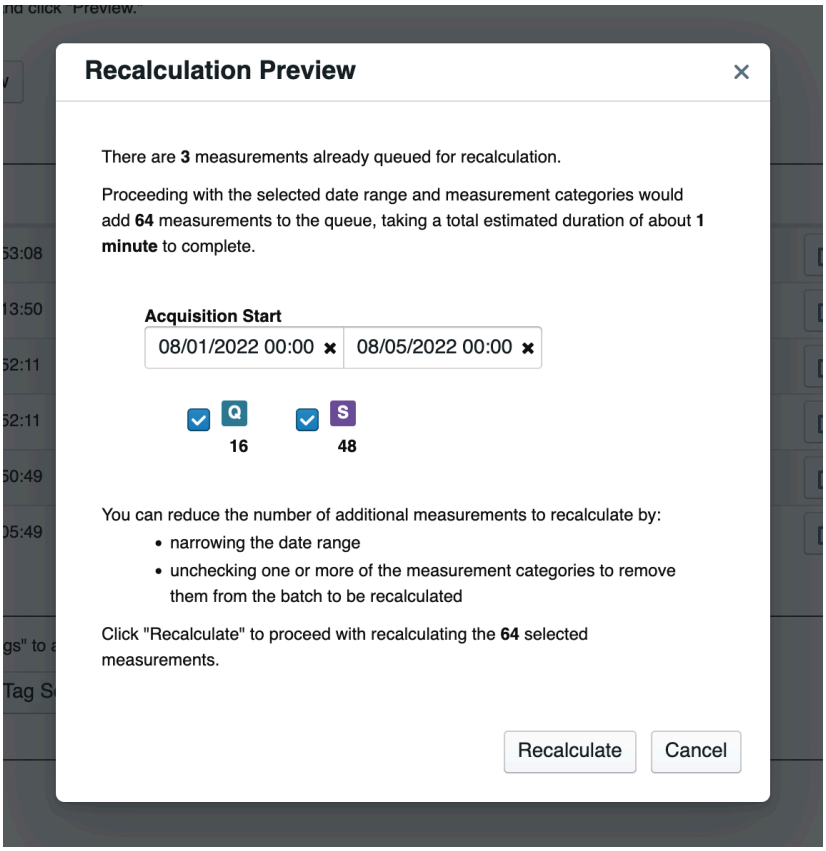


Figure 11-9. Recalculation Preview Dialog

The dialog provides the user the opportunity to reduce the number of measurements that would be added to the queue by changing the selected date range and/or unchecking groups of measurements. Clicking Recalculate adds the selected measurements to the queue.

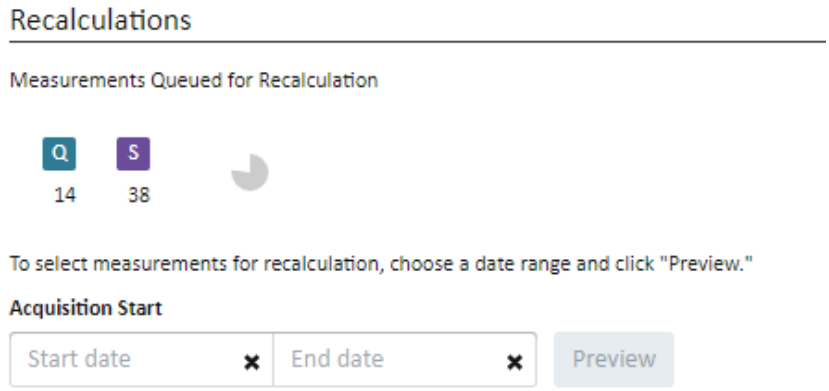


Figure 11-10. Recalculation Queue

The recalculation queue (Figure 11-10) appears when Station measurements are detected in the queue.

11.2.3.3 Reparse Measurements

The reparse measurements panel (Figure 11-11) allows users to select measurements for reparsing. To select measurements to reparse, select the detectors, data types, and date range of the measurements to add to the queue.

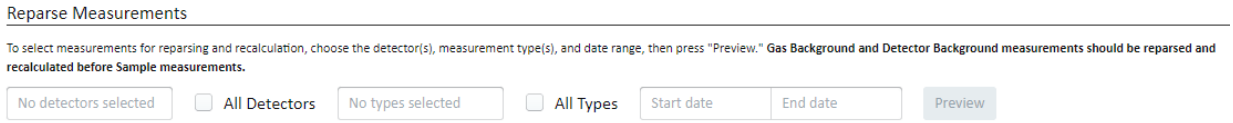


Figure 11-11. Reparse Measurements Panel

Then click the Preview button to open a dialog showing how many measurements would be added to the queue, how many measurements are in the recalculation queue, and how long it may take to complete reparsing and recalculating the measurements, including ones already in the queue and ones being selected.

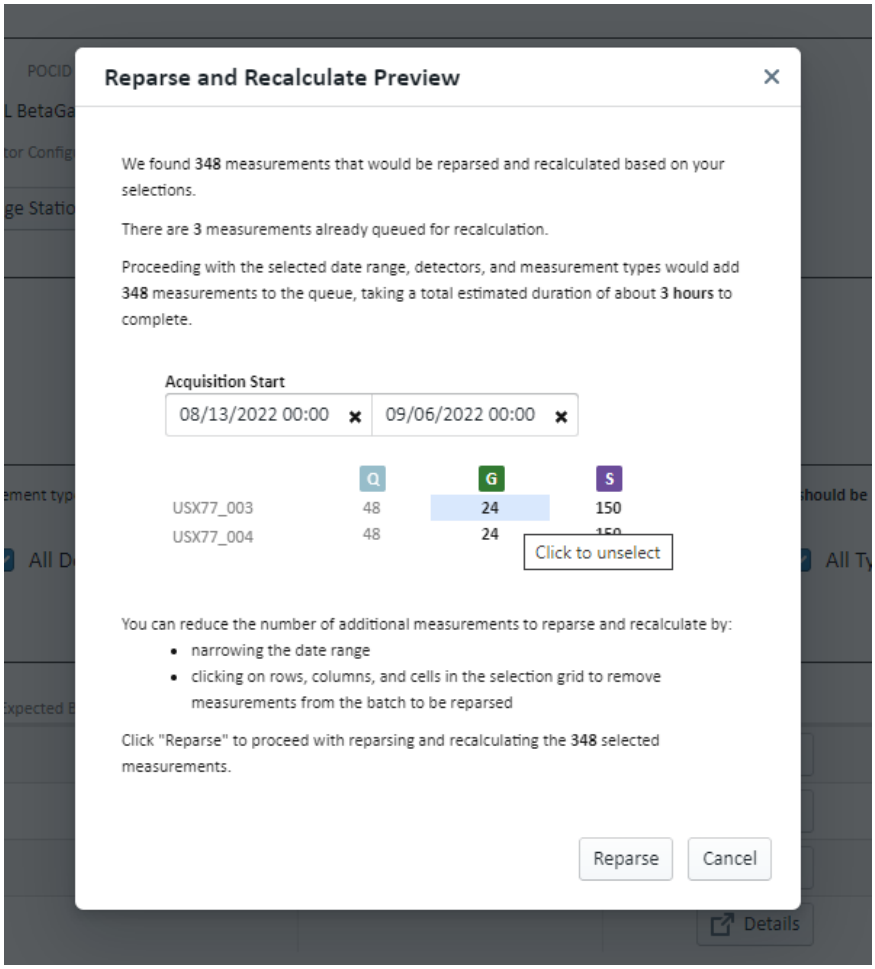


Figure 11-12. Reparse and Recalculate Preview

The Reparse and Recalculate Preview (Figure 11-12) provides the user the opportunity to reduce the number of measurements that would be added to the queue by changing the selected date range and/or unselecting measurements grouped by their datatypes and detectors. Clicking Reparse will add the selected measurements to the queue.

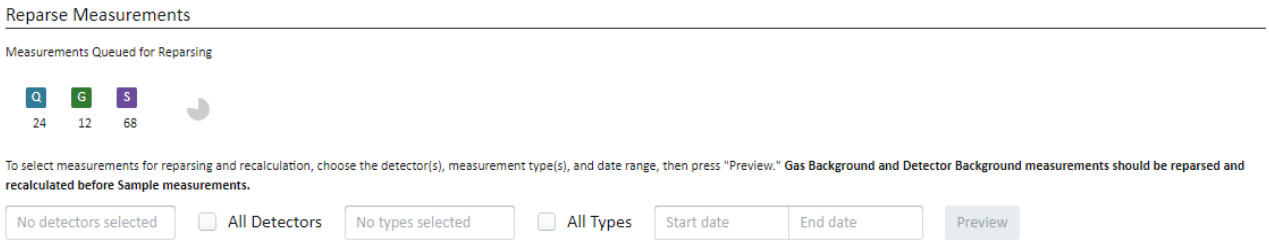


Figure 11-13. Reparse Queue

When measurements from a station are in the reparse queue, the station's reparse queue (Figure 11-12) appears in the reparse measurements panel.

11.2.3.4 Detectors

The detectors panel displays a table of all detectors assigned to the selected station (Figure 11-14) with their expect beta and gamma gain values.

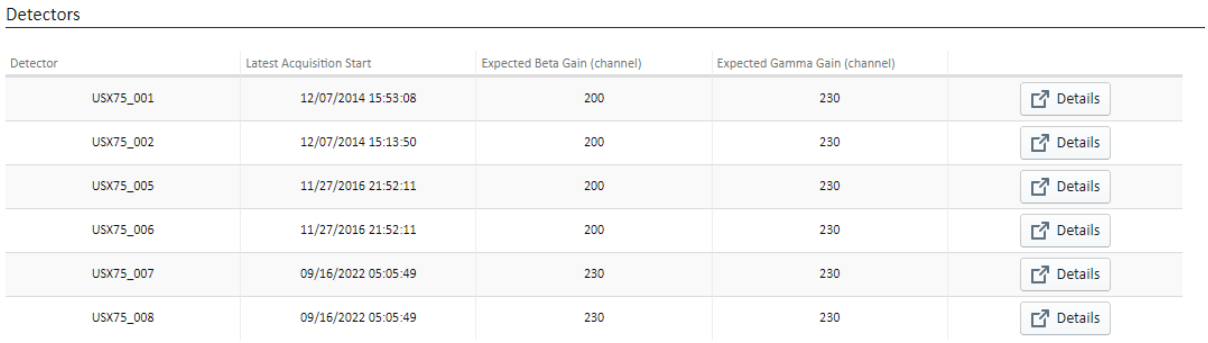


Figure 11-14. Station Detectors List

Clicking on the Details button for a detector opens the Detector page in a new tab. See section 11.3 for details on detector configuration.

11.2.3.5 Assign Tags

The assign tags panel can be used to assign tags to many measurements at once. With all the options selected the user can press the Assign Tags button to set the tag for measurements within the selected date range and from the selected detectors.

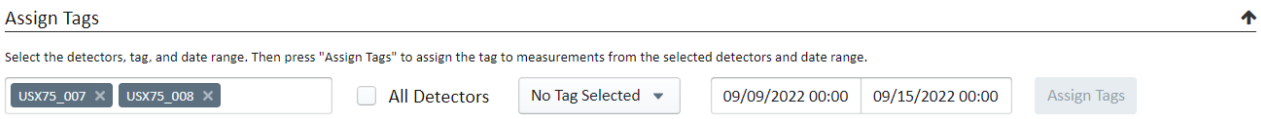


Figure 11-15. Assign Tags Panel

11.2.3.6 Indicator Group Overrides

The indicator group overrides panel allows a user to assign a specific indicator definition group to a station for a specific period. For each override, the Stop Date value is optional, but because overrides cannot overlap, at most one override per station may have no Stop Date. Overrides which have not Stop Date apply from the Start Date forward. To add a new override, click the Add Override button, fill in the form, and click Save. If the override is not valid, an error message will be shown above the table row. To view the indicator group configuration associated with an override, click the view button. To edit an override, click the edit button. To delete an override, click the delete button.

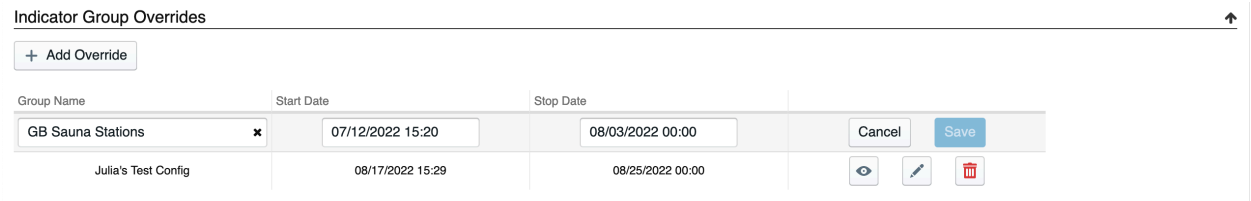


Figure 11-16. Editing an Indicator Group Override

11.2.3.7 Trend Range

The trend range panel displays trend data for the selected station. The default date range is one month. The date range can be modified, and the chart will automatically update. If the station has custom calibrations, they will appear in the Calibration dropdown. After selecting a calibration, the trend charts will update to display data for the selected calibration.

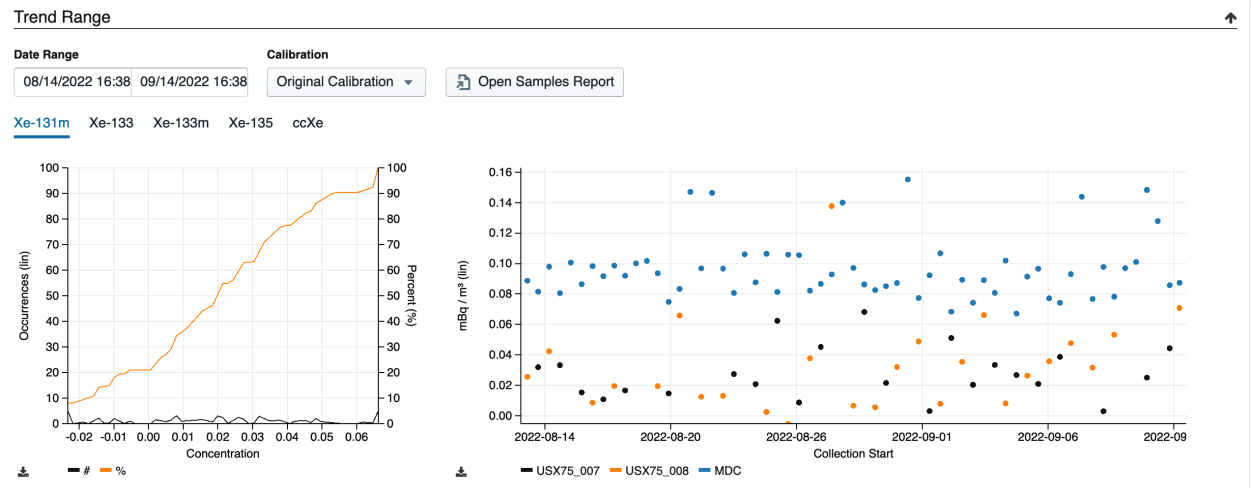


Figure 11-17. Station Trend Range Panel

Clicking the Open Samples Report button opens a dialog with tabular data for the selected calibration. Within this dialog one or more calibrations can be selected. Click the Download Samples Report button to download trend data for all selected calibrations in comma- separated value (CSV) format.

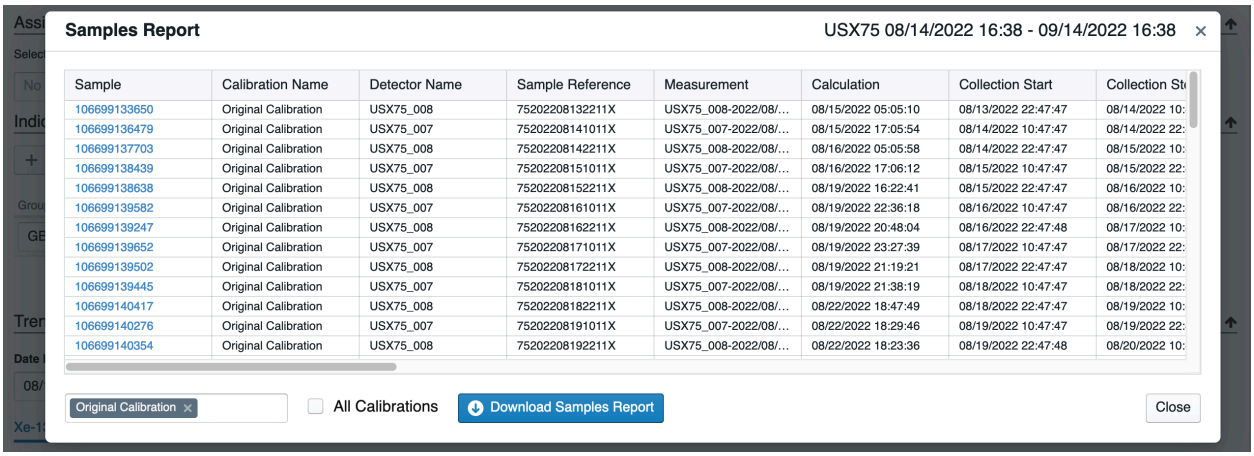


Figure 11-18. Trend Data Sample Report

11.2.3.8 Indicator Quality

On the station detail screen (see section 9.1 for full station detail documentation), the Indicator Quality section (formerly Station Health) displays historical indicator quality data. Similar to the Station Performance Overview graph the Indicator Quality section contains a graph showing indicator quality over time. The quality indicators are summarized in the topmost indicator, the Station Overview. By default, the chart displays data over the past 30 days with the indicators ordered alphabetically. The desired calibration can be selected using the calibration dropdown. Hovering over an individual data bar shows details the indicator, including its value and status—Bad, Fair, Good. Clicking on an individual data bar will open the related measurement in a new tab. Note that white spaces will appear when no data is available for a given period. Data for one or more indicators can be downloaded in the CSV format using the download tool above the chart.

Figure 11-19. Indicator Quality

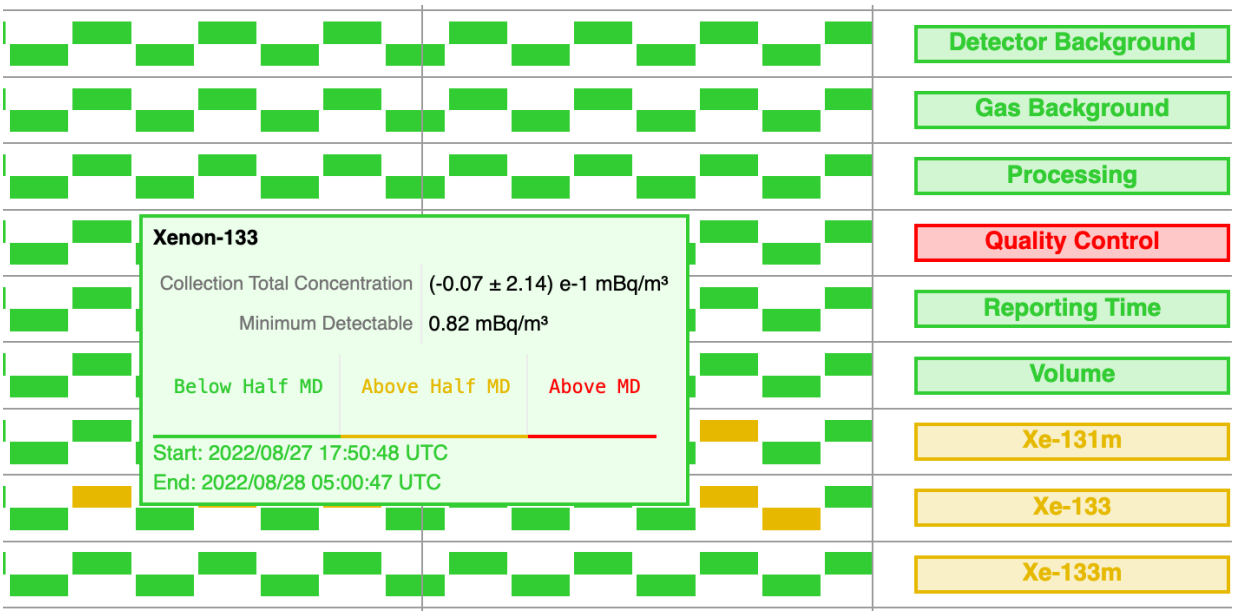


Figure 11-20. Indictor Quality Hover

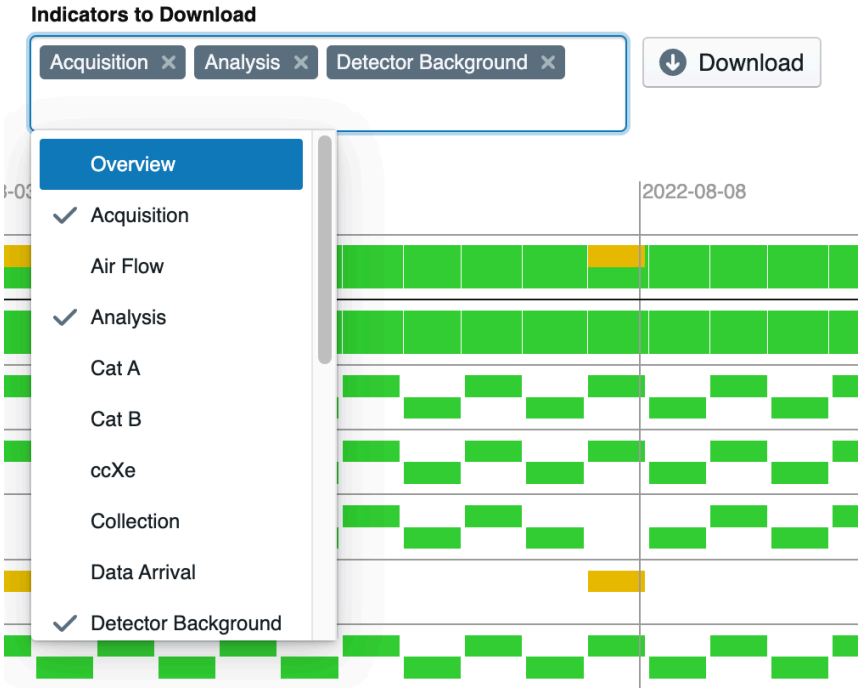


Figure 11-21. Indicator Data Downloader

11.3 Detector Configuration

The Detector page (Figure 11-22) can be reached by clicking a detector link from the Station page or by clicking the Details button for a detector from the Station page. The Detector page allows viewing and configuration of detector-specific settings including expected gain values, queued measurement recalculations, assigned calibrations, and indicator group overrides.

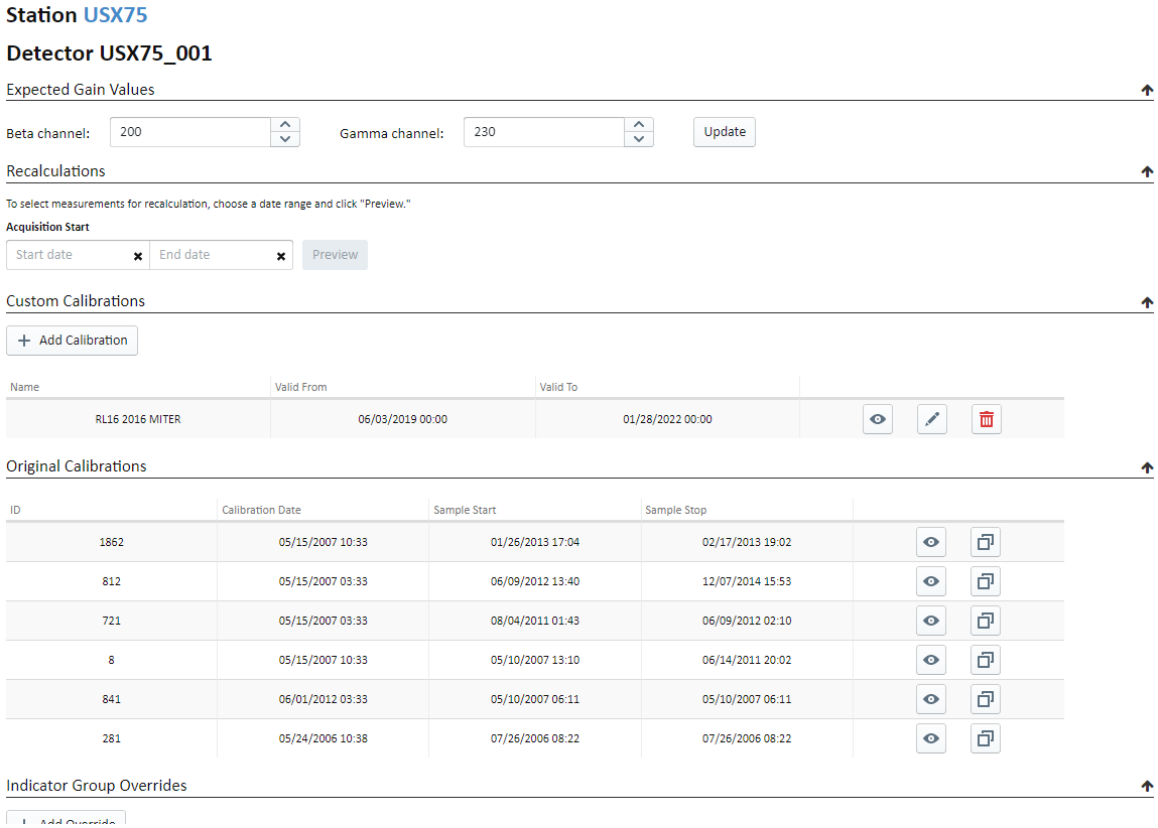


Figure 11-22. Detector Page

Measurement recalculation and indicator group overrides work the same for detectors as they do for stations. For information about these panels, see sections 11.2.3.3 and 11.2.3.6 respectively.

11.3.1 Adding a Custom Calibration

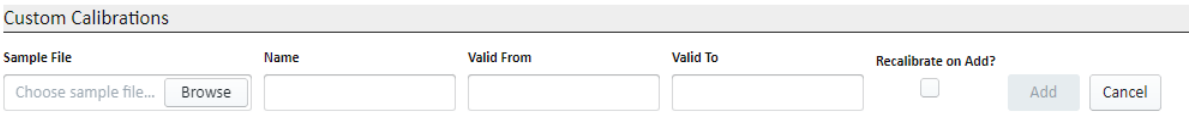


Figure 11-23. Adding Custom Calibration

Clicking the Add Calibration button allows the user to upload a measurement file containing the custom calibration, set a descriptive name, and set the period for which the custom calibration is valid (Figure 11-23). Note that “Valid From” is required while “Valid To” is optional. The default for “Valid

From” is the current date and time. If “Valid To” is left blank, then the calibration will be utilized with all measurements after the “Valid From” date.

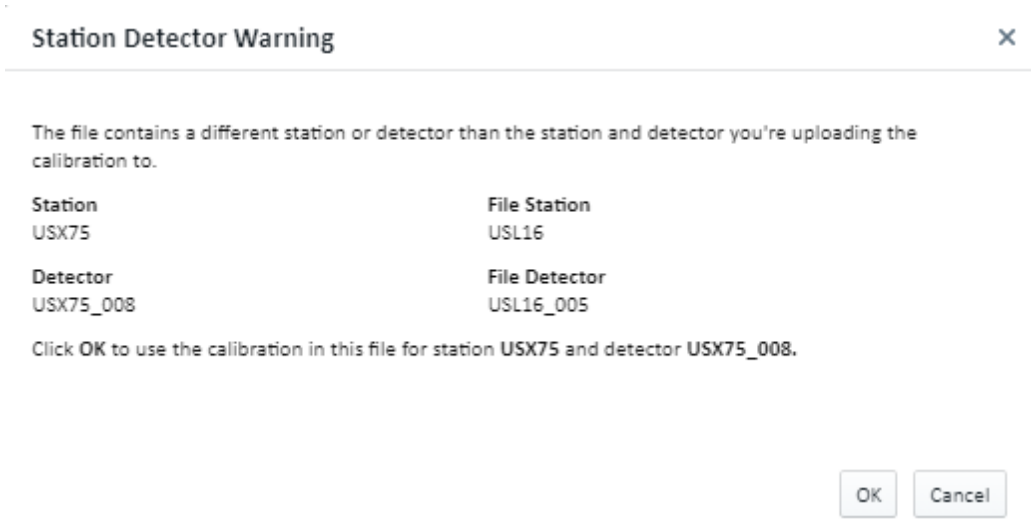


Figure 11-24. Mis-match Detector Dialog

If the user attempts to assign a calibration from a different system or detector, a dialog will ask the user to confirm that they want to import the mis-matched calibration (Figure 11-24). Selecting OK will confirm this choice.

Once required entries are filled, the checkmark button is enabled. After clicking the checkmark button, the file is uploaded, parsed, and inserted into the database, and the page is updated with the uploaded calibration (Figure 11-25).

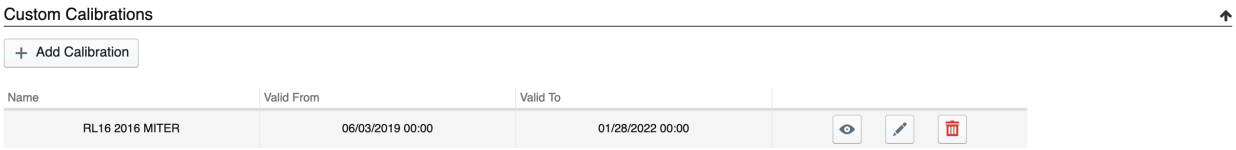


Figure 11-25. Uploaded Detector Calibration

After uploading a custom calibration, whenever measurement files are analyzed (either upon import or user-triggered recalculation), if the measurement’s acquisition start time falls within the custom calibration’s valid period, then additional analysis will be performed on the measurement with the custom calibration, and its results may be viewed on the Sample Review page by selecting the calibration from the Calibration dropdown select.

11.4 Quality Indicator Group Configuration

On the Quality Indicator Group Configuration page, users can change the configuration of limits for station quality indicators (see section 7.2 for a definition of indicators). Start by going to the Indicator Config menu item (found in the Administrator tab on the header). Select a configuration to view or modify using the Configuration drop-down menu.

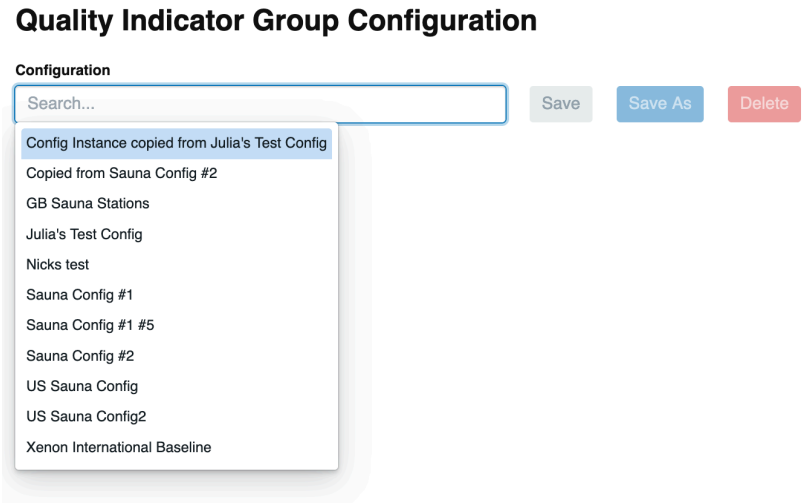


Figure 11-26 Indicator Group Selection

For each quality indicator, users can adjust the limit label, and adjust the limit value. If the quality indicator value crosses a limit value, the indicator's status is assigned within that limit. See Figure 11-27 for an overview of the screen.

Users can also toggle email notifications for an indicator's limits. If a quality indicator value crosses a limit and the email notification is enabled for that limit, a notification is sent to the configured email address at the time of calculation. See Figure 11-28.

Once configuration is complete, a user can save the configuration by clicking the Save button or save a new configuration using the Save As button. A quality indicator group configuration can be assigned to a station using the station indicator group override panel on the Station page or a detector using the detector indicator group override panel on the Detector page, see section 11.2.3.6.

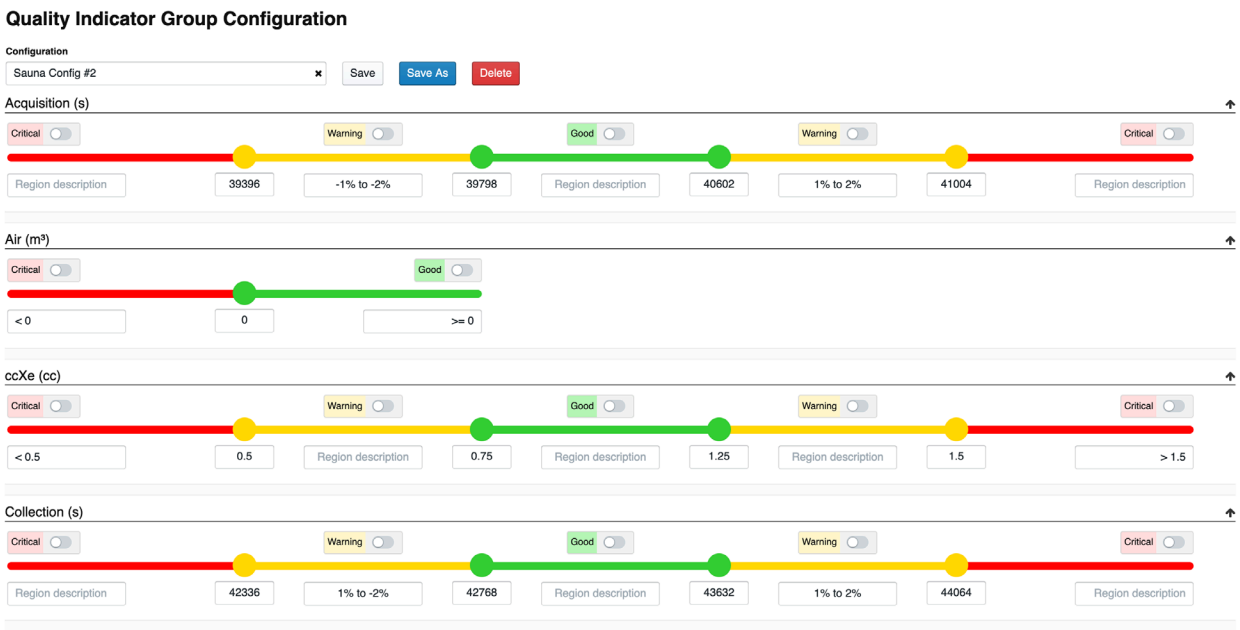


Figure 11-27. Quality Indicator Group Configuration

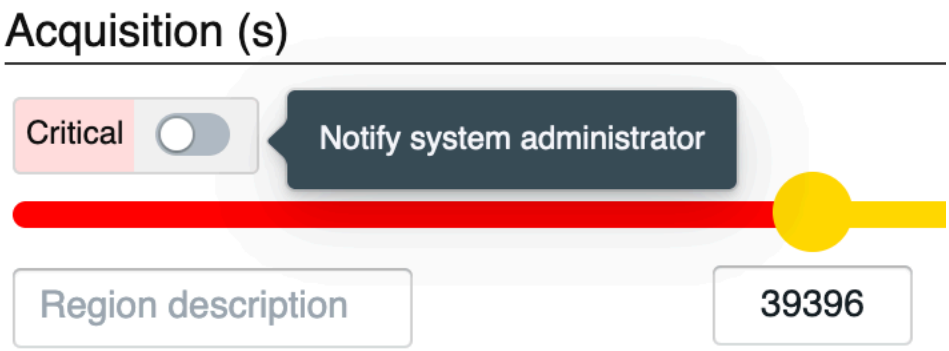


Figure 11-28. Toggle Email Notifications

11.5 Users

The Manage Users screen is used to assign roles to users which controls which review queues they have access to (Figure 11-29).

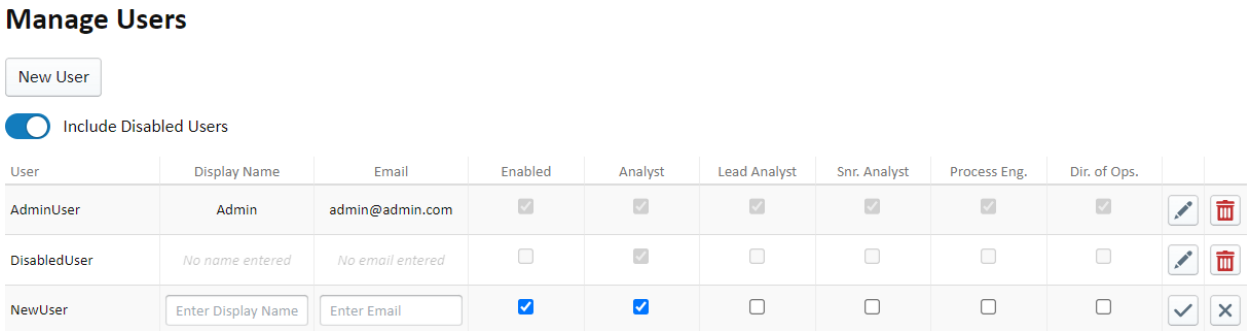


Figure 11-29. Manage Users

The first column shows common name of the user, hovering the mouse over the name shows the full name of the user if it is different.

The checkboxes can be used to select the roles (Analyst, Lead Analyst, Senior Analyst, Processing Engineer, or Director of Operations) a user is assigned. The Analyst role will be automatically added to a user granted the role(s) Lead Analyst, Senior Analyst, Processing Engineer, or Director of Operations. The Lead Analyst role will be automatically added to a user granted the Director of Operations role. Press the edit button to edit the roles. Changes to the roles can either be saved or canceled with the buttons on the right. Inherited roles will not be unchecked along with the heir role (e.g. unchecking Lead Analyst role will not uncheck the Analyst role). The "Enabled" role controls access to Watchmen; any user not enabled will be shown an error when trying to access Watchmen. A user is not assigned a role, besides "Enabled," will be able to view measurements, but will not be capable of reviewing them. To remove an existing user, click the trash can to the right of the username and confirm the deletion in a dialog. Only users without references (no assigned or reviewed measurements) in the Watchmen application can be deleted.

Users can assign a display name and email address. The display name will be displayed for the user on the menu. The email address is used for email notifications such as those from the Quality Indicator Group Configuration page.

New users added via New User button, or through the web request, will not be enabled, nor will they be assigned roles automatically. These new users will be filtered to the top of the users list. Additionally, a bell icon will be added to the Administrator's menu, and the Users menu item to notify administrative users that a user is awaiting a role. Enabling the user, or assigning them roles, will turn off the notification.

11.6 Tags

The Tags page is used to create tags which can be assigned to measurements and stations. These tags can be used to categorize or flag measurements.

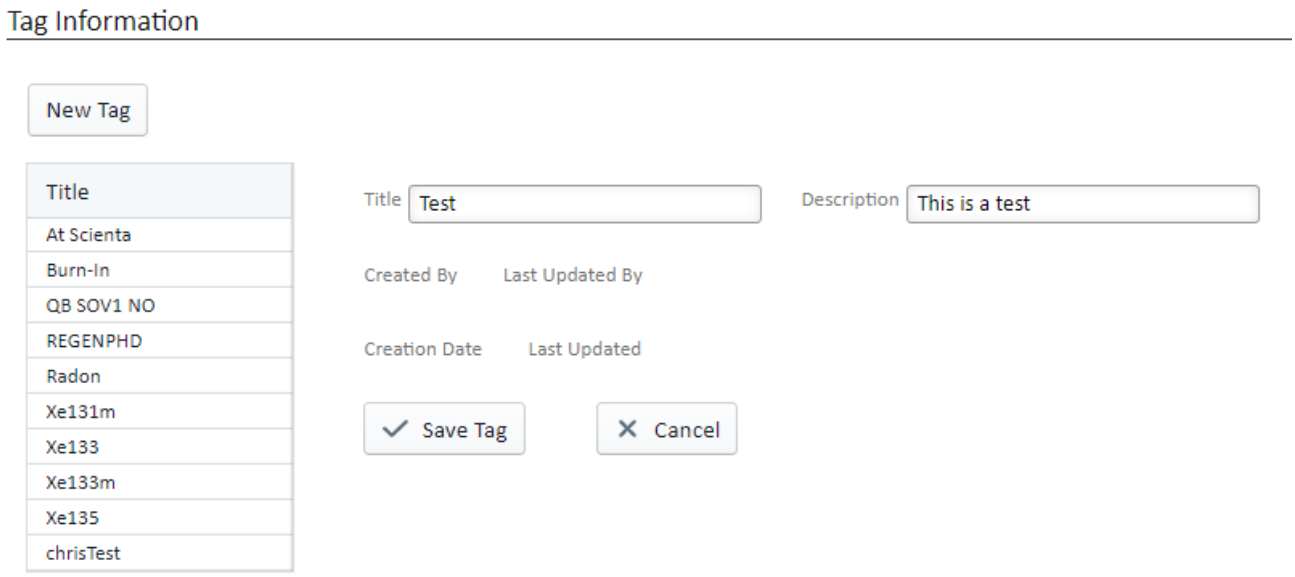


Figure 11-30. Creating Tag

The user can press the New Tag button to create a tag. After entering a title, the user can save the tag.

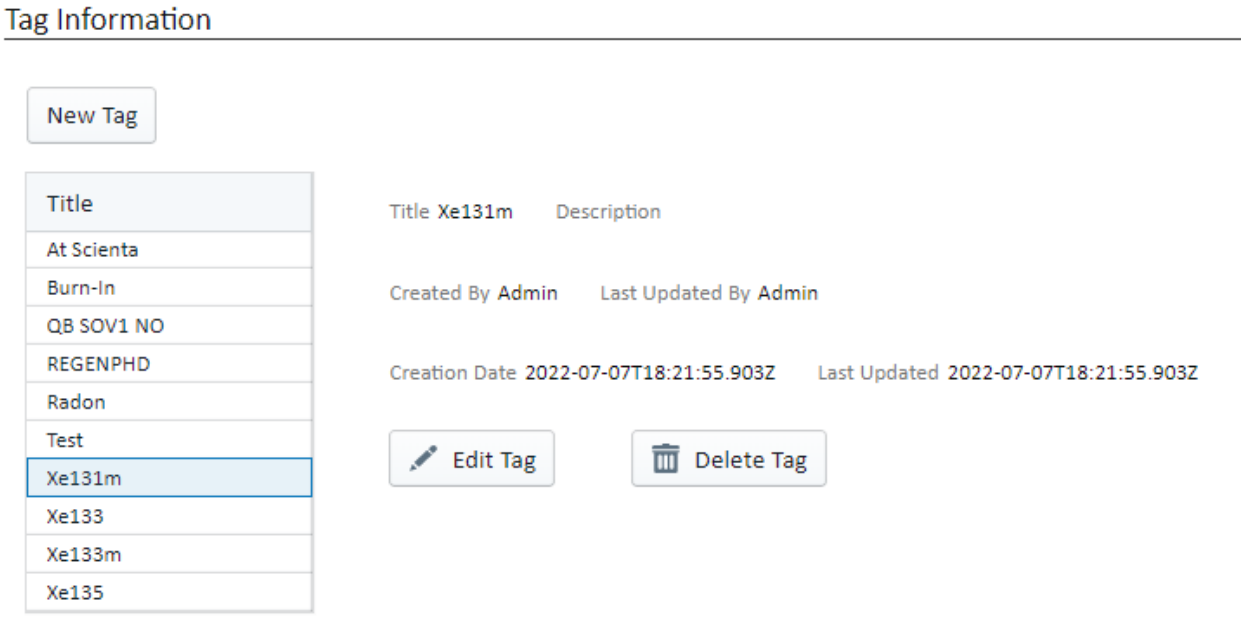


Figure 11-31. Editing or Deleting Tag

The tags can be edited or deleted by clicking on the tag in the table.

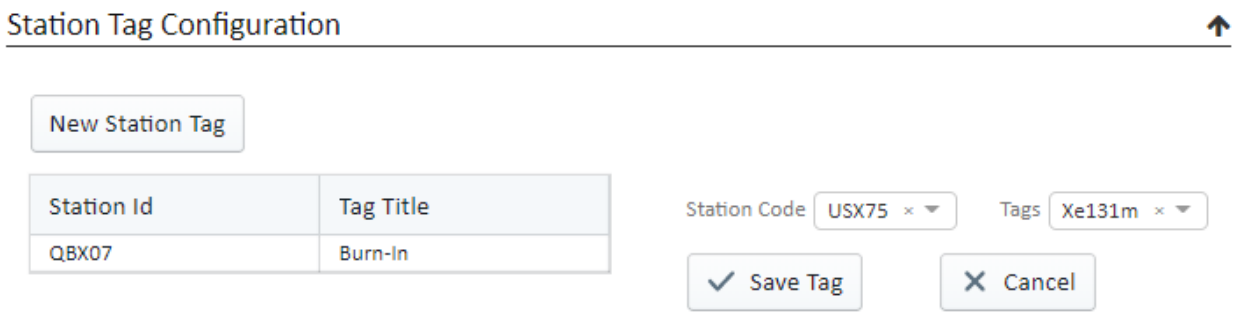


Figure 11-32. Creating Station Tag

The user can also assign tags to stations. To assign a station tag they must select a station code and tag and then press the save tag button.

11.6.1 Related Sections

To learn how to assign tags to many measurements at once see the Assign Tags section.

To learn how to filter by tags on the search page see the Searching section.

To learn how to assign tags to a measurement see the Assigning Tags to a Measurement section.

12.0 Information

By clicking on the question mark in the menu bar (), users can access the Information screen. This screen displays information about the Watchmen application. The information sections are defined in the following areas. See Figure 12-1 for an illustration of the information screen.

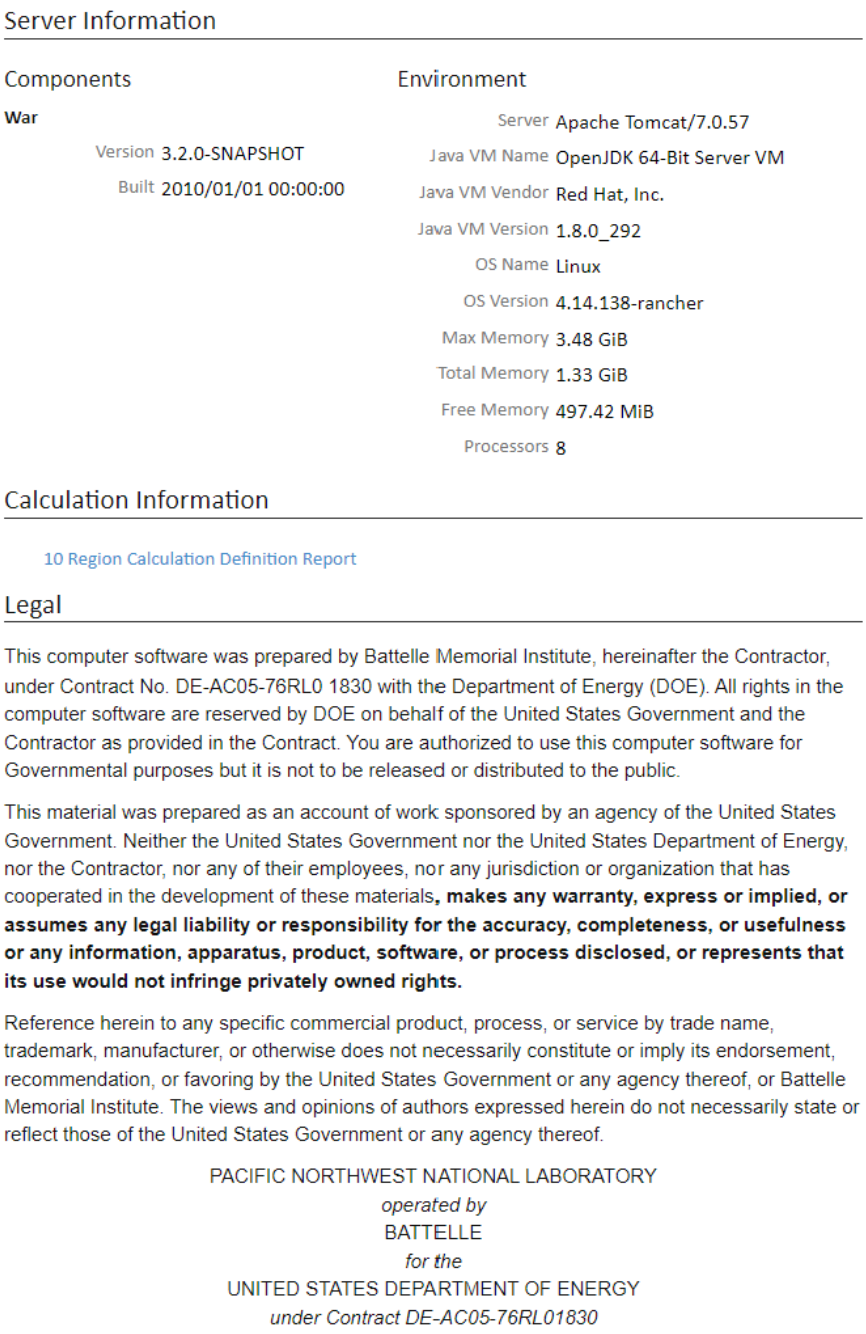


Figure 12-1. Information Detail

12.1 Server Information

This identifies information about the web server hardware and versioning, as well as the software build date.

12.2 Calculation Information

This is a link to a PDF document that illustrates the 10-region calculation process for Watchmen.

12.3 Legal

This section is a legal software notice from PNNL operated by Battelle, sponsored by the U.S. Department of Energy.

12.4 Developer Information

This section contains a link to the development REST API for documentation.

13.0 Context Parameters

This section documents the parameters, required and optional, utilized by the application. Required elements are in bold text. Parameters that may be shared by artifacts if deployed on the same instances are denoted by X in shared column. Further details regarding context parameters, and their setting, can be found in the system administrator's guide.

13.1 Mothman Context Parameters

The following are the parameters that are utilized by the Mothman artifact.

Table 13-1. Mothmen Context Parameters

Parameter	Description	Shared
gov/pnnl/watchmen/host	URL where Webviewer app is deployed	
gov/pnnl/mothman/archiveDir	Directory to store processed samples	
gov/pnnl/mothman/watchDir	Directory to monitor for new samples	
gov/pnnl/mothman/errorDir	Directory to store samples that cannot be processed	
gov/pnnl/mothman/duplicateDir	Directory to store samples that have already been processed	
gov/pnnl/mothman/pluginDir	Directory where plugins are located	X
gov/pnnl/mothman/threads	Number of threads available to application (default: 1)	
gov/pnnl/watchmen/jdbc/mainDB	Database connection configuration	X
gov/pnnl/mothman/dbDialect	Database dialect (default: "oracle")	
gov/pnnl/mothman/indicator/emailTo	Recipient's email address for indicators; may be a comma separated list of email addresses	
gov/pnnl/mothman/smtp/host	Email server hostname	
gov/pnnl/mothman/smtp/prt	Email server port	
gov/pnnl/mothman/smtp/encrypt	Sets encryption type to "SSL" or "TLS", else none	
gov/pnnl/mothman/smtp/from	Sender's email address	
gov/pnnl/mothman/smtp/to	Recipient's email address for standard communications; may be a comma separated list of email addresses	
gov/pnnl/mothman/smtp/auth	Email server require authentication: "true" or "false"? If not authenticated, credentials are ignored	
gov/pnnl/mothman/smtp/user	Username for email server authentication	
gov/pnnl/mothman/smtp/password	Password for email server authentication	

13.2 Webviewer Context Parameters

The following are the parameters that are utilized by the Webviewer artifact

Table 13-2. Webviewer Context Parameters

Parameter	Description	Shared
gov/pnnl/watchmen/trustedHeaderUsername	Parameter containing current user's username	
gov/pnnl/watchmen/trustedHeaderDisplayName	Parameter containing current user's display name	
gov/pnnl/watchmen/testingUsername	Overriding username for testing	
gov/pnnl/mothman/pluginDir	Directory where plugins are located	X
gov/pnnl/watchmen/melusine/xeconScript	Full path to Xecon script	
gov/pnnl/watchmen/reportDir	Directory to store Reviewed Radionuclide Report	
gov/pnnl/watchmen/jdbc/mainDB	Database connection configuration	X

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