Site Operator Training

This course covers the on-going (QREST) tasks performed by a Site Operator, including verifying stable and within-limits equipment operations (or no-contraindicating codes/values in manually uploaded data), QC check data entry, uploading supporting documentation, and generating reports. This training course is limited to QREST tasks, and references to documentation and procedures are all suggestions for consideration. This training assumes the Site Operator is the Level 1 Reviewer, but the specific L1 Review tasks, including documentation and excerpts from the USEPA's guidance for L1 reviews in the USEPA air data best practices guide, are described in a separate course in this training.

Lesson 1: Overview of Site Operator Training

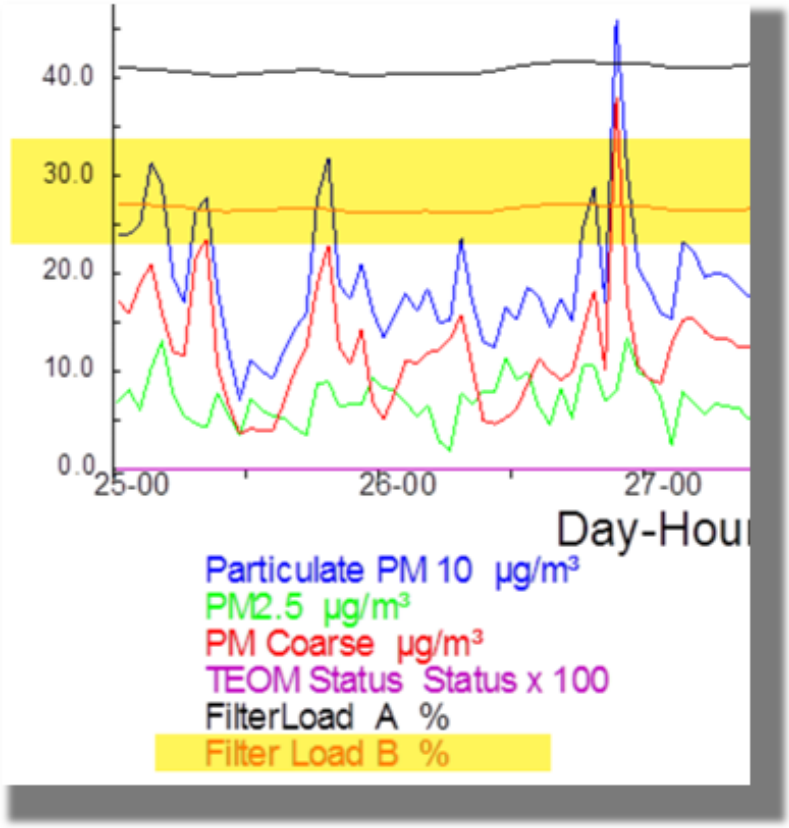
Basic information on how to conduct routine daily data review.

Lesson Step 1.1

The role of the site operator is the most important -- without someone paying attention, equipment may continue drawing power, but be producing no valid data. QREST assumes that the Site Operator will conduct the Level 1 Review, but a Tribal Agency can assign someone other than the site operator as the Level 1 reviewer at any time.

These descriptions cover how to use QREST, but Site Operators will also need to document their system-specific activities such as shelter temperature, filter loading, etc.

Note that supporting parameters such as filter loading can be mapped to QREST, as well as the parameter data. The QREST Global Admin can add such parameters to the global list, and then that parameter can be added by the Organization (Tribal Agency) Admin. QREST can produce time series graphs for comparison of such custom parameters to parameter data. (QREST can be used for non-AQS data, but obviously not send such parameters to AQS.)



Because the site operator will be verifying stable and within-limits equipment operation, their documentation is the foundation of all the subsequent data reviews. If it is possible to poll (or import) supporting parameters such as filter loading or flow rate, that data is also invaluable in supporting the validity of the parameter data. Alternatively, such supporting parameters may provide clear evidence of the

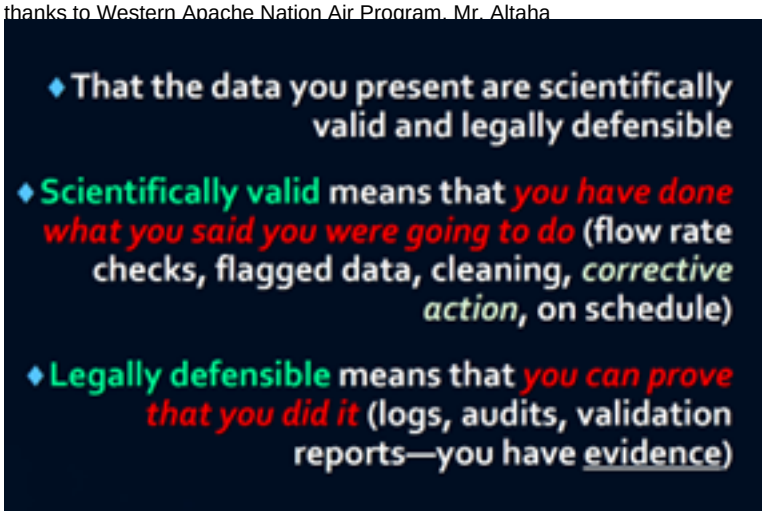
invalidity of some data.

It is important that the activities of the site operator be supported by management. It can be surprising to learn that well over half a site operator's time can be spent documenting their operations and managing the data they produce.

Logbooks are required tools for any data gathering operation. Site operators will often have a field log, generally left in the shelter, and a data logbook, kept with the site operator's computer. This course cannot be comprehensive regarding data management, but principles used to manage legally-defensible data include the following:

- Plan to be audited, and design your files so that you will be able to produce evidence that all QAPP-required operations were conducted during the gathering of this data, such as flow rate checks, and the results of such operations are logged and accessible to the Organization's data reviewers,
- If you did not write it down, it did not happen (in effect, if your data are challenged), and handwritten logs should be complete enough for another site operator to completely understand the activities,
- Try to never edit original data files, but only query data from them (using excel power query, R, QREST, Tribal Data Toolbox), and never edit original data files,
- Every summary statistic and hourly concentration must be reproducible by another reviewer, requiring all steps to be documented, so that someone could go from original data records and produce identical summary statistics and hourly concentrations,
- The judgments made by the reviewers regarding the validity or invalidity of the data should be supported by evidence, so that these decisions are also reproducible (or at least understandable).

thanks to Western Apache Nation Air Program, Mr. Altaha

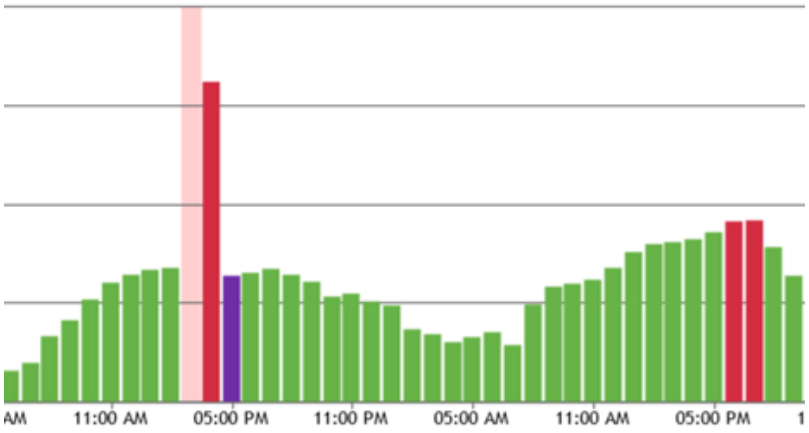


Lesson 2: Verifying Level 0 Validation Limits

Before reviewing data, it is useful to check the Level 0 limits, so that when you review data and see some values flagged in the data and shown in colored bars in the graph, you will quickly understand why flags were applied. It may be useful to print out these limits or save them to a windows or actual paper sticky note. The Tribal Agency Admin can access logs of changes to Level 0 Validation Limits.

Lesson Step 2.1

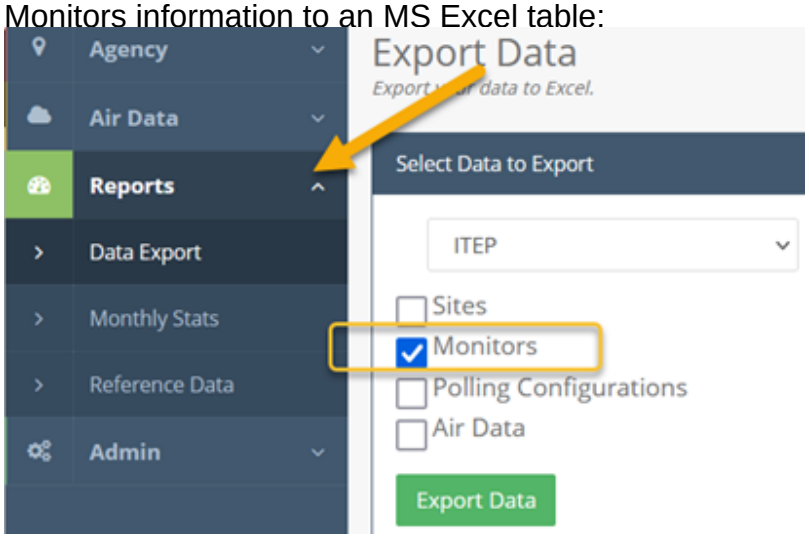
Verify Level 0 Validation Limits:



QREST charts present data by color in accordance with the Level 0 criteria that have been established for each parameter. Note that QREST does provide default criteria, but until the Organization's Admin sets these Level 0 (L0) criteria to either the defaults or user-set criteria (and for both hourly and 5-minute values), QREST does not apply an L0 criteria.

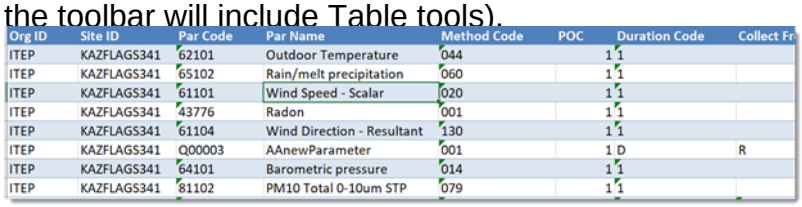
Red bars represent values that are greater than the Max or less than the Min, purple bars represent values that changed (jumped) by more than the Jump criterion, and gray bars represent values that are still being processed or do not include enough information to be valid for the hour. A background pink color represents an hour with an AQS null code.

The **fastest way to access what Level 0 criteria have already been set for all monitors at the site at once** is to use the **Reports** feature, and export the Monitors information to an MS Excel table:



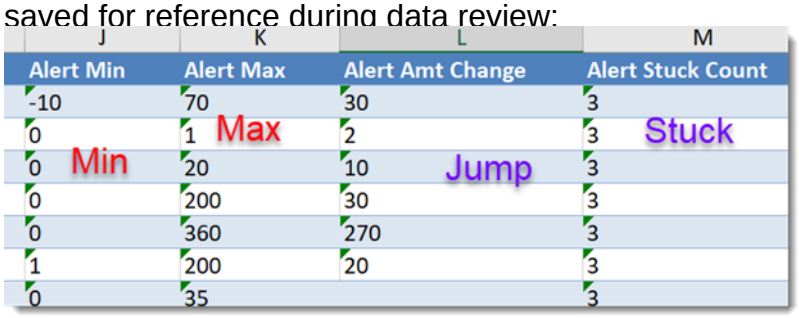
This export will produce an MS Excel table, which (depending on your browser settings) may appear as a new item in a popup downloads bar at the bottom of the browser window.

Note that the exported file is an MS Excel **Table**, which is different than an excel range (you can easily identify Excel Tables because their default formatting is usually something like that shown below, and if you click anywhere within the Table, the toolbar will include Table tools).



Org ID	Site ID	Par Code	Par Name	Method Code	POC	Duration Code	Collect Fr
ITEP	KAZFLAGS341	62101	Outdoor Temperature	044	1	1	
ITEP	KAZFLAGS341	65102	Rain/melt precipitation	060	1	1	
ITEP	KAZFLAGS341	61101	Wind Speed - Scalar	020	1	1	
ITEP	KAZFLAGS341	43776	Radon	001	1	1	
ITEP	KAZFLAGS341	61104	Wind Direction - Resultant	130	1	1	
ITEP	KAZFLAGS341	Q00003	AAnewParameter	001	1	D	R
ITEP	KAZFLAGS341	64101	Barometric pressure	014	1	1	
ITEP	KAZFLAGS341	81102	PM10 Total 0-10um STP	079	1	1	

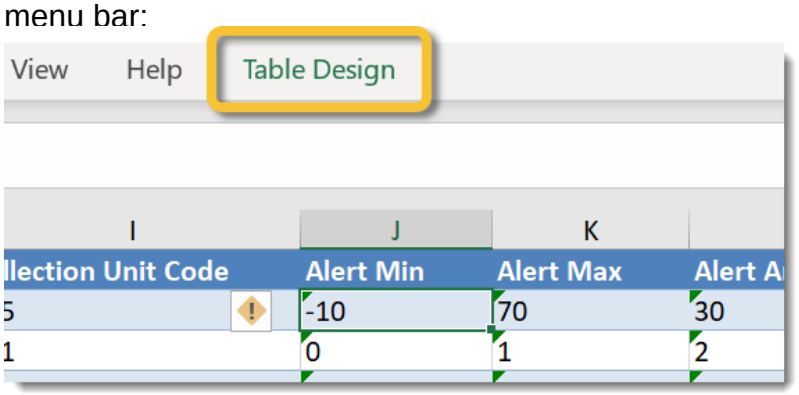
The Level 0 limits for all parameters are shown in the exported table, which can be saved for reference during data review:



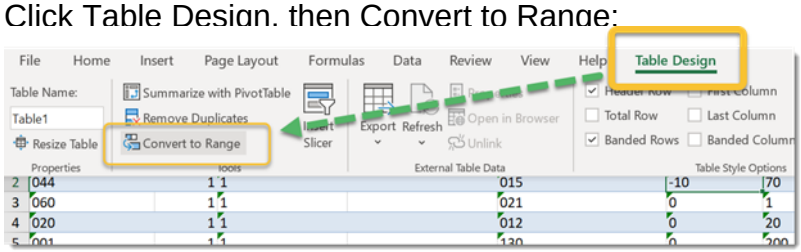
J	K	L	M
Alert Min	Alert Max	Alert Amt Change	Alert Stuck Count
-10	70	30	3
0	1	2	3
0	20	10	3
0	200	30	3
0	360	270	3
1	200	20	3
0	35		3

Max
Min
Jump
Stuck

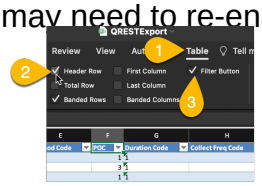
Note that in excel, if you want to edit the table, or otherwise treat it as a regular excel range, click anywhere in the table, and Table or Table Design appears in the menu bar:



Click Table Design, then Convert to Range:

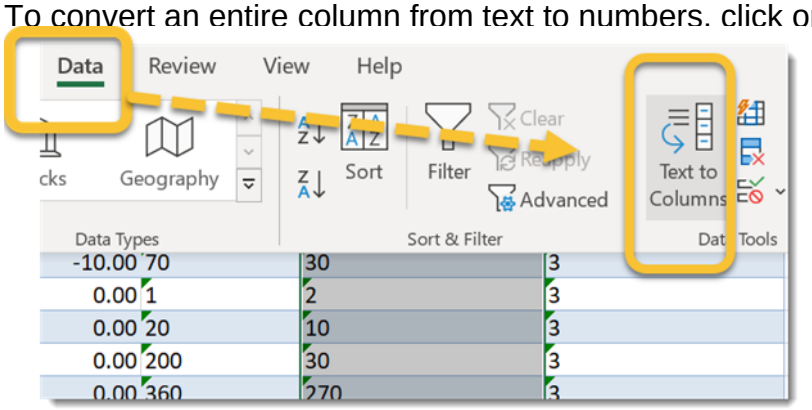


If you want to sort by each header, that can be done in either the excel Table or the range. (If the drop downs next to each header do not show up in the Table, you may need to re-enable them:



Note that some information is exported formatted as as text rather than as numbers, as indicated by the green triangle in the upper left of the cells. To convert individual cells from text to number, click on the green triangle.

To convert an entire column from text to numbers, click on Data, Text-to-Columns:



Follow the wizard, keeping the default of Tab delimited, to convert text to numbers. Note that these Level 0 criteria for automatic flagging can be edited as appropriate throughout the year. It is most useful if the alerts really do represent a condition that requires investigation, which generally requires tweaking for different seasons and conditions.

Lesson Step 2.2

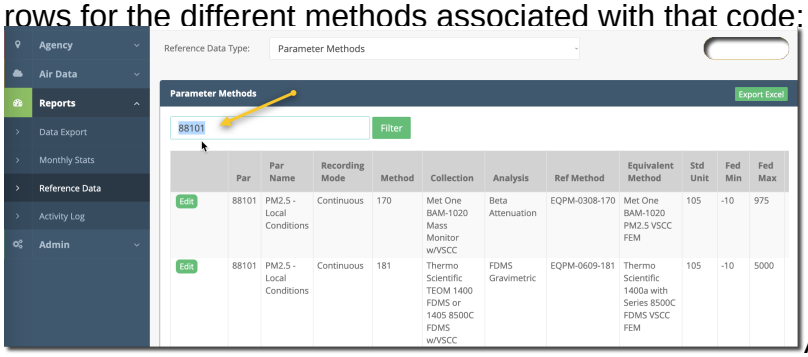
Interpreting Excel Table of Level 0 Criteria:

First, be sure to note that if you are managing both five minute and hourly data, verify that the limits you are looking at (hourly or M) are relevant to the data you are reviewing.

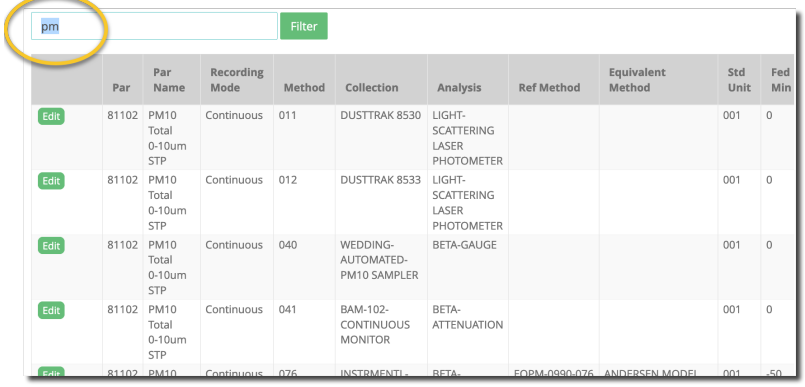
Second, to understand the codes in this file or elsewhere regarding your data, codes can be looked up in QREST by going to

Reports --> Reference Data

The search box can be used to search for a code, as is shown, providing all the rows for the different methods associated with that code:



Alternatively, the search can be for alpha characters, such as PM:



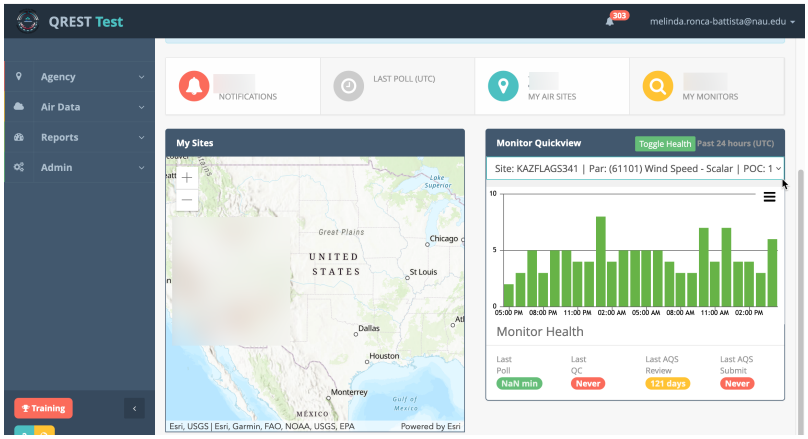
NOTE that it may take a second for the filtering to be applied, as it is a very long list of parameter methods.

Lesson 3: Reviewing Raw Data Charts

This lesson reviews how to use the Raw Data feature to access data, navigate and zoom in and out in the charts, what the color coding signifies, and how to export or print a chart. The SOP Raw Data QuickLook references these procedures.

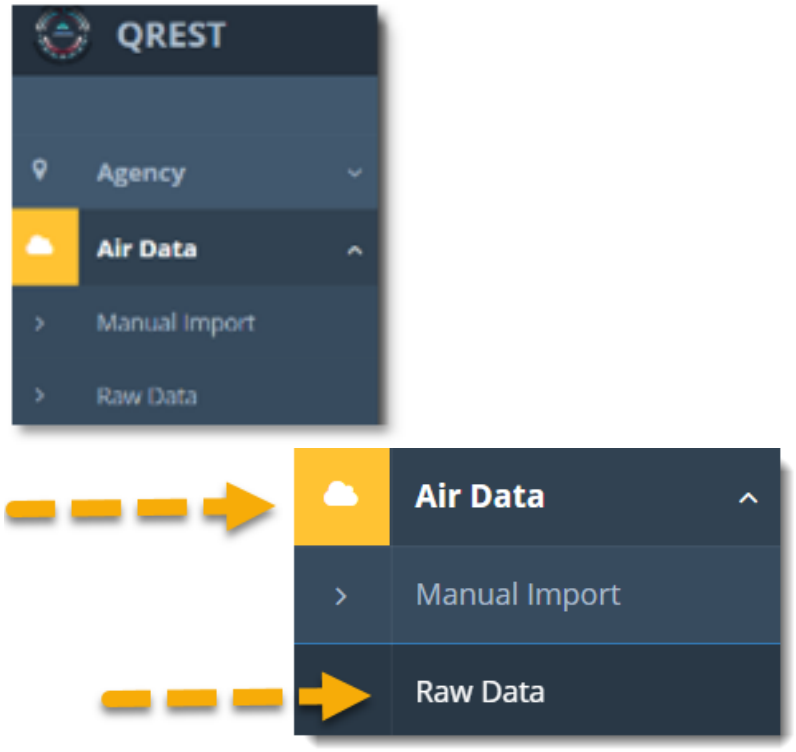
Lesson Step 3.1

Reviewing raw data can be conducted as frequently as useful; for example, the ITEP site operator checks the ITEP met station raw data at least once a day. The Monitor Quickview on the Dashboard provides a snapshot of the most recent 24 h of data:

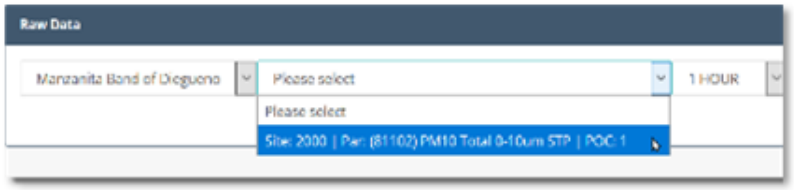


For more detail and more than the most recent 24 h of data, access the Raw Data feature:

Navigate to Air Data -> Raw Data:



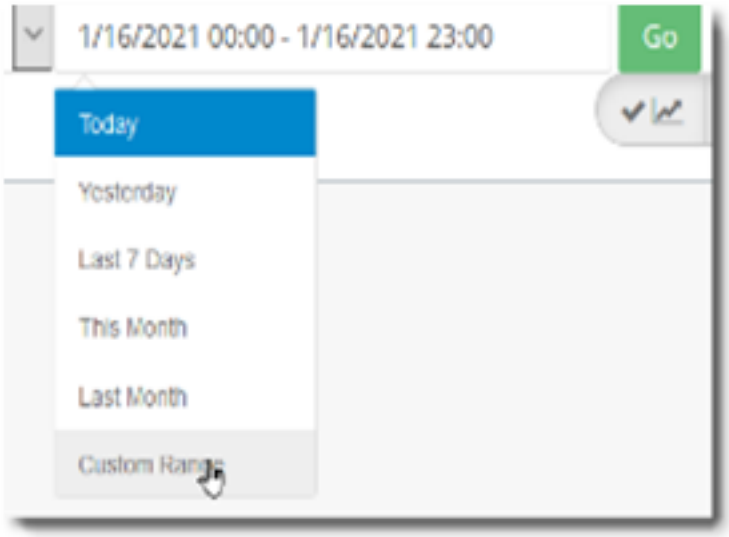
Select Agency, Parameter, time interval (5-min or hourly data), and the time specified as either local or UTC.



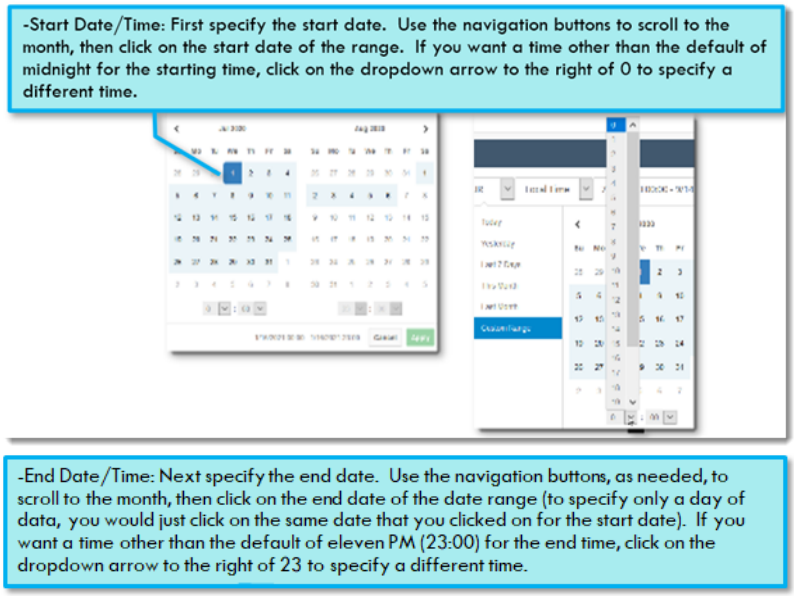
Raw data reviewers often look at the last 24 h as hourly values first, and then if there are any surprises or questions, looking at the 5 m values in those time periods with unusual values. (Keep in mind that looking at 5 m values in charts for long time intervals, such as months, takes some time to populate in QREST and in your browser.)

The default datetime interval is set as today. There are several options for specifying a different datetime interval. Options for selecting datetime intervals include:

Option A: Click anywhere in the datetime interval box to open a selection list. Selecting Yesterday, Last 7 Days, This Month, or Last Month from the selection list will populate the datetime interval box.



Option B: Click anywhere in the datetime interval box to open a selection list. Selecting Custom Range from the selection list will open a calendar option.

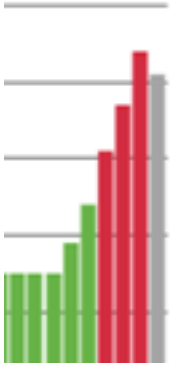


Option C: Dates and Times can also be typed directly into the datetime interval box. If using this option, it is best to highlight the segments of the default dates/times you need to change and then type over them.

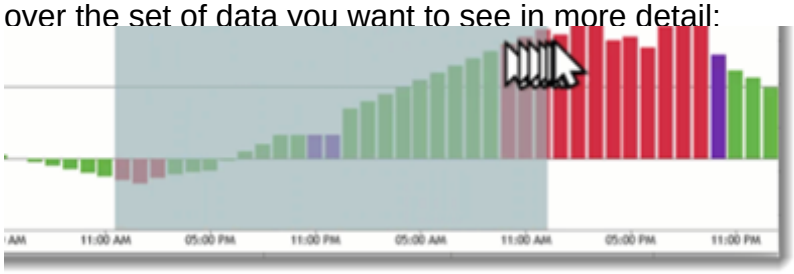
Click Go to generate the chart and table of the data selected. Alternately, you can press Enter on your keyboard while your cursor is in the datetime interval box to generate the chart and table of the data selected.

Lesson Step 3.2

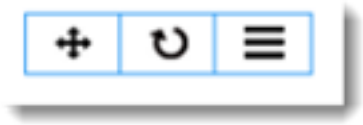
Navigating charts: The charts are color coded to help you quickly identify values that might warrant further review.
Values outside the min/max Level 0 criteria are displayed as red bars, gray bars represent "stuck," or repeated identical contiguous values, and purple bars represent values that "jump" from one record to the next by more than your preset Level 0 criterion.
In addition, records that are incomplete or still calculating hourly averages are shown as gray bars:



To zoom into a portion of the chart, hold down mouse button while sliding the cursor over the set of data you want to see in more detail:

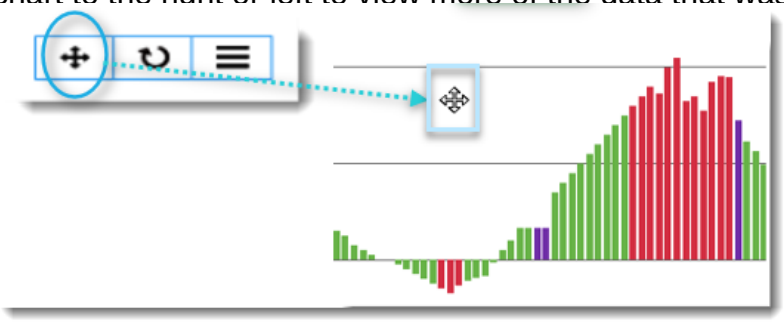


Once the chart has been zoomed, 3 tools appear in the upper right of the chart:



NOTE: If the view of your screen is set large, so that you can see it more easily, it may be that the print/export button overlays this zooming tool button. Click control-minus to make everything visible (and smaller).
After you have zoomed in on a portion of the data, to reset the chart to your original datetime selection, click the "reset" button, the middle tool, in the upper right corner of the chart.

To pan within the chart, click the pan button (the icon on the left, with the 4-directional arrows), which turns the cursor into the pan icon, and you can drag the chart to the right or left to view more of the data that was in your original selection.



Lesson Step 3.3

Printing or exporting charts:
To save the chart so that you can import into another document, or send to your default printer, click the three horizontal bars:

Lesson 4: Reviewing Raw Data Tables

This lesson describes how to review Raw Data tables (shown under the charts in the default view), as part of the routine checking of data values, either imported or automatically polled. The SOP Raw Data QuickLook references these procedures.

Lesson Step 4.1

Hiding the data table or chart: In either the Raw Data or Data Review tool, the default view is the chart in the top of the screen and the data table in the bottom part of the screen. To view only the chart or only the table, click on the relevant icons to unselect them:

If the table icon is unchecked, only the chart is shown.

If the chart icon is unchecked, only the table is shown.

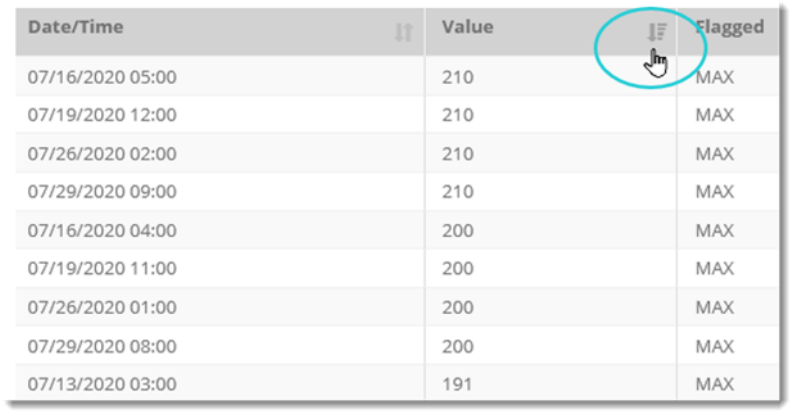
Lesson Step 4.2

The Level 0 flags are also shown as a column in the data table:

Date/Time	Value	Flagged
08/01/2020 13:00	180	MAX
08/01/2020 14:00	25	JUMP
08/01/2020 15:00	25	
08/01/2020 16:00	25	
08/01/2020 17:00	25	STUCK

Lesson Step 4.3

Columns in the table can be sorted by clicking the faint gray up/down arrows to the right of every header.

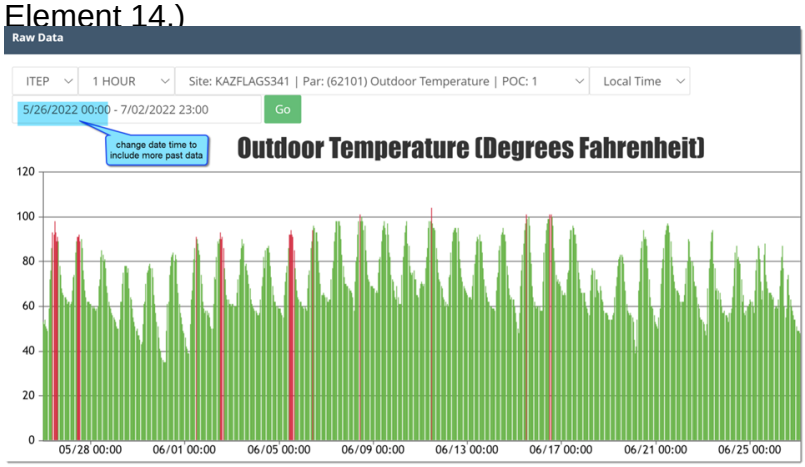


Date/Time	Value	Flagged
07/16/2020 05:00	210	MAX
07/19/2020 12:00	210	MAX
07/26/2020 02:00	210	MAX
07/29/2020 09:00	210	MAX
07/16/2020 04:00	200	MAX
07/19/2020 11:00	200	MAX
07/26/2020 01:00	200	MAX
07/29/2020 08:00	200	MAX
07/13/2020 03:00	191	MAX

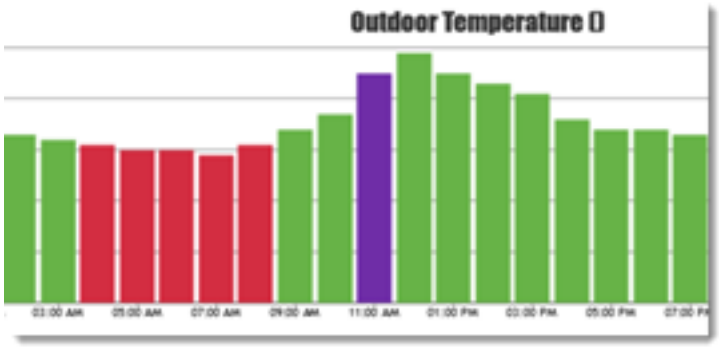
Once sorted, the arrow beside the sorted column header turn a darker gray.
This example was sorted by Value: click again to toggle min to max.
Note that if you have the chart open in the top panel, it will not change if you sort values in the table (but if you lasso a subset of values in the chart, the table will refresh to show only those values).
To see datetime in sequential order again, click on the gray button to the right of the Date/Time header.
Click the sorting buttons to toggle back and forth between earliest/recent, max/min, etc.
Sorting can be applied to the flags, so that all records flagged "Lost," for example, can be seen together in the table.
NOTE that alpha characters in any column will sort differently than numeric values, but repeat toggling will at least group all the rows with a "FEW" flag, for example, together.

Lesson Step 4.4

Reviewing diurnal patterns from 1 parameter: Your best judgment, knowledge of the environment, and the local patterns for each parameter (does this pattern look like yesterday at this time, last week at this time, or last year at this time, for example) and your common sense are the best guide to whether data are "real," or in other words, accurately represent the air quality. (How accurate is specified in the QAPP's Measurement Quality Objectives [MQOs], often in your QAPP's Element 14.)



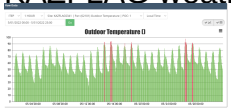
In the case of JUMP flags, use your experience and understanding to evaluate whether the sudden change in value was due to the actual parameter changing, or if there was a malfunction. Zooming into values marked with JUMP in the chart can be very helpful.



In this case, even though the Jump flag was applied, the change looks reasonable in comparison to adjacent values and the normal variation of this parameter at this site by time of day. So, this data was not invalidated based on the daily pattern, at least.

Note that the table under the chart refreshes to include only those values in the chart.

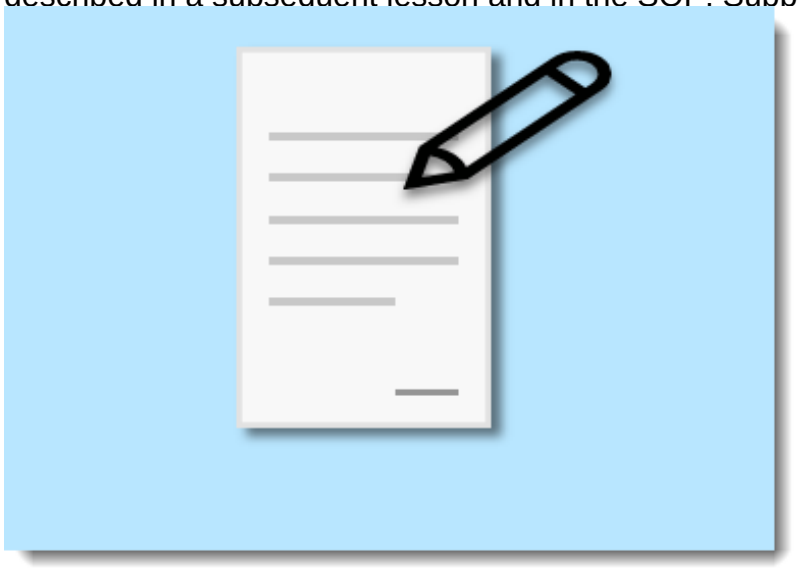
The Raw Data feature in QREST is for quick viewing of 5 m or hourly data, and does not provide a mechanism for adding documentation. In the case of the KAZFLAG weather station for May:



The Site Operator wanted to document their review of the entire month, and their decision that the pattern and range of values from day to day and week to week is reasonable and there is nothing about the pattern that should invalidate the data. To add such a note to all the data, they would use the Data Review feature, described in the Data Review course.

Lesson Step 4.5

Documenting reviews: Quickly reviewing the raw data is done frequently so that if any problems are found they can be rectified as quickly as possible to avoid data loss. If checking on the raw data is part of your daily routine, and no problems are found, it is usually not necessary to make note of the routine review. (However, follow your QAPP--if it says that daily routine raw data review is logged, then use your data management system, keep a running log in MS Word and/or in a paper logbook or in a log on your network drive, or however works with your policies.)
If values are to be further investigated or null coded, that must be done in the Data Review feature. However, it is important to make note of anything that needs to be investigated as soon as it is noticed. Ultimately, a log in MS Word or paper notes can be scanned and uploaded into QREST as part of the data review package, as described in a subsequent lesson and in the SOP: Supporting Documentation.



Lesson 5: QC Data Entry

This lesson reviews how to enter QC data into QREST. Once in QREST, these results are available to a data reviewer to ensure that results are within limits, not trending in one direction, and conducted with equipment and at a frequency as specified in the QAPP. In addition, QREST can be used to send QC data to AQS. Note that NAAQS regulatory programs must report QC data to AQS.

Lesson Step 5.1

QC in QREST: The QC feature in QREST provides the ability to review QC results when reviewing parameter data, presents the results (% differences) that are used as the basis for the USEPA estimations of imprecision and bias. These percent differences are the basis for the estimates in the US EPA AQS AMP256 reports, and are important to keep well within the limits specified in the QAPP. QREST calculates these percent differences for your tracking purposes, and provides the node to AQS for QC data (generally required for regulatory programs). All the QC types required for NAAQS regulatory data are available, including:

- **One-point QC for gaseous pollutants,** conducted at least once every two weeks, and required to be reported within the range of 0.005- 0.08 ppm for O3, SO2 and NO2 and 0.5- 5 ppm for CO.
- O3: + 1.5 ppb difference or + 7 percent difference, whichever is greater (from 5-21.5 ppb, 1.5 is greater than 7%),
- SO2: + 1.5 ppb difference or + 10 percent difference (from 5-15 ppb, 1.5 is greater than 10%),
- NO2: + 1.5 ppb difference or + 15 percent difference (from 5-10 ppb, 1.5 is greater than 15%),
- CO- NOTE: since the low end of CO one-point QC checks is 0.500 ppm, the absolute difference acceptance criteria that was developed for the annual PE (+ 0.03 ppm for concentrations <0.200ppm) will not be in effect.

- **Annual Performance Evaluations for gaseous pollutants,** which must be conducted for regulatory monitoring once every 365 days (once every calendar year), and is made by challenging the monitor with audit gas standards of known concentration from at least three different audit levels ("bins" of concentration ranges). The EPA provides 10 audit "bins," and to be acceptable, the annual PE must include at least 3 of the 10 bins. The QREST QC feature automatically fills the data into the correct bin, and provides messages about incompleteness due to not enough bins being filled. One evaluation must be within two to three times the method detection limit of the instruments within the PQAO's network, a second point must be less than or equal to the 99th percentile of the data at the site or the network of sites in the PQAO, or the next highest audit concentration level. The

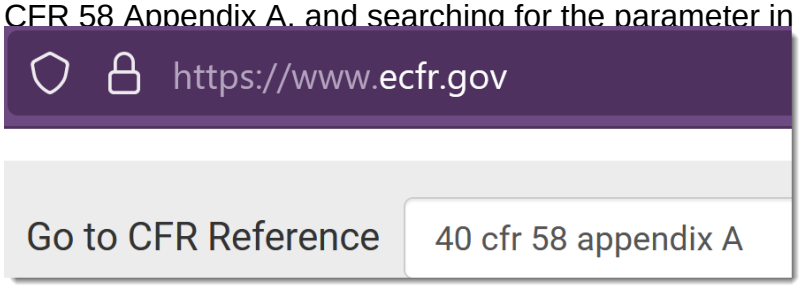
third point can be around the primary NAAQS or the highest 3- year concentration at the site or the network of sites in the PQAO. An additional 4th level is encouraged for those agencies that would like to confirm the monitors' linearity at the higher end of the operational range. For audit levels 3-10, the 15 percent difference acceptance criteria, currently in guidance, is acceptable. Due to the audit levels being expanded to allow for lower concentration audits to support NCore and trace-level work, a February 11, 2011, Technical Memo was posted on AMTIC in which EPA suggests the use of the following acceptance criteria for levels 1 and 2 audit ranges:

- For O3, SO2, and NO2:+ 1.5 ppb difference or + 15 percent difference, whichever is greater,
- For CO: + 0.03 ppm difference or + 15 percent difference, whichever is greater.

- **Zero Span for gaseous pollutants:** A zero check is a challenge of the instruments zero calibration conducted by introducing zero air into the analyzer and measuring the instrument response. A span check is a challenge of the upper limit of the analyzers calibration conducted by introducing a calibration gas (approximately 80% of the operating range) into the analyzer.
- **Flow Rate Verification for PM pollutants:** At least monthly for all PM methods (except for PM10 hi-vol and PM10 Pb lo-vol), a one-point flow rate verification must be reported to AQS. To perform the flow rate verification check, the monitor's normal flow rate is checked using a certified flow rate transfer standard. The known flow rate of the transfer standard, and the measured (or indicated) value from the monitor, are recorded by the operator for entry into QREST for that monitor on that date. For manual monitors, the check is performed prior to or after sampling so there is no data loss.

- **Semi Annual Flow Rate Audit for PM pollutants:** The Semi-Annual Flow Rate Audits should be performed at least every 6 months on each monitor used to measure PM10, PM10-2.5, PM2.5 and Pb. To perform the audit, the monitor's normal flow rate is checked using a certified flow rate transfer standard (which should be a different standard than the one used for calibrating the monitor). The auditing agency conducting the Semi-Annual Flow Rate Audit, according to CFR,* may be the PQAO, or may be an independent agency. In any event, the assessment should be conducted by other than the routine site operator. Similar to the monthly flow rate check, the percent difference between the flow standard's value and the monitor value can be calculated by QREST and subsequently sent to AQS on the tribal agency's schedule.

* check on the exact QC requirements in law by going to ecfr.gov, navigating to 40 CFR 58 Appendix A, and searching for the parameter in question:

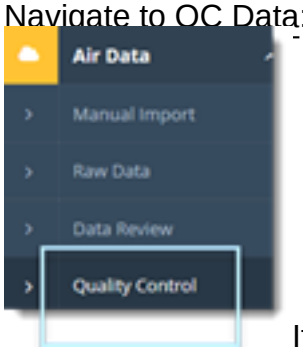


3.3.3 ***Semi-Annual Flow Rate Audit for PM_{10}*** . Audit the flow rate of the particulate monitor twice a year. The two audits should ideally be spaced between 5 and 7 months apart. The EPA strongly encourages more frequent auditing. The audit should (preferably) be conducted by a trained experienced technician other than the routine site operator. The audit is made by measuring the monitor's normal operating flow rate using a flow rate transfer standard certified in accordance with section 2.6 of this appendix. The flow rate standard used for auditing must not be the same flow rate standard used for verifications or to calibrate the monitor. However, both the calibration standard and the audit standard may be referenced to the same primary flow rate or volume standard. Care must be taken in auditing the flow rate to be certain that the flow measurement device does not alter the normal operating flow rate of the monitor. Report the audit flow rate of the transfer standard and the corresponding flow rate measured by the monitor to AQS. The percent differences between these flow rates are used to evaluate monitor performance.

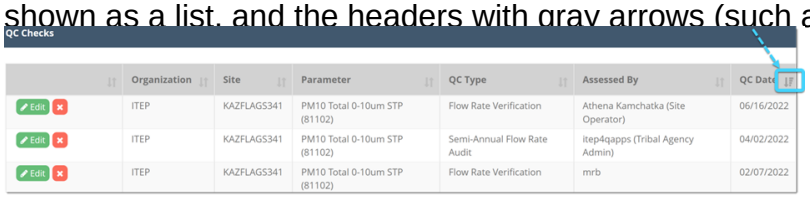
Link to click:
https://aqs.epa.gov/aqsweb/documents/AQS_Reports_Guide.html

Lesson Step 5.2

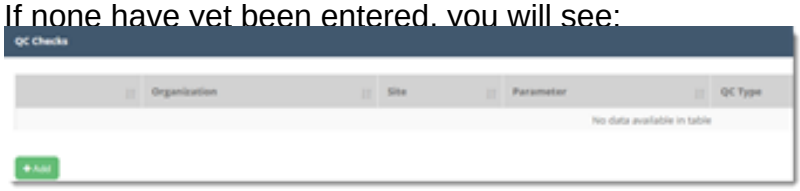
Navigate to QC Data: Select Air Data-> Quality Control:



If any QC checks have already been entered, these will be shown as a list, and the headers with gray arrows (such as date) can be sorted:

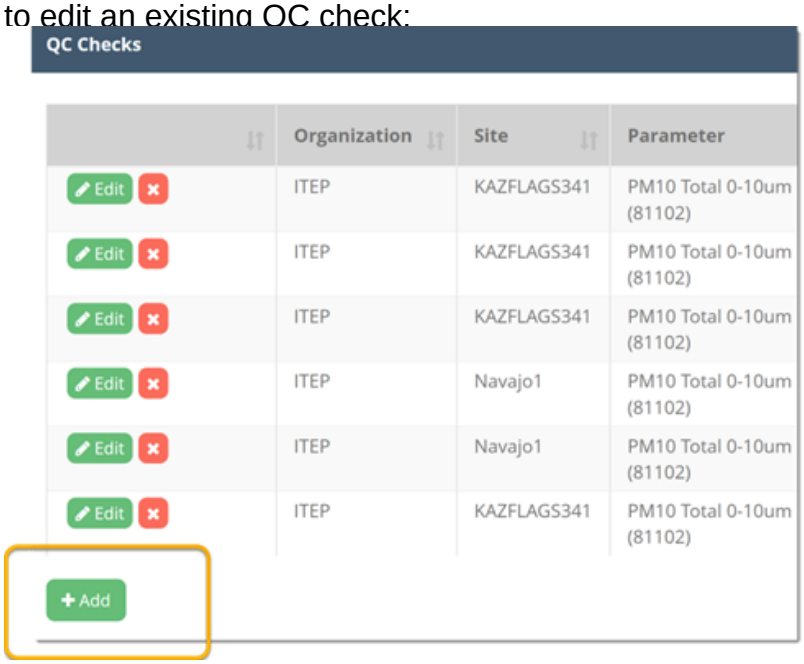


If none have yet been entered, you will see:

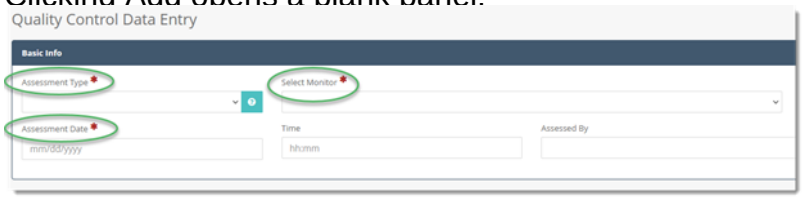


Lesson Step 5.3

Add or Edit QC: Click on the **Add** button to add a new QC Check or the **Edit** button to edit an existing QC check:

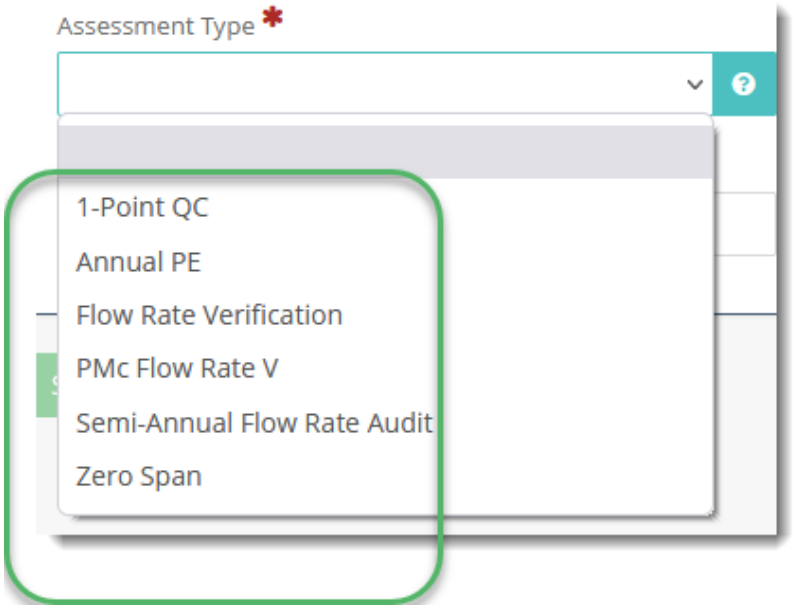


Clicking Add opens a blank panel:



As with other QREST screens, the asterisked items are required (because they are required in the AQS QC file).

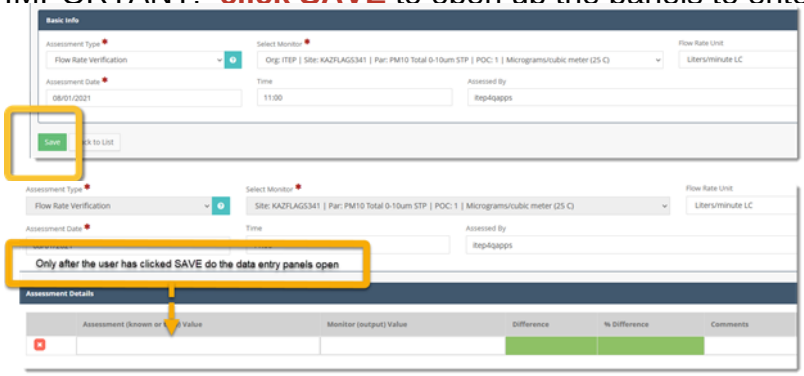
Select the assessment type:



After selecting the type of check, select the monitor from the drop-down list next to Select Monitor.

Enter the date the assessment was conducted, and (optional) the time and who made the assessment.

IMPORTANT! **click SAVE** to open up the panels to enter the actual data:



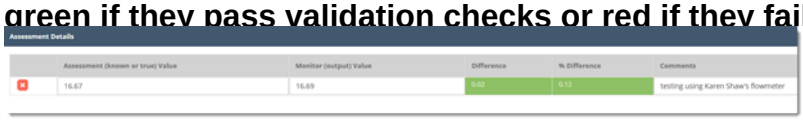
QREST will open a panel with:

- 10 rows for Annual Performance Evaluation
- 1 row for all other assessment types

Lesson Step 5.4

For each row, enter in the Assessment value (the known, "true," value from the standard) and the monitor's value.
Once these two values are entered, notice that the green Save button becomes active (not graved out):

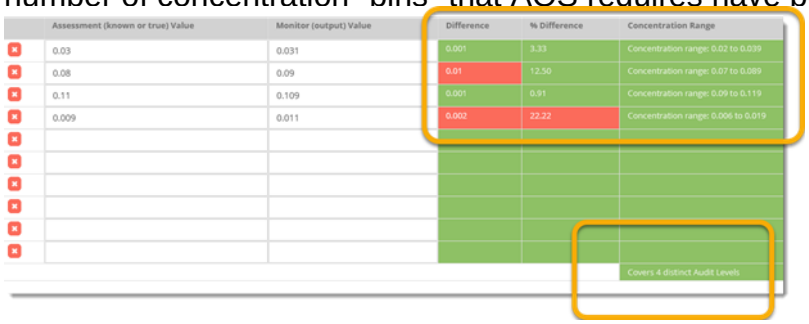
IMPORTANT: **Click *Save* to have QREST evaluate the values and shade them green if they pass validation checks or red if they fail validation checks:**



PM QC checks: Note that for particulate matter monitoring, there is no standard cylinder of PM to compare your analyzer's readings with. Instead, the determining parameter for PM monitoring is flow rate. So, when you enter values for your flow rate check, you need to check the units in the right-hand panel that opens up for flow rate checks, and select the flow rate units for your transfer standard and your analyzer:

If you edit data, or as you add new rows for a multi-point check, QREST blurs out the existing values because it may need to do some recalculations (such as which audit range "bin" the check fits into):

Once the values have been entered or edited, you must click **Save** to have QREST calculate the difference, percent difference, and concentration range (for gaseous). QREST then displays the calculated values, and gives you a message about the number of concentration "bins" that AQS requires have been filled:



Click **Save** liberally!

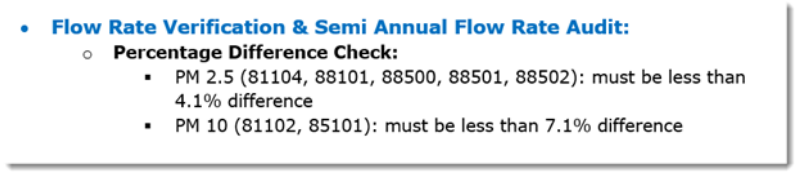
Lesson Step 5.5

Validation Checks for QC Data to be used for NAAQS**:**

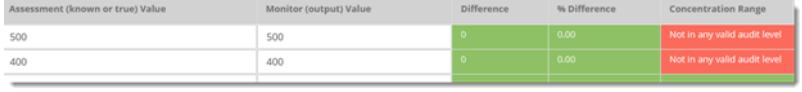
QREST checks the information and values entered to make sure that they satisfy US EPA requirements for the check to "count" (be in the correct concentration ranges, and in the appropriate date interval) and be successfully loaded to AQS:

- Distinct Concentration Range Check: Assessments must cover 3 of the 10 concentration ranges defined by EPA
- Percentage Difference Check:
- Sulfur Dioxide (42401, 42406), Ozone (44201) and NO2 (42602): must be less than 15% difference
- Concentration Difference Check:
- Sulfur Dioxide, Ozone and NO2: must be less than 1.5 pb
- **One-point QC for gaseous pollutants,** conducted at least once every two weeks, and required to be reported within the range of 0.005- 0.08 ppm for O3, SO2 and NO2 and 0.5- 5 ppm for CO.
- O3: + 1.5 ppb difference or + 7 percent difference, whichever is greater (from 5-21.5 ppb, 1.5 is greater than 7%),
- SO2: + 1.5 ppb difference or + 10 percent difference (from 5-15 ppb, 1.5 is greater than 10%),
- NO2: + 1.5 ppb difference or + 15 percent difference (from 5-10 ppb, 1.5 is greater than 15%),
- CO- NOTE: since the low end of CO one-point QC checks is 0.500 ppm, the absolute difference acceptance criteria that was developed for the annual PE (+ 0.03 ppm for concentrations <0.200ppm) will not be in effect.

For particulate matter QC checks:



Once the Save button is clicked, QREST performs the calculations and displays information about the validity (to AQS) of the data entered:



Click Save liberally! Once all the information has been entered, it must be saved. Although the "Send to AQS" button is available, the results of the QC check do not have to be sent to AQS at the time the data was entered into QREST. Many Tribal Agencies send QC data to AQS every quarter, and if the data are certified annually in AQS the QC data will be part of that certification package.

Lesson 6: Supporting Documentation

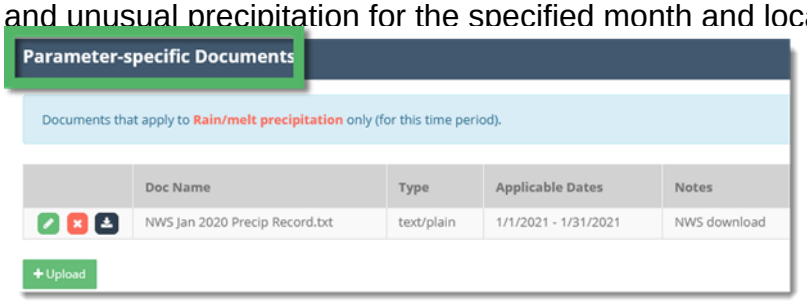
This lesson covers uploading and accessing documentation such as QAPPs, reference tables, audit reports, scanned logbook pages, videos, and other files that may be accessed by data reviewers and are relevant to the data's fitness for use (regulatory, informational, or other objectives are described in the QAPP). For example, the data review criteria tables in the QAPP (often in the element 14: QC) should be used for reference when making validation decisions. These references and records can be securely stored online in QREST and backed up nightly.

Lesson Step 6.1

Supporting Documentation: This feature allows users to store files and associate them with specific sites and monitors, including scanned paper forms, photos, and even short videos. Because these files would be used during data review, they are accessed from that feature.

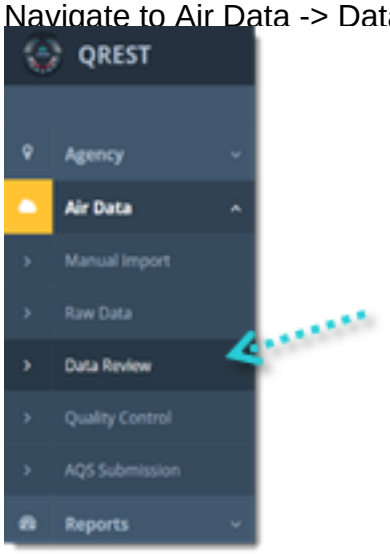
- Access to Supporting Documentation: All *non-public* users can upload and access documentation, including anyone assigned to that Tribal Agency as a Site Operator, Tribal Agency Admin, or the QA Reviewer.
- Applicability of Supporting Documentation: Many types of files can be uploaded, even short videos, and the intent is to allow a data reviewer quick access to the records that are needed to understand the decisions made about which data is valid, and which data was judged to be invalid. For example, the ITEP met station has files uploaded that apply to the site as a whole:

In addition to site-wide documents, files can be associated with data collected for a selected parameter over a specific time period. An example of this is a file containing a download of precipitation data from the NWS, corroborating the high and unusual precipitation for the specified month and location:



Lesson Step 6.2

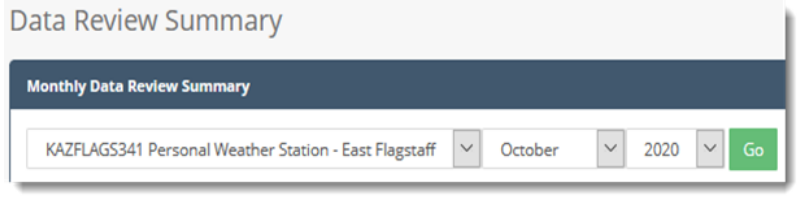
Navigate to Air Data -> Data Review:



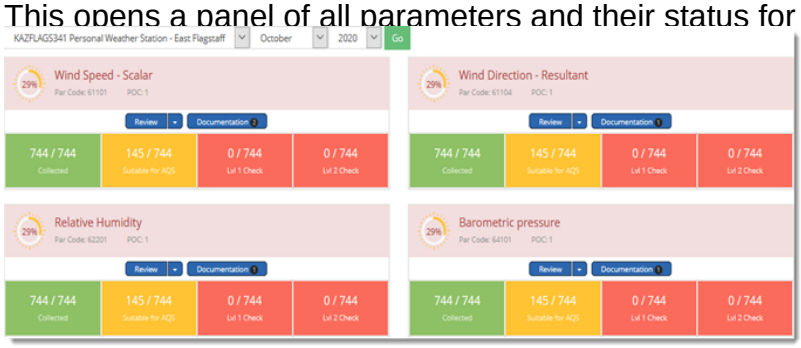
Link to click:
https://qrest-test.azurewebsites.net/Data/DataReviewSummary

Lesson Step 6.3

Select Site, Month, and Year in the drop down boxes, and click Go. Feel free to access the ITEP met station files in the QREST sandbox training site, if you have been assigned to the ITEP met station site for training purposes.



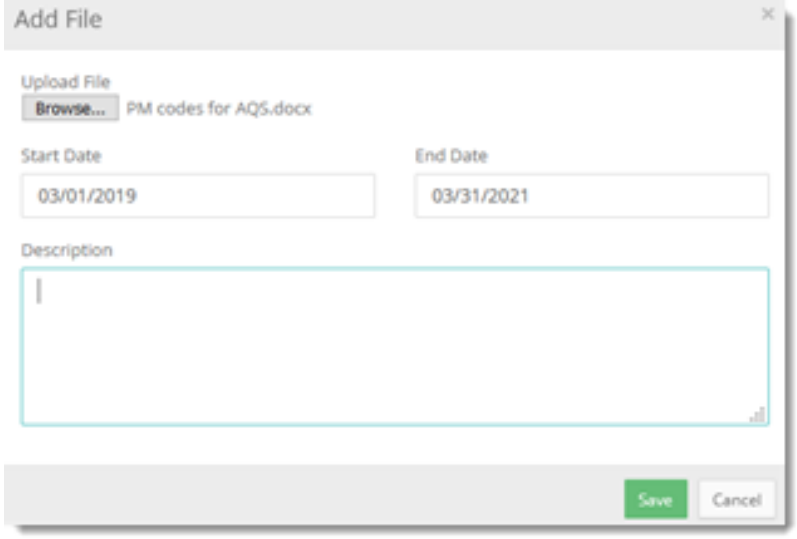
This opens a panel of all parameters and their status for the month selected:



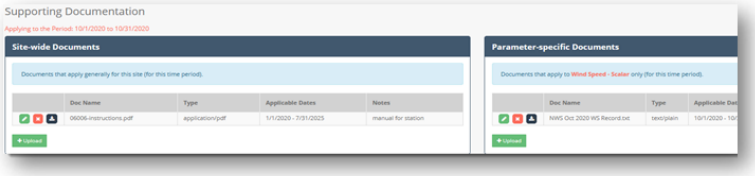
Lesson Step 6.4

Click on the Documentation button to view existing docs or to upload. Note that each parameter will have a separate Documentation button. If you are planning on uploading documentation that only pertains to a certain parameter, you should click on the Documentation button for that parameter. Any of the Documentation buttons can be used to view or upload documentation that pertains to the entire site.
The documentation button will have the number of files uploaded shown:

If uploading documentation that pertains to the entire site, click on the green Upload button on the left panel. If uploading documentation that only pertains to the parameter, click on the green Upload button on the right panel. Click browse and navigate on your computer to identify the file to upload, enter the date range that the file applies to (this may include multiple years) and an optional description.

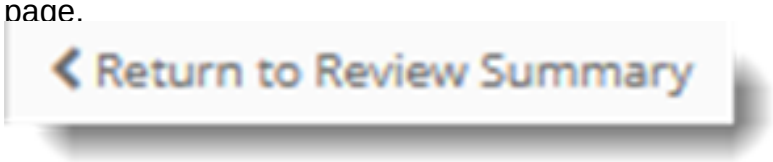


In the example below, the user has uploaded a pdf equipment manual (applying to the entire site) in the left panel. In the right panel are files that apply to a specific monitor or parameter, and in this example a NWS monthly summary has been saved, showing weather patterns in that area for that month which could be used to justify extreme values similar to the met parameters being collected. Images or data files downloaded from AirNowTech Navigator are other options for documenting validity of extreme values; these can be saved as images in a text or notepad file which can be uploaded and saved.



Site logbook pages can be scanned and saved as Supporting Documentation

(include initials and datetime, and all info necessary to reconstruct what was done and measured on the scanned pages).
Photos (include date in filename) are highly recommended to document site visits. Videos of up to 25 Mb can also be uploaded for later access.
Keep in mind that the Level 2 Reviewer will need to understand the validation decisions made by the Level 1 reviewer, so adequate Notes and supporting documentation should be saved so that the rationale of judging some data invalid or not is clear. Additional Notes and Supporting Documentation can be added at any time.
After uploading files, Save or cancel to exit. Then, return to the Review Summary page.

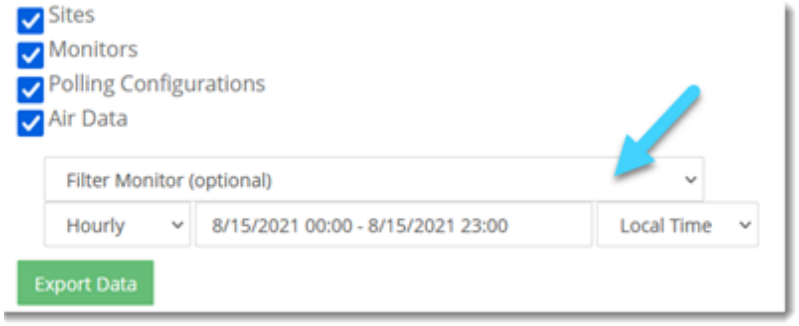


Lesson 7: Data Export

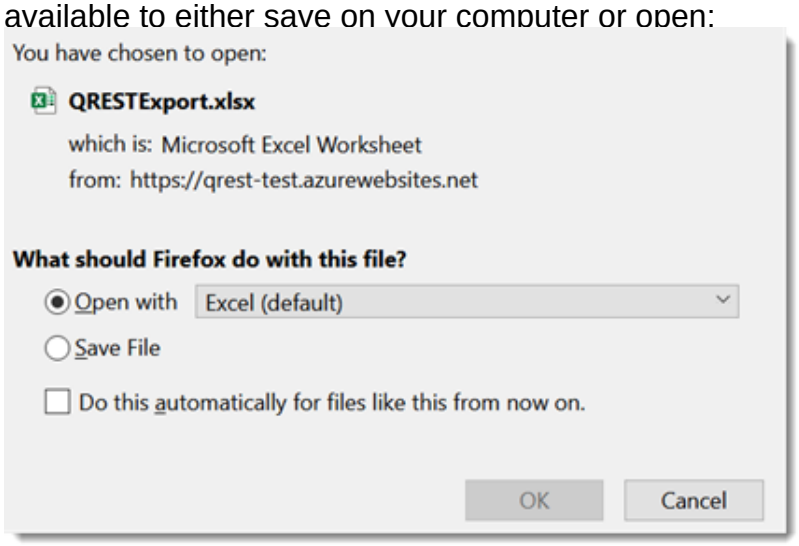
This lesson describes how to export different categories of data, codes, and information about your site, monitor, Level 0 criteria, and polling configurations.

Lesson Step 7.1

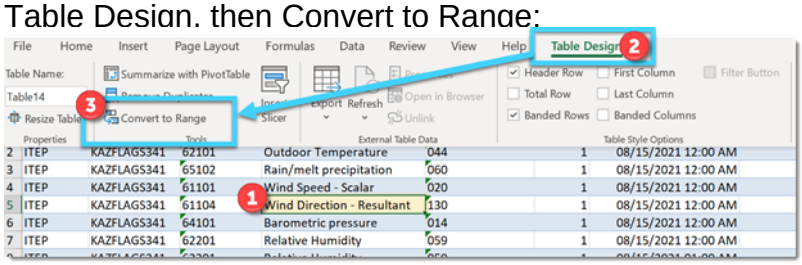
Navigate to Reports -> Export Data, and select the data you want to export. Note that in order to export measurement data (Air Data), first the Agency must be selected:



The data will be exported into one MS Excel file with separate tabs. If you want only measurement data from one monitor, select the monitor, five minute (if available) or hourly data.
Click Export Data, and, depending on your internet browser setup, a file will become available to either save on your computer or open:



Note that to edit the file, click Enable Editing. The file will automatically open as an Excel table, rather than just a range.
To change any tab to an Excel range, click on any filled cell in the table, then click Table Design, then Convert to Range:



Link to click:
https://support.microsoft.com/en-us/office/convert-an-excel-table-to-a-range-of-data-0b326ff1-1764-4ebe-84ea-786265d41c77

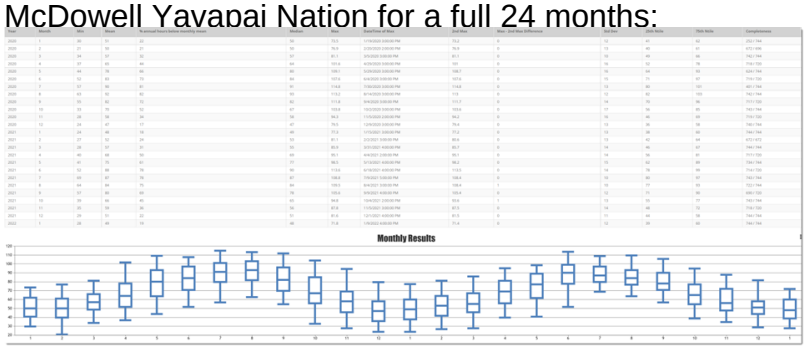
Lesson 8: Monthly Statistics

This lesson describes how to generate monthly box and whisker charts, which are used to compare sets of data from month to month, and

can be exported for insertion into other documents such as quarterly or annual reports.

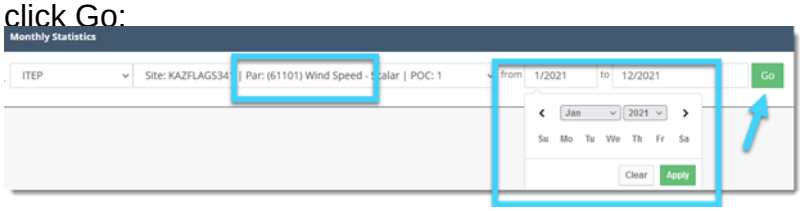
Lesson Step 8.1

Data Included in Monthly Statistics: All records that have not been assigned an AQS null code are included in the summary statistics and box charts. This means that if there are some error code values of, for example, 985.nn that have not yet been assigned null codes, those values will be included and the statistics and charts will be inaccurate. (You would immediately notice this particular example because the table would show those values in the Max column, but other invalidated data might not be obvious.) Because of this, the monthly table and box and whisker charts should not be used as final until all the data has been validated. QREST will display a table of summary statistics and under the table a longitudinal box and whisker plot. The example below shows outdoor temperature at the Fort McDowell Yavapai Nation for a full 24 months:

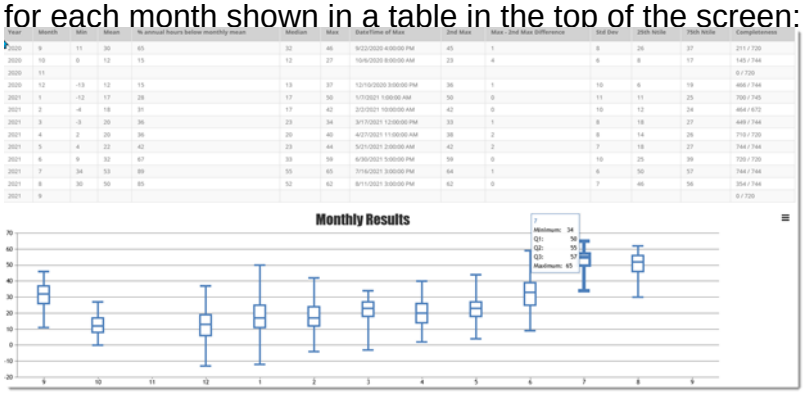


Lesson Step 8.2

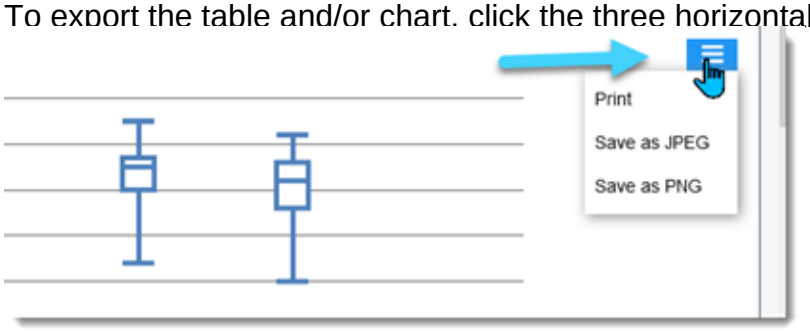
Navigate to Reports -> Monthly Stats, and select site, monitor, and month/year start, and month/year end, of the interval to generate box and whisker plots for, and click Go:



This opens the screen displaying the charts for each month, with summary statistics for each month shown in a table in the top of the screen:



These plots are very useful for looking at the spread and median of data from month to month, and are widely used by researchers and EPA in interpreting measurement data. To save space on the page, the box and whisker charts in QREST are vertical, while the ones generated by EPA in the link are horizontal. See the monthly statistics in a popup by hovering the cursor over the month's chart. To export the table and/or chart, click the three horizontal bars:



Lesson Step 8.3

For more information on these types of charts, see the link https://www.epa.gov/sites/default/files/2016-09/documents/boxplots_companion-generic_v2_9_9_16.pdf
and
https://www.statisticshowto.com/probability-and-statistics/descriptive-statistics/box-plot/

Link to click:
https://www.epa.gov/sites/default/files/2016-09/documents/boxplots_companion-generic_v2_9_9_16.pdf