AQS Exceptional Event Tutorial
March 15, 2010

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1. Exceptional Event Rule - background

The Exceptional Event Rule (EER) was published March 22, 2007 and became effective May 21, 2007. The EER allows the ambient air quality data which is submitted to AQS and used in making regulatory decisions, to be, in some cases, flagged and, where appropriate, excluded from calculations in determining whether or not an area has attained the standard. The data flagged as "exceptional" must have been affected by an exceptional event, which is defined as an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the EPA in accordance with 40CFR 50.14 to be an exceptional event.

2. Exceptional Event Rule - implementation in AQS

The Exceptional Event Rule (EER) has been implemented in AQS as of March 15, 2010.

The exceptional event implementation has ramifications for different AQS user groups:

- state/local/Tribal users who enter exceptional event information or who would flag specific sample measurements with exceptional event qualifiers,
- EPA Regional Office users who would "concur" or "deny" the exclusion of specific sample measurements and
- AQS users who run standard reports
- AQS users who create ad-hoc reports via Discoverer.

Exceptional Event Process flow

Real-world exceptional event occurs →

Ambient air quality is affected by the exceptional event and measured by monitor reporting to AQS →

Reporting agency investigates and determines that there is cause to suspect exceptional event influence on the sample measurement(s) →

Reporting agency flags the data in AQS that is suspected of being influenced by the exceptional event (note: the flagging of data can occur either before or after the data is submitted to AQS; reporting agency has *until July 1st of the year following the year in which the flagged measurement occurred to add an exceptional event qualifier flag*) →

Reporting agency enters the initial Event description; AQS responds by creating the event record → (note: reporting agency has *until July 1st of the year following the year in which the flagged measurement occurred to add an initial description of the exceptional event)*

Reporting agency accesses AQS to associate the appropriate flagged values with the Event (AQS saves date of association; →

Reporting agency can take *up to 3 years from the time of the event* to conduct analysis, hold public review, prepare justification documentation *and submit documentation to the EPA* →

For appropriate flagged measurements, the reporting agency develops documentation that the exceedance was caused by the exceptional event.

- A clear causal relationship exists between the event and the measurement;
- The measurement is in excess of normal historical fluctuations, including background;
- There would not have been an exceedance or violation if the event had not occurred;
- The required public comment process has been followed;
- The documentation package includes references to specific exceedances of a specific NAAQS.

Reporting agency submits (via hardcopy or electronic means) the required justification documentation for affected measurements to their EPA Regional Office →

Regional administrator receives documentation package →

Regional administrator reviews documentation with respect to:

- Validity of event occurrence;
- Causal relationship to the monitoring data (exceedences) under consideration →

Regional administrator accesses AQS to Concur or Deny with the exclusion request, with respect to the specific NAAQS →

AQS re-computes affected summaries.

2.1 Flag sample value with an exceptional event qualifier – State/local/Tribal users

As a State, local or Tribal AQS user, if you have already entered raw data to which you now wish to add an exceptional event qualifier code, then you would either use the online forms or batch transactions.

When you log in to AQS, you must select and have authority for the screening group that "owns" this data.

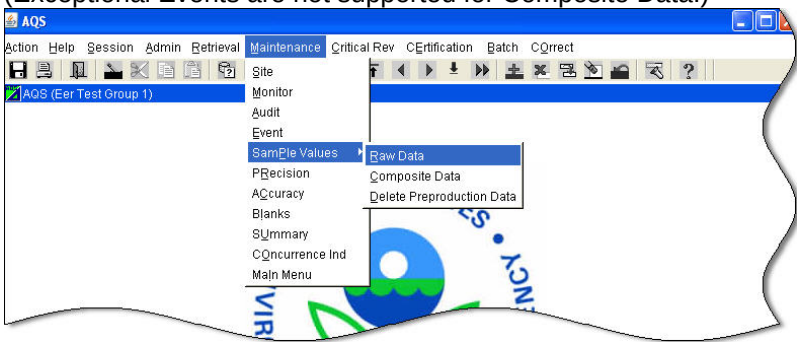
2.1.1 Flag sample value via on-line forms

Work Flow

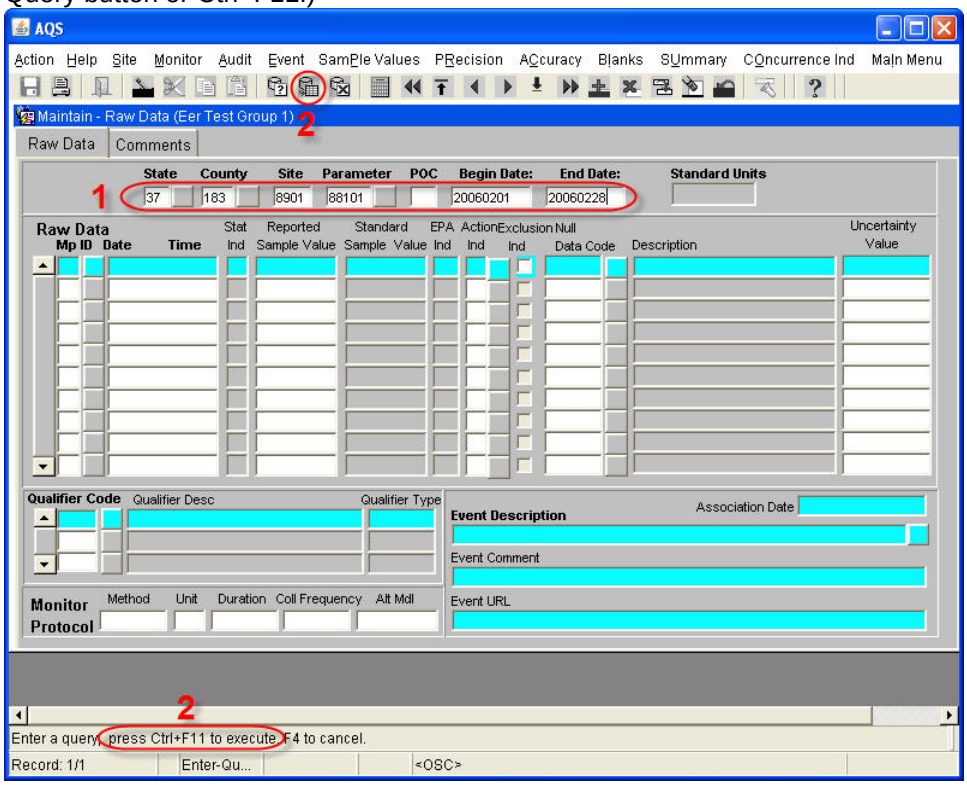
1. The reporting agency user determines that a specific sample measurement (or small set of measurements) is affected by an exceptional event.

2. The user decides to flag the sample measurement with the Exclusion Qualifier ("REQEXC") for the event type. ("REQEXC" = set of qualifier codes signifying "requested exclusion") Adding qualifiers does NOT affect the Monitor-Year certification.

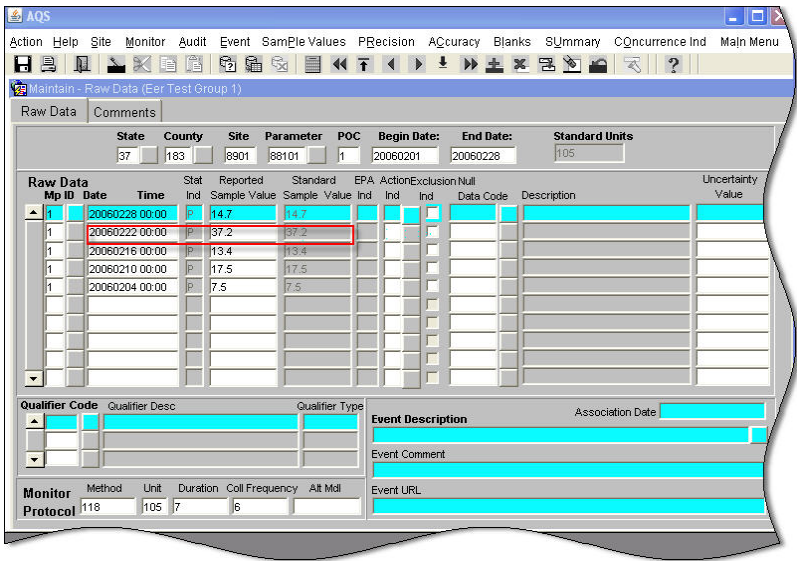
3. The user queries the measurement. In AQS, go to Maintenance → Sample Values → Raw Data (Exceptional Events are not supported for Composite Data.)



4. Use the Query tool to select the sample measurement to which you will add (or modify) the qualifier code. (1 -- Enter the State, County, Site, Parameter and/or Begin and End Dates and 2 -- press Execute Query button or Ctrl+F11.)



5. The query results. The measurement on this date is high due to a chemical spill/industrial accident.



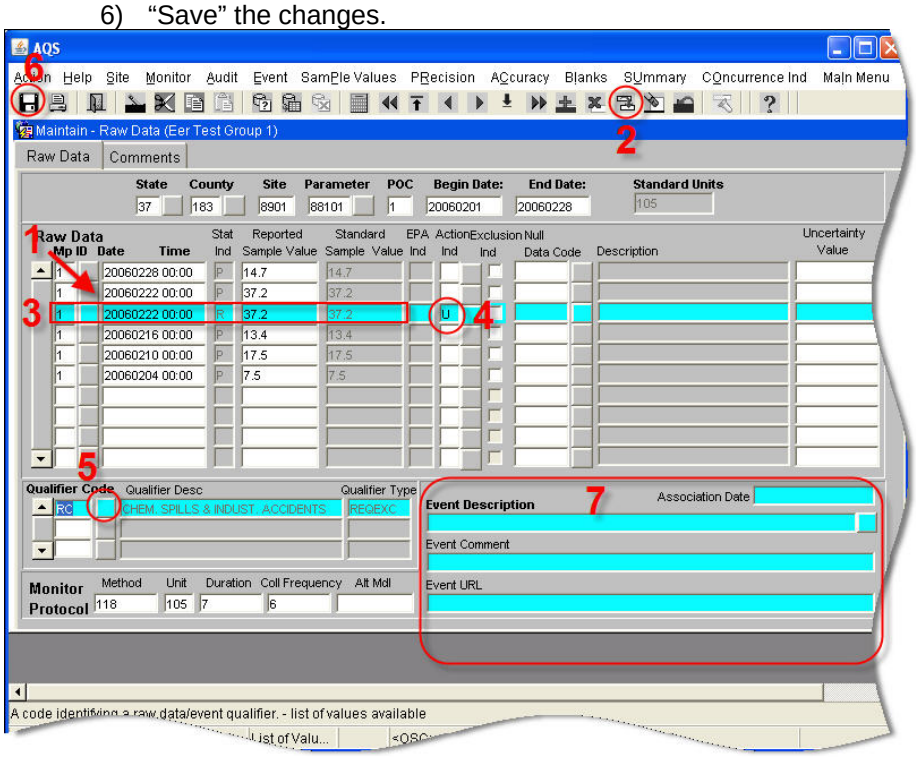
6. In the following steps, the exceptional event qualifier code for “chemical spill” will be added to the raw data record.

First, duplicate the measurement row as a pre-production update transaction.

1) Position the cursor on the record field to be updated.
2) At the icon menu at the top, select “Duplicate Record.”
3) A new record will be added just underneath and will be highlighted in blue
4) In the “Action Ind” column for the new record, add “U” for update.

Second, add the qualifier code.

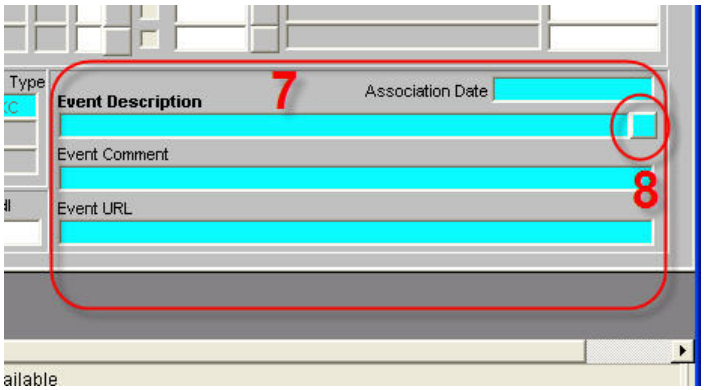
5) In the “Qualifier Code” block, activate the drop-down menu for Qualifier Code by clicking the circled box. Select the Qualifier Code of “RC” for “Chemical & Industrial Accidents - REQEXC.”
6) “Save” the changes.



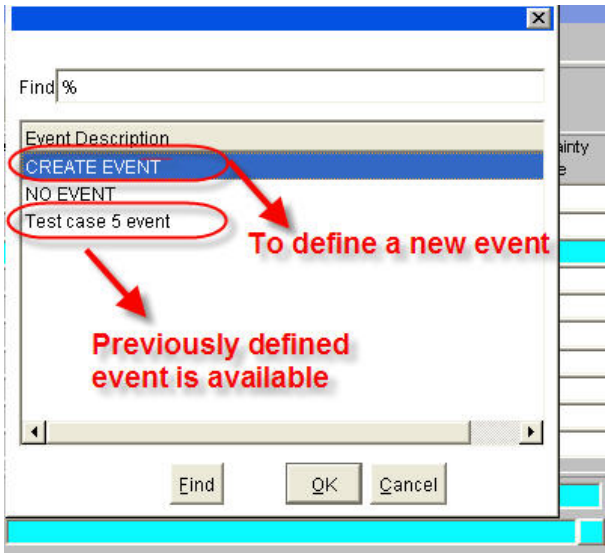
This sample measurement now has an exceptional event flag. Before this sample measurement is visible to the Regional Office for concurrence purposes, the sample measurement must be linked to an Exceptional Event. If you had previously defined an Exceptional Event via Maintain Event, you can associate this sample measurement to that Exceptional Event. If you have not yet defined an Exceptional Event, you can do that now.

7) Move to the Event Description block

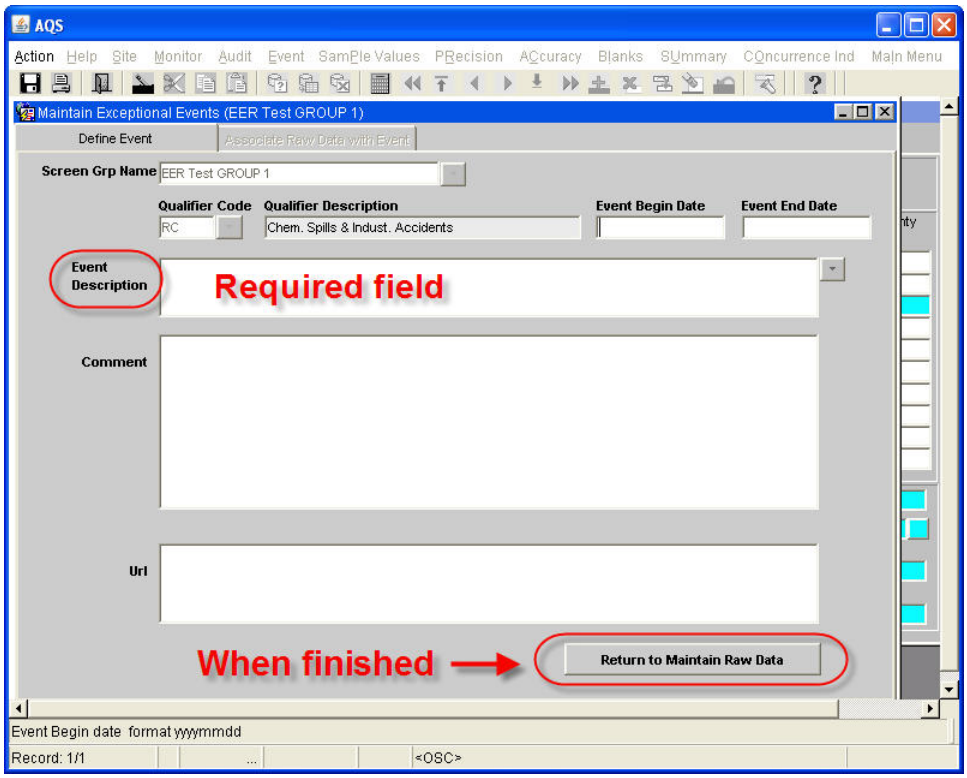
8) Activate the drop-down menu for Event Description by clicking the circled box.



9) The drop-down menu will contain “CREATE EVENT” and “NO EVENT” and any previously defined Exceptional Events for your screening group, this qualifier code, and this sample year.

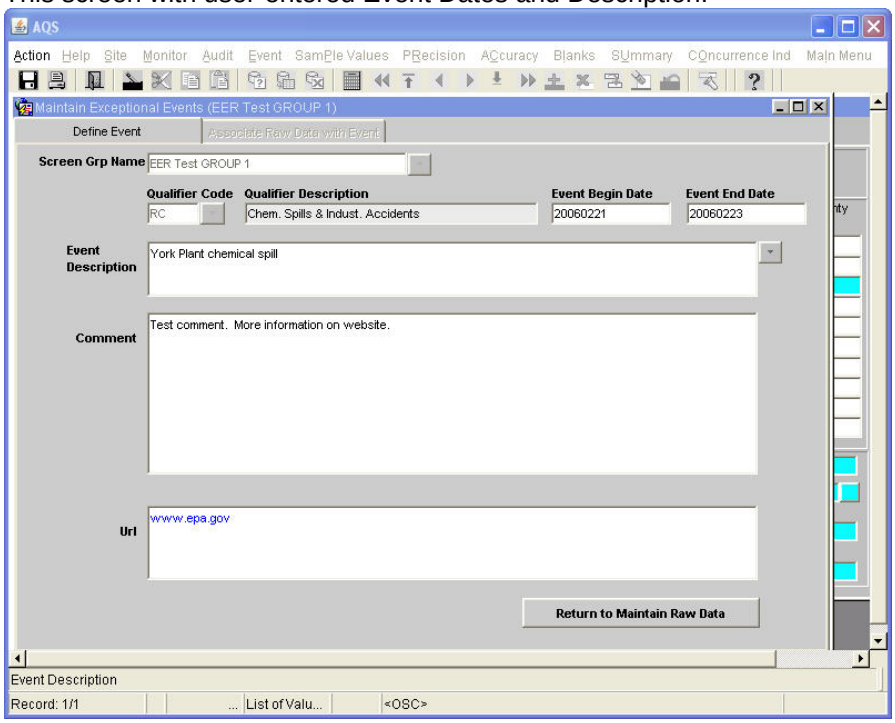


10a) **If you DO NOT have a previously defined Exceptional Event** that appears on the drop-down, then select “CREATE EVENT” and “OK.” The “Define Event” screen from “Maintain Exceptional Events” will appear.

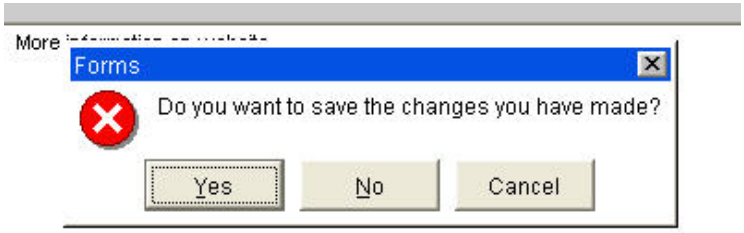


“Event Begin Date” and “Event End Date” – (format: YYYYMMDD) - usually exceptional events have a distinct begin and end date – optional
“Event Description” – (format: text) - required
“Comment” – (format: text) – additional information - optional
“Url” – (format: text) – provide a website for additional explanatory information – optional

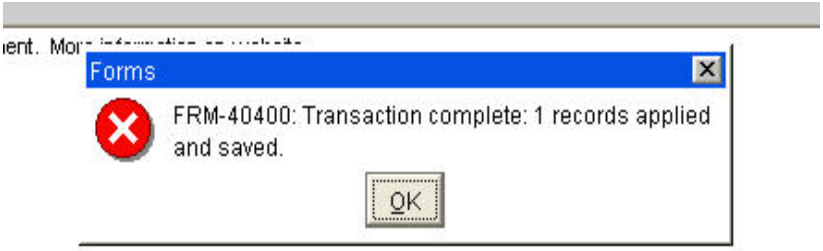
This screen with user-entered Event Dates and Description:



After filing in the information, select “Return to Main Menu.” If you have not already saved the record, you will see these screens:

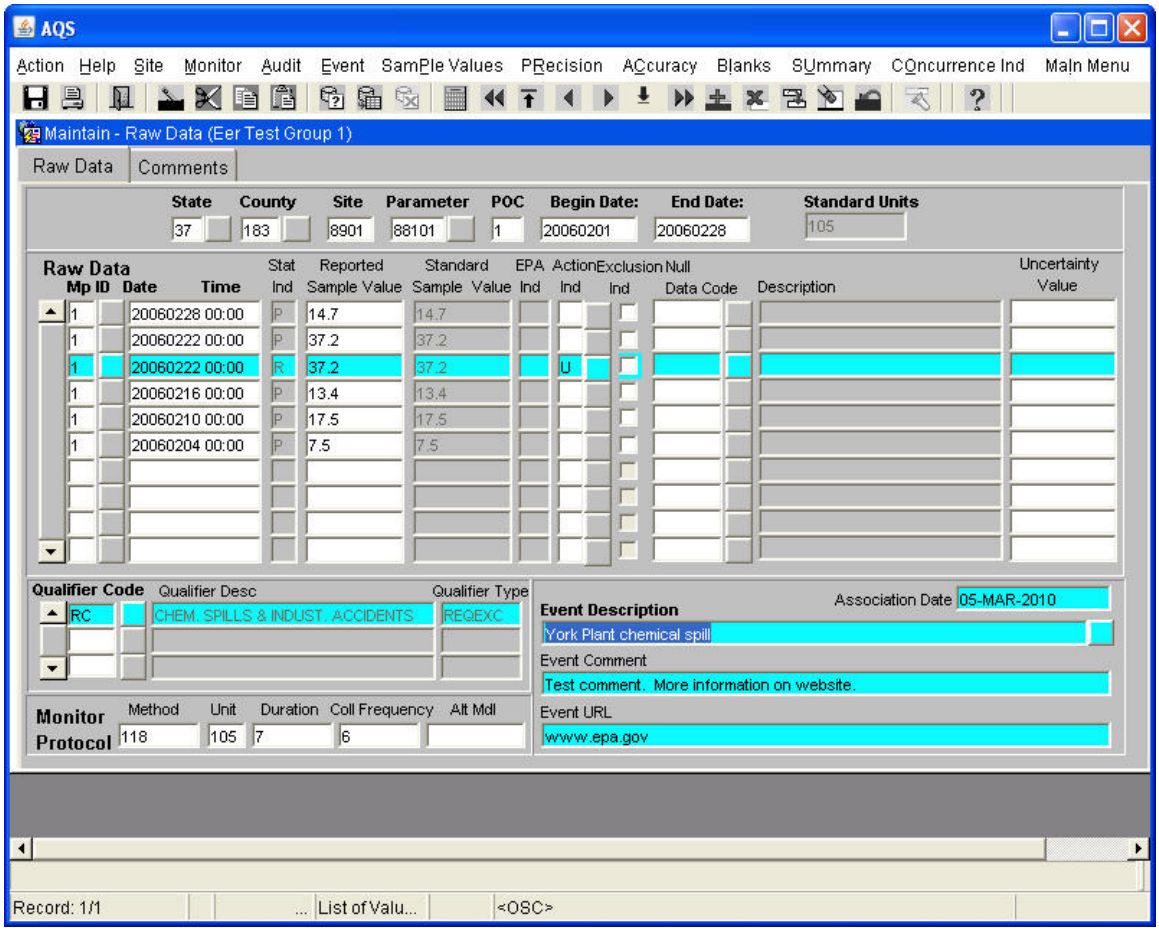


Appears if the record has not already been saved. Respond “Yes.”



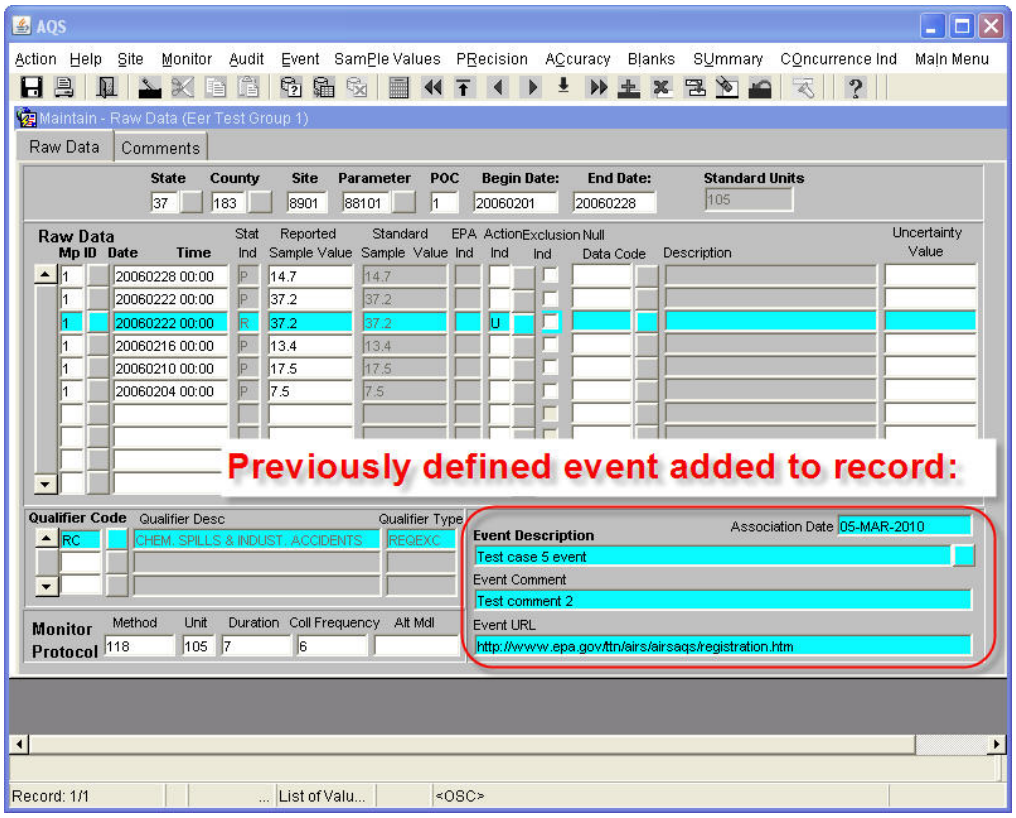
Click “OK” and you will be returned to Maintain Raw.

The Maintain Raw screen:



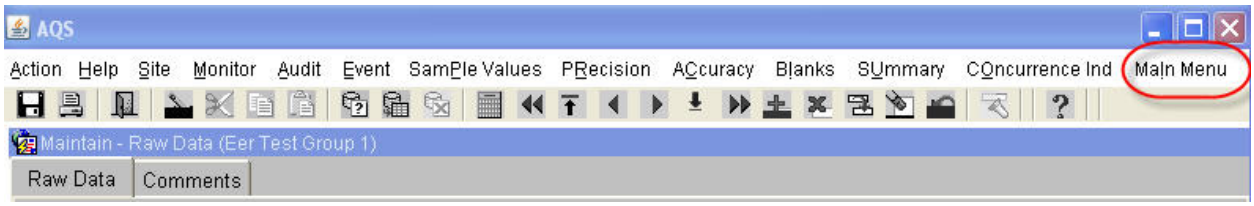
10b) **If you DO have a previously defined Exceptional Event** that you want to use, select it.

In this example, "Test case 5 event" was selected in Step 9 (on page 5). The event information was added to the record for that sample value on the Maintain Raw screen. "Save" your changes. Further information can be also entered on the "Comments" tab.



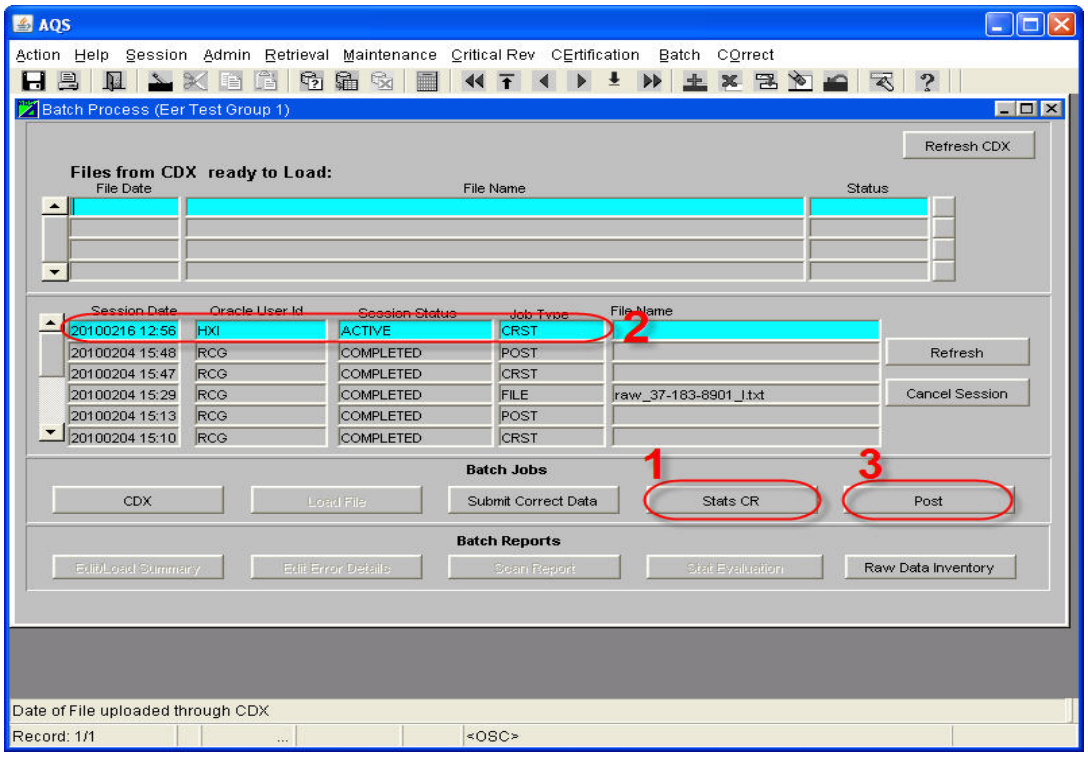
7. When all the sample values have been flagged, then Stat/CR and Post must be run from the Batch menu. This is the only way to get the changed records promoted to "Production" status.

8. Go to "Main Menu."

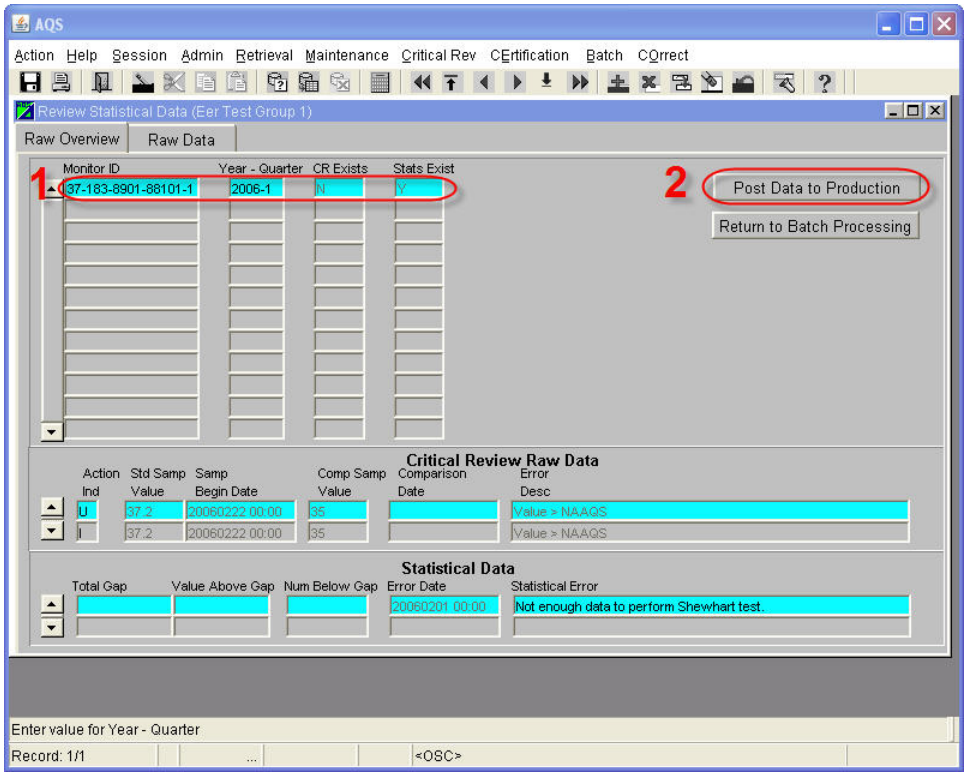


9. Select "Batch."

10. The Batch screen:
Step 1 – Submit “Stats/CR.” Step 2 – Your submitted job will appear. When the CRST job has completed, you can look at the Scan Report and/or Stat Evaluation report. Step 3 – “Post.”

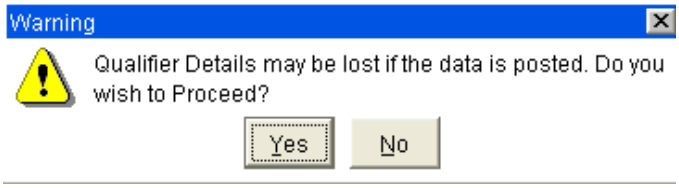


11. Review Statistical Data: Your monitor selection appears in 1. Next, select “Post Data to Production.”

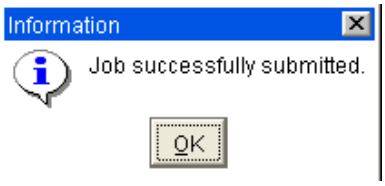


The POST process initiates the re-computation of all of the summaries (at monitor-level: NAAQS Averages, Daily Summaries, Quarterly Summaries, Annual Summaries; and at site-level: Daily Summaries, Quarterly Summaries, and Annual Summaries.)

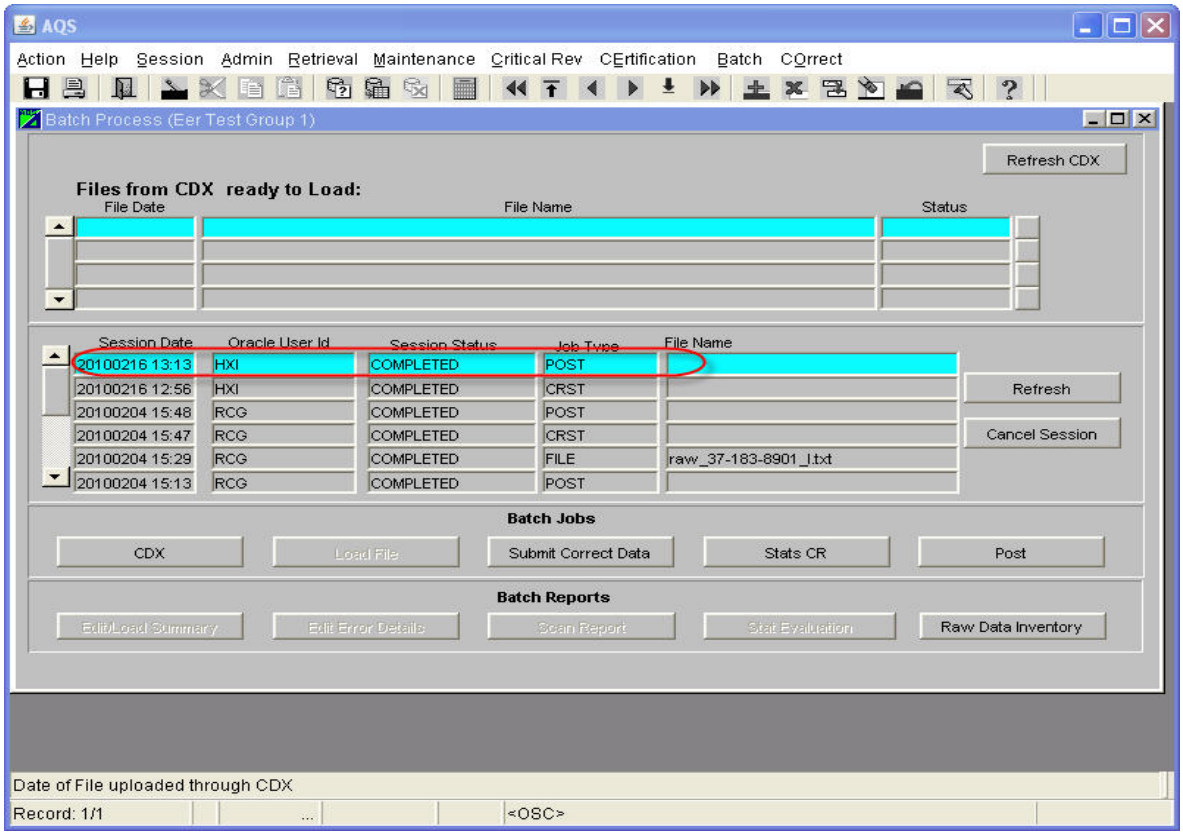
12. You will see a warning message. Select "Yes."



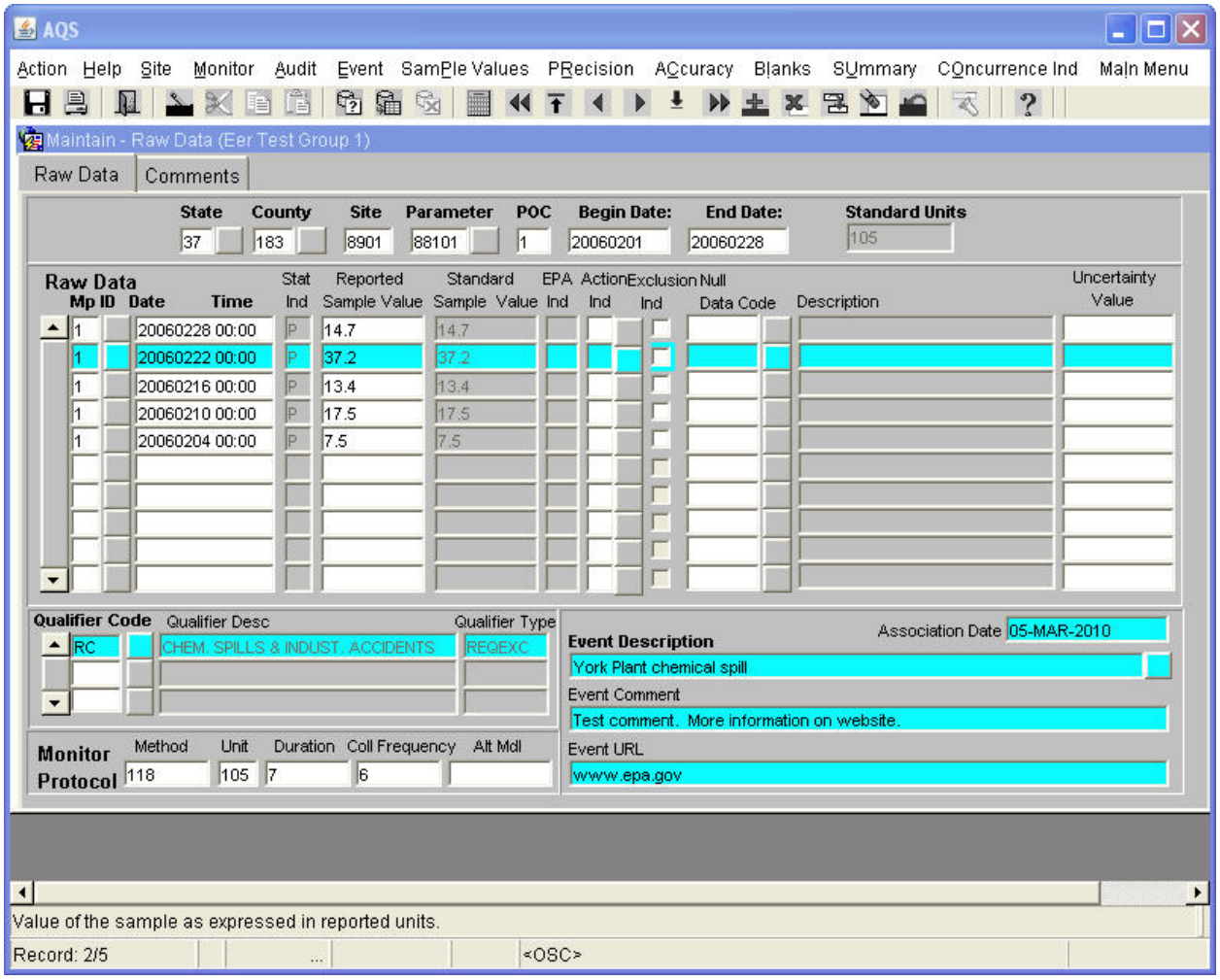
13. You will see an information message. Click "OK."



14. Select "Return to Batch Processing" and "Refresh" until your job shows up as "Completed."



15. Back at Maintain – Raw Data, the changed sample measurement will have Status Indicator “P” for Production.



Note: The above process is a change from previous AQS procedure. Before this, an exceptional event exclusion was requested by a *comment* associated with a Raw Data measurement. Comments are no longer used or accepted for exclusion requests.

2.1.2 Flag sample value via batch transactions

Work Flow

1. The reporting agency user determines that a set of sample measurements is affected by an exceptional event.

2. The user decides whether to flag the sample measurement with the Exclusion Qualifier ("REQEXC") for the event type.

3. If the sample measurement **has not yet been submitted** to AQS, then user will add the qualifier for the event type to the delimited AQS input transaction (or XML) that will be submitted to AQS via the standard Batch process of Load, Stat/CR and POST.

Note: the qualifier code goes on the RD transaction in any of the ten "Qualifier Code" fields. See www.epa.gov/ttn/airs/airsaqs/manuals for the "AQS Input Transaction Formats."

4. If the sample measurement **has been submitted** to AQS, then the user creates an update transaction for the sample measurement (using the delimited AQS input transactions or XML) with the qualifier for the event type. Use any of the ten "Qualifier Code" fields on the RD transaction.

(Note: Adding qualifiers does NOT affect the Monitor-Year certification.)

To create an update transaction, it is recommended that the user generate the update transactions via the AQS Standard Report AMP501 "Extract Raw Data." This will ensure that no other information (other than adding the qualifier) is changed.

This update transaction is then submitted to AQS via the standard batch process of Load, Stat/CR and POST.

5. The POST process initiates the re-computation of all of the summaries (at monitor-level: NAAQS Averages, Daily Summaries, Quarterly Summaries, Annual Summaries; and at site-level: Daily Summaries, Quarterly Summaries, and Annual Summaries.)

2.2 Defining an Exceptional Event – State/local/Tribal users

As a State, local or Tribal AQS user, if you have an exceptional event that affects ambient air quality data and you intend to flag that data as affected and submit that data to the EPA Regional Office to request concurrence that the data be excluded, then that exceptional event must be described and documented. The description and documentation of an exceptional event must be done in AQS via online forms; the event cannot be defined via the AQS batch transactions.

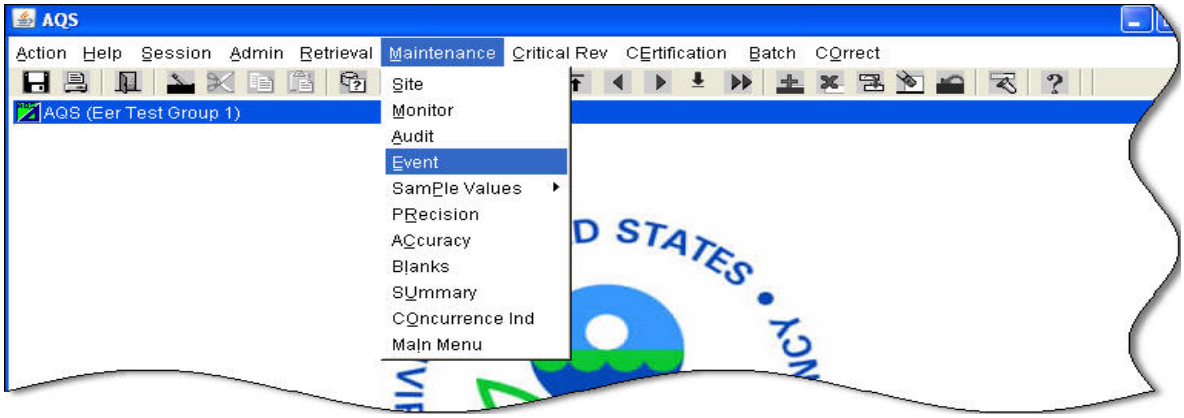
The event can be defined either via Maintain Exceptional Events (recommended if you anticipate that this event will affect many sample values) or via Maintain Raw for each sample value (this is recommended only if you have one or few sample measurements affected by an event.) The latter process was demonstrated in Section 2.1.1 of this *Exceptional Event Tutorial*.

You do not have to define an exceptional event before adding an exceptional event qualifier code to sample measurements. The exceptional event can be defined afterwards, as previously demonstrated in section 2.1.1. However, if you request a concurrence from EPA to exclude that flagged measurement, then the exceptional event **must** be defined and associated with the measurement data **before** the Regional Office can review your request to set a concurrence flag.

When you log in to AQS, you must select and have authority to update Raw Data for the screening group that "owns" this data.

2.2.1 Defining an Exceptional Event via Maintain Exceptional Events

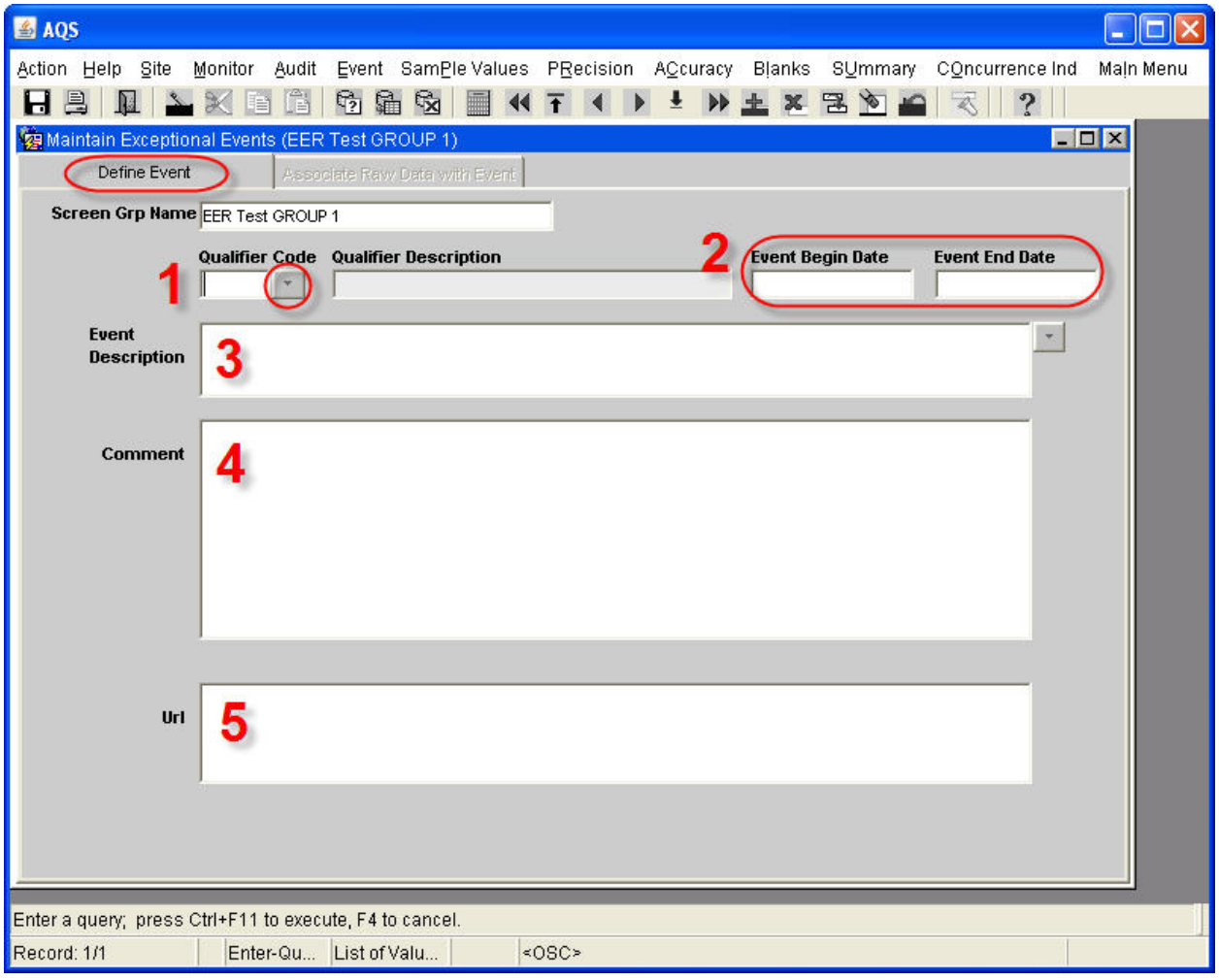
1. In AQS, go to Maintenance → Event



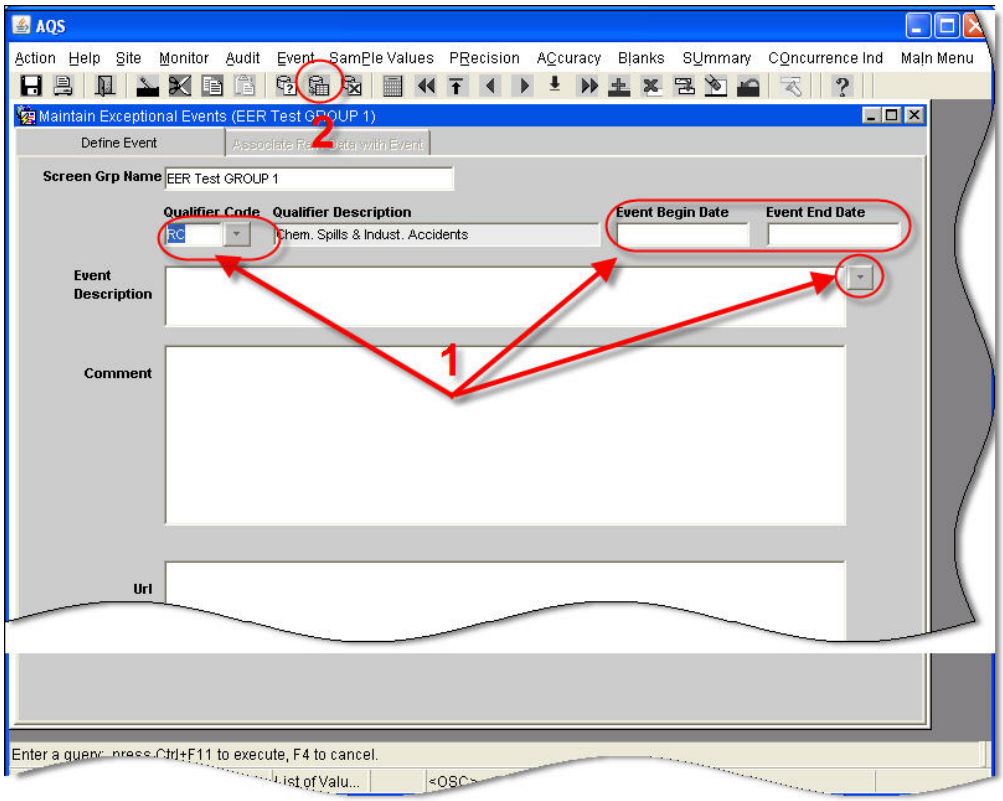
To define an Exceptional Event, the following information is REQUIRED:
Event Description and Qualifier Code (the codes are available from the “Qualifier Code” drop down – these map to the REQEXC type qualifiers)

The following is OPTIONAL:
Event Begin Date, Event End Date, Comment, and URL

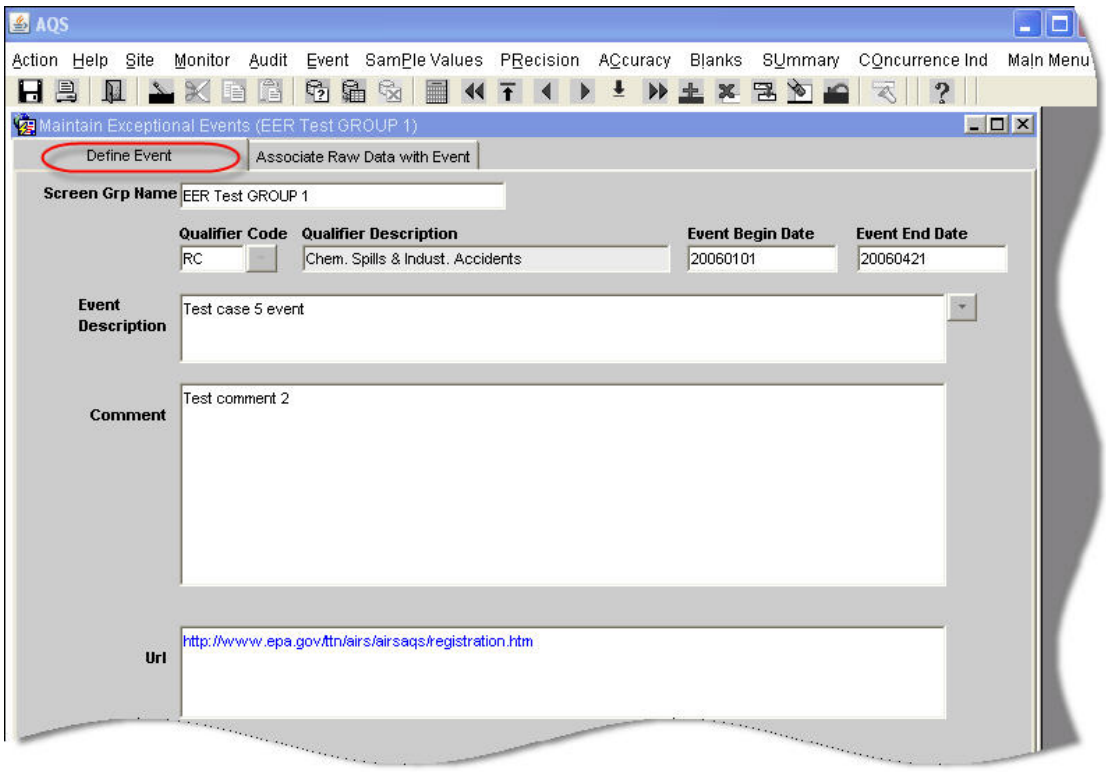
On the Define Event tab,
1 – Use the drop down on “Qualifier Code” to select the type of exceptional event
Possible choices include Forest Fire, African Dust, Asian Dust, Chemical Spills & Industrial Accidents, Cleanup After a Major Disaster, etc.
The “Qualifier Description” field will be populated with the description matching the Qualifier Code selection.
2 – Add an “Event Begin Date” and “Event End Date” ” – (format: YYYYMMDD) – usually exceptional events have a distinct begin and end date. – optional
3 – “Event Description” – (format: text) – required
4 – “Comment” – (format: text) – additional information – optional
5 – “Url” – (format: text) – provide a website for additional explanatory information – optional



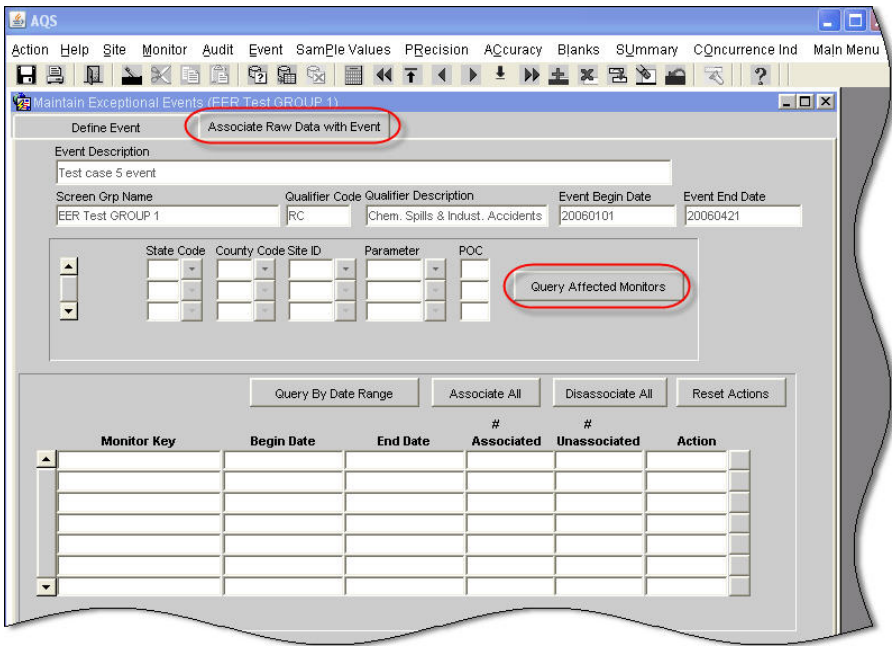
If there is an existing Exceptional Event, then the event can be queried by 1 - entering the Qualifier Code and/or the Event Begin Date and/or the Event End Date and/or the Event Description and 2 - submitting the query using the “Execute Query” icon:



On the “Define Event” tab - the events that match the query criteria will display:



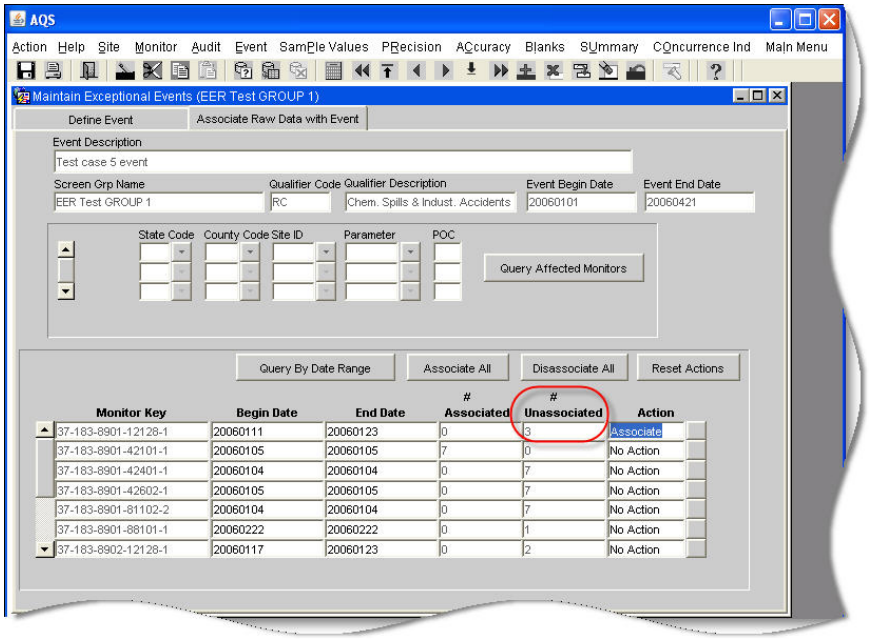
Move to the “Associate Raw Data with Event” tab - To see which monitors are associated with this event, or to associate a monitor with this event, select “Query Affected Monitors.”



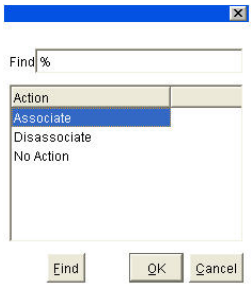
The query will return all monitors that have this qualifier code (“RC”) and fit the date range (Jan 01 2006 to Apr 21 2006.)

To associate ALL the monitors that were returned by the query, choose the “Associate All” button. Conversely, you can disassociate all by choosing “Disassociate All.” The “Reset Actions” button sets any actions you changed (up to the last time you saved) back to “No Action.”

If only some of the sample measurements for a monitor should be associated,
In this example, we are interested only in the monitor and date range that appears at the top of the list. Notice that “# Unassociated” is 3.



In the “Action” column, you must choose “Associate” to connect this monitor and date range with the exceptional event that you defined.

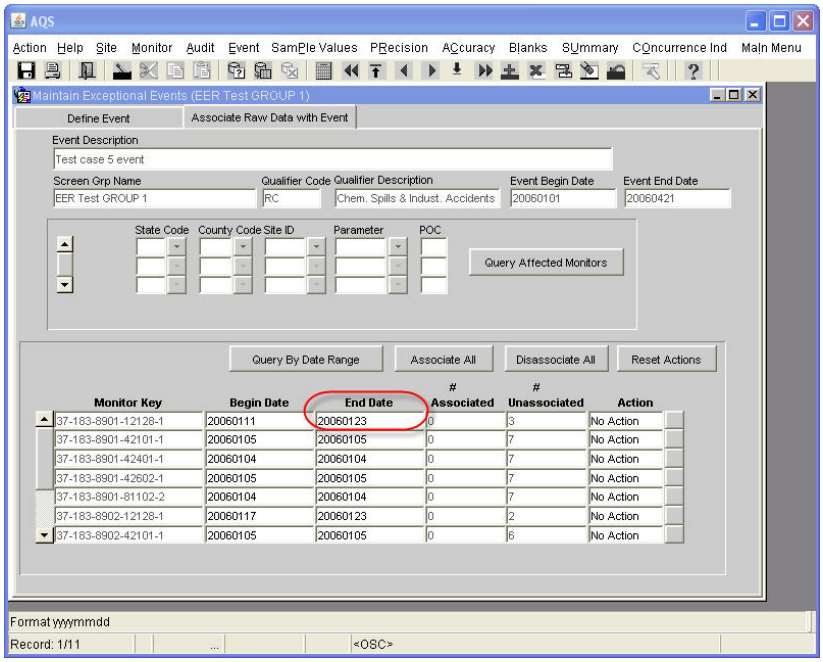


Make your selection and click “OK.”

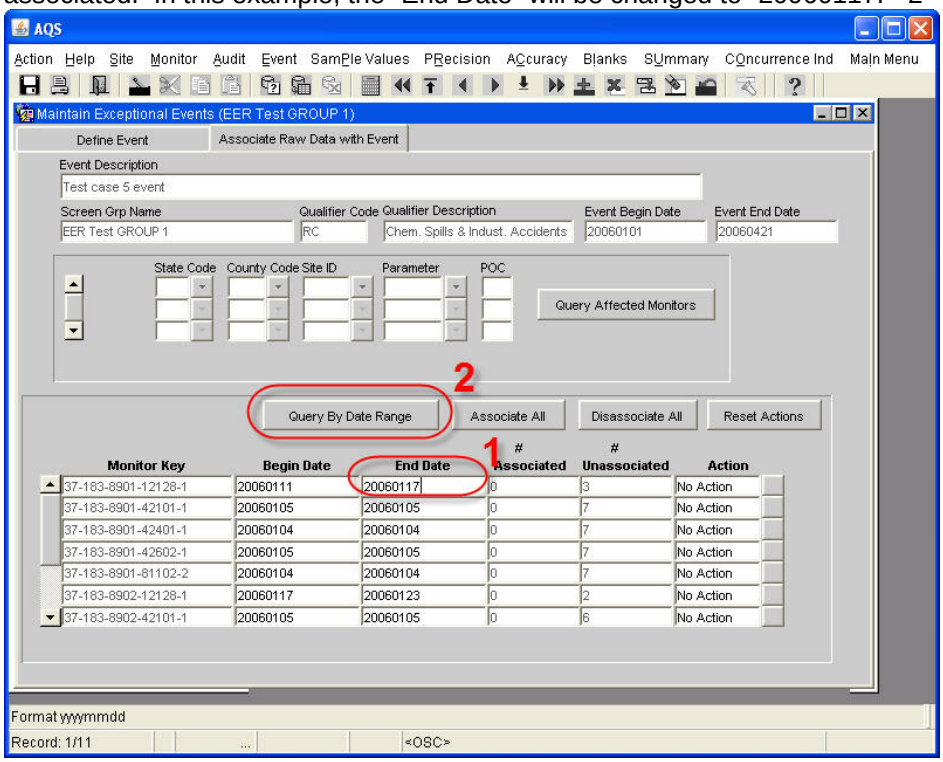
“Save” your changes using the Save icon on the taskbar or <F10>.

We just associated all three sample measurements with the exceptional event defined as “Test Case 5 event.”

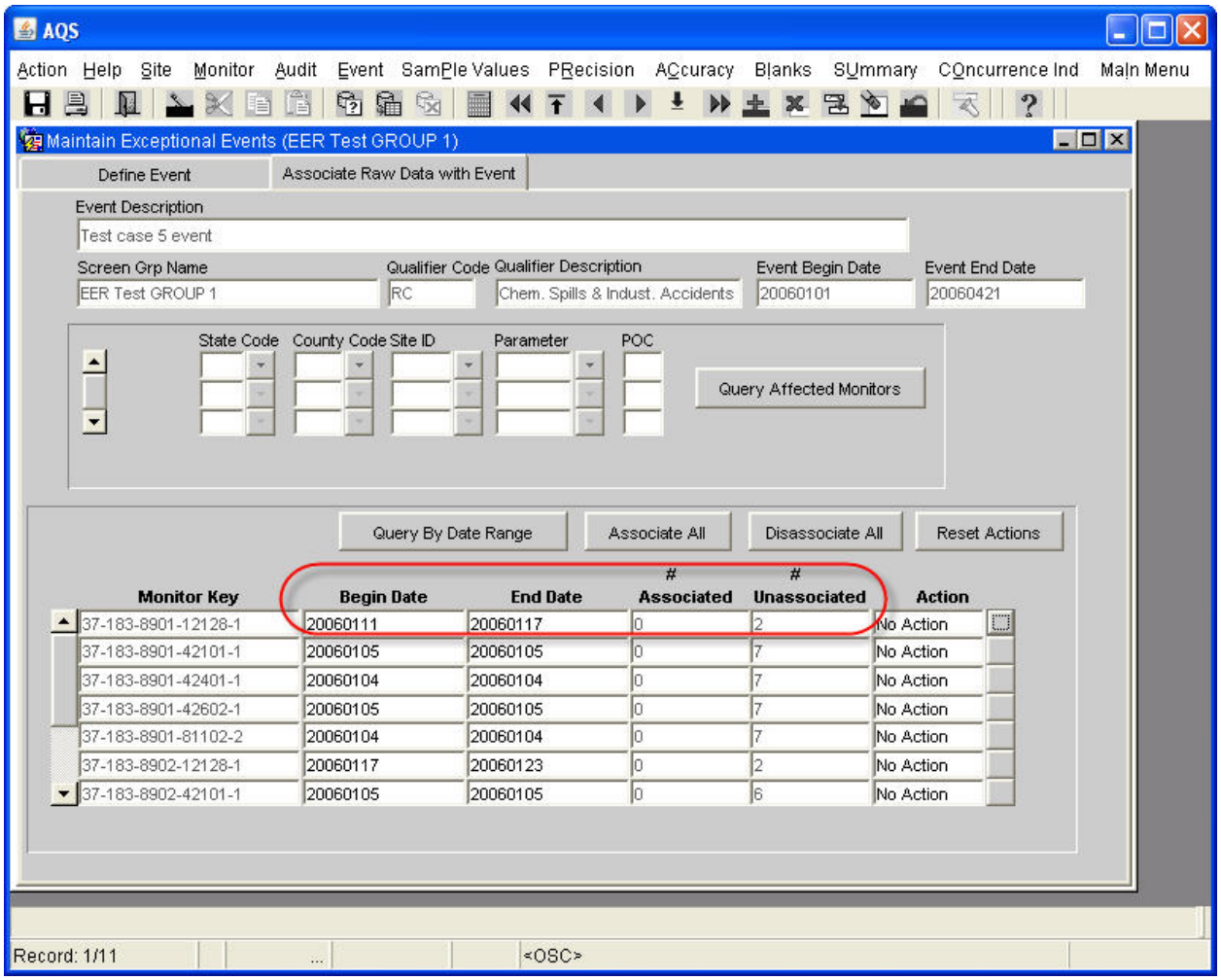
If not all three sample measurements were affected by this event, then it is possible to narrow the date range. In the next example, only the first two of these three sample measurements, the samples collected between Jan 11 and Jan 17 2006, were affected by the “Test Case 5 event.”



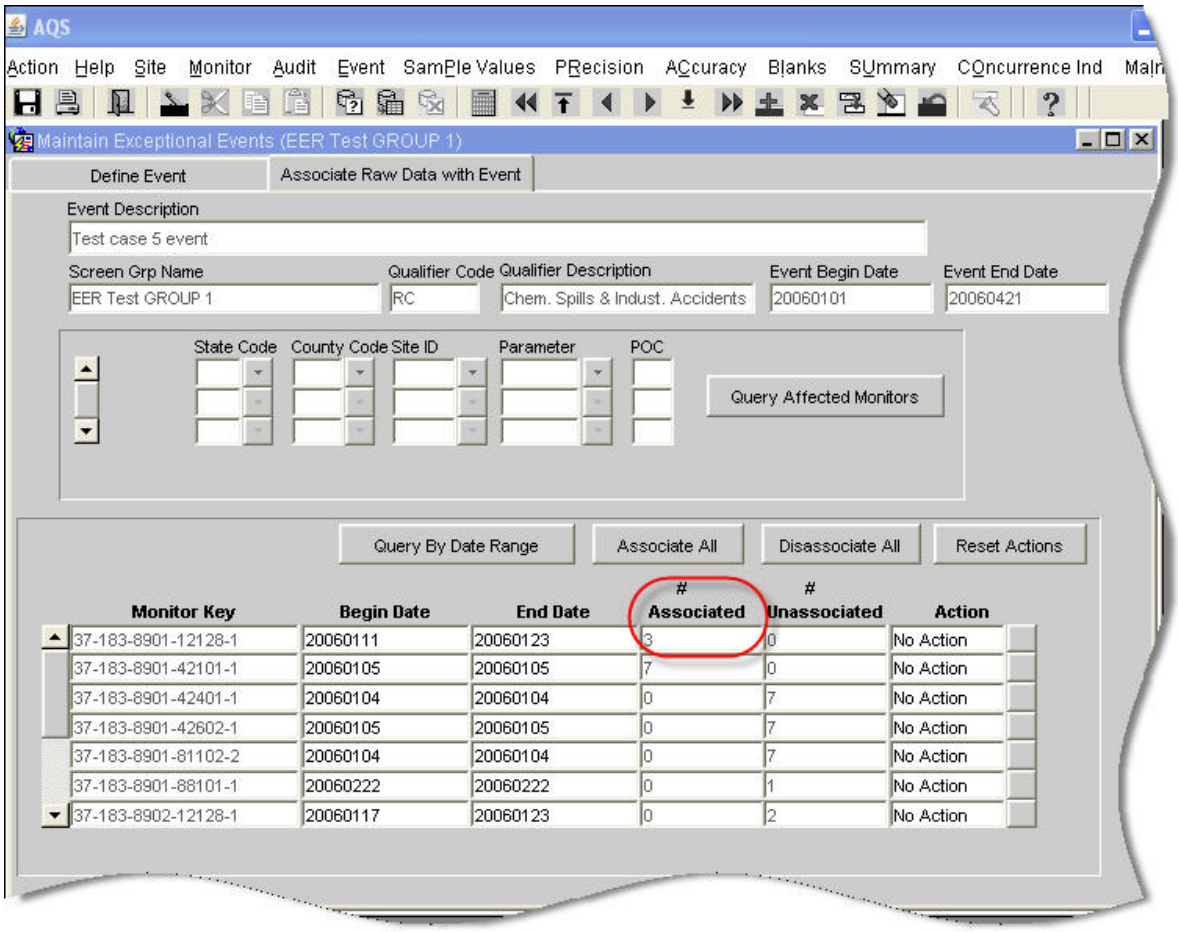
After the Monitor data has been retrieved by “Query Affected Monitors,” 1 -- go to the Begin Date and/or End Date Field and enter the date range that contains the sample measurement that should be associated. In this example, the “End Date” will be changed to “20060117.” 2 – “Query By Date Range”



You can choose to Associate only these first two measurements.



In the screen below, we choose to associate all three sample measurements (from page 16). At this point these measurements are available for the Regional Office to set the concurrence flags via the Maintain Concurrence menu in AQS.



2.3 Add concurrence flag – Regional Office

As an EPA Regional Office AQS user, you can add a concurrence flag to signify that you concur with the exclusion of sample measurements due to an exceptional event. **Concurrence/non-concurrence can only be done via online forms.**

A "Concur" flag means that the Regional Office concurs with the exclusion.
A "Deny" means that the Regional Office does not concur with the exclusion.

Certification is preserved when data is Concurred or Non-Concurred. The Certification of a Monitor-Year is only removed when the concentration value of a sample measurement is updated, but not when other fields are updated.

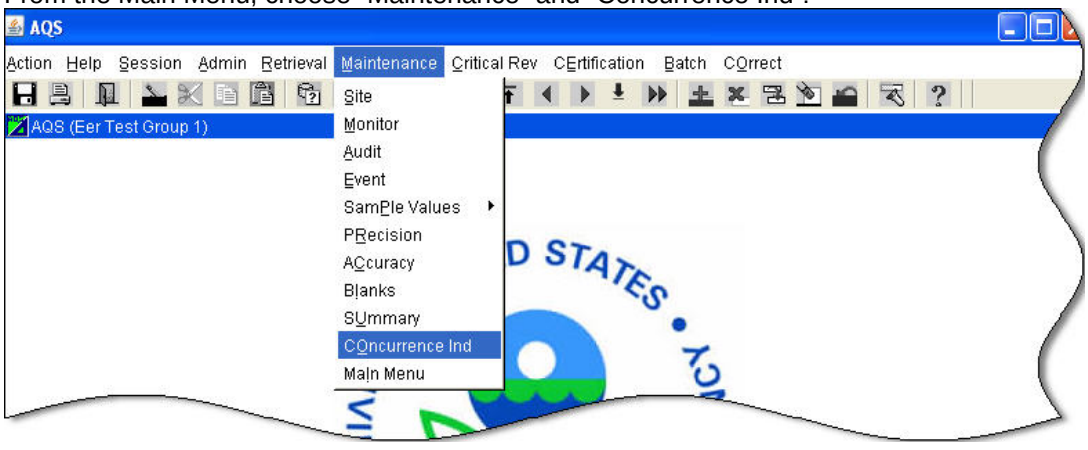
Sample values can be concurred/non-concurred based on different existing standards. Presently, these are as follows:

Pollutant	Standards
O_3	8-hour 2008 1-hour Daily 2005 8-hour 1997
SO_2	24-hour 1971 3-hour 1971 Annual 1971
NO_2	Annual 1971
CO	8-hour 1971 1-hour 1971
Pb	Quarterly 1978
PM_{10}	24-hour 2006
$PM_{2.5}$	24-hour 2006 Annual 2006

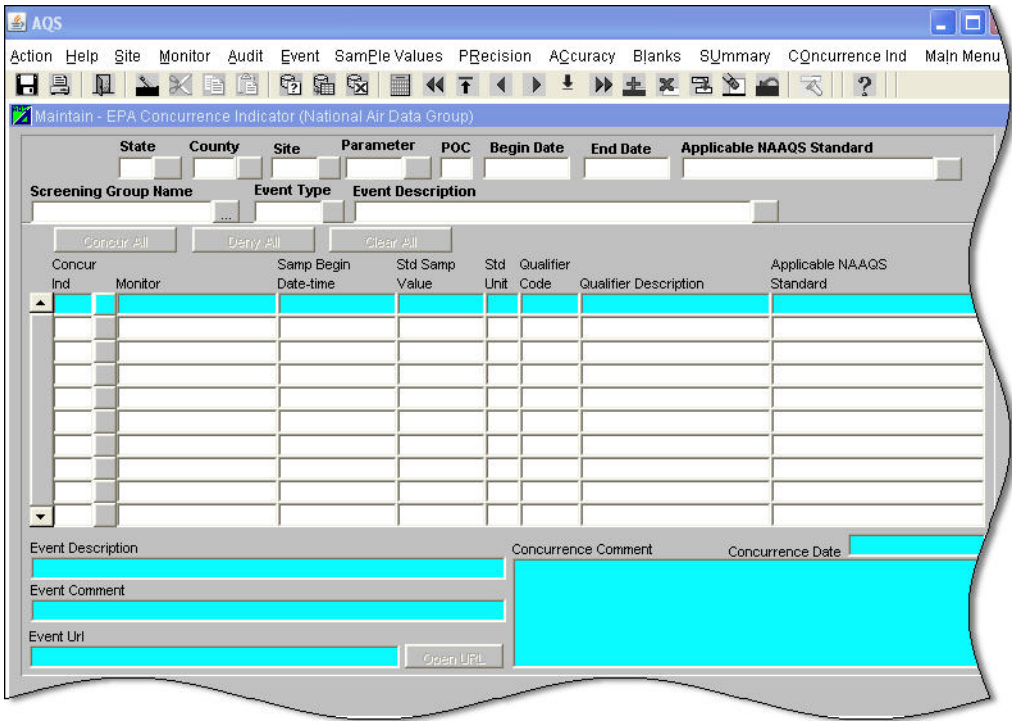
Work Flow
1. The Regional Office user evaluates the documentation for a sample measurement that was flagged as being affected by an exceptional event.

2. The Regional Office user will use the Maintain Concurrence form in AQS to query the affected sample measurements and to set the concurrence flag. *To access this portion of AQS, you must have the correct authorization.* An authorized Regional Office user would have access to all the monitors in that region.

From the Main Menu, choose "Maintenance" and "Concurrence Ind":

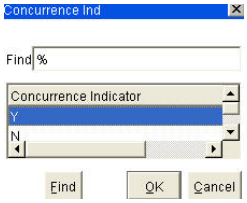


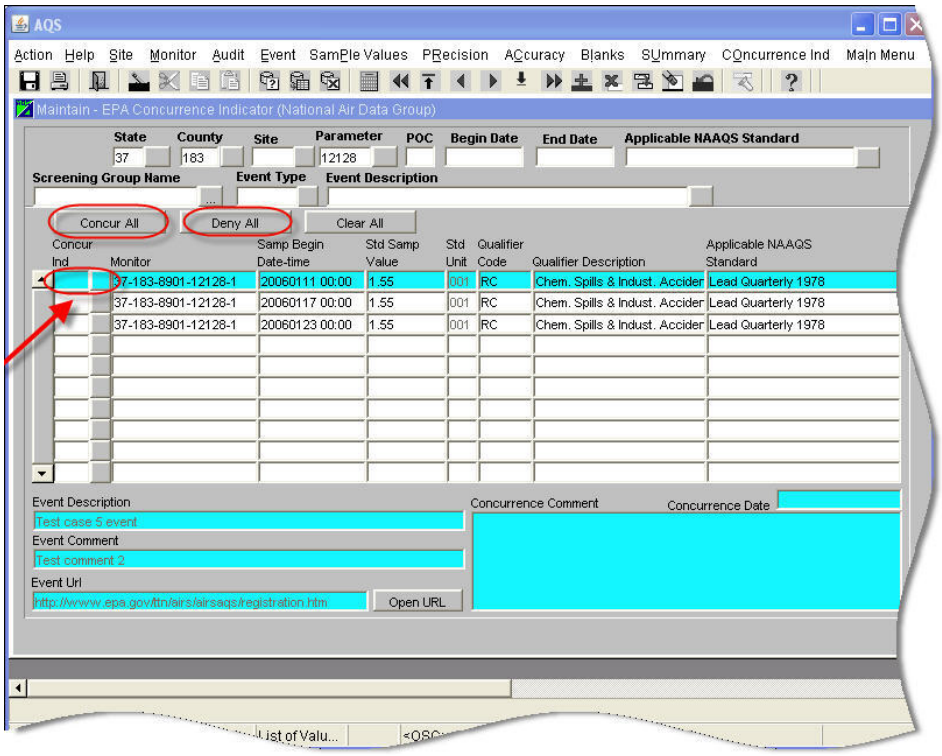
The “Maintain – EPA Concurrence Indicator” screen:



3. Query the affected sample measurements:

You can “Concur All,” “Deny All,” or apply a Concurrence Indicator only to an individual record using the drop down on the highlighted record**.**



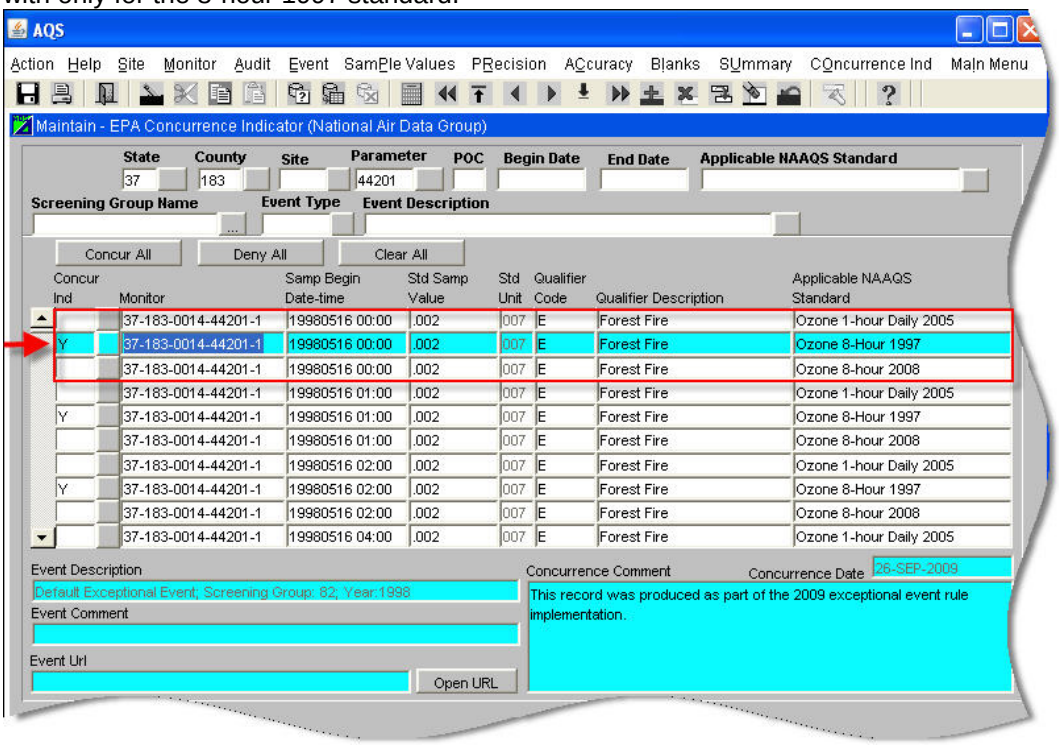


4. Save the changes using the “Save” icon on the Taskbar or <F10>.

5. Again, where applicable, **the concurrence flag can be set for a particular standard**.

In the ozone example below, the sample measurement records would appear multiple times with the column of “Applicable NAAQS Standard” changing to reflect the standard that would be applied.

One such sample measurement is circled in red. There are three ozone standards applicable, the 1-hour Daily 2005, the 8-hour 1997, and the 8-hour 2008. This particular sample measurement was concurred with only for the 8-hour 1997 standard.



Note:

- You can query using any of the fields in the top block.
- To query measurements with the intention of concurring with respect to a single standard (when multiple apply), then select the standard as part of the query criteria.
- To query measurements with the intention of concurring with ozone “BG” null data codes, then enter “BG” in the “Event Type” field.

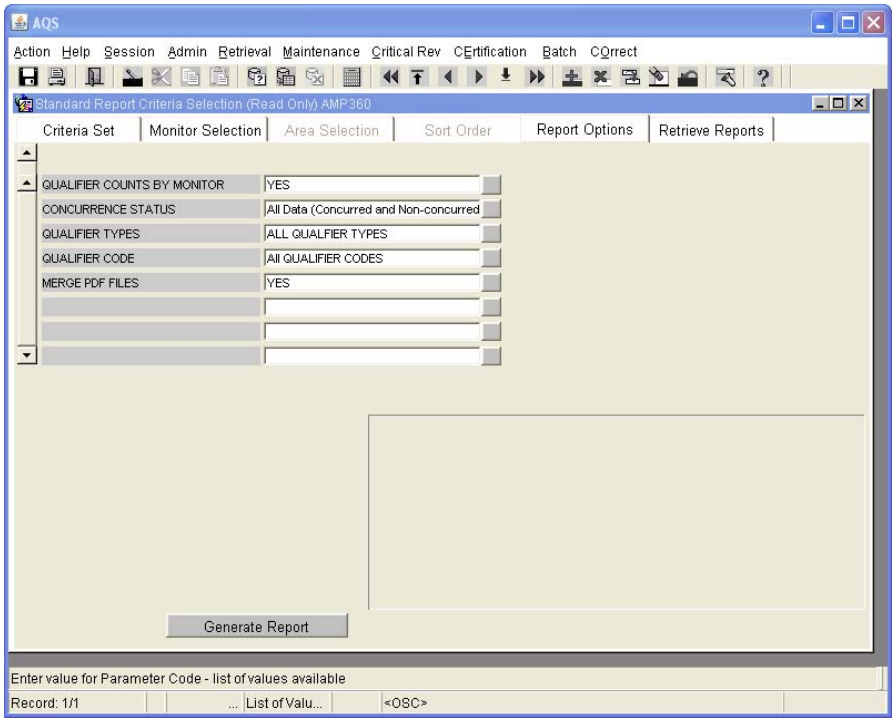
2.4 New Standard Report – AMP360 Raw Data Qualifier

The new AMP360 report can retrieve all types of qualifiers. For exceptional event data, the AMP360 can select by concurrence status, qualifier types, and qualifier codes.

There are several suggested ways to use this report.

1. See the status of data that has been flagged with an exceptional event and is awaiting Regional Office action - choose Concurrence Status of "Unreviewed Data Only"
2. See which data measurements have been denied exclusion and see the Regional Office comments - choose Concurrence Status of "Non-concurred Data Only"
3. See which data has been accepted for exclusion - choose Concurrence Status of "Concurred"
4. See if the null data codes for ozone have been concurred for data completeness purposes - choose Concurrence Status of "Concurred" AND Qualifier Type of "Null Data Codes Only"
   Note: Ozone sample measurements that are flagged with the null data code "BG" and that receive Regional Office concurrence will count towards data completeness. (BG=Missing ozone data not likely to exceed level of standard)

The output of the AMP360 is a pdf or a workfile (a pipe delimited file that can be imported into Excel, etc.)



Qualifier Counts By Monitor:
Options:
YES --- *default*
NO

Select "YES" and, in the report, at the end of a section for a monitor, you get a count for each qualifier. Example:

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
37-183-0014-44201-1 3801 SPRING FOREST RD.	2009-07-31 03:00		BD	Auto Calibration				

Monitor Qualifier Counts:			
	AE	Shelter Temperature Outside Limits	Count: 26
	AY	Q C Control Points (zero/span)	Count: 2
	AT	Calibration	Count: 15
	BF	Precision/Zero/Span	Count: 227
	AN	Machine Malfunction	Count: 108
	AO	Bad Weather	Count: 26
	BD	Auto Calibration	Count: 1265
	AV	Power Failure	Count: 30
	BA	Maintenance/Routine Repairs	Count: 39
	AC	Construction/Repairs in Area	Count: 38
	BC	Multi-point Calibration	Count: 35
	AZ	Q C Audit	Count: 8
	AL	Voided by Operator	Count: 22

Concurrence Status:
Options:
CONCURRED DATA ONLY (Concurrence = Y)
NON-CONCURRED DATA ONLY (Concurrence = N)
UN-REVIEWED DATA ONLY (No concurrence value)
All Data (Concurred and Non-Concurred) --- *default*

Qualifier Types:
Options:
ALL QUALIFIER TYPES --- *default*
REQUEST EXCLUSION (EVENT) QUALIFIERS ONLY
INFORMATIONAL (EVENT) QUALIFIERS ONLY
NULL DATA CODES ONLY
QA QUALIFIERS ONLY

Qualifier Code:
ALL QUALIFIER CODES --- *default*
RH – Fireworks (REQEXC)
RI – High Pollen Count (REQEXC)
RH – High Winds (REQEXC)
.
.
.
RG – Fire – Mexico/Central America (REQEXC)

Note: The Report Options form does not subset data for later options based on what you have already selected. For example, if you selected "Required Exclusion" as the qualifier type, then the Qualifier list will still show all codes, not just the REQEXC ones. (If you choose a code that is not REQEXC, then the report will run, but will be empty.)

2.5 Standard Reports – exceptional event selection criteria for each report – all users

The addition of an exceptional event qualifier flag to sample values initiates (during the POST process) the re-computation of all of the summaries:

- at monitor-level:
    - NAAQS Averages
    - Daily Summaries
    - Quarterly Summaries
    - Annual Summaries;
- at site-level:
    - Daily Summaries
    - Quarterly Summaries
    - Annual Summaries,

All summary records are stored with identifiers that indicate whether the summaries include or exclude the sample values that were flagged with an exceptional event qualifier. When Standard Retrievals are done, the user will be able to select (from the Events Processing drop-down in the Report Options menu) which summary records will be retrieved. Summary records also have an indicator.

Note: Discoverer users – Any previously saved queries that deal with summary records will need to be updated to reflect the new Events Processing!

Report Output:

Some standard reports now have options for Applicable Standard on the Report Options selection tab, ie the user is able to select which standard to apply to the report. Example, in the case of a AMP450 Quick Look for ozone, the user can select one of the following standards (Ozone 8-hour 2008 or Ozone 1-hour Daily 2005 or Ozone 8-hour 1997) to apply to the retrieval.

Standard reports had had options for Events Processing on the Report Options selection tab, and these options remain.

The report selection criteria vary between reports and are summarized in the following table.

For this **AQS Report**:	You can choose the **Applicable Standard*** to be applied to the report:	And you can choose one of the following options for **Events Processing**:
AMP450 (Quick Look Criteria Parameters)	Yes	Include Events OR Exclude Events OR Exclude Regionally Concurred Events OR Report All Event Records
AMP450NC (Quick Look All Parameters)	Yes	
AMP435 (Daily Summary)	Yes	
AMP230 (Frequency Distribution)	Yes	
AMP440 (Maximum Values)	Yes	
AMP260 (Reduced Frequency Distribution)	Yes	
AMP470 (Raw Values by Year)	No	
AMP355 (Combined Site Sample Values)	Yes	Include Regionally Concurred Events OR Exclude Regionally Concurred Events
AMP350 (Raw Data Report)	No	Include Events OR Exclude Events
AMP460 (Raw Data WF Parameters by Time)	No	
AMP350MX (Raw Data Max Values)	Yes	Include Events OR Exclude Events OR Exclude Regionally Concurred
AMP350NW (Raw Data NAAQS Averages)	Yes	
AMP300 (Violation Day Count)	Yes	
AMP360 (Raw Data Qualifier)	No	Concurred Data Only (Concurrence = Y) OR Non-concurred Data Only (Concurrence = N) OR Un-reviewed Data Only (No Concurrence Value) OR All Data (Concurred and Non-Concurred)

*Applicable Standards:
Ozone 8-hour 2008, Ozone 1-hour Daily 2005, Ozone 8-hour 1997, SO_2 24-hour 1971, SO_2 3-hour 1971, SO_2 Annual 1971, NO_2 Annual 1971, CO 8-hour 1971, CO 1-hour 1971, Lead Quarterly 1978, PM_{10} 24-hour 2006, $PM_{2.5}$ 24-hour 2006, $PM_{2.5}$ Annual 2006