The background features a large, faint watermark of the United States Environmental Protection Agency (EPA) seal. The seal is circular and contains the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY" around the perimeter. In the center of the seal is a stylized flower with a white center and green petals, set against a green background.

Working with QA Data

Chris Chapman, US EPA
National Ambient Air Monitoring Conference
August 10, 2016 – St. Louis, Missouri



Background

- The QA requirements for ambient air quality monitoring are specified in 40 CFR Part 58 Appendix A.
- In 2012 the EPA initiated a project to develop transactions that more closely matched the Appendix A requirements.
- In 2013, AQS was enhanced to support loading these, and a new set of reports were developed to utilize this data.



Background (Con't)

- We converted AQS Precision and Accuracy data to the new QA data tables.
- In 2015, we embarked on a LEAN effort to facilitate the collection and loading of NPAP Audits into AQS, including the development of a stand alone Windows program for conducting audits (PEAT).
- In 2016, we are doing the same thing with PEP data.



QA Transaction List

- 1-Point QC
- Annual Performance Evaluation
- Flow Rate Verification
- Semi-Annual Flow Rate Audit
- Lead Analysis Audit
- Performance Evaluation Program (PEP)
- National Performance Audit Program (NPAP)
- PM Coarse Flow Rate Verification
- PM Coarse Semi-Annual Flow Rate Audit
- Speciation Flow Rate Verification
- Speciation Semi-Annual Flow Rate Audit
- NATTS Duplicate Assessment
- NATTS Replicate Assessment
- Field Proficiency Test
- Lab Proficiency Test
- Ozone SRP
- Ambient Air Protocol Gas Verification Program
- Definitions: <https://aqs.epa.gov/aqsweb/documents/TransactionFormats.html>



Example: 1-Point QC

- Regulatory Requirement: 40 CFR Part 58 Appendix A § 3.1.1
 - A one-point quality control (QC) check must be performed at least once every 2 weeks on each automated analyzer used to measure SO₂, NO₂, O₃ and CO.
 - The QC check is made by challenging the analyzer with a QC check gas of known concentration (effective concentration for open path analyzers) between 0.005 and 0.08 parts per million (ppm) for SO₂, NO₂, and O₃, and between 0.5 and 5 ppm for CO analyzers.
 - Report the audit concentration of the QC gas and the corresponding measured concentration indicated by the analyzer. The percent differences between these concentrations are used to assess the precision and bias of the monitoring data

Example: 1-Point QC (2)



No.	Field Name	Description
1	Transaction Type	New transaction type "QA"
2	Action Indicator	1 character code specifying Insert (I), Update (U) or Delete (D)
3	Assessment Type	A label specifying the assessment for which data is being submitted. "1-Point QC"
4	Performing Agency Code	Agency Code of organization performing assessment (optional)
5	State Code / Tribal Indicator	The FIPS state code of the monitor being assessed, or "TT" to indicate that the next field on the transaction is a Tribal code.
6	County Code / Tribal Code	The FIPS County Code of the monitor being assessed. If the previous field on the transaction contains "TT", then the Tribal Code of the monitor being assessed.
7	Site number	Four digit number to uniquely identify site in county.
8	Parameter Code	The AQS parameter code assigned to the monitor in AQS for which the assessment is being performed

No.	Field Name	Description
9	POC	Parameter Occurrence Code: One or two digit number identifying a specific monitor for a parameter at the site.
10	Assessment Date	Date that the assessment was performed
11	Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be "1" unless additional same assessments are performed.
12	Monitor Method Code	The sampling methodology of the monitor being assessed.
13	Reported Unit	Units associated with the assessment concentrations (Monitor Concentration and Assessment Concentration)
14	Monitor Concentration	The concentration value provided by the monitor being assessed.
15	Assessment Concentration	The value of the check gas standard concentration.



Transaction Format Link

- AQS Transaction Formats:
 - <https://aqs.epa.gov/aqsweb/documents/TransactionFormats.html>
 - Formats for all transactions, not just QA.



Generating QA Transactions

Users have several options for entering QA data into AQS; these include the following:

- Entering the data directly into the AQS Web application Maintain forms
- Submitting via Batch Processing after
 - Creating the data manually using a text editor or other PC tool (e.g. Excel)
 - Having a vendor's data management system create a file for submission to AQS.
 - Using the AQS QA Transaction Generator program.



On-Line Maintain Forms (1)

- On-Line Maintain Forms
 - One for each QA transaction type
 - Can be used to edit (Insert, Update, or Delete) Production QA data
 - Each field is validated as it is entered.
 - AQS codes can be picked from list where appropriate
 - Record fully validated by SAVE process
 - Records immediately show up on QA reports without having to run AQS LOAD



Batch Loading and Correct

- Batch Loading
 - Load through ENSC or State Node
 - Load Pipe Delimited or XML Format
 - Transactions are staged and then verified using business rules
 - Transactions that pass are loaded (production read)
 - Transactions that fail show up in correct form
 - Combination of BATCH form and Correct Form to correct QA Transactions.

Example Batch Form



Current Screening Group (click batch to change)

HISTORY AND STATUS						LOAD			POST		
Submission Date	File Name	User Name	Records In File	Date (last)	Process Status	Recs Loaded	Recs Failing to Load	Stat/CR Finding Count	Records to Post	Skip'd Monitors	Records Posted
20160810 01:16	EXERCISE4_T70.txt.zip	CHRIS CHAPMAN	3	20160810 01:28	LOAD-ERROR	0	1				
20160810 01:15	EXERCISE2_T70.txt.zip	CHRIS CHAPMAN	34	20160810 01:25	POST-COMPLETED	34	0	2	24	0	24
20160805 15:35	ONLINE_CIX_1527470	CHRIS CHAPMAN	1	20160805 16:16	POST-COMPLETED	1	0	1	1	0	1
20160804 14:16	EXERCISE2_T50.txt.zip	CHRIS CHAPMAN	34	20160804 14:17	POST-COMPLETED	34	0	2	24	0	24
20160802 10:13	do_nothing_unix.txt.zip	ROBERT COATS	0	20160802 10:13	STAGE-COMplete						
20160525 09:43	R3_Test1.txt.zip	ROBERT COATS	1	20160525 09:43	LOAD-ERROR	0	1				
20160418 14:28	ONLINE_CIX_1482653	NOT FOUND		20160418 14:28	UPLOAD-COMPLET						
20160418 14:25	CSN NC.zip	NOT FOUND	23	20160418 14:25	LOAD-ERROR	0	23				
20160317 08:33	ONLINE_RCG_1468470	ROBERT COATS		20160317 08:33	UPLOAD-COMPLET						
20160317 06:51	NE_PQAO_Trans.txt.zip	ROBERT COATS	1755	20160317 06:51	LOAD-COMPLETED	1755	0				
20160317 06:50	SW_PQAO_Trans.txt.zip	ROBERT COATS	1659	20160317 06:50	LOAD-ERROR	1655	4				

PROCESS CONTROL	Load	Post	Other
Process selected file through:	<input type="button" value="Load File"/>	<input type="button" value="Post File"/>	<input type="button" value="Show User Log"/>
Results and Reports:	<input type="button" value="Load Summary and Errors"/>	<input type="button" value="Stat CR Report"/>	<input type="button" value="Goto ENSC"/>
		<input type="button" value="Raw Data Inventory"/>	<input type="button" value="Refresh Sessions"/>

Example Correct Form



GENERIC CORRECT FORM (National Air Data Group)

Select file to view errors:

Submission Date: 20160810 01:16 | File Name: EXERCISE4_T70.txt.zip | User Name: CHRIS CHAPMAN | Trans_Count: 1

Load QA Data

1-Point QC

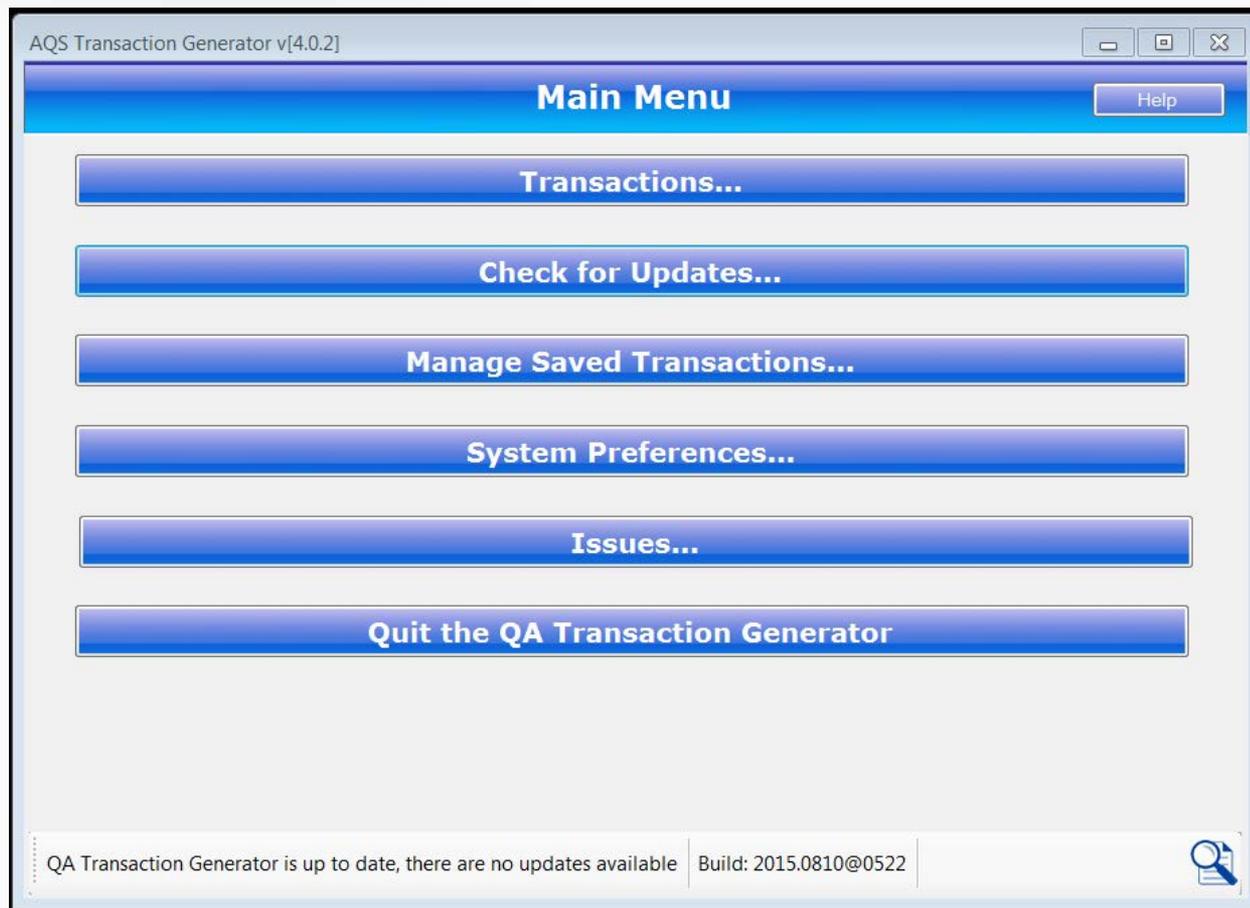
Action Ind	State Code/ Tribe Ind	County Code	Tribal Code	Site Number	Parameter Code	Poc	Assessment Date	Assessment Number	Performing Agency	Monitor Method	Reported Unit	Monitor Conc.	Assessment Conc.
	37	073		9070	94201	1	20130703	1	001	019	008	70.2	70

QA Transaction Generator (1)



- Tool to allow **off-line** creation of all QA transaction types.
- All fields and records validated as soon as they are entered.
- Has built-in capabilities to keep both software and AQS codes up-to-date
- Creates files that are submitted via the normal AQS Batch process.
- Can be downloaded from:
<https://www.epa.gov/aqs/aqs-transaction-generator>

QA Transaction UPDATE Generator (2)



QA UDPATE Transaction Generator (3)



QA Transactions

Select Transaction Type Help

- 1-Point Quality Control (QC)
- Annual Performance Evaluation (PE)
- Flow Rate Verification
- Semi-Annual Flow Rate Audit
- Flow Rate Verification for PMc
- Semi-Annual Flow Rate Audit for PMc
- Performance Evaluation Program (PEP)
- National Performance Audit Program (NPAP)
- Field Proficiency Test (PT)
- Duplicate
- Replicate
- Pb Analysis Audit
- Lab Proficiency Test (PT)
- Speciation Flow Rate Verification
- Speciation Semi-Annual Flow Rate Audit
- Ambient Air Protocol Gas Verification
- Ozone SRP and Ozone Transfer Standard Verifications

Cancel

1-Point Quality Control (QC) Help

Transaction Type

Action Indicator

Assessment Type

Performing Agency

State Code

County Code

Site Number

Parameter Code

POC

Assessment Date

Assessment Number

Monitor Method Code

Reported Unit

Monitor Concentration Assessment Concentration

OK Cancel

Input: QA Documents



- A Maintain form exists for each of the following types of QA Documents
 - Quality Management Plans
 - Quality Assurance Project Plans
 - Technical System Audits
 - Audits of Data Quality
- These can only be entered on-line and not via batch
- These can only be entered by EPA staff or Independent Auditors, but can be viewed by anyone
- Note: These forms only record the existence and dates for the documents, but do not support uploading the documents themselves.



QA Collocation

- QA Collocation is the explicit pairing of monitors at a site for the purpose of quality control.
- It is required by Part 50 Appendix A for PM10, PM2.5 and Pb data.
- Collocation checks are set up by defining the Monitor Collocation for the “Primary” at the site and a QA Collocated Monitor (Maintain Monitor Form or Batch MJ Transaction)
- Once set up, AQS will pair Daily Summaries from the QA Primary and Collocated monitors to calculate the Part 58 Appendix A statistics.
- Note: Previously, collocated assessments were submitted on RP transactions. This is no longer supported.



Relationship to Legacy P&A

- All valid legacy Precision and Accuracy data has been converted to the corresponding QA data
- Legacy Precision (RP) and Accuracy (RA) transactions are no longer accepted.
- Legacy RP and RA transactions converted to QA data as soon as loaded (Initially over night)
- Caveats:
 - Legacy NATTS Duplicate and Replicate assessments not separated from 1-Point-QC assessments
 - Any Legacy Field-PT assessments not separated from 1-Point-QC assessments



Outputs: QA Reports

- QA Raw Data Report (AMP251):
 - Produced formatted report of submitted transactions with Percent Difference for each value pair
 - Replaced:
 - AMP250: P&A Raw Data Report
 - AMP246: Precision Report
 - AMP247: Accuracy Report
- QA Data Quality Indicator Report (AMP256):
 - Calculates Part 58 Appendix A statistics
 - Replaced: AMP255 (with bug fixes)
- Extract QA Data (AMP504)
 - Allows retrieval of QA transactions as submitted
 - Replaced AMP502 – Extract P&A Data



Access Control

Access is controlled by Agencies assigned to the monitor rather than by Screening Group

Monitoring Organization (monitor owner)	Full access to routine QA data & Monitor Metadata
PQAO (Pooled QA across monitors)	Full access to routine QA data & Monitor Metadata
Reporting Organization	Full access to routine QA data
Collecting Agency	Full access to routine QA data
Analyzing Agency	Full access to routine QA data
Audit Agency	Full access to <i>Independent</i> QA data (i.e. PEP & NPAP)
EPA Staff	<ul style="list-style-type: none">• Read access to data for review• Full access to <i>Independent</i> QA data



AMP251 Example

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 AIR QUALITY SYSTEM
 Raw Monitor Assessment Report

Aug. 4, 2016

ONE POINT QC

PQAO: North Carolina Dept Of Environment And Natural Resources(0776)

Parameter: Carbon monoxide(42101)

Method of Collection and Analysis

INSTRUMENTAL

Gas Filter Correlation Thermo Electron 48i- TLE

<u>Site/Poc.</u>	<u>Method</u>	<u>Assess Date</u>	<u>Number</u>	<u>Assess Conc.</u>	<u>Monitor Conc.</u>	<u>% Diff</u>	<u>Unit Abbr.</u>
37- 067- 0023- 1	554	2015- 01- 01	1	9	9	0	ppm
37- 119- 0041- 4	554	2015- 01- 01	1	300	322	7.3	ppb



AMP256 example

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM

DATA QUALITY INDICATOR REPORT

One Point Quality Control

Aug. 4, 2016

Pollutant:		42101 (Carbon monoxide)				PQAO: Forsyth County Environmental Affairs Department (0403)						App A? Y
Year	Region	State	Ste IDs	POC	MT	Begin Date	End Date	Intervals Required	Valued Intervals	% Complete	CV UB	Bias UB
2015	04	NC	37-067-0023	1	S	20-MAR-15	31-DEC-15	20	20	100	1.74	+/- 1.46
2015			SUMMARY			20-MAR-15	31-DEC-15	20	20	100	1.74	+/- 1.46
SUMMARY			SUMMARY			20-MAR-15	31-DEC-15	20	20	100	1.74	+/- 1.46



Questions?

Next is QA Transaction Generator Example.

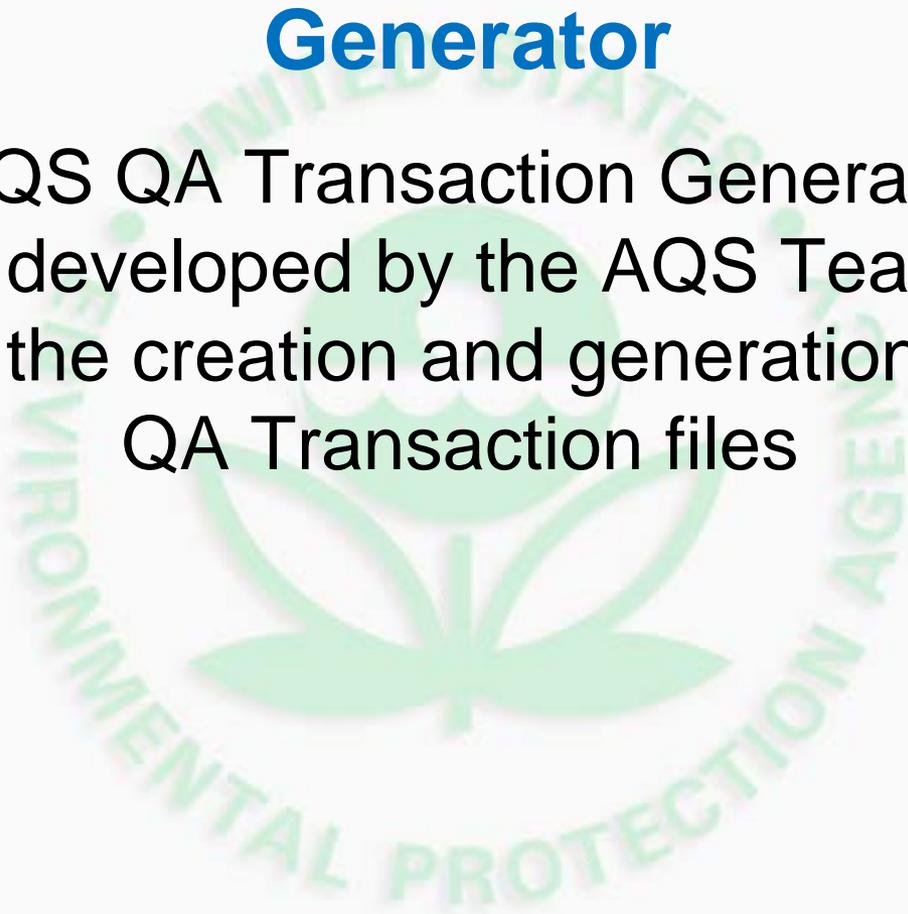


AQS QA Transaction Generator

- Welcome to the mini-training for the AQS QA Transaction Generator
- In this presentation you'll learn the following:
 - What is the AQS QA Transaction Generator
 - AQS QA Transaction Generator features
 - How to download and install the AQS QA Transaction Generator
 - Getting started – An example from start to finish
 - How to turn on Tribal Mode
 - How to get support and/or make enhancement suggestions

What is the AQS QA Transaction Generator

The AQS QA Transaction Generator is a tool developed by the AQS Team to simplify the creation and generation of AQS QA Transaction files



AQS QA Transaction Generator features

- Facilitates the creation and validation of ALL AQS QA Transactions
- Supports customization in the form of setting preferences for commonly used reference data such as:
 - State
 - Counties
 - Performing Agencies
 - Parameter Codes
 - Monitor Method Codes
 - Reported Units
 - PQAOAs
 - Enabling Tribal Mode
 - Tribal Areas
- Supports automated updating of the application and reference data

How to download and install the AQS QA Transaction Generator

- Use your internet browser to navigate to:
 - <https://www.epa.gov/aqs/aqs-transaction-generator>
- Click on the link for: Download the [AQS QA Transaction Generator Zip File](#)
- Save the zip file to a location you can remember
- Right click on the zip file and select 'Extract to here'
- Double click on 'setup.exe'
 - ***** Please Note you will need Administrative rights to install the AQS QA Transaction Generator**
- The application will start once the installation completes

Getting started – An example from start to finish

- Let's do the following:
 - Launch the AQS QA Transaction Generator
 - Set our System Preferences for:
 - State
 - County
 - Site
 - Parameter
 - Create a 1 Point Quality Control (QC) Transaction
 - Generate the transaction so it can be submitted to AQS

Getting started – An example from start to finish

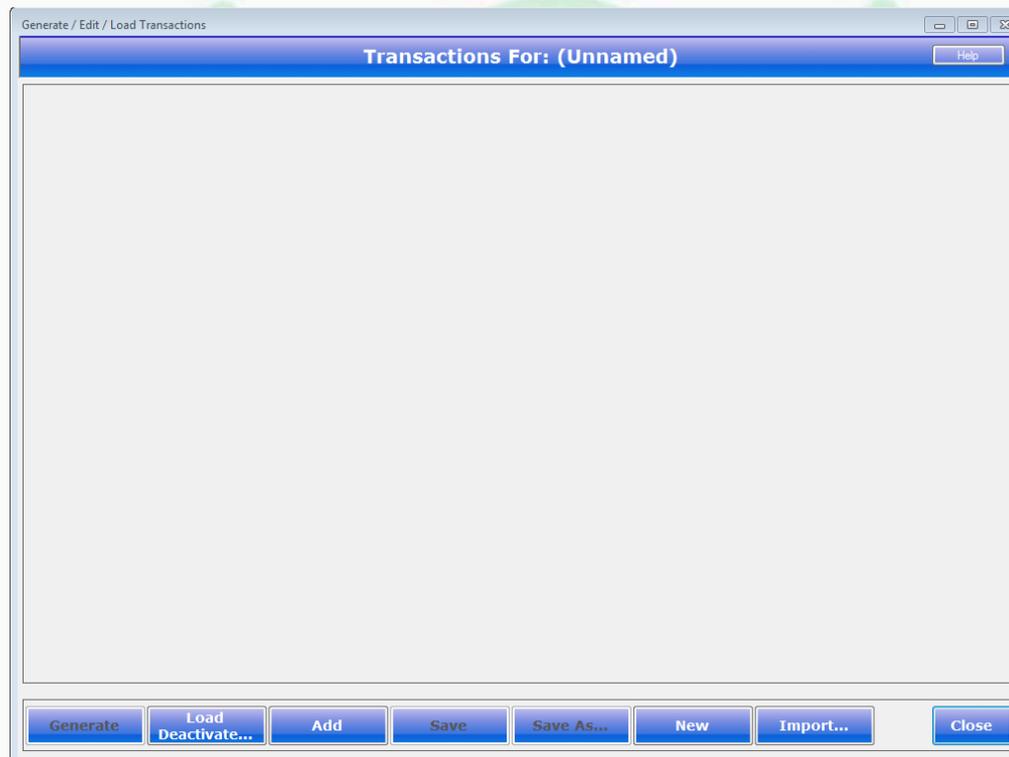
- If you haven't done so already, launch the AQS QA Transaction Generator
- Click the 'System Preferences...' button
 - Let's set defaults for the following:
 - State - AK
 - County - Anchorage
 - Parameter Codes - 42101 Carbon monoxide
 - Reported Units - 040 Parts per 100 million
 - To set the defaults start by clicking on 'States' under the 'System Defaults' list
 - You can either drag and drop 'AK' to the 'Selected States' area or click the 'Add Selected' button
 - Click the 'Save Changes' button
 - Now click on 'Counties' under the 'System Defaults' list
 - Drag and drop 'AK (020) (Anchorage)' to the selected Counties area and click the 'Save Changes' button

Getting started – An example from start to finish

- Now click on 'Parameter Codes' under the 'System Defaults' list
 - Drag and drop '42101 (Carbon monoxide)' to the selected Parameters area and click the 'Save Changes' button
- Now click on 'Reported Units' under the 'System Defaults' list
 - Drag and drop '040 (Parts per 100 million) (CONCENTRATION)' to the Selected Reported Units area and click the 'Save Changes' button
- Each time you select the drop down list for States, Counties, Parameter Codes and Reporting Units the values that you selected in the 'System Preferences' section will appear first in the drop down list.
 - You can also click the 'Search' button  to locate the item using a partial search just like in AQS
- Click the 'Close' button
 - You should now be back at the main menu

Getting started – An example from start to finish

- You should now see the 'Transactions' screen:



Getting started – An example from start to finish

- Click the  button
 - Select '1 Point Quality Control (QC)' from the list of transactions



Getting started – An example from start to finish

- You should now see the '1-Point Quality Control (QC) Screen:

The screenshot shows a software window titled "1-Point Quality Control (QC)". The window has a blue header bar with the title and a "Help" button. Below the header, there is a list of fields for data entry. Each field has a small icon to its left: a green checkmark for required fields and a red 'R' in a square for optional fields. The fields and their values are:

- Transaction Type: QA
- Action Indicator: Insert (I)
- Assessment Type: 1-Point QC
- Performing Agency: [Dropdown menu]
- State Code: [Dropdown menu]
- County Code: [Dropdown menu]
- Site Number: [Dropdown menu]
- Parameter Code: [Dropdown menu]
- POC: [Dropdown menu]
- Assessment Date: Thursday, July 17, 2014
- Assessment Number: + 1
- Monitor Method Code: [Dropdown menu]
- Reported Unit: [Dropdown menu]
- Monitor Concentration: + [Input field] Assessment Concentration + [Input field]

At the bottom right of the window, there are "OK" and "Cancel" buttons.

Getting started – An example from start to finish

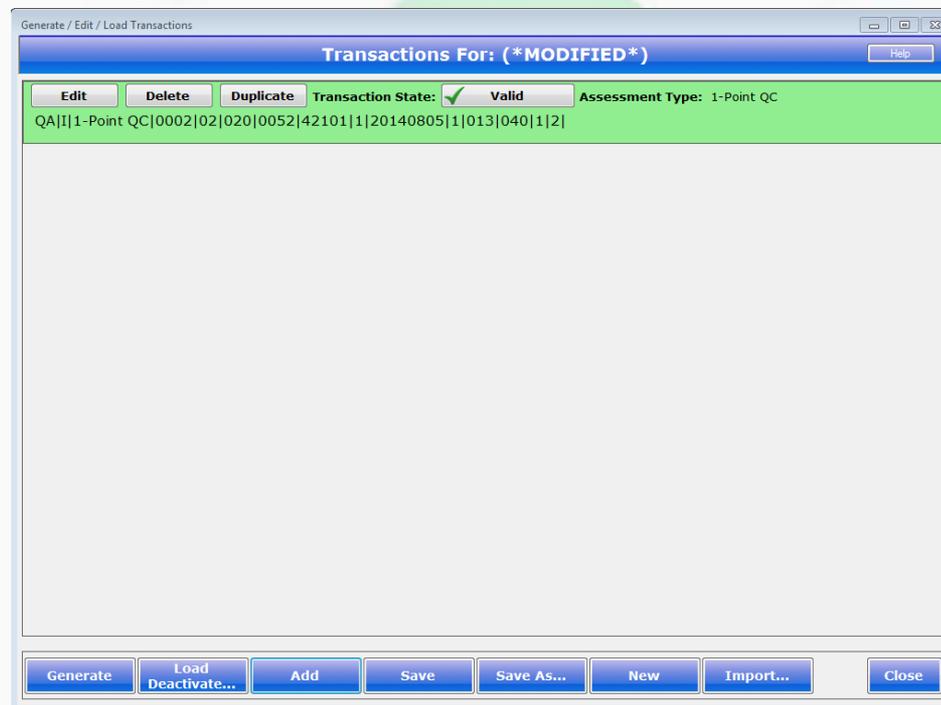
- Let's enter the following information:
 - Action Indicator - Insert (I)
 - Performing Agency - A. E. Staly Company (0002)
 - State Code - AK (02)
 - County Code - Anchorage (020)
 - Site Number - DHHS (02) (020) (0052)
 - Parameter Code - Carbon monoxide (42101)
 - POC - 1
 - Assessment Date - Tuesday, August 05, 2014
 - Assessment Number - 1
 - Monitor Method Code - INSTRUMENTAL (DETECTION TUBE)
(42101) (013)
 - Reported Unit - Parts per 100 million (040)
 - Monitor Concentration - 1
 - Assessment Concentration - 2
- Click the  button

Getting started – An example from start to finish

- Please note:
 - The AQS QA Transaction Generator will validate the data as you selecting/entering it. Selecting a 'State Code' will limit the 'County Code' to the counties for the selected state. Selecting the 'County Code' will now limit the 'Site Number' to the 'State Code' and 'County Code' that you selected. The 'Parameter Code' will be limited to the 'State Code', 'County Code' and 'Site Number that you selected. The 'Reported Unit' will be limited to the 'Parameter Code' and the type of QA transaction that you are creating.
 - The AQS QA Transaction Generator ensures that the transaction that you create is a valid AQS QA transaction by using the reference data that is updated nightly. Therefore it is imperative that you apply any and all updates to ensure that the transaction(s) that you are creating are valid AQS QA Transactions.

Getting started – An example from start to finish

- The 'Transactions' screen will be displayed and should look like the following:



Getting started – An example from start to finish

- The green background color is an indicator that the transaction is valid
- Let's save this transaction before we continue
 - Click the  button at the bottom of the screen
 - Enter '1-Point' for the description and click the  button

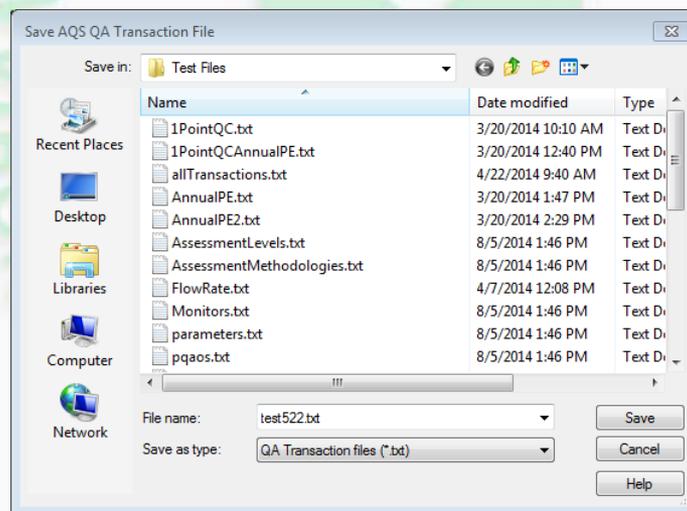


- The 'Title' for the transaction screen should now look like the following:

Transactions For: 1 Point

Getting started – An example from start to finish

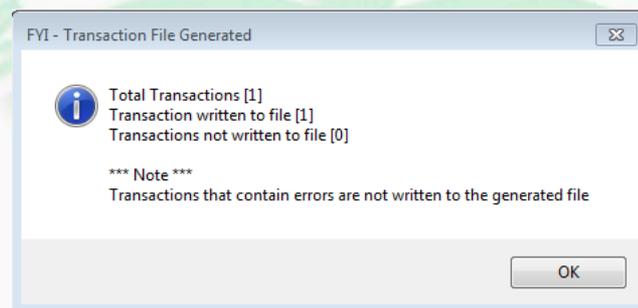
- Let's 'Generate' or create the AQS QA Transaction file that can be submitted to AQS
 - Click the  button
 - The 'Save AQS QA Transaction File' screen will open:



- That's it, the last step is to log on to AQS and submit your QA Transactions

Getting started – An example from start to finish

- Navigate to the Folder location you wish to save the generated AQS QA Transaction file to
- Enter the 'File name' for the transaction set
- Click the 'Save' button
- The AQS QA Transaction Generator will now generate all transactions that do not have an error to the transaction file
- A status dialog titled 'FYI – Transaction File Generated' will be displayed
 - The dialog will indicate how many transactions were in the transaction set and how many we written to the transaction file. Please note that transactions with errors are not written.



How to turn on Tribal Mode

- The AQS QA Transaction Generator fully supports Tribal Mode. By setting Tribal mode to 'On' the AQS QA Transaction Generator will change 'State Code' to 'Tribal Indicator' and automatically select 'TT'. It will also change 'County Code' to 'Tribal Code' and populate the selection with 'Tribal Areas'
- To turn on Tribal Mode click the 'System Preferences...' button on the main menu
- Now click the 'Tribal Mode' selection under 'Tribal'
 - Turn on Tribal Mode by clicking the 'ON' button
 - Now click 'Save Changes'

How to turn on Tribal Mode

- You can also set the default Tribal Areas that you use on a regular basis. To set the Tribal Areas simply click the 'Tribal Areas' under 'Tribal'
- Now drag and drop the appropriate 'Tribal Areas' from the 'Available Tribal Areas' section to the 'Selected Tribal Areas' section
- Click the 'Save Changes' button
- Now when you choose a Tribal Code from the a Tribal Code drop down list the Tribal Areas that you selected will appear first

How to get support and/or make enhancement suggestion

- All AQS QA Transaction support, whether it is issue related or a suggested enhancement is submitted via the AQS help desk at:
 - 1 (866) 411-4372
 - EPACallCenter@epa.gov
- Please don't contact an AQS team member directly, going through the help desk ensures that the issue or enhancement request is entered into a tracking system and then assigned to a developer.



- **QUESTIONS?**