QA Transactions and Reports

Monitoring Quality Assurance

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.
- AQS was configured to convert Precision and Accuracy data to the new QA data tables.

New 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:
  http://www.epa.gov/ttn/airs/airsaqs/manuals/QA_Transaction_Formats.pdf

Example: 1-Point QC

- Regulatory Requirement: 40 CFR Part 58 Appendix A § 3.2.1
  - A one-point quality control (QC) check must be performed at least once every 2 weeks on each automated analyzer used to measure SO_2, NO_2, O_3 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 0.01 and 0.10 parts per million (ppm) for SO_2, NO_2, and O_3, and between 1 and 10 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.

Generating QA Transactions

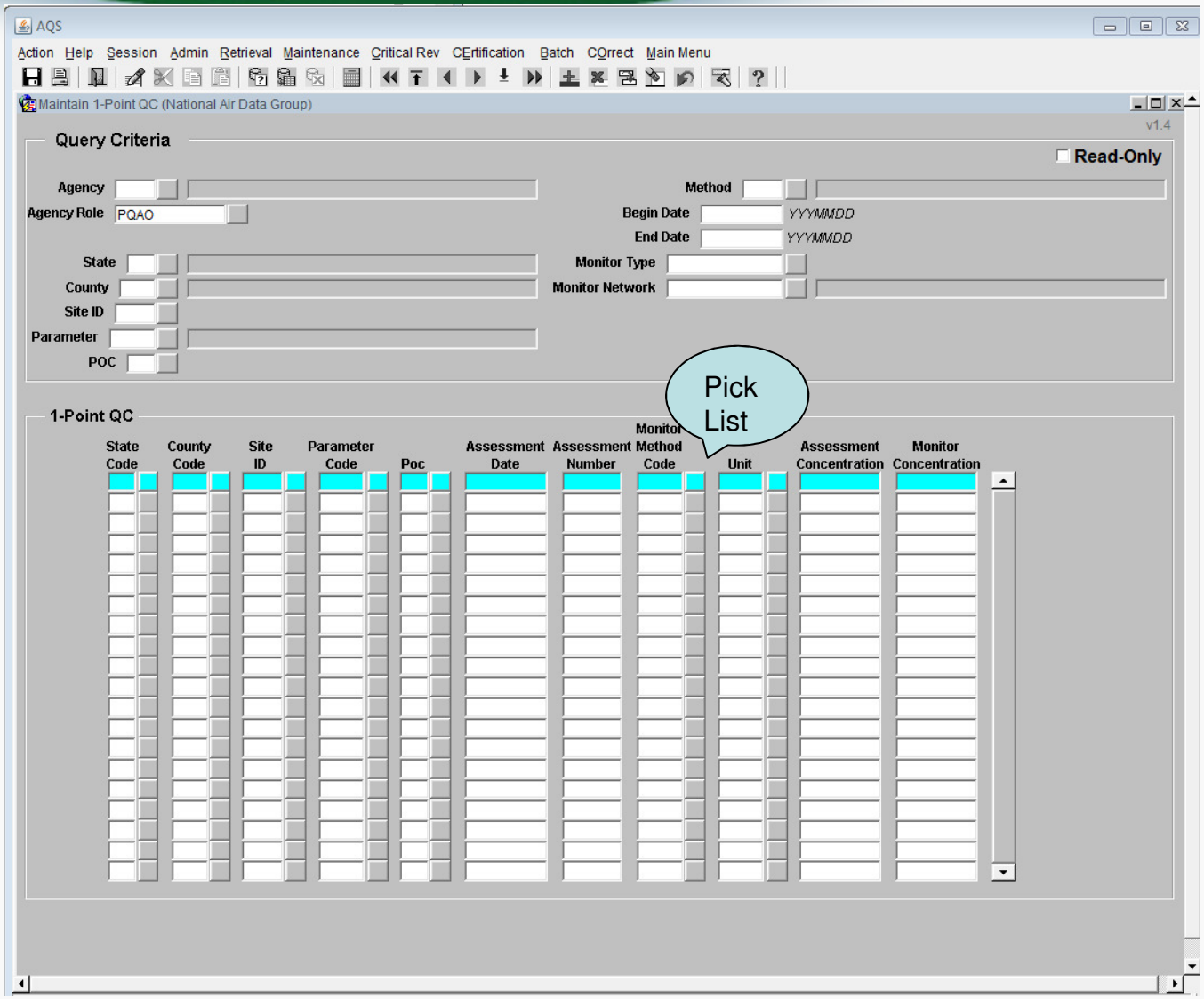
Users have several options for entering QA data into AQS; these include the following:

- Entering the data directly into the AQS Web application Maintain forms.
- 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

Example QA Maintain Form



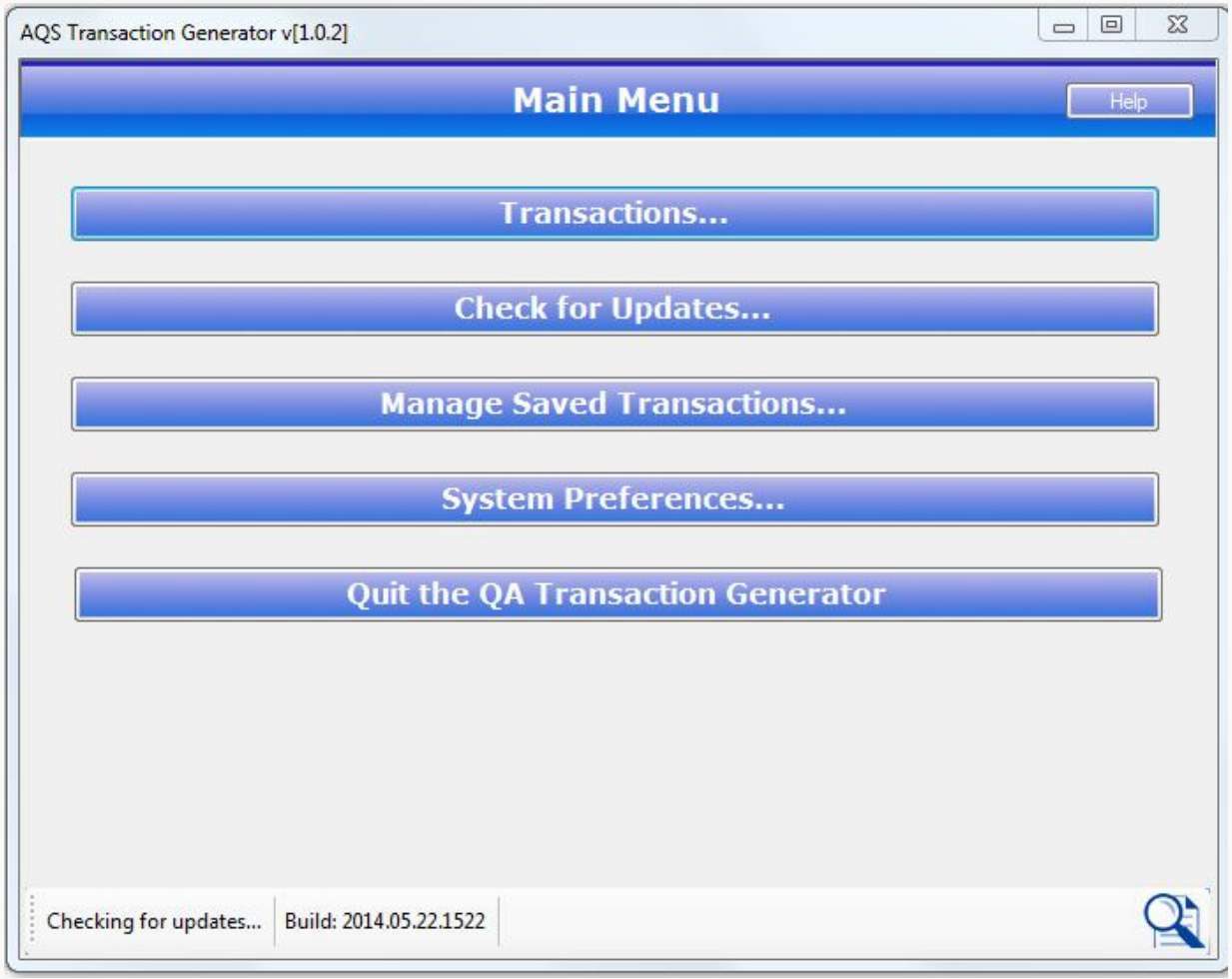
Existing data can be queried

Queried data or newly created records.

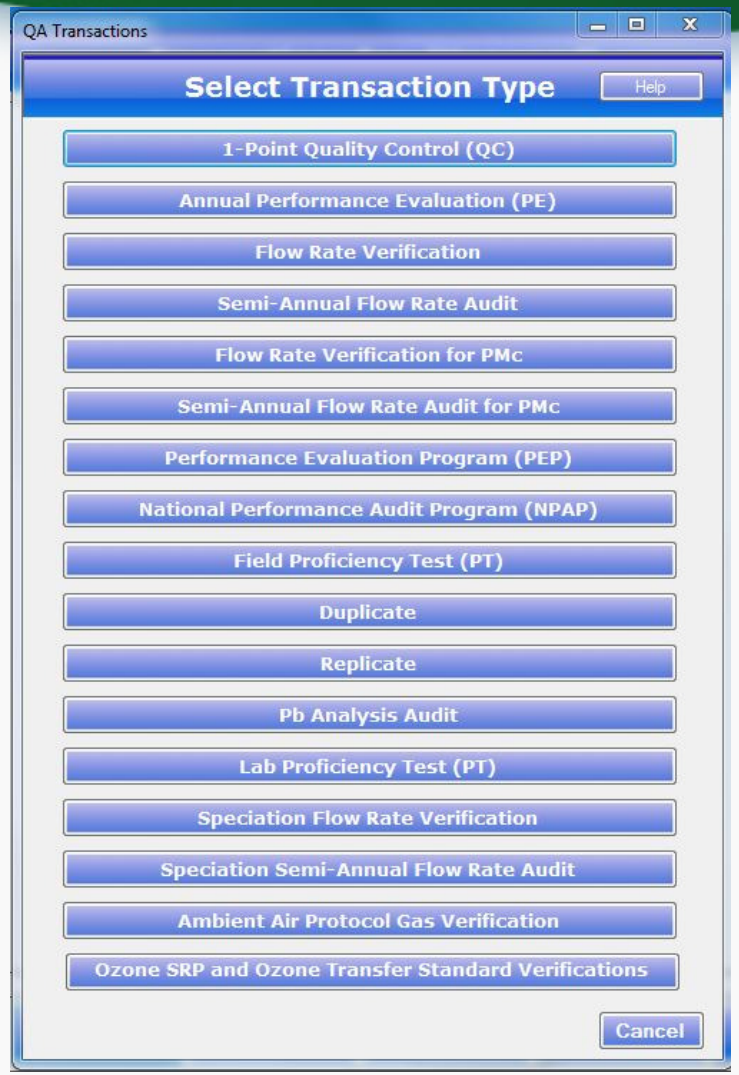
QA Transaction Generator (1)

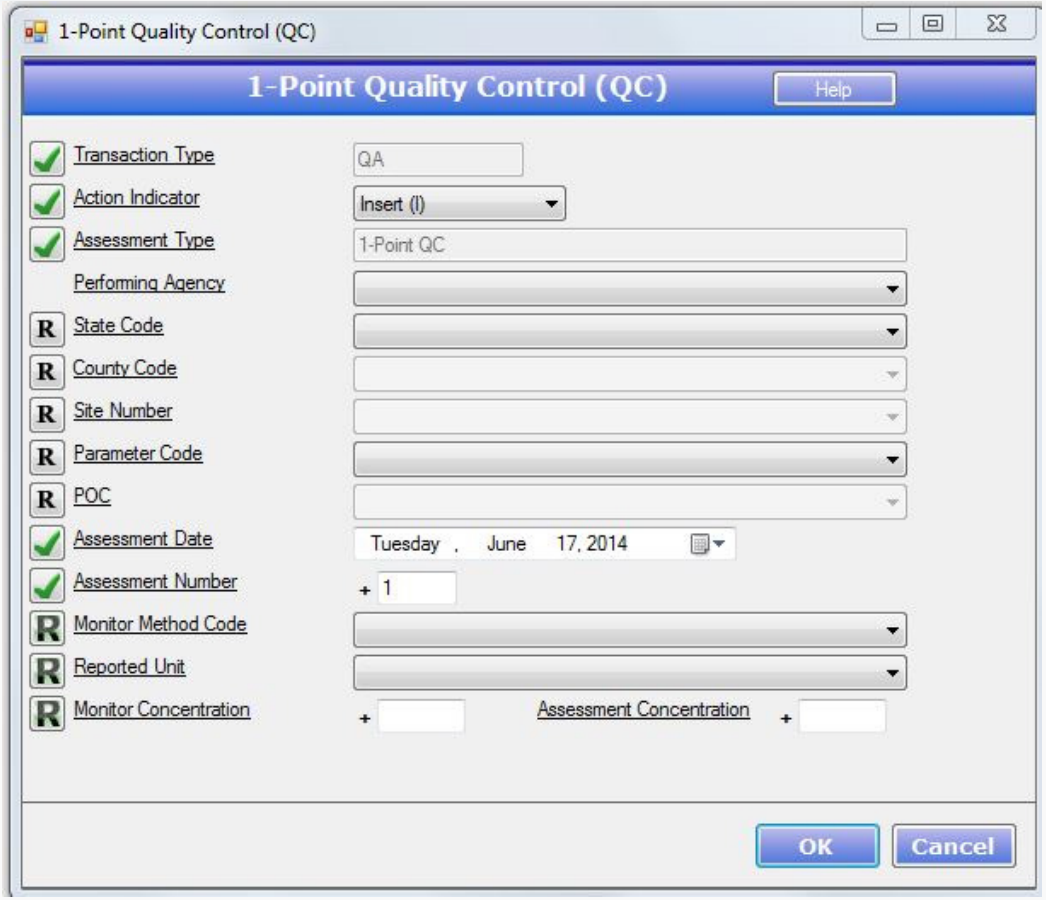
- Tool to allow **off-line** creation of all QA transaction types.
- All fields and records validated as soon as they are entered.
- Has built-in capabilities to keep both software and AQS codes up-to-date
- Creates files that are submitted via the normal AQS Batch process.
- Can be downloaded from: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

QA Transaction Generator (2)



QA Transaction Generator (3)





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 PM 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) -- DEMO.
- 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 will continue to be accepted through March 2015
- 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
  - Replaces:
    - AMP250: P&A Raw Data Report
    - AMP246: Precision Report
    - AMP247: Accuracy Report
- QA Data Quality Indicator Report (AMP256):
  - Calculates Part 58 Appendix A statistics
  - Replaces: AMP255 (with bug fixes)
  - Workfiles coming
- Extract QA Data (AMP504)
  - Allows retrieval of QA transactions as submitted
  - Replaces 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
Reporting Organization	Full access to routine QA data
Collecting Agency	No access to QA data
Analyzing Agency	No access to QA data
Audit Agency	Full access to ***Independent*** QA data (i.e. PEP & NPAP)
EPA Staff	• Read access to data for review • Full access to ***Independent*** QA data

Example amp251

AMP251 – QA Raw Data Report (1)

Raw Monitor Assessment Report

ONE POINT QC

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Parameter:Carbon monoxide(42101)

Method of Collection and Analysis INSTRUMENTAL GasFilt

Site/Poc.	Method	Assess Date	Number	Assess Conc.
13- 089- 0002- 1	055	2013- 01- 01	1	.4
13- 089- 0002- 1	055	2013- 01- 08	1	.4
13- 089- 0002- 1	055	2013- 01- 15	1	.4
13- 089- 0002- 1	055	2013- 01- 16	1	.4
13- 089- 0002- 1	055	2013- 01- 22	1	.4

lter Correlation Thermo Electron 48C- TL

Monitor Conc.	%Diff	Unit Abbr.
.4	0.8	ppm
.4	- 1.8	ppm
.4	- 2	ppm
.4	- 3.5	ppm
.4	1.5	ppm
.4	- 1.5	ppm

Example amp251 (2)

ANNUAL PERFORMANCE EVALS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Paramete Carbon monoxide(42101)

Method Analysis Coll / Desc and Code. 054 INSTRUMENTAL NONDISPERSIVE INFRARED

AQS Site ID POC	Asm Date	LVL	Asm Con.	Mon Con	% Diff.	Asm Con.	Mon Con.	% Diff.	Asm Con.	M
13- 121- 0099- 1	22- FEB- 13	1- 5								
		6- 10	9.98	9.6	- 3.8					
13- 121- 0099- 1	10- JUN- 13	1- 5								
		6- 10	10	9.77	- 2.3					
13- 121- 0099- 1	03- SEP- 13	1- 5								
		6- 10	10.01	9.6	- 4.1					

n Con.	% Diff.	Asm Con.	Mon Con.	% Diff.	Asm Con	Mon Con.	% Diff
		2	1.9	- 5.0	5	4.8	- 4.0
		2	1.9	- 5.0	5	4.9	- 2.0
		2	1.9	- 5.0	5.01	4.8	- 4.2
		2	1.8	- 10.0	5	4.5	- 10.0

Example amp251 (3)

FLOW RATE VERIFICATIONS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Parameter PM10 Total 0- 10um STP(81102)

Method of Collection and Analysis INSTRUMENT MET ONE 4 MC BETA A

Site/Poc.	Method	Assess Date	Number	Assess Flow
13- 089- 0002- 1	122	2013- 01- 18	1	16.7
13- 089- 0002- 1	122	2013- 02- 08	1	16.35
13- 089- 0002- 1	122	2013- 03- 29	1	16.67
13- 089- 0002- 1	122	2013- 04- 26	1	16.65
13- 089- 0002- 1	122	2013- 05- 24	1	16.74

ATTENUATION

Monitor Flow	%Diff	Unit Abbr.
16.5	- 1.0	L/min
16.7	2.1	L/min
16.7	0.2	L/min
16.7	0.3	L/min
16.7	- 0.2	L/min

Example amp251 (4)

SEMI ANNUAL FLOW RATE AUDITS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Parameter: Lead (TSP) LC(14129)

Method of Collection and Analysis: Hi-Vol — ICAP SPECTRA (ICP-MS); 0.45M HN

Site/Poc.	Method	Assess Date	Number	Assess Flow	Monitor Flow	%Diff	Unit Abbr.
13-015-0003-1	110	2013-04-25	1	1.355	1.3	-1.0	cu-m/min
13-015-0003-1	110	2013-11-21	1	1.5	1.4	-4	cu-m/min
13-089-0003-1	110	2013-05-29	1	1.386	1.3	-6.1	cu-m/min
13-089-0003-1	110	2013-12-26	1	1.362	1.5	9.5	cu-m/min
13-089-0003-2	110	2013-05-29	1	1.507	1.4	-6.4	cu-m/min
13-089-0003-2	110	2013-12-26	1	1.372	1.5	12.2	cu-m/min
13-215-0009-1	110	2013-03-25	1	1.379	1.5	5.4	cu-m/min

PEP AUDITS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Parameter: PM2.5 - Local Conditions(88101)

Method of Collection and Analysis: BGI Model PQ200 PM2.5 Sa — GRAVIMETRIC

Site/Poc.	Method	Assess Date	Number	Assess Conc	Monitor Conc	%Diff	Unit Abbr.
13-021-0007-1	116	2013-05-01	1	8.5	8.5	0	ug/m3 LC
13-021-0012-1	116	2013-05-01	1	8.9	8.1	-9.0	ug/m3 LC
13-067-0003-1	116	2013-02-06	1	8.9	8.6	-3.4	ug/m3 LC
13-095-0007-1	116	2013-05-22	1	13.1	9.8	-25.2	ug/m3 LC

Example amp251 (5)

COLLOCATED ASSESSMENTS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program(0437)

Parameter: Lead (TSP) LC(14129)

Method of Collection and Analysis: Hi-Vol; ICAP SPECTRA (ICP-MS); 0.45M HNO3 Boil30 min

Site/Poc.	Method	Assess Date	Number	Assess Conc.	Monitor Conc.	%Diff	Unit Abbr
13-089-0003-1	110	2013-01-04	1	0.003	0.003	0	ug/m3 LC
13-089-0003-1	110	2013-01-10	1	0.004	0.004	0	ug/m3 LC
13-089-0003-1	110	2013-01-16	1	0.001	0.001	0	ug/m3 LC
13-089-0003-1	110	2013-01-22	1	0.003	0.003	0	ug/m3 LC
13-089-0003-1	110	2013-01-28	1	0.003	0.003	0	ug/m3 LC

LEAD ANALYSIS AUDITS

PQAO: Georgia Air Protection Branch Ambient Monitoring Program

Lab Agency: Georgia Air Protection Branch Ambient Monitoring Program (0437)

Param	Asmnt Date	Asmnt Num	L1 Lab Resp	L1 Known Mass	L1 Perc Diff	L2 Lab Resp	L2 Known Mass	L2 Perc Diff	Unit
14129	08-FEB-13	1	10.7	12.3	-13.0				Micrograms
14129	08-FEB-13	2				70.3	73	-3.7	Micrograms
14129	22-FEB-13	1				66.7	73	-8.6	Micrograms
14129	22-FEB-13	2	11.1	12.3	-9.8				Micrograms
14129	28-FEB-13	1				62.2	73	-14.8	Micrograms

Example AMP256

AMP256 – QA Data Quality Indicator Report

One Point Quality Control

Pollutant: 42101 (Carbon monoxide) **PQAO:** Georgia Air Protection Branch A

Year	Region	State	Site IDs	POC	MT	Begin Date	End Date	# Required	(
2013	04	GA	13-089-0002	1	S	01-JAN-13	31-DEC-13	26	
2013	04	GA	13-121-0099	1	S	01-JAN-13	31-DEC-13	26	
2013	04	GA	13-223-0003	1	S	01-JAN-13	31-DEC-13	26	

n Ambient Monitoring Program (0437) **App A?** Y

# Observation	% Complete	CV UB	Bias UB
57	100	2.11	- 2.12
62	100	1.64	- 2.19
60	100	2.11	- 3.02
179	100	1.90	- 2.32
179	100	1.90	- 2.32

Example AMP256 (2)

Example AMP256 (2)

Annual Performance Evaluation (APE)

Pollutant: 42101 (Carbon monoxide) **PQAO:** Georgia Air Protection Branc (0437)

Year	Regior	State	Site ID	POC	MT	Begin Date	End Date	L1/6	L 2/7	Avg %D / Leve L 3/8
2013	04	GA	13-089-0002	1	S	01-JAN-13	31-DEC-13			-0.50
						(Levels 6 thru 10)				
2013	04	GA	13-121-0099	1	S	01-JAN-13	31-DEC-13			
						(Levels 6 thru 10)		-5.10		

el L4/9	L5/10	Obs / Q Q1	Q2	Q3	Q4	Criteria Met?	Conf. Limits Lower	Upper	% Bet. Cf Lim
-0.67	-0.72	3	0	3	0	Y	-5.08	2.16	100
-6.25	-5.05	3	3	3	3	Y	-4.57	1.09	50
-10.80	-10.00	0	0	3	0	Y	-6.19	1.08	
-5.31	-4.52	6	3	9	3	Y	-5.40	1.55	71
-5.31	-4.52	6	3	9	3	Y	-5.40	1.55	71

Example AMP256 (3)

Flow Rate Verifications (FRV)

Year	Reg	St	Site ID	POC	MT	Begin Date	End Date	# Obs Required	# Obs	Average %D	% Complete	Bias UB
2013	04	GA	13-089-0002	1	S	01-JAN-13	31-DEC-13	12	12	0.59	100	+/- 1.57
2013	04	GA	13-121-0039	1	S			12	0		0	+/-
2013	04	GA	13-245-0091	1	S			12	0		0	+/-
2013	04	GA	13-245-0091	2	S			11	0		0	+/-
								47	12	0.59	26	+/- 1.57
								47	12	0.59	26	+/- 1.57

Example AMP256 (4)

Semi- Annual Flow Rate Audits

Pollutant: PM10 Total 0-10um STP (81102) **PQAO:** Georgia Air Protection Branch Ambient Monitoring Program (0437) **APP A?:** Y

Year	Reg	St	AQS Site ID	POC	MT	Begin Date	End Date	# Req	#Q	% Complete	Criteria Met?	Obs / Q 1	2	3	4	Avg % d	Conf. Limits Lower	Upper	% Between Conf Lmt
2013	04	GA	13-089-0002	1	S	01-JAN-13	31-DEC-13	2	2	100	Y	0	1	0	1	-1.61	-2.25	3.43	50
2013	04	GA	13-121-0039	1	S	03-JAN-13	31-DEC-13	2	2	100	Y	0	1	0	1	1.89			0
2013	04	GA	13-245-0091	1	S	01-JAN-13	31-DEC-13	2	2	100	Y	1	0	1	0	0.76			0
2013	04	GA	13-245-0091	2	S	10-JAN-13	31-DEC-13	2	2	100	Y	1	0	1	0	1.31			0
2013			SUMMARY			01-JAN-13	31-DEC-13	8	8	100	100	2	2	2	2	0.59	-2.25	3.43	75
SUMMARY			SUMMARY			01-JAN-13	31-DEC-13	8	8	100	100	2	2	2	2	0.59	-2.25	3.43	75

Collocated Detail Report

Pollutant: 14129 (Lead (TSP) LC) **PQAO:** 0437 (Georgia Air Protection Branch Ambient Monitoring Program) **App A?** Y

Year	Method	Reg	St	AQS Site ID	Parameter Code	POC	MT	Begin Date	End Date	# Req	# Obs	# Valid	% Comp	CV UB
2013		04	GA	13-089-0003	14129	1	S	01-JAN-13	31-DEC-13	30	56	0	100	

Pollutant: 81102 (PM10 Total 0-10um STP) **PQAO:** 0437 (Georgia Air Protection Branch Ambient Monitoring Program) **App A?** Y

Year	Method	Reg	St	AQS Site ID	Parameter Code	POC	MT	Begin Date	End Date	# Req	# Obs	# Valid	% Comp	CV UB
2013		04	GA	13-245-0091	81102	1	S	01-JAN-13	31-DEC-13	30	21	20	70	11.33

Pollutant: 88101 (PM2.5 - Local Conditions) **PQAO:** 0437 (Georgia Air Protection Branch Ambient Monitoring Program) **App A?** Y

Example AMP256 (5)

Collocation Summary (CS)

Pollutant: Lead (TSP) LC (14129) **PQAO:** Georgia Air Protection Branch Ambient Monitoring Program (0437) **APP A?:** Y

Year	Method	Region	State	# Sites	# Colloc Reqd	# Colloc Actual	% of Req Sites Colloc	# Obs Req	# Obs	# Valid Obs	% Complete	CV UB
2013		04	GA	5	1	1	100	30	56	0	100	
SUMMARY		04	GA	5	1	1	100	30	56	0	100	

Pollutant: PM10 Total 0-10um STP (81102) **PQAO:** Georgia Air Protection Branch Ambient Monitoring Program (0437) **APP A?:** Y

Year	Method	Region	State	# Sites	# Colloc Reqd	# Colloc Actual	% of Req Sites Colloc	# Obs Req	# Obs	# Valid Obs	% Complete	CV UB
2013		04	GA	3	1	1	100	30	21	20	70	11.33
SUMMARY		04	GA	3	1	1	100	30	21	20	70	11.33

Performance Evaluation Program (PEP)

Aug. 12, 2014

Pollutant: 14129 (Lead (TSP) LC) **PQAO:** Georgia Air Protection Branch Ambient Monitoring Program (0437) **APP A:**

Year	Region	State	# Sites	# PEP Reqd	# PEP Collected	# Colloc PEP Reqd	# Colloc PEP Collected	% Complete	Bias	Conf. Limits Lower	Conf. Limits Upper
2013	04	GA	5	1	0	1	0	0			
SUMMARY	04	GA						0			

Pollutant: 88101 (PM2.5 - Local Conditions) **PQAO:** Georgia Air Protection Branch Ambient Monitoring Program (0437) **APP A:**

Year	Region	State	# Sites	# PEP Reqd	# PEP Collected	# Colloc PEP Reqd	# Colloc PEP Collected	% Complete	Bias	Conf. Limits Lower	Conf. Limits Upper
2013	04	GA	23	8	8	0	0	100	- 7.34	-12.65	-2.02
SUMMARY	04	GA						100	- 7.34	-12.65	-2.02

Example AMP256 (6)

Lead Audit Strip Analysis

PQAO: Georgia Air Protection Branch A

Year	Region	St	Parameter Code	Lab ID	Q1	Q2
2013	04	GA	PB_TSP	0437	100	50
SUMMARY	04	GA	PB_TSP	0437	100	50

Ambient Monitoring Program (0437)

Percent Completness			
Q3	Q4	Year	Bias UB
50	50	63	- 8.32
50	50	63	- 8.32

Questions?