Welcome to Pb QA!

Pb Quality Assurance

Routine Monitoring and Pb-PEP

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Regulation Summary

Monitoring Requirements

- *NAAQS Standard - 0.15 µg/m^3*
- *Secondary standard identified as 0.15 µg/m^3*
- *Measured as total suspended particulate at **local conditions***
- *Deploy low-volume PM_{10} monitoring at NCORE sites at CBSAs with a population greater than 500,000 people*
- *Monitoring threshold based on emissions of 1/2 tpy for a facility (airports at 1 tpy)*
- *15 Airports identified for monitoring for TSP-Pb for one year (now completed)*

Pb Monitoring Methods

Depending on the monitoring situation, two sampling methods may be used

High volume sampling

Low volume sampling

Requirements for Monitoring Pb in TSP

The sampling and analytical requirements are found in 40 CFR Part 50:

- *Appendix B – sampling method (High Vol TSP)*
- *Appendix G – analytical method (ICP-MS)*
  ICP-MS is the reference method; however, you can apply for an FEM through ORD

The quality assurance requirements are found in 40 CFR Part 58:

- *Appendices A through E – Pb-PEP, siting, reporting, network*

Laboratory QA Critical Criteria

Initial Acceptance Tests:

(OAQPS tests for each filter lot)

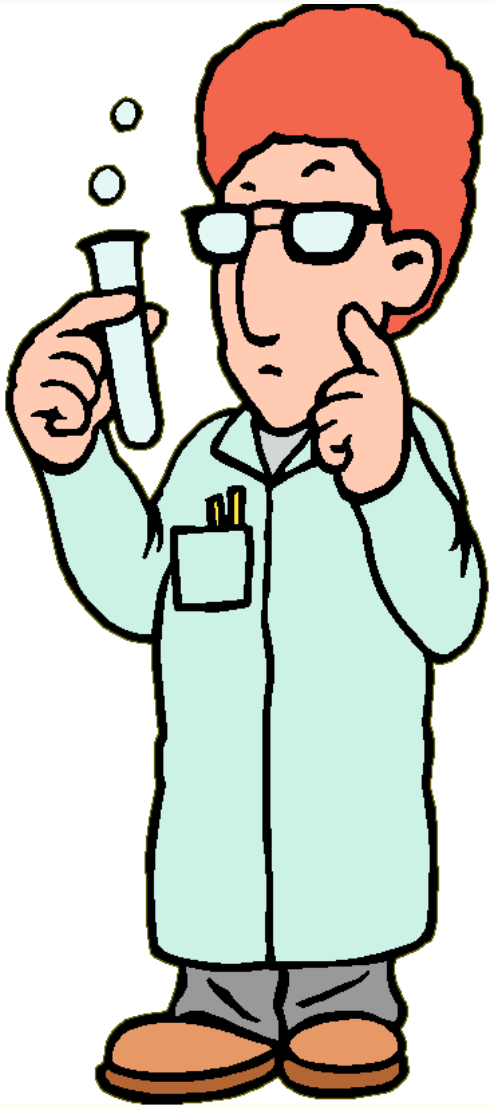
- *Collection efficiency – 99%*
- *Pressure drop – 42-54 mmHg*
- *pH: 6 to 10*
- *Pb content < 15ug/filter*

Physical Examination of Filters:

- *Free of defects (pin-holes, imperfections, tears)*

Calibration reproducibility checks

+/- 5% of predicted calibration curve value performed at the beginning, after every 10 samples, and at the end of each analysis



High Volume TSP

Laboratory QA Operational Criteria

- *Analysis (precision) audits - 6 strips/quarter, 3 at each concentration range – 10% difference*
- *Field blank each quarter < LDL*
- *Lab blank each batch < LDL*
- *Reagent blank < LDL per batch*

High Volume TSP

Field QA Critical Criteria

Sampling Activities:

- *Sample period - 1440 minutes +/- 60 minutes midnight to midnight*
- *Average flow rate - 1.1 – 1.7 m^3/min at **local conditions** following each sample run*

One point flow verification:

- *+/- 7% once every 3 months (Recommend to be completed more frequently to reduce data loss)*

Sample Recovery:

- *Retrieve all samples as soon as possible; best practice would be to collect samples within 24 hours*

High Volume TSP

Field QA Operational Criteria

Verification/Calibration:

- ***Leak Check**, conducted prior to each flow check, not a quantitative check, leak indicated by a whistle.*
- ***Multi-point Flow Rate Calibration /Verification,** conducted after receipt, after motor maintenance or failure of 1-point check and 1/yr. Includes 5 points distributed over the flow range.*

  ***Note:** Samplers with MFC can be calibrated in the field, VFC go to the manufacturer for calibration*

High Volume TSP

Field QA Operational Criteria

Precision:

- ***Flow Audits,*** *conducted every 6 months ensuring comparison is +/- 7% of the independent audit standard.*
- ***Collocated Samples,*** *15% of each method code in the PQAO collected every 12 days. Criteria is CV ≤ 20% for samples that measure concentrations greater than 0.02 µg/m³*

Field QA Operational Criteria

Sampler Maintenance:

- ***Inlet Cleaning,*** *conducted every three months*
- ***Motor/Housing Gaskets,*** *inspected and or replaced every ≈ 400 hours*
- ***Blower Motor Brushes,*** *replace every 400 -500 hours*
- ***Manufacturer Specific Checks,*** *different samplers may have additional checks that should be identified and addressed in agency QAPPs and SOPs.*

High Volume TSP

Pb QA Systematic Criteria

- *Ensure sampler meets FRM designation*
- *Annually evaluate if siting requirements are met*
- *75% data completeness each quarter*
- *Measurements are reported in µg/m^3 at **local conditions***
- *Data is reported truncated to three decimal places*

- *LDL is at least 0.07 µg Pb/m^3*
- *Precision for single analyzer quarterly of 90% CL of CV < 20% > 0.02 µg/m^3*
- *Bias, measured by Pb-PEP of 95% CL Absolute bias +15% > 0.02 µg/m^3*

High Volume TSP

Pb QA Systematic Criteria

Field Activities

Flow Rate Transfer Standard

- Resolution 0.02 m3/min
- + 2% reproducibility
- Should have annual multi-point certification traceable to NIST

Field Thermometer

- 2° C resolution
- Should have annual multi-point certification traceable to NIST

Field Barometer

- + 5 mm Hg resolution
- Should have annual multi-point certification traceable to NIST

Clock/Timer Verification

- + 2 min/24-hour
- Should be comparable to network time (internet, cell phone, etc)

Lab Activities

Reagents (HNO_3 and HCl)

- ACS reagent grade

Pb Nitrate $Pb(NO_3)_2$

- ACS reagent grade (99.0% purity)

High Volume TSP

These are not in CFR or the QA Handbook, but are important!

Temperature and BP Audits

Recommend checking monthly and auditing quarterly to ensure temperature is +/- 2 °C and BP is +/- 10 mmHg

Temperature and pressure are important in samplers that use MFCs to control flow and for samplers using VFCs calibrated under STP conditions

Low Volume PM_{10}

The requirements for monitoring Pb in PM_{10} are similar to PM_{10} particulate

The requirements are found in 40 CFR Part 50:

Appendix L – sampling method
Appendix Q – analytical method (XRF FRM)

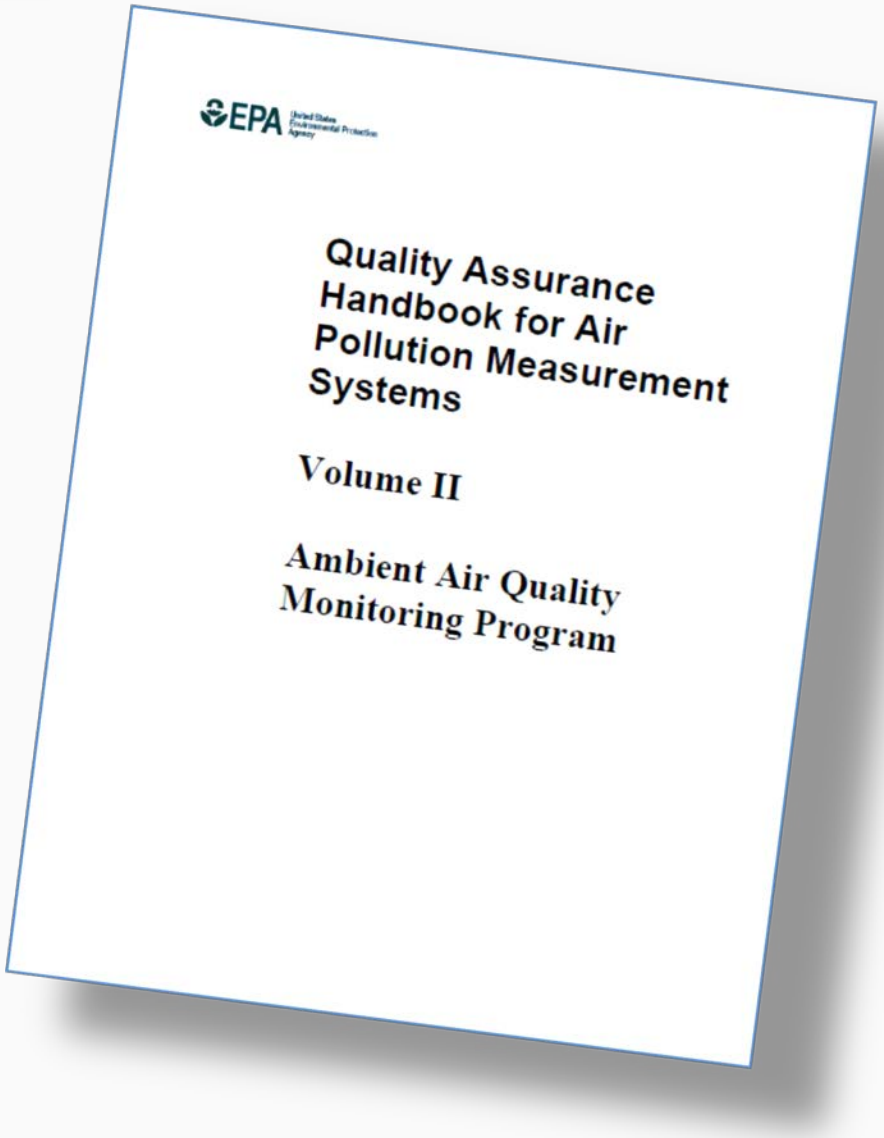
And scattered through 40 CFR Part 58

Appendices A through E – Pb-PEP, siting, reporting, network

Low Volume PM_{10}

Dennis covered the Appendix L low-volume PM_{10} method earlier

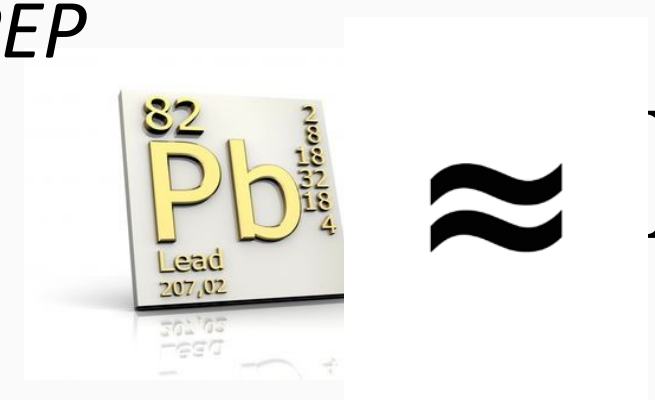
*See **40 CFR Part 50, Appendix L,** the **QA Handbook** and validation Templates for more information*



Low Volume PM_{10}

Notable Differences from low volume PM_{10}

- *Analytical testing of filters for background Pb by OAQPS (~ 20 test filters per lot and 90% of filters < 4.8 ng Pb/cm²*
- *Must use an **EPA approved analytical method (FRM/FEM)** for Pb analysis*
- *Quarterly Pb filter audits (more on this later)*
- *Pb-PEP*



$\approx PM_{10}$

Pb Collocation Requirements

Lead Collocation Requirements:

40 CFR Part 58 App A sec 3.4.4 (TSP) and 3.4.5 (PM_{10})

- *Collocate 15% of primary monitors in PQAO (not counting non-source oriented NCore sites in PQAO).*
- *Have a minimum of one collocated monitor.*
- *Site the first collocated sampler at the highest measuring Pb site in the network.*
- *Monitors must be sited within 4 meters of each other and…*
  - *≥ 2 meters apart (inlet to inlet) for TSP*
  - *≥ 1 meter apart (inlet to inlet) for PM_{10}*
- *Follow the 1 in 12 sampling frequency.*

Pb Collocation Requirements

Cutoff concentrations for use in collocation calculation:

0.002 µg/m3 *(Methods approved after 3/04/2010, with exception of manual equivalent method EQLA-0813-803).*

0.02 µg/m3 *(Methods approved before 3/04/2010, and manual equivalent method EQLA-0813-803).*

EQLA-0813-803 - Flame Atomic Absorption Spectroscopy (FAAS)
Manual Equivalent Method

National Pb QA Programs

Pb-Performance Evaluation Program (Pb-PEP) and Pb Strips/Filters

Pb-PEP

Independent program that evaluates total measurement system bias (field and laboratory) in the network by comparing collocated samplers with primary samplers

Pb Strips/Filters

Provides a check of laboratory bias between laboratories supporting the Pb monitoring network

National Pb QA Programs

Pb-Performance Evaluation Program (Pb-PEP)

Nationally implemented program; however, an implementation option is available for SLTs that can demonstrate independence and adequacy

The Pb-PEP has two parts:

Independent collocated audits

- *National program run by ESAT contractors or SLT implementers*
- *An external group sets up and runs an independent sampler beside the SLT routine sampler and uses an independent lab for analysis*

Extra SLT collocations

- *At their collocated site, the SLTs (preferably the QA group) runs an extra collocated sample using their existing samplers on an off-run day*
- *The primary sampler filter goes to the routine state lab, and the collocated sample goes to the Pb-PEP lab*

National Pb QA Programs

Pb-PEP Details per PQAO

15% of all sites audited per year minimum with all sites audited in 6 years. Must audit at least one of each monitor type each year.

- *If 5 sites or less, 5 audits per year*
- *If >5 sites, 8 audits per year*

This translates into…

5 audits per year

- *1 collocation with an independent PEP sampler*
- *4 filters collected from network collocated sampler*

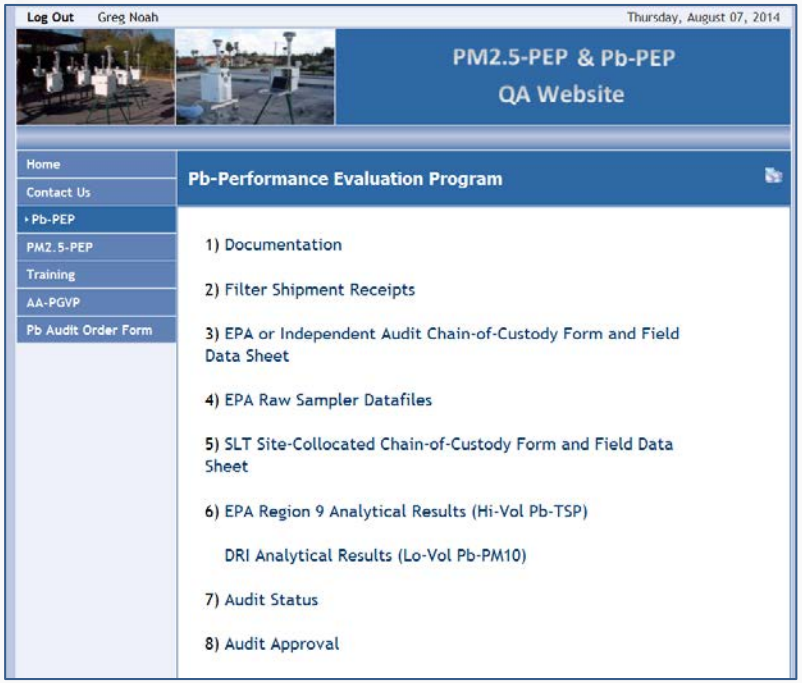
8 sites per year

- *2 collocations with an independent PEP sampler*
- *6 filters collected from network collocated sampler*

National Pb QA Programs

Pb-PEP Data

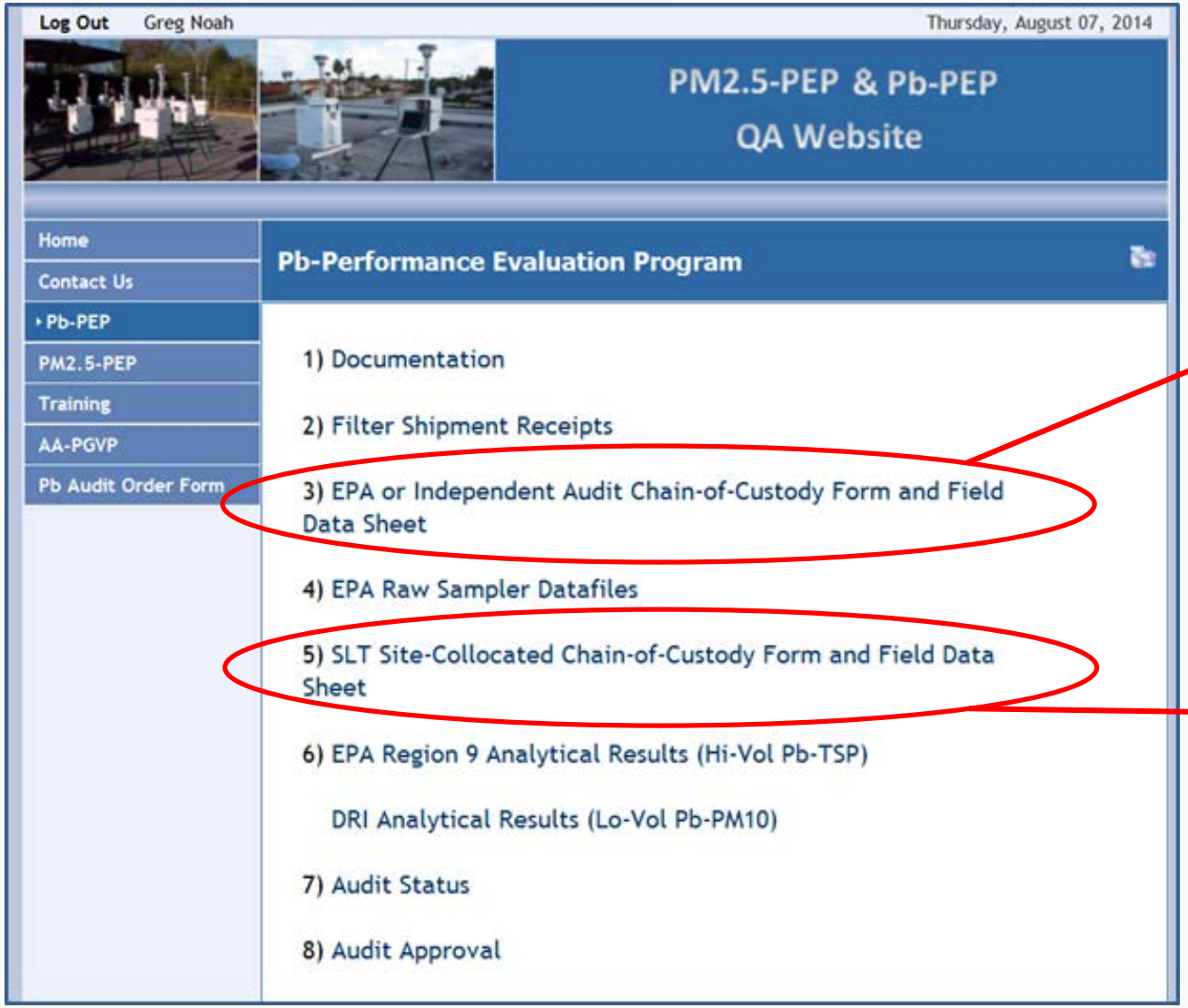
*Pb-PEP Audits **begin** and **end** at the AIRQA Website*



Summary of work flow:

- ✓ *Print Field Data/Chain of Custody sheets*
- ✓ *Enter field data on FDS/COC sheet*
- ✓ ***Enter field data into AIRQA***
- ✓ *Send filters to R9 PEP Lab*
- ✓ *Laboratory uploads data*
- ✓ *Link lab and field data*
- ✓ *Generate concentration and QA checks*
- ✓ ***Validation and approval decisions***
- ✓ *Upload to AQS*

National Pb QA Programs



EPA ESAT or Self-implementers use this selection

"extra collocated samples" collected by SLT use this selection

National Pb QA Programs

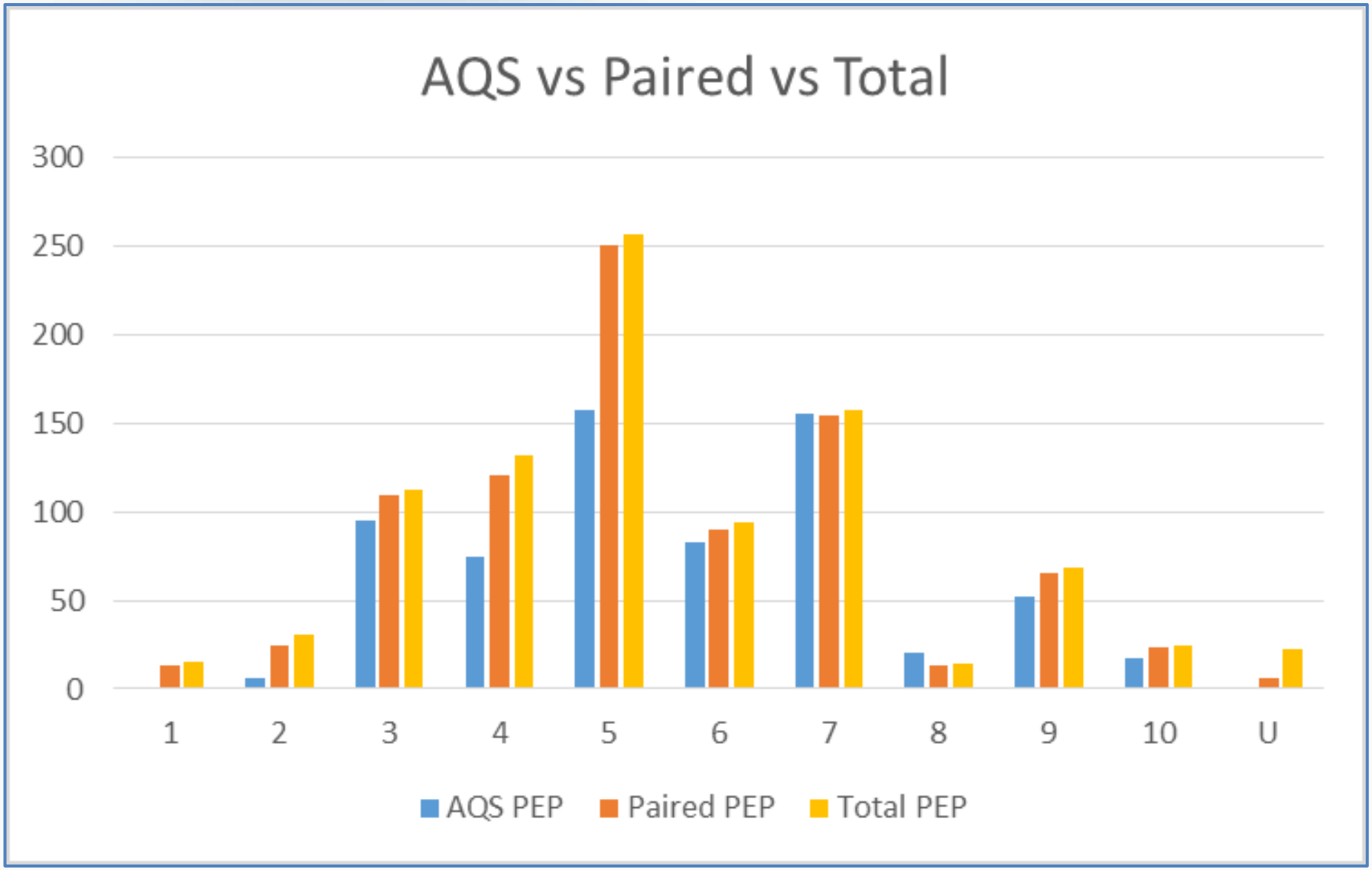
Pb-PEP Data Issues

- *All field data is not being entered into AIRQA; therefore it is very difficult to pair with lab data*
- *Data is not being approved on AIRQA in a timely manner*

What Have We Done to Help?

- *Revised the Pb-PEP website to eliminate entry errors*
- *Reviewed the data to discover weaknesses and errors*
- *Identified what data we have that is not paired.*
- ***Distributed this data to the Pb-PEP regional contacts***

National Pb QA Programs



Pb-Strips/Filters

For each laboratory analyzing for Pb NAAQS:

6 strips/filters must be analyzed quarterly (24 annually)

The 6 filters will have certified values split between two ranges:

- *3 at low range (30-100% of the NAAQS)*
- *3 at high range (200-300% of the NAAQS)*

*The check must be within **10% difference** of the certified value of the strip or filter*

ICP-MS is a destructive analysis so 24 strips are required
XRF is not destructive so only 6 Teflon filters are required

Need Help Getting the Data into AQS

Pb-PEP Coordinators

- *I have submitted a couple spreadsheets of audits that need attention – address those and get those audits corrected*
- *Completed audits must be approved before uploading the data into AQS*

***Going forward**, we have used the LEAN process to re-invent this program to:*

- *Improve efficiency*
- *Speed data upload to AQS*
- *Eliminate confusion*
- *Improve the review and approval process*
- *Reduce cost*
- *Reduce contract support*
- *Better utilize technology*
- *Eliminate errors*

Pb-Strips/Filters Ordering Directions

- *Mike sends out a notice every year that he is ordering audit filters (about February concluding in May)*
- *When you get the email,* ***order the filters***
- *Here's the web link to AIRQA: https://www.sdas.battelle.org/airqa/*
- *If you do not order, you will get automated reminders*
- *Only one POC in each agency gets the email, make sure it is the right contact and let us know if a change is needed.*
- *Fill out the form and tell us how many filters you need*