Important AQS related Monitoring Issues

- NATTS

- Pb parameter codes

- $PM_{2.5}$ continuous parameter codes

- $NCore/PM_{10-2.5}$

- Quality Assurance

- Carbon

- Acrolein

NATTS Data Reporting

- NATTS data reporting standards include:
  - Minimum required analytes and associated target MDLs
  - Data censoring prohibition
- NATTS Workplan Template, Section 5: Reporting Requirements
  - "All data, *to include values below MDL*, shall be reported to AQS. *Under no circumstances are data value substitutions (e.g., ½ MDL) acceptable.*"
- *NATTS Technical Assistance Document, Section 5: Data Management*
  - *"EPA Policy dictates that all data, to include values below MDL, shall be reported to AQS. Data values at or below the MDL must be flagged with an 'MD' flag. Don not report ½ MDL or any integer of the MDL, only report the actual measured value and the 'MD' QA flag."*

NATTS Data Assessment

- As a preliminary step in the pending NATTS Network Assessment, OAQPS conducted a NATTS Data Assessment
  - Objectives:
    - Determine whether or not all required data have been reported to AQS in the prescribed manner
    - Identify reporting discrepancies
    - Evaluate the degree to which each laboratory's reported Method Detection Limits (MDLs) favorably compare with the target MDLs
- Approach
  - Retrieved all requisite raw data from AQS for each of the 29 NATTS sites (27 active, 2 inactive) during the period 2003-2009
  - Site-, year-, and pollutant-specific summary table was generated showing
    - Number of reported values
    - Number of ½ MDL values
    - Number of zeros
    - Number of values below MDL not = ½ MDL or zero
   - Reported to target MDL ratio

NATTS Data Assessment (continued)

- Approach (continued)
  - Review summary table for any indications of incomplete data sets, reporting discrepancies, and reasonableness of MDLs
  - Such indications led to review of associated raw data files for confirmation of / further insight into data reporting issues
  - Documentation and communication with NATTS agency and Regional Office for discussion / corrective action plan
- Assessment revealed that some agencies engaged in one or more of the following practices:
  - Failure to collect and report <u>all</u> required analytes
  - Data "censoring" (e.g., substitute ½ MDL or zero for values less than MDL)
  - MDLs that far exceed the health-based, readily achievable target MDLs
    - "Readily achievable" MDLs are a function of multiple factors and a subject of ongoing discussion
  - Failure to report lab- / analysis-specific MDLs
    - i.e., AQS default MDLs associated with reported data

Data Assessment Findings and Implications

- OAQPS working with Regional Offices and relevant State and local agencies to
  - Remedy future data reporting
  - Where feasible, remedy previously reported data
  - As needed / applicable, work to improve MDLs
- Impact: data censoring can lead to high or low bias, especially if MDLs are well above target values
  - e.g., reported MDL is 10x target MDL
    - ½ MDL substitution results in reported values 5x target MDL
      - *Actual ambient concentration values may well be in the general range of the target MDL hence very high bias (approaching factor of 5 or more)*
    - Zero substitution results in any ambient concentrations less than 10x the target MDL are reported as zero hence biased low

Improper Data Reporting: Carbon Tetrachloride

Typical ambient concentration range
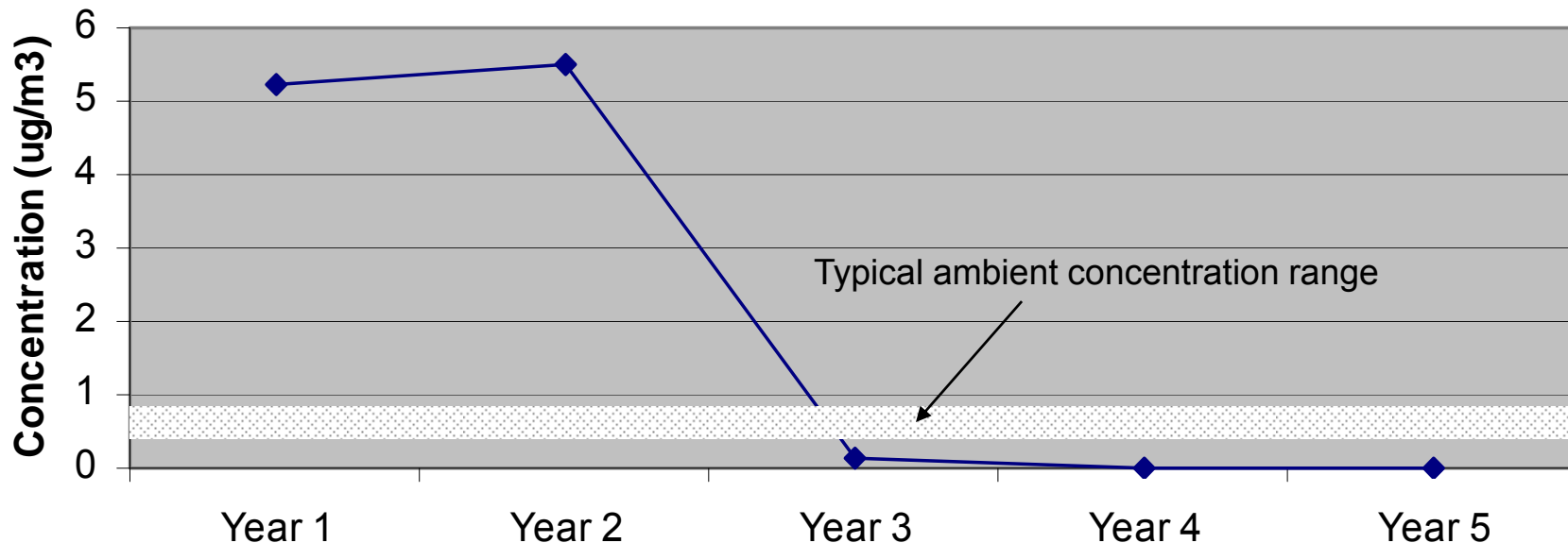
- Carbon tetrachloride ubiquitous and consistent (~ 0.4 – 0.8 ug/m3)

- First two years: very high MDL coupled with reporting ½ MDL for values > MDL

- Early in third year switched to reporting zero for values < MDL

Contact: Mike Jones, jones.mike@epa.gov, 919-541-0528

Lead reporting Issues

Appendix R to Part 50—Interpretation of the National Ambient Air Quality Standards for Lead

- Pb-TSP and Pb-PM$_{10}$ measurement data are reported to AQS in units of micrograms per cubic meter (μg/m3) at local conditions (local temperature and pressure, LC, parameter code - 14129) to three decimal places; any additional digits to the right of the third decimal place are truncated.

  – Pre-rule Pb-TSP and Pb-PM$_{10}$ concentration data that were reported in standard conditions (standard temperature and standard pressure, STP, parameter code - 12128) will not require a conversion to local conditions but rather, after truncating to three decimal places and processing as stated in this appendix, shall be compared ''as is'' to the NAAQS (i.e., the LC to STP conversion factor will be assumed to be one).

Reporting Status - Lead Monitors in AQS

- 15 states have lead monitors established under the 12128 parameter code (CA, CO, GA, HI, IL, MA, MI, MN, NM, OH, OK, PA, SC, TN & WV)
    - 139 lead monitors established in AQS under the old parameter code (12128)
- 10 states have lead monitors established under the 14129 parameter code (CA, AL, FL, IL, NY, OH, OR, TN, TX & VA)
    - 76 monitors established in AQS under new parameter code (14129)
- 4 states have lead monitors established under both 12128 & 14129 parameters codes
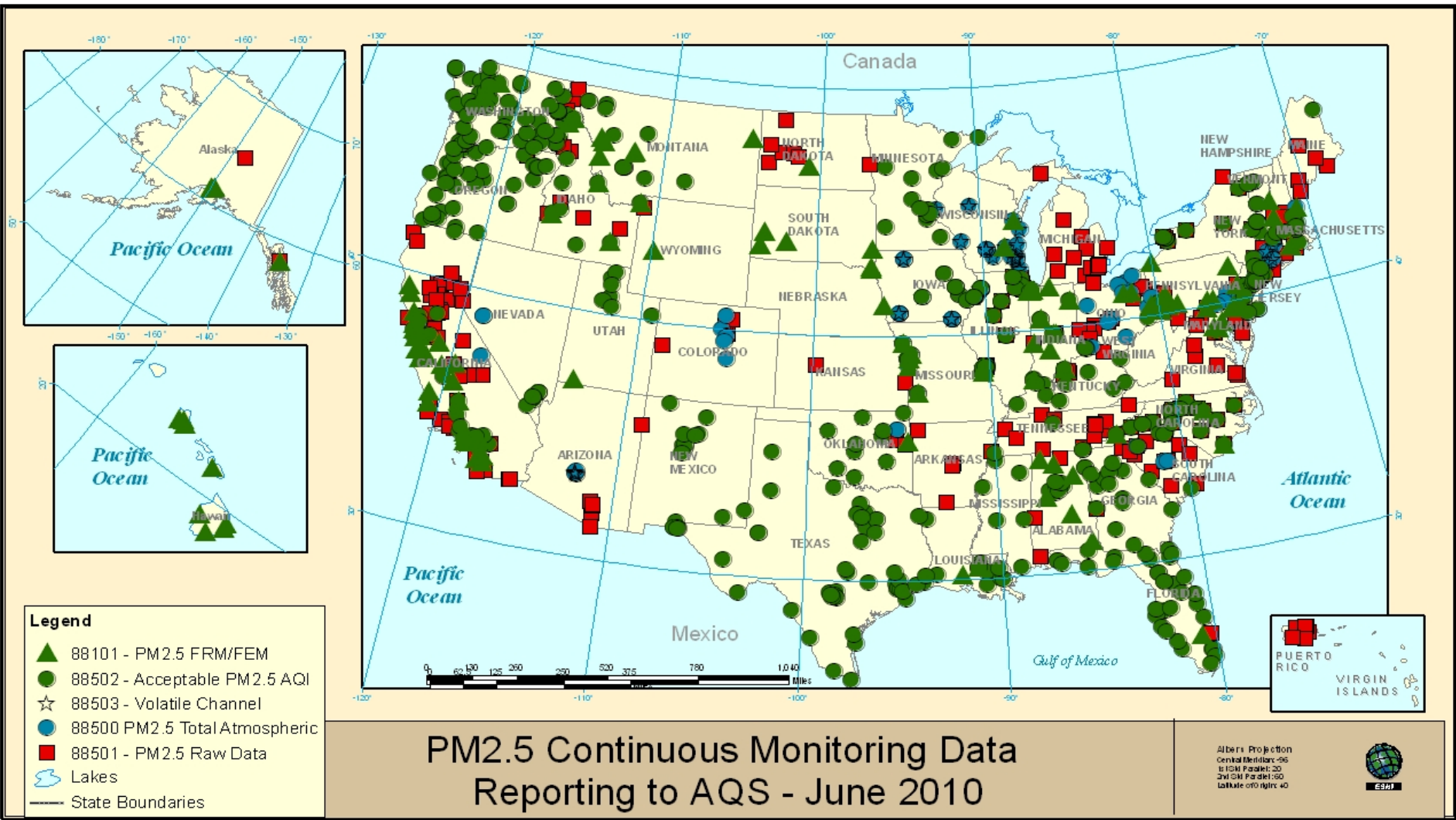
Reporting Status in AQS for 2009
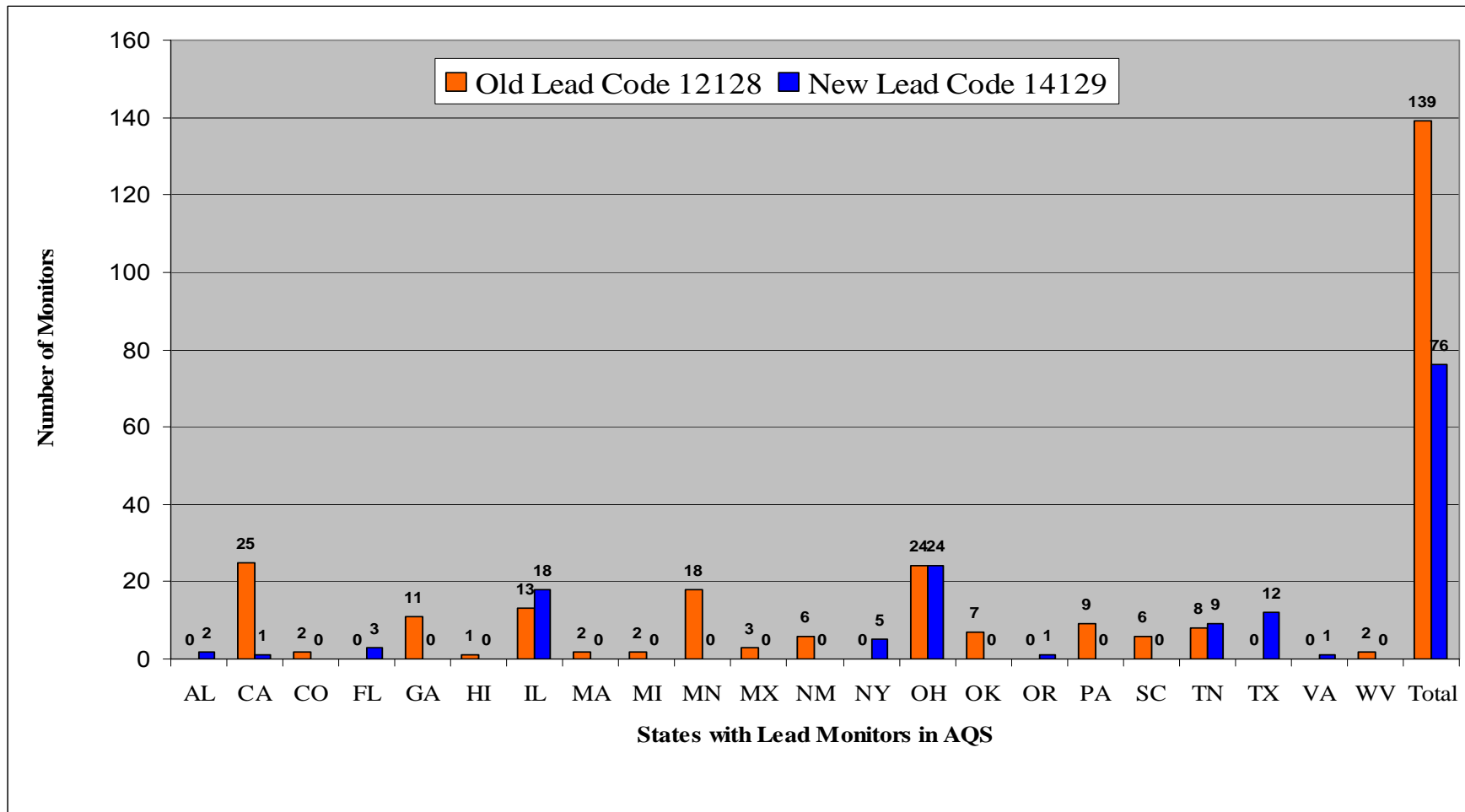
Locations of lead sources of 1.0 TPY or greater
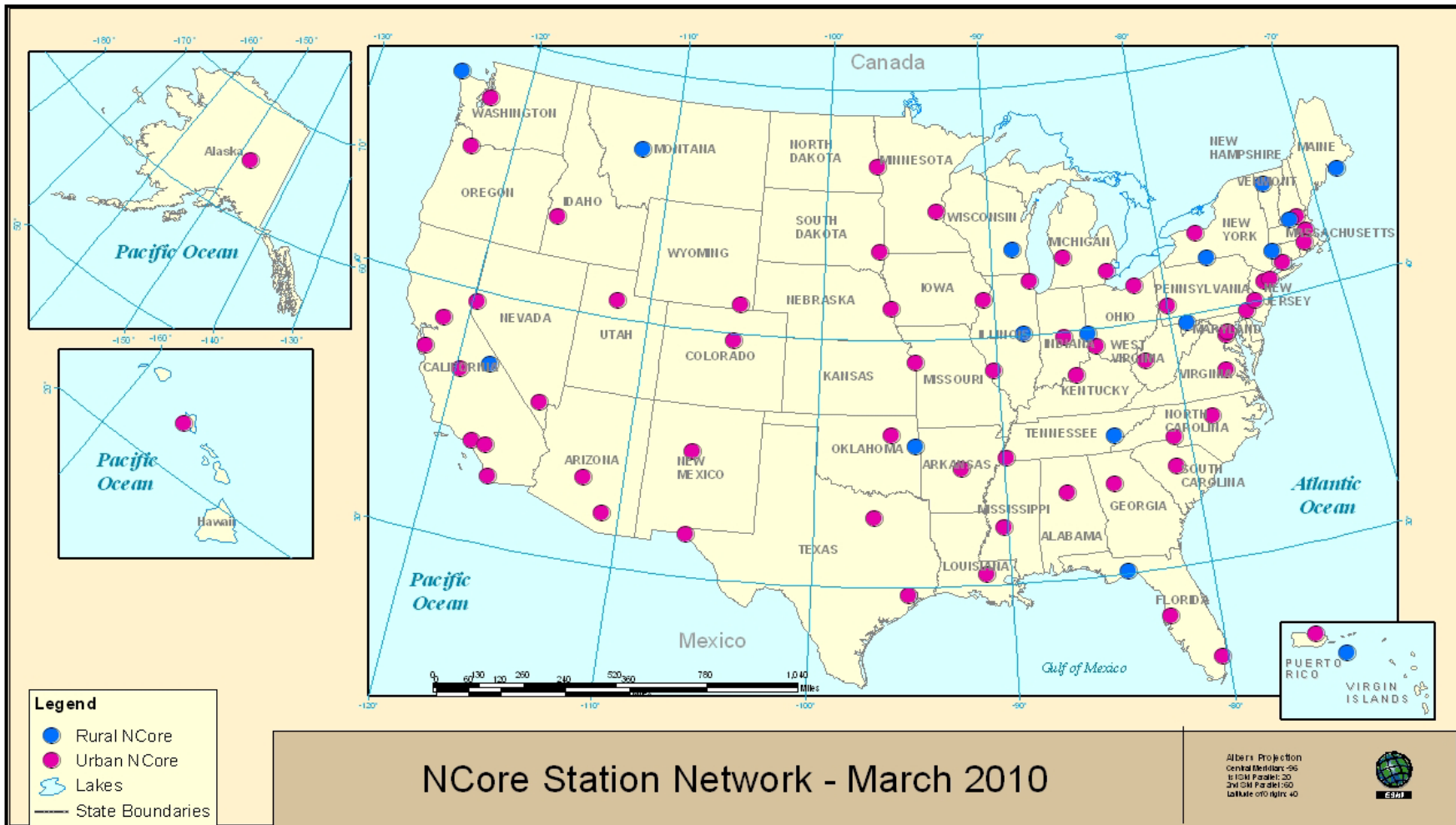
Has monitors reporting to parameter 14129
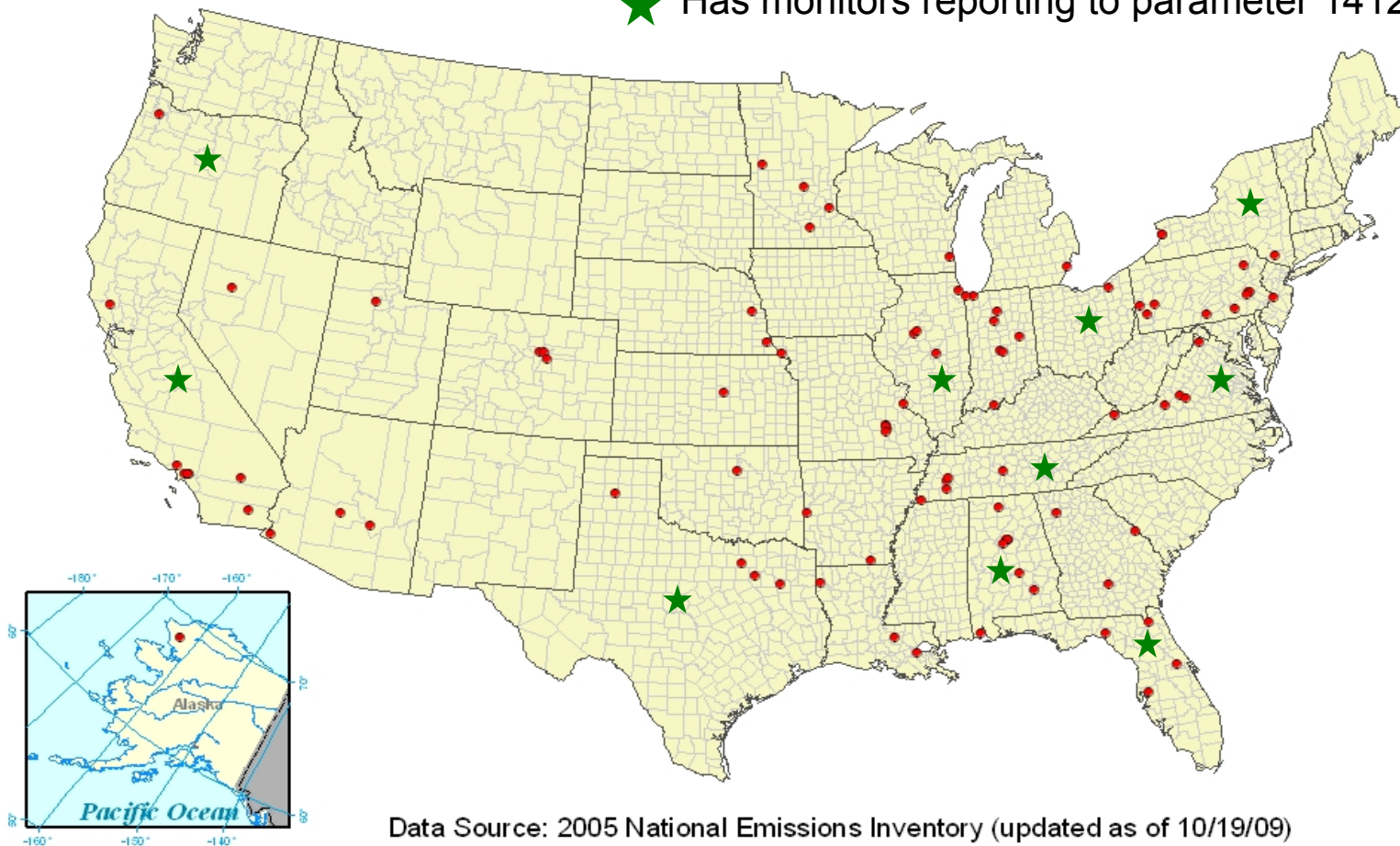
Data Source: 2005 National Emissions Inventory (updated as of 10/19/09)

PM$_{2.5}$ **continuous parameter codes**

Legend
- ▲ 88101 - PM 2.5 FRM/FEM
- ● 88502 - Acceptable PM 2.5 AQI
- ☆ 88503 - Volatile Channel
- ● 88500 PM2.5 Total Atmospheric
- ■ 88501 - PM2.5 Raw Data
- ∽ Lakes
- --- State Boundaries

PM2.5 Continuous Monitoring Data
Reporting to AQS - June 2010

Albers Projection
Central Meridian: -96
1st STD Parallel: 20
2nd STD Parallel: 60
Latitude of Origin: 40

NCore Reporting Update

NCore Station Network - March 2010

Legend
- Rural NCore
- Urban NCore
- Lakes
- State Boundaries

Contact: Tim Hanley, hanley.tim@epa.gov , 919-541-4417

What have we said with regard to NCore Data Reporting?

At National Monitoring Conference in Nashville we said:

- Complete equipment procurement (as needed), acceptance, and deployment
- Gain operational experience and a compile a quality control track-record
  - Trace gases, new PM samplers, meteorology
- Develop/revise SOPs and QAPP for new measurements
- Train station operators and brief QA staff
- **Commence data reporting to AQS and AirNowTech when a "comfort level" is achieved**
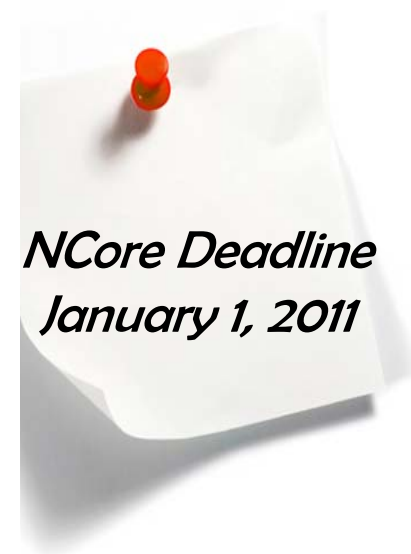
NCore Deadline
January 1, 2011

Table of Select AQS Metadata associated with NCore

AQS Metadata Field	Location of Metadata	Are Multiple Options Allowed	Does AQS Require this Field?	Expected Option(s) for NCore	Notes
Local Site Name	Site Level	No	No	We are requesting you identify your site name in AQS.	Please use a descriptive name.
Latitude	Site Level	No	Yes	8 digits, including 6 past the decimal place with a positive sign indicating above the equator (+xx.xxxxxx)	Ensure the correct "Horizontal Datum" is populated with the coordinates
Longitude	Site Level	No	Yes	9 digits, including 6 past the decimal place with a sign (+xxx.xxxxxx)	Ensure the correct "Horizontal Datum" is populated with the coordinates
Primary Monitor Periods	Site Level	No	Yes, but only for 88101	Always populate for PM$_{2.5}$ (parameter code 88101)	
Monitor Type	Monitor Level	Yes	Yes	NCore	EPA-OAQPS will update or add "NCore" as a monitor type for each approved NCore station
				SLAMS, Tribal Monitors, Non-EPA Federal, or CASTNET	Monitors at each station should also identify one of the Monitor Types on the left.
				Other Monitor types such as IMPROVE, PAMS, or Trends Speciation may also apply	
Measurement Scale	Monitor Level	No	No – however, we are requesting you populate this field	Neighborhood Scale 500M to 4KM Urban Scale 4 KM to 50 KM	Expect one of these for monitors at Urban or Suburban Stations
				Regional Scale 50 to hundreds KM	Expected for monitors at Rural stations
Monitoring Objective	Monitor Level	Yes	Yes	Population Exposure	For monitors at all Urban and Suburban NCore Stations
				Upwind Background, General Background, Regional Transport, or Extreme Downwind	Expect one of these for monitors at Rural NCore Stations
				Other Monitoring Objectives may apply for either Urban or Rural NCore stations; however, one of the above should be utilized at a minimum	
Area Represented	Monitor Level	Only one type of area (CBSA or CSA) can be listed per objective	No – however, we are requesting you populate this field	CBSA Represented	Urban Stations should use one of the following
				CSA Represented	
				Rural stations should not populate this field.	
Sample Frequency	Monitor Level	No	Required only for PM	Relevant sample frequencies include: 1 Every Day 3 Every 3rd day	PM monitoring is required at a minimum frequency of one in every third day.

AQS Metadata Actions for NCore

Site Level

- _Local Site Name_ – Although not required, we are asking you to populate this field with a descriptive name for your NCore station.

- _Latitude and Longitude_ – Ensure the correct "Horizontal Datum" is populated with the coordinates. Monitoring agencies are also encouraged to validate these coordinates with commercially available GPS units and/or by reviewing publically available satellite imagery such as on GoogleTM Earth.

Complete instructions included in enclosure B to approval letter

AQS Metadata Actions for NCore (continued)

Monitor Level:

- *Monitor Type* – Each monitor operating at an NCore station will typically have at least **two** monitor types associated with it.

  - **EPA-OAQPS** will be responsible for adding "NCore" as a monitor type for NCore measurements being reported at each approved NCore station. Note: we will also remove "Proposed NCore", where applicable. For NCore measurements that come on-line and begin reporting after the initial round of NCore monitor type associations, EPA-OAQPS will periodically review NCore station data in AQS and add a monitor type of NCore for any remaining required NCore measurements being reported, but not already associated with a monitor type of NCore.

  - Each **monitoring agency is** responsible for populating a monitor type that provides the Administrative Classification of the monitor. For NCore stations this will largely be a monitor type of SLAMS since the majority of NCore stations are operated by State and local agencies.

AQS Metadata Actions for NCore (continued)

Monitor Level: (continued)

- *Measurement Scale* – We are requesting that you populate this field for each monitor reporting data to AQS. For Urban and Suburban NCore Stations, this will most likely be either Neighborhood Scale or Urban Scale. For Rural NCore Stations, we are expecting the use of Regional Scale.

- *Monitoring Objective* – All Urban and Suburban monitors reporting to AQS should use "Population Exposure" as the monitoring objective. Rural NCore stations should use the most appropriate choice between "Upwind Background," "General Background," "Regional Transport," or "Extreme Downwind." Other Monitoring objectives may apply, but are not expected.

- *Area Represented* – For Urban and Suburban Stations, populate this field with the appropriate code for either the CBSA or CSA, if applicable. For Rural Stations, this field should not be populated.

- *Sample Frequency* – A sample frequency is required to be associated with each of the PM measurements. For filter-based measurements this is typically on a schedule of "every 3rd day." However, some agencies may be operating their PM samplers on a daily schedule. Sample frequency does not need to be loaded for continuous measurements.

AQS Metadata Actions for NCore (continued)

Data Level:

- *Method Code* - Each data record includes a 3 digit method code that associates detail on the sampling and analysis method with a piece of data. Of particular note for NCore trace gas measurements of CO, SO_2, and NO/NO_Y monitoring agencies should be utilizing the appropriate method code associated with the trace gas measurements that provides a substantially improved detection limit.
    - Default Method Detection Limits (MDL's) are provided for each commonly used trace gas method in the AQS data base. Monitoring agencies can also submit their own MDL, where applicable. Many, but not all of the method codes associated with trace gas instruments have a method code in the range between 500 and 600

Trace Gas Method Codes

Parameter Code	Unit Standard	Parameter	Methodology Code	Sample Analysis Desc	Fed MDL	Reference Method Id	Equivalent Method Desc	Unit Desc
42101	007	CO	593	Gas Filter Correlation Teledyne API 300 EU	.02000	RFCA-1093-093	API Model 300 EU	Parts per million
42101	007	CO	588	Gas Filter Correlation Ecotech EC9830T	.02000	RFCA-0992-088	Ecotech EC9830T	Parts per million
42101	007	CO	554	Gas Filter Correlation Thermo Electron 48i-TLE	.02000	RFCA-0981-054	Thermo 48i TLE	Parts per million
42101	007	CO	055	Gas Filter Correlation Thermo Electron 48C-TL,TLE	.02000	NULL	NULL	Parts per million
42401	007	SO2	600	Ultraviolet Fluorescence API 100 EU	.00020	EQSA-0495-100	Teledyne API 100 EU	Parts per million
42401	007	SO2	592	Ultraviolet Fluorescence EC9850T	.00020	EQSA-0193-092	Ecotech EC9850T	Parts per million
42401	007	SO2	560	Pulsed Fluorescent 43C-TLE/43i-TLE	.00020	EQSA-0486-060	Thermo Electron 43c-TLE/43i-TLE	Parts per million
42600	007	NOY	599	Chemiluminescence Teledyne API 200 EU/501	.00005	NULL	NULL	Parts per million
42600	007	NOY	591	Chemiluminescence Ecotech EC9843	.00005	NULL	NULL	Parts per million
42600	007	NOY	590	Chemiluminescence Ecotech EC9841T	.00005	NULL	NULL	Parts per million
42600	007	NOY	574	Chemiluminescence Thermo Electron 42C-Y	.00005	NULL	NULL	Parts per million

Measurement of PM$_{10\text{-}2.5}$ Mass

Measurement of PM$_{10\text{-}2.5}$ mass is **required** and can now be accomplished with one of several recently approved Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) described in the table below. Monitoring agencies should include one of these methods in their next annual monitoring network plan and have the method operational by January 1, 2011.

Manufacturer	Model	Method
BGI, Inc	PQ200 Sampler Pair	Manual Reference Method: RFPS-1208-173
Thermo-Fisher, Inc.	Model 2000 PM10-2.5 Sampler Pair	Manual Reference Method: RFPS-0509-175
Thermo-Fisher, Inc.	Model 2025 PM10-2.5 Sequential Air Sampler Pair	Manual Reference Method: RFPS-0509-177
Thermo-Fisher, Inc.	2000-D Dichotomous Air Sampler	Manual Equivalent Method: EQPS-0509-178
Thermo-Fisher, Inc.	2025-D Dichotomous Air Sampler	Manual Equivalent Method: EQPS-0509-180
Met One, Inc.	BAM-1020 PM10-2.5 Measurement System	Automated Equivalent Method: EQPM-0709-185

Agency must compute the PM$_{10\text{-}2.5}$ value and report (direct measure with a dichotomous sampler or actual difference) using parameter code 86101 – PM$_{10\text{-}2.5}$ Local Conditions

AIRNOW Actions for NCore

- All of the continuous parameters can be reported to AIRNOWTECH in real-time

- This action is not required but strongly encouraged

- Check with your DAS vendor for specific instructions – attend the Data Acquisition and Reporting session on Wedneday for AIRNOW data transfer updates

Quality Assurance Issues

Contact: Mike Papp, papp.mike@epa.gov, 919-541-2408

Revisions to QA Appendix A
Pb-PM$_{10}$ Collocation at NCore

- 2006 Monitoring Regulation did not address Pb-PM$_{10}$ at NCore
  - Actually a provision of lead monitoring rule being completed now
- Would be additional burden on monitoring orgs that only have one Pb site in network at the NCore site
- Solution
  - Mimic PM$_{10-2.5}$ requirement
  - Collocate 15% of each method designation at <u>NCore</u> sites (nationally) not PQAO level
  - Does not change QA requirements for NAAQS required Pb monitoring.
    - Meaning if you are already required to monitor for Pb then you follow the current PQAO requirements
  - Select the same NCore sites that will be collocating PM$_{10-2.5}$ for Pb collocation
  - EPA Regions need to identify what sites within the NCore network will be collocated.
 - Technical guidance developed

Revisions to QA Appendix A - Audit Levels

- Monitoring Orgs having trouble selecting 3 distinct audit levels for Annual PE that bracket 80% of their concentrations
  - Audit levels ranges too big
- 2-pronged solution
  - Allow monitoring orgs to use their data to create specific audit levels
    - Would require some work in AQS
  - Expand the 5 levels to 10 make each range smaller
  - Technical Guidance developed

Audit level	Concentration range, ppm			
	O_3	SO_2,	NO_2	CO
1......	0.02–0.05	0.0003–0.005	0.0002–0.002	0.08–0.10
2......	0.06–0.10	0.006–0.01	0.003–0.005	0.50–1.00
3......	0.11–0.20	0.02–0.10	0.006–0.10	1.50–4.00
4......	0.21–0.30	0.11–0.40	0.11–0.30	5–15
5......	0.31–0.90	0.41–0.90	0.31–0.60	20–50

Monitoring Org Created Audit Levels

- Each year, aggregate all routine sites within a PQAO for a particular pollutant
- Find the concentration range from highest MDL in the PQAO to the 99.9%tile
- Divide the range by 5 to create 5 evenly spaced concentration bins
- select 3 bins which contain the greatest amount of data (generally it will be bins 1-3 or 2-4),
- Report the range information for the selected bins to AQS for each pollutant
- The AMP255 would then evaluate the data based on this selection.

Concentration range determines audit bin width

| 1 | 2 | 3 | 4 | 5 |

MDL   99.9%tile
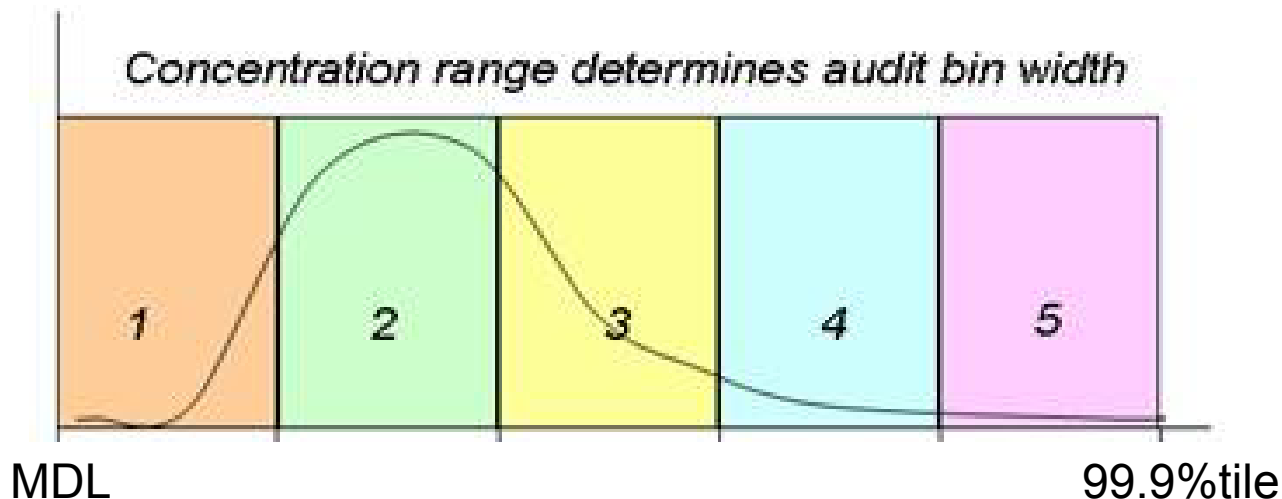
AMP255 Fixes

- PM$_{2.5}$ collocation of 15% of each method designation
  - Current 255 uses all method designation within the PQAO
  - Fix this to only look at the "PRIMARY" monitors.
- Request from California ARB: Have an option to perform the statistics grouped by Reporting Org rather than by PQAO.
  - EPA does not need it, do others want it. Who pays for it?
- Pb audit Strips will be evaluated at separate audit levels
  - Currently, all levels aggregated into a single evaluation.
- Semi-Annual flow rate audits,
  - expand acceptance criteria if there are 4 valid quarters of audits regardless of the time elapsed (5-7 month rule) between any of the samples.
- Accommodate reporting PM10 LC (QA and routine data) .
- Adjust the Annual Performance Evaluation Audit levels to new standard
  - Expansion from 5 to 10 easy
  - New MO developed audit levels hard.
- Current 255 looks for Pb audit strips in all 4 quarters not quarters samples were analyzed.
  - Don't have easy fix for this.
- Need to identify automated and manual instruments for PM10 and PM2.5 flow rate verifications.
  - Will help to determine when verification data need to be reported to AQS

Use of "Non-Regulatory" Monitor Type Code
http://www.epa.gov/ttn/amtic/cpreldoc.html

- Should use "non-regulatory" monitor type code if:
  - not using an FRM/FEM/ARM for monitoring
  - not required or planning on meeting siting criteria (40 CFR App E)
  - not required or planning on meeting the QA criteria (40 CFR Appendix A)
- Exception- no data identified as a SLAMS monitor type can be designated as "non-regulatory"
- Began with 2009 data
- If not identified it is assumed that Appendix A criteria must be followed and data will be checked as such.

Revision of the P&A Transactions Why?

- Want to Accommodate more types of QA data
  - TSAs, Round Robins
- Want to get more definitive about our required data
  - Who performed the audit, types of standards used
  - Eliminate the famous (or infamous) "other" category
- Want to eliminate entries not needed or not required,
- Want to simply entry process
- Proposal planned to be out for review this year

Reporting Chemical Speciation Flow Rate Audit Data to AQS

For Further Information Contact:
Dennis Crumpler crumpler.dennis@epa.gov
Phone: 919-541-0871

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- We have a new set of tools!!
  - Unique audit form
    - Used across the nation
    - Consistent recording and reporting of audit results
    - Verifications by operators
  - Website for auditors and operators
    - Posting site for audit and sampler verification reports
    - Provides downloadable resource information
  - XL macro software
    - Extracts flow-rate audits
    - Generates properly formatted transaction files to upload to AQS

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- ## Companion developments

  - ### Historically, no way to associate audit results with analytes other than PM$_{2.5}$ mass

    - No way to certify the monitor data for trace metals, cations and anions, and carbon

  - ### Expanded the Analyte-to-sampler channel (analyte) associations in AQS

    - For first time audit value for trace metals, cations and anions, and carbon will be recorded, therefore

    - Supports data certification process

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- ## Companion developments
  - ### New audit and verification forms
    - Clearly defines and limits the choices of "Auditor Types"
      - Flow Verification by Site Operator
      - PQAO
      - Reporting Org
      - Federal
      - Federal Contractor
    - Terms are consistent with current usage

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- ## How the process will work
  - – Auditors/operators Excel spreadsheet form,
    - Enter audit or verification data
      - Flow rates,
      - GPS latitude & longitude readings,
      - ambient pressure,
      - ambient and filter temperatures
    - Upload the Spreadsheet to the website as a report
    - The audit data is stored in a companion data base

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- How the process will work

  - The CSN network lab service contractor (currently RTI) uses Excel macro

    - Extracts flow rate audits or verifications

    - Creates the AQS transaction file and

    - Posts results to AQS.

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- Future developments

  – Assessment tools to track the overall health of the network.

  – Flagging mechanisms

    - Auditors alerts

      – Service and Maintenance Frequency

      – Tracking long-term sampler performance

      – Failing parameters--data should be invalidated!

      – GPS readings that are significantly different from those in AQS

  – Tracking tool for Auditor Certification and Recertification

Reporting Chemical Speciation Flow Rate Audit Data to AQS

- Upcoming Training
  - Webinars
    - June 1 & 2 Targeted Auditors specifically
    - June 16, 22, & 28 Targets Site Operators
    - Additional Follow-up seminars this summer to be announced
    - Contact Pamela Phillips <Phillips.Pamelaj@epa.gov>
  - On-site training August 16-19, 2010 RTP, NC
    - Contact Solomon Ricks <ricks.solomon@epa.gov>

Carbon EC/OC Recalculation

- In the start of the CSN, OC and EC were determined at RTI Lab using Sunset Lab instruments.

- Used original version of Sunset Software.

- In 2003, RTI updated the Sunset instruments software to new version.

- To date, still use this version of software.

- It was recommended from the Carbon experts that advise EPA to go back to the old (prior to July 2003) OC/EC data and recalculate OC/EC using the new version of software to be consistent.

- This has been completed. The new data will be put in AQS soon.

- Results will see a slight decrease in EC and slight increase in OC, but not affect Total Carbon (TC).

Contact: David Shelow, shelow.david@epa.gov, 919-541-3776

Acrolein Reporting Update*

- Name of the existing acrolein parameter code (43505) changed to "Unverified Acrolein" to indicate the current level of uncertainty that exists with the data already reported to AQS.
  - Ongoing acrolein measurements should be reported to the "Unverified Acrolein" parameter code.
- EPA will develop a brief guidance document to provide a data quality evaluation framework for establishing confidence in acrolein measurements.
  - Monitoring agencies will be free to use this guidance document along with other factors of their own choosing to establish whether their historical and current acrolein data should be moved from "unverified" to a new parameter, "Verified Acrolein" and whether they should report new data as "verified."

*Draft of joint recommendations of OAQPS and NACAA Monitoring Steering Committee. EPA senior management still needs to consider.

Acrolein Reporting Update (cont)

- Acrolein data should continue to be analyzed and reported; we will direct the national contract laboratory to do so for acrolein measurements (unverified) taken as part of the NATTS and UATMP networks.
    - ensures some continuity in ambient measurements; a continuous data record is needed to properly assess changes in reported values due to factors such as 1) impact of closing an existing or opening a new facility in the vicinity of a VOC monitor, 2) sampling and/or analysis method changes (e.g., arising from our method improvement work with ORD), etc.
- For state/local agencies <u>not</u> using the national contract laboratory, acrolein analysis and data reporting will become an ***optional*** part of their air toxics program.
- EPA will continue to work on the review of potential improvements to the existing acrolein method as well as the investigation of new technologies that could compliment or supplant canister sampling. Until such time as method improvements can be investigated and reviewed independently (e.g., before the CASAC AAMMS), we will maintain these data reporting policies.