

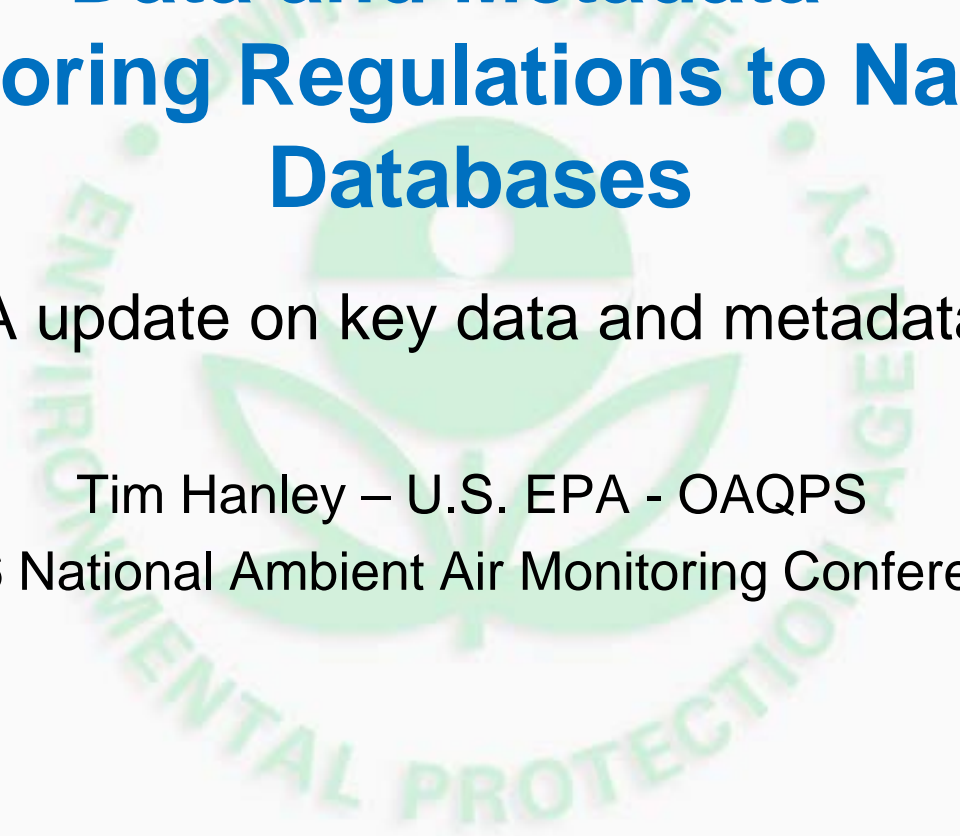


Data and Metadata – Monitoring Regulations to National Databases

A update on key data and metadata

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2016 National Ambient Air Monitoring Conference





Why are Metadata Important?

- Consistency of metadata across networks is critical to ensuring appropriate interpretation and use of the data.
 - e.g., Health studies may be under-utilizing pollution data where key metadata is missing or labeled incorrectly.
- With a large investment by EPA and monitoring agencies to collect data, its important to maximize the data's utility with the appropriate metadata
- Assessment tools are becoming more readily available with a large number users; need to provide enough key information to address most common questions.

Metadata from AirData web site

<https://www3.epa.gov/airquality/airdata/>

E Millbrook Middle School

AQS Site ID: 37-183-0014

POC: 3

State: North Carolina

City: Raleigh

MSA: Raleigh-Durham-Chapel Hill,NC

Local Site Name: E Millbrook Middle School

Address: 3801 SPRING FOREST RD.

Datum: WGS84

Latitude: 35.856111

Longitude: -78.574167

Lat / Lon Accuracy (meters): 3.04

Elevation (meters): 100

Parameter Name: PM2.5 - Local Conditions

Monitor Start Date: 01JUN09

Last Sample Date: 29FEB12

Measurement Scale: NEIGHBORHOOD

Measurement Scale Definition: 500 M TO 4KM



Key changes in AQS Data Reporting and Metadata over the last few years?

- § 58.16 and Appendix A – Two reporting requirements are changed in recent final rule.
- Combined PM_{10-2.5} reporting into one parameter code – PM10-2.5 Local Conditions (parameter code 86101)
 - Acceptable PM10-2.5 Local Conditions (Parameter code 86502) has been closed
- Alignment of Monitor Type with Part 58 definitions and related separation of networks into another field called Network Affiliation.
- Measurement Scale is now a required field for criteria pollutants.
- Updated Agency Roles to now include PQAO.
- Guidance on POCs for cases where multiple samplers make up one primary record.



Revised Data Reporting Requirements

Appendix A – (New)

- **3.2.1 Flow Rate Verifications for PM_{2.5}.** “Report the flow rate of the transfer standard and the corresponding flow rate measured by the monitor to AQS.”

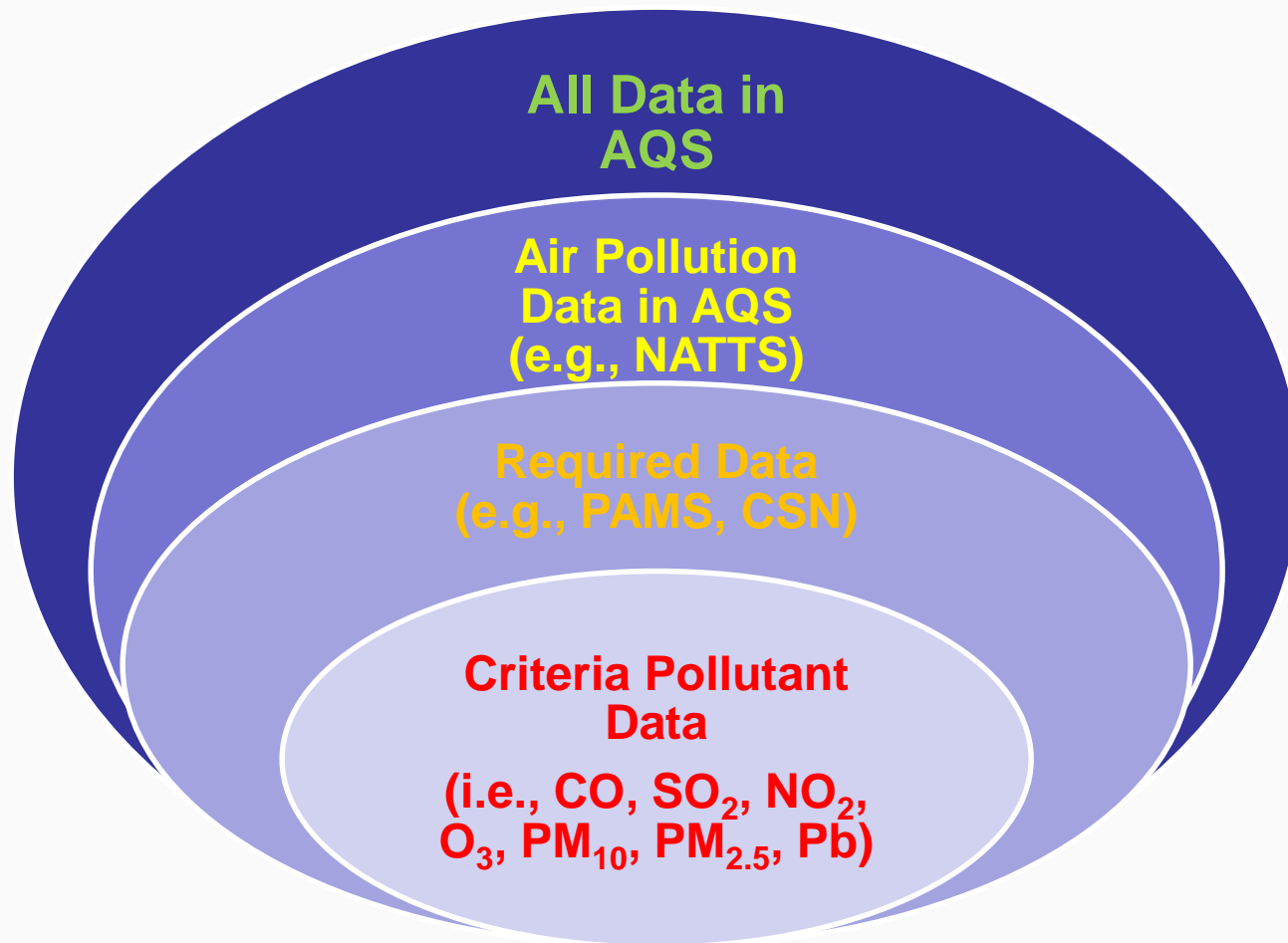
§ 58.16 Data submittal and archiving requirements. (Revised)

- (a) The state, or where appropriate, local agency, shall report to the Administrator, via AQS all ambient air quality data and associated quality assurance data for SO₂; CO; O₃; NO₂; NO; NO_y; NO_x; Pb-TSP mass concentration; Pb-PM₁₀ mass concentration; PM₁₀ mass concentration; PM_{2.5} mass concentration; for filter-based PM_{2.5} FRM/FEM the field blank mass, ~~sampler-generated average daily temperature, and sampler-generated average daily pressure~~; chemically speciated PM_{2.5} mass concentration data; PM_{10-2.5} mass concentration; meteorological data from NCore and PAMS sites; ~~average daily temperature and average daily pressure for Pb sites if not already reported from sampler generated records~~; and metadata records and information specified by the AQS Data Coding Manual (<http://www.epa.gov/ttn/airs/airsaqs/manuals/manuals.htm>). The state, or where appropriate, local agency, may report site specific meteorological measurements generated by onsite equipment (meteorological instruments, or sampler generated) or measurements from the nearest airport reporting ambient pressure and temperature. Such air quality data and information must be submitted directly to the AQS via electronic transmission on the specified quarterly schedule described in paragraph (b) of this section.

Bottom line is that sampler generated average daily temperature and pressure are no longer required to be reported; however, they are still accepted in AQS.



Venn Diagram of Data in AQS





Requirements for the Annual Monitoring Network Plan

§ 58.10 (b) The annual monitoring network plan must contain the following information for each existing and proposed site:

- (1) The **AQS site identification number**.
- (2) The location, including **street address** and **geographical coordinates**.
- (3) The **sampling and analysis method(s)** for each measured **parameter**.
- (4) The **operating schedules** for each monitor.
- (5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
- (6) The **monitoring objective** and **spatial scale of representativeness** for each monitor as defined in appendix D to this part.

Green = Generally populated very well in AQS
Maroon = Identified as needing improvement



Requirements for the Annual Monitoring Network Plan - *Continued*

- (7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS as described in § 58.30.
- (8) The MSA, CBSA, CSA or other area represented by the monitor.**
- (9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.
- (10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator...
- (11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb- PM_{10} monitoring in lieu of Pb-TSP monitoring...
- (12) The identification of required NO_2 monitors as either **near-road, area-wide, or vulnerable and susceptible population monitors** in accordance with appendix D,

§ **Green = Generally populated very well in AQS**
Maroon = Identified as needing improvement

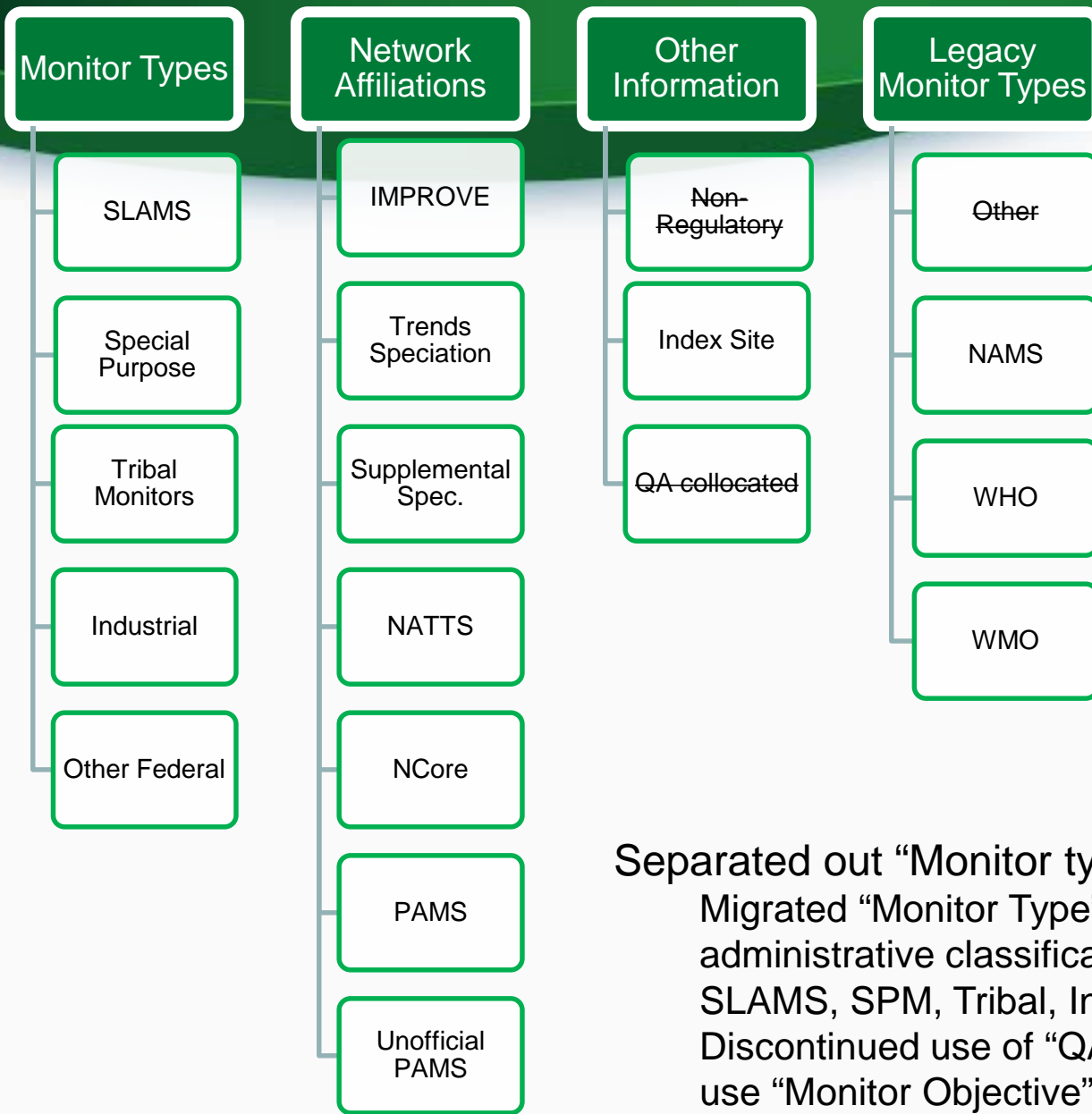


Requirements for the Annual Monitoring Network Plan - *Continued*

- (13) **The identification of any PM_{2.5} FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS.** For required SLAMS where the agency identifies that the PM_{2.5} Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in § 58.12 or other Class III PM_{2.5} FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

Green = Generally populated very well in AQS

Maroon = Identified as needing improvement

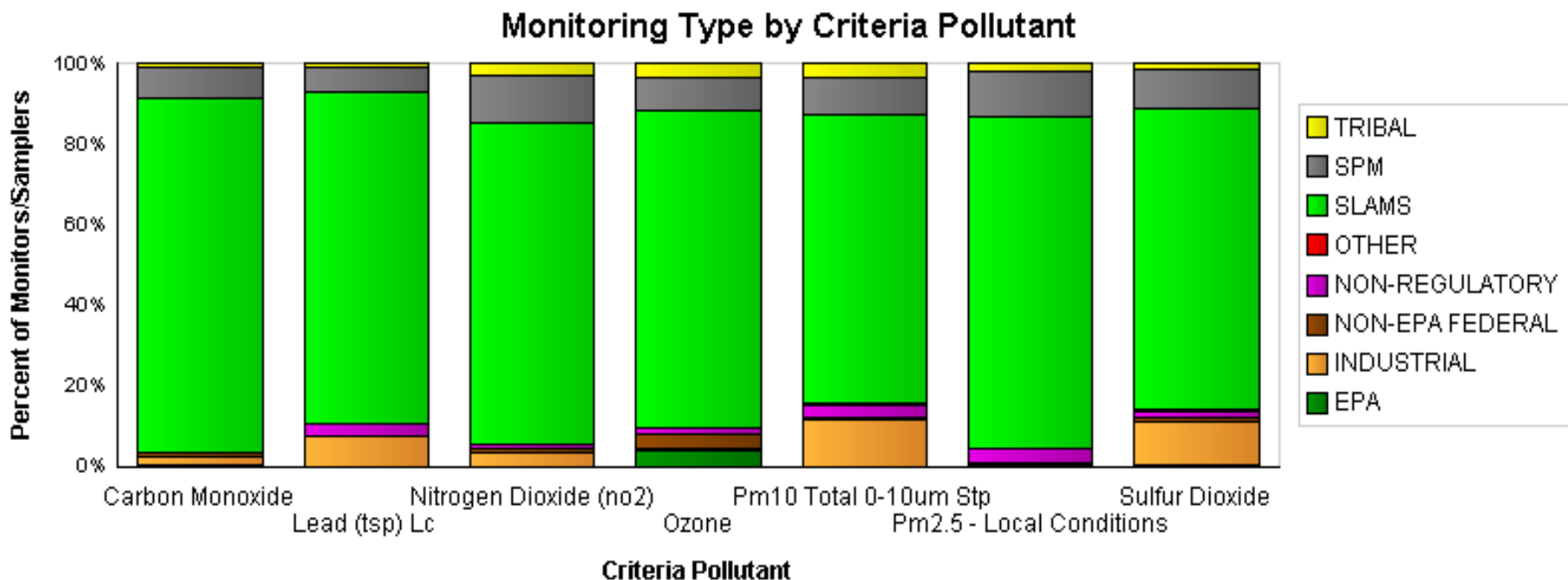


Monitor Type is defined as the Administrative Classification of the monitor
- Mutually exclusive
- Required field

Separated out “Monitor type” and “Network Affiliation”.
Migrated “Monitor Type” back to its original definition (the administrative classification of the monitor) (e.g., SLAMS, SPM, Tribal, Industrial)
Discontinued use of “QA Collocated” with Monitor Type; use “Monitor Objective” to describe these instead.

Current Status of Monitor Type Reporting to AQS for Criteria Pollutant Monitors/Samplers

Monitor Type is required and can only be populated with one selection



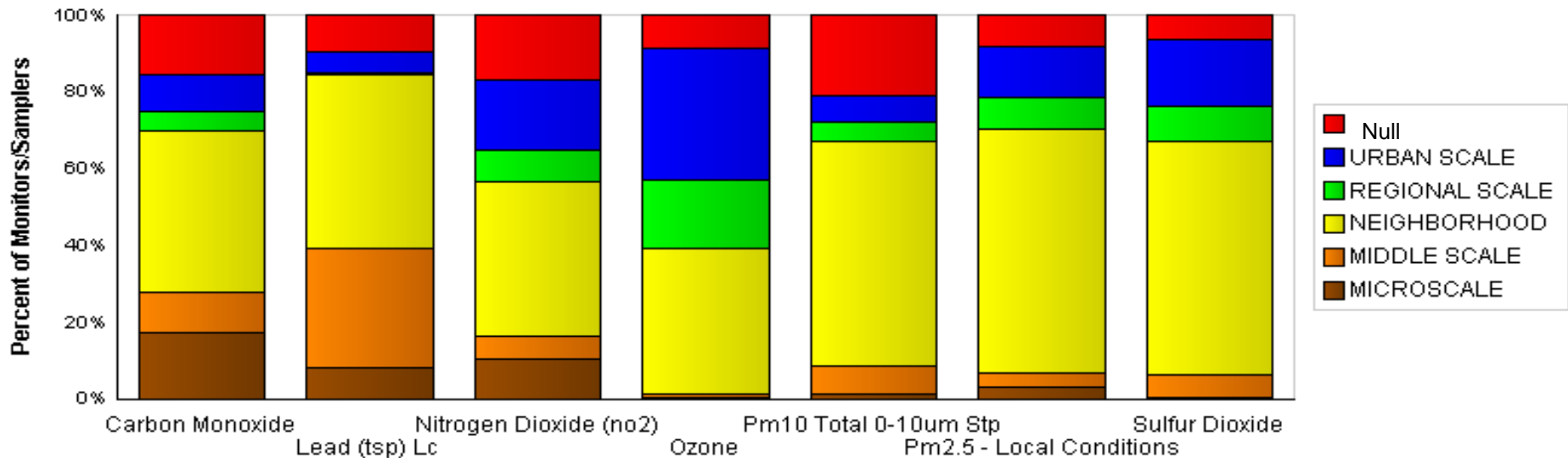
“Other” and “Non-Regulatory” are no longer available

Measurement Scales for Criteria Pollutant Monitors/Samplers Reporting to AQS

Measurement Scale is now a required field in AQS.

Measurement Scale	Area represented	Carbon Monoxide	Lead (Tsp) Lc	Nitrogen Dioxide (No2)	Ozone	Pm10 Total 0-10um Stp	Pm2.5 - Local Conditions	Sulfur Dioxide
Null		48	18	78	110	159	81	30
Totals		313	186	462	1282	765	1001	464

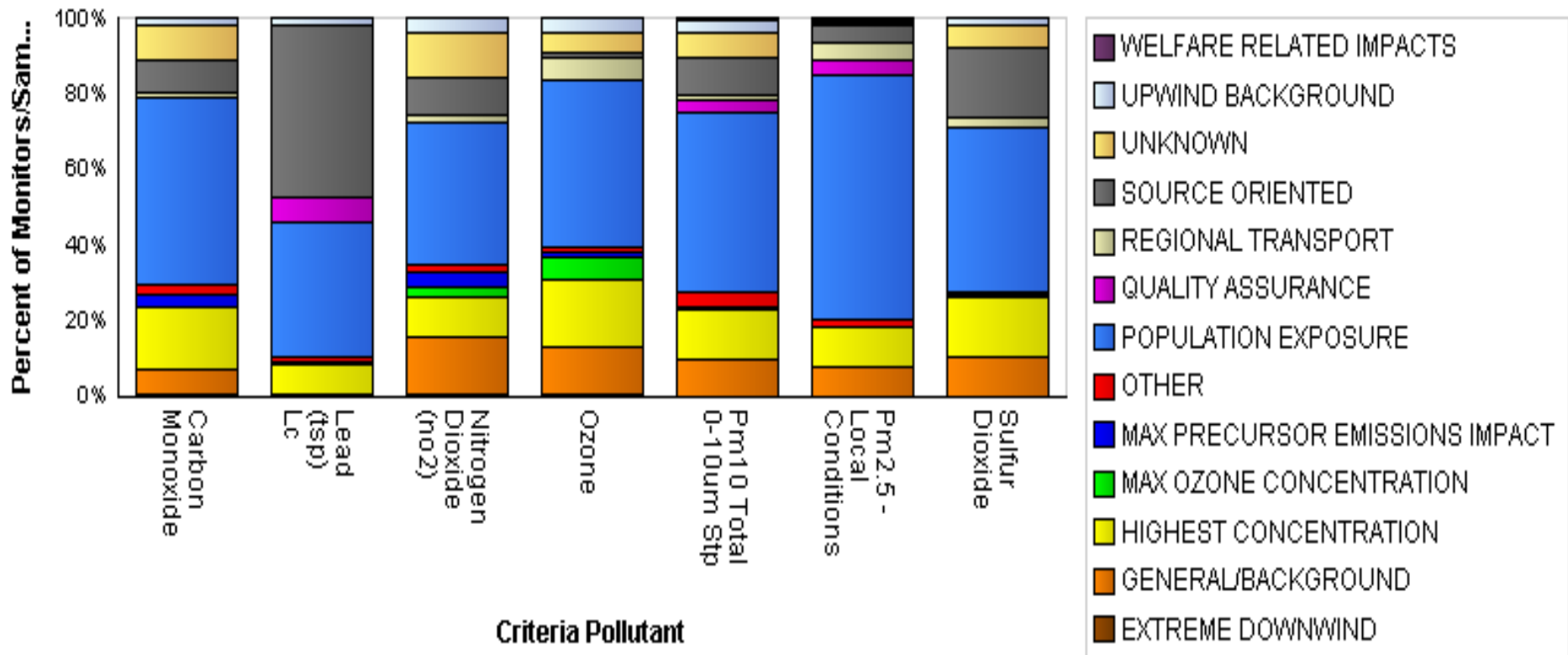
Scale of Representation by Criteria Pollutant



Monitoring Objectives for Criteria Pollutant Monitors/Samplers Reporting to AQS

At least one Monitoring Objective is required, but more than one can be populated

Monitoring Objective by Criteria Pollutant



Latitude and Longitude at Criteria Pollutant Sites Reporting to AQS

- At least one criteria pollutant monitor is reported at 2,353 sites across the country
- EPA standard coordinates are in the NAD83 datum
- **73 sites have 3 or less decimal places in either or both latitude or longitude.**
- Assessment of coordinates should take place as part of audits. **But need to close the loop if issues are found.**
 - Working to include a check of latitude and longitude as part of NPEP.

Sites marked in red need additional resolution in coordinates



Degree precision versus length

decimal places	decimal degrees	DMS	qualitative scale that can be identified	N/S or E/W at equator	E/W at 23N/S (HI ~22; tip of FL ~25)	E/W at 45N/S (e.g., MN, OR)	E/W at 67N/S (AL= 58 to 64)
1	0.1	0° 06' 0"	large city or district	11.132 km	10.247 km	7.871 km	4.3496 km
2	0.01	0° 00' 36"	town or village	1.1132 km	1.0247 km	787.1 m	434.96 m
3	0.001	0° 00' 3.6"	neighborhood, street	111.32 m	102.47 m	78.71 m	43.496 m
4	0.0001	0° 00' 0.36"	individual street, land parcel	11.132 m	10.247 m	7.871 m	4.3496 m
5	0.00001	0° 00' 0.036"	individual trees	1.1132 m	1.0247 m	787.1 mm	434.96 mm
6	0.000001	0° 00' 0.0036"	individual humans	111.32 mm	102.47 mm	78.71 mm	43.496 mm



Monitoring Topics that we intend to work on:

- Making better use of the “Parameter Classification” table – e.g., for CSN, IMPROVE, NATTS
- Availability of more “Network Affiliations”
- Other?



Near-Road Metadata

- Described in Section 14 of the Near-Road NO₂ Monitoring Technical Assistance Document –
 - <https://www3.epa.gov/ttn/amtic/files/nearroad/NearRoadTAD.pdf>

Key Metadata Fields for Near-Road NO₂

AQS Field	Populate with
Monitor Objective	Source Oriented
Distance from Monitor to Tangent Road	As accurately as possible, reflect the distance, in the horizontal, between the inlet probe and the outside nearest edge of the target road segment. This will be a highly visible and often used piece of metadata.
Dominant Source	Reflect that the “mobile source” category is the dominant source



NCore Metadata Update/Reminders

- Wind Speed and Wind Direction
 - Reporting is “Resultant”; (i.e., not “scaler)
- PM_{10-2.5} local conditions
 - Parameter code 86101 is used for all FRM/FEM and IMPROVE
 - Discontinued use of 86502 (Acceptable PM_{10-2.5}).
- A PM_{2.5} continuous monitor is required to be operated. May be reported as either:
 - PM_{2.5} Local conditions (parameter code 88101)
 - Acceptable PM_{2.5} AQI &... (parameter code 88502)
- New - Monitoring agencies have the ability to populate Network Affiliation of “NCore” with their reporting monitors.



Air Toxics Metadata Update

- Recommendations:
 - Report all values below MDL
 - Report your laboratory's MDL
 - Follow definitions from NATTS TAD on:
 - Collocated
 - Duplicate
 - Replicate

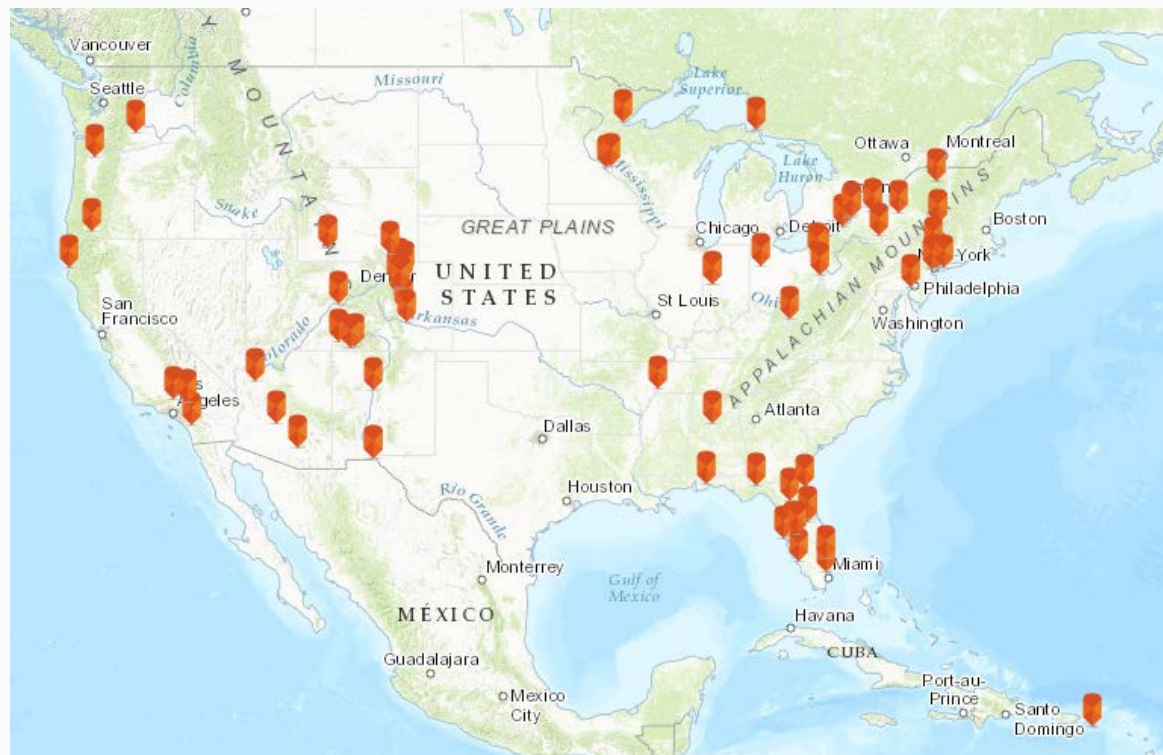
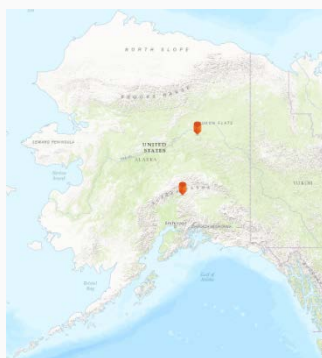
SO₂ Reporting Update

- 486 SO₂ monitors reporting data
- § 58.16 - Data are required to be reported as
 - One hour data; and
 - (12) five-minute averages for each hour (interval H); or
 - 5-minute max (parameter code 42406) for each hour
- 48 Monitors without 5 minute data
 - 20 SLAMS
 - 6 SPM
 - 3 Tribal
 - 16 Industrial
 - 3 Non-EPA Federal

SO₂ Monitors reporting one hour data, but not 5-minute data



PM_{2.5} FRM Samplers with no Field Blank data loaded in 2015



88 cases with no FBs
876 cases with FBs



CSN Metadata Update

- Recommendations for State/local/Tribal AQS contacts
 - Ensure site names are populated
 - Utilize network affiliations for CSN
 - Trends
 - Supplemental



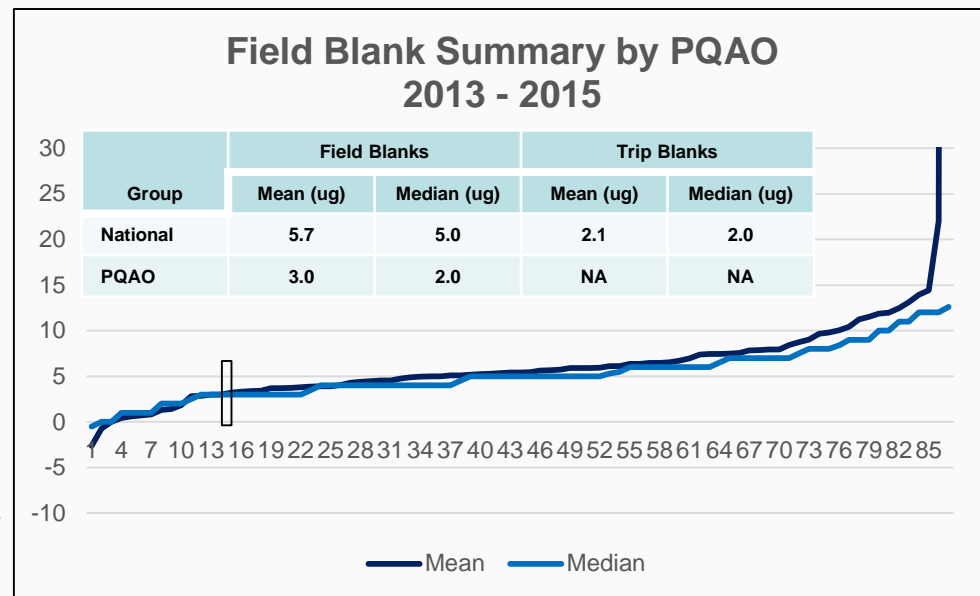
Summary of Recommendations for Monitoring Agencies to Work on:

- Report Flow Verifications
- Update Monitor Type, as needed
- Add Measurement Scales, where missing
- Add/update Monitoring Objectives, where applicable.
- Check Latitude and Longitude for cases with 3 or less decimal places
- Populate Local Site Name
- Update network affiliations, where appropriate.
- Air Toxics – follow TAD recommendations
- Report 5-minute SO₂ data
- Report PM_{2.5} Field Blank data
- Other?



New Ideas for Monitoring and AQS:

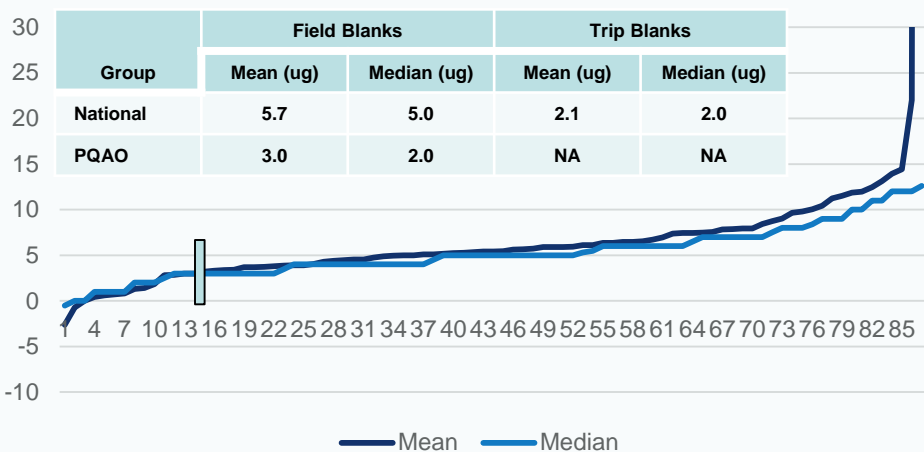
- Working on a Visual Assessment of data for the PM_{2.5} FRM
- Straw - Align POCs to easily determine cases where combined records are intended?
 - For example:
 - POC 1 = single channel FRM primary sampler running on first day
 - POC 11 = single channel FRM sampler running on second day
 - POC 21 = single channel FRM sampler running on third day
- What ideas do you have?



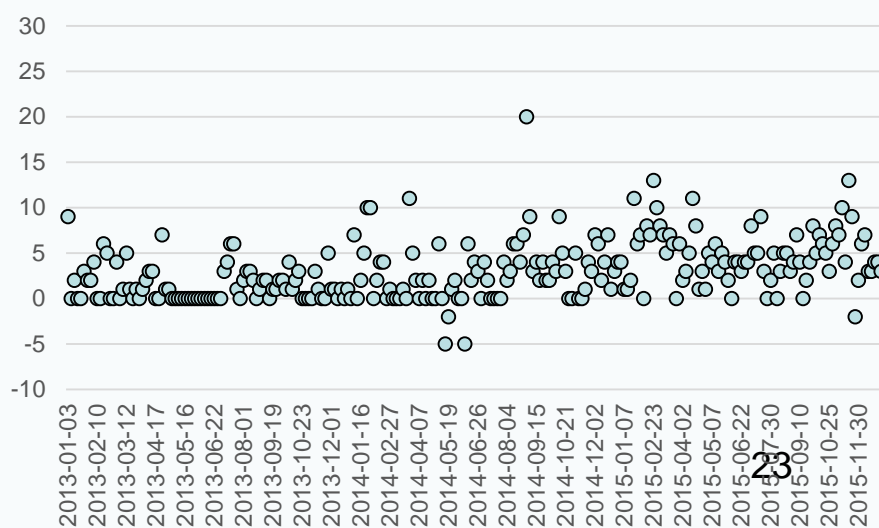
We are developing an automated PM_{2.5} FRM Visual Assessment

- In order to know if we are getting good PM_{2.5} continuous monitoring data we need to know if we are getting good FRM data.
- Similar to the PM_{2.5} continuous monitoring one page assessment, we are developing a one-page visual assessment of a PQAO's PM_{2.5} FRM data quality
- Will include up to 3 years of data for four indicators of PM_{2.5} data quality:
 - Collocated precision
 - Bias via Performance Evaluation Program
 - Flow Rate Audits/Verifications
 - **Field Blanks**

Field Blank Summary by PQAO
2013 - 2015



Field Blank Time Series within PQAO
2013 - 2015





PM_{2.5} FRM Visual Assessment

- Development is underway
- Working with STI on this project

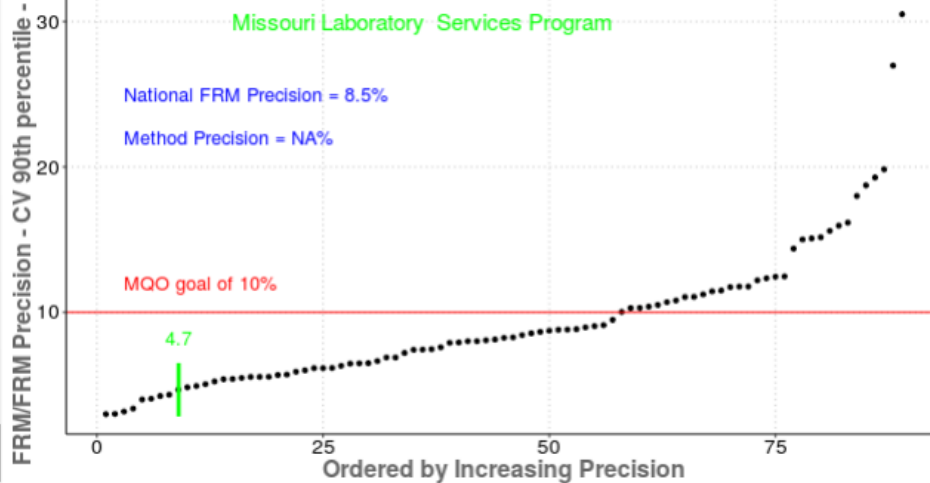
PM_{2.5} Data Quality Assessment

Choose a PQAO

Missouri Laboratory Services Program ▼

Select a Method

FRM/FRM Precision: PQAO compared to all other PQAO's



Time Series of Precision in PQAO

