

Data Roadmap – From Monitoring Regulations to National Databases

A review of monitoring definitions and metadata fields with a crosswalk of how that information is stored in AQS

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What is Metadata? Metadata is the data about the data

Where does the Metadata come from?

- Most of the metadata comes from the submitting monitoring agency – (e.g., scale of representation, method code...)
- Some metadata comes from other data bases such as envirofacts (e.g., city code, census tract, census block, ZIP code, congressional district, and urbanized area code).

Editorial – Metadata does not have to be perfect or even populated for every field that is available; however, we **should expect that it will be available and correct for the most important fields.**



Goals for this Session

- Identify the most important metadata fields to focus on
- Review how well these fields are populated in AQS
- Develop recommendations for improvement
- Identify how to best communicate and get improvement
 - At a minimum communicate recommendations at AQS conference (August 2012)



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

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



What are the inputs to understanding which metadata are important?

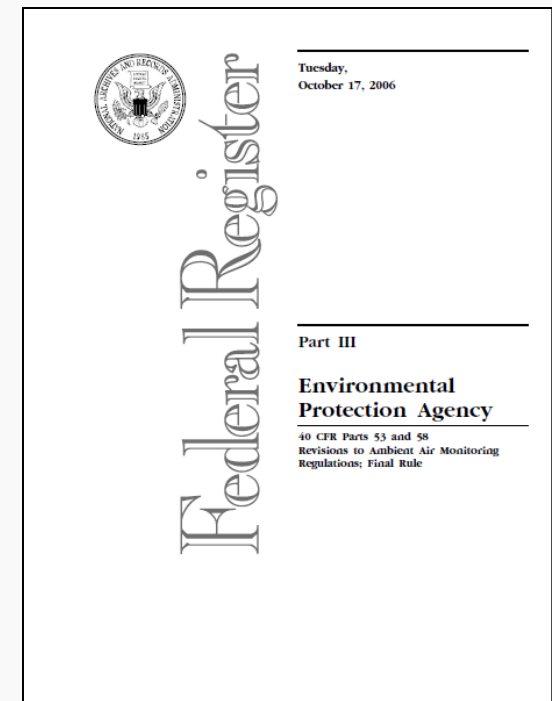
- You – and other stakeholders
- Monitoring Regulations
- Technical Documents
 - NCore Documentation
 - At the time the NCore approval letters delivered, EPA identified several key fields to focus on when setting up sites and monitors.
 - Technical Assistance Documents (TADs)
 - e.g., Technical Assistance Document for NATTS
- AQS



Monitoring Regulations

40 CFR, Part 58 – Ambient Air Quality Surveillance

- Definitions connected to AQS metadata
 - SLAMS, SPM, PQAO
- Annual Monitoring Network Plans
- Sample Frequency Requirements
- Quality Assurance in Appendix A
- Methodology in Appendix C
- Network Design in Appendix D
 - Spatial scales are detailed for each NAAQS pollutant
- Probe and Siting Criteria in Appendix E



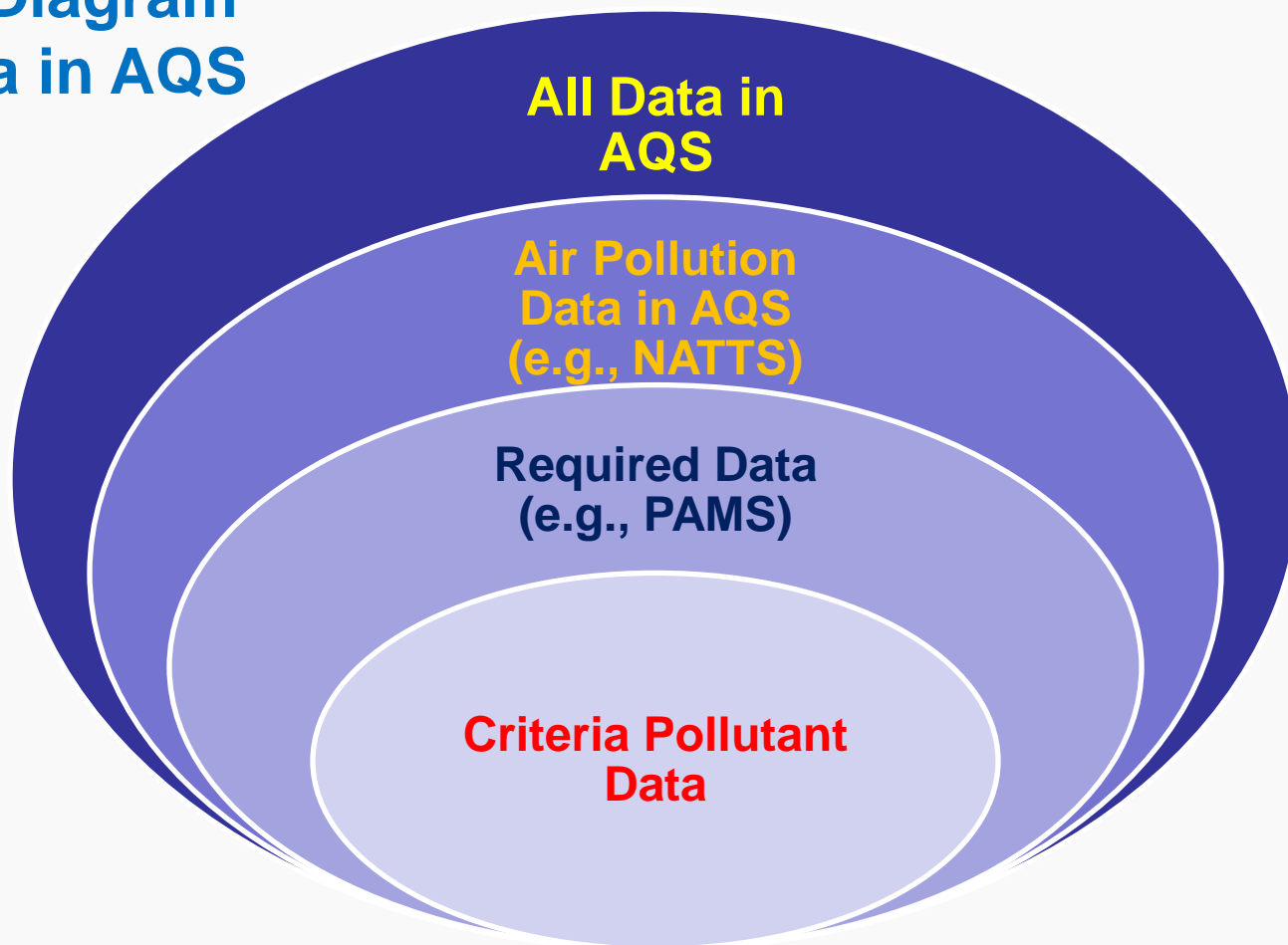


Key interpretation and data use questions that could be addressed with improved metadata

- Which monitors are intended to be compared to the NAAQS?
 - All SLAMS, some SPM's, some Tribal, some others?
- Which monitors are to participate in national level QA programs?
Same as above?
- Which sites are representative of exposure, fenceline, transport...?
- For use in resource planning: What is the national network size of a given pollutant?
 - Do include SLAMS and Tribal; don't include industry run sites?



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 or area-wide sites** in accordance with appendix D, section 4.3 of this part.

Purple = not provided for in AQS

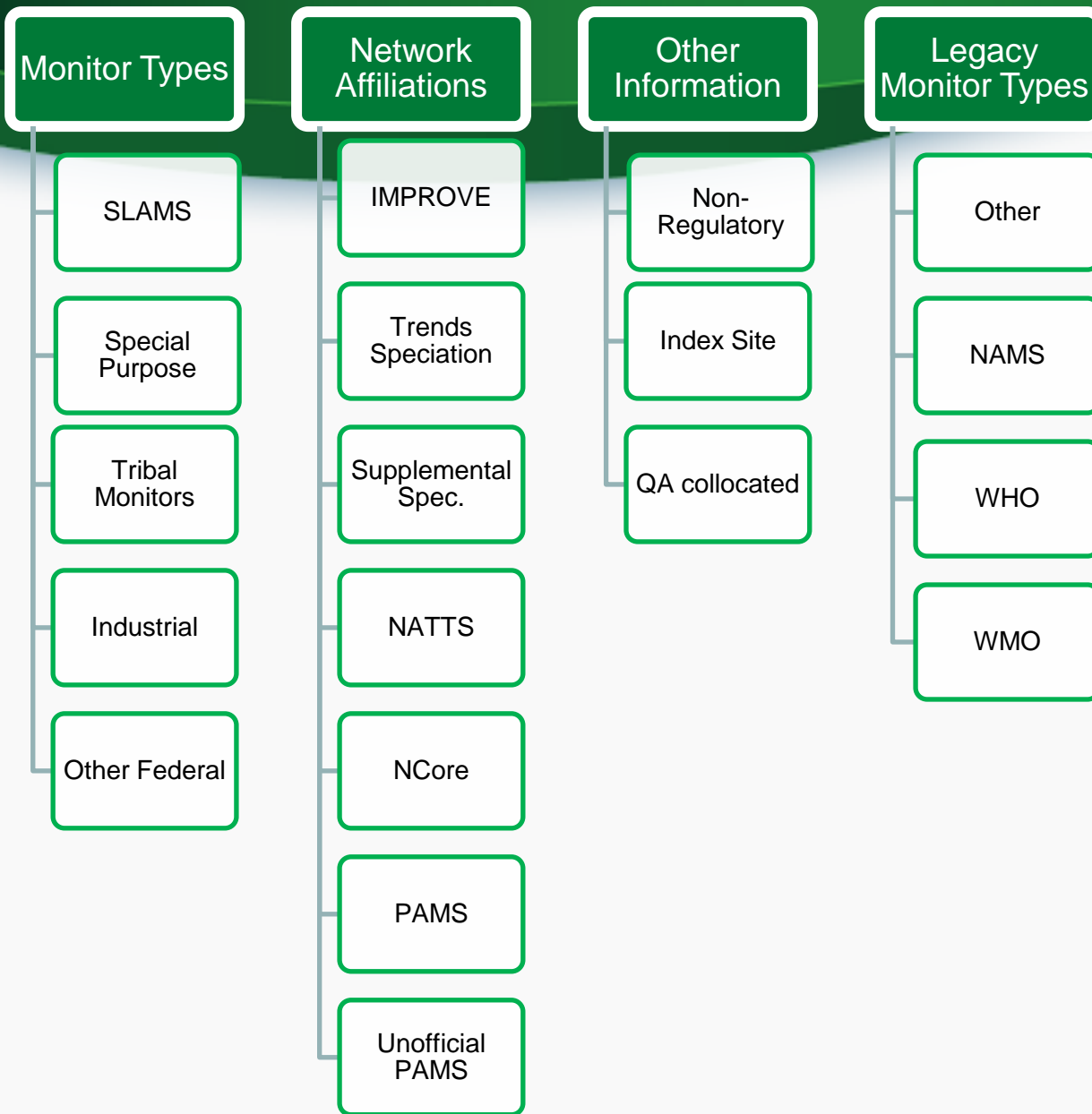
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Recommendations we have discussed with the AQS team

- Allowing easier identification of method in daily and annual summary reports
- Making better use of the “Parameter Classification” table – e.g., for CSN, IMPROVE, NATTS
- Migrating “Monitor Type” back to its original definition (the administrative classification of the monitor) (e.g., SLAMS, SPM, Tribal, Industrial)
- Discontinue use of “QA Collocated” with Monitor Type; use “Monitor Objective” to describe these instead.
- Having a different field available to identify the technical network a monitor is associated with. This is the other part of how “Monitor Type” is used now. (e.g., IMPROVE, NCore, NATTS)
- Deleting “Collection Frequency Description” since this is somewhat redundant with “Required Collection Frequency Code”.
 - May delete “Required” from above for use with other pollutants.



Monitor Type is defined as the Administrative Classification of the monitor

The first three columns are currently available as a “Monitor Type”



Current Status of Monitor Type Reporting to AQS for Filter-based PM_{2.5} FRM/FEM monitors

Monitor Type	Monitor Types Associated with a Filter-based PM _{2.5} FRM/FEM monitor
SLAMS	766
Special Purpose	99
Tribal Monitors	18
Industrial	2
NCore	60
QA Collocated	58
Non-Regulatory	11
Other	67
Individual Number of stations Reporting	872

Monitor Type is required and it can be populated multiple times.



Measurement Scales for PM_{2.5} Sites Reporting a filter-based FRM/FEM to AQS

Measurement Scale
is not currently
required.

Measurement Scale	Area represented	Number of Filter-Based PM _{2.5} Monitors in each scale Reporting to AQS
Microscale	Up to 100 meters	4
Middle Scale	100 meters to 0.5 kilometers	23
Neighborhood	0.5 to 4.0 kilometers	585
Urban Scale	4 to 50 kilometers	108
Regional Scale	Tens to hundreds of kilometers	59
Null		93
Totals		872



Monitoring Objectives for PM_{2.5} Sites Reporting a filter-based FRM/FEM to AQS

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

Monitoring Objective	Number of Filter-Based PM _{2.5} Monitors Reporting to AQS
Upwind Background	13
General Background	60
Regional Transport	44
Population Exposure	747
Highest Concentration	80
Source Oriented	25
Max Precursor Emissions Impact	3
Max Ozone Concentration	1
Extreme Downwind	2
Welfare related impacts	3
Other	34
Unknown	10
Quality Assurance	15
Totals at 872 stations	1037



Common Site Level Fields – That are Generally in Good Shape

Field	Required in AQS?	Example	Recommendations
EPA Region Code	Yes	01	None
State Name	Yes	Maine	
City Name	?	Portland	
Site ID	Yes	23-001-0010	

Note: Envirofacts validates State and County Code based on what is submitted for the coordinates; also loads several other associated fields (e.g., census track)



Common Site Level Fields – That Need Attention:

Field	Required in AQS?	Example	Recommendations
Local Site Name	No	Queens College 2	Recommend having this populated with a conventional name for the site. This makes it easier when discussing data with stakeholders. AIRNow does have site names. At this point we are not recommending making this mandatory for AQS. Should we?
Latitude and Longitude	Yes	40.736140, -73.821530	Set to Latitude and Longitude to the EPA Standard for horizontal datum - WGS84 . Many but not all sites have migrated to this datum. See 8/28/07 Memo - Procedure to populate Standard Coordinates on AQS memo web page at: http://www.epa.gov/ttn/airs/airsaqs/memos/
Street Address	No	Queens College 65-30 Kissena Blvd Parking Lot#6	Should field be required? At a minimum recommend populating field with address from annual monitoring network plans



Common Monitor Level Fields – That are Generally in Good Shape:

Field	Required in AQS?	Example	Recommendations
Parameter code and Parameter description	Yes	44201 & Ozone	Already required when setting up a monitor. A few agencies may need help on the use of the multiple PM _{2.5} parameter codes.
Monitor Type Begin Date	Yes	Jan 01, 2011	



Common Monitor Level Fields – that Need Attention:

Field	Required in AQS?	Example	Recommendation(s)
Monitor Type	Yes	SLAMS	Realign field so that only one “Monitor Type” can be loaded per monitor. Move technical aspects of existing monitor types to another field
Measurement Scale	No	Neighborhood	Recommend requiring this field for criteria pollutants. Should it be required for any other measurements?
Monitoring Objective	Yes	Population Exposure	Establish consensus on use of available fields.
Parameter Type	No	Gaseous	EPA should group common measurements for programs such as NATTS



Summary of Recommendations for EPA to work on:

- Monitor Type - Realign field so that only one “Monitor Type” can be loaded per monitor. Move technical aspects of existing monitor types to another field
- Require Measurement Scale for criteria pollutants
- Discontinue use of “QA Collocated” as a monitor type
- Provide examples of most common Monitoring Objectives by pollutant
- Communicate these and other changes; at a minimum communicate at AQS conference
- Other?



Summary of Recommendations for Monitoring Agencies to Work on:

- Populate Local Site Name
- Align Latitude and Longitude with EPA standard datum (WGS84)
- Populate street address in AQS from annual monitoring network plans
- Populate spatial scale of representation for criteria pollutants
- Align monitoring objectives across agency network
- Other?



Other AQS Reporting that Appears to Need Improvement:

- 5-minute SO₂ Reporting
- Reporting of additional parameters with PM_{2.5}
 - Ambient Temperature
 - Barometric Pressure
 - Field Blanks
- PM_{10-2.5} at NCore is to be reported as 86101.
- Use of “Resultant Wind Speed” and “Resultant Wind Direction” instead of Scalar.