



2018 MARAMA Air Quality Monitoring Training Workshop

December 6, 2018
Omni Hotel, Charlottesville VA

Tom Wolf, Governor

Patrick McDonnell, Secretary

Overview

- How I Got Here
- The Hole
- DIY Shovel Design
- The TAD
- What's Next

How I Got Here

- Start with Air Quality: February 2016
 - Wastewater Treatment Plant Effluent Data
 - Radiation Measurements
 - Private Environmental Labs

What I Found

- The Hole
 - Data Backlog
 - VOCs, Carbonyls, Toxic Metals
- The Shovel
 - Updated QA/QC protocol

What I Found- PA DEP Toxic Sites



PM10 Toxic Metals- 9 Monitors

What I Found- PA DEP Toxic Sites



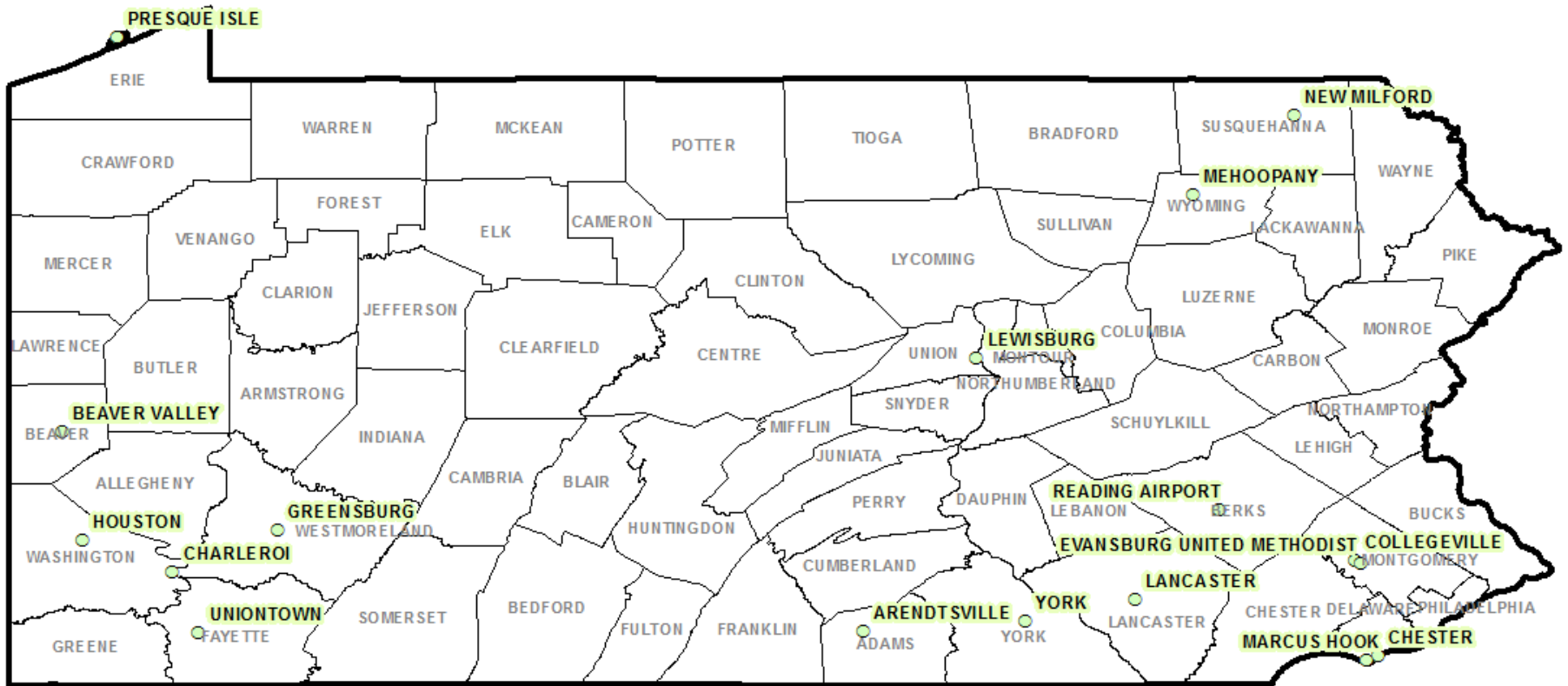
TSP Toxic Metals- 3 Monitors

What I Found- PA DEP Toxic Sites



Carbonyls- 5 Monitors

What I Found- PA DEP Toxic Sites



VOCs- 17 Monitors

What I Found- PA DEP Toxic Sites

- PA Monitoring Network Toxic Sites
 - Toxic Metals (PM10/TSP)
 - 12 Sites
 - Carbonyls
 - 5 Sites
 - VOCs
 - 17 Sites and 1 more on the way

What I Found- Extent of the Hole

- Samples per year
 - Toxic Metals = 732
 - Carbonyls = 780
 - VOCs = 1,097
- Records per year
 - Toxic Metals = $732 \times 9 = 6,588$
 - Carbonyls = $780 \times 8 = 6,240$
 - VOCs = $1,097 \times 56 = 61,432$

“You gotta build your own shovel”

- Technical Assistance Document for the National Air Toxics Trends Stations Program, Revision 3
 - October 2016
 - MDLs, Toxic Metals, Carbonyls, VOCs

No NATTS for You

- Technically, PA DEP does not “do” NATTS
 - Just Guidelines
 - PA DEP Bureau of Labs NOT a NATTS lab
 - Nothing below MDLs
 - Does not use TO-11a

Building the Shovel

- TAD Layout
 - Analytical Method
 - Overview
 - Sample collection
 - Sampler/media information
 - Sample prep
 - Instrument calibration
 - Lab QC samples
 - Data review

Building the Shovel

- Section 7.0: Data Validation Tables
 - Categorizes by Critical, MQO, Operational, and Practical requirements
 - Ex:

7.1 VOCs via EPA Compendium Method TO-15

Parameter	Description and Required Frequency	Acceptance Criteria	Reference	Category
<i>Field Readiness Checks and Collection Activities</i>				
Canister Cleaning Batch Blank	Minimally one canister selected for analysis from a given batch of clean canisters to ensure acceptable background levels in the batch of cleaned canisters - must represent no more than 10 canisters	Each target VOC's concentration < 3x MDL or 0.2 ppb, whichever is lower	Section 4.2.6.2.4 TO-15 Section 8.4.1.6	Critical
Canister Viability	All canisters	Canister must be used within 30 days from final evacuation	Section 4.2.6.2 TO-15 Section 1.3	Operational

Building the Shovel

- Breaking it Down
 - By Analysis
 - Toxic Metals
 - Carbonyls
 - VOCs
 - By Responsibility
 - Field Staff
 - Lab Staff
 - QA Staff

Building the Shovel

Show me the spreadsheets!

Building the Shovel

Example:

Parameter	TAD Requirement	Frequency	Acceptance Criteria
<i>Clock Check</i>	Digital Clock	Each sample	± 5 min
	Mechanical Timer	Each sample	± 15 min
	Set to local standard time	Each sample	Yes or No

Example:

Parameter	TAD Requirement	Frequency	Acceptance Criteria	
			Mass (m/z)	Ion Abundance Criteria *
<i>BFB Tune Check</i>	For Quadrapole MS only. 50 ng BFB injected to verify tune of MS detector	Prior to ICAL and every 24 hours of analysis after	50	8.0 to 40.0% of m/z 95
			75	30.0 to 66.0% of m/z 95
			95	Base peak, 100% relative abundance
			96	5.0 to 9.0% of m/z 95 (see note)
			173	Less than 2.0% of m/z 174
			174	50.0 to 120.0% of m/z 95
			175	4.0 to 9.0% of m/z 174
			176	93.0 to 101.0% of m/z 174
			177	5.0 to 9.0% of m/z 176

Building the Shovel

Examples:

Parameter	TAD Requirement	Frequency	Acceptance Criteria	Operations/Lab Responses	Chris's Comments
Retention Time (RT)	Check the retention time of each target analyte and internal standard for all qualitatively identified compounds and internal standards	Each sample	Each target RRT \pm 0.06 RRT units of the mean ICAL RRT	As defined by our SOP; the retention time control limit for target compounds is 0.1 minutes of the calibration standard. This would equate to a RRT of 0.03 for Propene, the earliest eluter. The 4 ketones are allowed a higher variance of 0.5 minutes. For Acetone, the earliest eluting Ketone, this would equate to an RRT of 0.1	The BoL criteria is actually more stringent than EPA's.
			Each IS RT \pm 0.33 minutes of the mean ICAL RT		

Parameter	TAD Requirement	Frequency	Acceptance Criteria	Operations/Lab Responses	Chris's Comments
Initial Calibration	A minimum of five standards ranging from approx. 0.1 to 5 ppb.	Initially and at least every three months thereafter. After a failed Tune Check, failed CCV, or when changes to the instrument affect calibration	Average RRF \leq 30% RSD and each calibration level \pm 30% of nominal	We run a 16-point calibration curve ranging from 0.1 to 10 ppb. The minimum allowable number of curve points is 5 for an average fit, 6 for a linear or quadratic regression fit. Calibrations typically last one to two weeks before recalibration is required.	What is the acceptance criteria used to determine if a curve is valid?
			Linear Regression , $r \geq 0.995$ and each calibration level \pm 30% of nominal		

Building the Shovel

- Current Lab Procedures
- Clarifications/Questions
- Face-to-face meeting
- Regular follow-ups

Building the Shovel

Example:

VOCs		
Parameter	Status	Implementation
<i>Initial Calibration</i>	Yes	Done
<i>Secondary Source Calibration Verification (SSCV)</i>	Yes	Done
<i>Continuing Calibration Verification (CCV)</i>	Yes	Done
<i>Internal Standards (IS)</i>	Yes	Done
<i>Precursor Leak Check</i>	Yes	Done
<i>Method Blank (MB)</i>	Yes	Done
<i>Laboratory Control Sample (LCS)</i>	Yes	Done
<i>Retention Time (RT)</i>	BoL requirements are more stringent than the TAD's.	Done
<i>Compound Identification</i>	Yes	Done
<i>Replicate Analysis</i>	Yes	Done
<i>Method Detection Limit (MDL)</i>	Each year, BoL establishes MDLs. Most of these meet the TAD requirements. BoL is aware of the MDL targets, but can't speak to how closely they will be able to meet them in 2018 using the updated MDL rule.	MDLs will be evaluated each year with the goal of attaining TAD requirements.

The Dig... So Far

- VOCs
 - 2013 through 2015
 - No 1-Bromopropane
- Toxic Metals
 - TSP 2013 through 2015

Not NATTS

- Results below the MDL
 - Should report the value with MD qualifier
 - Instead, report “0” with the ND qualifier
- Time between canister cleaning and analysis
 - Should be within 30 days of last evacuation
 - Instead, canister is good for six months
- MDLs above TAD Target MDLs

Up Next

- Carbonyls
- Shovel 2.0
- Power BI
- We'd love to hear from you!
 - What does your program do?
 - What hurdles have you jumped?
 - How do you treat values below the MDL?



Bureau of Air Quality

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