National Performance Evaluation Program (NPAP, $PM_{2.5}$-PEP, and Pb-PEP) Updates

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EPA's Office of Air Quality Planning and Standards
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NPAP: Background

- The **National Performance Audit Program** (NPAP): independently assesses monitoring agencies' proficiency in operating criteria gas monitors (O_3, SO_2, NO_2, and CO).
- Primary purpose: provides a national independent assessment of performance while maintaining a consistent level of data quality.
- Regulations detailed in 40 CFR Part 58 App. A Sect. 2.4 and 3.1.3.
- Each PQAO must have 20% of sites audited per year and 100% every 6 years.
- All 10 Regions and 1 PQAO (TCEQ) perform Federal NPAPs.
- Visit EPA's NPAP AMTIC page for program info and QA documentation.

NPAP: Background

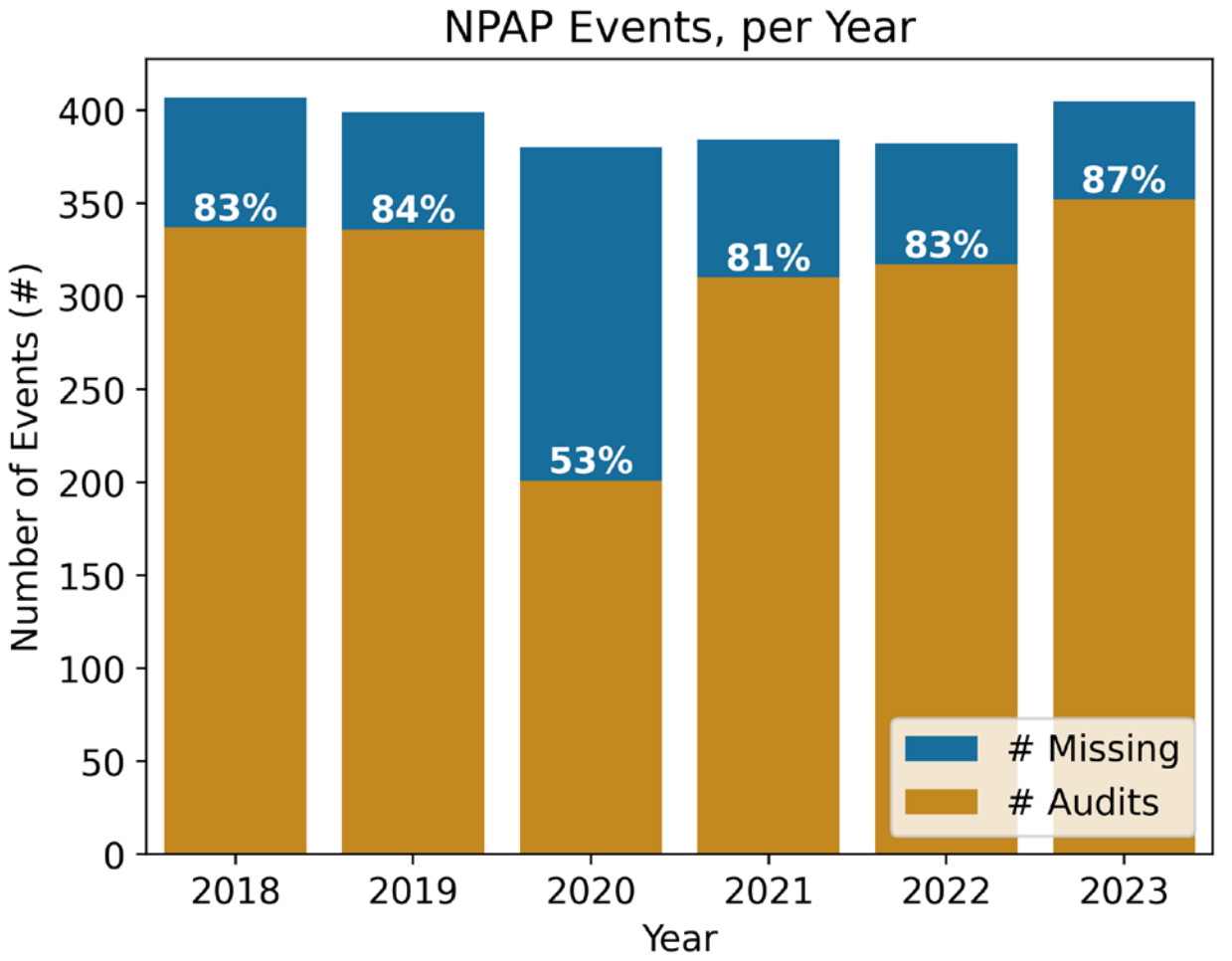
NPAP audits involve:

- NPAP Field Scientist traveling to monitoring site with a 'mobile lab'
- Delivers PE/audit gas to analyzers
- Gas samples delivered directly to the inlet probe (TTP)
- Analyzers are challenged at multiple concentrations (at least 3)
- Analyzer result compared against challenge gas to evaluate performance

Audit Level	Concentration Ranges (ppm)			
	O_3	SO_2	NO_2	CO
1	0.0040 - 0.0059	0.0003 - 0.0029	0.0003 - 0.0029	0.020 - 0.059
2	0.0060 - 0.019	0.0030 - 0.0049	0.0030 - 0.0049	0.060 - 0.199
3	0.020 - 0.039	0.0050 - 0.0079	0.0050 - 0.0079	0.200 - 0.899
4	0.040 - 0.069	0.0080 - 0.0199	0.0080 - 0.0199	0.900 - 2.999
5	0.070 - 0.089	0.0200 - 0.0499	0.0200 - 0.0499	3.000 - 7.999
6	0.090 - 0.119	0.0500 - 0.0999	0.0500 - 0.0999	8.000 - 15.99
7	0.120 - 0.139	0.1000 - 0.1499	0.1000 - 0.2999	16.00 - 30.99
8	0.140 - 0.169	0.1500 - 0.2599	0.3000 - 0.4999	31.00 - 39.99
9	0.170 - 0.189	0.2600 - 0.7999	0.5000 - 0.7999	40.00 - 49.99
10	0.190 - 0.259	0.8000 - 1.000	0.8000 - 1.000	50.00 - 60.00

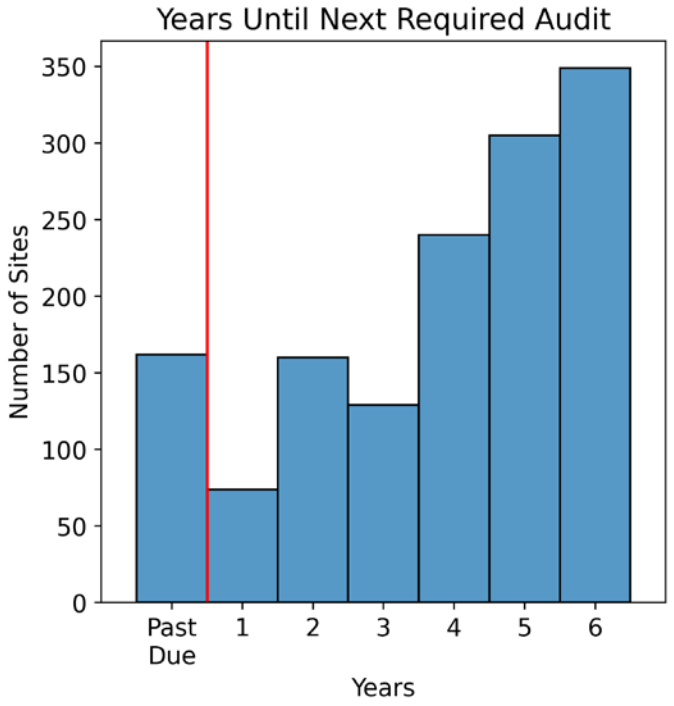
NPAP: Work Completed from 2018-2023

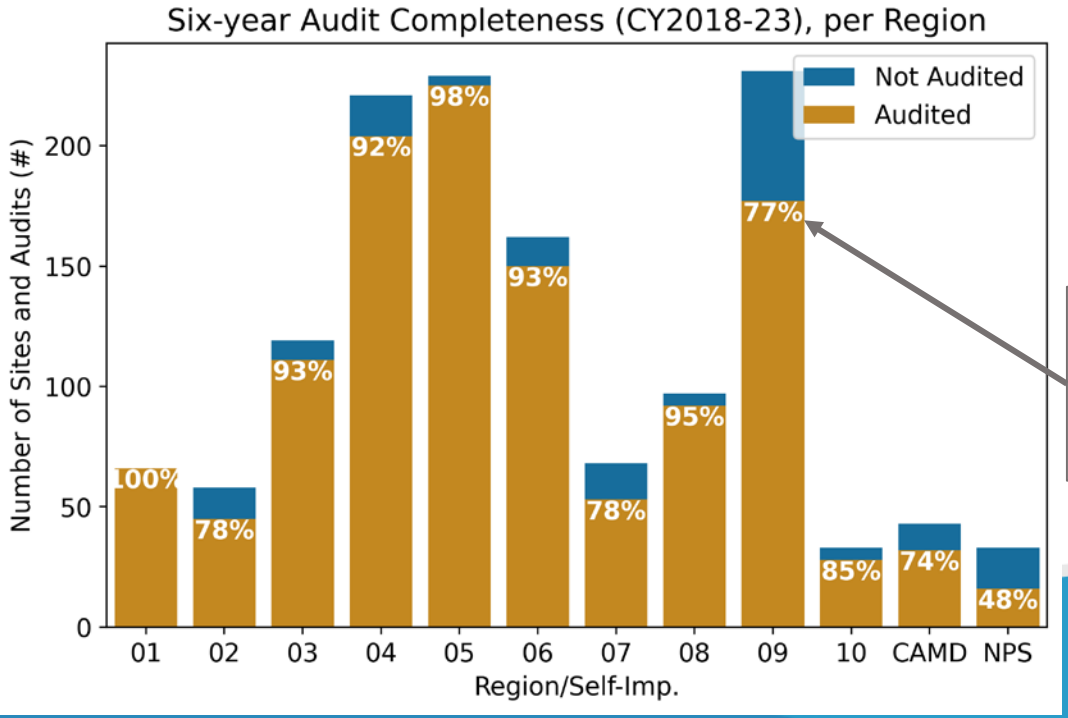
- Nationally and per year:
  - ~110 active PQAOs
  - ~1500 active monitoring sites
  - ~400 NPAP audits required
- Excluding COVID-impacted CY2020:
  - More than 300 audits completed each year
  - >80% required audits performed
- CY2023 shows highest audit completeness over last 6 years



NPAP: Work Completed from 2018-2023

- Six-year goal:
  - As of CY2023, a total of 1,364 monitoring sites were active nationally in each year since CY2018.
  - Of these, 1,203 (88%) were audited at least once and 161 (12%) were not audited over the 6-year period.

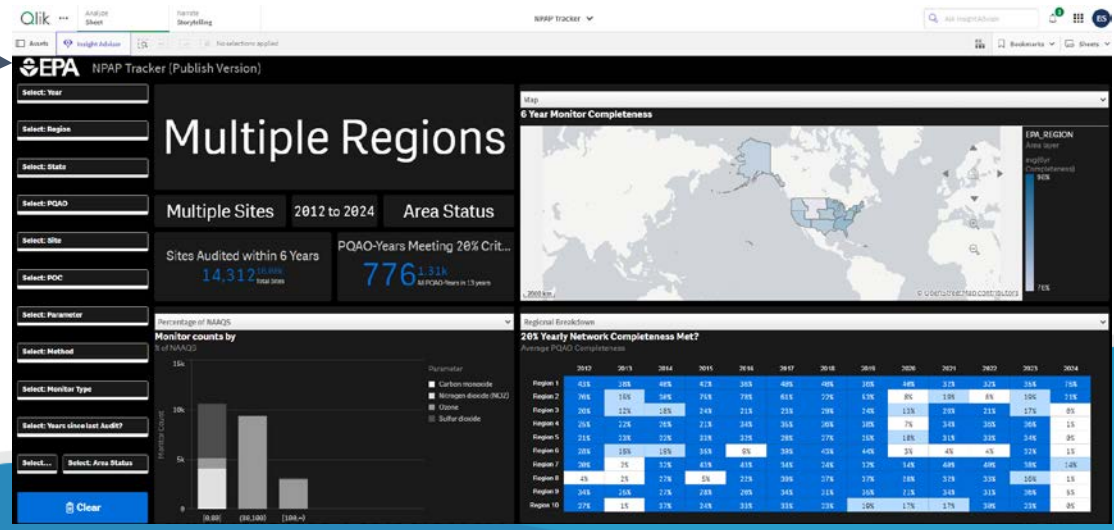




Percentage of sites meeting 6-year goal.

NPAP: Improvements and Updates

- Recent regulation changes impacting program:
  - Part 58 App A. Section 3.1.3.3 requiring annual verification of NPAP tank gases to allow ORD verification frequencies – added flexibility where the science supports it.
  - Part 58 App. E: Broadened list of acceptable probe materials for reactive gases
- Introducing flow-based audits (details in later presentation)
- NPAP Qlik App released
- TSAs of the Regional programs started in CY2023; all to be audited by CY2026
- Continuing National NPAP auditor training – hands-on focus



The PEPs ($PM_{2.5}$ & Pb): Background

- The **Performance Evaluation Programs** (PEPs):
  - Independent assessment of NAAQS $PM_{2.5}$ & Pb monitors.
  - Primary purpose: estimate total measurement system bias.
- Regulations detailed in 40 CFR Part 58 App. A Sect. 2.4, 3.2.4, and 3.2.7.
- Annually, each PQAO must complete:
  - 5 valid PEP events if operating ≤ 5 sites
  - 8 valid PEP events if operating > 5 sites
- $PM_{2.5}$-PEP only: All sites audited every 6 years.
- Pb-PEP only: Two event types
- Visit EPA's $PM_{2.5}$-PEP and Pb-PEP AMTIC pages for program info and QA documentation.

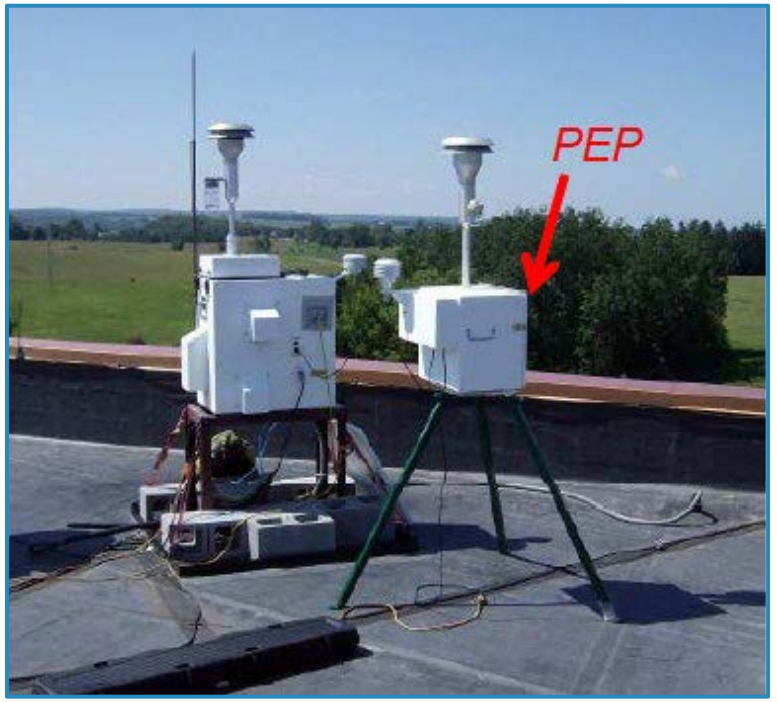
Required Pb-PEP, per PQAO/year/type

# Active Sites	EPA Ind.	SLT Coll.
≤ 5	1	4
> 5	2	6

The PEPs ($PM_{2.5}$ & Pb): Background

PEP sampling events involve:

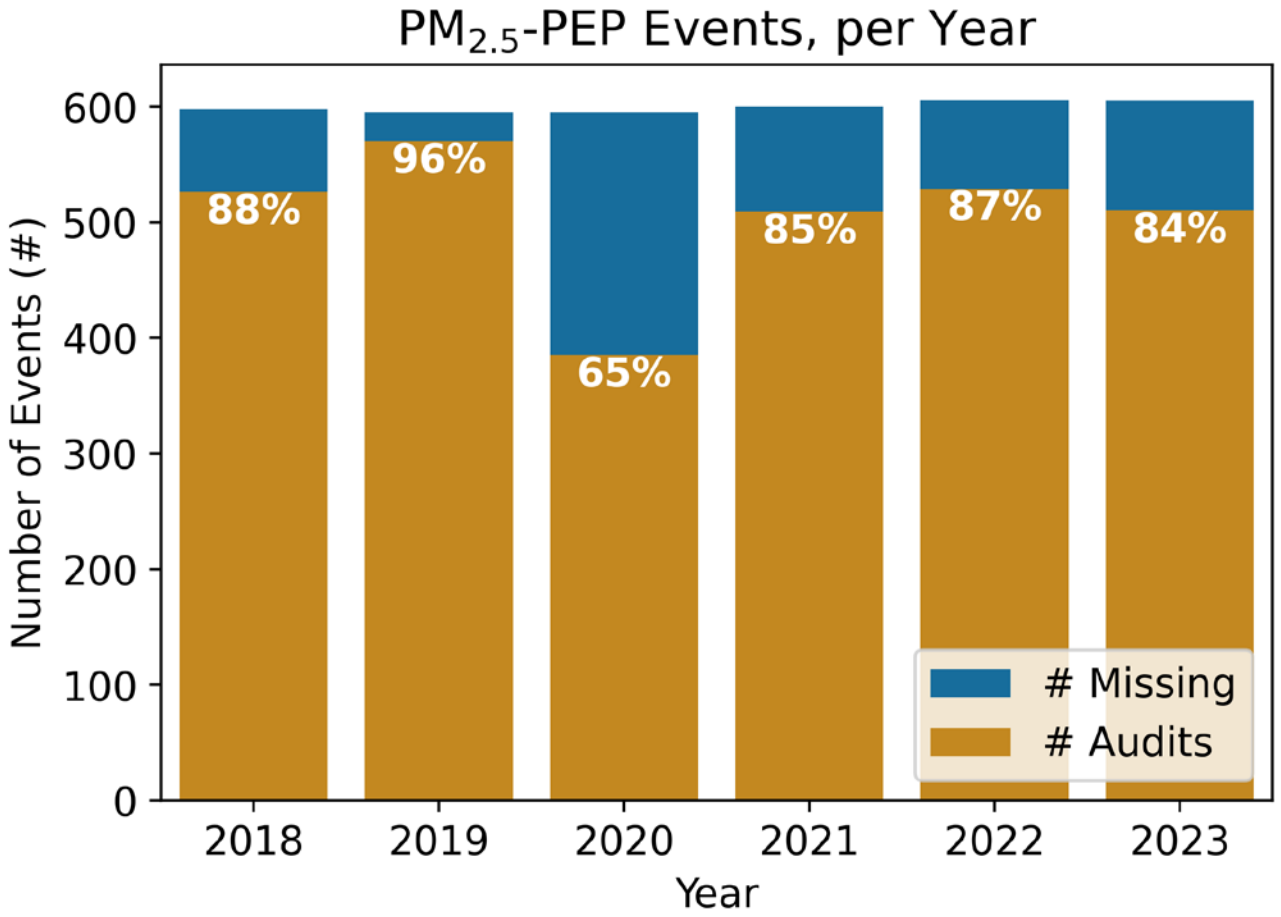
- PEP Field Scientist collocates* a portable FRM** with site's primary monitor.
  - For SLT Collocated Pb-PEP events, permanently collocated/SLT operated monitors are utilized and operated by SLT QA staff.
- Both monitors simultaneously sample for 24 hours.
- PEP filter analyzed by National PEP laboratories
  - R4 lab for $PM_{2.5}$-PEP; R9 lab for Pb-PEP
- Routine network sample weighed/analyzed under normal protocol.
- Concentrations are compared and included in aggregated bias assessment.



* Following Part 58, Appendix A, Section 3.2.3
** $PM_{2.5}$-PEP samplers: BGI PQ200s
** Pb-PEP samplers: Tisch TE-5170 HiVols

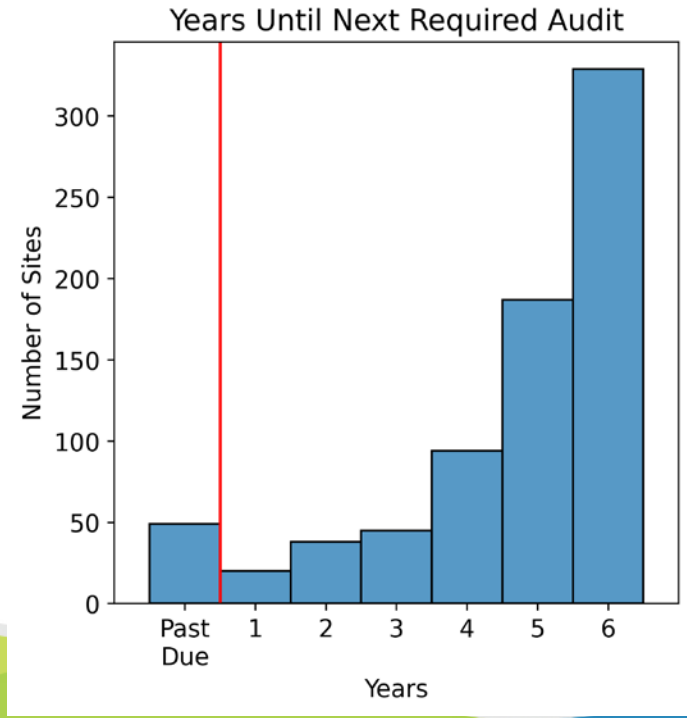
$PM_{2.5}$-PEP: Work Completed from 2018-2023

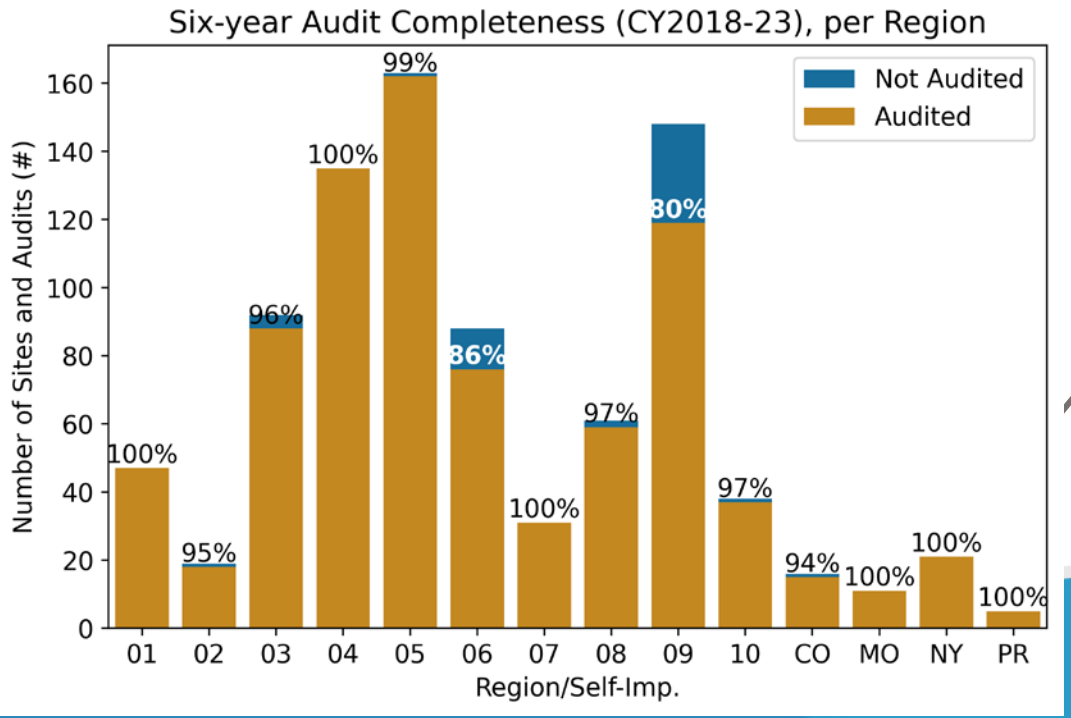
- Nationally and per year:
  - 86-88 active PQAOs
  - ~950 active monitoring sites
  - ~600 $PM_{2.5}$-PEP events required
- Excluding COVID-impacted CY2020:
  - More than 500 audits completed each year
  - 84-96% required audits performed
  - Flood in weigh lab in CY2023 impacted completeness stats



$PM_{2.5}$-PEP: Work Completed from 2018-2023

- Six-year goal:
  - As of CY2023, a total of 875 monitoring sites were active nationally in each year since CY2018.
  - Of these, 824 (94%) were audited at least once and 51 (6%) were not audited over the 6-year period.

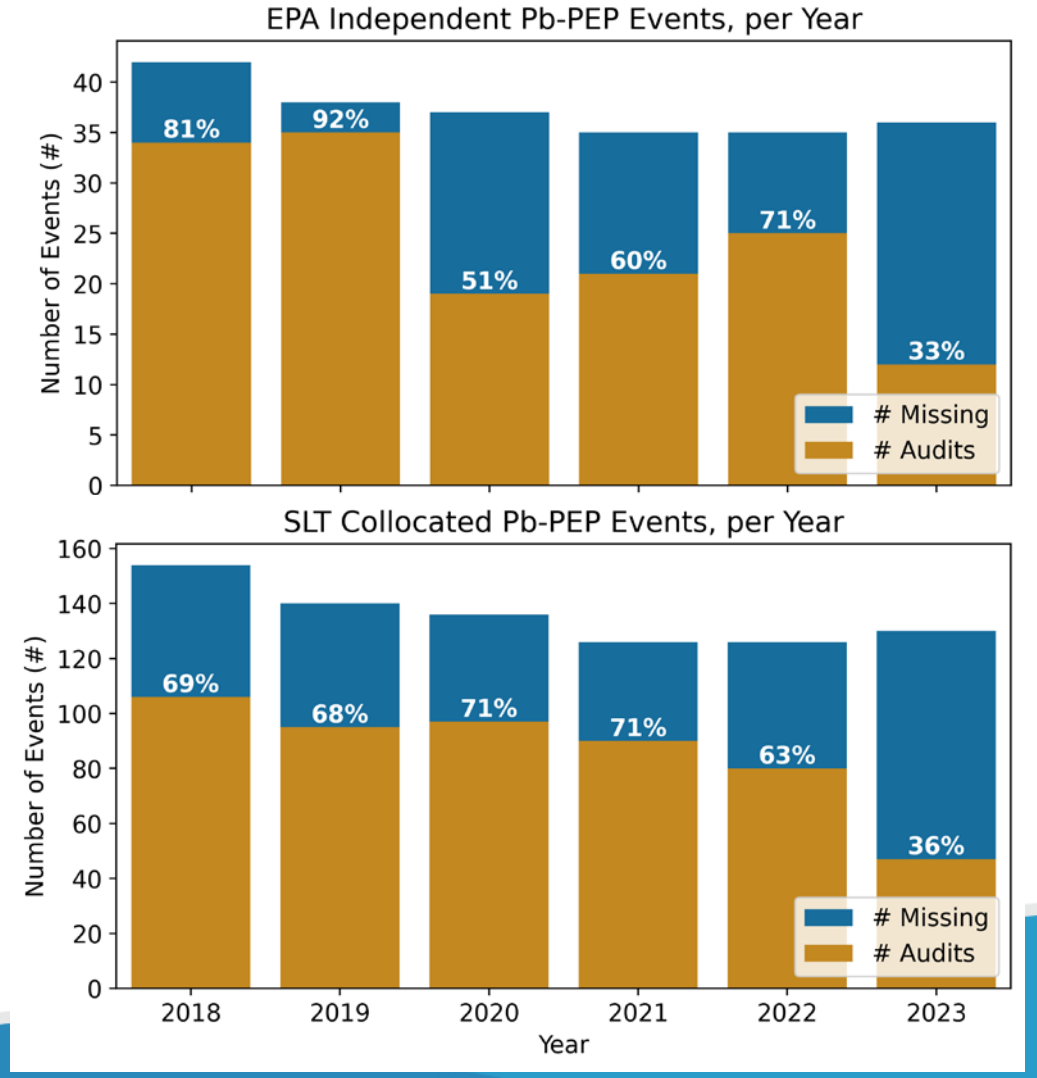




Percentage of sites meeting 6-year goal.

Pb-PEP: Work Completed from 2018-2023

- Nationally and per year:
  - 28-35 active PQAOs
  - ~115 active monitoring sites
  - ~170 Pb-PEP events required
    - ~35 EPA Independent
    - ~135 SLT Collocated
- EPA Independent completeness trending up since COVID.
- SLT Collocated completeness hovering ~70%.
- CY2023 data still being processed (reason for lower completeness)



The PEPs: Improvements/Updates

- Recent regulation changes (Part 58 App. A) affecting $PM_{2.5}$-PEP:
  - Minimum 'valid' concentration for bias assessment down from 3 µg/m³ to 2 µg/m³.
  - Bias calculation updated to better evaluate at lower concentrations.

Old Equation

$$\frac{1}{n} \times \sum_{i=1}^{n_i} \frac{meas_i - audit_i}{audit_i} \times 100$$

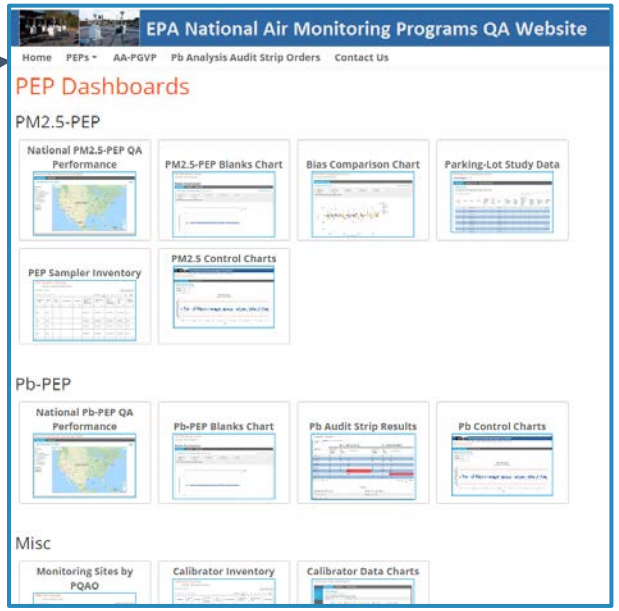
New Equation

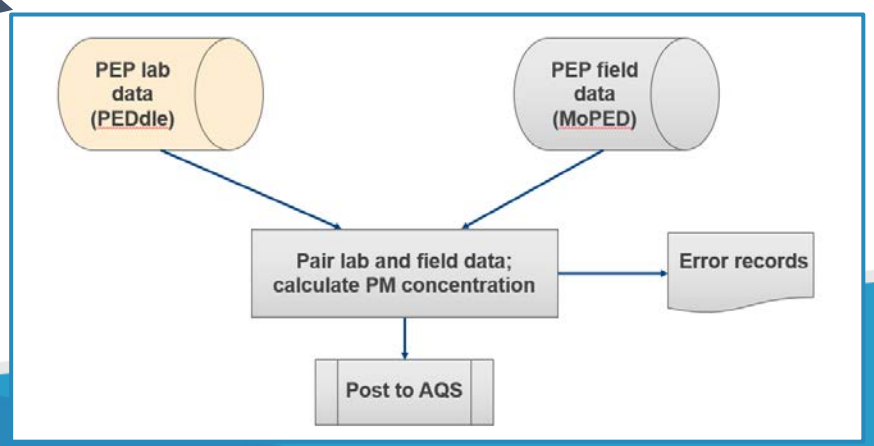
$$100 \times \frac{\sum_{i=1}^{n} \frac{meas_i - audit_i}{\sqrt{audit_i}}}{n\sqrt{NAAQS\ Conc}}$$

- Pb-PEP Analytical lab transitioned from EPA R4 to R9 in mid-2024.

The PEPs: Improvements/Updates

- AirQA website updates/improvements
  - EPA's central online resource for acquiring, processing, and posting QA data generated within the PEPs.
  - Facilitates PEP data upload to AQS
- On the horizon: Updated database management system to process both lab and field data.
- TSAs of the Regional programs started in CY2023; all to be audited by CY2026





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