

A Description of the PM_{2.5} Monitoring Network Performance Evaluation Program (PEP) and Findings for 2004-2007

2008 Conference on Managing Environmental Quality Systems

April 23, 2008

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Dennis Crumpler, *US EPA OAQPS, AQAD, RTP, NC*

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Problem

- There's no easy way of determining the "truth" of PM_{2.5} measurements
- A standard for PM does not exist

Solution

- EPA developed a measurement method called the PM_{2.5} Performance Evaluation Program (PEP)

The PEP (PM_{2.5} Performance Evaluation Program)

- Network of approximately 40 active (BGI PQ200) samplers
- 10 field scientists
- 4 lab support/QA staff in Region 4
- 10 Regional task order managers/technical contacts
- Now 4 States and 1 Tribal organization have joined the program

PEP Method

- **Collocate** an audit sampler **beside a FRM/FEM** sampler

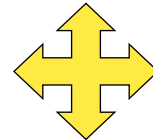


- Provides **independent assessment** of **network sampler bias**
- Can also provide **independent audit** of State/local/Tribal FRM measurements

PEP Requirements for each PQAQO as of January 2007

- 15% of all sites audited per year; all sites in 6 years
- If 5 sites or less, then 5 audits per year
- If >5 sites, then 8 audits per year
- At least one of each “type” audited each year

QA for a QA Program

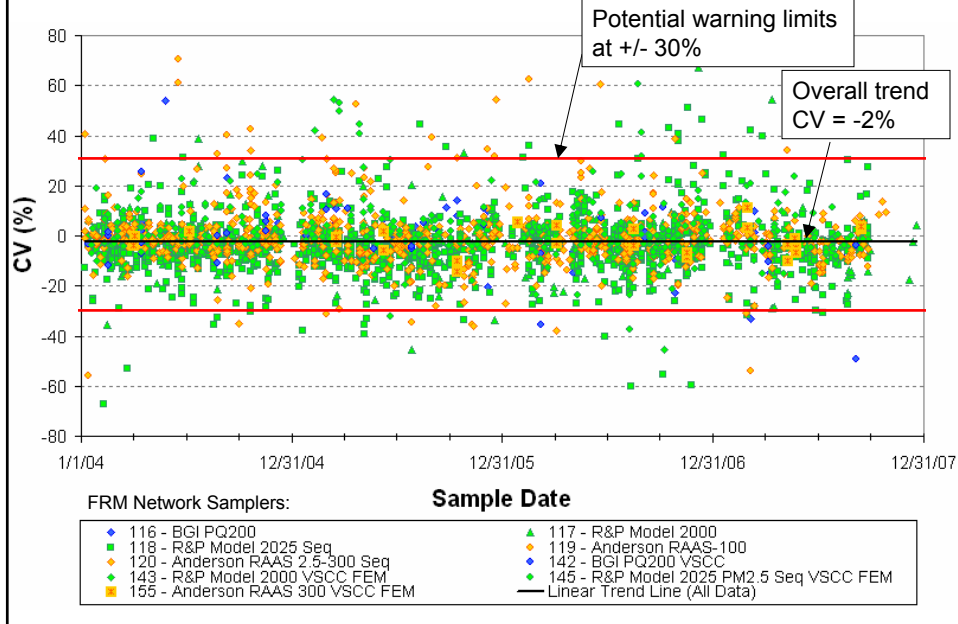


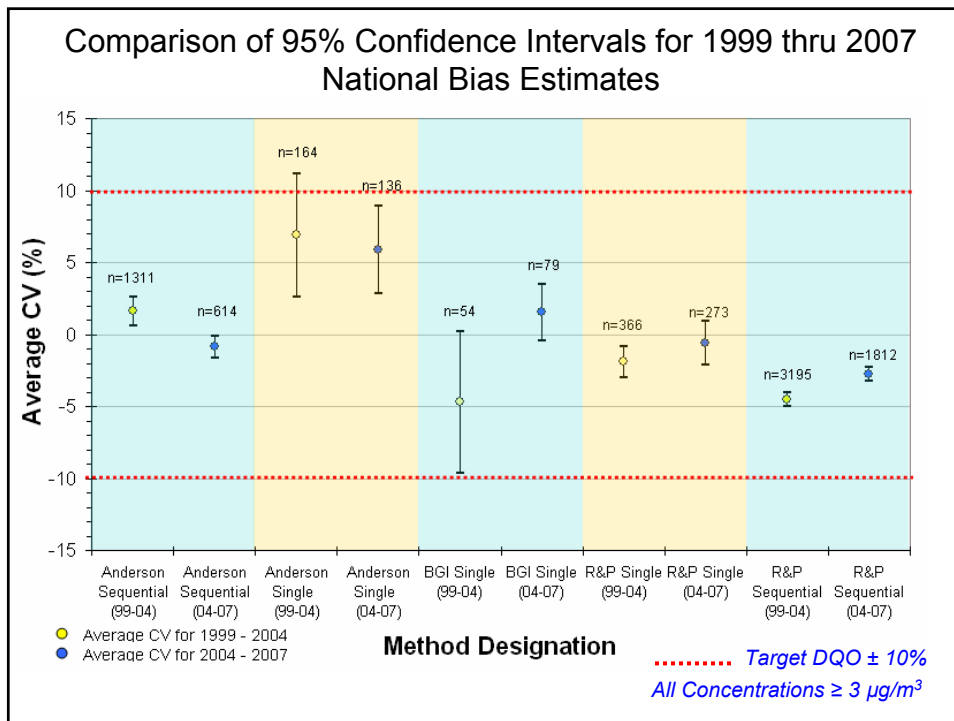
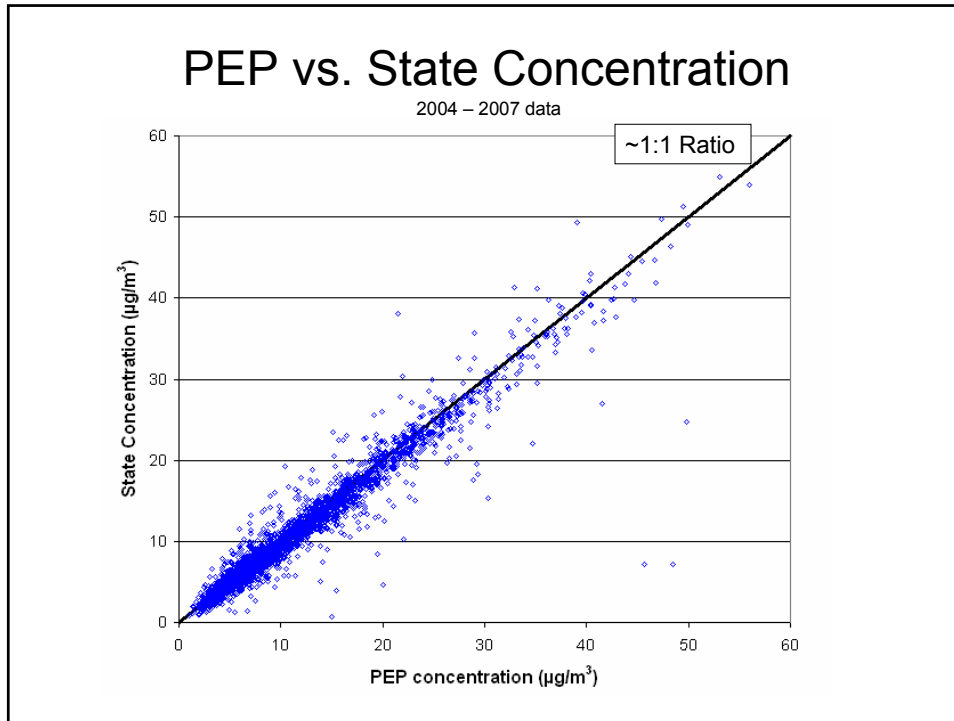
- PEP is considered a “GOLD Standard” QA program therefore...
- We are also subject to a QA program
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 - Have a detailed Level 1 QAPP
 - Utilize extensive SOPs for Field and Lab
 - Generate and monitor a substantial amount of QA data for ourselves

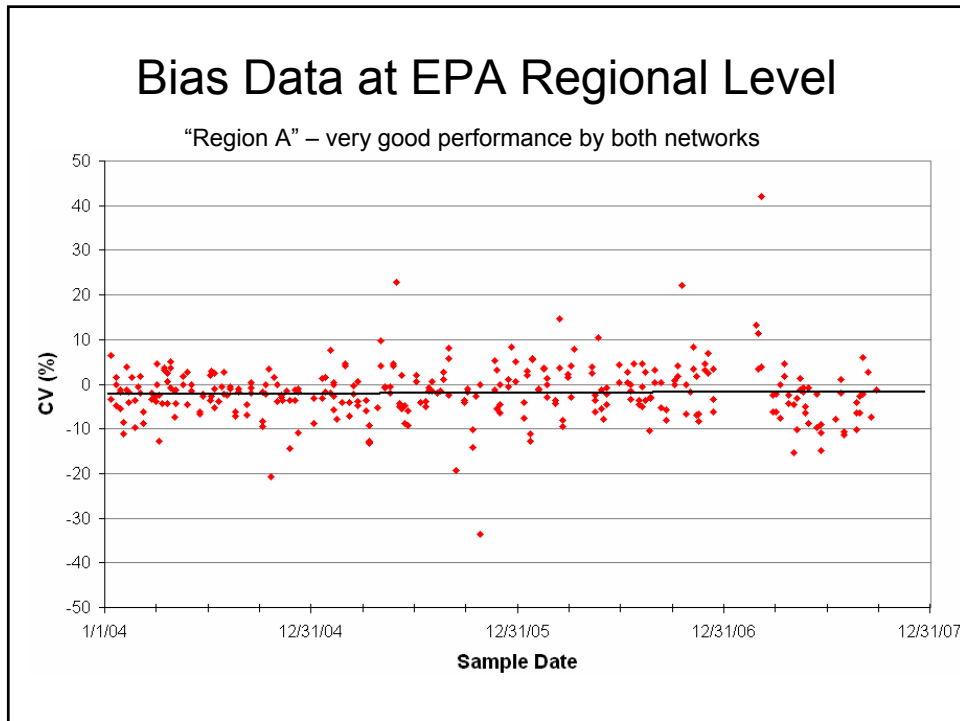
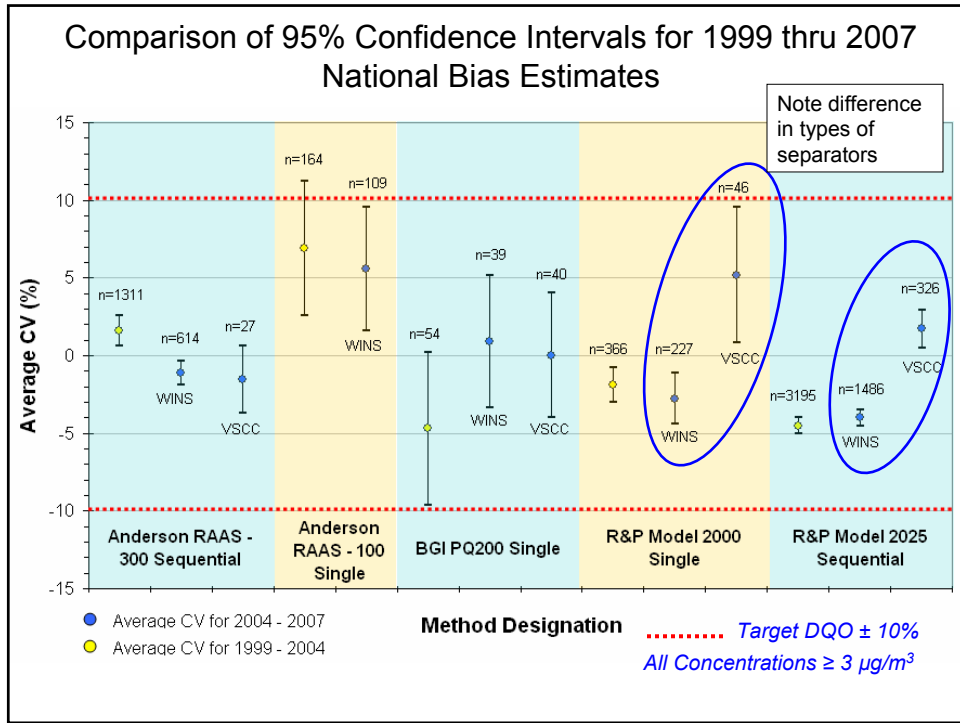
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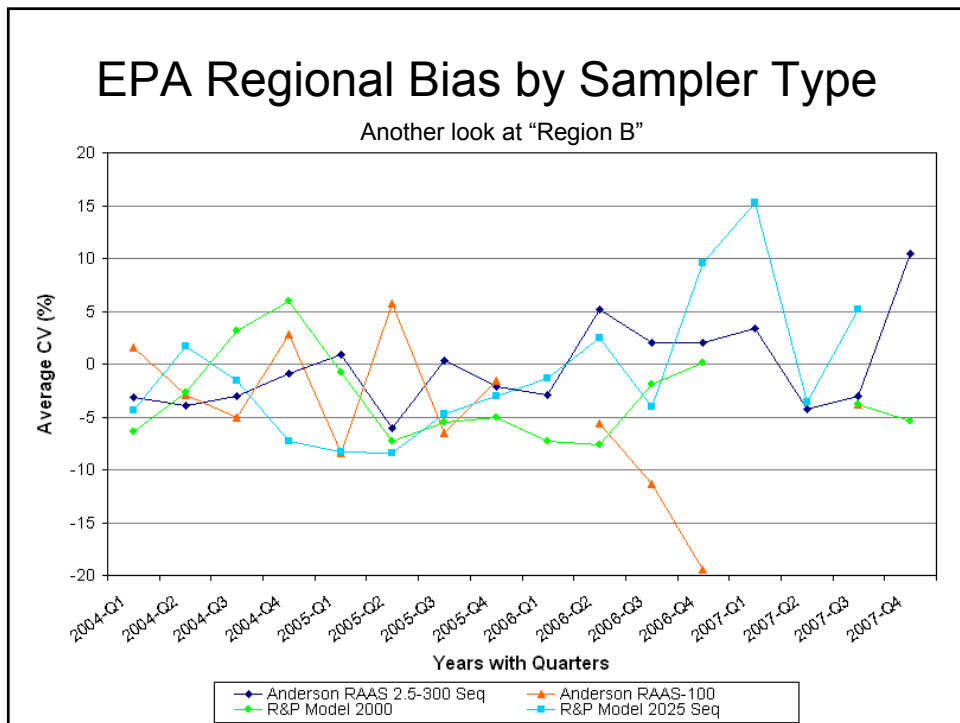
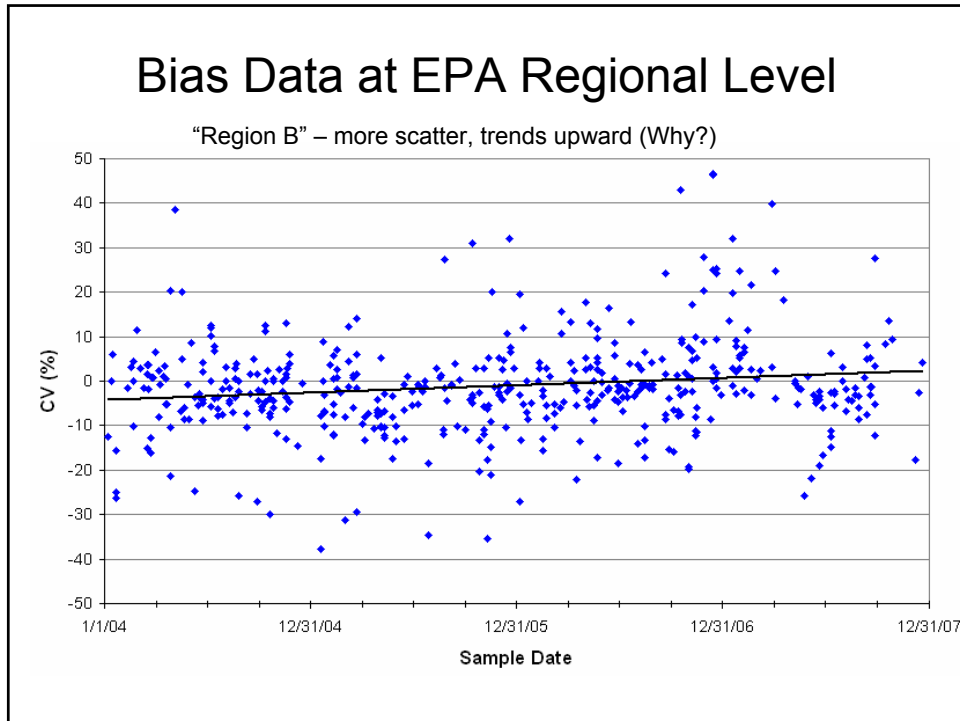
- Budget Cuts
- Revised the QAPP
- 5 State, local, or Tribal organizations have taken over their programs
- Consolidated to one Support Lab
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- Major shift in sampling strategy
- Has this deteriorated the “Gold Standard”?

PEP Look at Network Bias









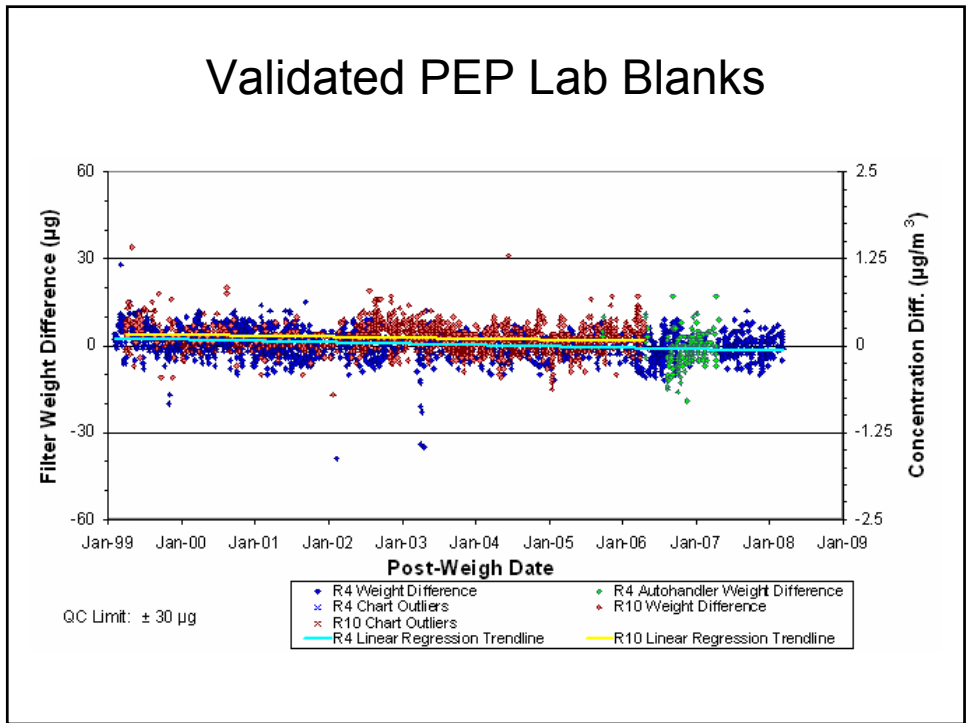
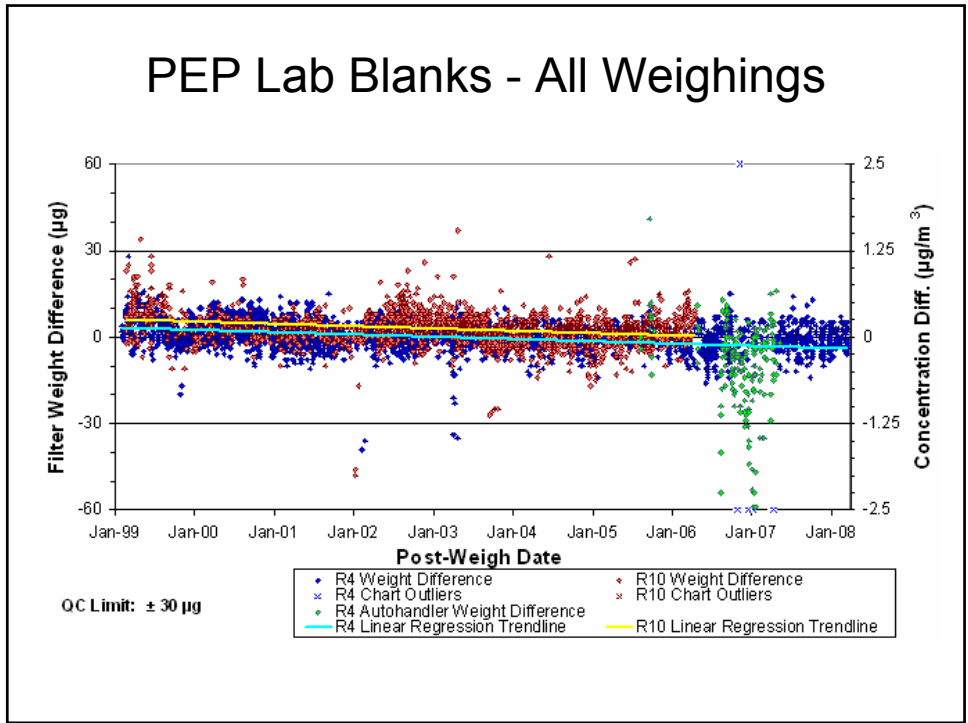
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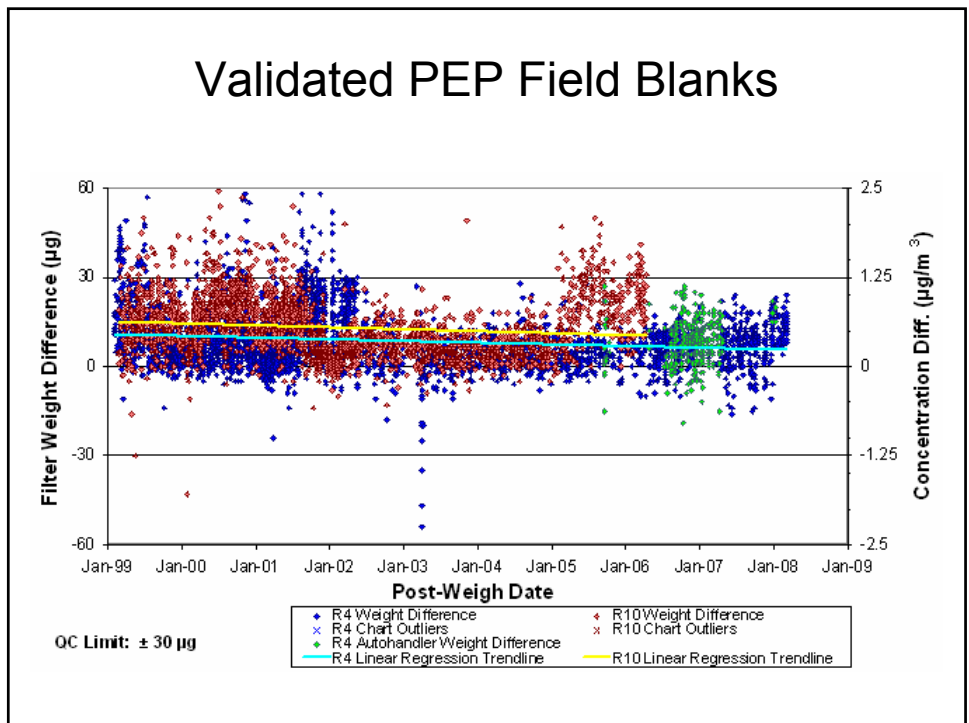
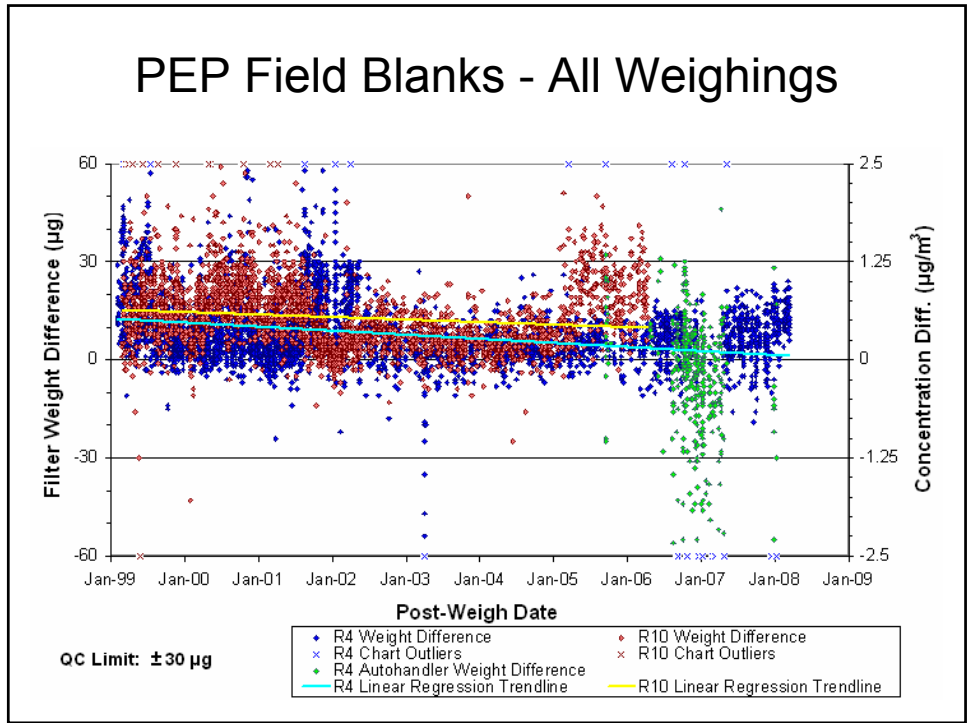
- PEP employs approximately 40 validation checks for each PE.
- Database tools were designed to automate these checks to improve speed and maintain consistency.



PEP QC Samples

- Let's take a closer look at some of the more interesting QC samples and the stories they tell:
 - Lab Blanks
 - Field Blanks
 - Collocations



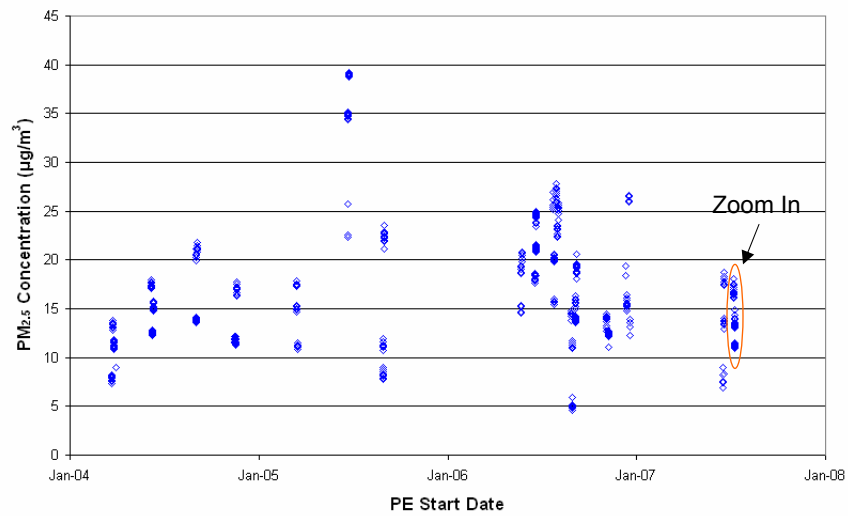


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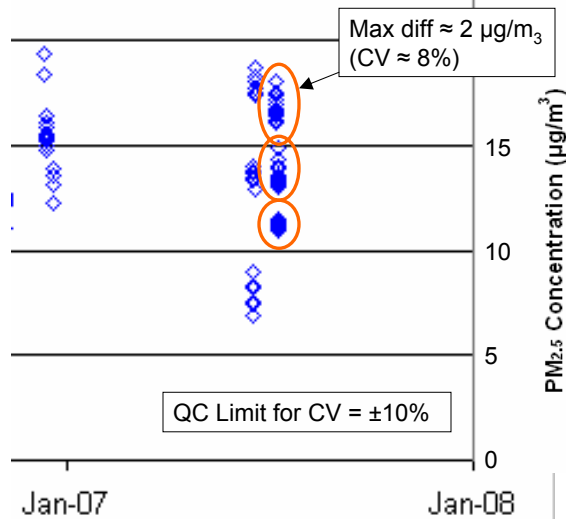


PEP Region 4 Collocations

2004 – 2007 data



This demonstrates three days of collocation, with tightly clustered data points.



Wrap Up

- Data shows that we are meeting the goals of the PEP and PM_{2.5} ambient monitoring network.
- PEP will monitor effects of change in sampling strategy.
- PEP will work to improve feedback to EPA Regions/States/PQAOs to identify and resolve issues as early as possible.

Additional Information

Why is the PEP the “Gold Standard”?

1. EPA, OAQPS conducts an initial full certification and annual recertification course for both ESAT contractors and SLT field operators. These include classroom or internet conferences and hands-on field tests.
2. The PEP utilizes rigorous QA/QC procedures:
 - Short sample recovery periods 48 vs 177 hours for FRM
 - Cold overnight shipping vs ambient for FRM
 - 15-day target for post weighing vs 30 days for FRM
 - We gather all regional and SLT samplers together twice a year to confirm uniform sampler performance and determine regional precision
 - Field operators perform leak checks, pressure, temperature, and flow verifications during each sampler setup
 - PEP audit reference standards and calibration standards are subject to annual certification against NIST traceable primary standards
 - All PEP samplers are subjected to quarterly audits either as part of the bi-annual Regional collocation or laboratory checks with independent standards.
3. The EPA Regional PEP leader conducts an annual Technical Systems Assessment of the Regional PEP contractor and SLT programs; OAQPS conducts a TSA of the Support Lab; and ORIA coordinates a semi-annual performance trial of the primary and back-up PEP support laboratories.
4. The data we derive from the PEP undergoes 2 levels of verification and 3 levels of validation before it is ready for posting in AQS. The data cannot be posted in AQS until the SLT post their routine FRM monitoring results. The Regional PEP project lead or monitoring contact is notified if any issues are identified prior to that posting. This has become particularly important in the new paradigm. 100% completeness is required and necessary to insure the bias estimates will be within desirable confidence limits. SLTs can get copies of the data as soon as they post their FRM data on AQS.
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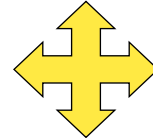


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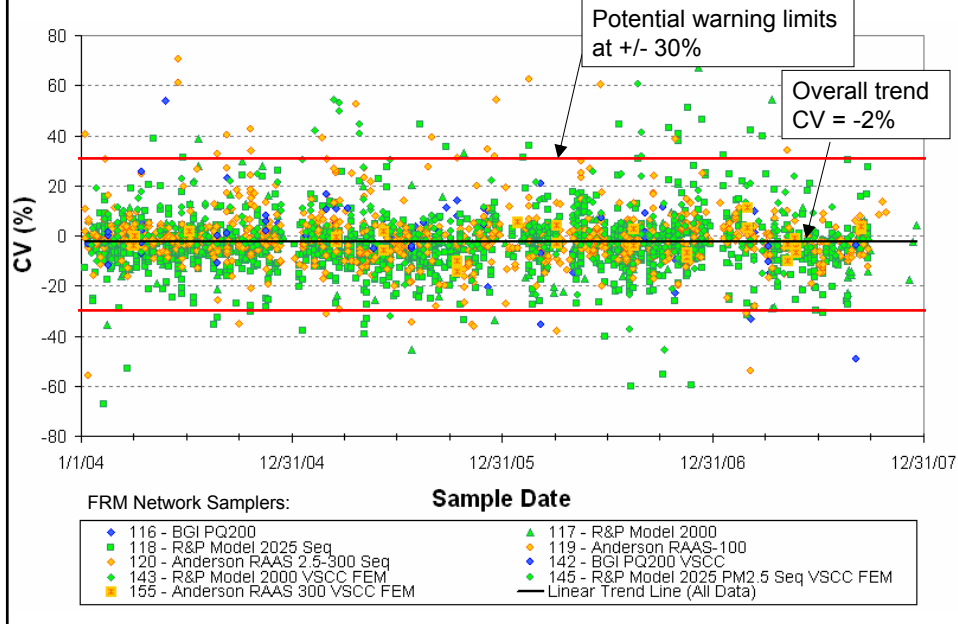


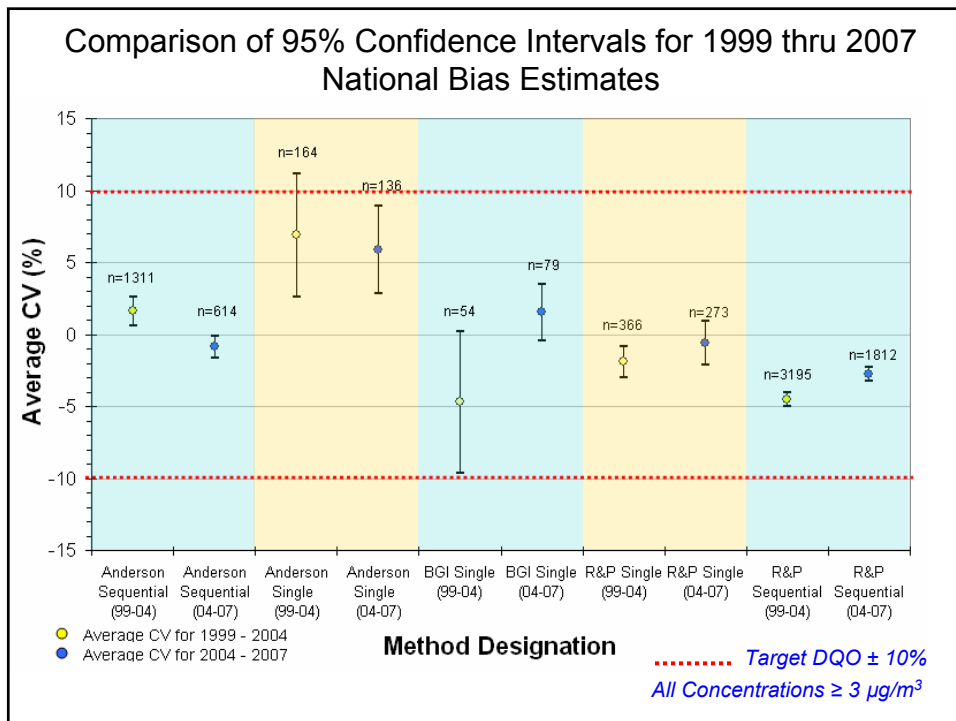
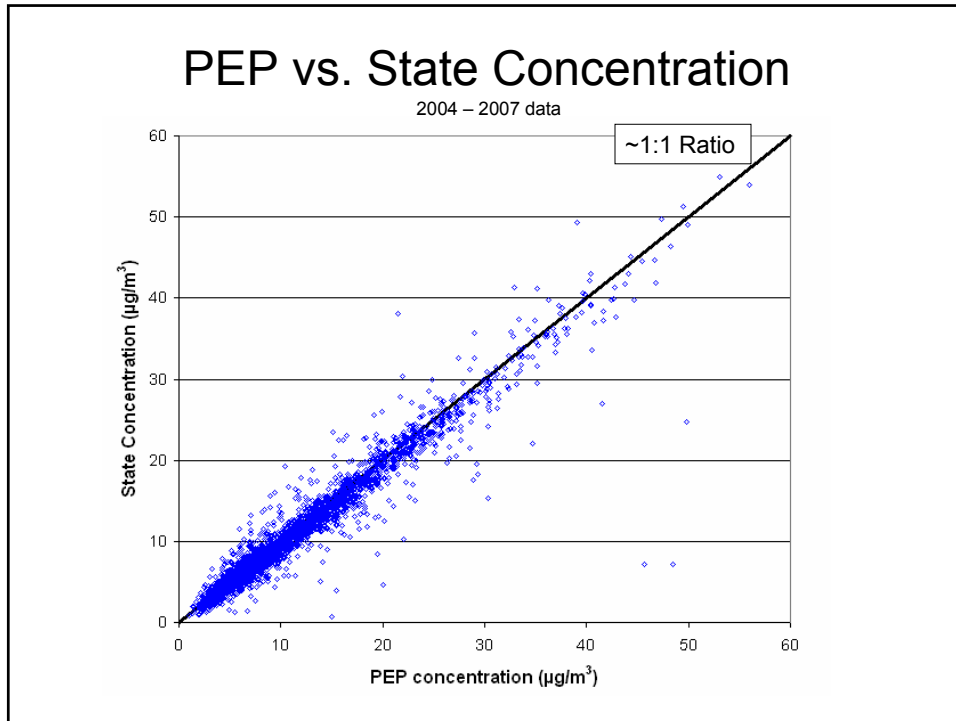
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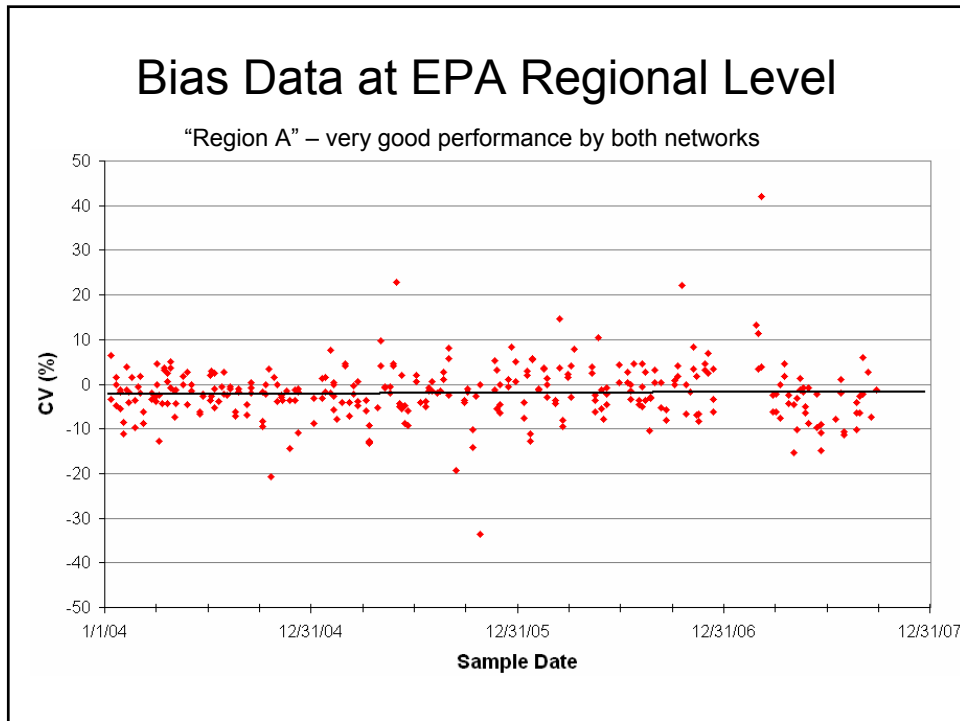
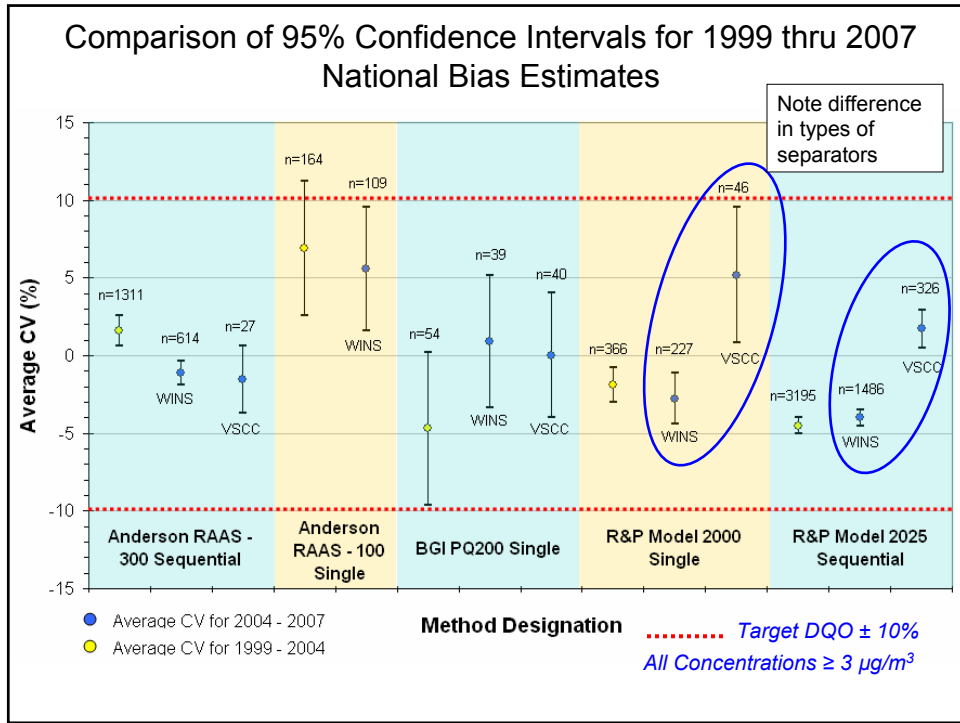
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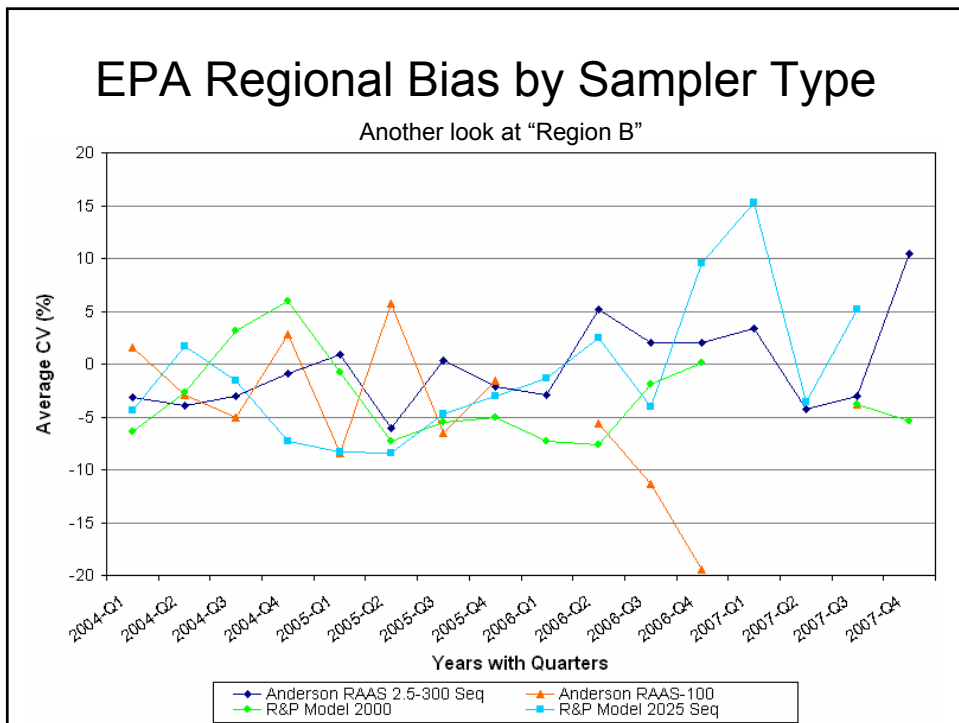
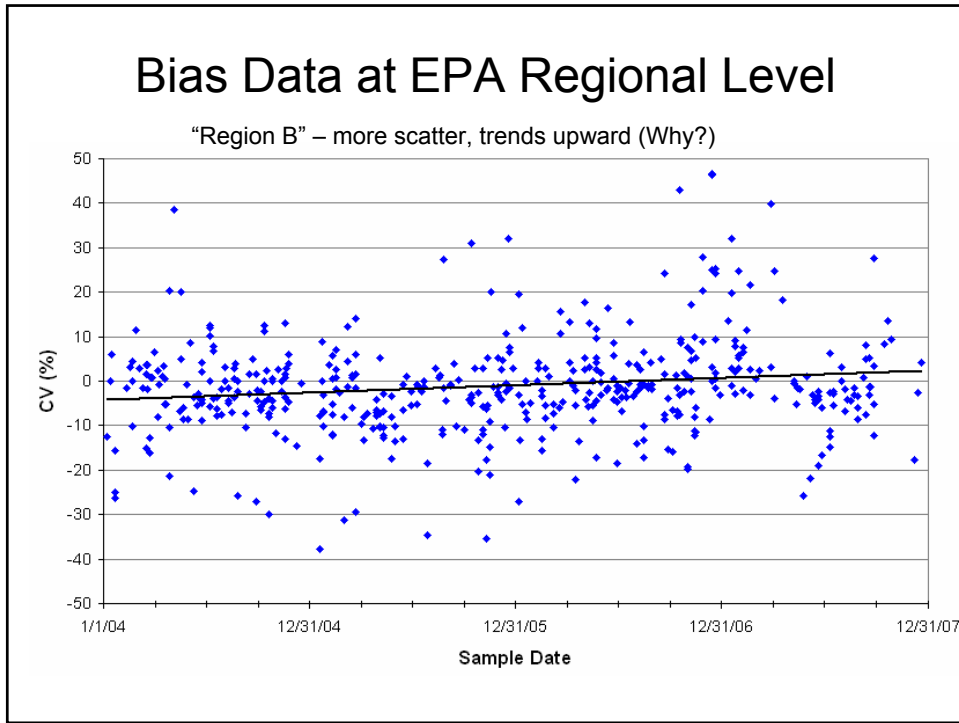
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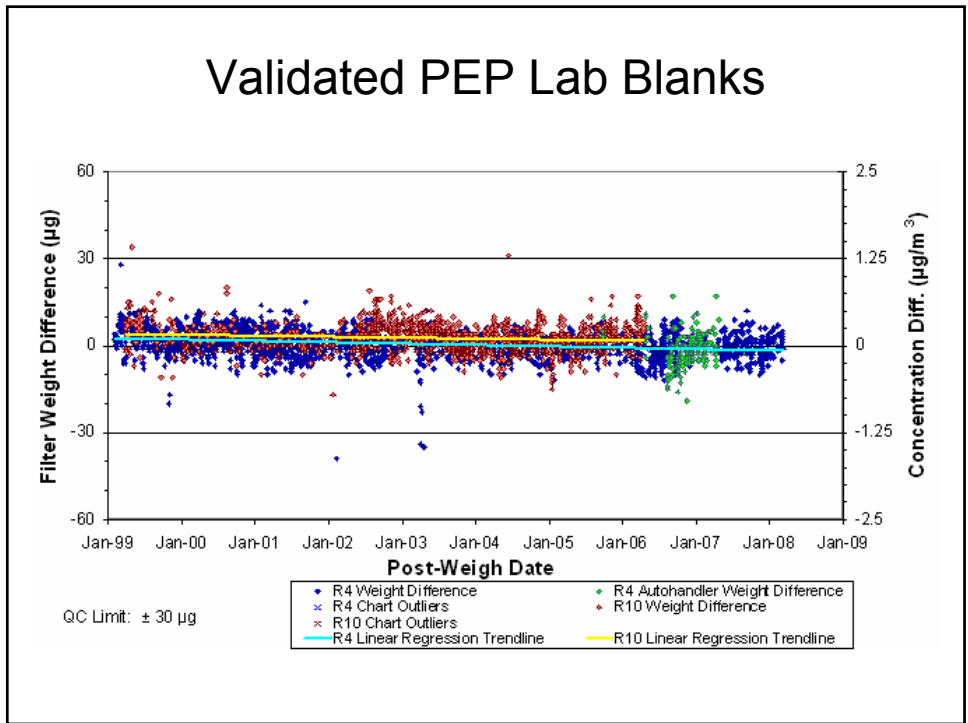
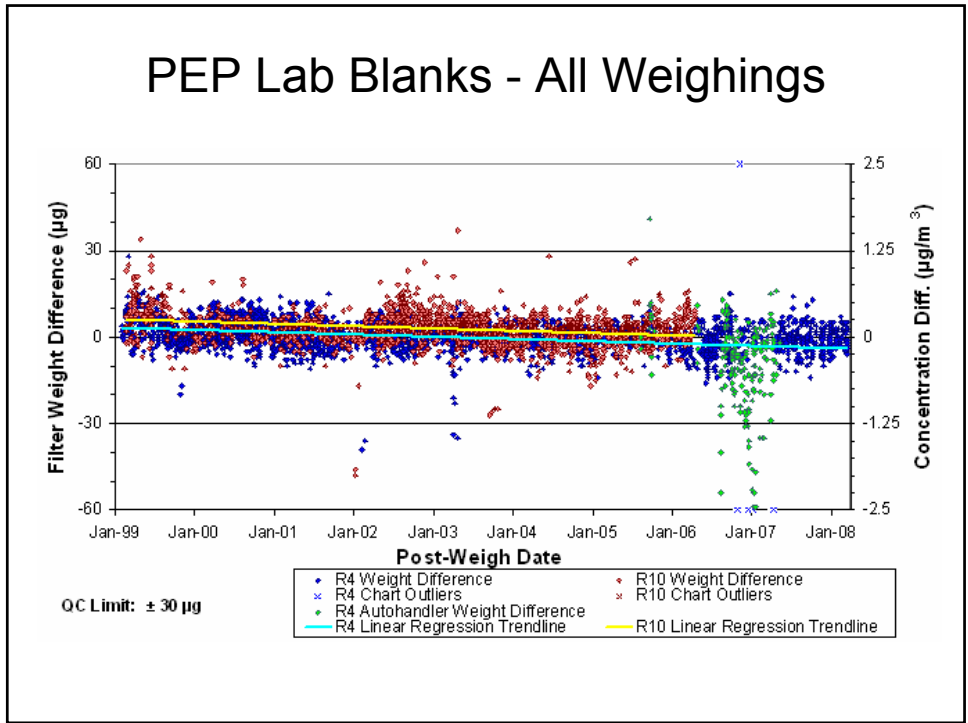
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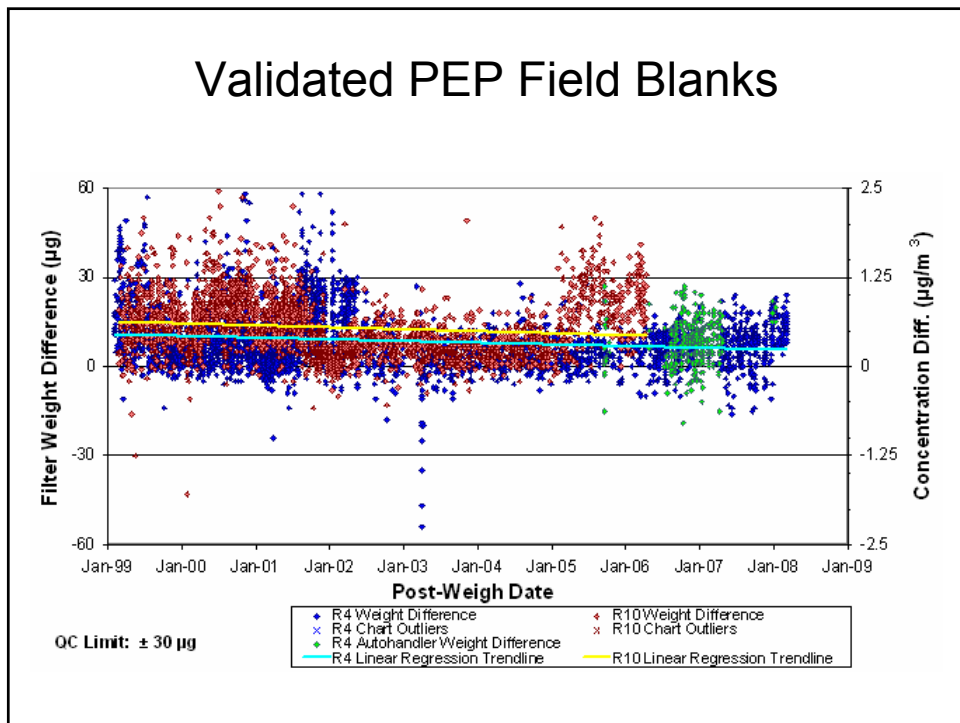
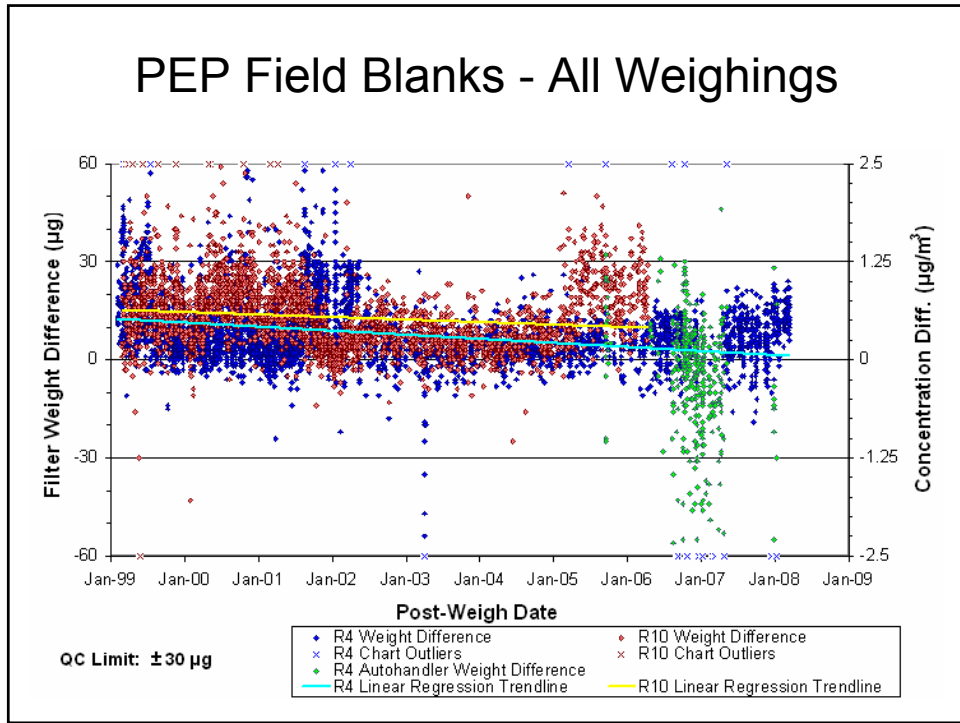
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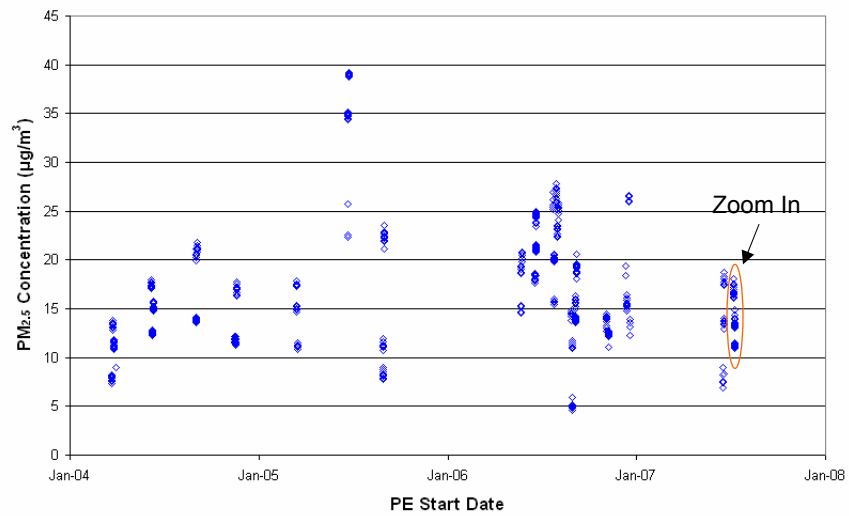


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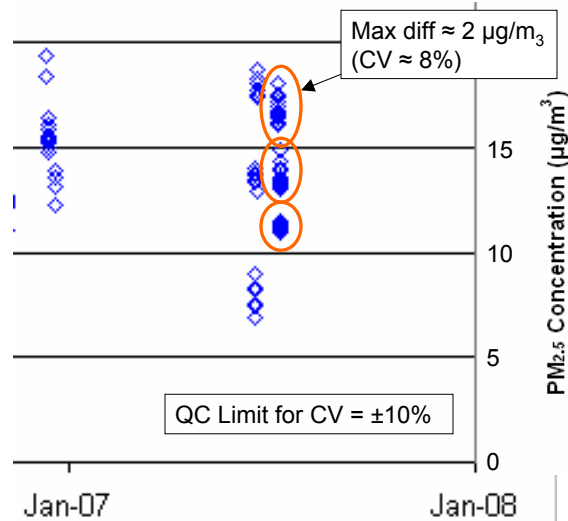


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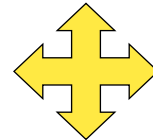


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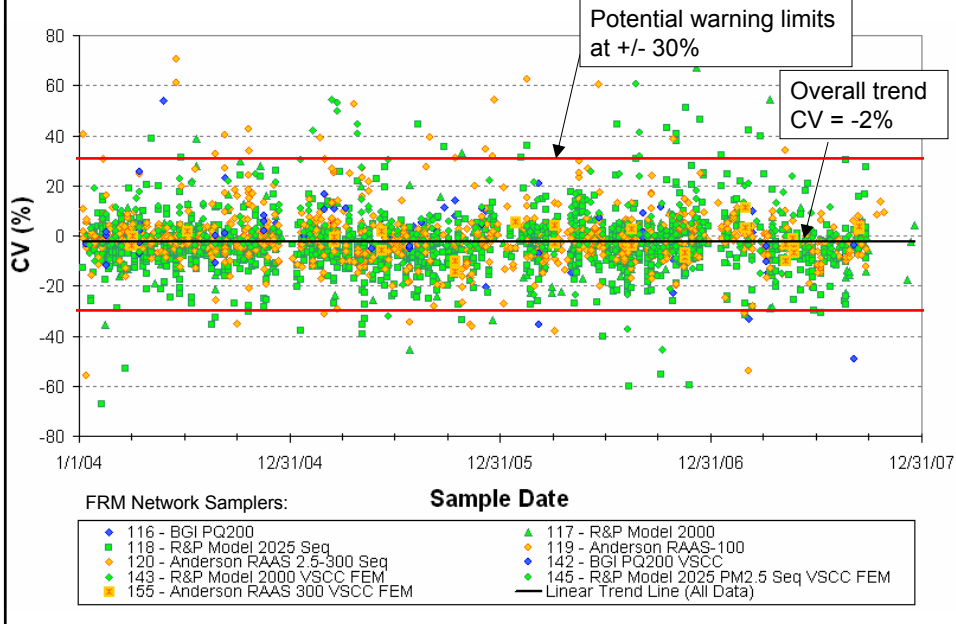


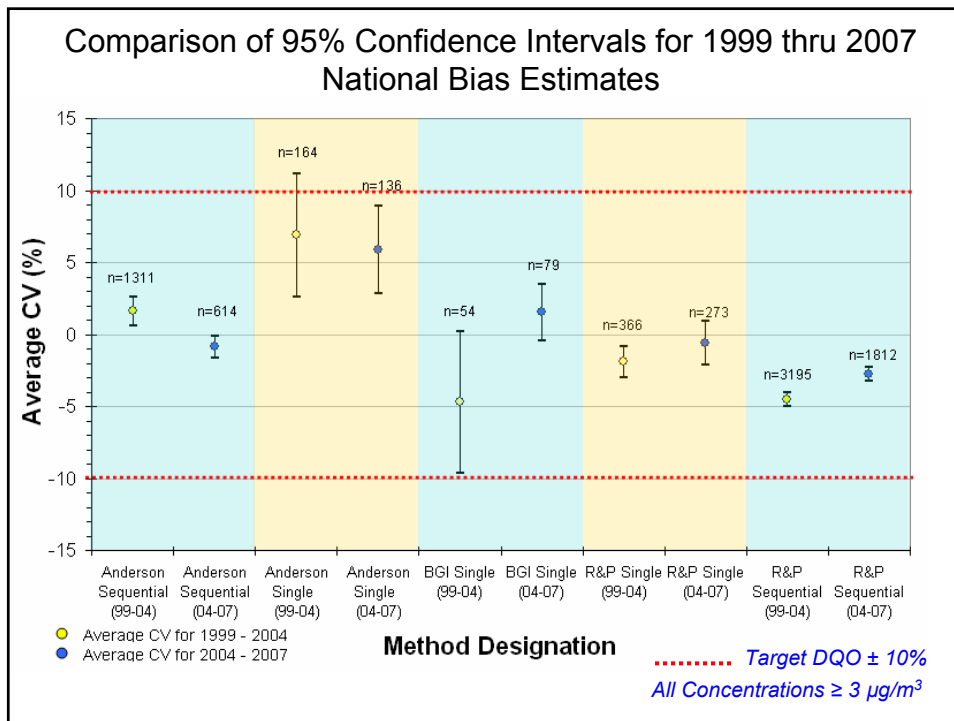
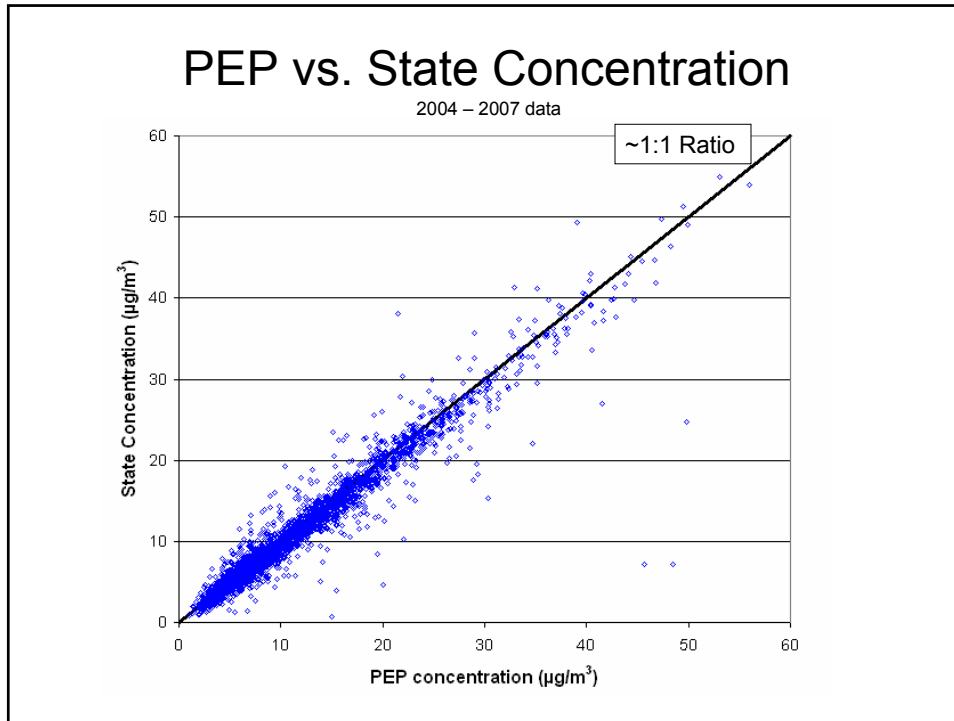
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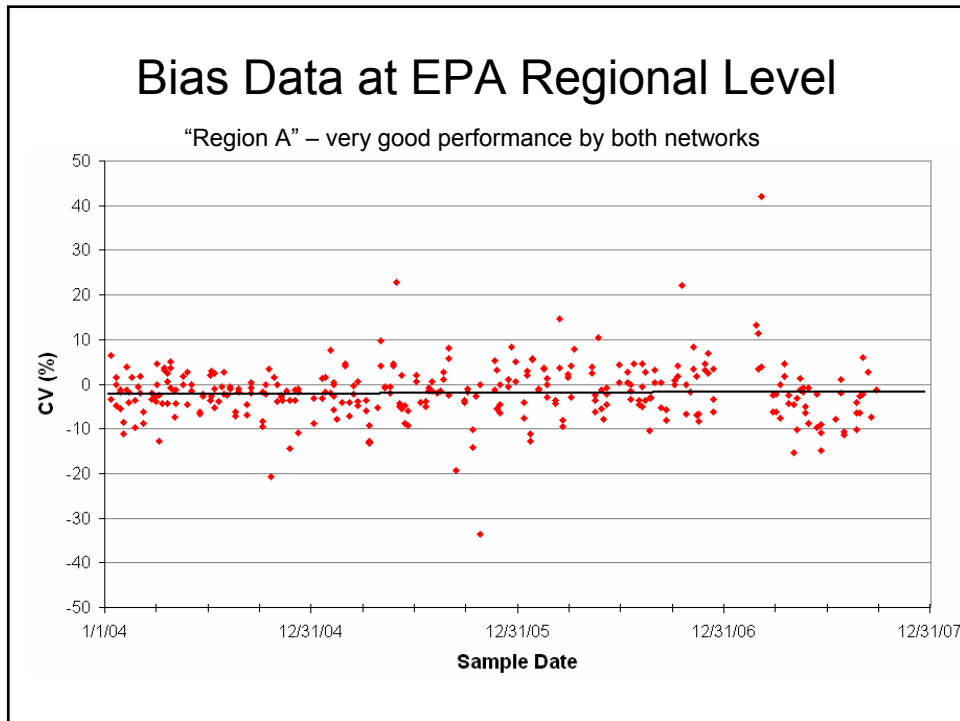
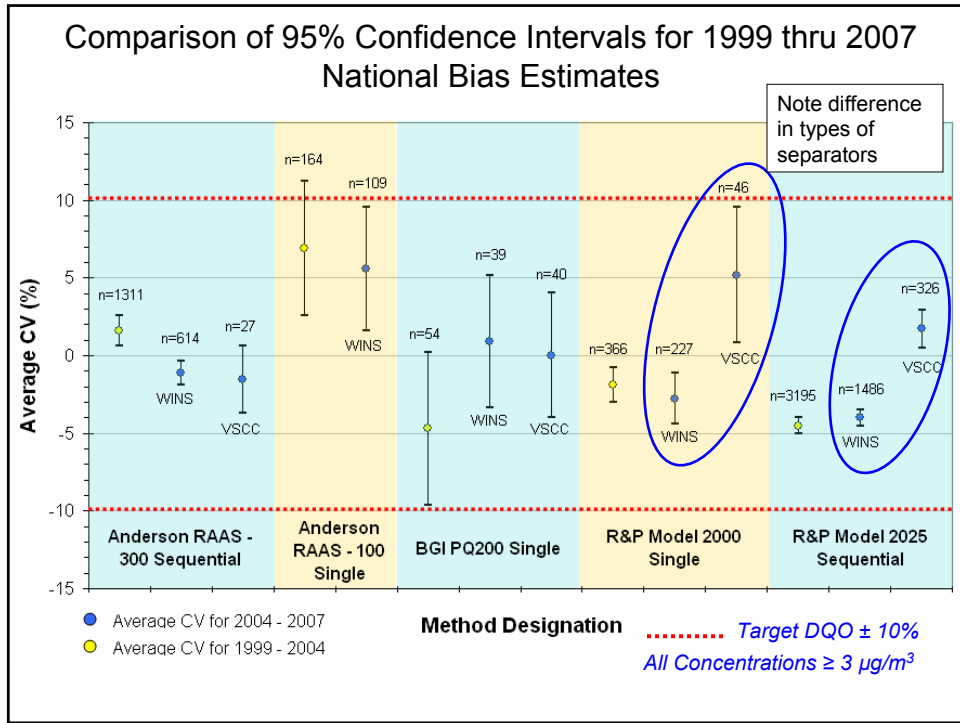
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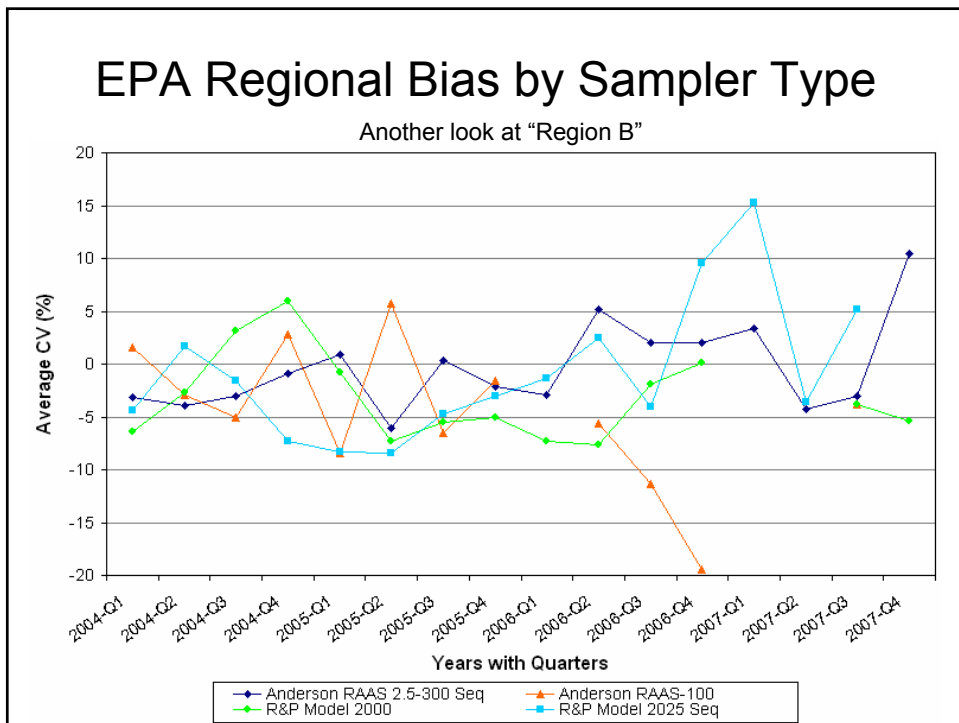
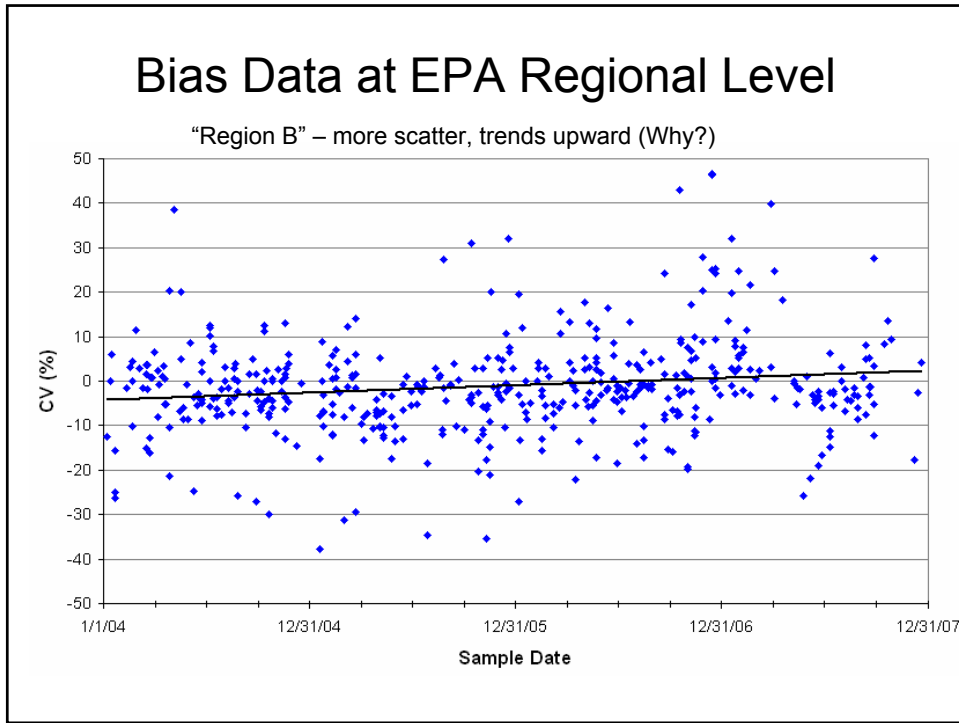
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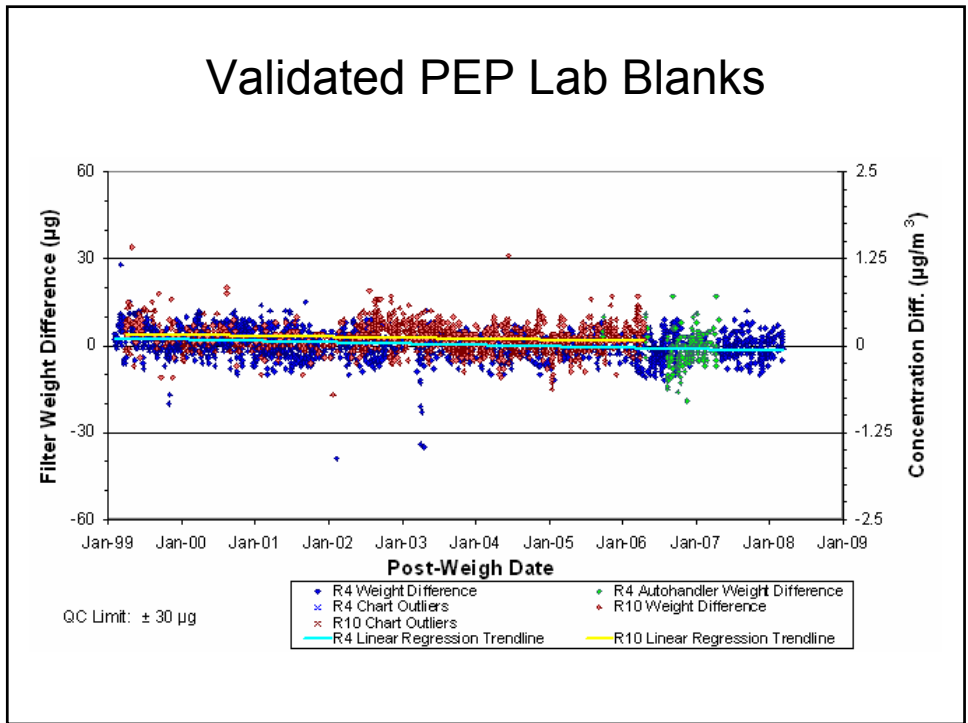
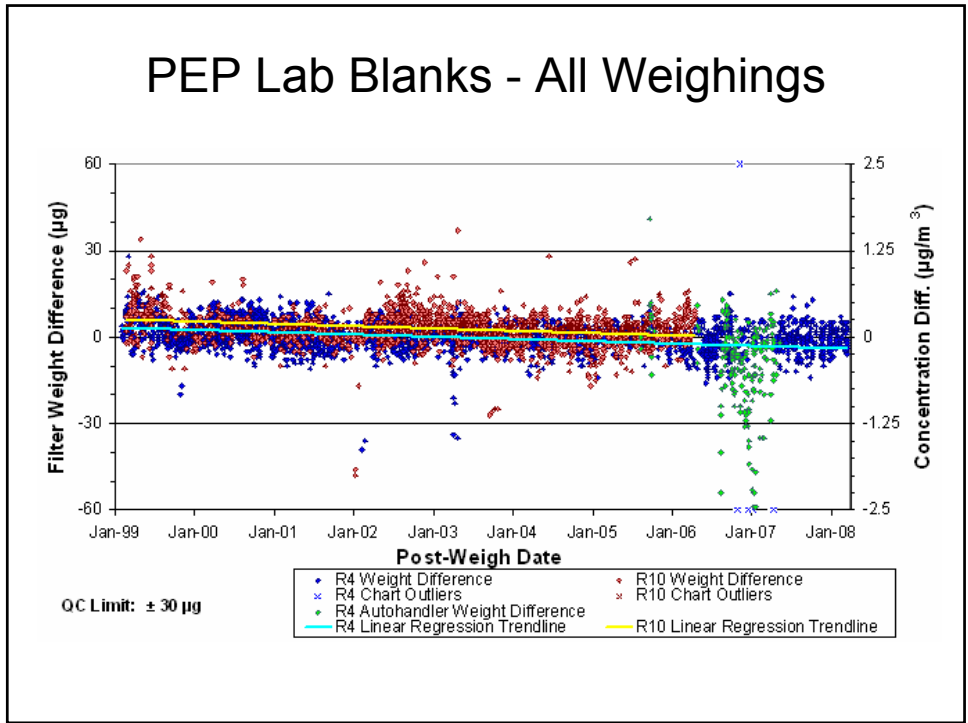
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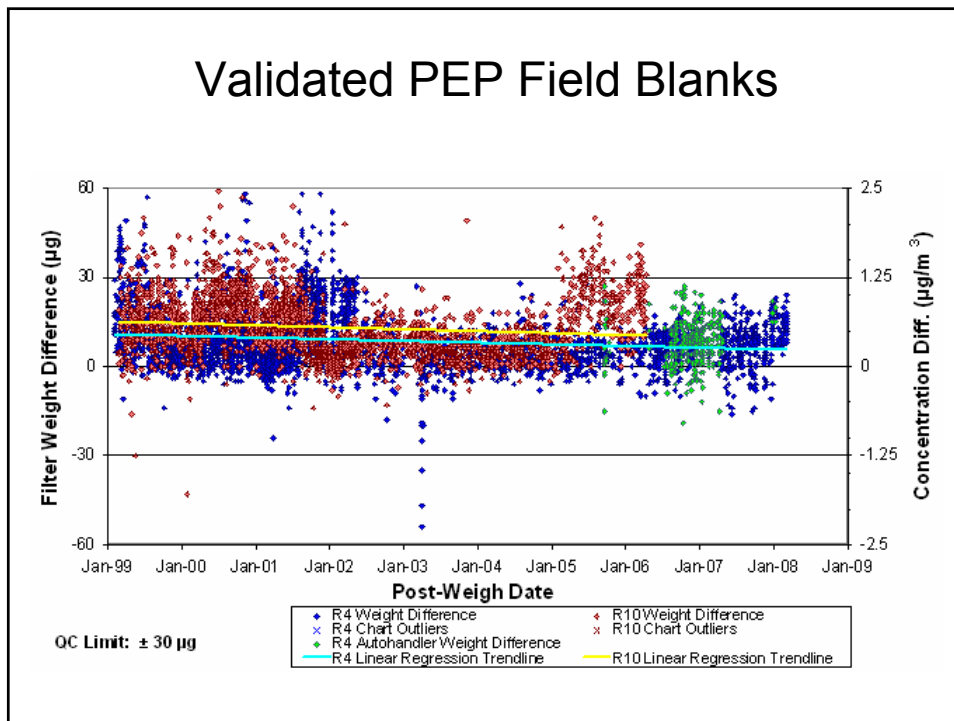
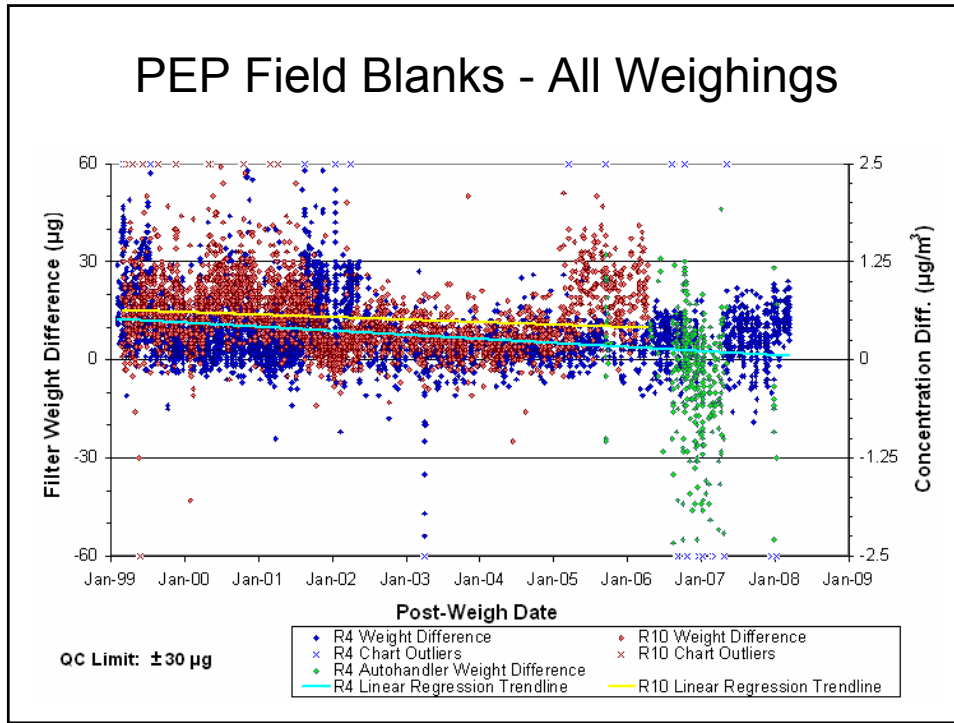
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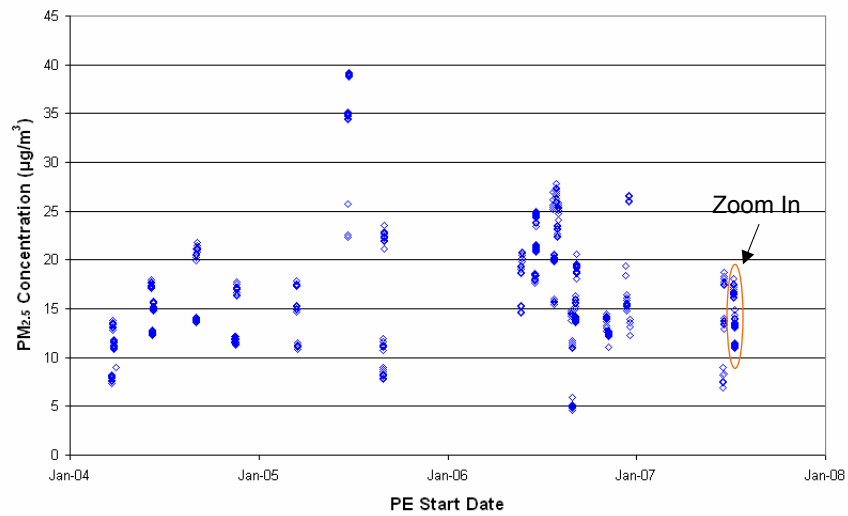


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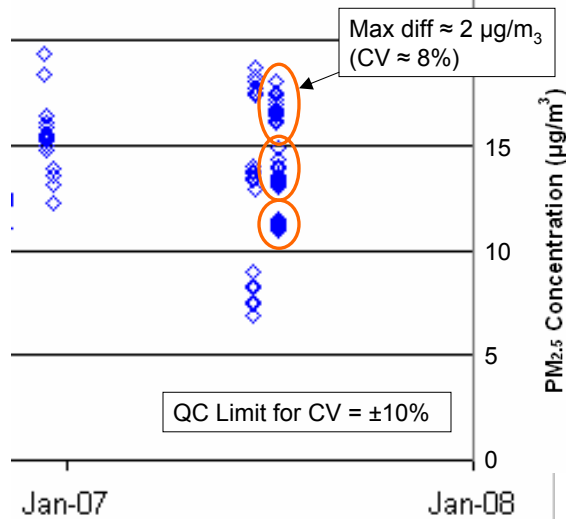


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