

Southeastern Bias Assessment: Trend from 2006 to 2011



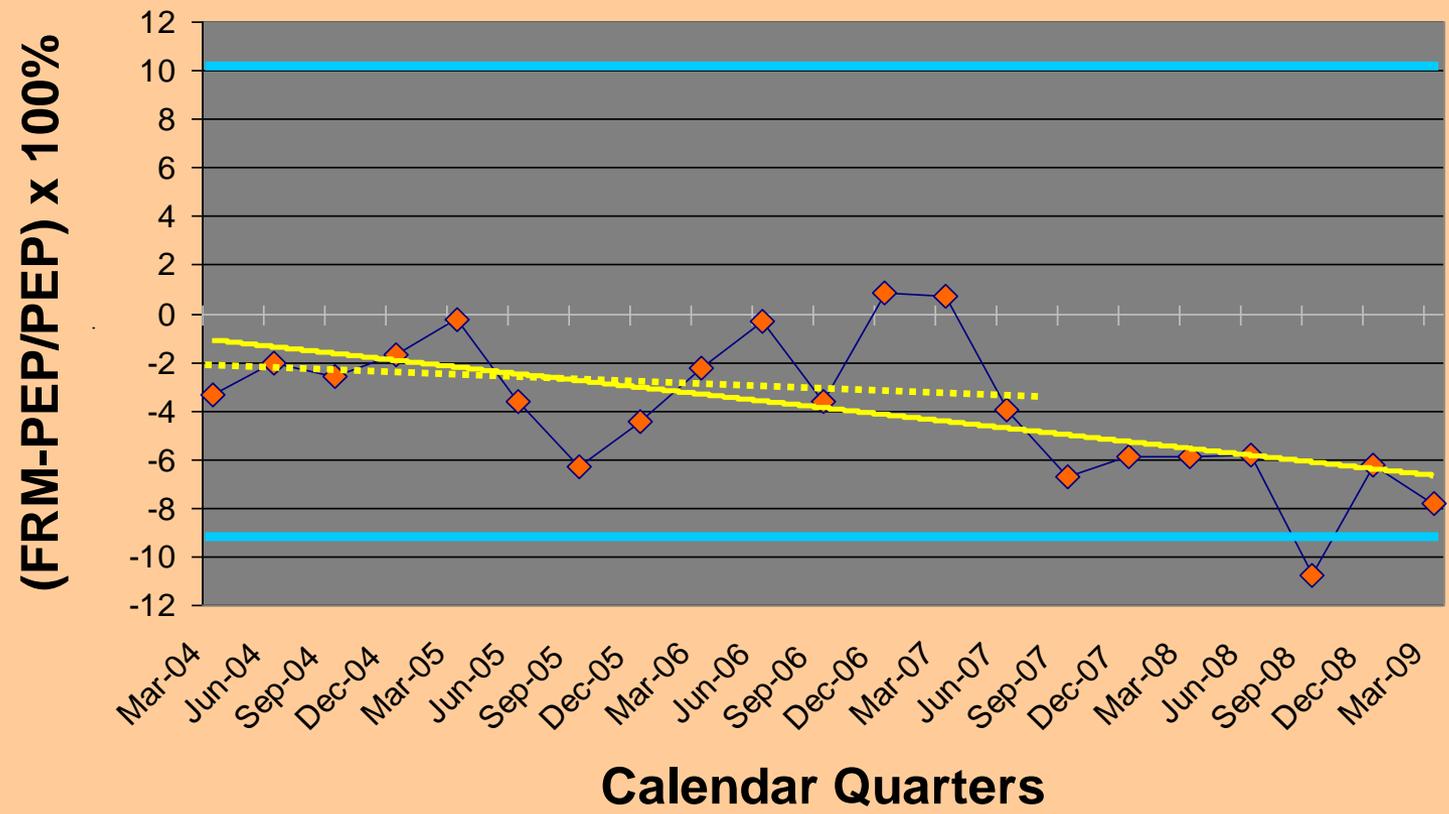
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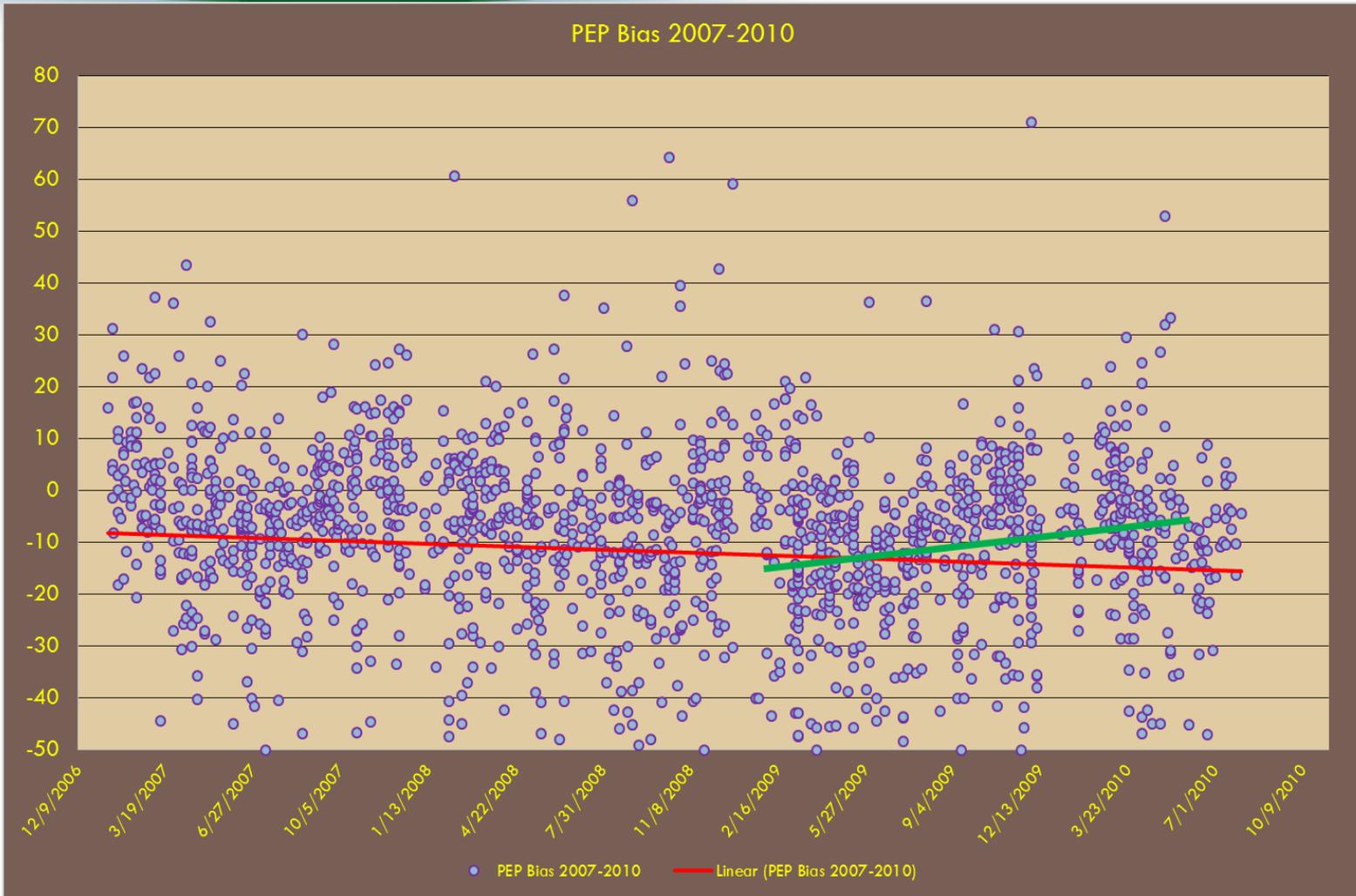
When it all Started



2004--Mar 2009 PM_{2.5} Network BIAS Quarterly Average



BIAS 2009-2010 Presented at Denver NMC in 2012



PM_{2.5} FRM/FEM Performance Evaluation Program



- Collocates an independent FRM audit sampler beside a FRM/FEM
- Applies rigorous performance and QA/QC requirements to field and laboratory operations
- Provides independent assessment of network sampler bias
- Might indicate if the monitoring agency's FRM is experiencing performance issues, **BUT**
 - 60 days after the fact!
 - It is only 1 data point for one isolated sampling event



- **PEP Requirements for Each PQAO:**
 - 15% of all sites audited per year; all sites in 6 years
 - If **5 sites or less** ----- **5 audits per year**
 - If **>5 sites** ----- **8 sites per year**
 - At least one of each “monitor type” audited each year, including “regulatory” FEMs and SPMS

Cherokee, NC with PEP Monitor



Highland Heights, KY with PEP Monitor



Tallahassee, FL with PEP Monitor



PM_{2.5} PEP Audit Data Uses



- Audits should show where a state may have challenges in their statewide quality system.
- Audits now used as part of data certification AQS recommendation.

The Observed Dilemma in Southeast



- History of precision data for most states in the southeast is relatively stable
- History of bias data relatively stable until 2006, then started changing after 2007.
- The PEP Bias trend in the Southeast is dramatic!

Comparing SLT Precision to PM_{2.5} PEP Audits



- In this presentation, same equation used for bias and precision for consistency.

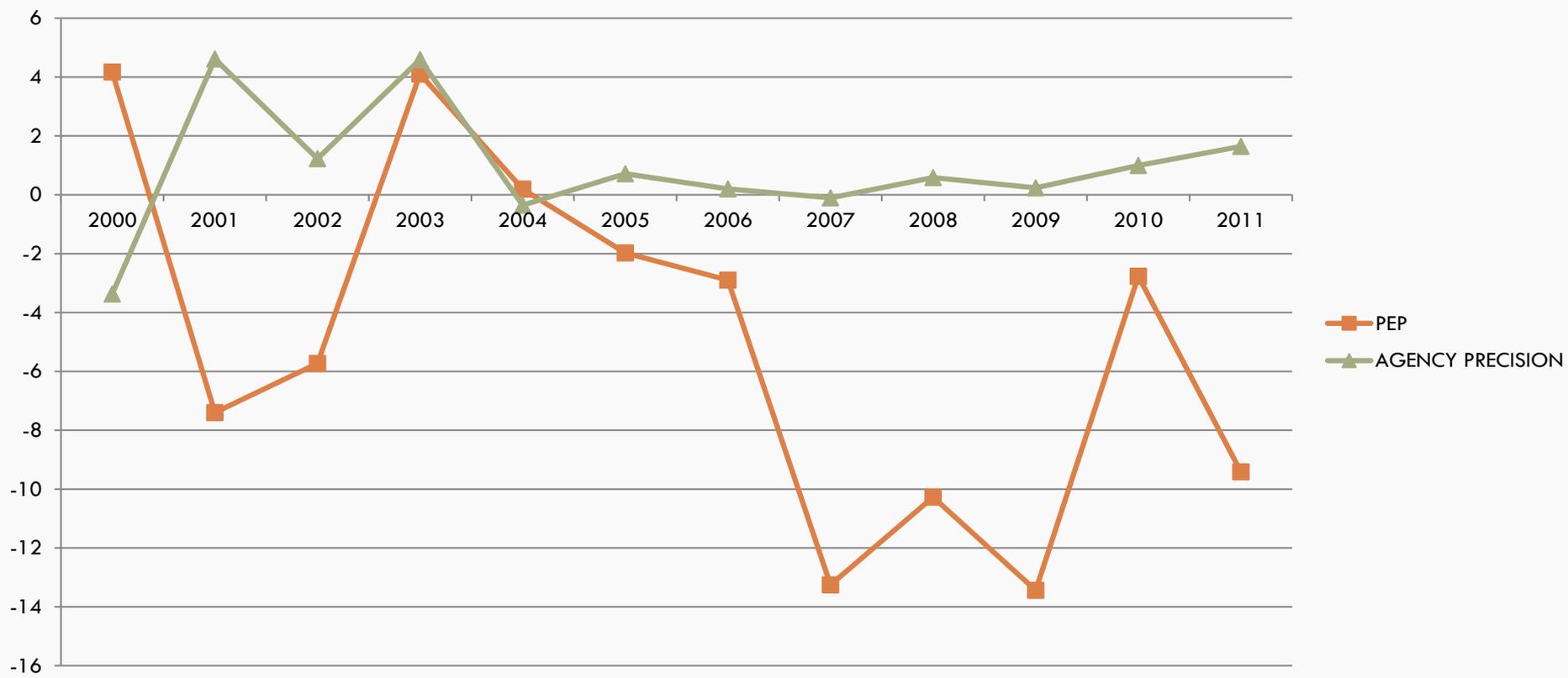
$$\textit{Bias} = \frac{\textit{SLTValue} - \textit{PEPValue}}{\textit{PEPValue}} * 100$$

$$\textit{Precision} = \frac{\textit{PrimValue} - \textit{ColloValue}}{\textit{ColloValue}} * 100$$

Examine State-by-State



Alabama PEP vs Precision

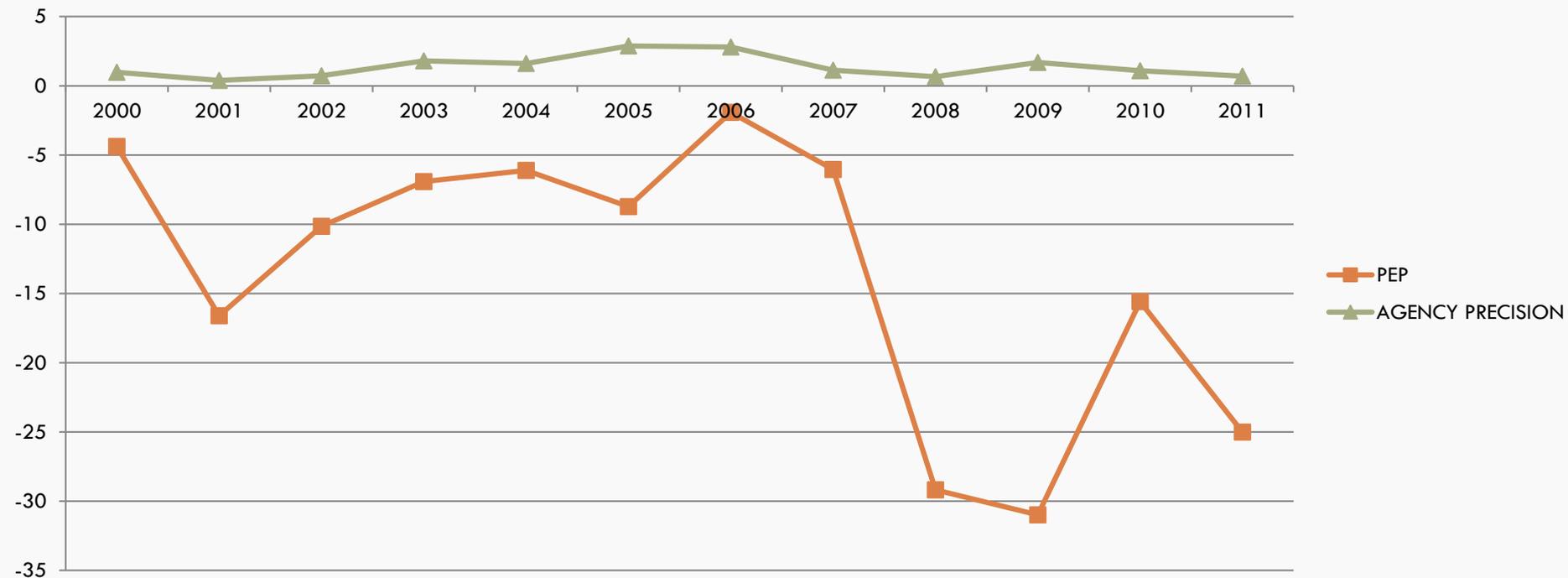


Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



Florida PEP vs Precision



Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



Georgia PEP vs Precision

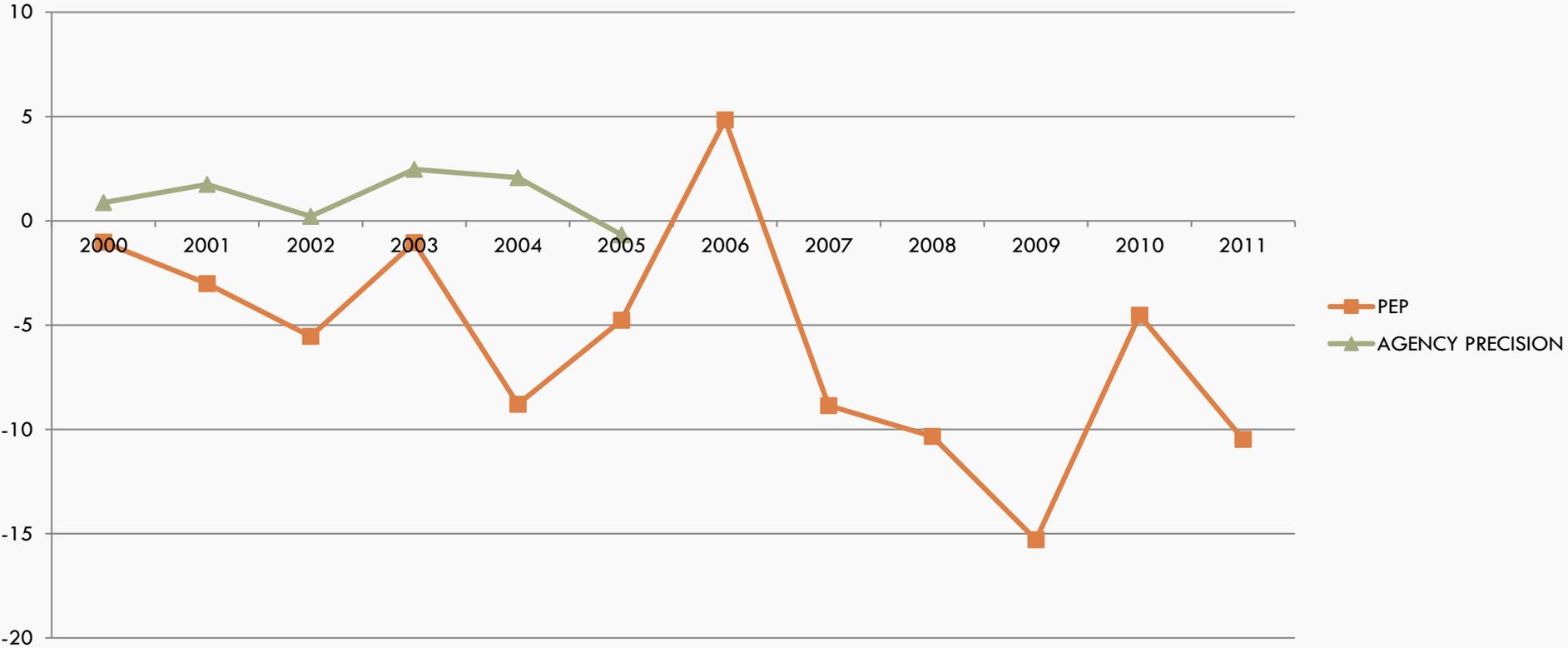


Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



Kentucky PEP vs Precision

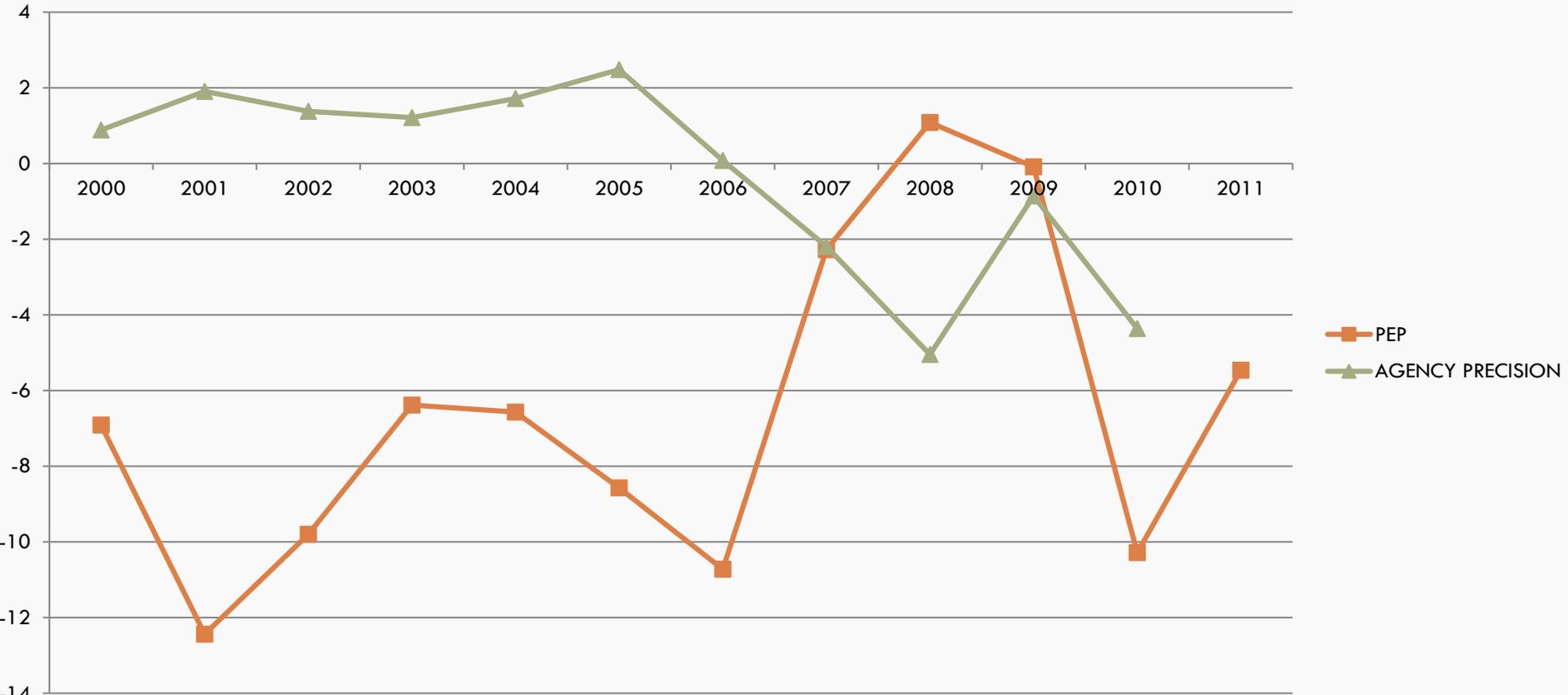


Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



Mississippi PEP vs Precision

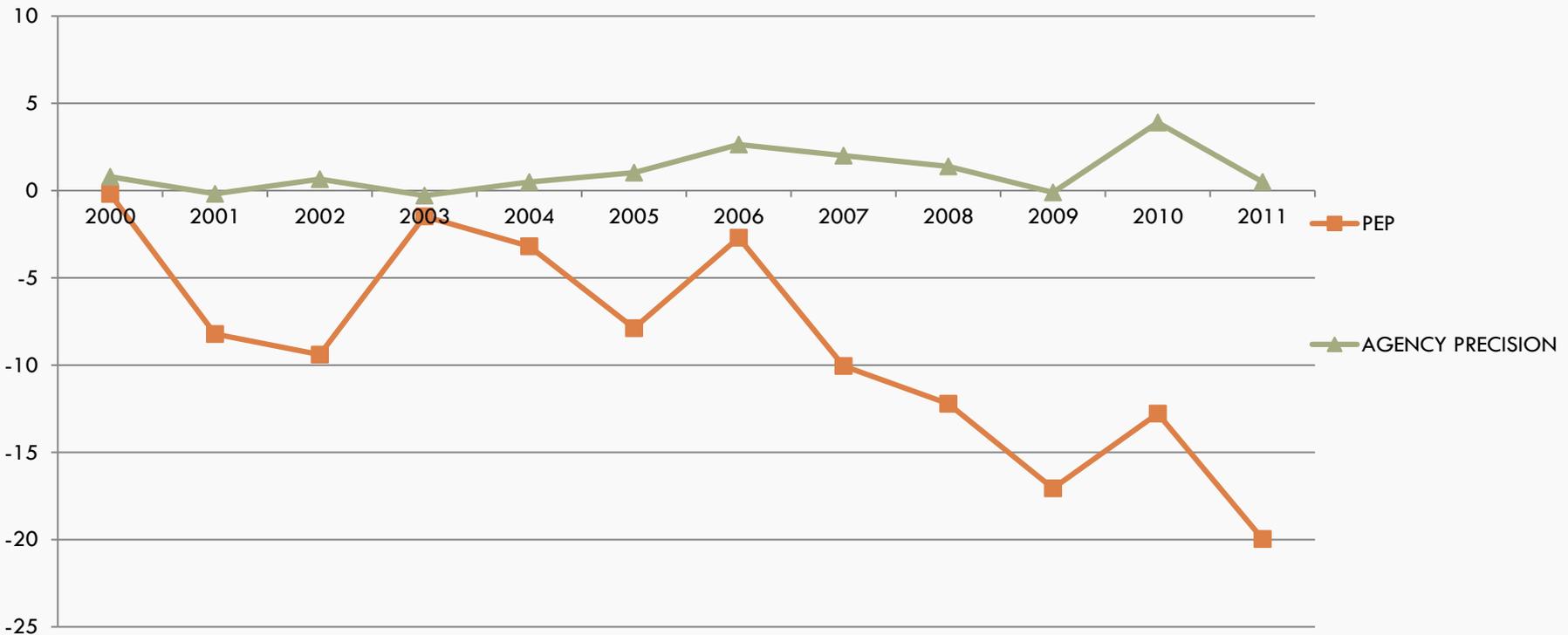


Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



North Carolina PEP vs Precision

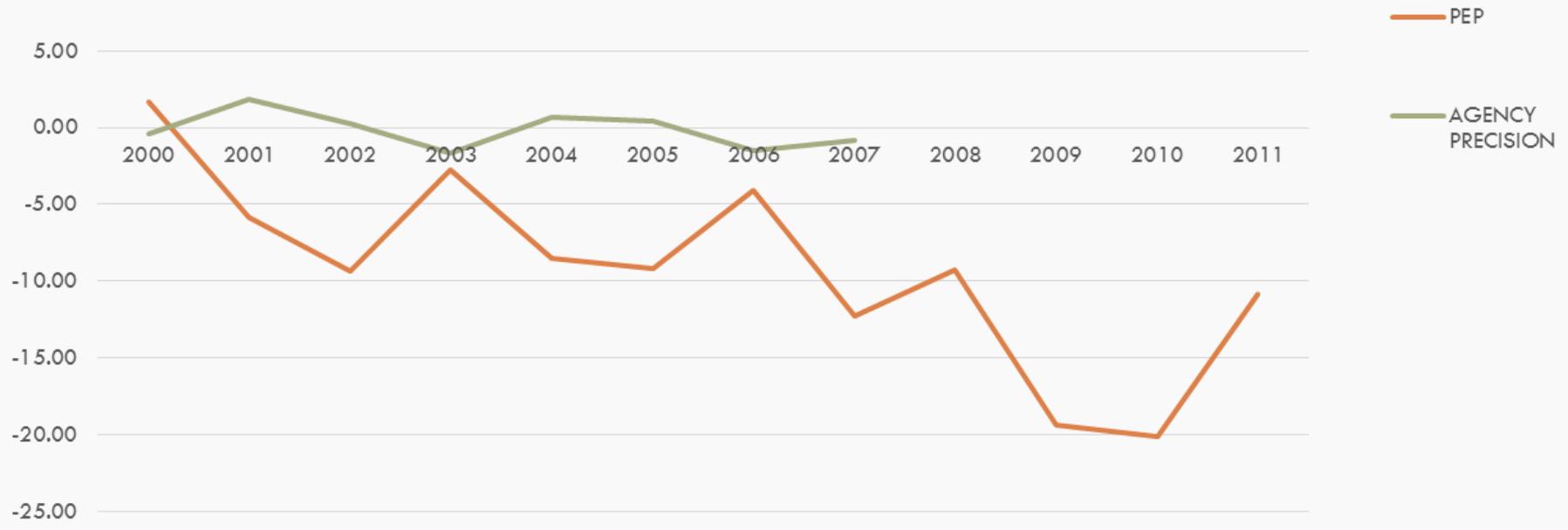


Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Examine State-by-State



Tennessee PEP vs Precision



Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Questions?



- Are 8 state systems in the southeast likely to experience the same phenomenon with such similar impacts?
- Was there a causal Impact of the Great Recession
- Has the reduction in ambient PM 2.5 been a factor
- Could Region 4 lab practices or filter supply contractor change be contributors?
- Is some mechanical issue manifesting during sampling events that is not evident at PEP sampler set-up?
- Further investigation revealed that this trend was exhibited across the country; does this suggests a more systemic cause?



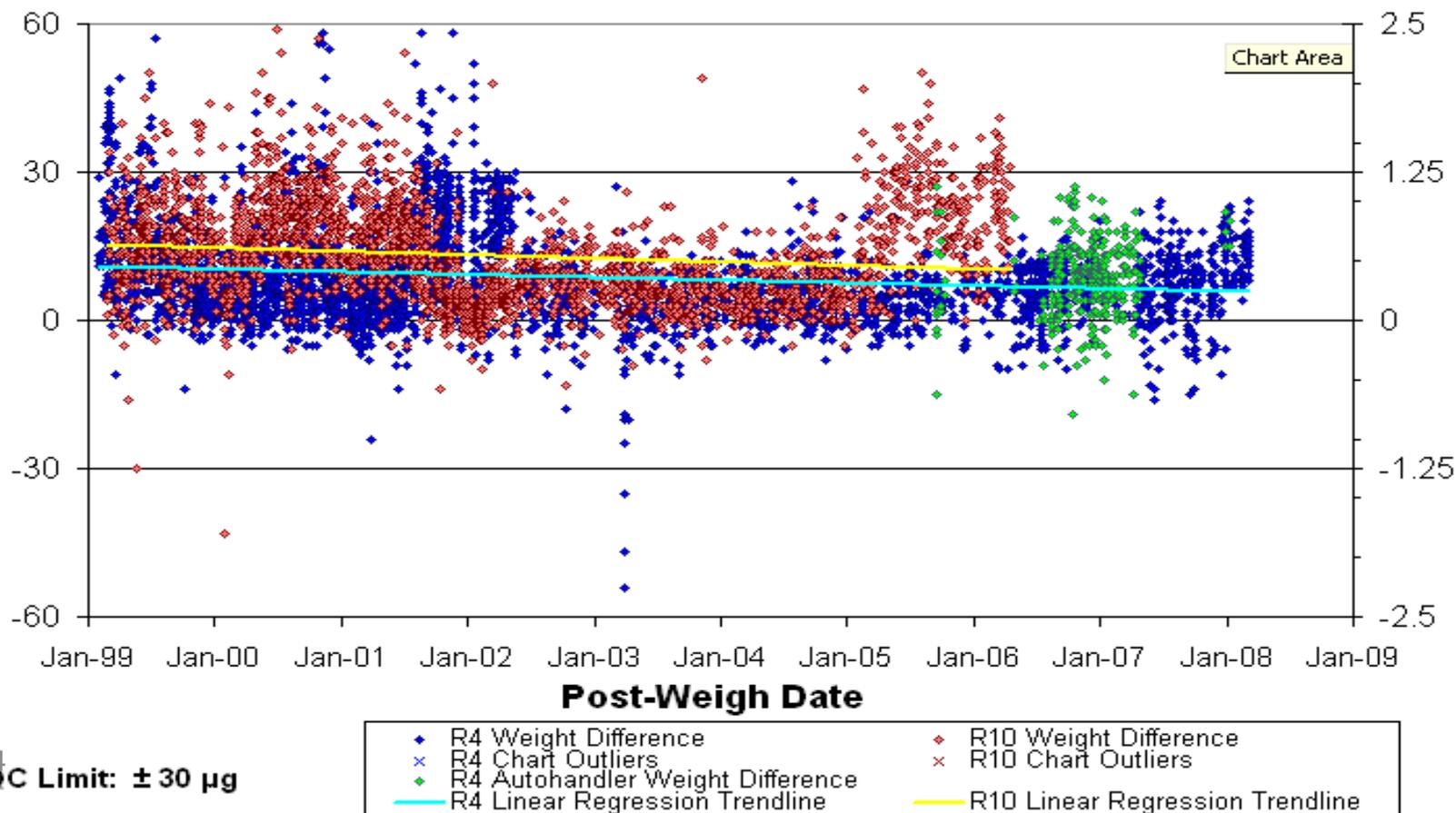
- Flow is verified before every sampling event
- Flow CV is examined after every event—
complies with FRM requirements actually we will pull a sampler at Avg CV $\geq 1\%$
- WINS are cleaned after every sampling event
- Each Region runs a fleet collocation study 2X per year
 - 2002-2009 Results are well within the Appendix A Precision Requirements

		Avg. Normalized % Difference
Avg. Diff	0.60	5.75
Std. Dev	1.35	13.48

QA/QC factoids from PEP



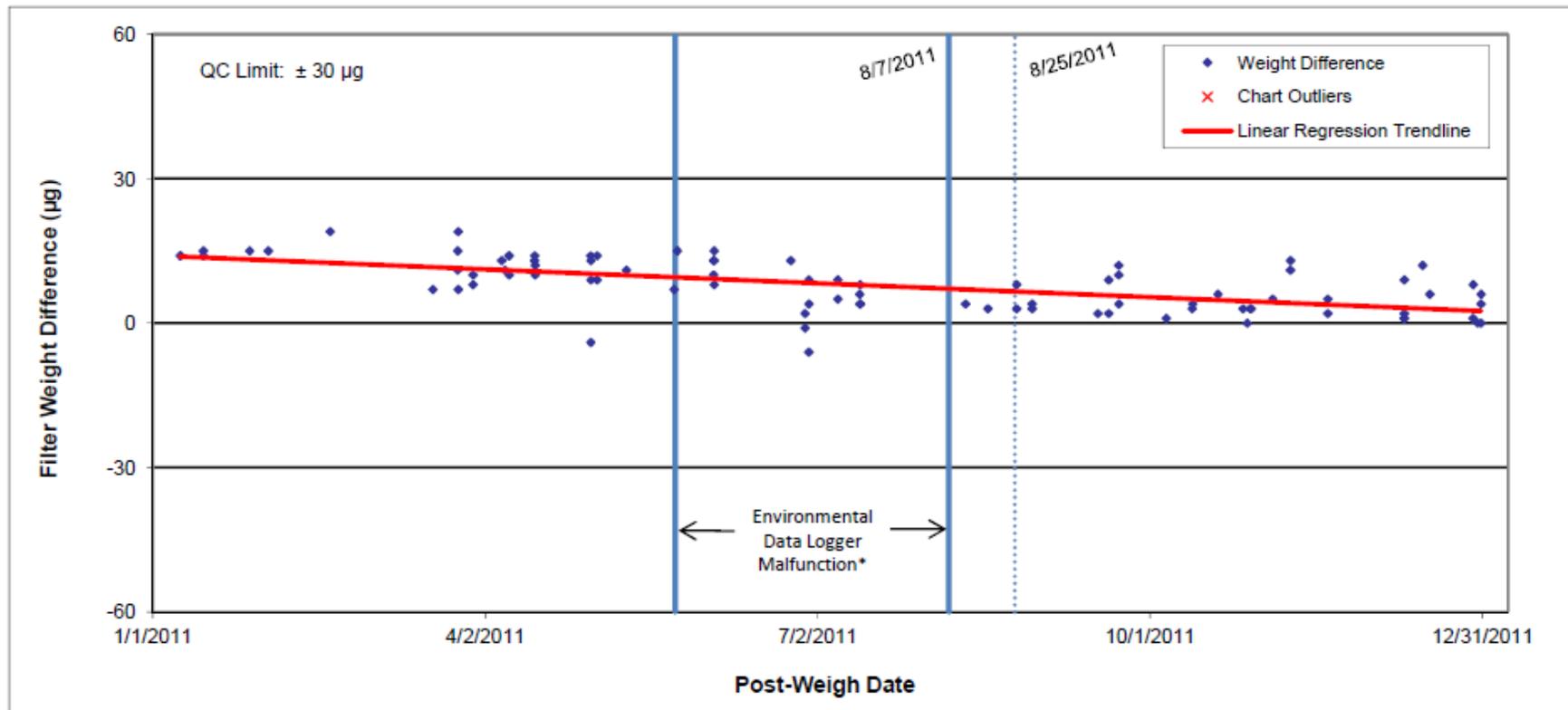
- 2002-2010 Field Blanks averaged $< 1 \mu\text{g}/\text{m}^3$ (even less since 2011!)



QA/QC factoids from PEP



2011 Trip Blanks - Region 4

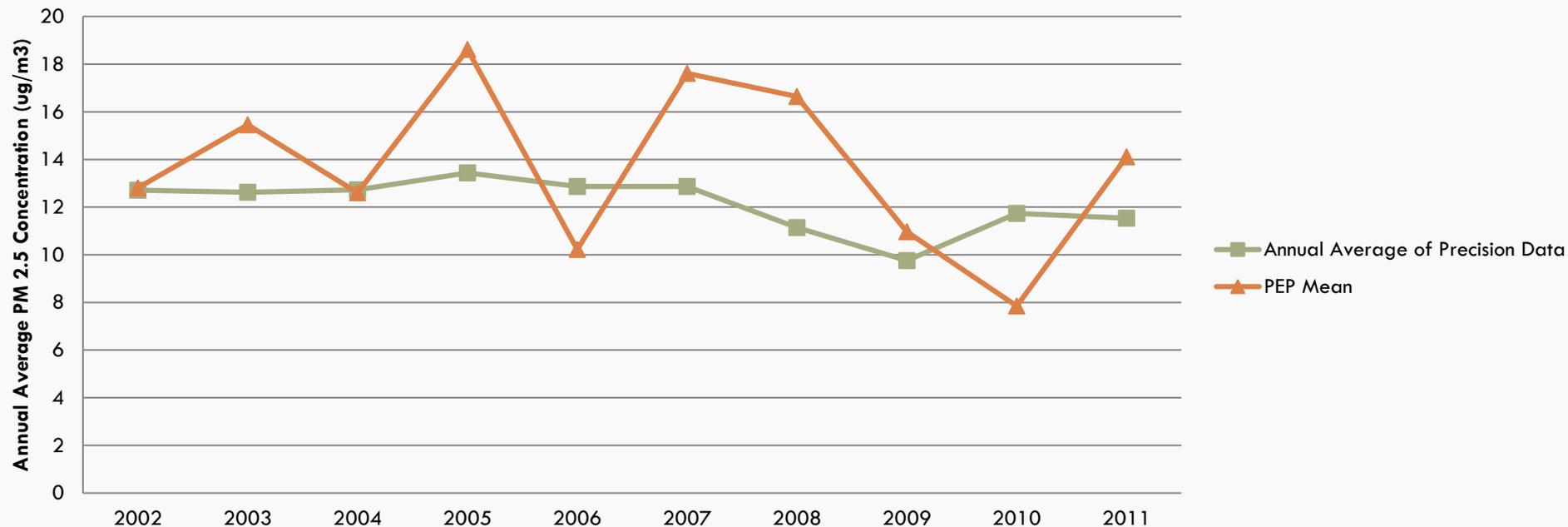


Looking for Drivers of the Differences:



Annual Averages and PEP Average Concentrations?

Southeastern States Annual Avg PM 2.5 VS Annual PEP Avg PM 2.5



Annual averages taken over all sites collocated for precision, not just those visited by PEP.

Conclusions of the Regional Investigation to Date



- Changes appear not to be directly tied to
 - changes in ambient concentrations
- PEP Field and Trip blanks do not implicate the change in the filter manufacturer
- PEP QC/QA measures do not reveal a significant causal factor lies in the PEP
- Could the Great Recession have changed the constituents of PM_{2.5} such that BGI retains more mass than other FRMs?