

The Lead (Pb)-PEP **R**EVOLUTION—

Where we've been
Where we are
Where we're going

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All data presented are preliminary and have not undergone final EPA review and validation.



The Lead (Pb)-PEP **R**EVOLUTION—

Where we've been
Where we are
Where we're going

- Preview:
 - Recent regulatory history
 - The QA requirements for Pb-PEP
 - TSP, airport sites, NCore, and low volume PM-10 Pb sampling
 - The early challenges with TSP Pb
 - Tools and remedies
 - The TSP results 2010 through 2011 and partially in 2012



The Lead (Pb)-PEP **R**EVOLUTION— Where we've been



Regulatory History

- November 12, 2008 Primary NAAQS revised
 - From 1.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to $0.15 \mu\text{g}/\text{m}^3$,
 - measured as total suspended particles (TSP)
 - Secondary (welfare-based) standard identical
- December 10, 2010
 - Monitoring threshold at proximity of source lowered from 1 tpy to 0.5 tpy
 - Deploy low-volume PM-10 monitoring at NCORE sites at CBSAs with a population of 500,000 people
 - 15 Airports monitored for TSP-Pb for one year



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Regulatory Requirements



§ 58.16 Data submittal and archiving requirements.

(a) The State, or where appropriate, local agency, shall report ... all ambient air quality data and associated quality assurance data for; Pb–TSP mass concentration; Pb– PM₁₀ mass concentration;...



Pb-PEP Independent Audit Frequencies

- **15% of all sites audited per year**; all sites in 6 years
- **If 5 sites or fewer → 5 Audits per year**
 - 1 with an Independent PEP sampler
 - 4 filters collected from network precision samplers and sent to EPA's Independent lab
- **If 5 sites or more → 8 audits per year**
 - 2 collocations with a PEP Sampler



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Temporary Airport sites



§ 58 Appendix D 4.5(a)iii State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D–3A for a period of 12 consecutive months Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.



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Temporary Airport sites as SPMs?



§ 58.20(b) Any SPM data collected by an air monitoring agency using a Federal reference method (FRM), Federal equivalent method (FEM), or approved regional method (ARM) must meet the requirements of §58.11, §58.12, and appendix A to this part or an approved alternative to appendix A to this part.



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Where We've Been—Where we're going



Required Collocation and PEP Audit Summary

Pb Sampler in network	Host PQAQ	No. Collocation sites.	No. Independent PEP Audits	No. SLT Site-Colloc. filters to EPA
TSP	SLT	15% or at least one	1 or 2; all in 6 yrs	4 or 6 spread across sites and qtrs.
TSP NCore	SLT	If only SLT TSP site, "0"	Include in SLT PQAQ	Covered by SLT PQAQ Requirements
TSP Airport	SLT	Optional-part of PQAQ	Include in SLT PQAQ	Optional unless only SLT PQAQ Site
PM-10 Low Vol	SLT	15% or at least one	Include with respective Region's NCore PQAQ Rotation	1 filter per site per qtr.
PM-10 Low Vol NCore	NCore	15% --3 based on current site count	Every Region with site conducts 1 per year; all in 6 yrs	Covered by 5 NCore Colloc. sites
PM-10 Low Vol NCore Collocated	NCore	5 sites have been approved as of Jan 2012	First year and in the Regional 6 yr Rotation thereafter	1 filter per site per qtr.



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QA Goals

- **Collocated sampler precision**
 - Coefficient of variation 20%
at the 90% confidence limit
- **Overall absolute bias**
 - Upper bound goal of 15%.
- **Goals assessed on 3 years of data at the PQA0 level of aggregation.**
- **SLT Site collocated PEP data will be evaluated separately**
- **100% Completeness!!!**





The Lead (Pb)-PEP **R**EVOLUTION— Where we've been—Where we're going

Challenges in the TSP Pb PEP

- **Finding a suitable “Gold Standard” sampler**
 - Evolving from Mass-Flow Controlled back to Volume-Flow controlled
 - Still have some questions about high altitude sampling
 - Measuring fleet precision is a logistical challenge





The Lead (Pb)-PEP **R**EVOLUTION— Where we've been—Where we're going

Challenges in the TSP Pb PEP

- **Sampler Issues**
 - Temperature probe hysteresis and lethargic response
 - Pressure transducers
 - Calibration drift
 - Data acquisition software and hardware connections



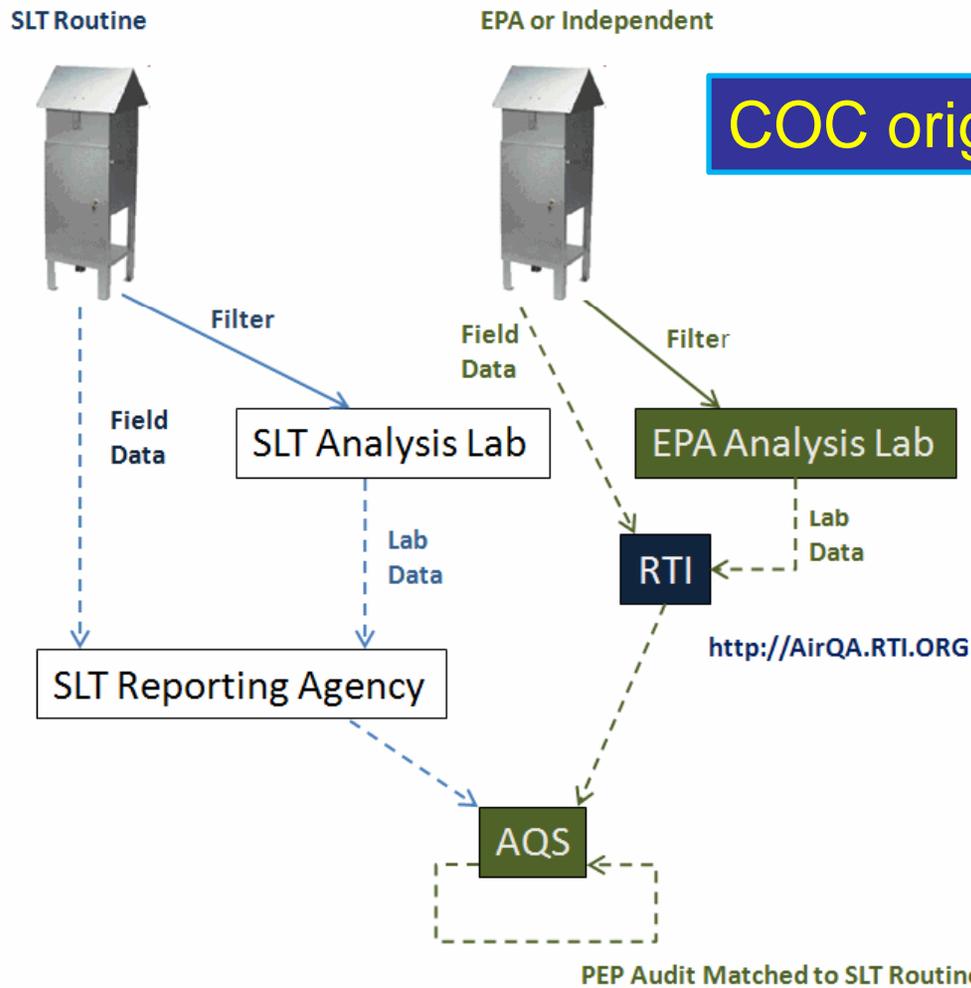


The Lead (Pb)-PEP **R**EVOLUTION— Where we've been—Where we're going

Challenges in the TSP Pb PEP Data

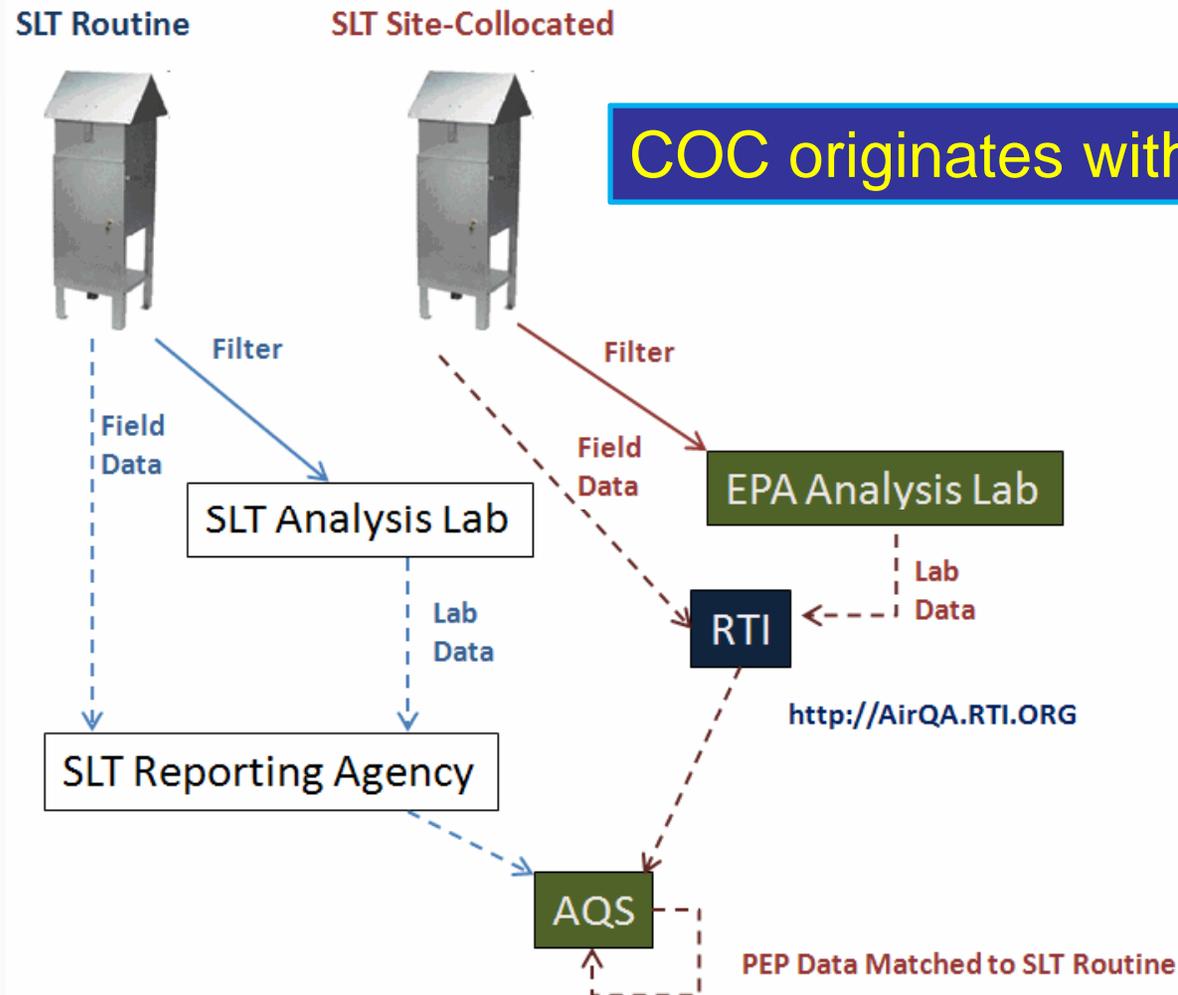
- Complicated Data Flow
 - EPA or Independent Audits
 - SLT Site-Collocated Audits
- Missing field data
- Data quality issues
- Data matching issues
- Bias data loss

Data Flow for EPA or Independent Audits



COC originates with Auditor

Data Flow for SLT Site-Collocated Audits



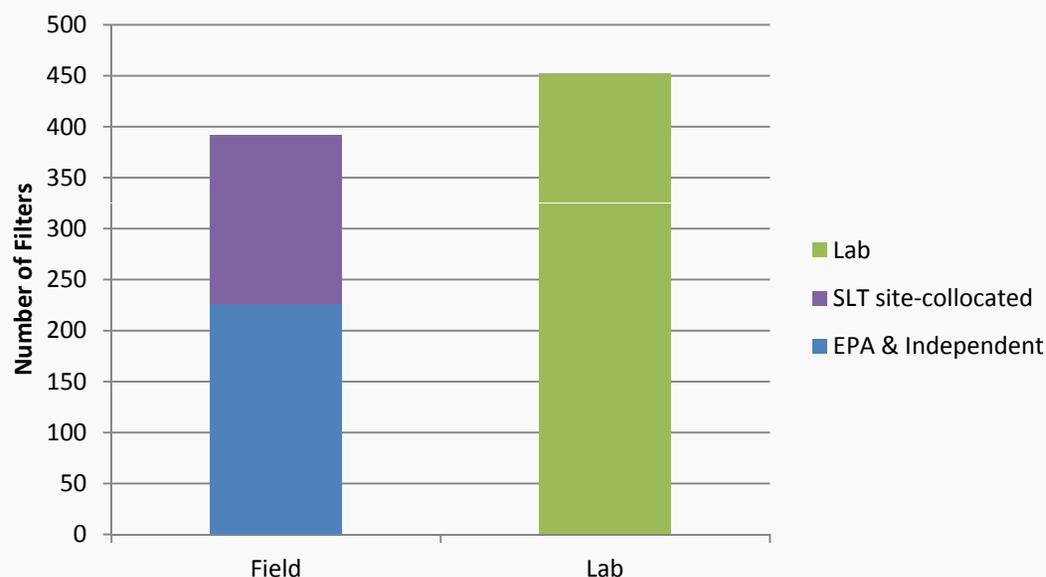
Incomplete and/or Incorrect Data Contribute to Data Matching and Validation Problems



Comparison of Field and Lab Record Counts

Missing some field data.
Differences could be attributed to:

- SLTs may be submitting field and trip blanks (these can't be entered on the website).
- Filters used and sent to lab but no field data entered (likely scenario).



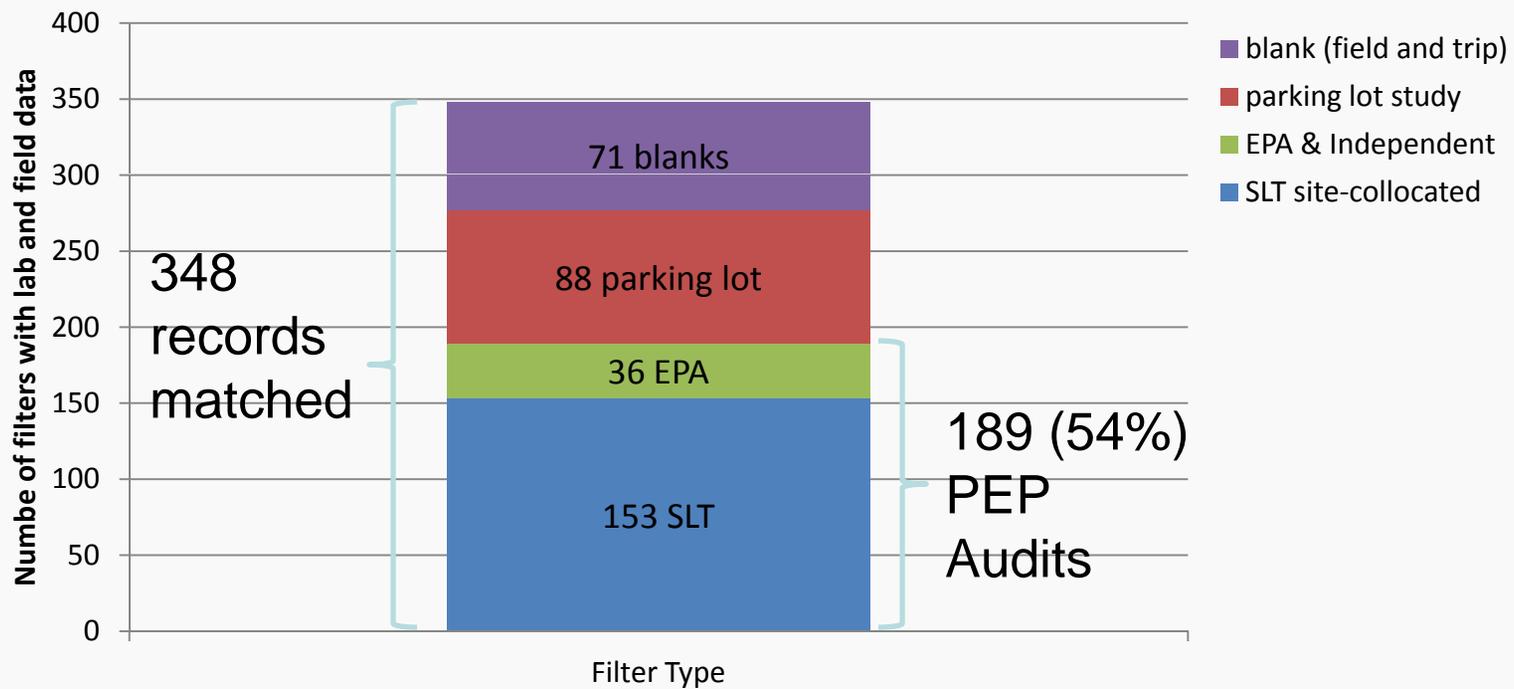
Includes EPA field blanks and parking lot study filters

More lab results than field data!

Both **Field** and **Lab** Results are **Required** for a Complete Audit.



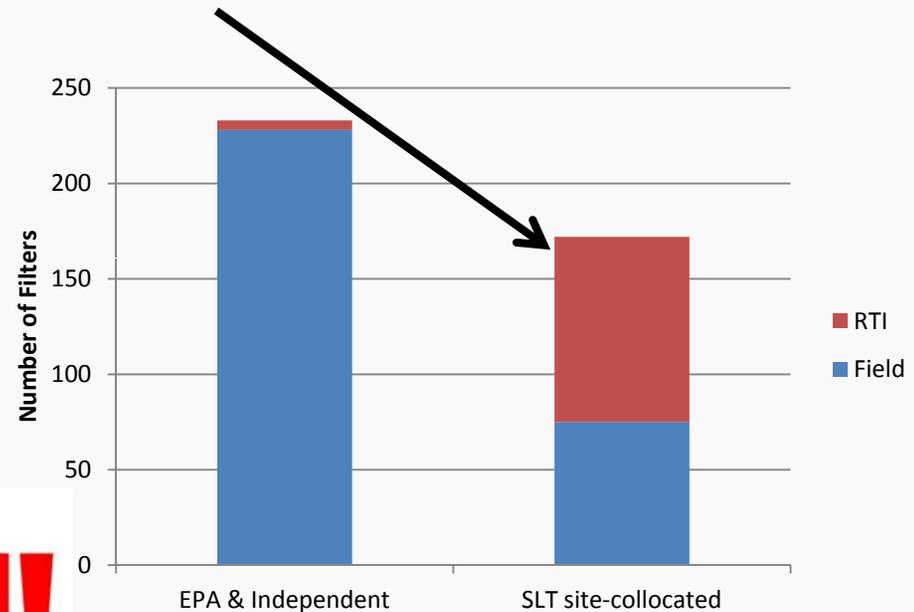
Filters with Matched Field and Lab Data





Missing COC/FDS Information

- Problems with entering data from scanned forms:
 - Difficult and time consuming for RTI to enter.
 - No contact info (needed to resolve questions).



HELP! We need the SLTs to register and enter their own data.

Missing COC/FDS data led to reliance on scanned images (often difficult to read)



Pb-PEP Collocated Hi Volume Sample Field Data Sheet and Chain-of-Custody Form
 (*Red- Required Field)

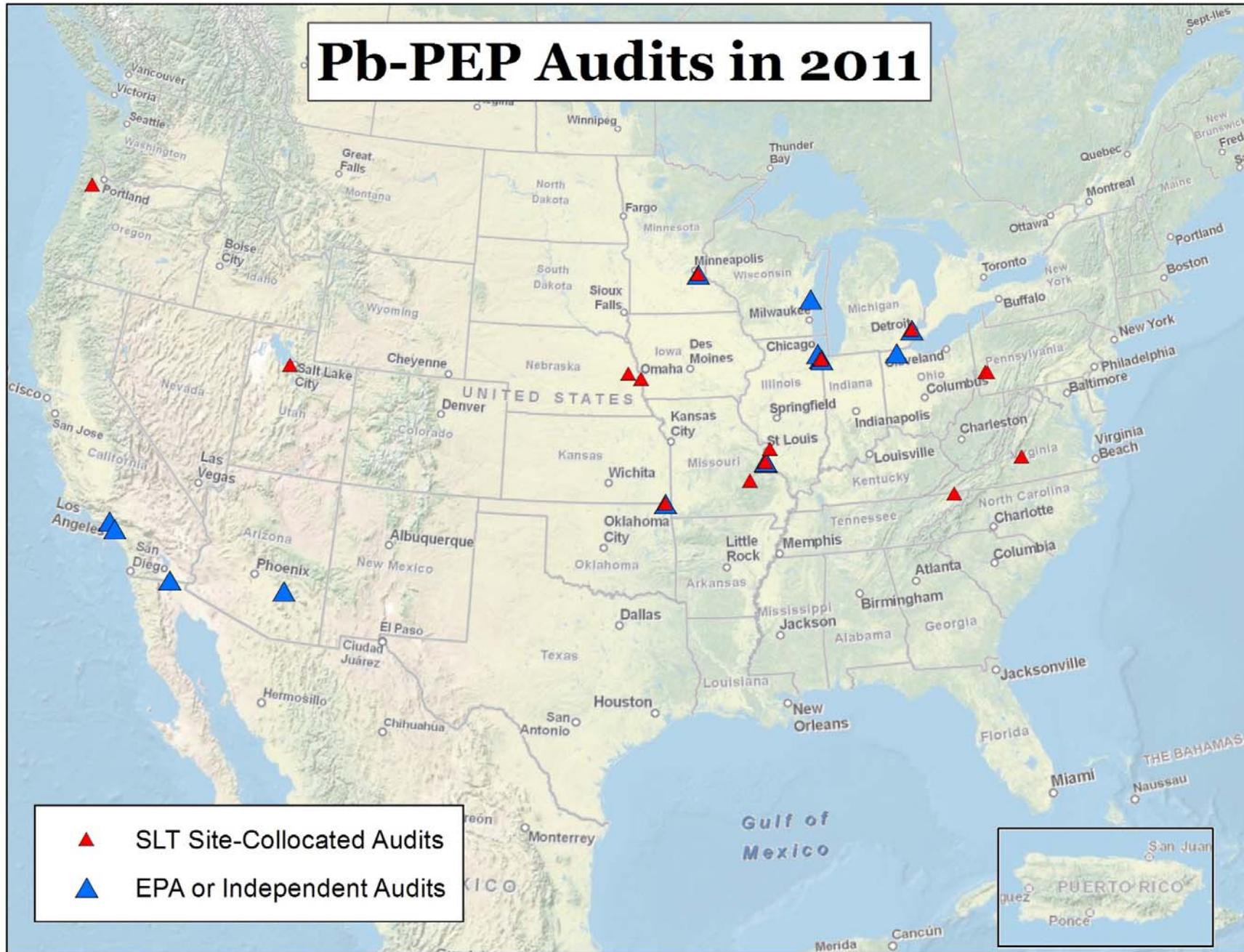
PART I - SAMPLING EVENT INFORMATION			
AQS Site ID*	17-119-0010	Filter ID Number*	09519976
Site Name*	Granite City 10th & Madison	*Collocated Sampler POC	1
Site Operator*	Dave Huffman	Primary Sampler Serial No	
Other Operators or Observers		Collocated Sampler Serial No.	A22209

PART II - SAMPLING EVENT FILTER AND EXPOSURE DATA			
*Sample Date (MM/DD/YY)	01/09/11	Sample Retrieval Date	01/09/11
*Elapsed Time (ET) (hr)	24	*Total Volume ambient (m ³)	10164
*Start Date/Time	01/09/11 00:00	*Initial Flow Rate ambient (m ³ /min)	1.350
*Stop Date/Time	01/09/11 14:20	*Final Flow Rate ambient (m ³ /min)	1.350
Flow Rate ambient (m ³ /min)	Max: 1.350	Min: 1.280	Avg: 1.350
Temperature (o C)	Max:	Min:	Avg:
Barometric Pressure (mm Hg)	Max:	Min:	Avg:
Sampler Flags	Field Flags:		

*Shipment Date	01/21/11	*Shipped via:	UPS	x	Other
*Affiliation of Shipper	UPS Next Day Air	*Airbill No.	CA 948 9-04		
*Shipped by (Signature)	<i>Michelle Husear</i>	Overhaul			
Do you want a portion of the filter sent back to the PQAO?	Y or N				

PART VI - NATIONAL Pb-PEP LABORATORY RECEIVING INFORMATION			
Date Received	1/21/11 10:30	Received by (Signature):	Integrity Flag:
Notes:		<i>[Signature]</i>	OK

Pb-PEP Audits in 2011



Issues Matching PEP Audits to Routine Sample Results in AQS



Hi-Vol PEP Audits by Year

(filters with field and lab data matched up)

Year	EPA or Independent Audits	SLT Site-Collocated Audits	Total Audits	EPA matched to Routine	SLT matched to Routine	Total matched to Routine	Data Loss (% of Total)
2010	6	88	94	4	62	66	30%
2011	29 (42% of goal*)	60	89	17 (25% of goal*)	37	54	39%
2012	1	5	6	0	2	2	67%
TOTAL	36	153	189	21	101	122	35%

* Annual EPA goal is ~69 audits per year

- 43 PEP audits match to invalid routine data in AQS
- 8 PEP audits have invalid AQS Site IDs (not 9 character site codes)

Reasons Routine Values were Invalidated



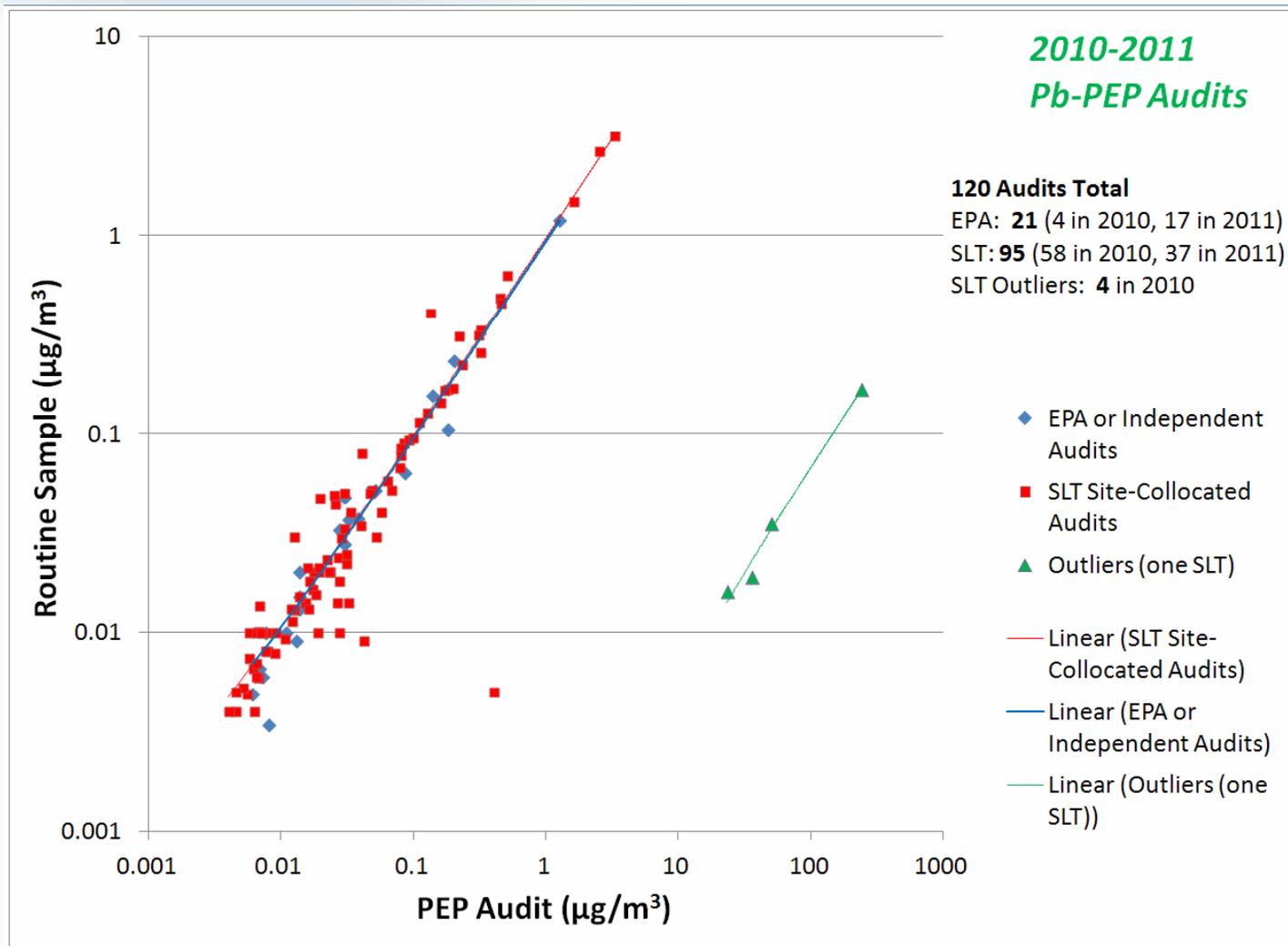
AQS Null Data Codes			
Parameter	Null Data Code		Number of Audits
14129	AM	MISCELLANEOUS VOID	10
14129	AL	VOIDED BY OPERATOR	8
14129	AZ	Q C AUDIT (AUDT)	7
14129	AR	LAB ERROR	5
14129	AU	MONITORING WAIVED	3
14129	AQ	COLLECTION ERROR	3
14129	AN	MACHINE MALFUNCTION	3
14129	AV	POWER FAILURE (POWR)	2
14129	AI	INSUFFICIENT DATA (CAN'T CALCULATE)	2
14129	AH	SAMPLE FLOW RATE OUT OF LIMITS	2
14129	BL	CODE NOT DEFINED	1



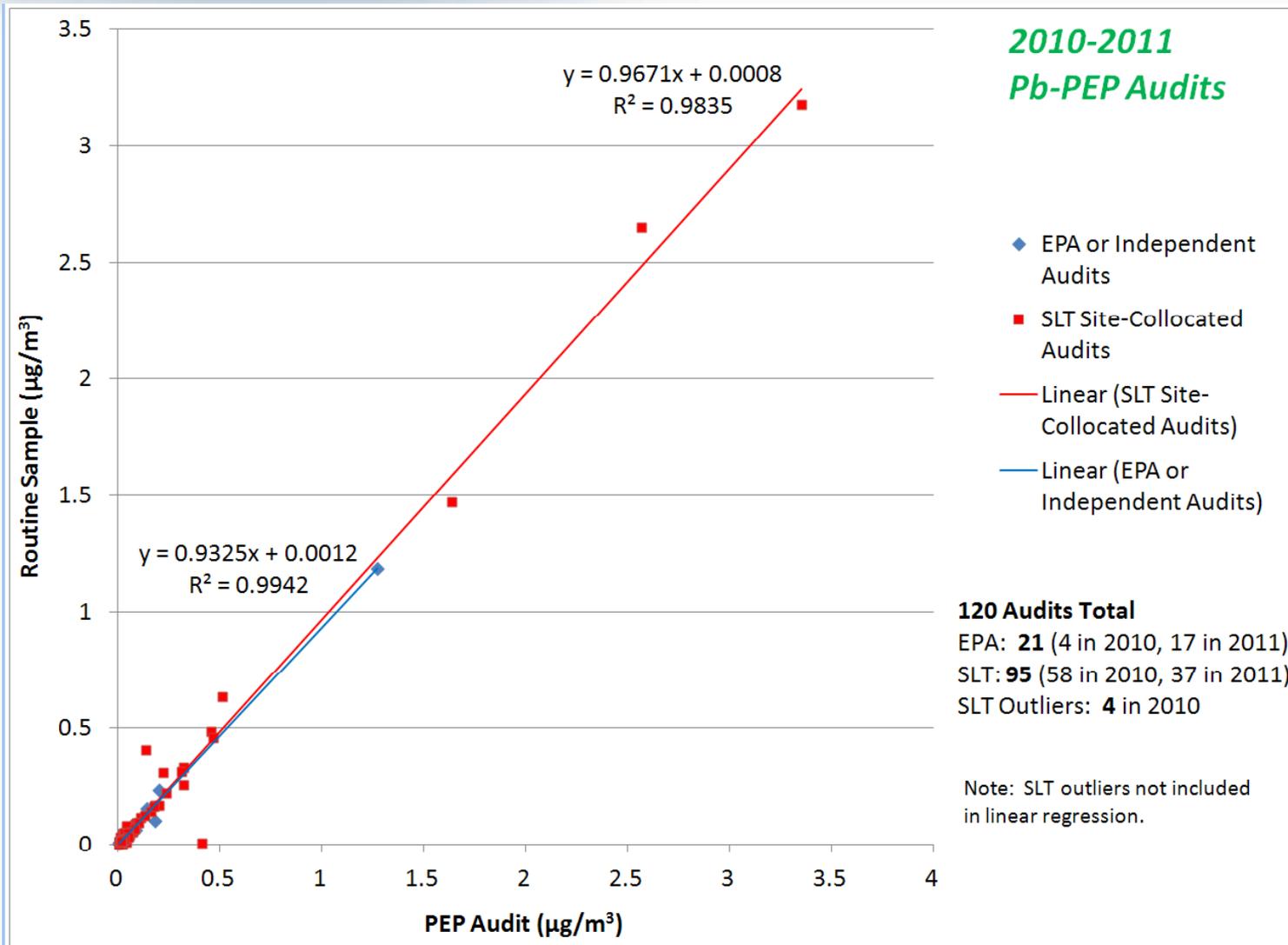
Critical Data Reporting Issues

- **Incomplete AQS_Site_ID** – Need all 9 digits, including leading zeros for state code
- **Incorrect AQS_Site_ID** – Some IDs do NOT match ANY known site for lead
- **Incorrect filter numbers** – Fundamental need for matching field with lab results!
- **No matching site value in AQS** – Wrong site, wrong date, site did not submit results, etc.
- **Flow or volume data in incorrect units** – e.g. submitted values in cubic feet but specified as cubic meters
- **Incomplete field data** – Prohibits validation

Examine PEP vs. Routine Concentrations (Log Scale to View Outliers)

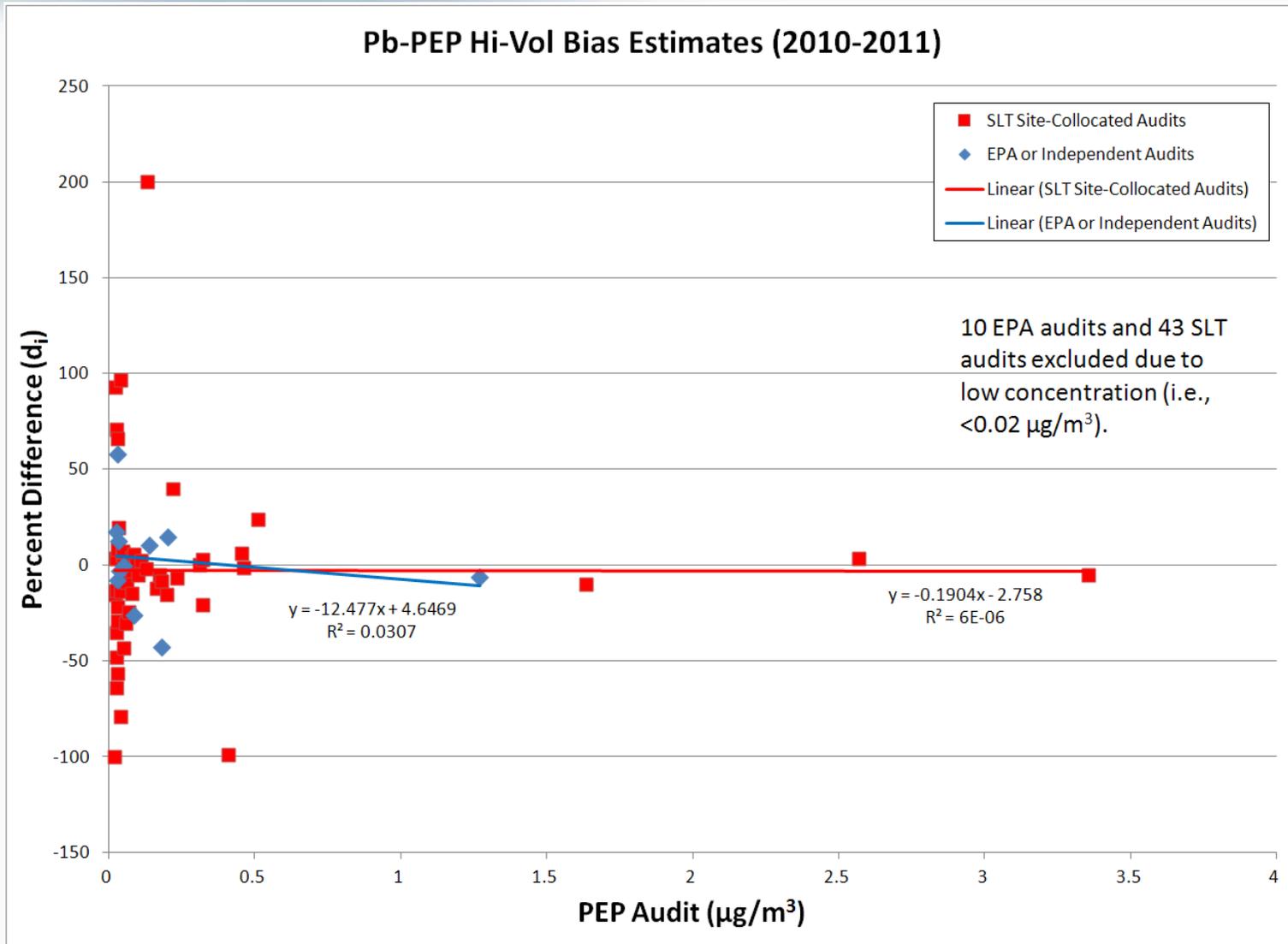


Examine PEP vs. Routine Concentrations (Linear Regression)



Examine PEP vs. Routine Bias Estimates

$$d_i = (\text{Routine} - \text{PEP}) / \text{PEP} * 100\%$$



Revisit Audit Counts with Bias Data Loss



Year	PEP Audits			Matched to Routine				Results $\geq 0.02 \mu\text{g}/\text{m}^3$			
	EPA	SLT	Total	EPA	SLT	Total	Unmatched Loss (% of PEP audits)	EPA	SLT	Total	Unmatched & Bias Loss (% of PEP audits)
2010	6	88	94	4	62	66	30%	3	35	38	60%
2011	29 (42% of goal*)	60	89	17 (25% of goal*)	37	54	39%	8 (12% of goal*)	21	29	67%
2012	1	5	6	0	2	2	67%	0	2	2	67%
Total	36	153	189	21	101	122	35%	11	58	69	63%

* Annual EPA goal is ~69 audits per year

For bias estimates, exclude Pb audit concentrations $< 0.02 \mu\text{g}/\text{m}^3$

- 1 EPA and 27 SLT excluded 2010
- 9 EPA and 16 SLT excluded 2011



The Lead (Pb)-PEP **R**EVOLUTION— Where we are—Where we're going

Tools and Remedies

- Website
 - COC/FDS redesigned and expanded for critical validation data and PM-10 enabled
 - Will become the site for Regions and SLTs to participate in the validation process
 - Will ultimately provide the PEP data to generate the bias values until the AQS QA transaction area is re-engineered.



PM2.5-PEP, Chemical Speciation, & Pb-PEP QA Website

- Home
- Pb-PEP
- PM2.5-PEP
- CSN Audit Repository
- AA-PGVP

Welcome to the QA Website

The purpose of this website is to facilitate the transmission and processing of field data collected as part of EPA's PM2.5 and Lead (Pb) National Monitoring Networks QA programs. In addition the site will be used to provide program managers with summary reports to aid in their QA review of program data.

[Click here](#) to view the Terms of Use for this site.

[Click here](#) to log into the site. If you do not have an account, [click here](#) to register.

<https://AirQA.RTI.ORG>

CSN Audit Repository	Auditor Certifications
PM2.5 - Performance Evaluation Program	Pb - Performance Evaluation Program
AA-PGVP - Ambient Air Protocol Gas Verification Program	





Conclusions

- Collocated SLT sites are established
- Auditors need to complete digital COC/FDS forms using the AirQA.rti.org Website
- EPA is making data available to QA managers via the Website
- Bias data loss due to low concentrations is an inherent issue
- Correlation of data we have been able to match up is encouraging



Pb-PEP Contacts

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