

Experimental Inter-comparisons  
of the  
Chemical Speciation Laboratories

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US EPA ORIA-Montgomery  
Before the  
**IMPROVE Steering Committee**  
October 21-22, 2010

# US EPA / NAREL



# Specific QA Activities at NAREL

- PT Samples  
single-blind samples analyzed at different labs
- Laboratory TSA  
on-site inspection and interviews with lab staff
- Special Studies  
experimental investigations

# Speciation Laboratories

California Air Resources Board (CARB) Sacramento, CA	Mass, Ions, Carbon, XRF
Desert Research Institute (DRI) Reno, NV	Mass, Ions, Carbon, XRF
Oregon Dept. of Environmental Quality (ODEQ) Portland, OR	Mass, Ions, XRF
Research Triangle Institute (RTI) Research Triangle Park, NC	Mass, Ions, Carbon, XRF
South Coast - Air Quality Management District (AQMD), Diamond Bar, CA	Mass, Ions, Carbon, XRF
Crocker Nuclear Lab, University of California Davis, CA (UCD)	XRF
EPA's National Air and Radiation Environmental Laboratory (NAREL), Montgomery, AL	Mass, Ions, Carbon

# Collocated Met One Samplers



# XRF Analysis

Thirty 47-mm filters analyzed at 6 Labs  
RTI served as reference lab

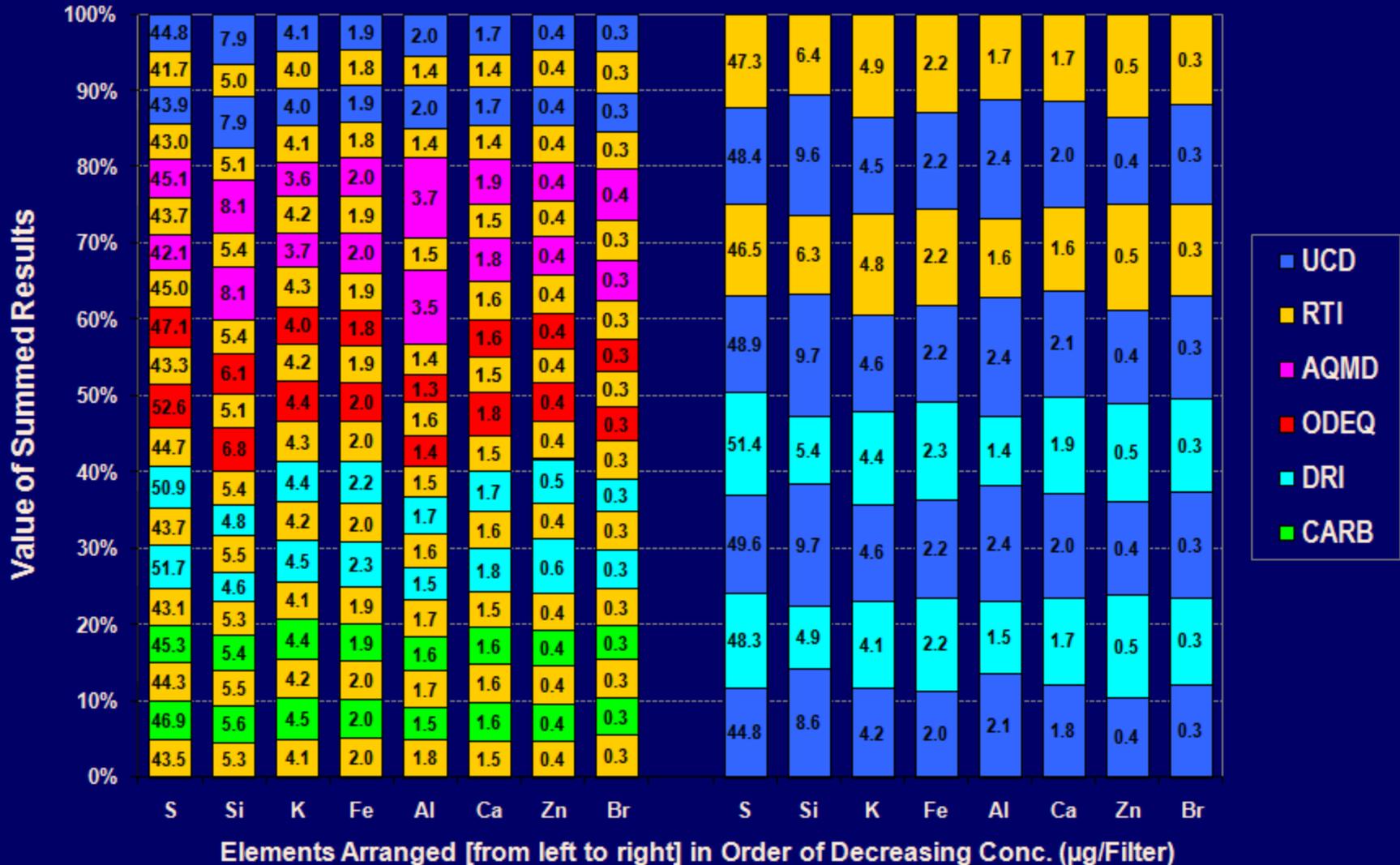
Twelve 25-mm filters analyzed at 3 Labs  
UC Davis served as reference lab



## Comparison of XRF Results from Replicates Collected on February 25

*47-mm Filters*

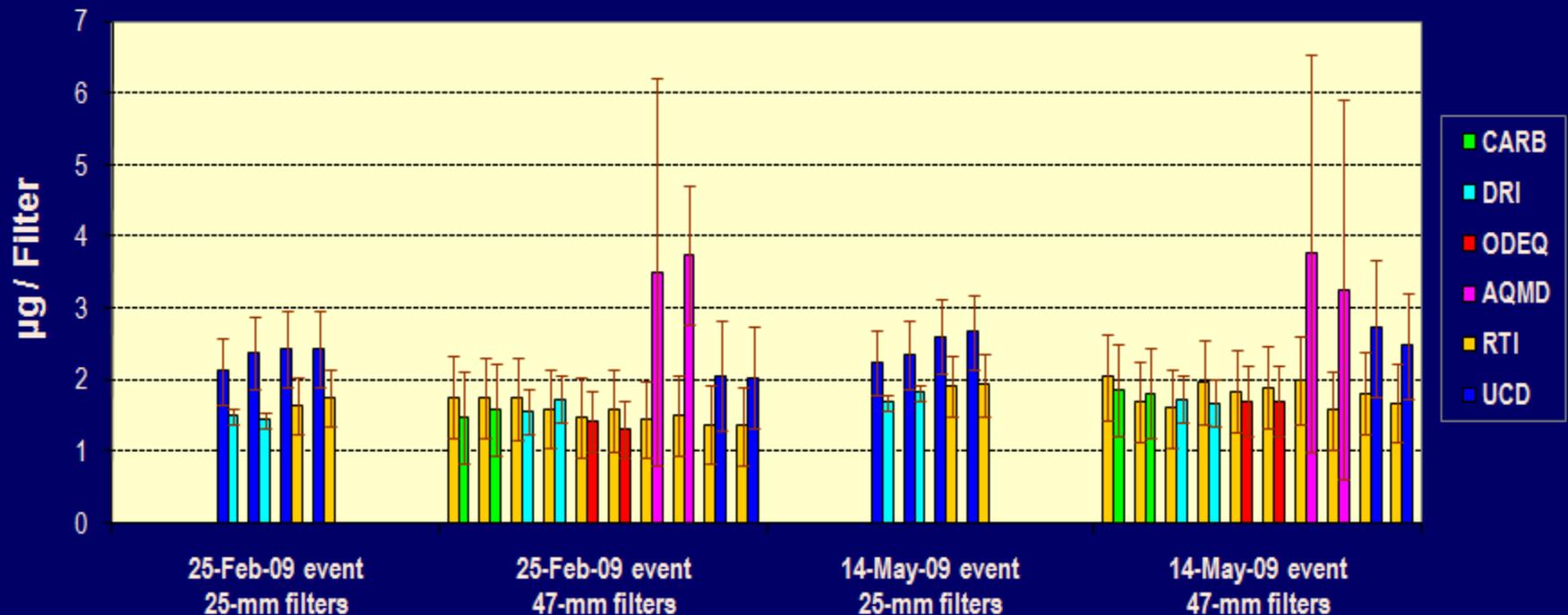
*25-mm Filters*



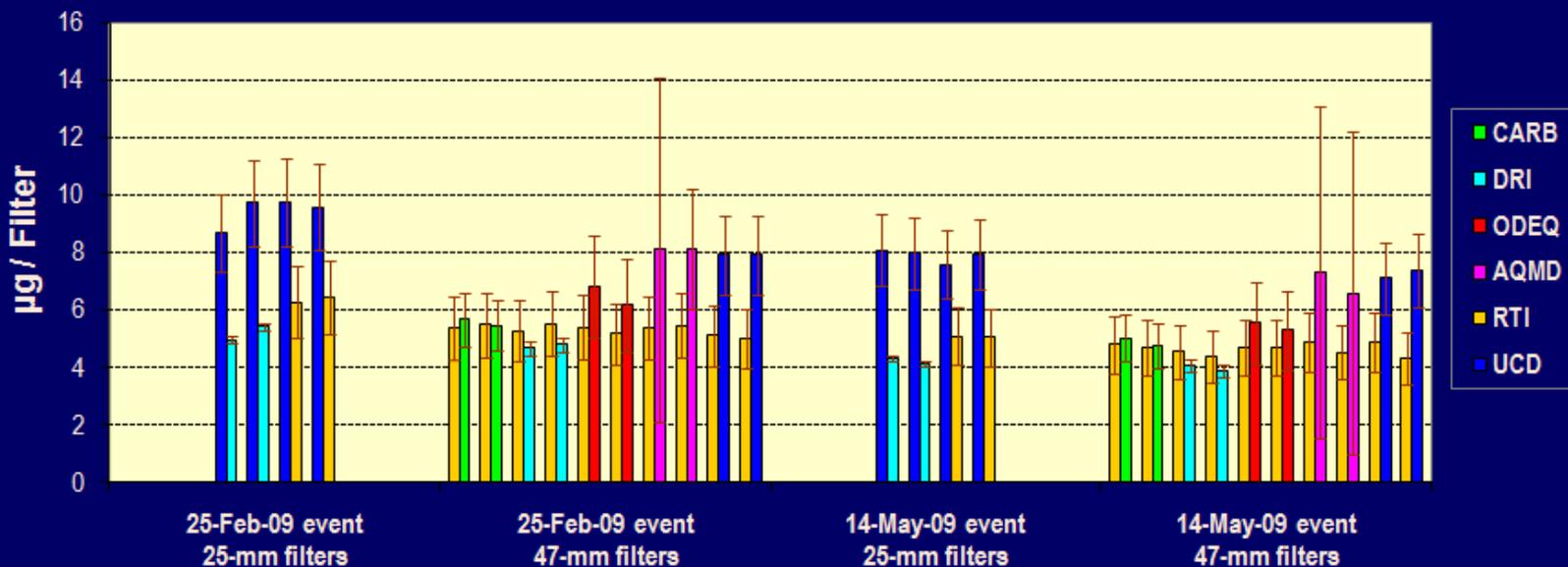
# XRF Results for Replicates

## Prepared During Two Different Sampling Events

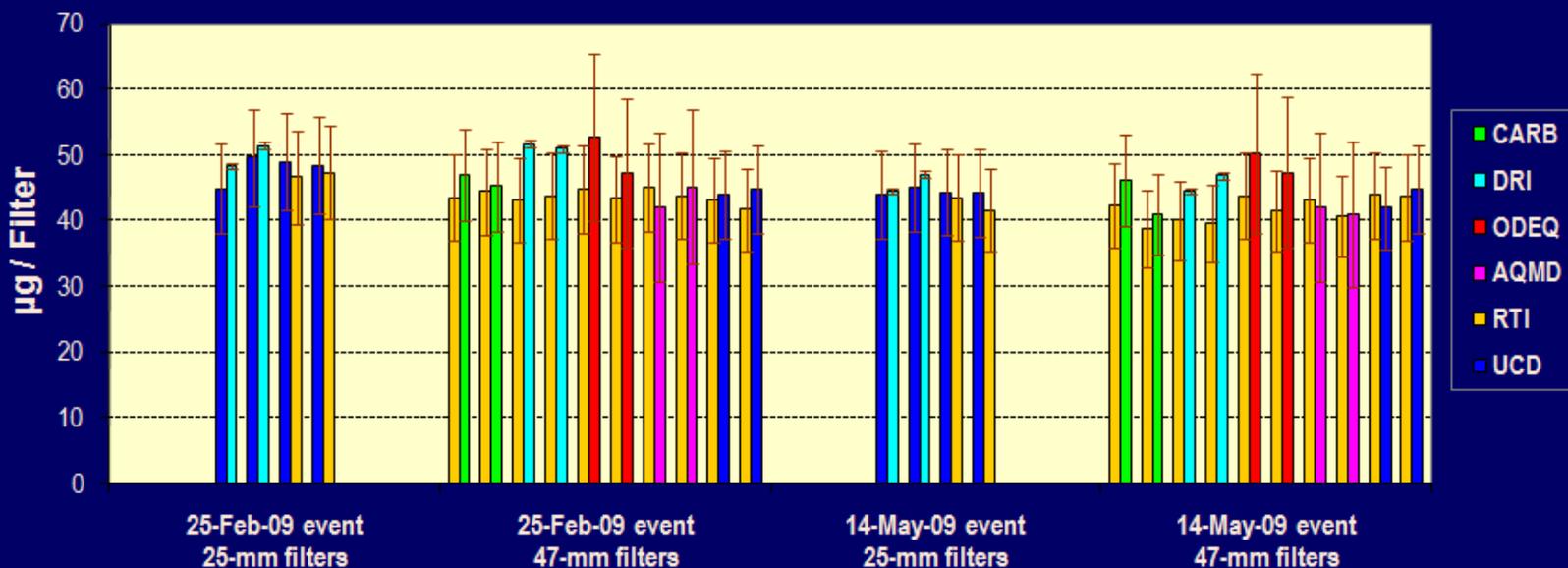
Aluminum — XRF Results with 3-Sigma Uncertainties



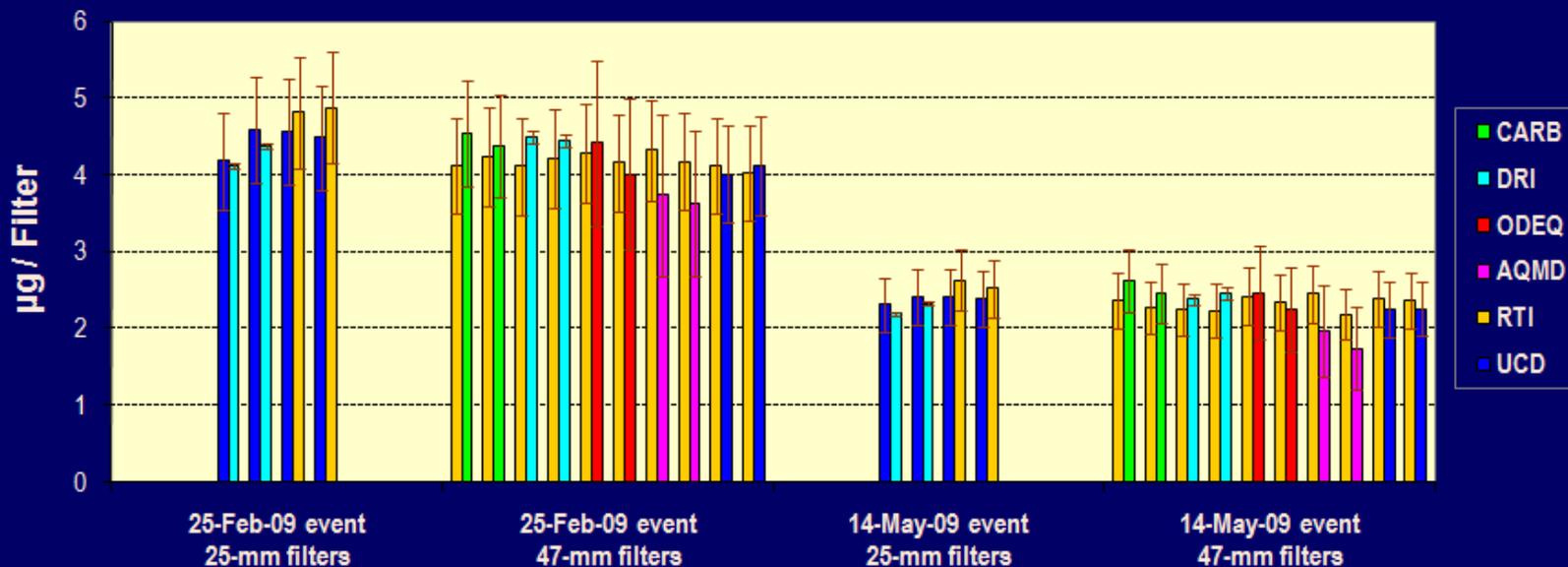
### Silicon — XRF Results with 3-Sigma Uncertainties



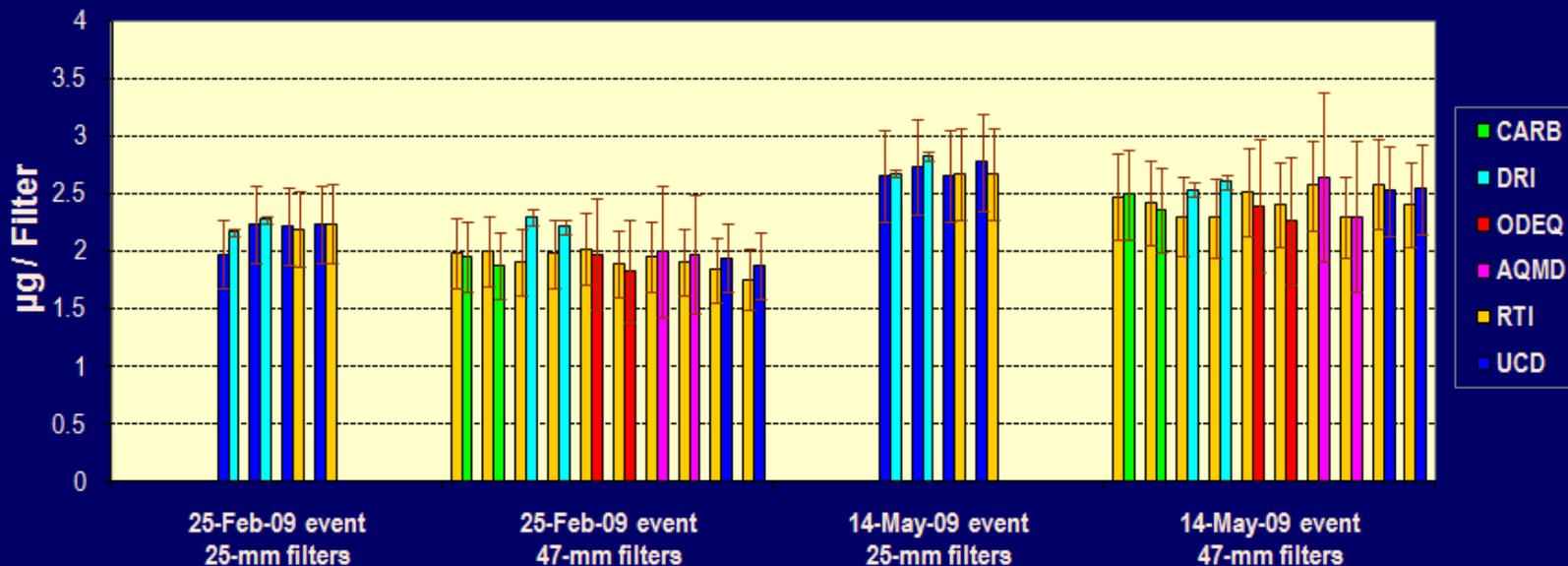
### Sulfur — XRF Results with 3-Sigma Uncertainties



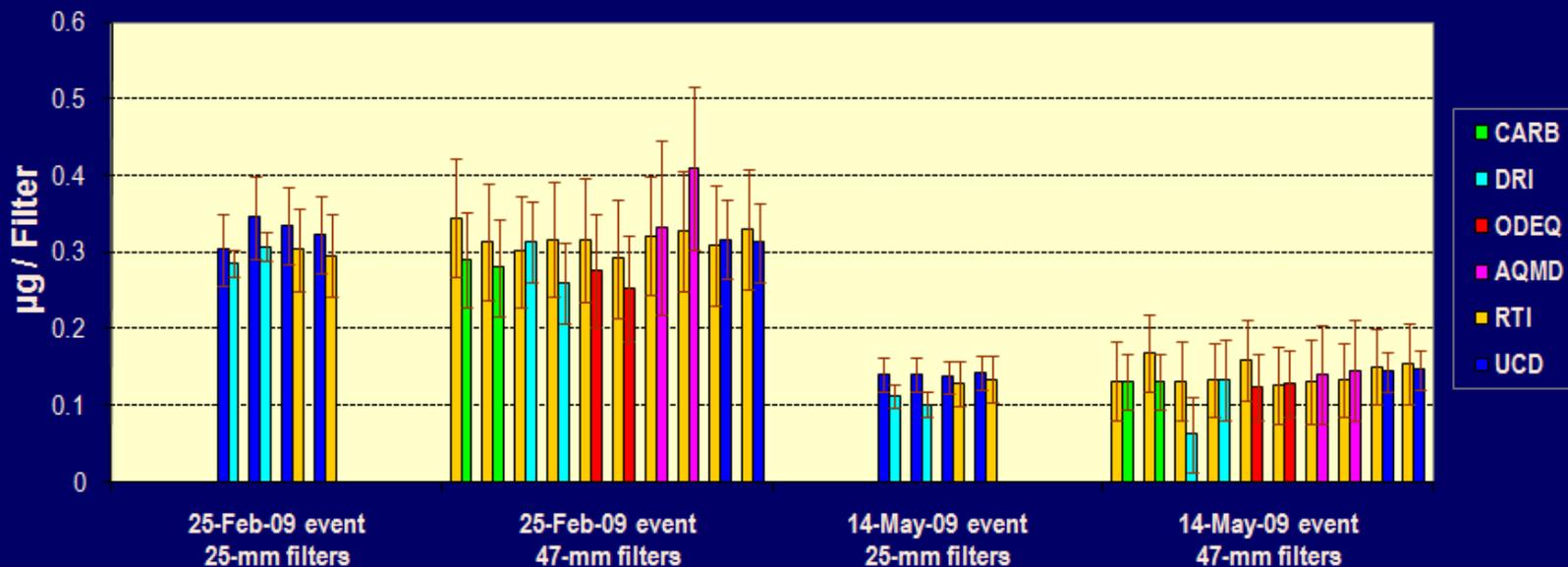
### Potassium — XRF Results with 3-Sigma Uncertainties



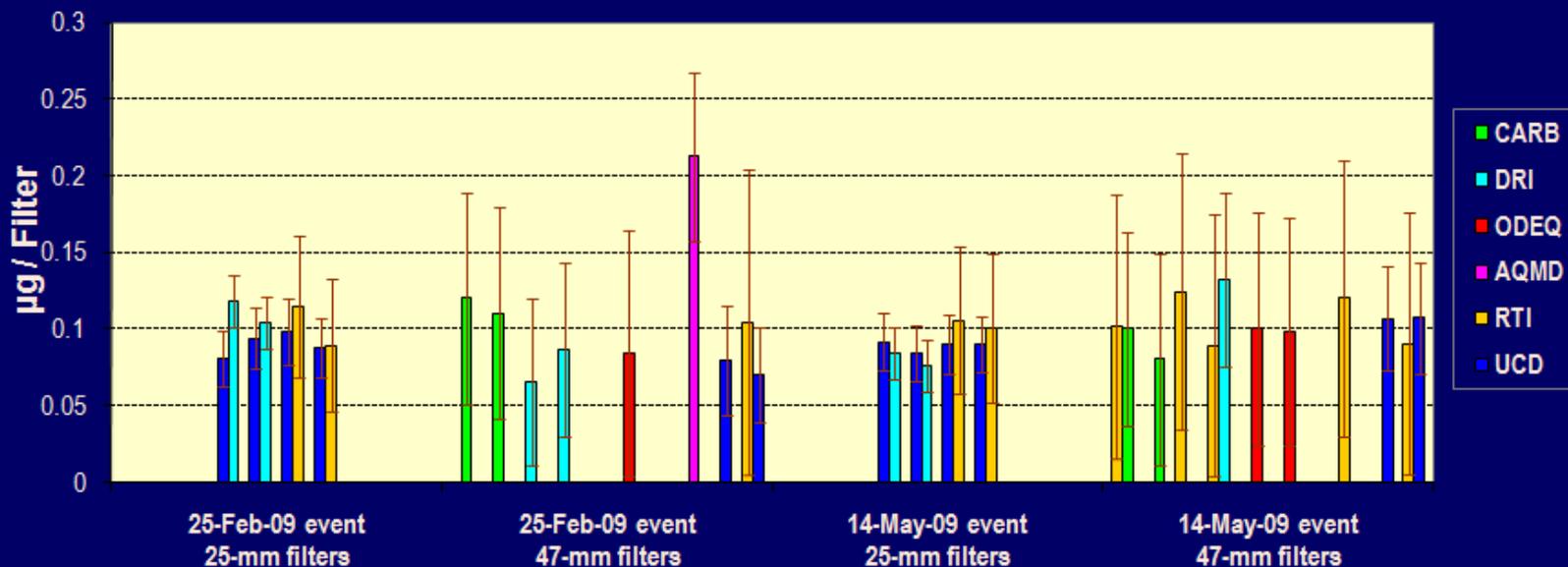
### Iron — XRF Results with 3-Sigma Uncertainties



### Bromine — XRF Results with 3-Sigma Uncertainties



### Lead — XRF Results with 3-Sigma Uncertainties



# TOA Carbon Analysis

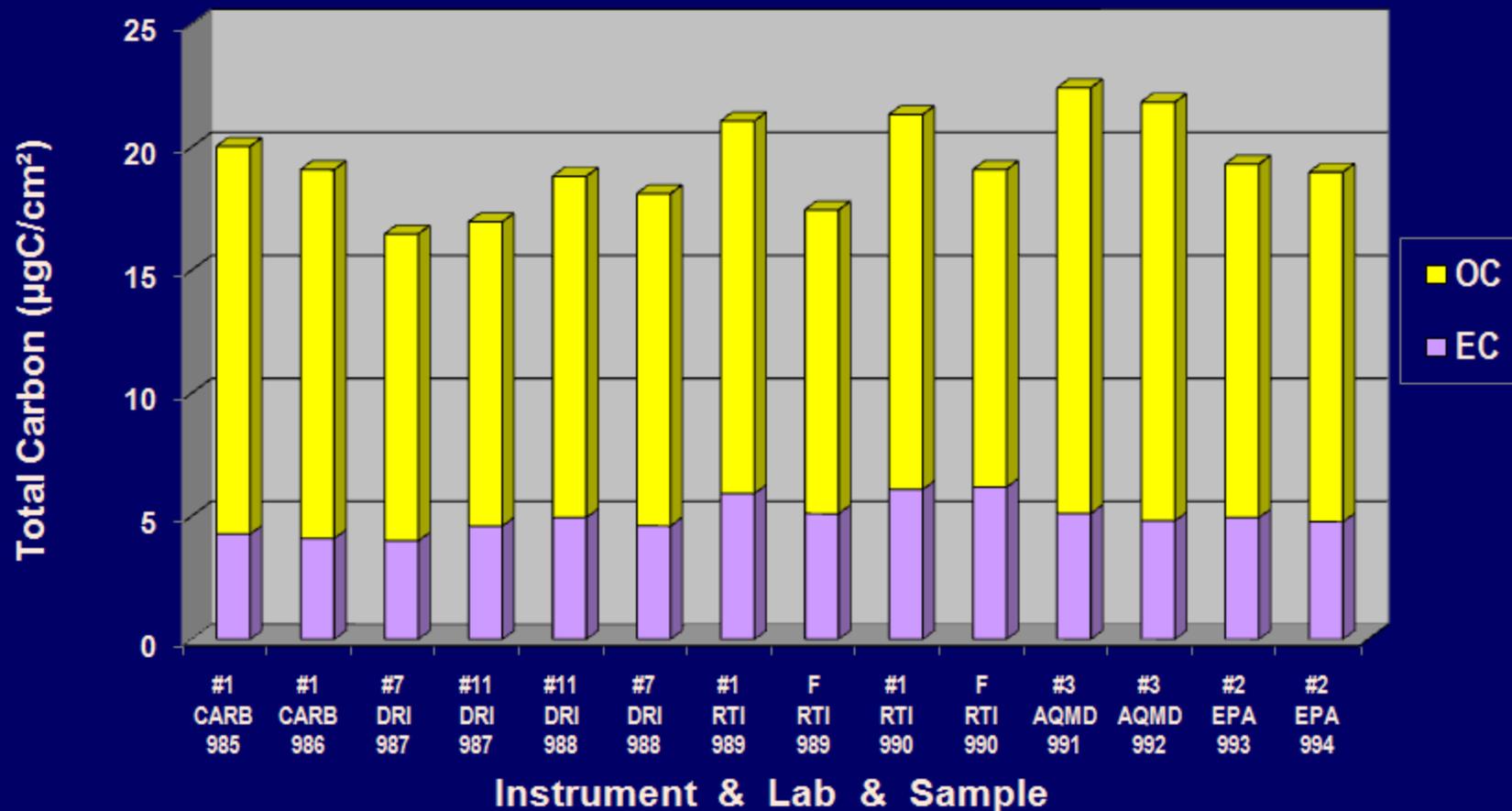
Each Lab Received Six Filters for Analysis

2 replicates from January 29 sampling event

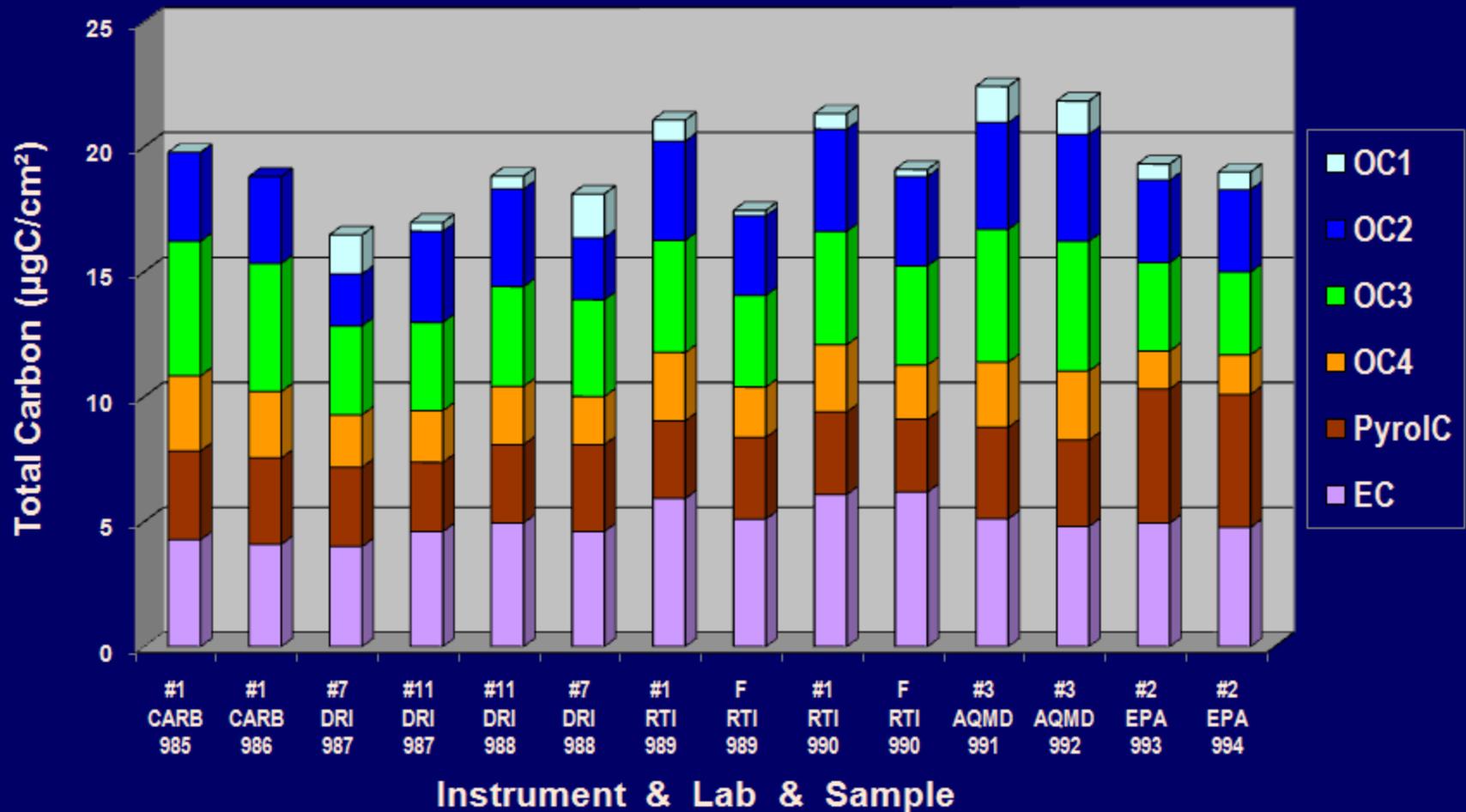
2 replicates from July 9 sampling event

2 blank filters

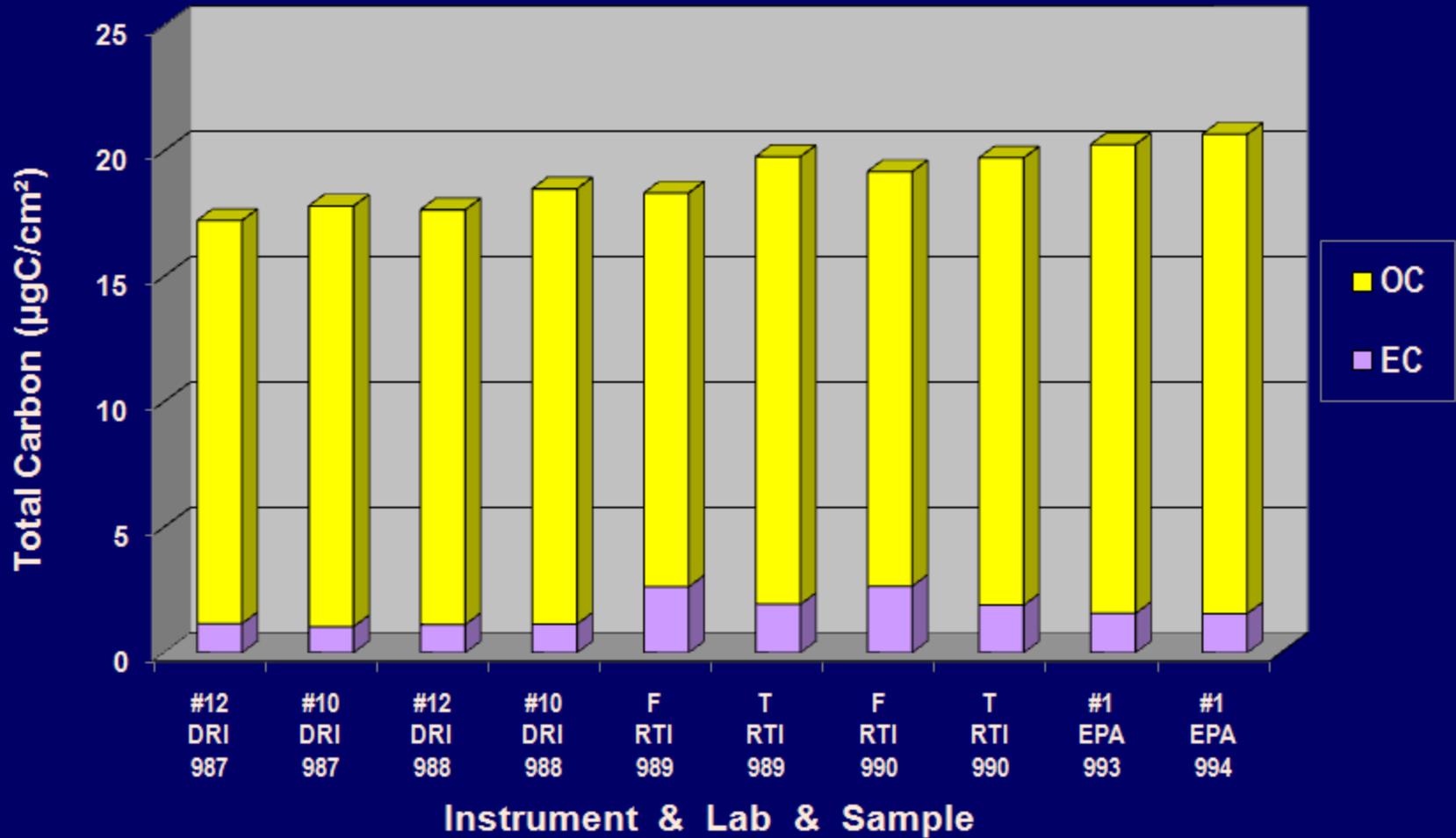
## Analysis of Replicate Quartz Filters - January 29 Event IMPROVE\_A / TOR Method



## Analysis of Replicate Quartz Filters - January 29 Event IMPROVE\_A / TOR Method



## Analysis of Replicate Quartz Filters - January 29 Event CSN / TOT Method



# Ion Chromatographic Analysis

## Most Labs Received Six Filters for Analysis

2 replicates from January 7 sampling event

2 replicates from March 30 sampling event

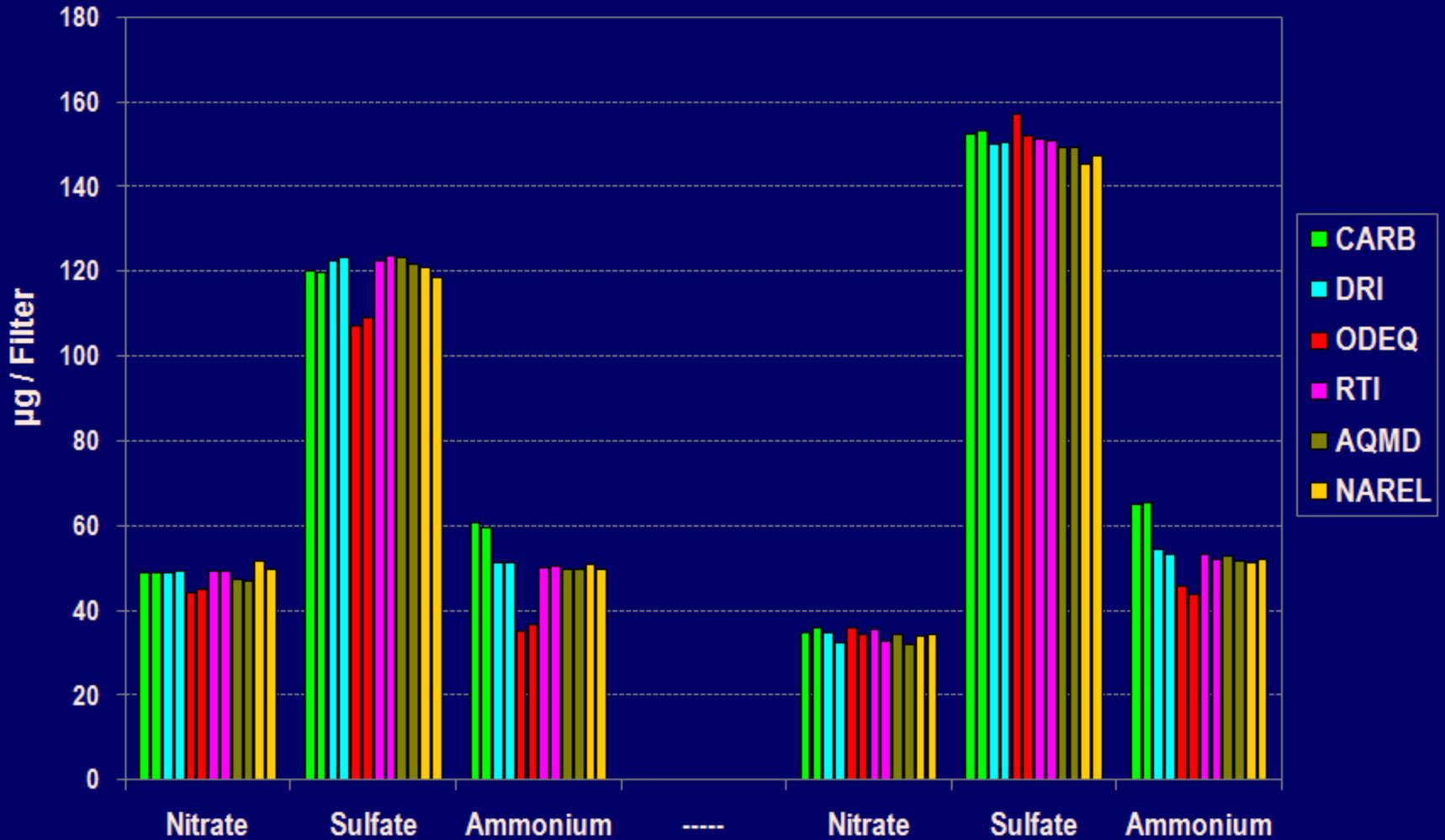
2 blank filters

*DRI and RTI received extra filters to test more than one method.*

# Nylon Filter Analysis, CSN Method, Mid-level Components

January 7 Replicates

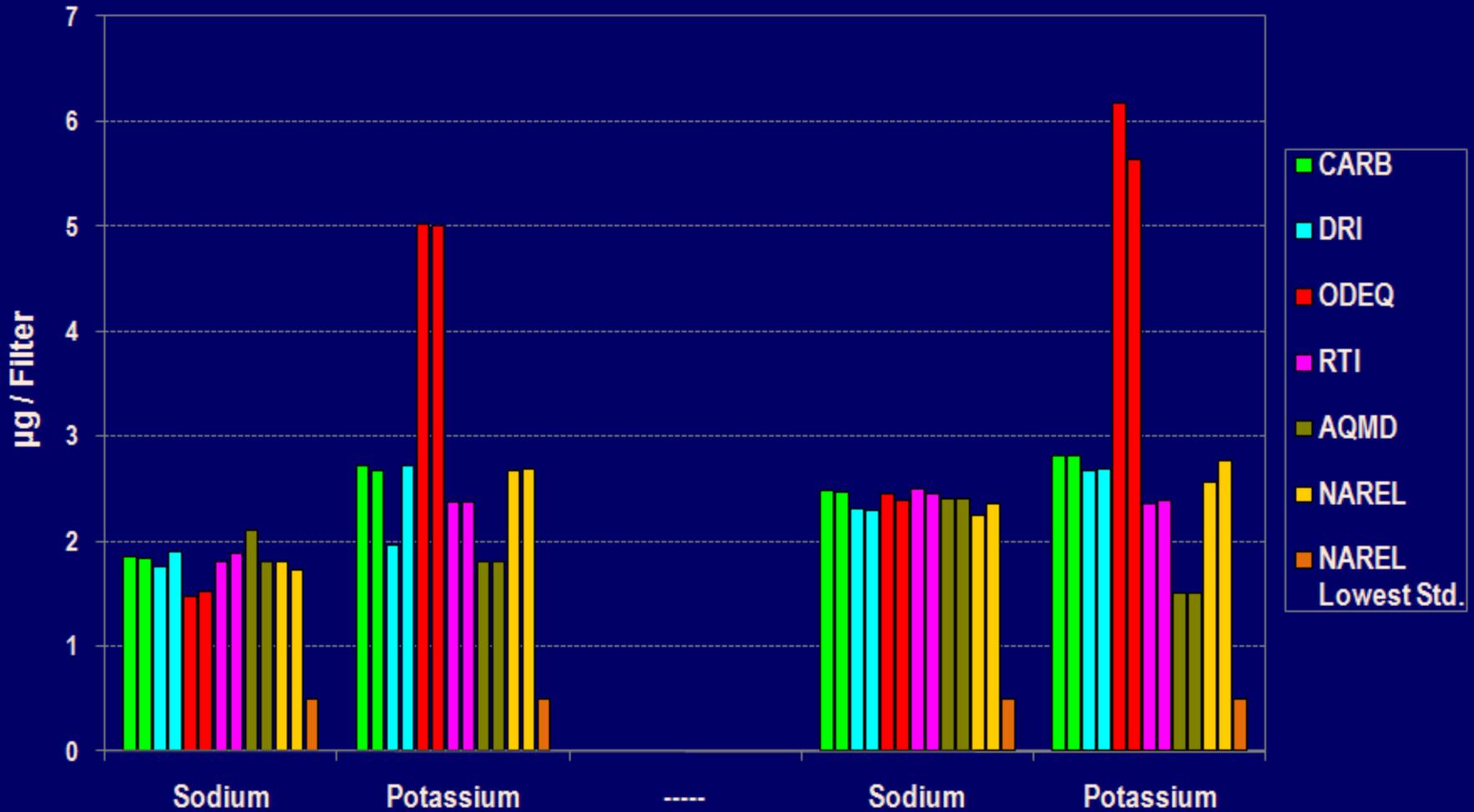
March 30 Replicates



# Nylon Filter Analysis, CSN Method, Low-level Components

January 7 Replicates

March 30 Replicates

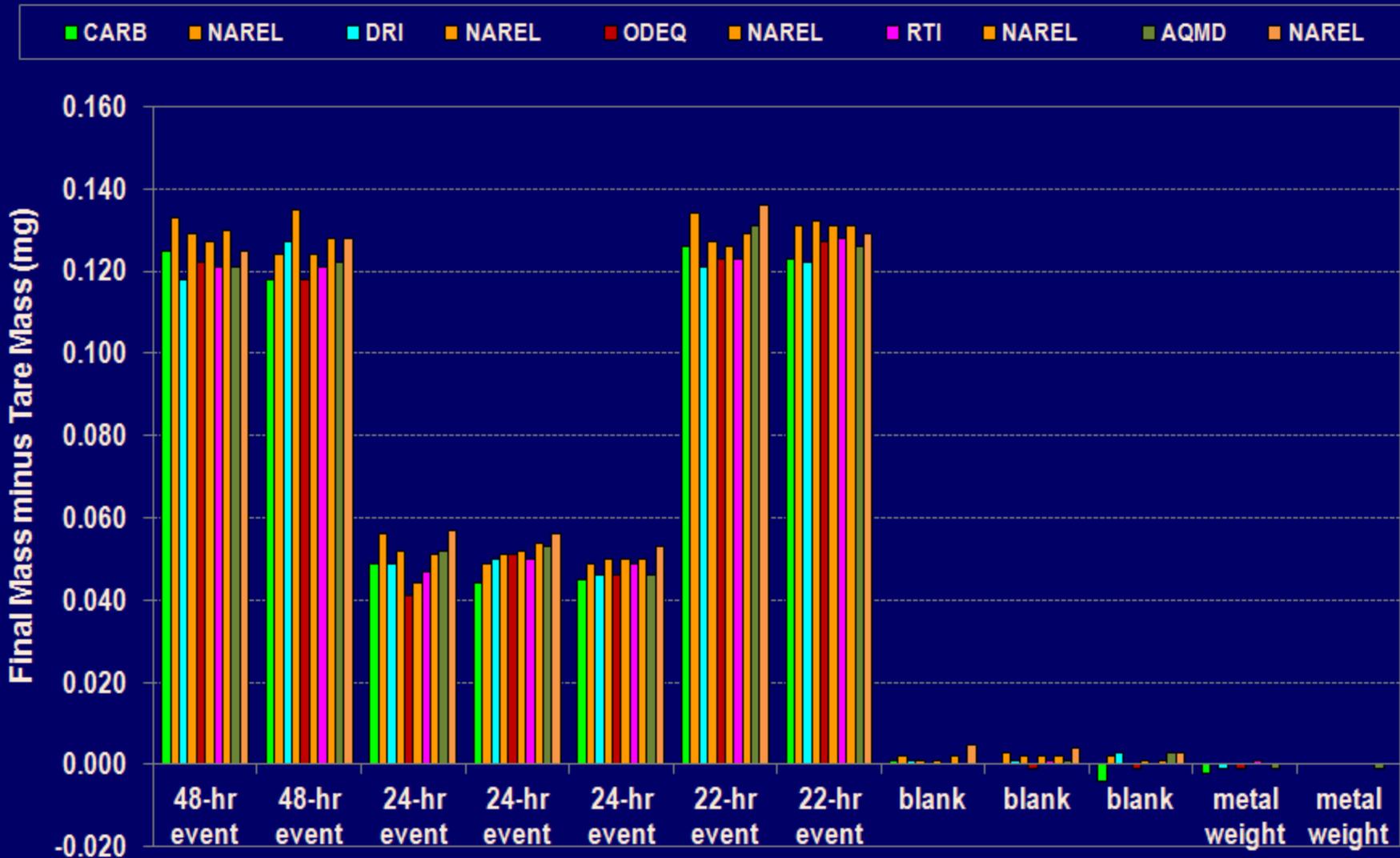


# Gravimetric Mass Analysis

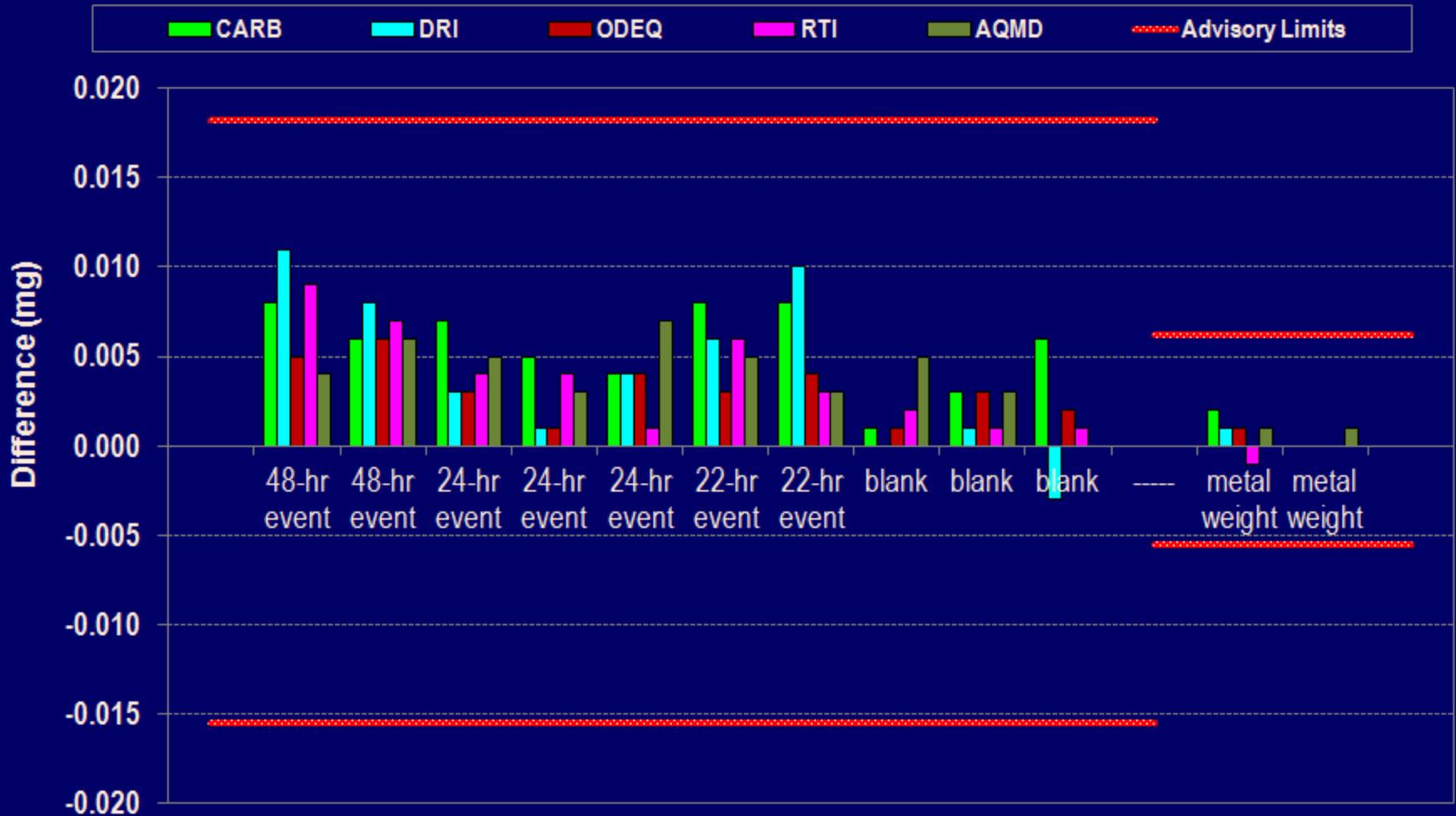
Ten teflon filters and two metallic weights were submitted to each lab for analysis.

*NAREL* served as reference lab

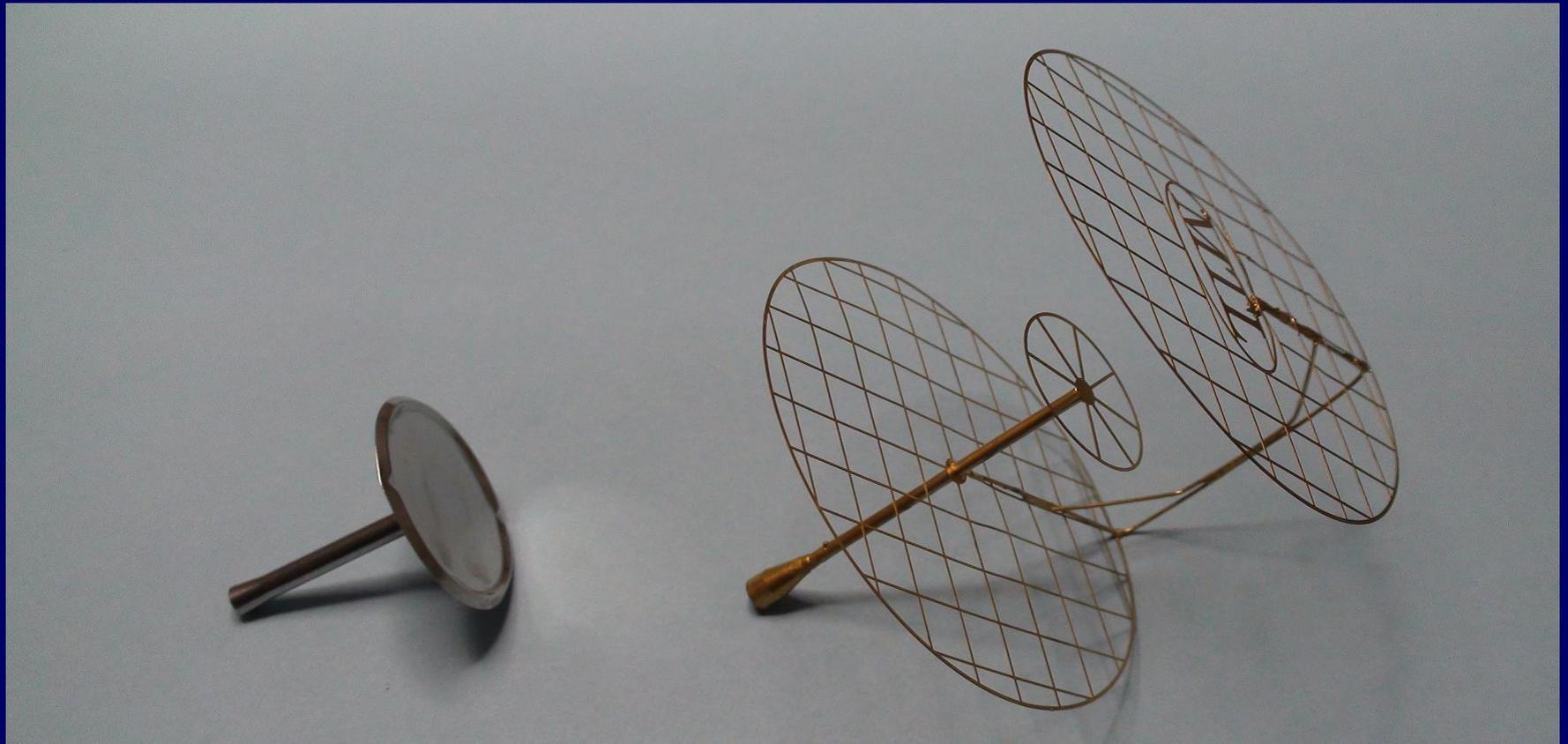
## Captured PM2.5 Determined by Each Participating Lab and NAREL



## PM2.5 Capture Comparisons - NAREL Value minus Participating Lab Value (negative value indicates a smaller capture determined by NAREL)



# New Kind of Weighing Pan

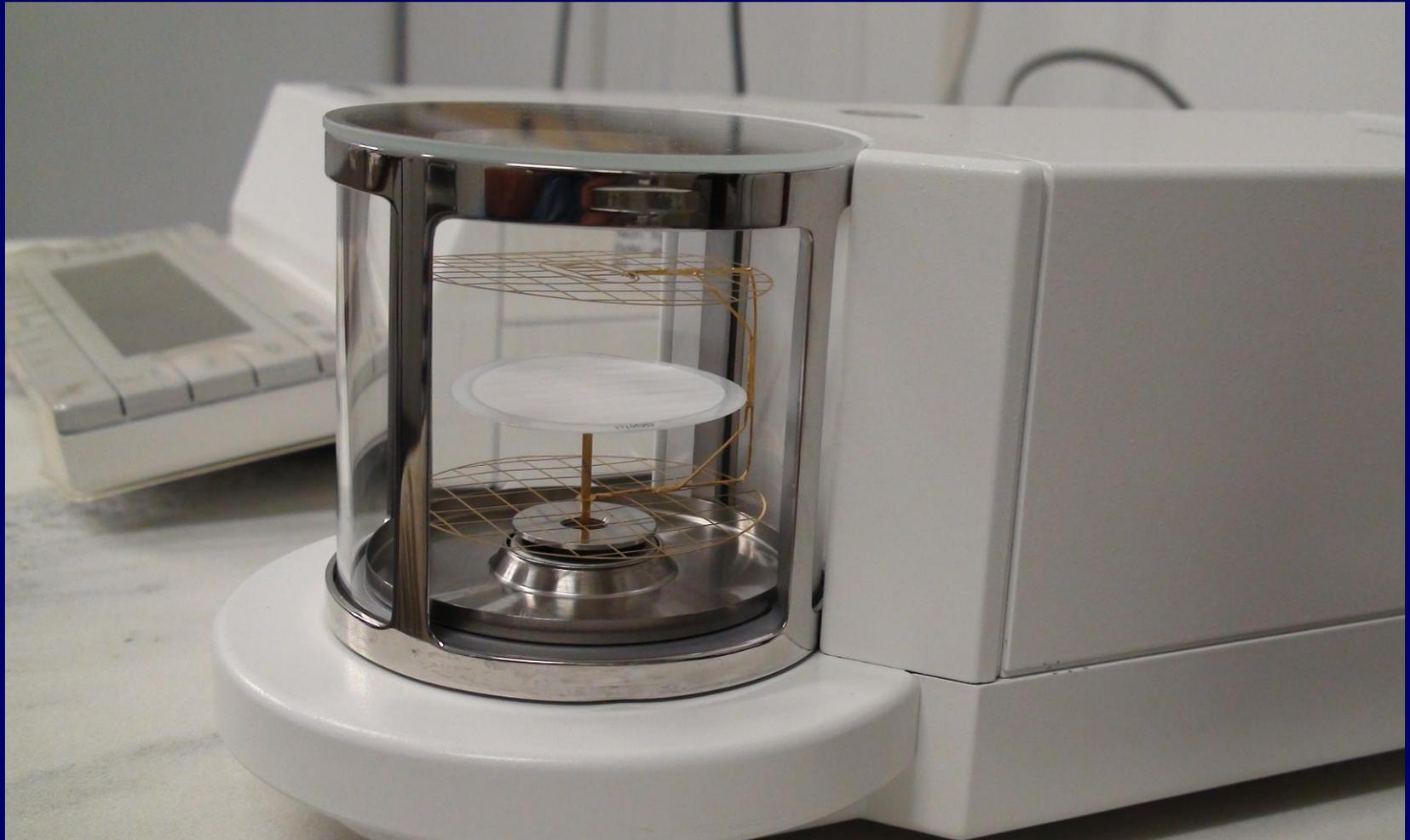


Standard Mettler Pan

MTL Faraday Pan

# Mettler MT5 Microbalance

with MTL Faraday Pan Installed



Full report for most recent Inter-laboratory comparison study is posted on the web.

<http://www.epa.gov/ttn/amtic/files/ambient/pm25/spec/multilabspeciationpt2009.pdf>

Questions?