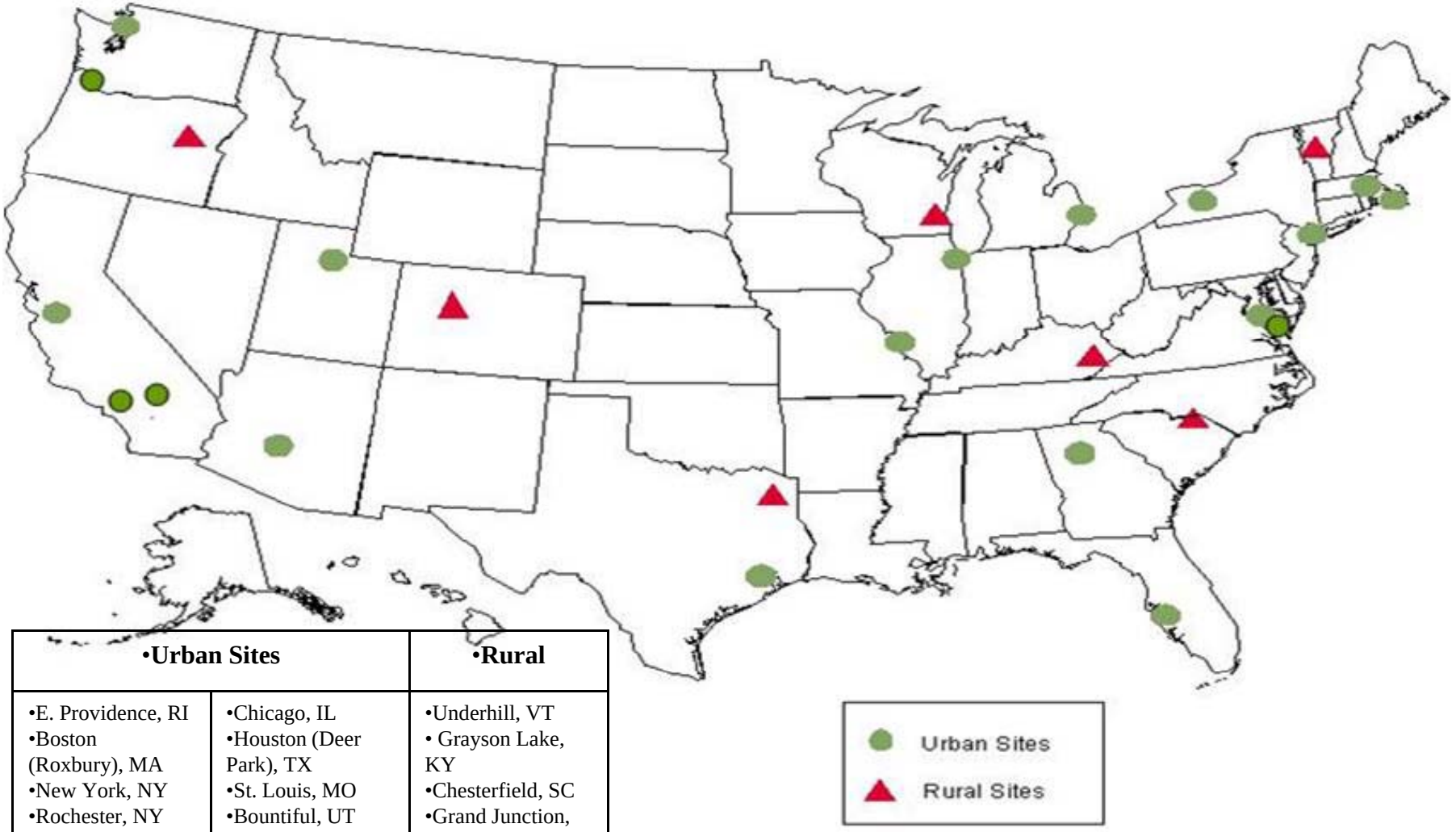
Data Quality and Measurement Quality Objectives for the National Air Toxics Trends Program

Dennis K. Mikel
EPA – OAQPS
AT Workshop 2011

NATTS Sites - 2011



•Urban Sites		•Rural
•E. Providence, RI •Boston (Roxbury), MA •New York, NY •Rochester, NY •Washington, DC •Decatur, GA •Tampa, FL (2) •Detroit, MI •Los Angeles, CA •Rubidoux, CA	•Chicago, IL •Houston (Deer Park), TX •St. Louis, MO •Bountiful, UT •San Jose. CA •Phoenix, AZ •Seattle WA •Richmond, VA •Portland, OR	•Underhill, VT • Grayson Lake, KY •Chesterfield, SC •Grand Junction, CO •La Grande, OR •Harrison County, TX •Mayville, WI

NATTS QA Objective

Data Quality Objective (DQO) is in support of the GPRA goal of reduction of Air Toxics by 75% (1993 levels) by 2010:

"To be able to detect a 15% difference (trend) between two successive 3-year annual mean concentrations within acceptable levels of decision error."

To meet this DQO we need:

- **1-in-6 day sampling frequency with at least an 85% quarterly completeness**
- **Precision controlled to a Coefficient of Variance (CV) of no more than 15%**
- **Detectability based on 2001 Pilot Study Minimum Detection Limits (MDLs)**
- **Bias for the data set of less than 25%**

These are our Measurement Quality Objectives (MQOs)!

Measurement Quality Objectives

How are these determined?

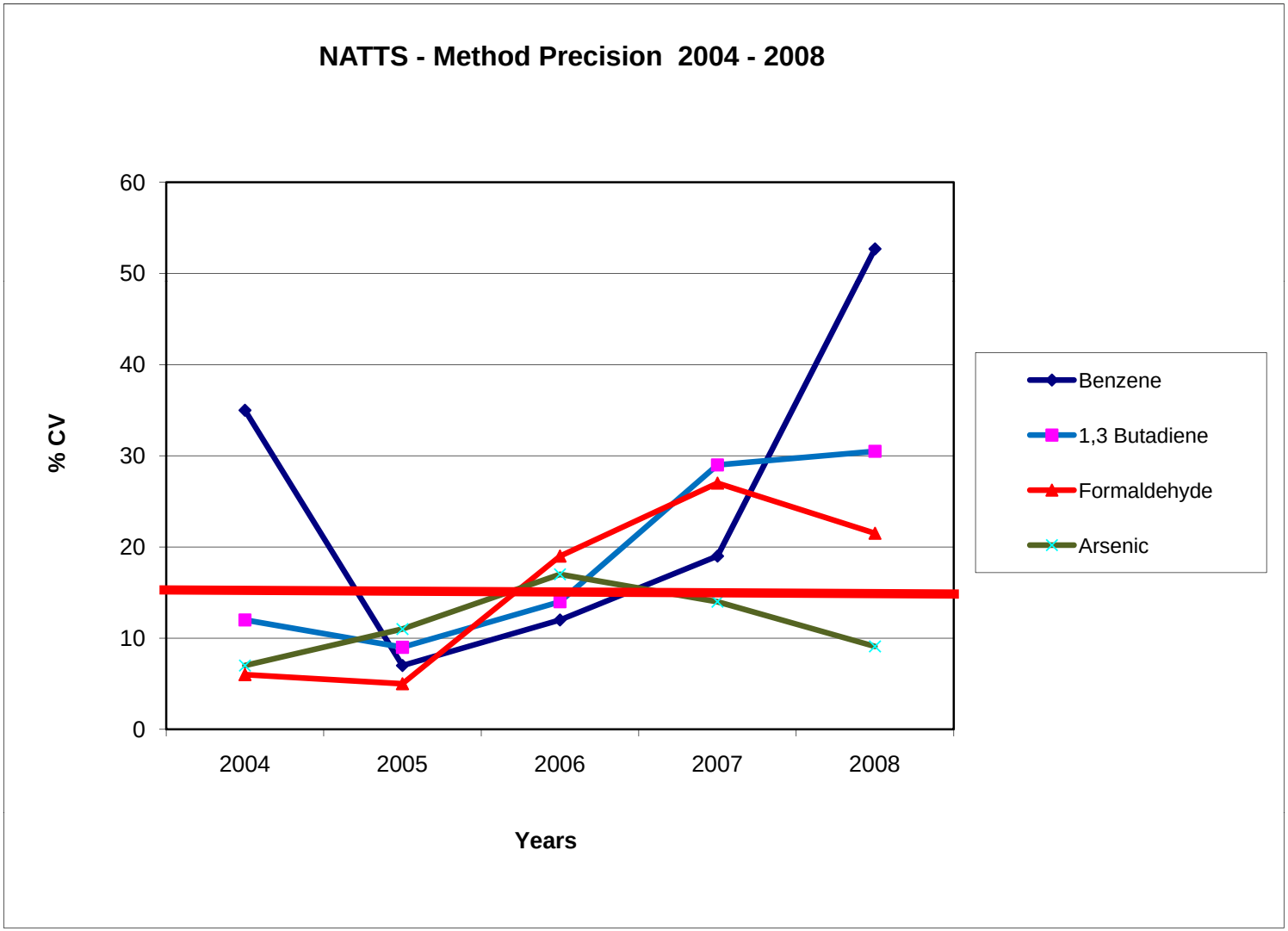
- Precision: Determined by analyzing collocated/duel samples or analyzing sample twice (replicate)
- Bias: EPA sends out blind PT samples to the labs – report back results
- Completeness: Calculated from number of samples reported to AQS divided by possible samples
- Detectability: Determined by laboratories using EPA Method of 7 duplicate samples near the level of detection

NATTS QA Program

Measurement Quality Objectives (MQOs)

Compound	Precision (CV)	Bias (Lab)	Detectability	Completeness
Arsenic	< 15%	< 25%	0.217 ng/m3	> 85%
Benzene	< 15%	< 25%	0.016 ug/m3	> 85%
1,3-Butadiene	< 15%	< 25%	0.013 ug/m3	> 85%
Formaldehyde	< 15%	< 25%	0.0074 ug/m3	> 85%

Meeting Objectives: Precision Results 2004 - 2008



Five Year Average:

Benzene: 25%

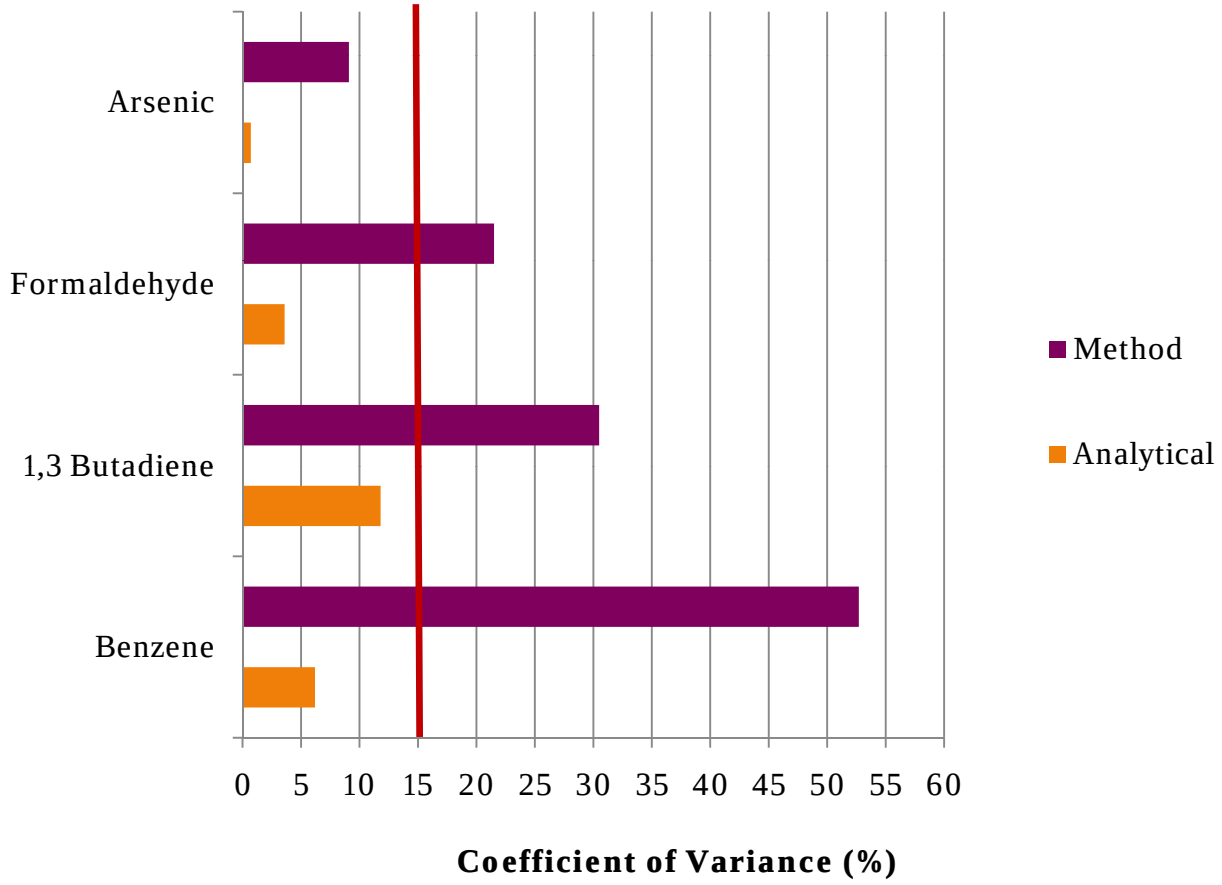
1,3 Butadiene 19%

Formaldehyde: 16%

Arsenic: 12%

<u>Only Arsenic is meeting our Precision MQO</u>

Meeting Objectives: Overall Precision vs. Analytical Precision -2008

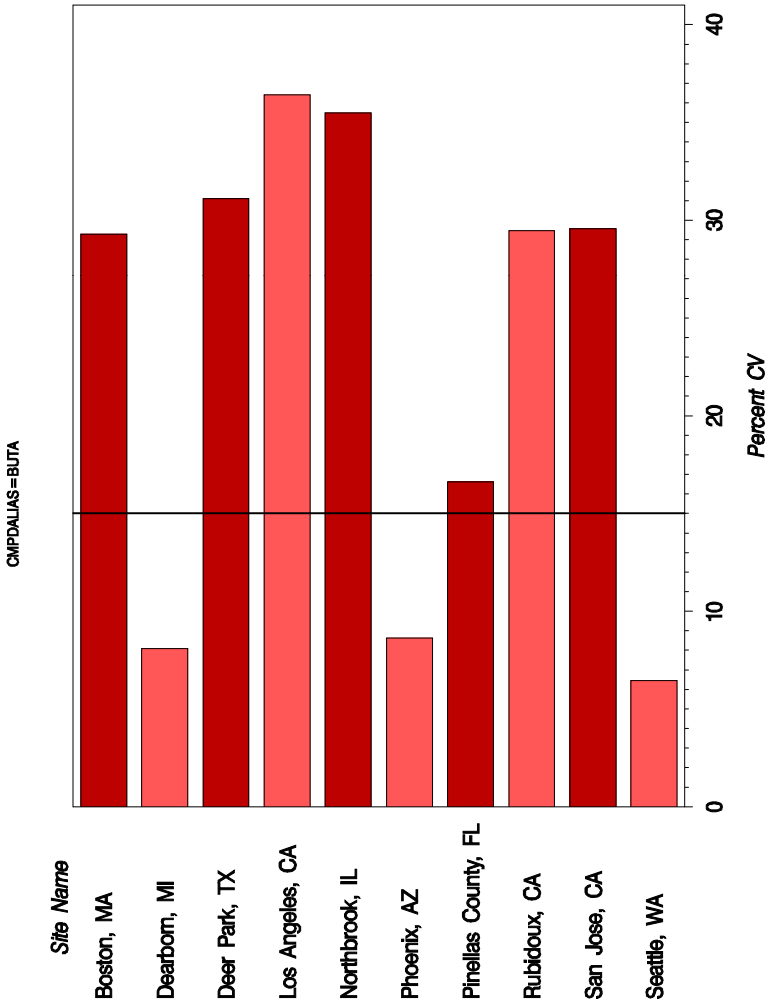


Analytical Precision accounts for laboratory practices and instrumentation

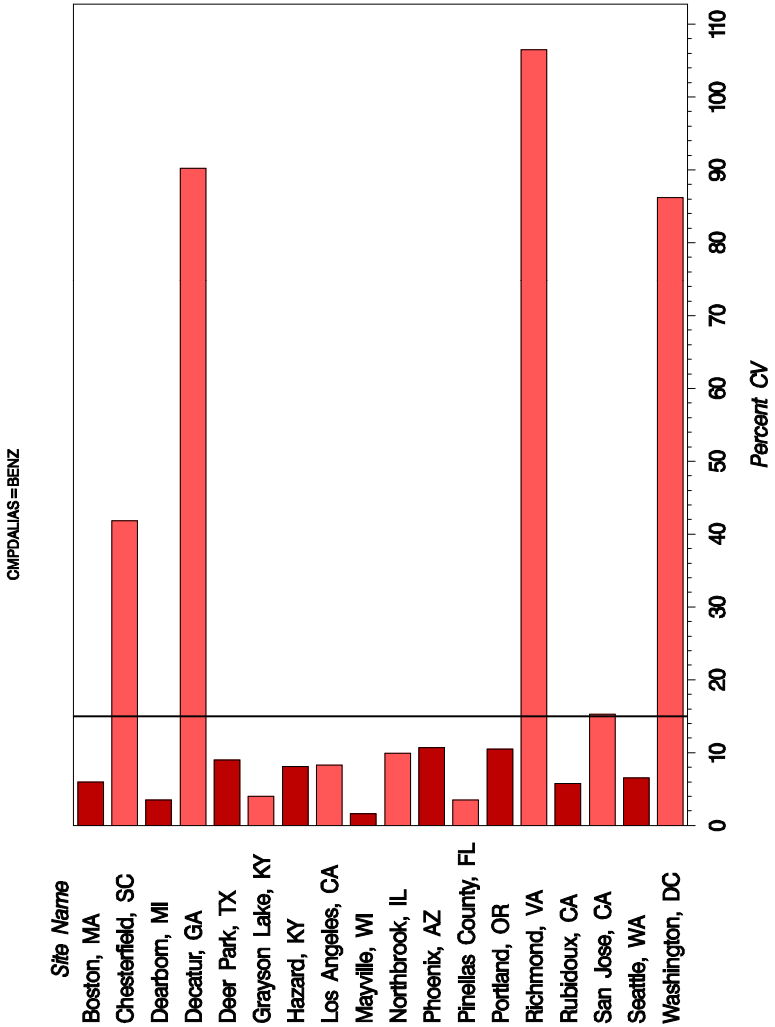
Method Precision accounts for analytical precision, sample handling and field operations

Meeting Objectives: Overall Precision of 1,3 butadiene + Benzene

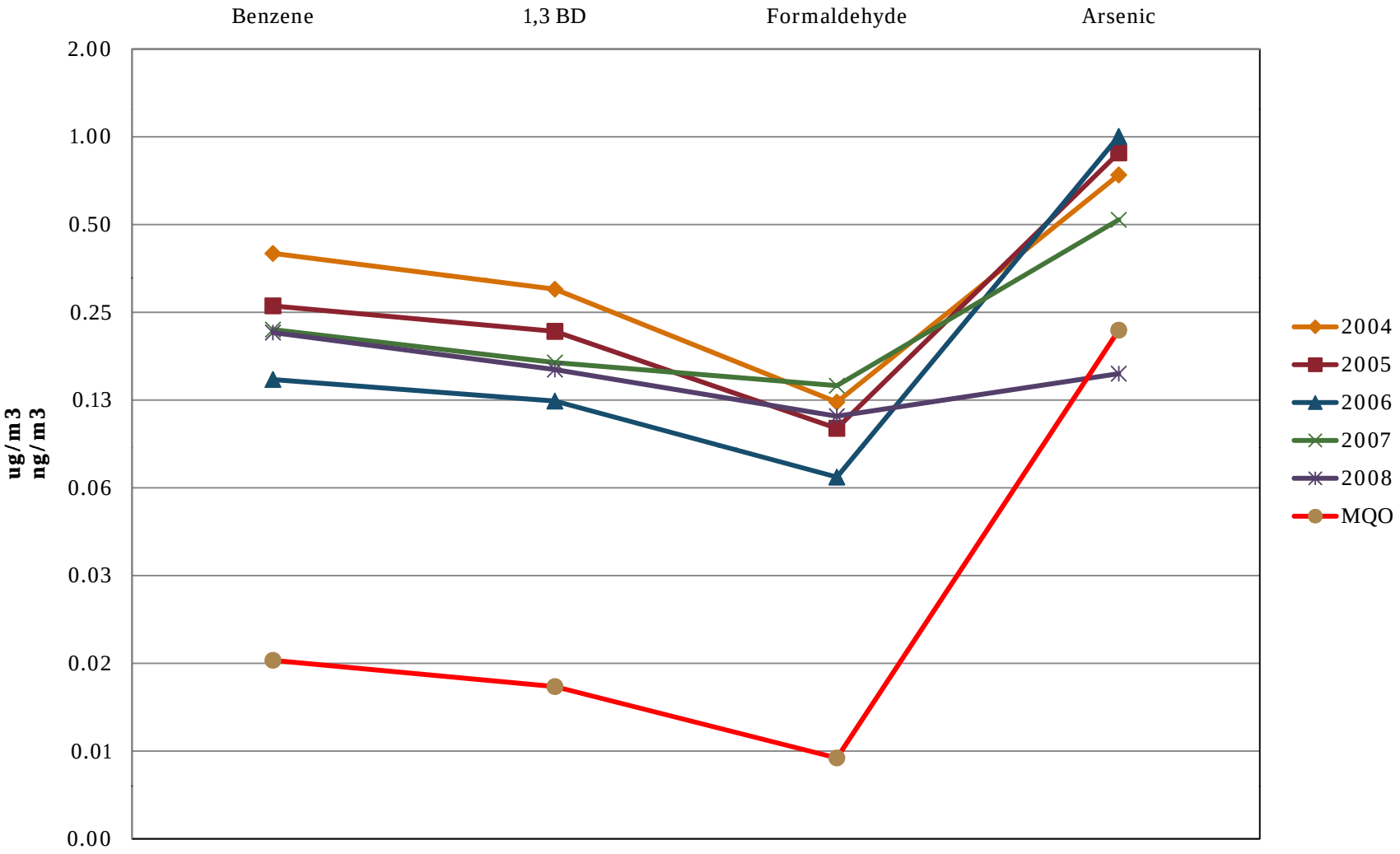
1,3, Butadiene



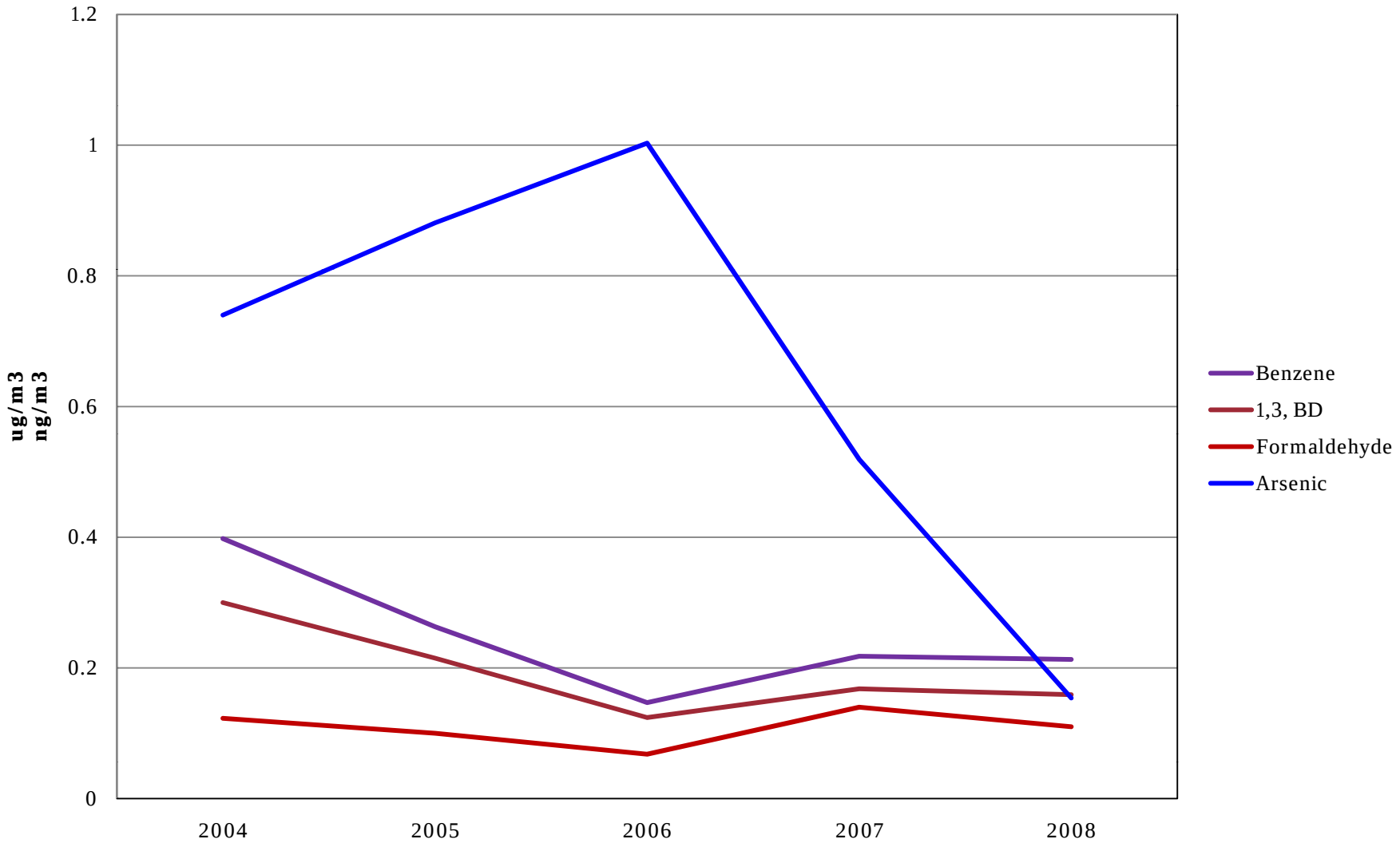
Benzene



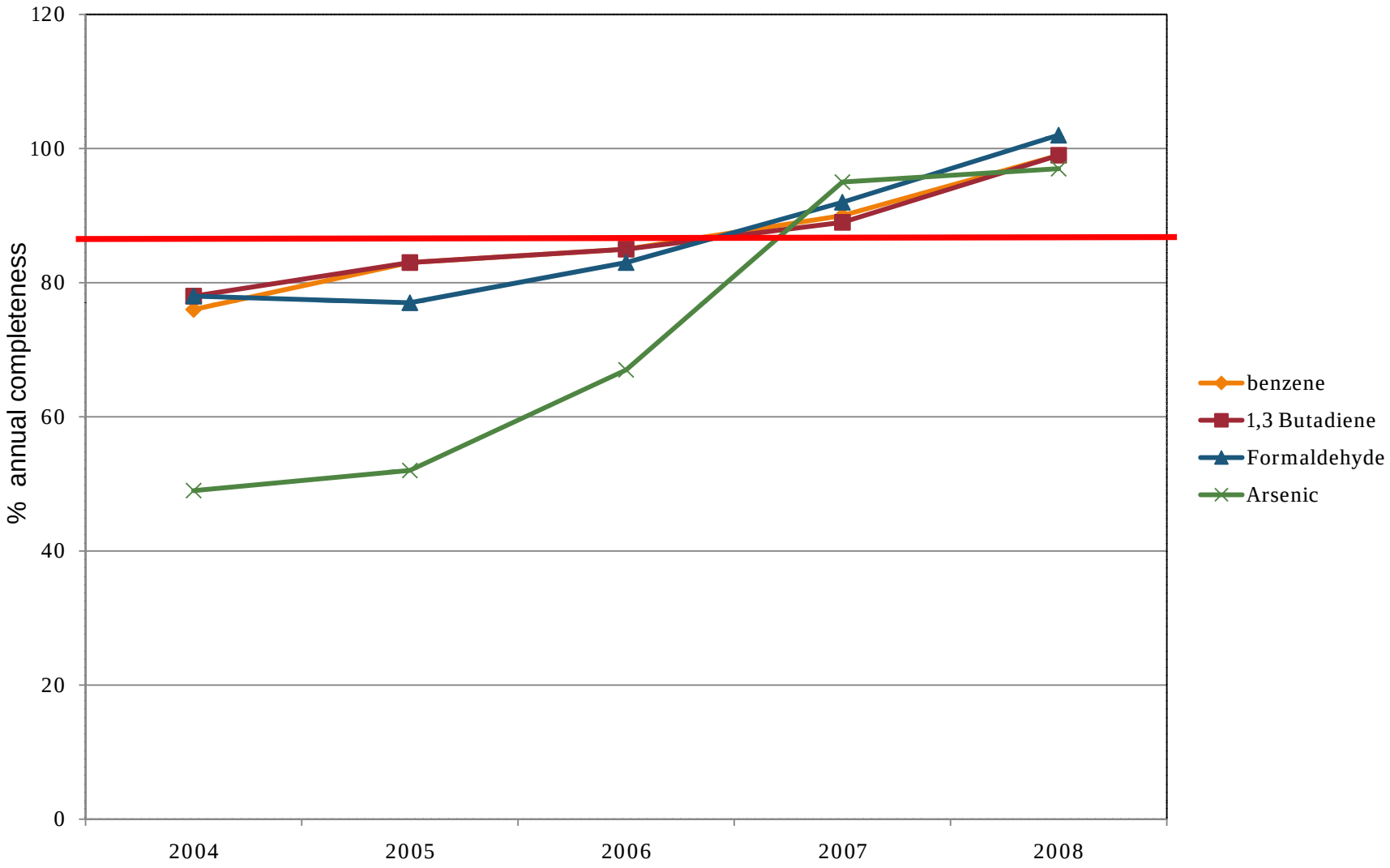
Meeting Objectives: Method Detection Limits 2004 - 2008



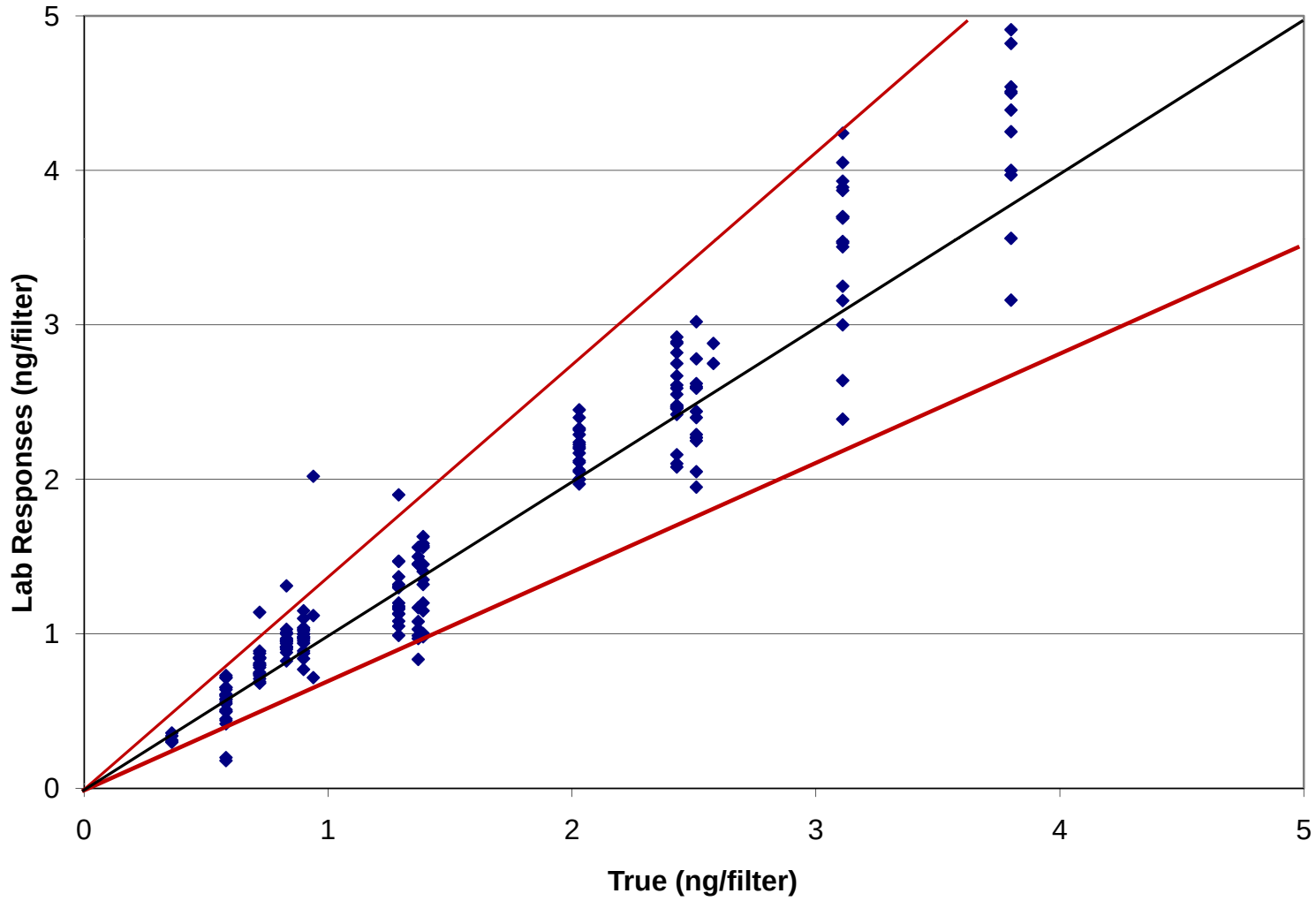
Meeting Objectives: Method Detection Limits 2004 – 2008



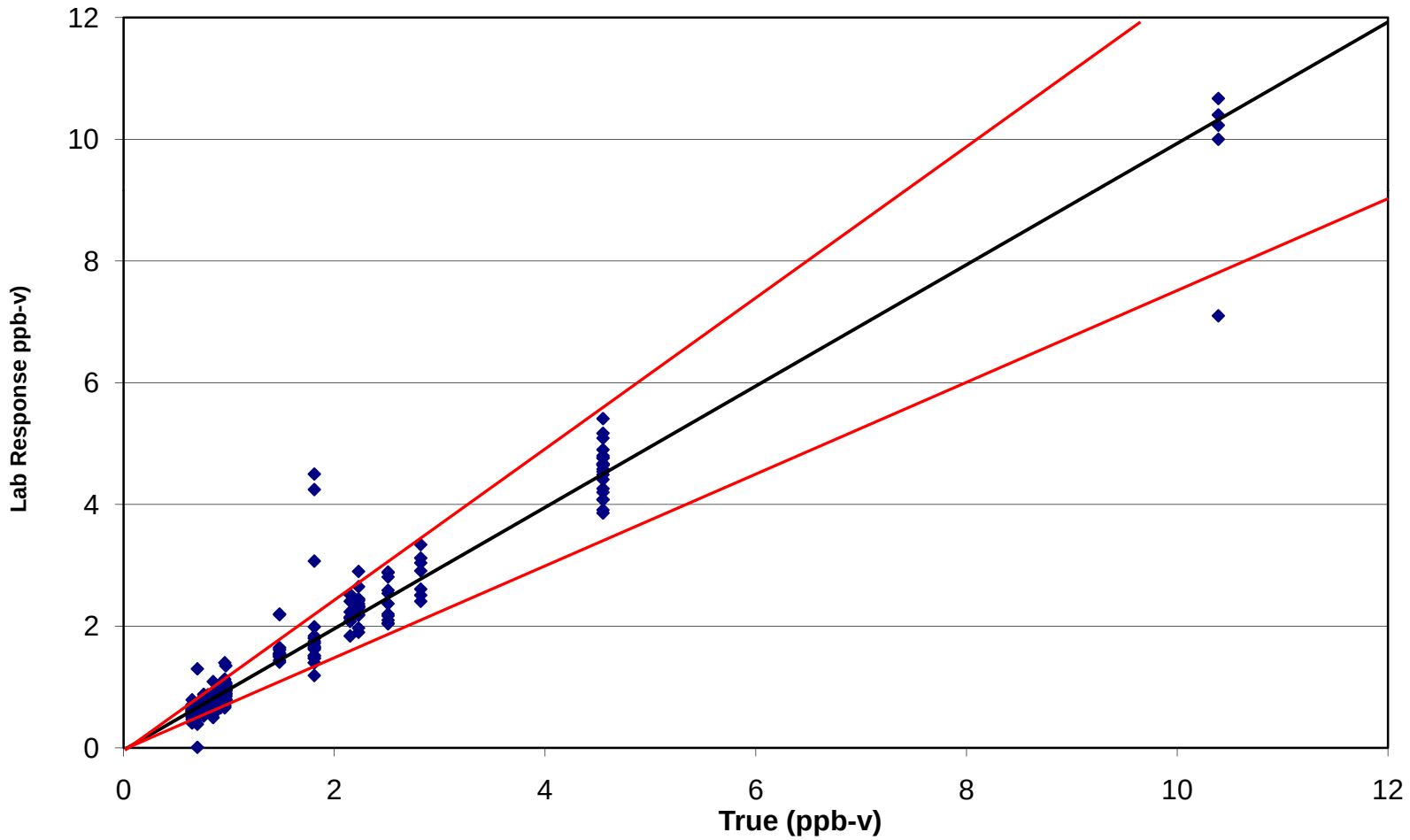
Meeting Objectives: Data Completeness 2004 – 2008



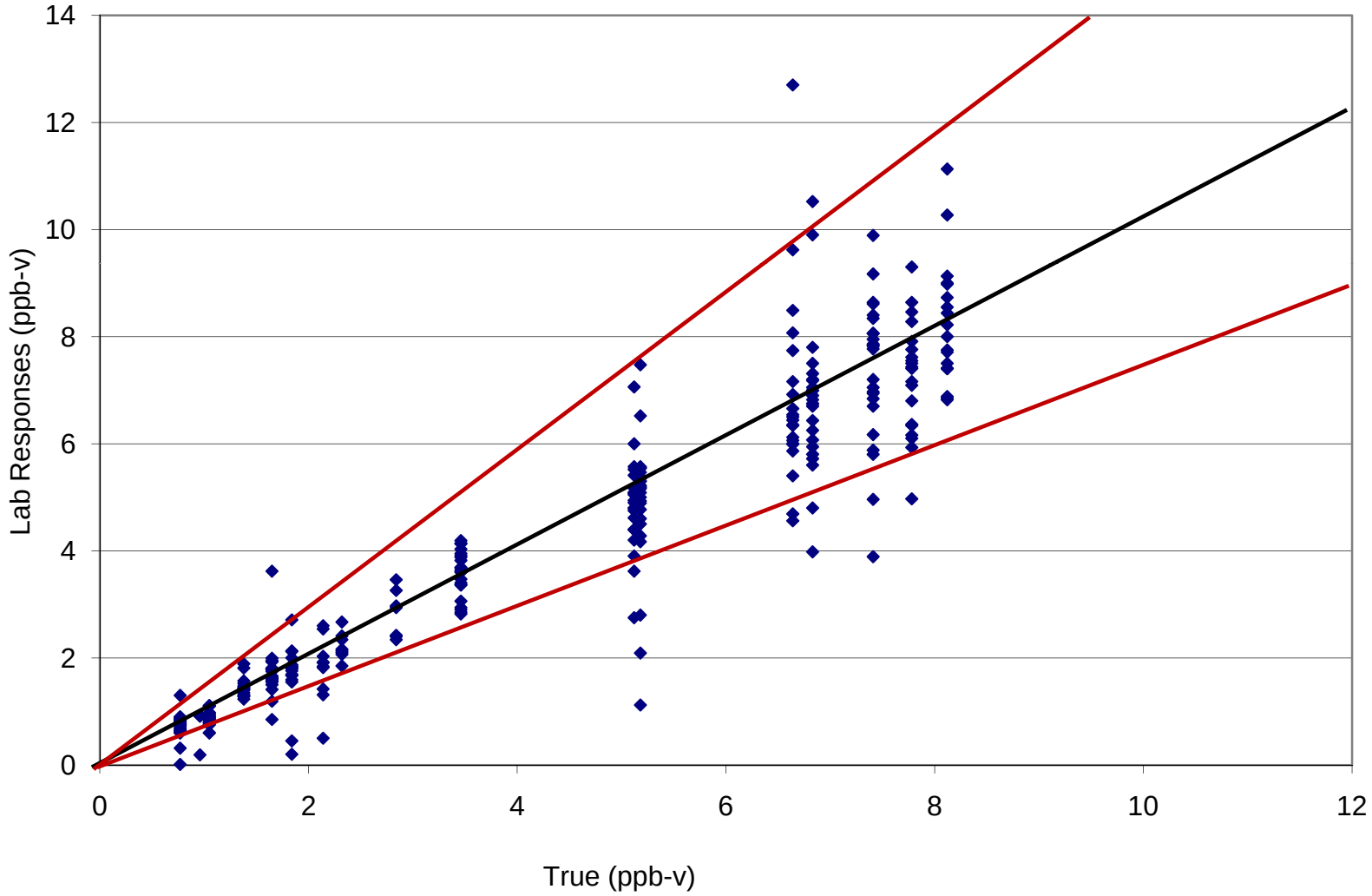
Meeting Objectives: Proficiency Testing: Arsenic 2004- 2009



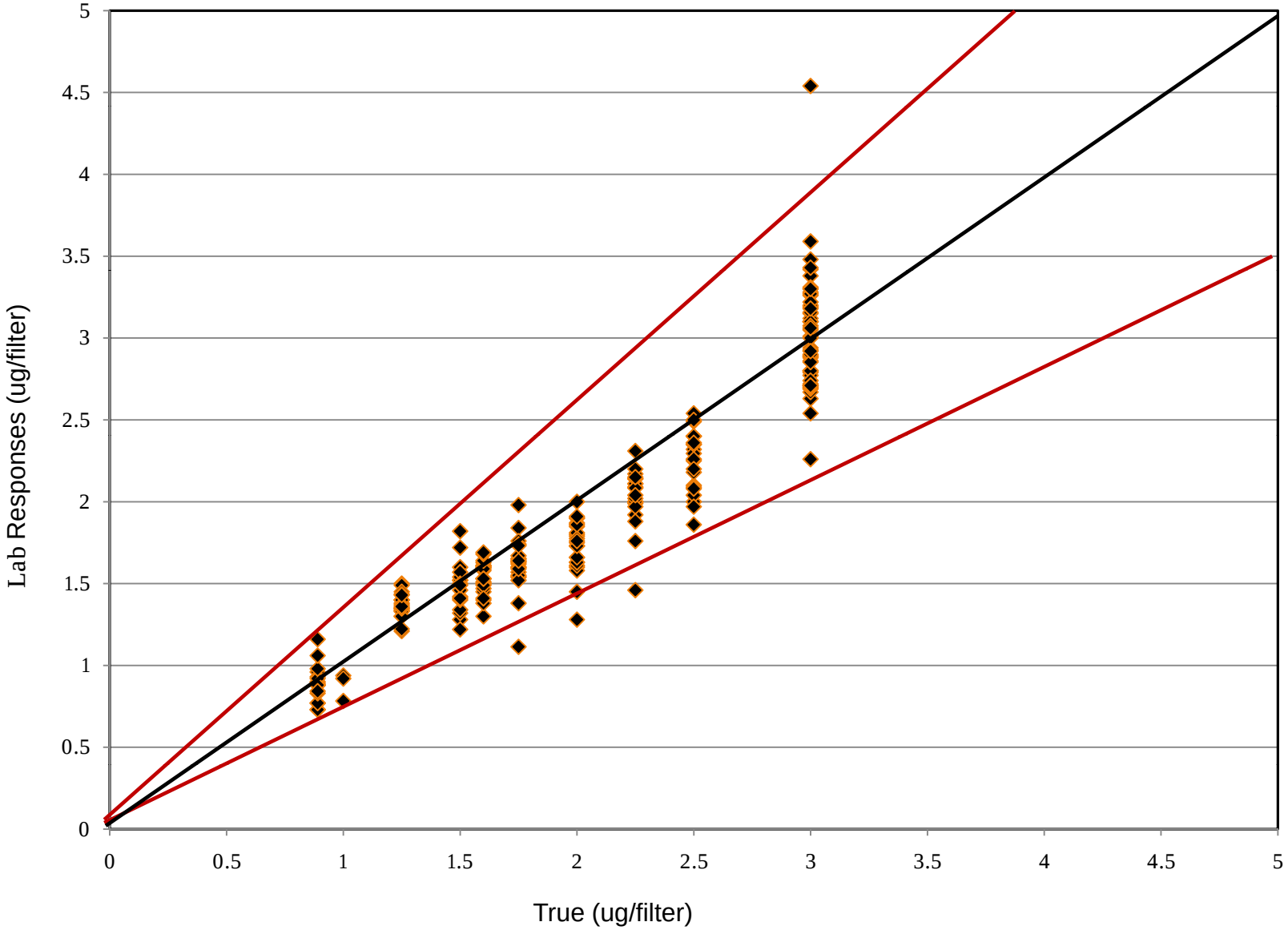
Meeting Objectives: Proficiency Testing: Benzene 2004- 2009



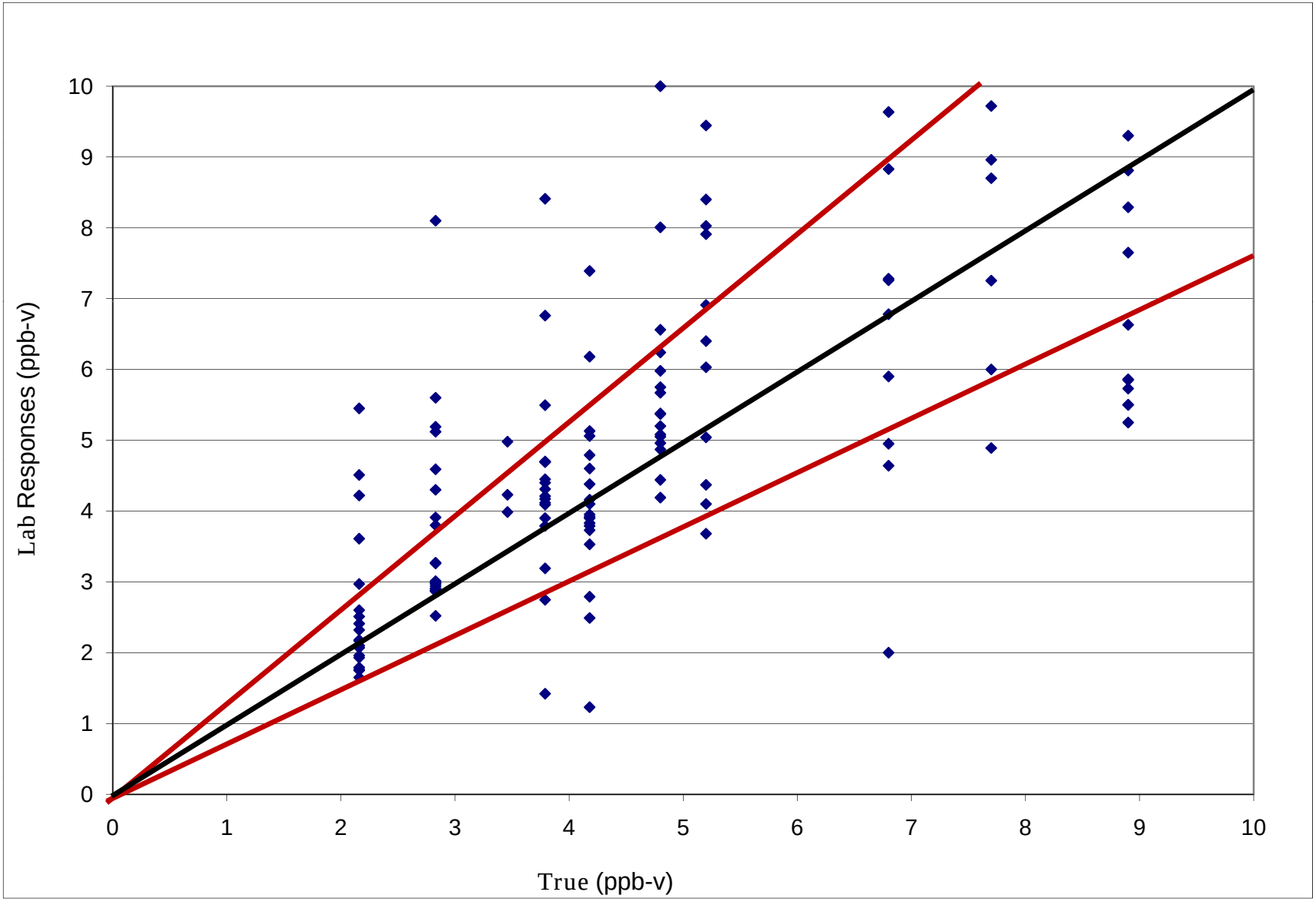
Meeting Objectives: Proficiency Testing: 1, 3 Butadiene 2004- 2009



Meeting Objectives: Proficiency Testing: Formaldehyde 2004- 2009



Meeting Objectives: Acrolein PT Results 2006 - 2009



Summary: Is the Program Able to Meet the DQOs?

- ✓ **Yes and No**
  - ✓ The data completeness (2007-2008) is above the required 85% good job everyone!
  - ✓ Overall precision data illustrates that we are not meeting a CV of less than 15% with the exception of Arsenic
  - ✓ The mean MDLs data illustrates that we are not meeting our MQO for detectability with the exception of Arsenic
  - ✓ The laboratories are meeting the 25% bias requirement

Take Home Message: We now have a realistic view of the quality of Air Toxics data - This will guide us in the formulating new Data Quality Objectives