NATTS Quality Assurance Update

Air Toxics Workshop

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Outline

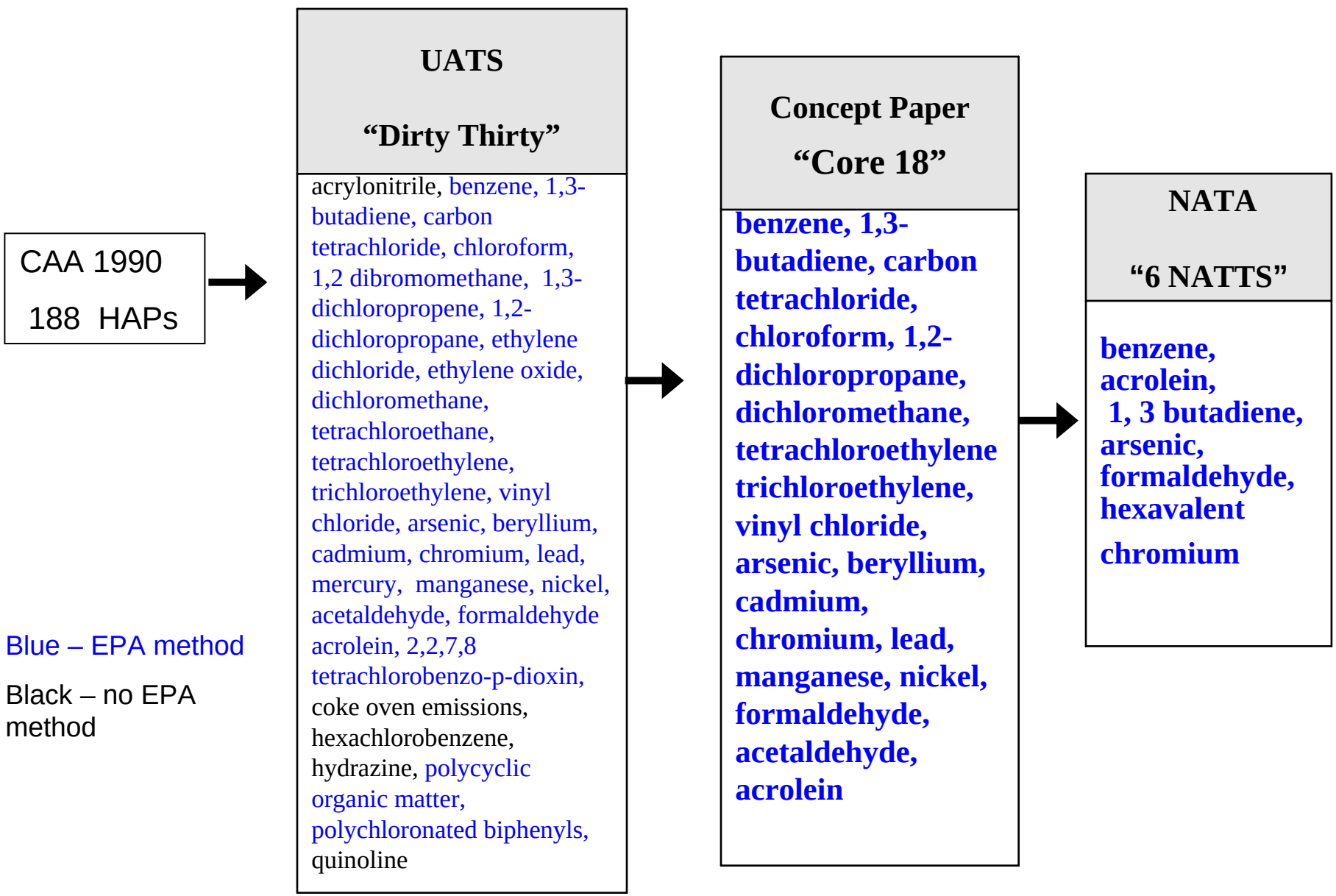
- An Effective QA Program
- The NATTS Program QA Indicators
  - Evolution of the NATTS Program and Compounds
  - Data Quality Objectives
  - Measurement Quality Objectives
- Meeting our Stated Objectives
  - Precision
  - Bias
  - Completeness
  - Detectability
- Other Effectiveness Indicators
- Proficiency Testing (PT) Expansion
- Summary/Recommendations

Presentation Objective

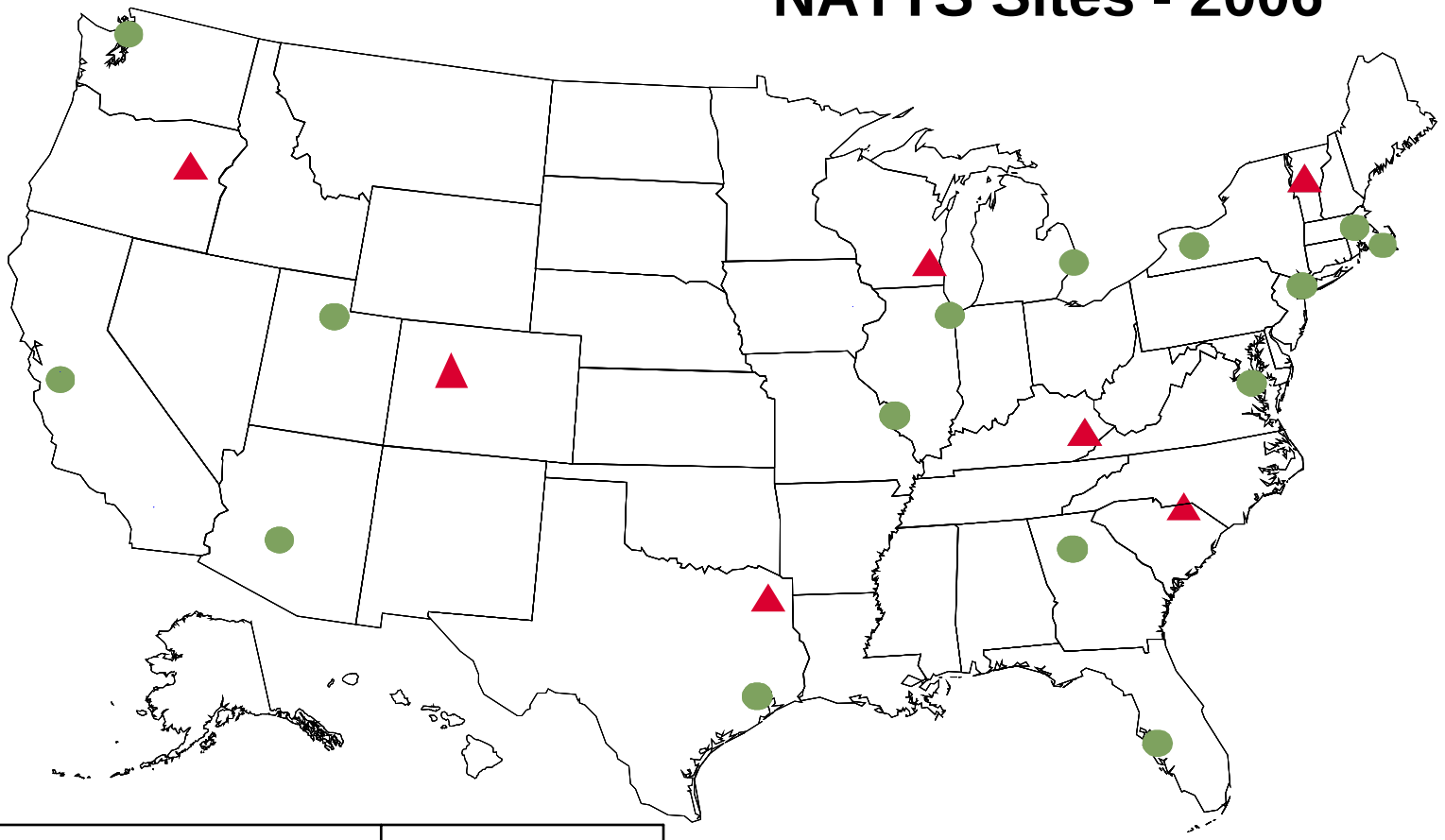
For a QA Program to be effective it must:

- Meet the stated objectives;
- Successfully implement quality improvements;
- Identify method issues or problems;
- Be cost effective, and;
- Deliver this information in a timely manner!

Evolution of the NATTS Compound List



NATTS Sites - 2006



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

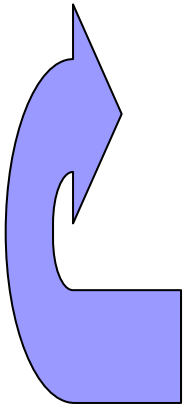
NATTS QA Objective

Data Quality Objectives (DQOs) are tied to 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 these DQOs 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)!

DQOs and Parameters

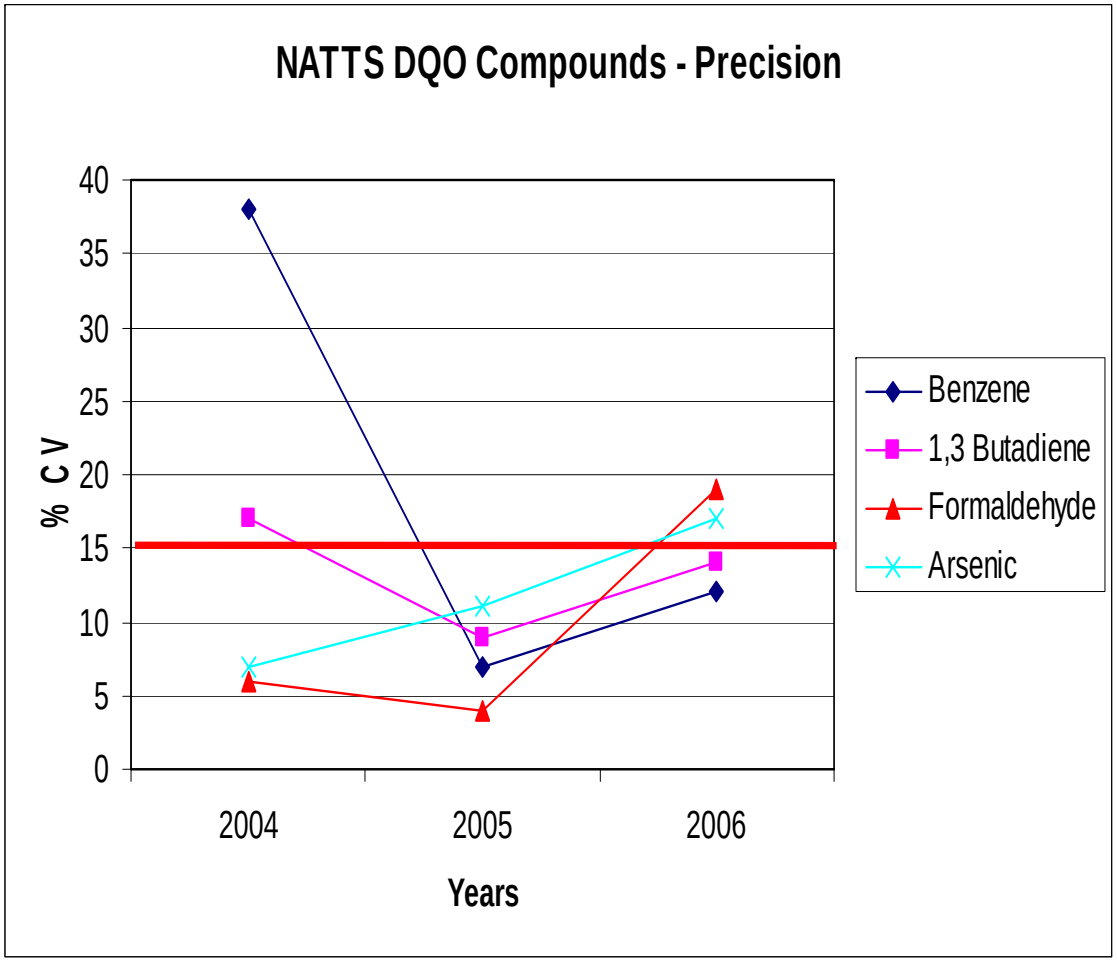
- Initially, six compounds had DQOs calculated
- benzene, 1,3-butadiene: VOCs
- formaldehyde, acrolein: Aldehydes
- arsenic, chromium: Metals
  - chromium was replaced with hexavalent chromium;
  - acrolein – issues with method - new method developed;
  - Bottom line: There are now 4 compounds with DQOs
    - Chromium and acrolein DQOs are not valid!

NATTS QA Program

Measurement Quality Objectives (MQOs)

Compound	Precision (CV)	Bias (Lab)	Detectability	Completeness
Arsenic	**< 15%**	**< 25%**	**0.046 ng/m3**	**> 85%**
Benzene	**< 15%**	**< 25%**	**0.044 ug/m3**	**> 85%**
1,3-Butadiene	**< 15%**	**< 25%**	**0.020 ug/m3**	**> 85%**
Formaldehyde	**< 15%**	**< 25%**	**0.014 ug/m3**	**> 85%**

Meeting Objectives: Precision Results 2004 - 2006



Three Year Average:

Benzene: 18%

1,3 Butadiene 12%

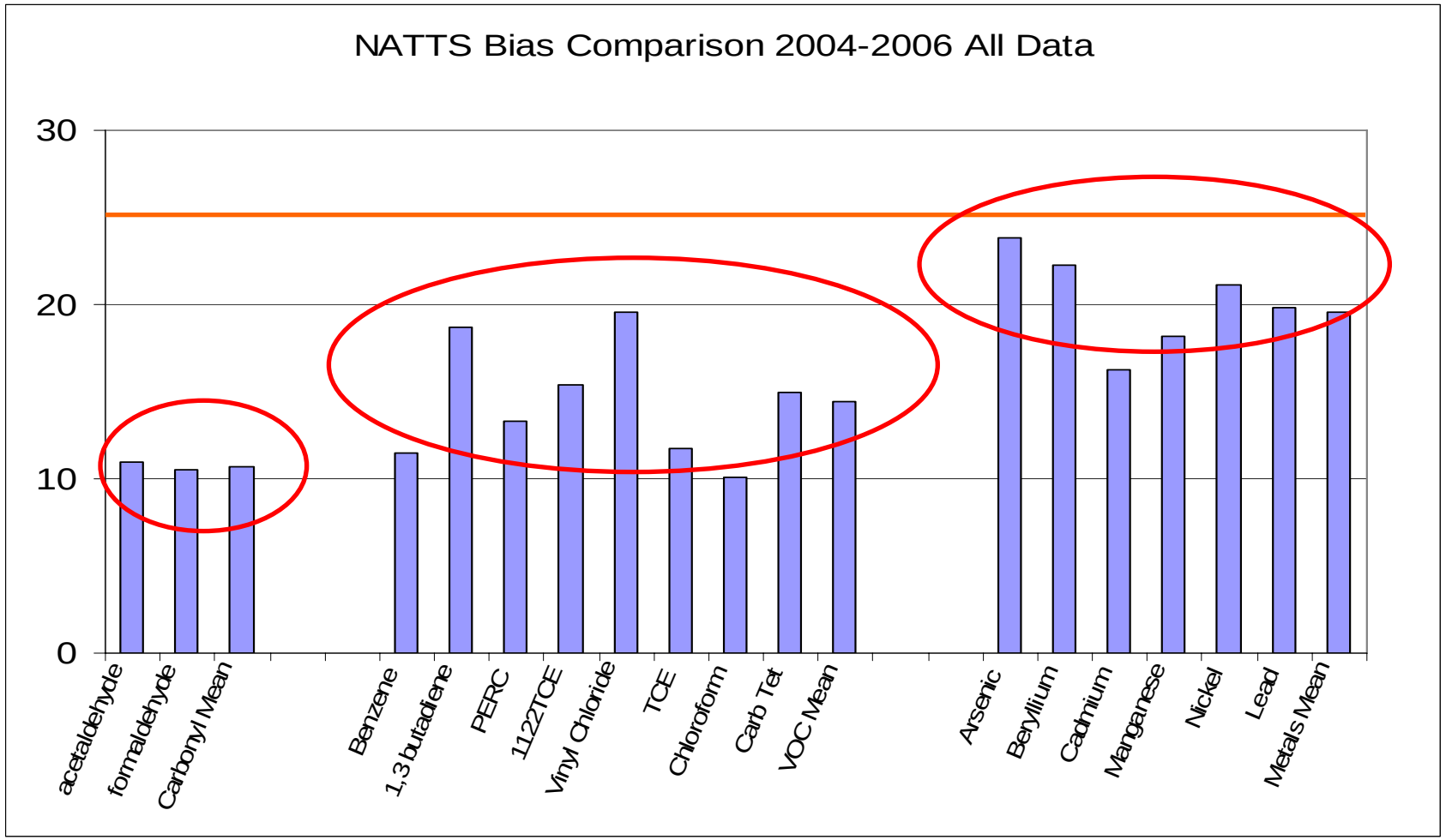
Formaldehyde: 10%

Arsenic: 12%

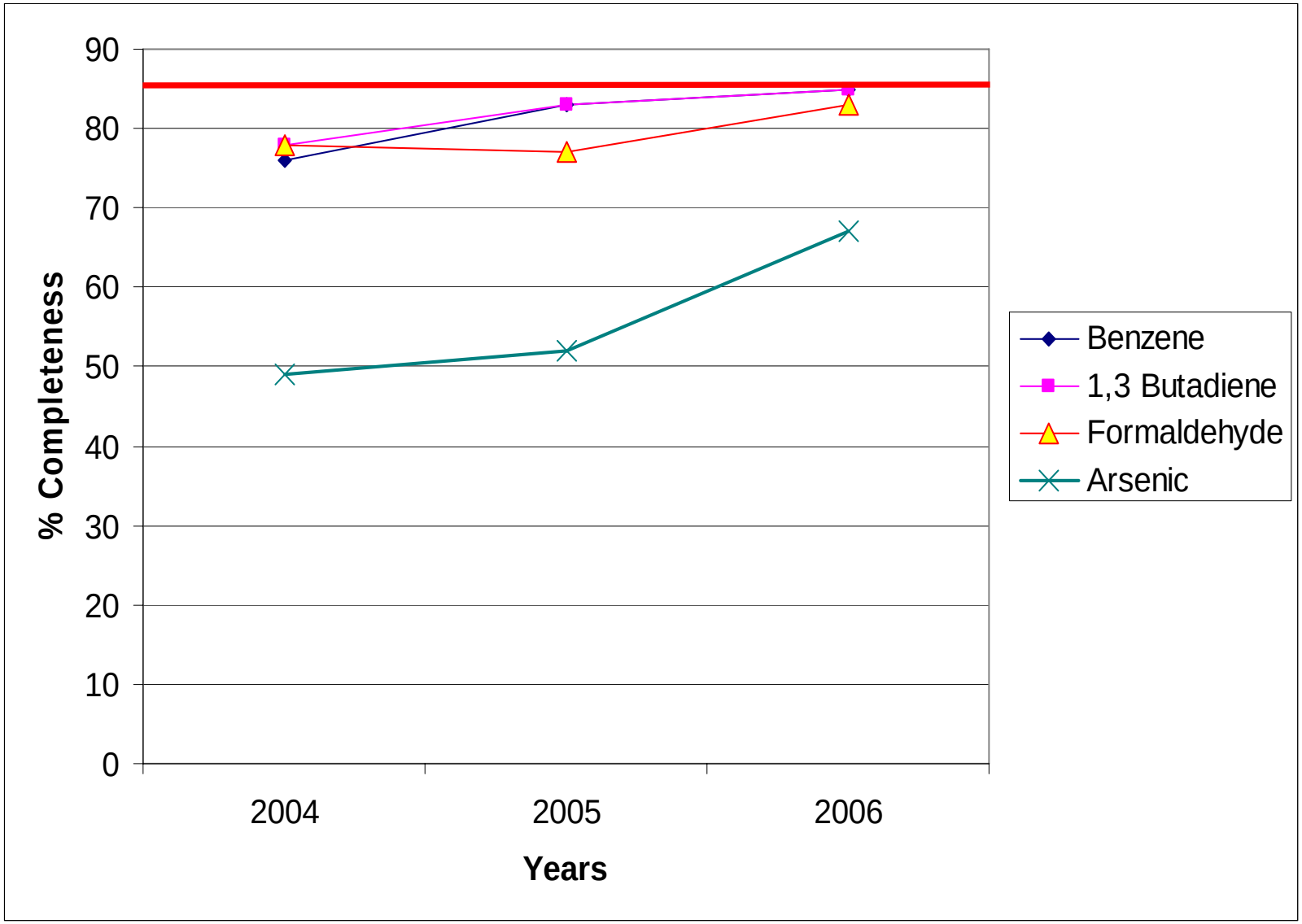
No. of collocated sites

	'04	'05	'06
vocs	7	4	14
aldehydes	5	5	13
metals	1	2	8

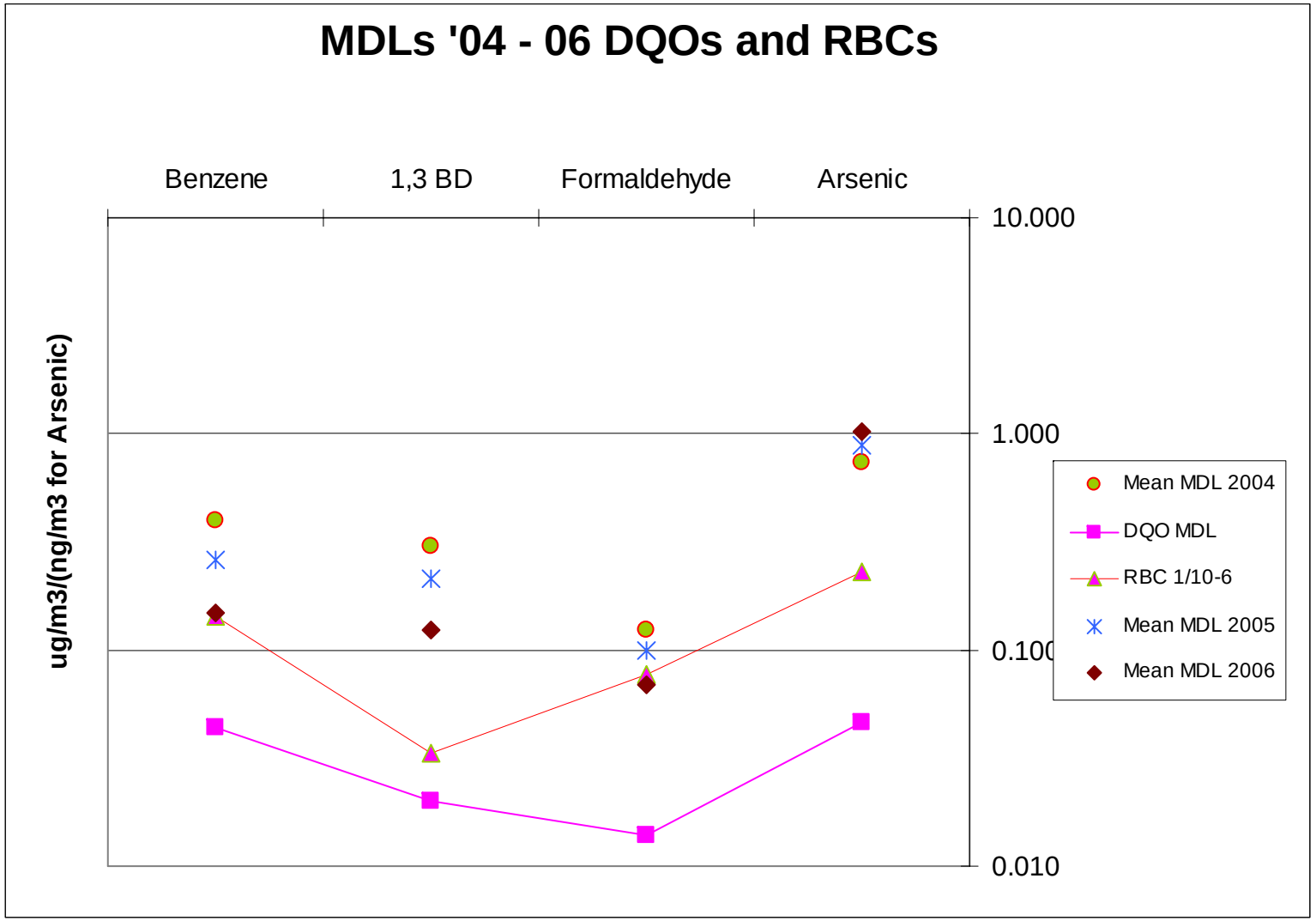
Meeting Objectives: Bias from PT Analysis



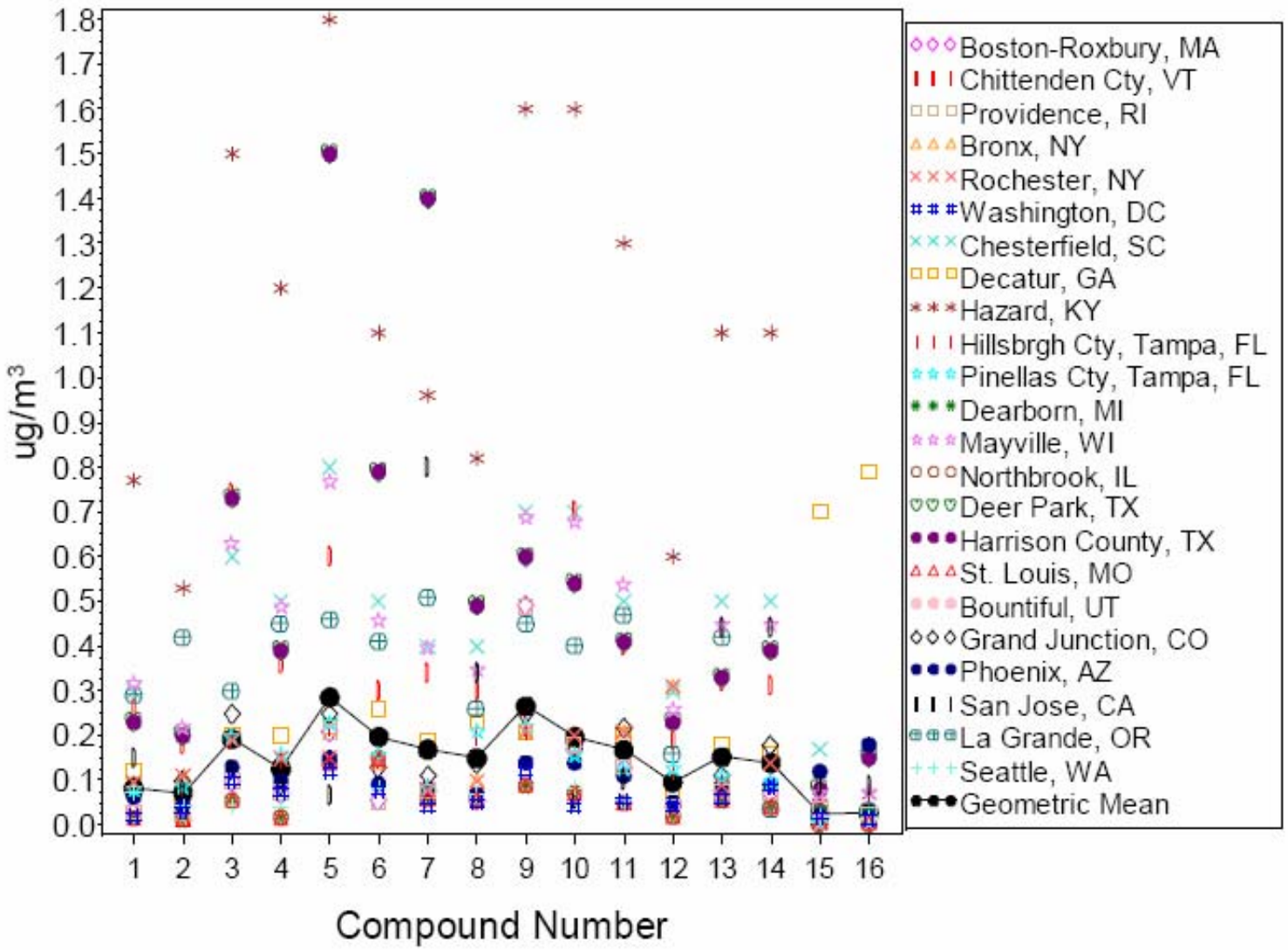
Meeting Objectives: Data Completeness 2004 – 2006



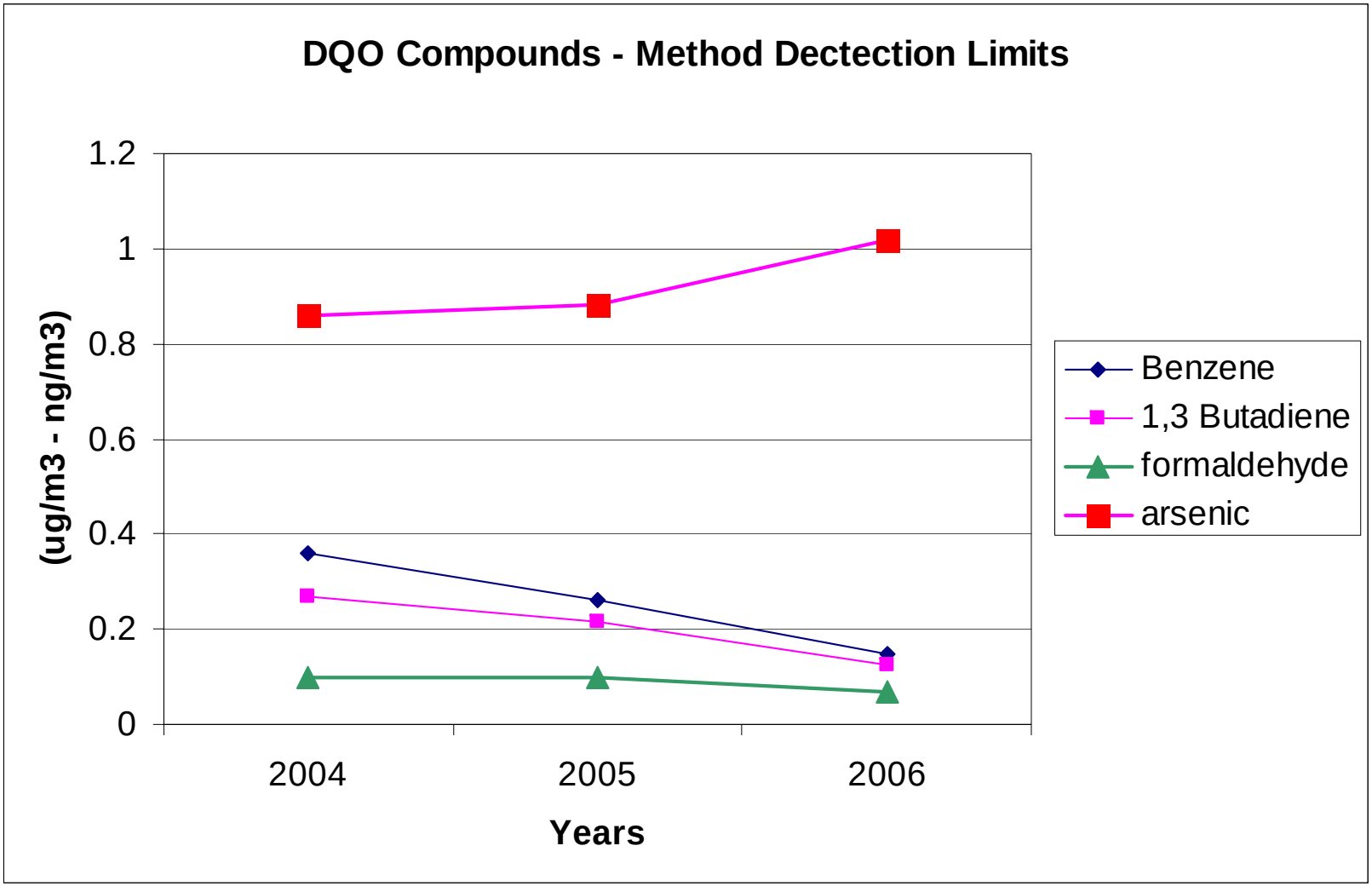
Meeting Objectives: Mean MDLs 2004 - 2006



Identifying Problems: MDLs Reported 2006 VOCs/Carbonyls



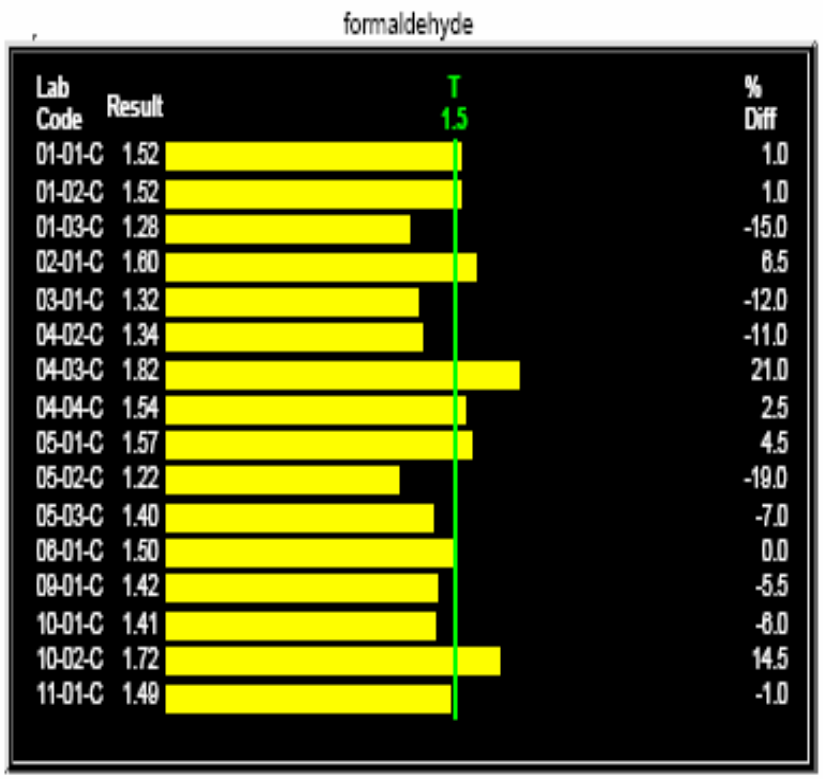
Identifying Problems: DQO compounds 2004 – 2006

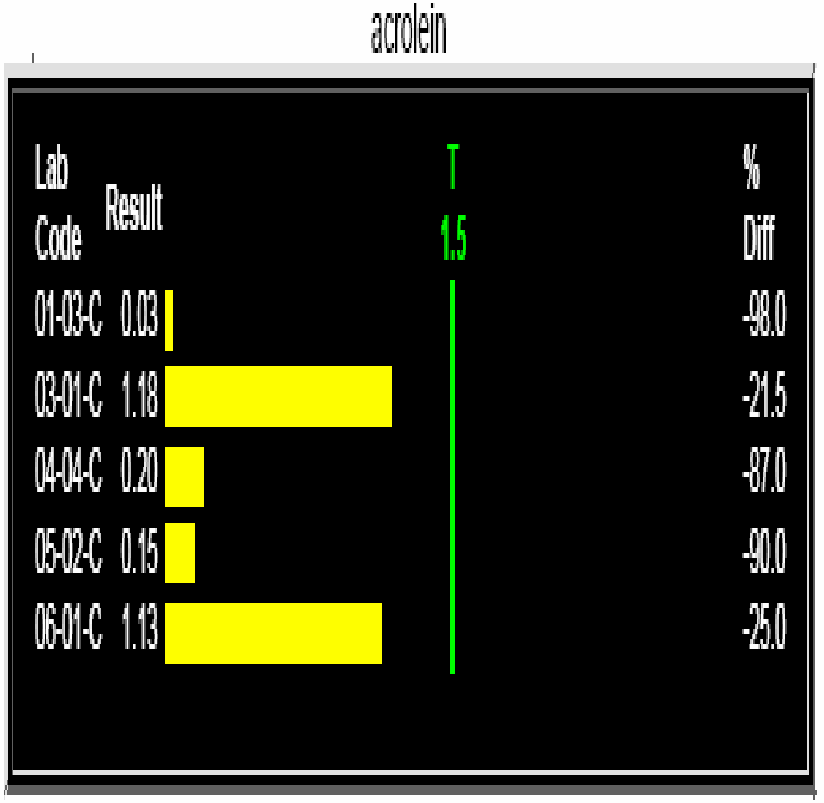


Identifying Problems: Technical System Audits

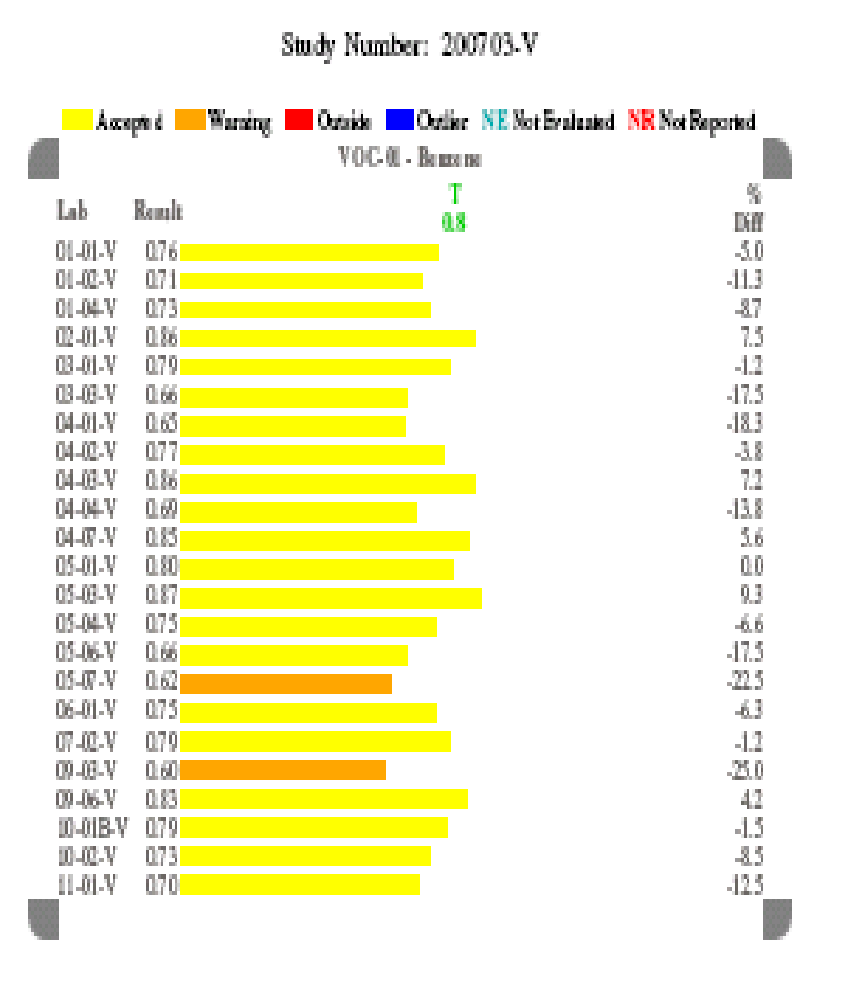
- All stations and most labs audited (DRI, Reno Nevada still to be audited)
- Most common problems found:
  - QAPPs and SOPs needing to be updated;
  - No system in place for QAPP/SOP review and updating;
  - Field Blanks were not collected at a number of sites.
- Overall, the most labs are doing an excellent job!

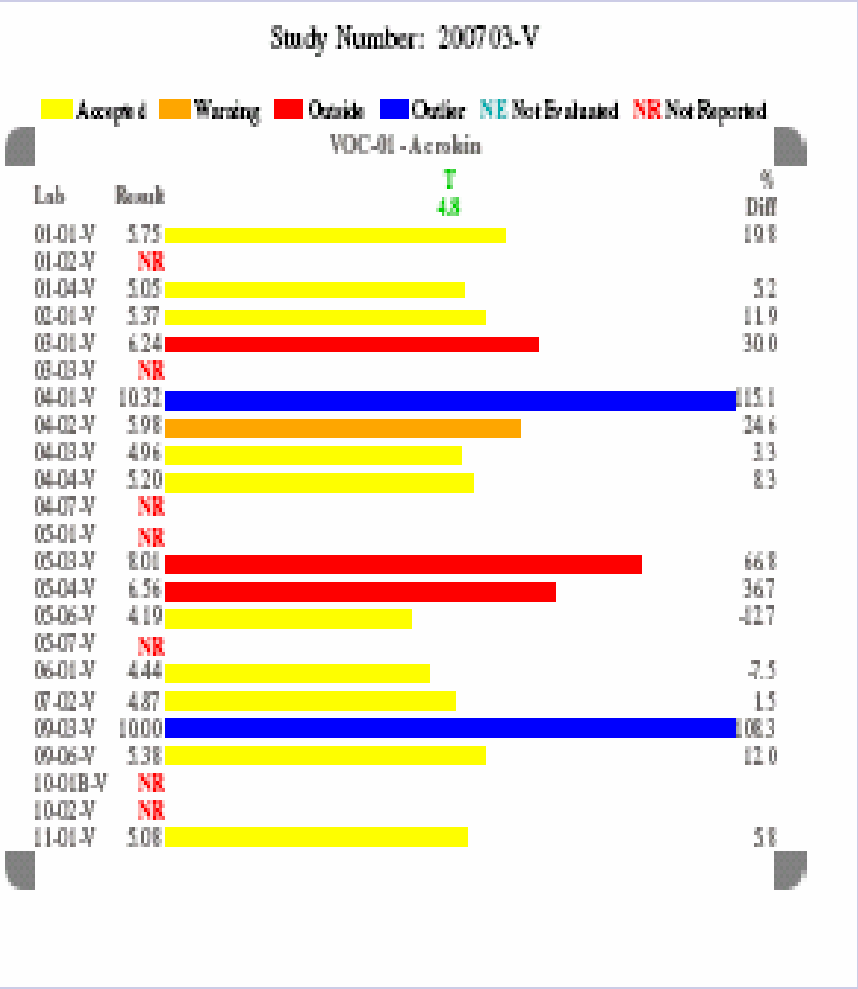
Identifying Problems: Acrolein by DNPH - 3rd Qtr '04



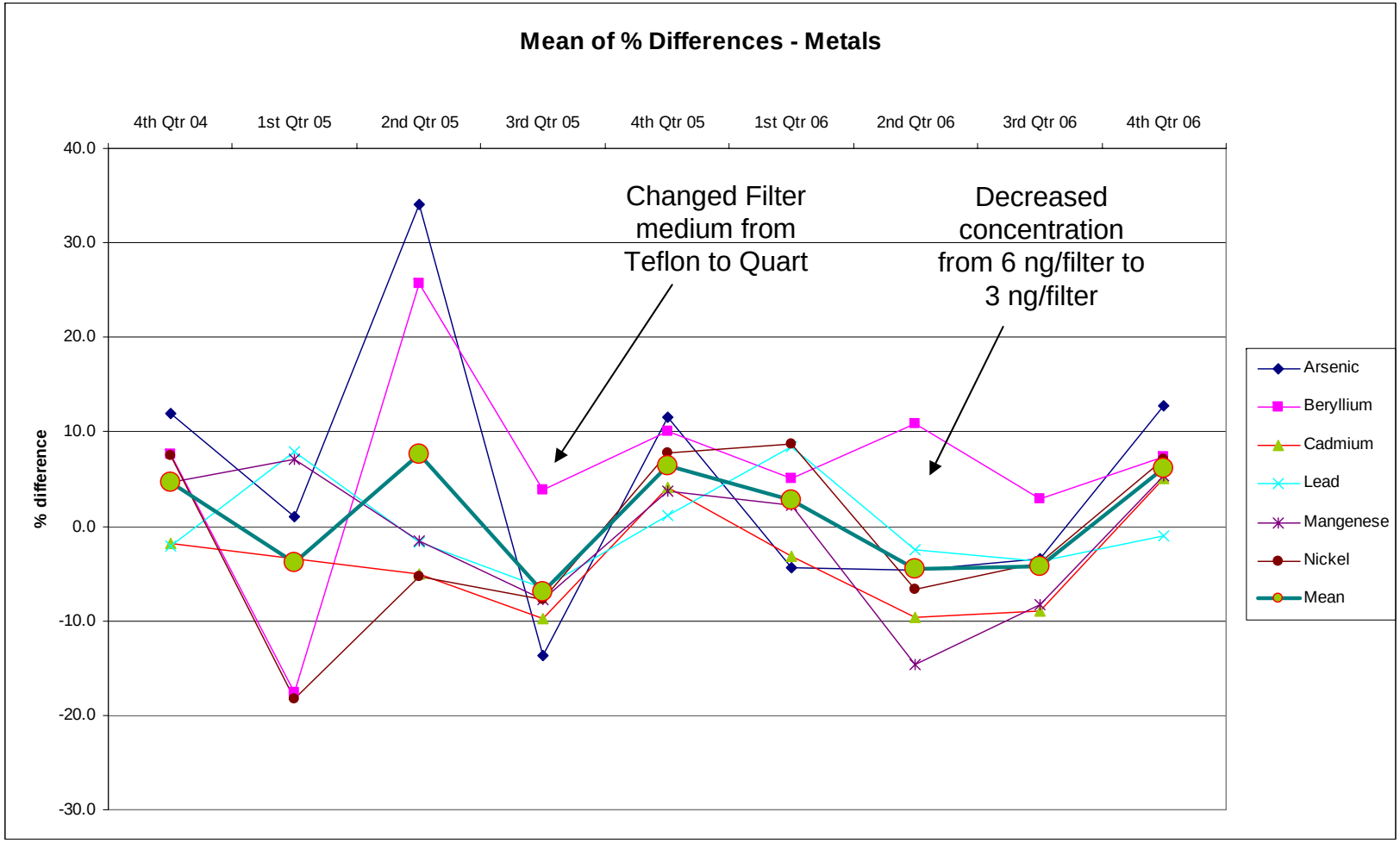


Identifying Problems: Acrolein TO-15 3rd Qtr 07

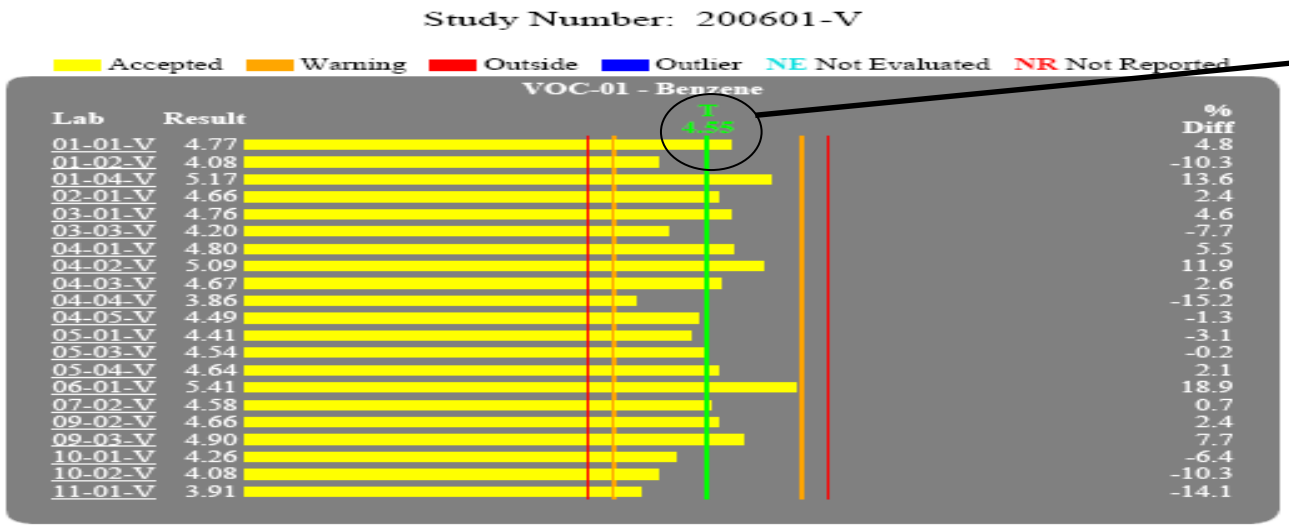




Quality Improvement: Averages by Quarter - Metal PTs



Quality Improvement: VOCS

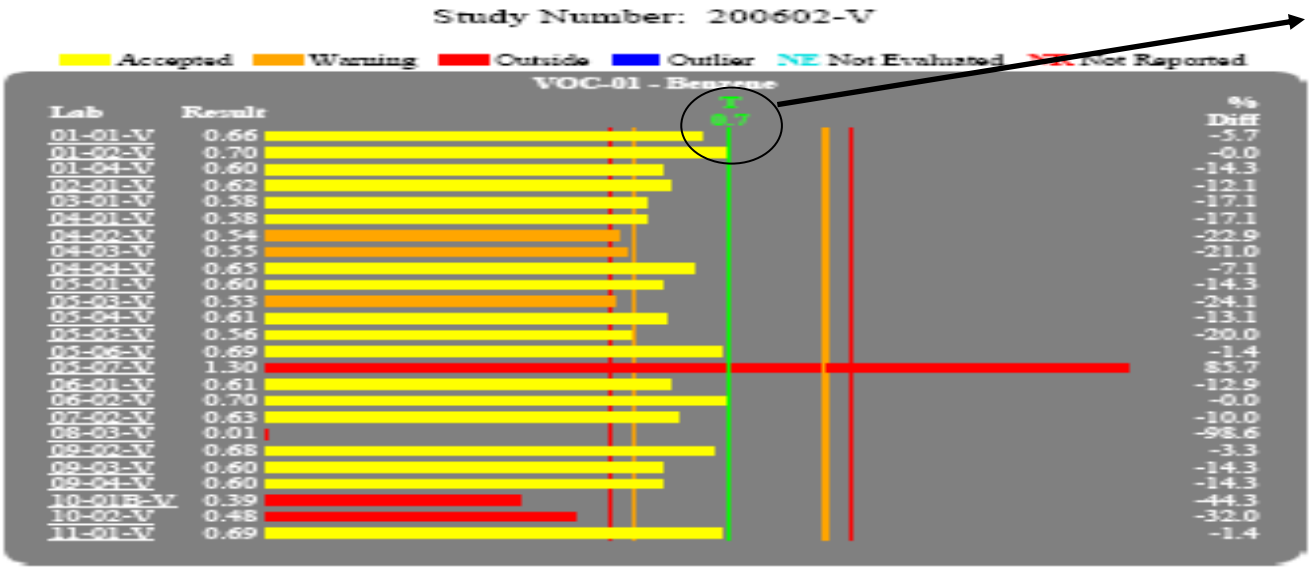


Target Value = 4.55 ppbv

Mean = 4.57 ppbv (0.5 %)

Median 4.65 ppbv (2.2 %)

STD = 0.405 ppbv (8.9 %)



Target Value = 0.7 ppbv

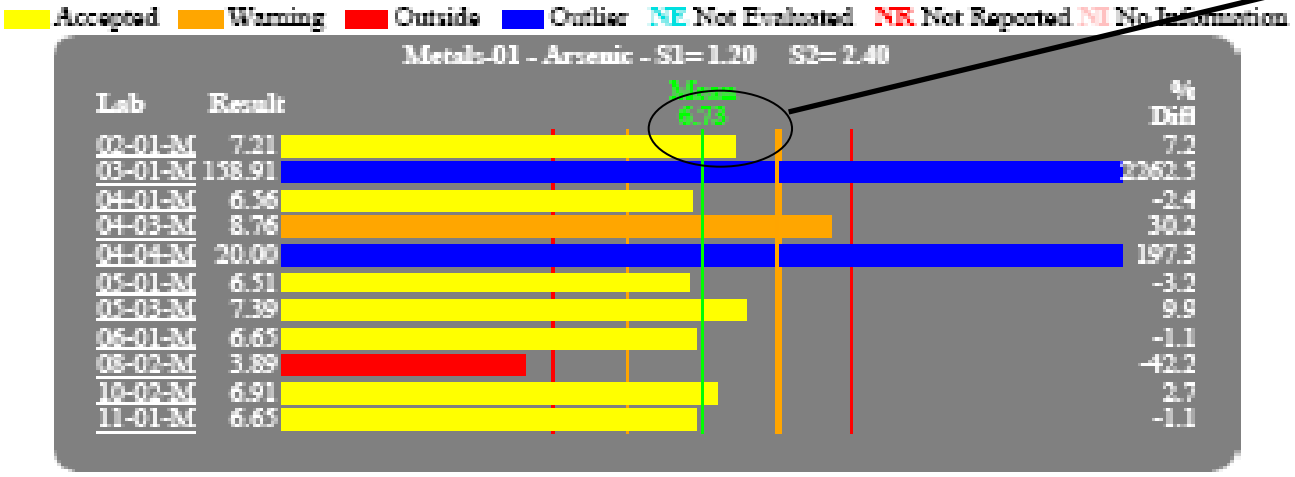
Mean = 0.62 ppbv (-12.1 %)

Median 0.60 ppbv (-13.7 %)

STD = 0.20 ppbv (28.4 %)

Quality Improvements: Metals

Study Number: 200502-M



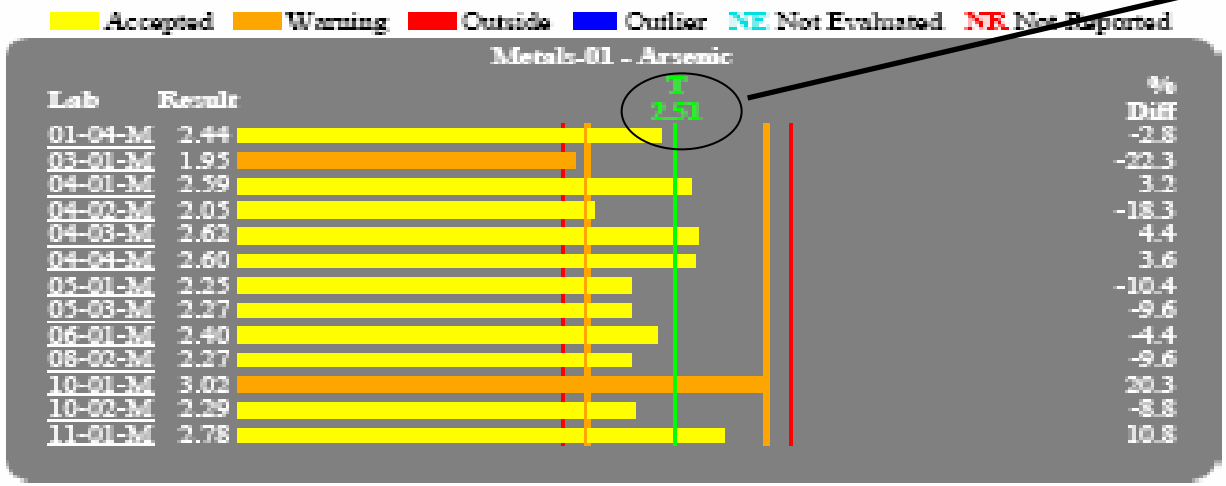
Target Value = 6.73 ng/filter

Mean = 15.1 ng/filter (223.6 %)

Median 6.9 ng/filter (2.7 %)

STD = 45.7 ng/filter (679.0 %)

Study Number: 200602-M



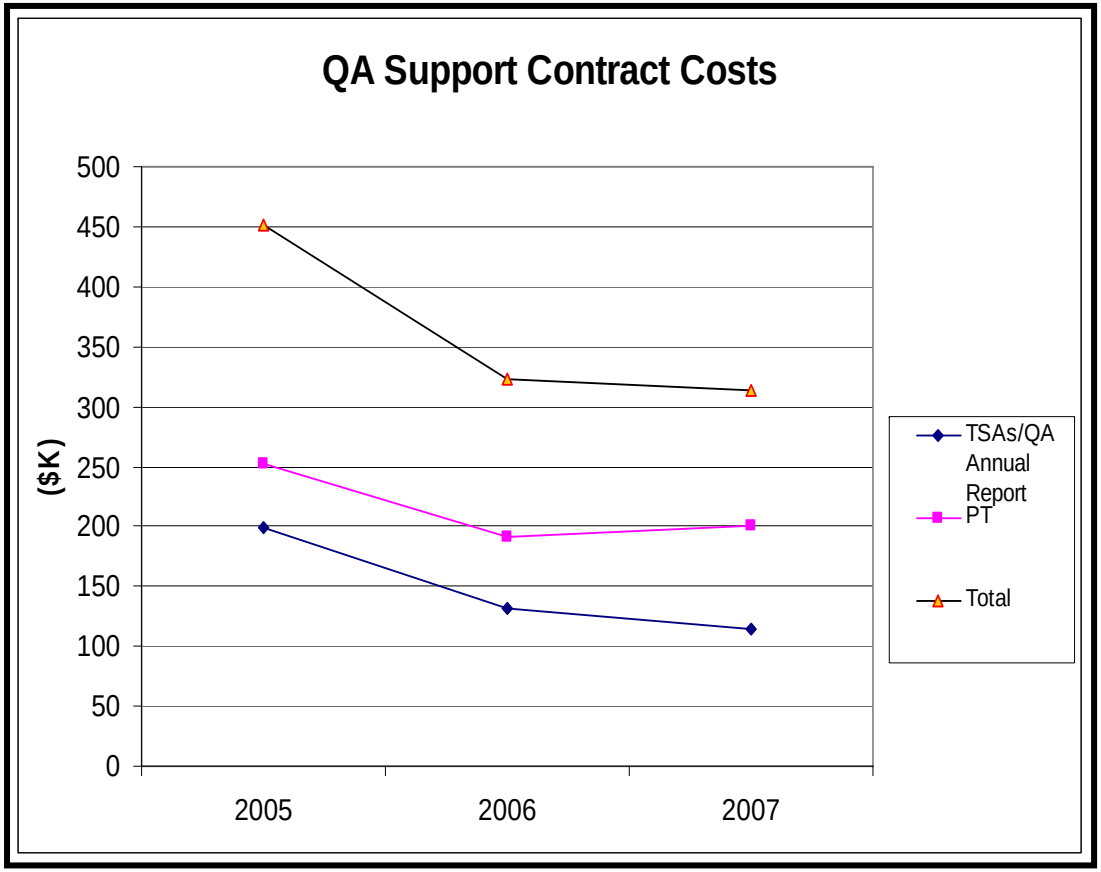
Target Value = 2.51 ng/filter

Mean = 2.42 ng/filter (-3.6 %)

Median 2.40 ng/filter (-4.4 %)

STD = 0.31 ng/filter (12.1 %)

QA Program Cost Effectiveness



Year	2005	2006	2007
% of NATTS Funds	14%	10%	9%

PT Program and Expansion

- Shortly after PT program started, we began to get requests from Non-NATTS labs for PT samples;
- In 2006, we expanded the program to include Non-NATTS lab;
- The EPA Regional Labs (6) requested inclusion;
- The PT program is flexible, i.e., a non-NATTS lab can buy-in for any number of samples.

PT Program Expansion: Number of Lab Participating

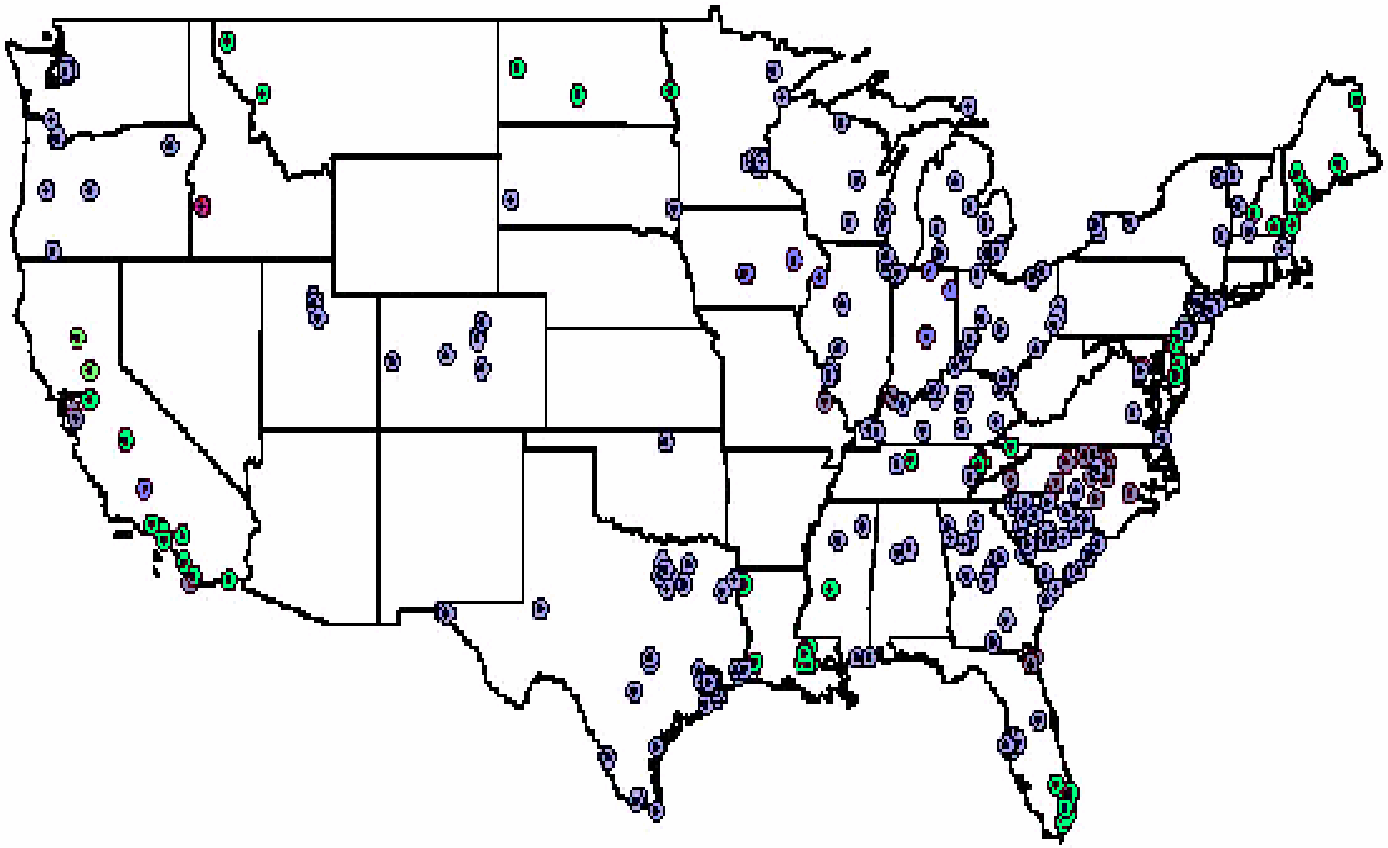
	Startup (2004)	Currently
Carbonyls	17	24
Metals	15	19
VOC	15	29*
Total	47	72*

This is a 53% increase

All Voluntary!!

* Six of these labs are EPA Regional labs (Regions 1,3,4,5,6 and 9)

PT Program Expansion



- AT Stations using PT Program

- AT Station not using PT Program

There is an estimated 417 Air Toxics Stations in US (2006)

For 77% (322) of these sites, are supported by labs analyzing OAQPS PT Samples

<u>Our goal, 100% of all Air Toxics labs analyzing PT samples.</u>

Summary: Is the Program Able to Meet the DQOs?

- **Short Answer: Yes and No.**
  - The mean data completeness is below the required 85% for the 3rd year in a row, with the exception of the VOCs. Improvement has been seen in this area;
  - The detectability for the 4 DQO compounds does not meet the MDLs stated in the DQOs, although there are improvement;
  - The CV data from the collocated/duplicate data illustrates that we are meeting CV of less than 15% with the exception of Benzene;
  - The laboratories are meeting the 25% Bias requirement.

Summary: Is the NATTS QA Program Successful?

- **Yes, the NATTS QA program is very successful:**
  - **The QA program can detect problems and issues;**
    - **Acrolein by DNPH and TO-15 have issues**
    - **Extraction of metals from Teflon filters is a problem**
  - **The QA program illustrates there has been improvements;**
    - **Improvements have been seen across the board**
  - **The QA program has been shown to be cost effective;**
    - **Costs have gone down three years in a row**
  - **PT program has undergone 53% growth!**
  - **We understand the realistic quality of HAPS data!**

Summary/Recommendations

- **Recommend working NATTS agencies to report data in a more timely manner and increase data completeness;**
- **Recommend that we work together to get all Air Toxics labs analyzing PT samples at least once per year;**
- **Recommend we continues our task force to see how to lower MDLs.**