National Air Toxics Trends Stations
Quality Assurance Update
September 27, 2005

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Outline

- The NATTS Program
  - Evolution of the NATTS Program and Compounds
  - Data Quality Objectives
  - Measurement Quality Objectives
- Assessments
  - Bias
  - Precision
  - Detectability
  - Completeness
- Discoveries
- Quality Improvement and Next Steps

Evolution of the NATTS Compound List

CAA 1990

188 HAPs

UATS

"Dirty Thirty"

acrylonitrile, benzene, 1,3-butadiene, carbon tetrachloride, chloroform, 1,2 dibromomethane, 1,3-dichloropropene, 1,2-dichloropropane, ethylene dichloride, ethylene oxide, dichloromethane, tetrachloroethane, tetrachloroethylene, trichloroethylene, vinyl chloride, arsenic, beryllium, cadmium, chromium, lead, mercury, manganese, nickel, acetaldehyde, formaldehyde **acrolein,** 2,2,7,8 tetrachlorobenzo-p-dioxin, coke oven emissions, hexachlorobenzene, hydrazine, polycyclic organic matter, polychloronated biphenyls, quinoline

Concept Paper

"Core 18"

benzene, 1,3-butadiene, carbon tetrachloride, chloroform, 1,2-dichloropropane, dichloromethane, tetrachloroethylene, trichloroethylene, vinyl chloride, arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, formaldehyde, acetaldehyde, **acrolein**

NATA

"6 NATTS"

benzene, chromium, **acrolein**, 1, 3 butadiene, arsenic formaldehyde

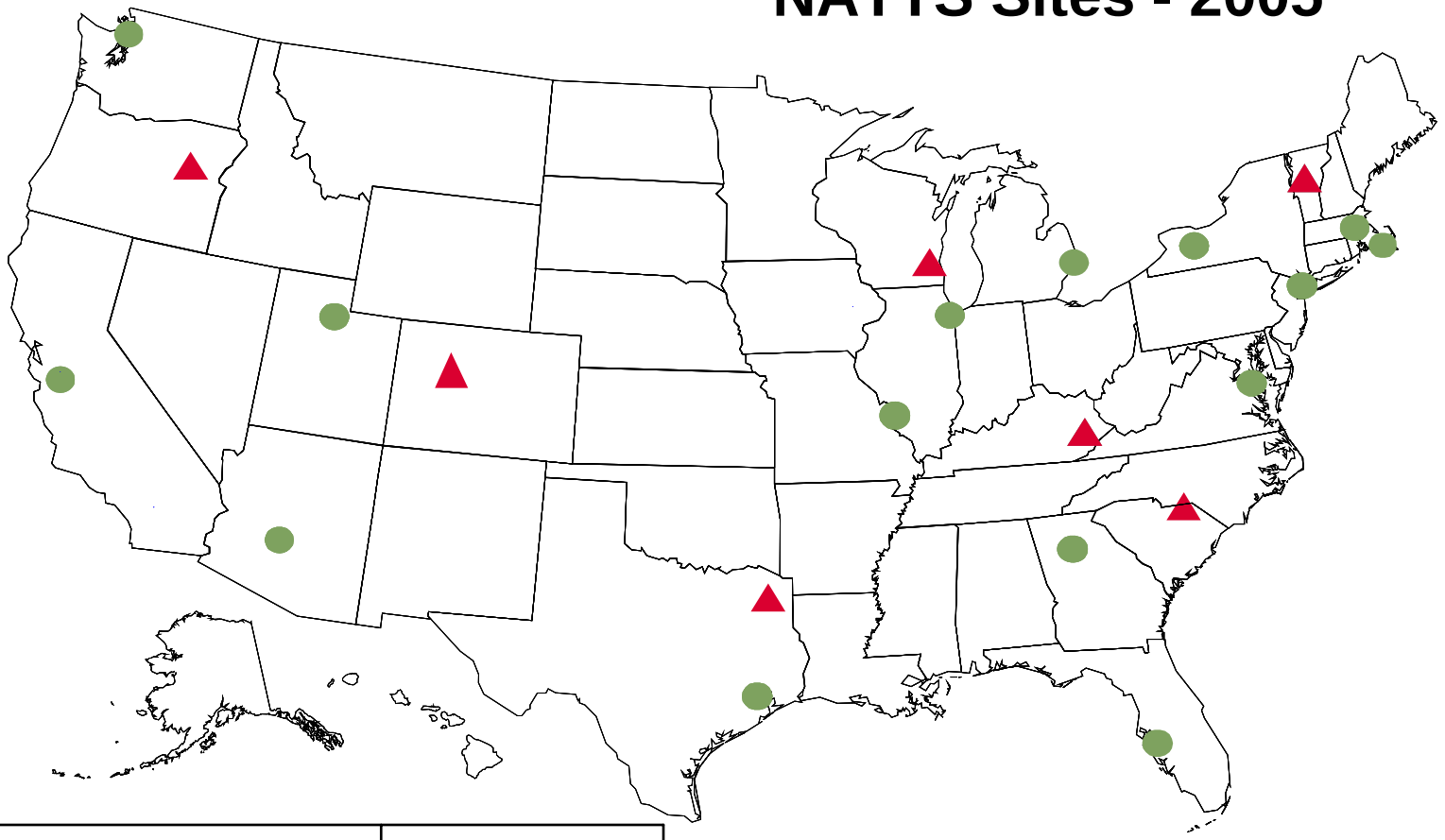
- hexavalent chromium*

Blue – EPA method

Black – no EPA method

Red – method has poor recovery

NATTS Sites - 2005



•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):

"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 is expected to be zero.**

These are our Measurement Quality Objective (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
  - 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	Detectability (Pilot Study)	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%**

Note: 2004 is the first year of operation.

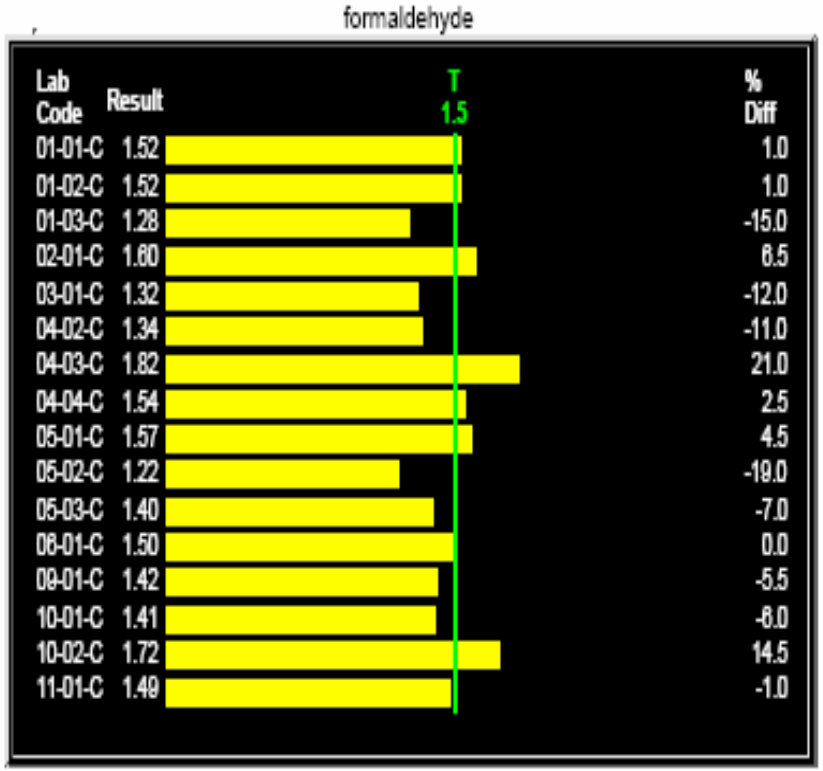
NATTS MQOs

Sources of MQO data

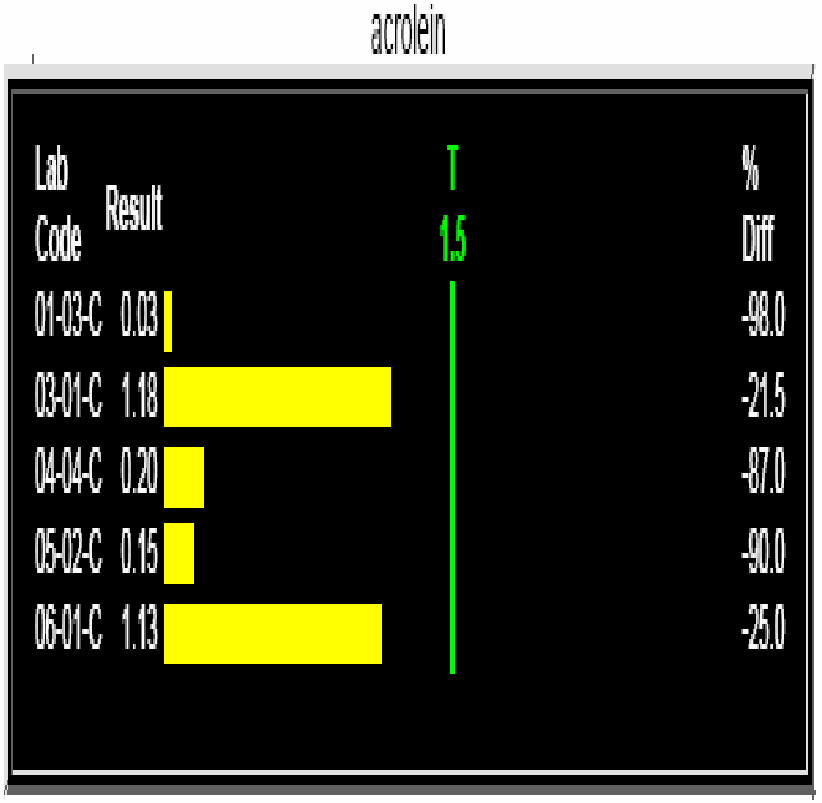
MQO	Source of Data	Tolerance	Units
Precision – CV	**Air Quality System (AQS)**	**< 15%**	**Percent Difference**
Bias	**Proficiency Testing and Field Sampler Audits**	**< 25%**	**Percent Difference**
Detectability	**Laboratories**	**Variable**	**ug/m3 or ng/m3**
Completeness	**AQS**	**> 85%**	**Percent of possible samples**

Bias – Acrolein Results

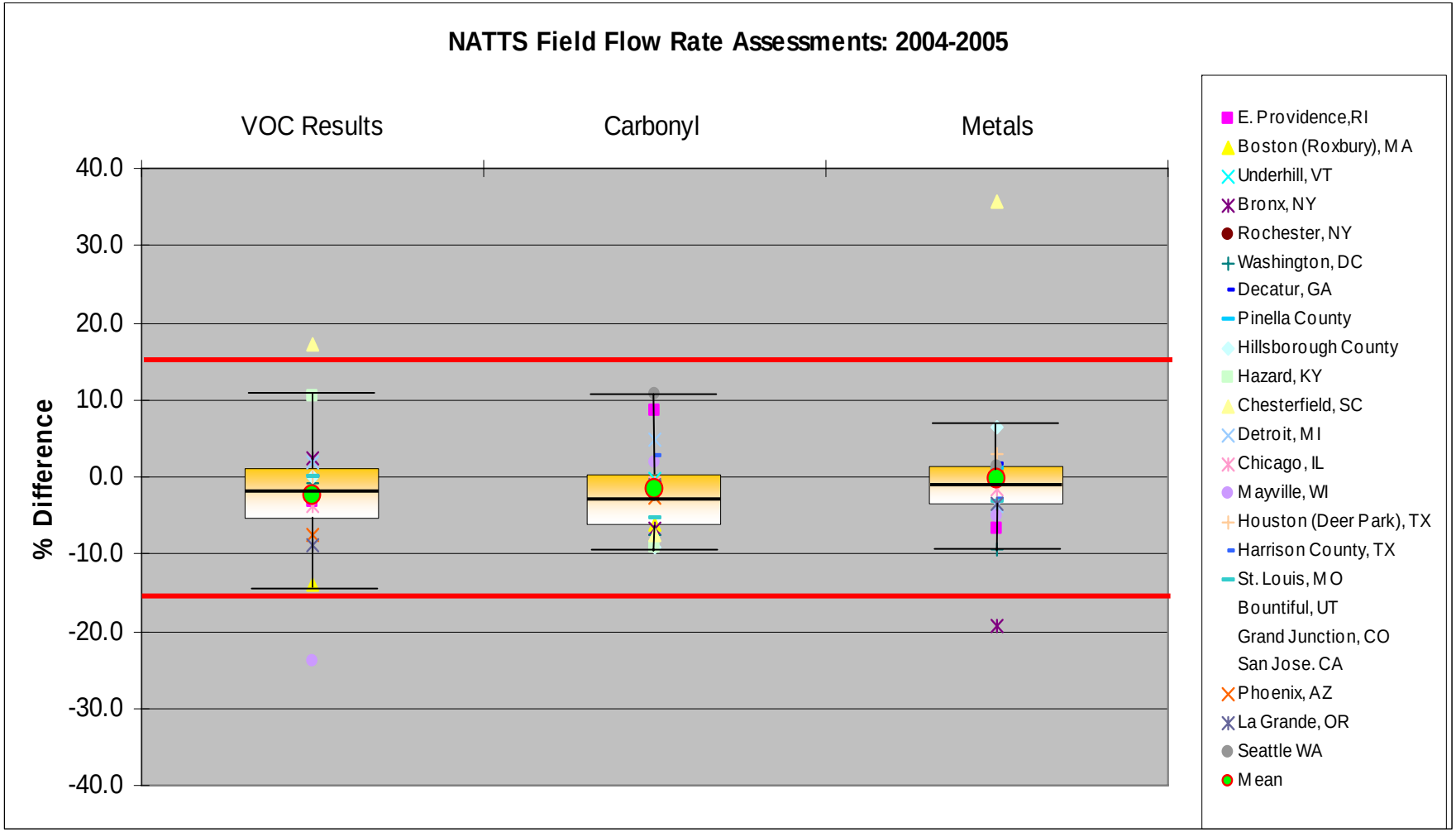
3rd Qtr '04



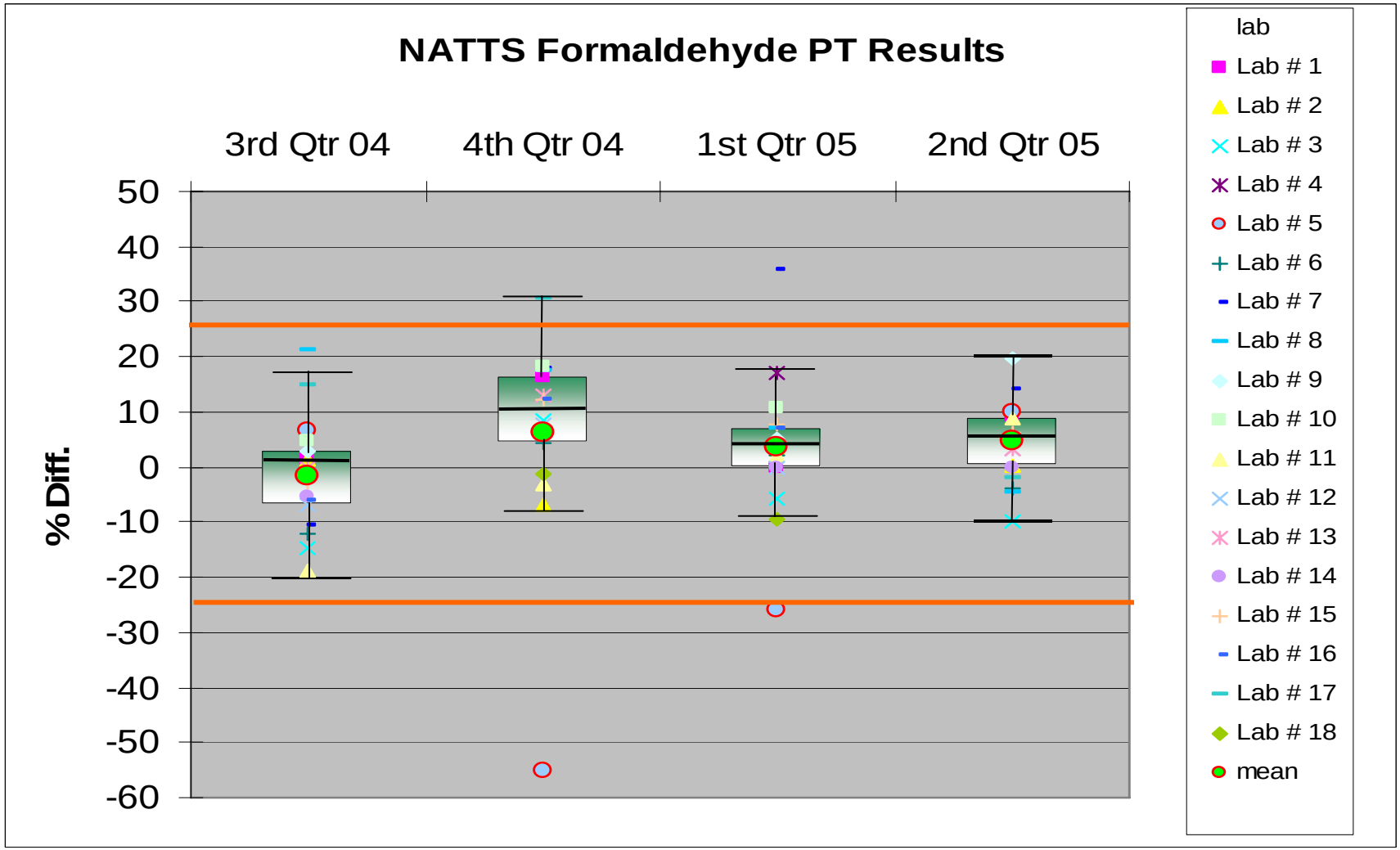
3rd Qtr '04



Bias – Field Assessments



Bias – PT Inter-laboratory Comparison



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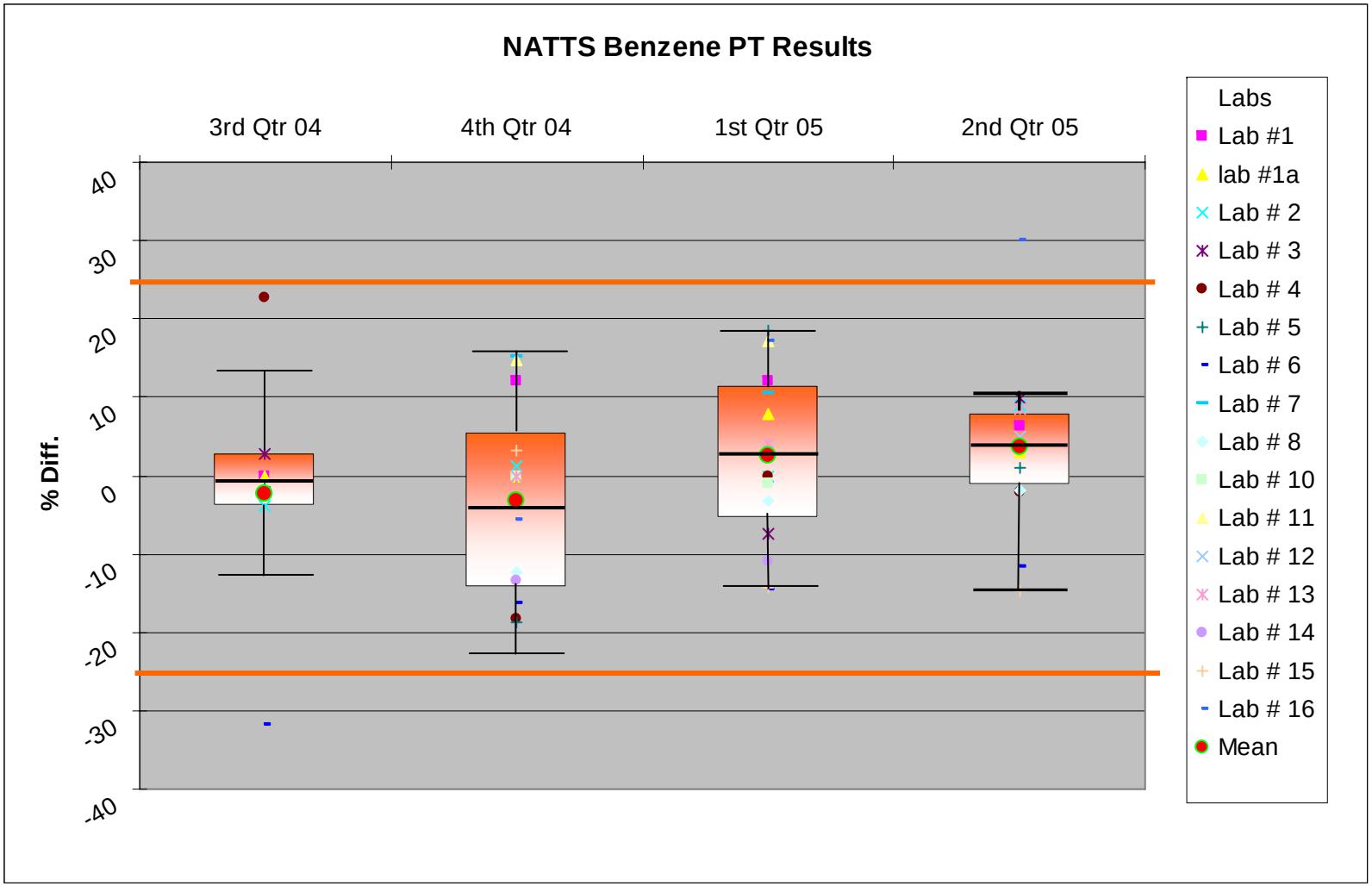

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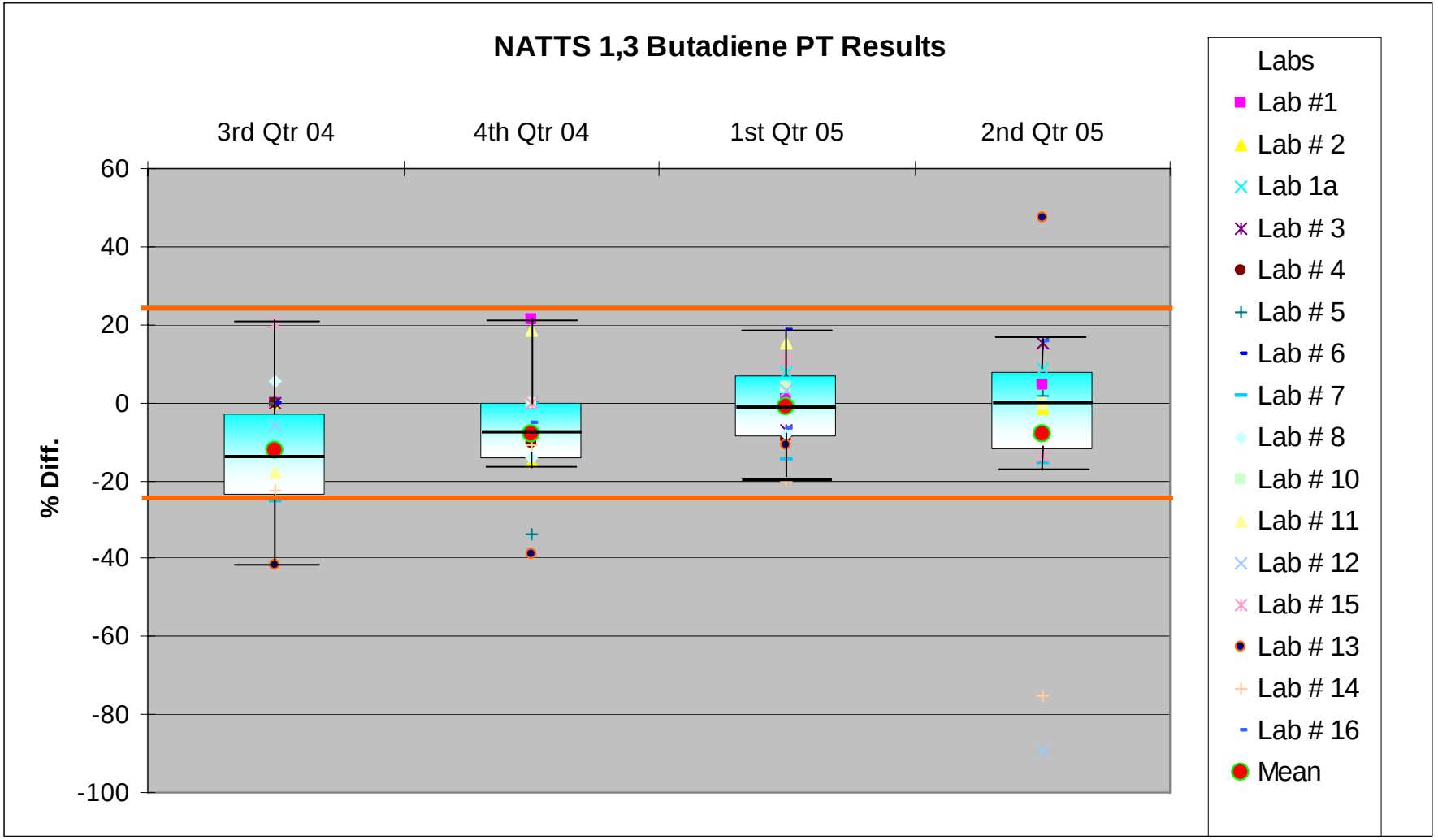

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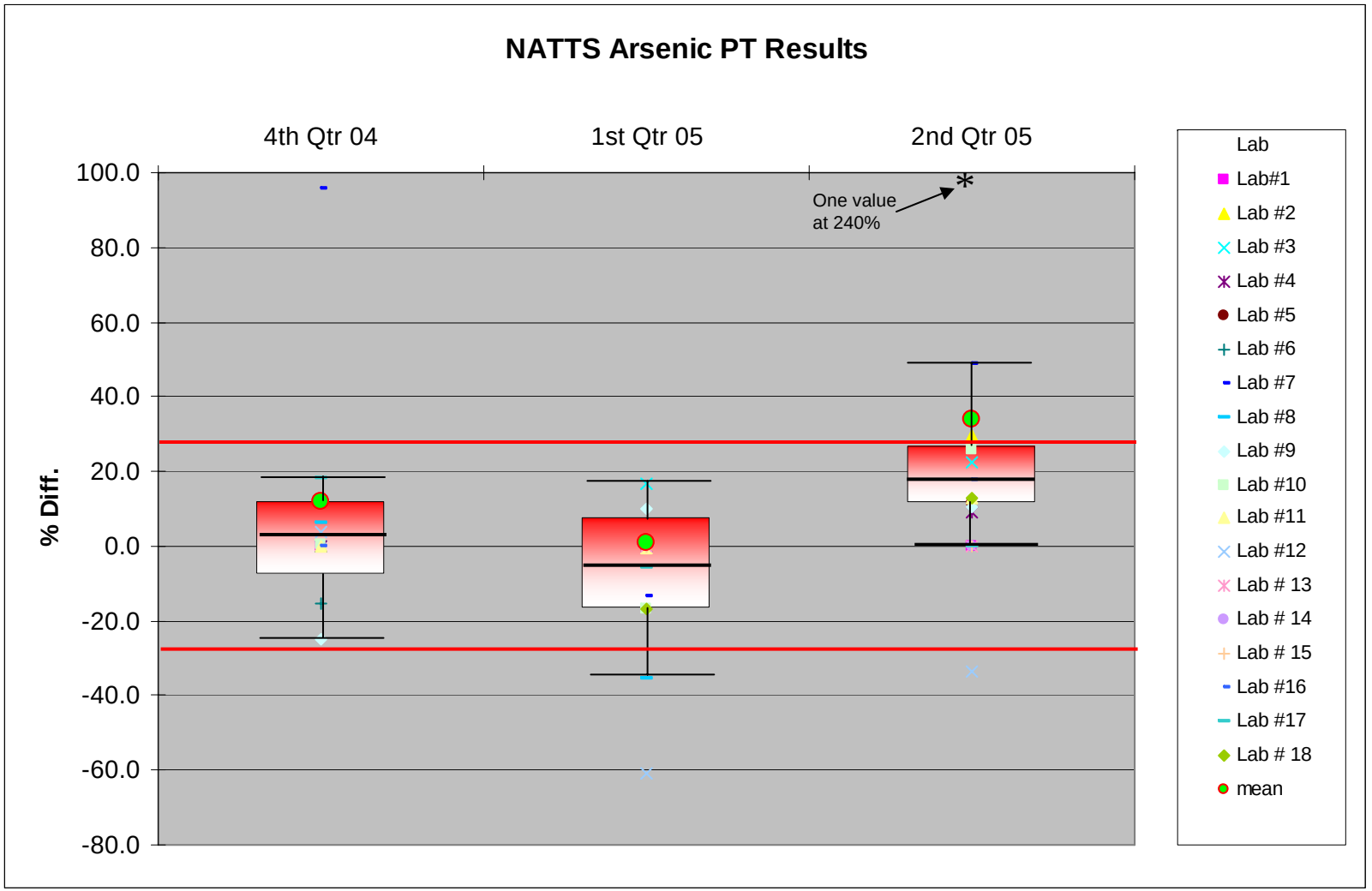
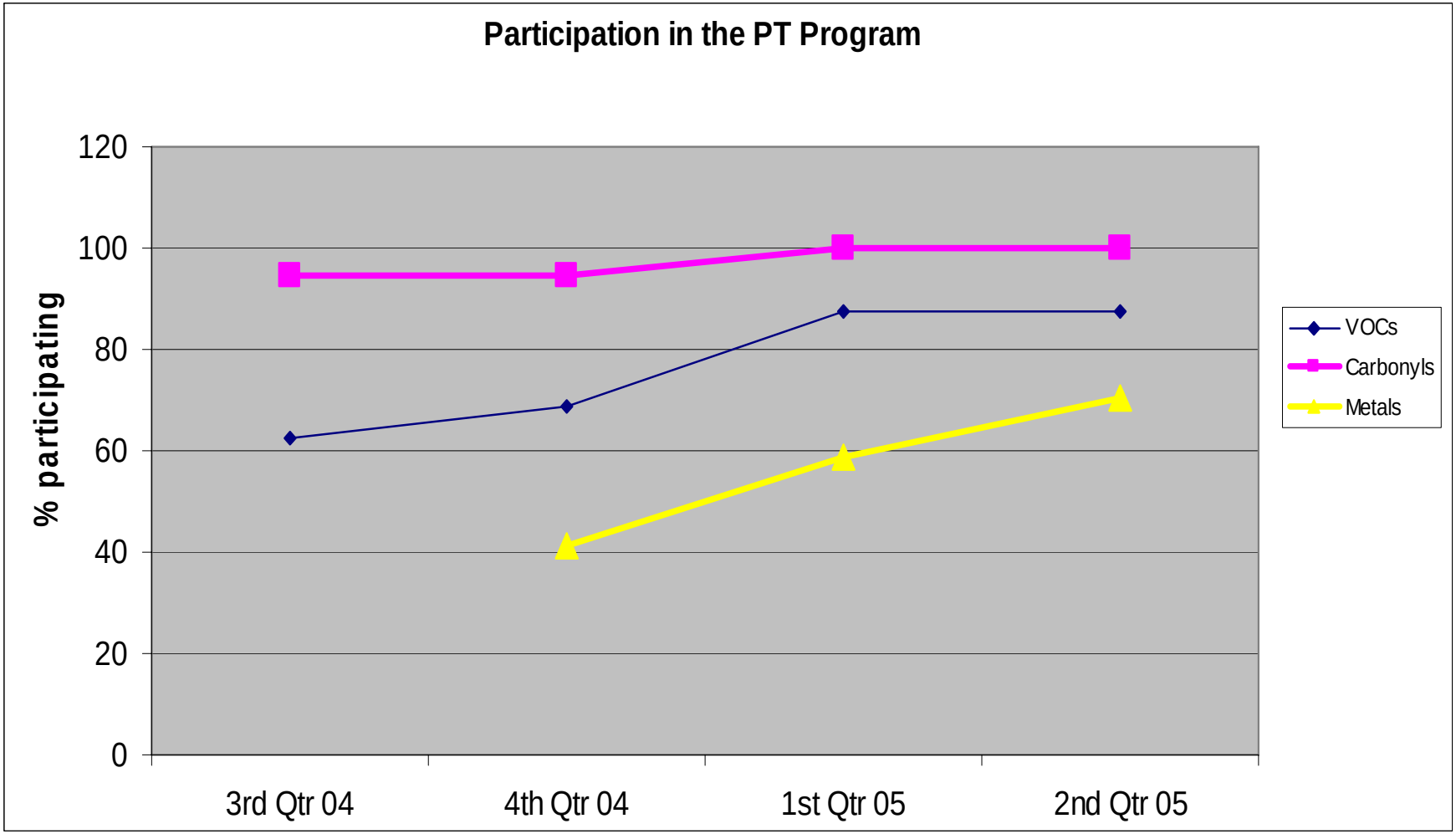
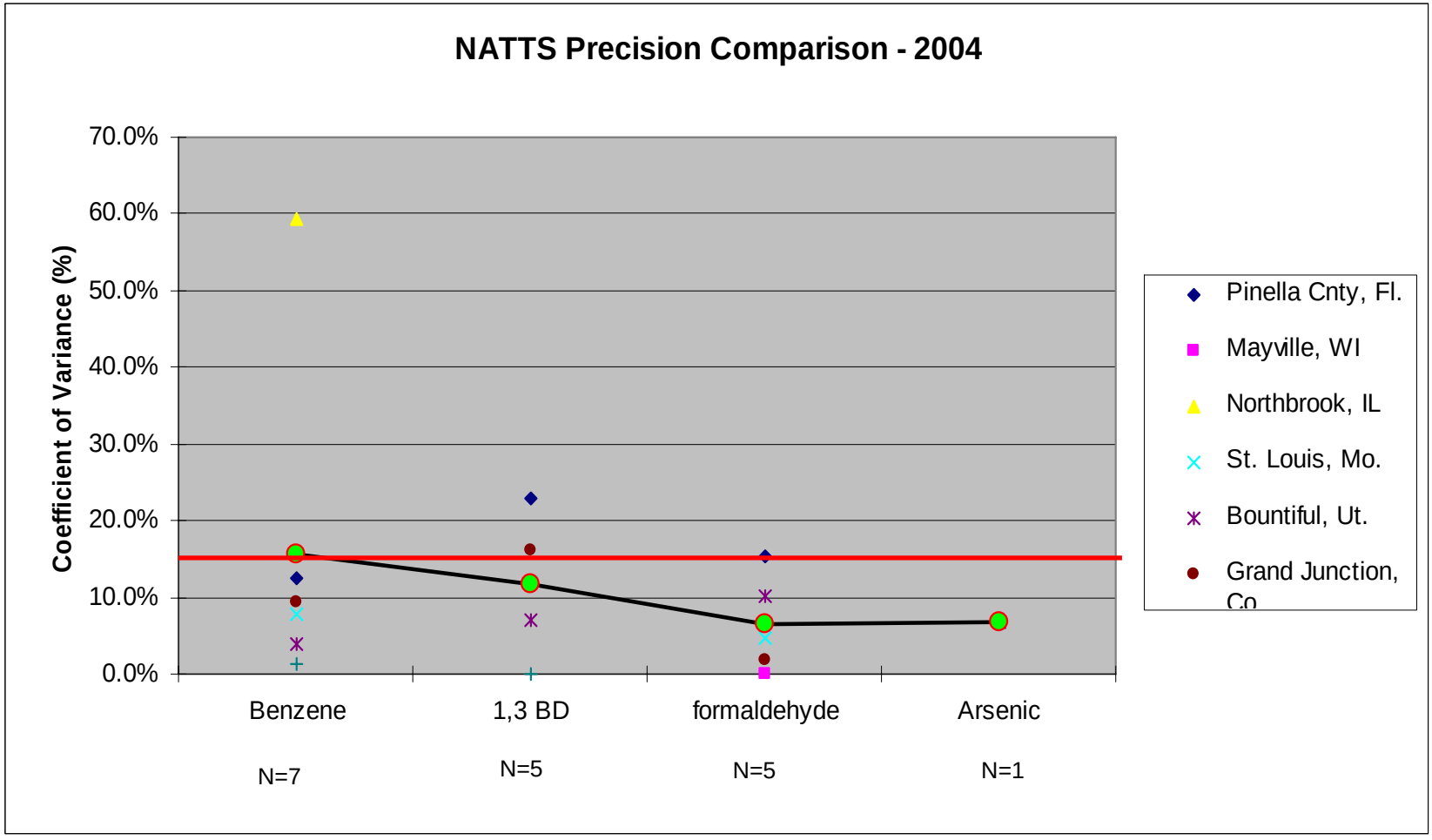


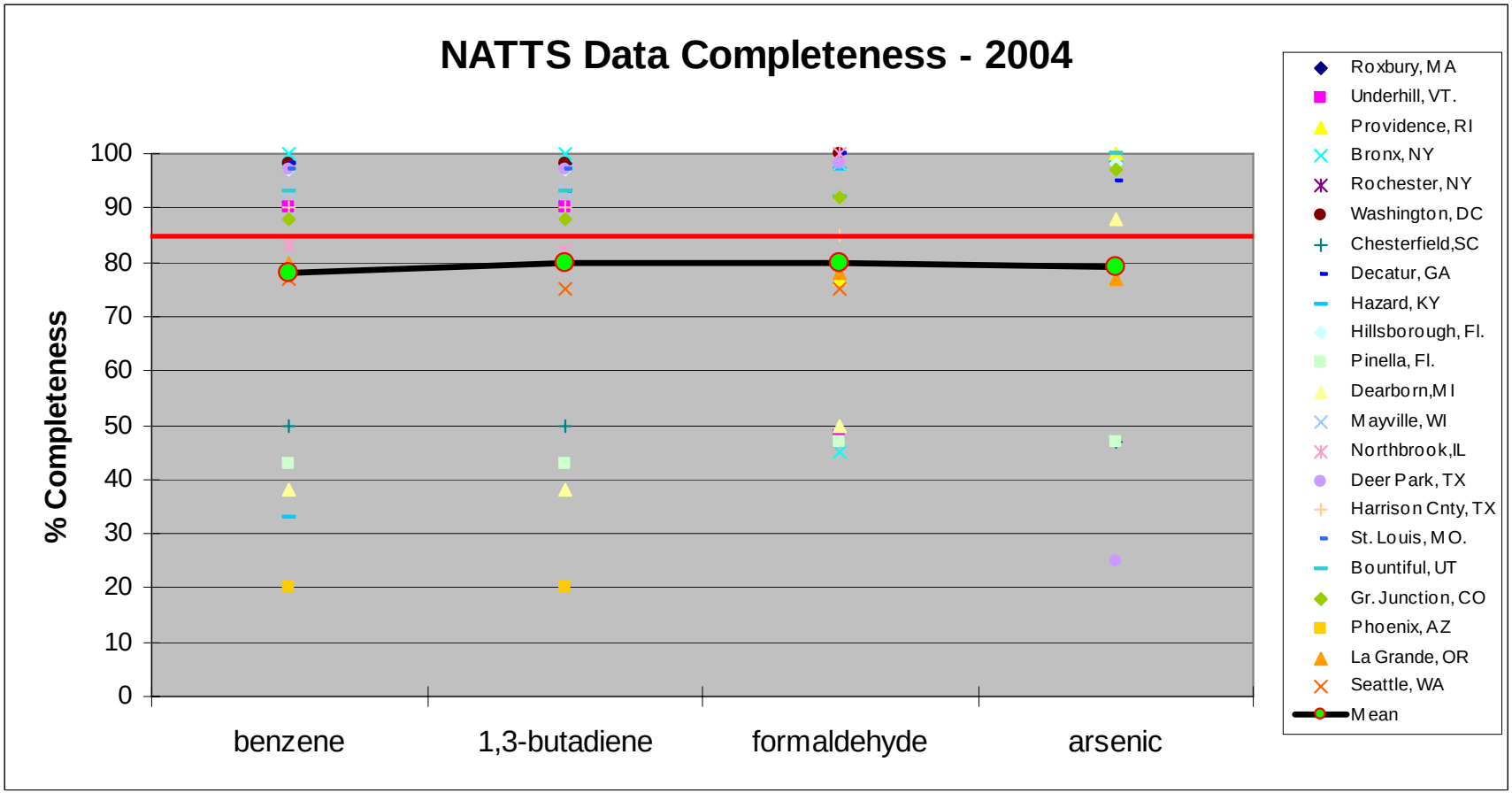
Bias - PT Participation Results



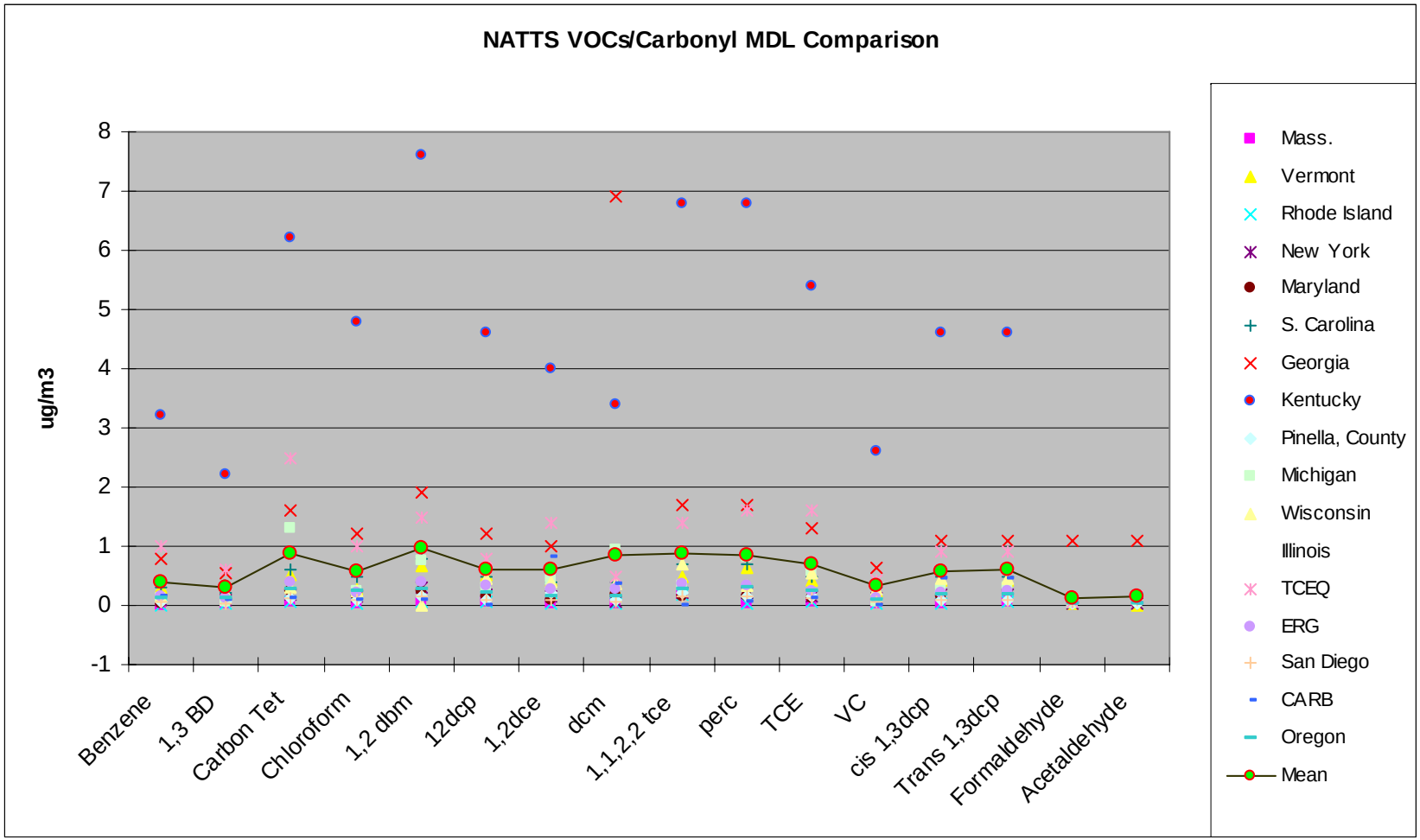
Precision Results Comparison



Completeness – All Quarters 2004



Detectability MDLs Reported



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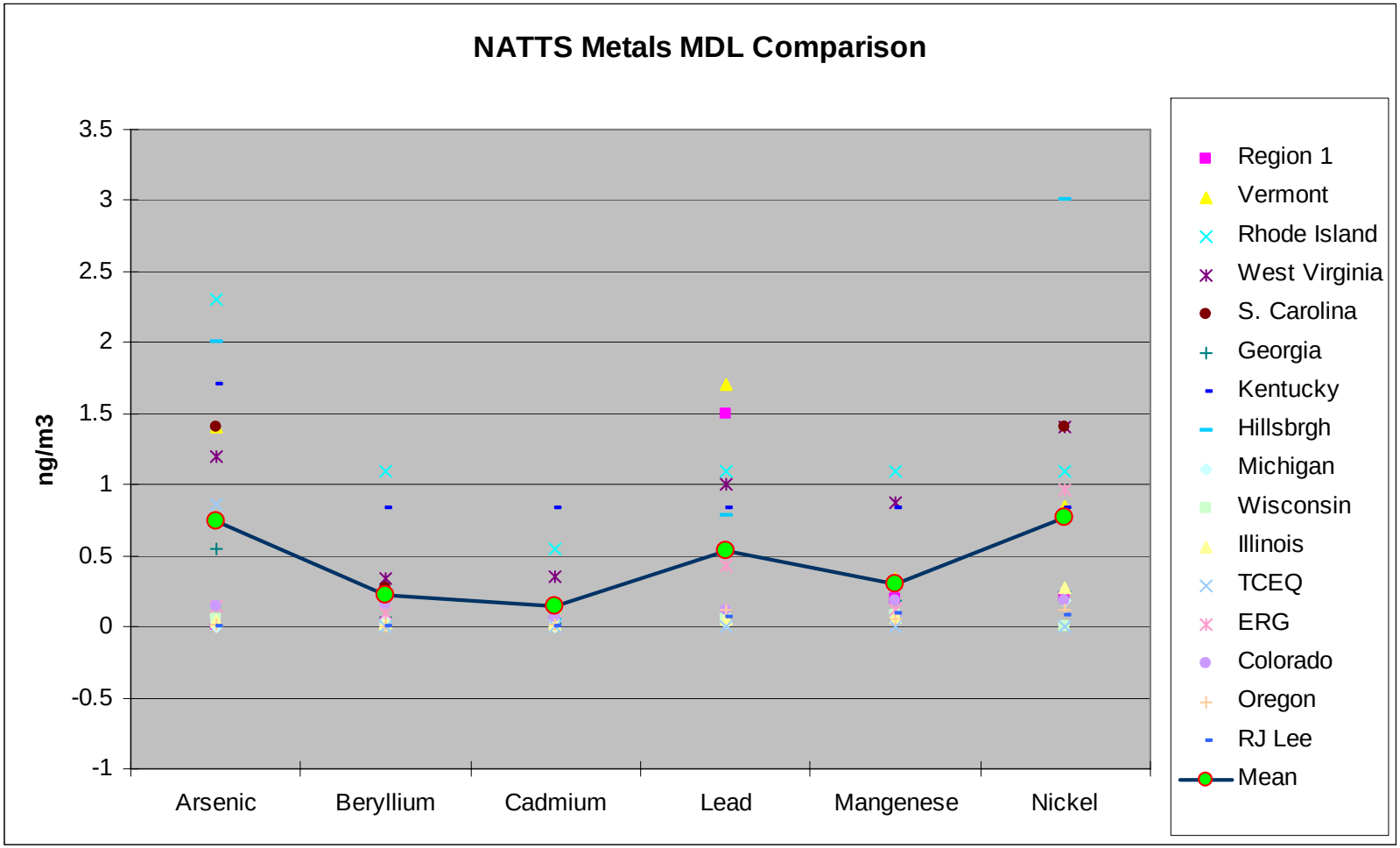
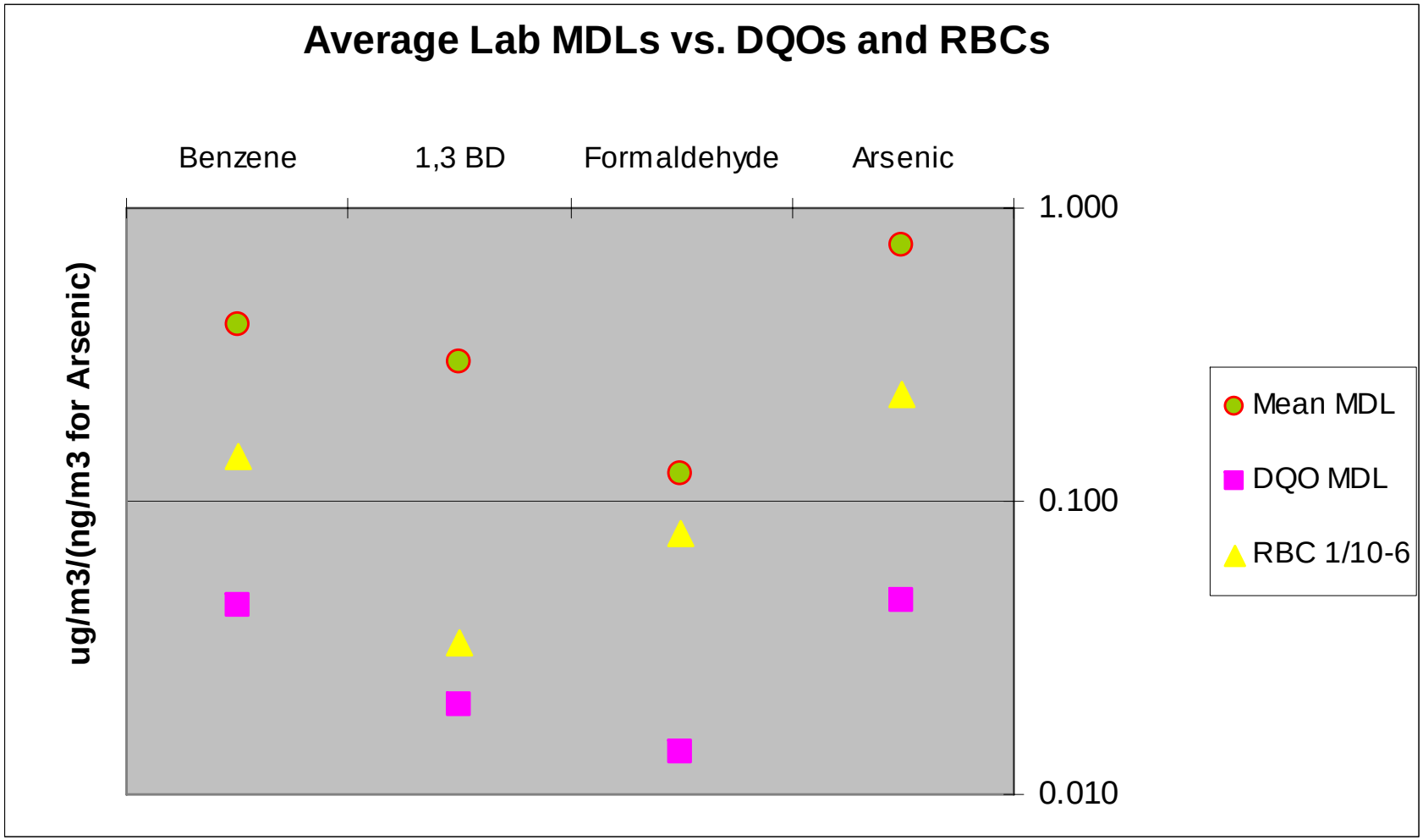


Detectability MDLs vs. Risk Based Conc. And DQOs MDLs



Discoveries

Many challenges ahead!

- Field sampler flow audits: flows were generally below 15%.
- Formaldehyde, Benzene and 1,3 BD Bias are within tolerance of 25%. Arsenic is not.
- The TO-11A method does not give us good recovery for Acrolein
- PT participation for VOCs and Aldehydes is excellent. Metals PT participation needs improvement

Discoveries

Many challenges ahead!

- Benzene is not meeting our Precision goal of less than 15% CV. 1,3 BD, Formaldehydes and Arsenic are. Note Benzene CV is 15.7%.
- There is only one site submitting collocated Arsenic data.
- Data Completeness for the 4 DQO compounds are not meeting the 85% completeness criterion. This area needs improvement.
- Detectability varies amongst the laboratories
- The detectability for the 4 DQO compounds does not meet the MDLs stated in the DQOs. Nor does it meet the 1 in 10^6 Cancer Risk Based Concentrations

Quality Improvement and Next Steps

- What we have done so far:
  - Research into Acrolein Method via TO-15
  - Recommended decrease in Aldehyde PTs to semi-annual samples – Save $$.
  - Research should begin on 1,3 BD recovery
  - Research is being conducted on Hexavalent Chromium Method

Quality Improvement and Next Steps

- What we need to do:
  - Work with NATTS agencies to:
    - Increase data completeness
    - Increase the number of collocated metals samplers
    - Increase the participation of the metals labs in the PT program
  - Research into lowering the MDLs for the DQO compounds

Quality Improvement and Next Steps

- Expansion of the PT program
  - Request from EPA Regional lab
  - Request from Non-NATTS labs
  - Currently, putting in the Work Assignments to accommodate all AT labs that wish to participate – Available Early 2006!