USEPA Region 5 Inter-lab comparability program

Motria Caudill, EPA-R5, Air Monitoring & Analysis Section

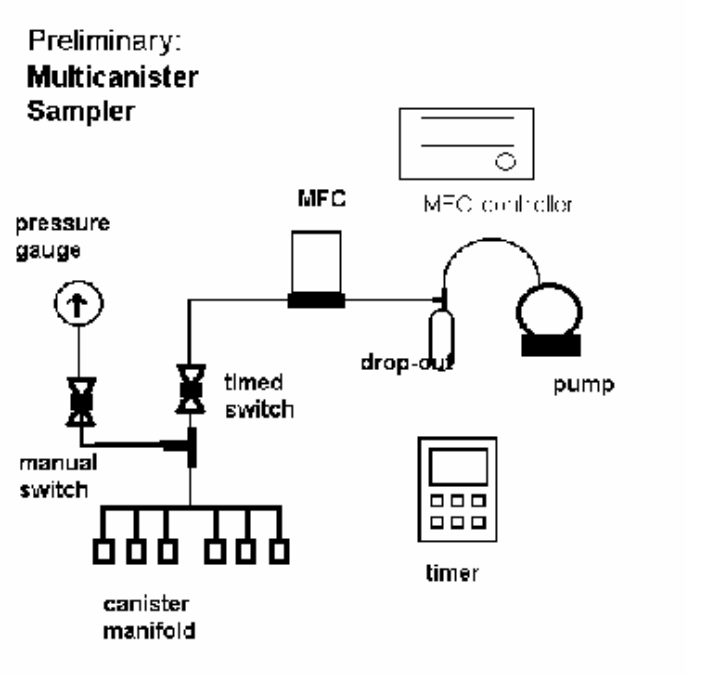
Need for air toxics analysis comparability assessment

- Non-criteria pollutant monitoring data considered unreliable by some
  - varied lab methods
  - perception of questionable QA/QC
- Air toxics programs are growing and gaining visibility
- Are monitoring data from State/Local networks as good as national programs like UATMP?

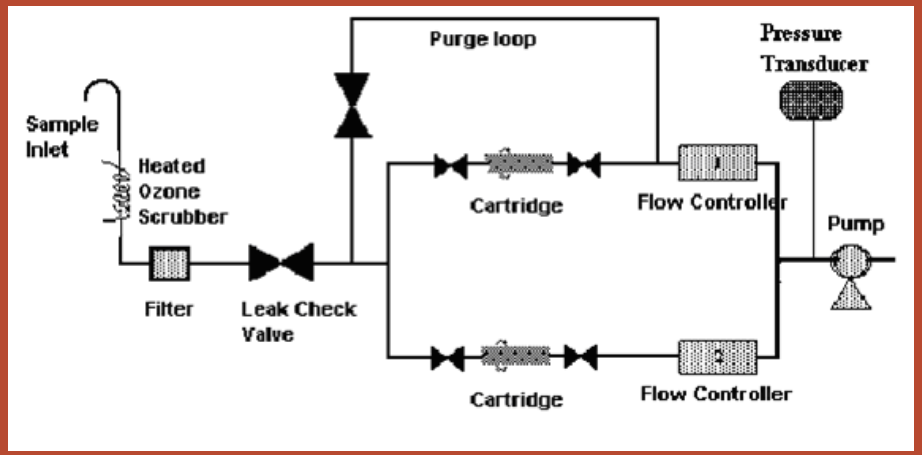
Origins of lab comparability program in R5

- Late 1990s State toxics monitoring staff initiated canister exchange program to assess comparability of VOC results
- Expanded effort to include carbonyls and TSP metals in 2002

Initially Wisconsin DNR collected parallel ambient samples



- 6-8 VOC canisters
- multiple pairs of carbonyl cartridges
- TSP filter cut into strips

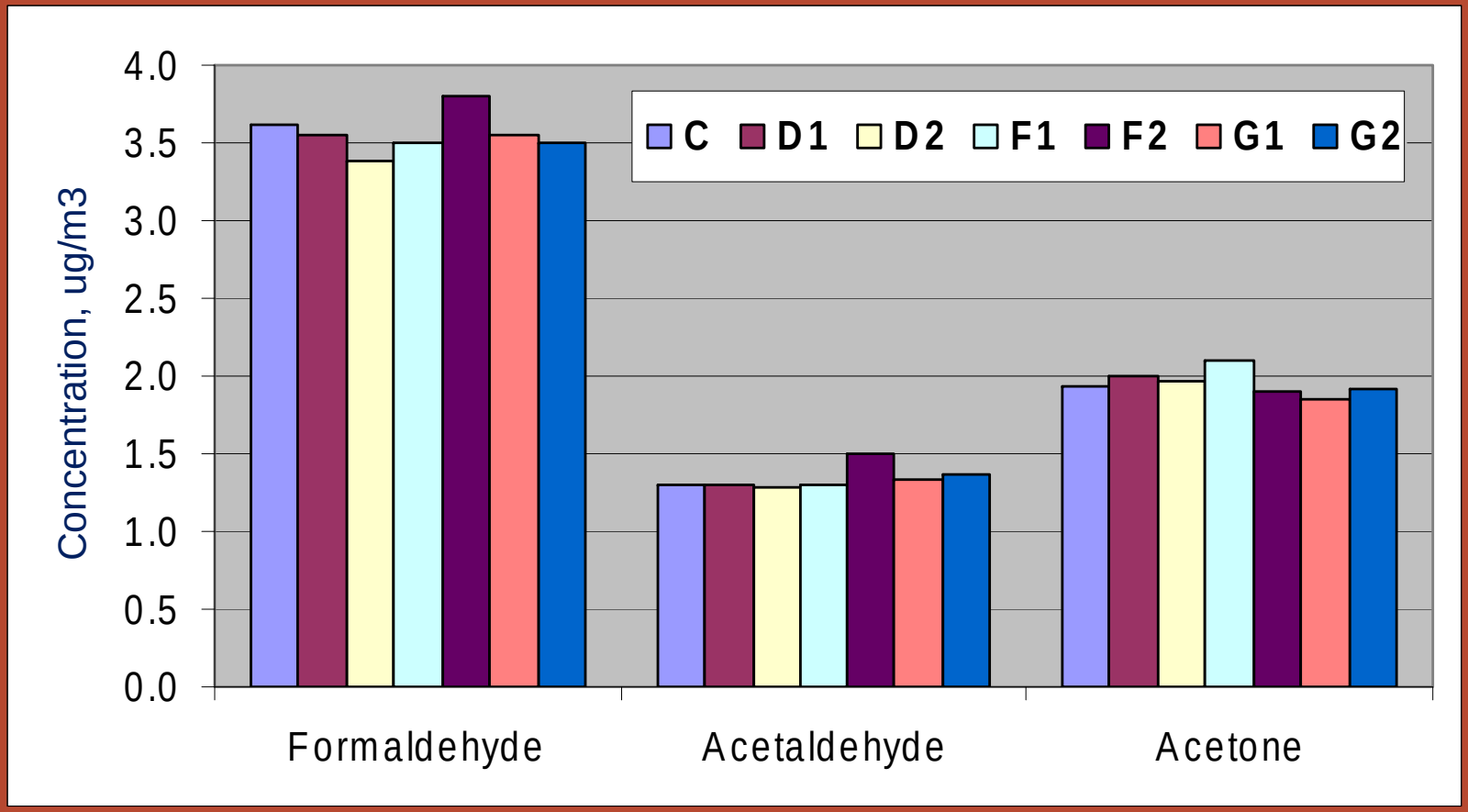


NOTE: “true” HAP conc. is unknown, unlike NATTS performance tests (PT) spiked with known amount.

Current participants

- State agencies
  - Illinois Environmental Protection Agency
  - Indiana Department of Environmental Management
  - Michigan Department of Environmental Quality
  - Minnesota Pollution Control Agency
  - Ohio Environmental Protection Agency
  - Wisconsin Department of Natural Resources
- Eastern Research Group (ERG)
  - joined program in 2004
  - took over sample collection for VOCs and carbonyls
- EPA R5 Central Regional Laboratory, 2006

Carbonyl result, 2008a



Data analysis similar to CARB "round robin" program

Region 5 2008a carbonyl exchange

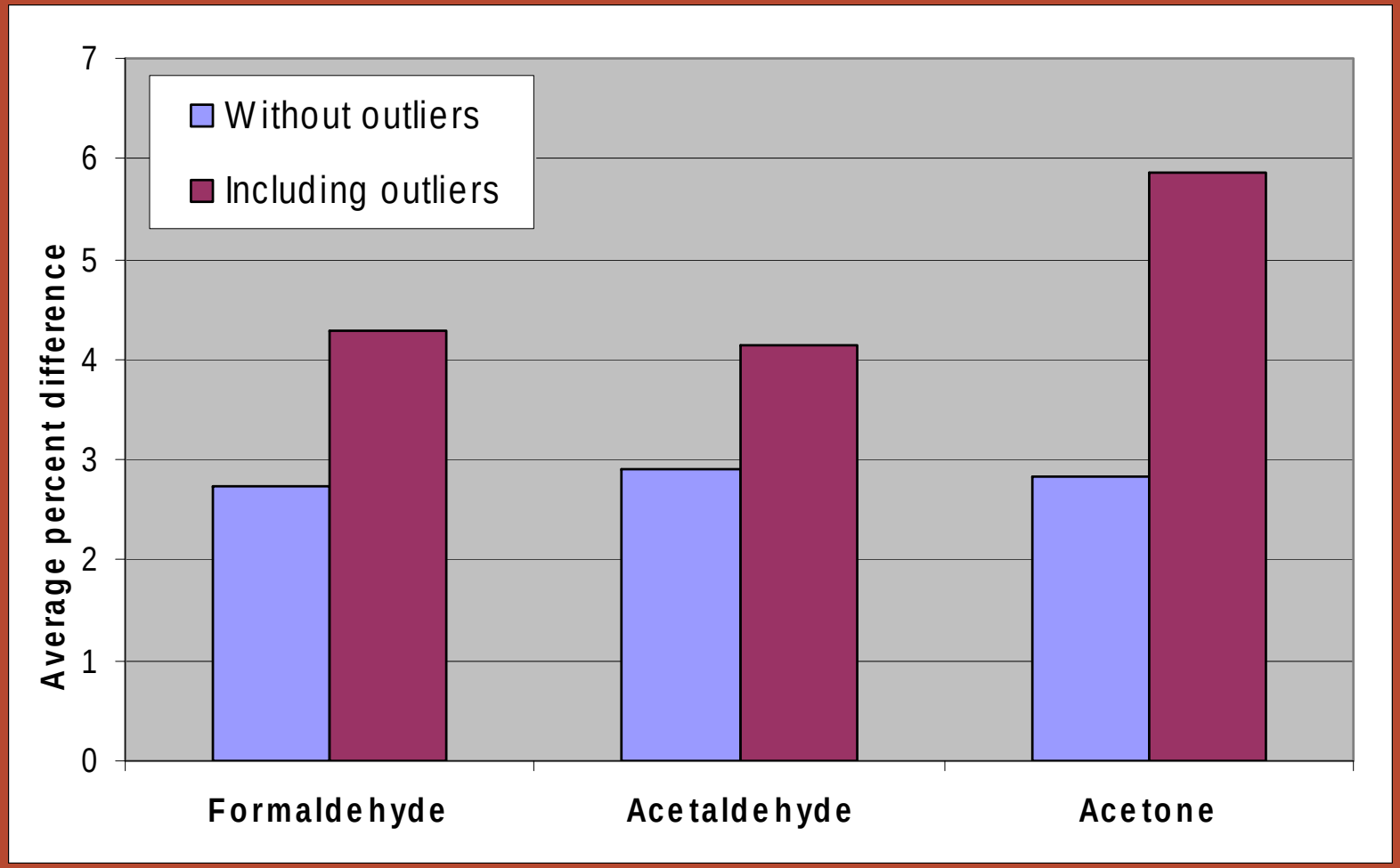
	Analytical results, ug/m3							Ave. ug/m3	Percent difference from average							LCV	UCV	Adj Ave
	C	D1	D2	F1	F2	G1	G2		C	D1	D2	F1	F2	G1	G2			
Formaldehyde	3.6	3.6	3.4	3.5	3.8	3.5	3.5	3.6	1.5	-0.2	-4.7	-1.6	6.8	-0.4	-1.4	3.40	3.72	3.5
Acetaldehyde	1.3	1.3	1.3	1.3	1.5	1.3	1.4	1.3	-3.0	-3.0	-3.7	-3.0	11.9	-1.0	1.8	1.24	1.44	1.3
Acetone	1.9	2.0	2.0	2.1	1.9	1.9	1.9	2.0	-1.2	2.4	0.4	7.6	-2.7	-4.9	-1.6	1.85	2.05	1.9
Benzaldehyde		0.2	0.2	0.2	0.2	0.2	0.2	0.2		-9.5	-4.4	-4.4	10.6	5.1	2.6	0.18	0.22	0.2
Propionaldehyde		0.3	0.2	0.3	0.4	0.3	0.3	0.3		-7.6	-14.7	3.1	28.0	-5.8	-3.0	0.23	0.33	0.3

% diff. from adj. ave. (abs)							w/o outl.	incl. all	
C	D1	D2	F1	F2	G1	G2			
1.9	0.2	4.3	1.2	7.3	0.0	1.0	0.9	2.3	Ave. by Carb
1.0	1.0	1.8	1.0	14.2	1.0	3.8	1.6	3.4	
0.1	3.7	1.7	8.9	1.5	3.7	0.4	1.8	2.8	
	9.5	4.4	4.4	10.6	5.1	2.6	6.1	6.1	
	2.1	9.6	9.2	35.5	0.2	2.8	4.8	9.9	
1.0	3.3	4.4	4.0	6.0	2.0	2.1	w/o outl.		
1.0	3.3	4.4	5.0	13.8	2.0	2.1	incl. all		
Average by Laboratory									

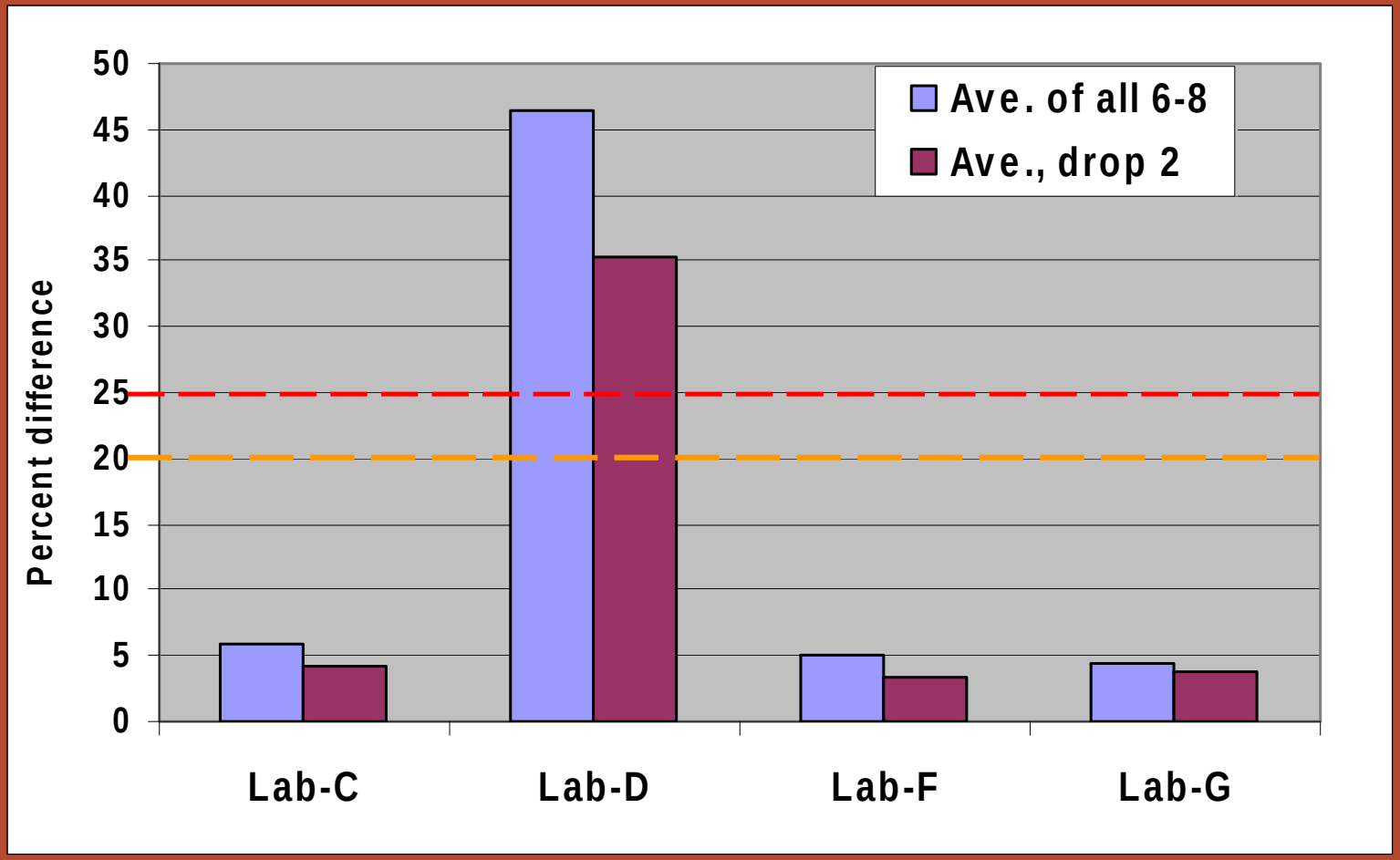
Adjusted average

- excludes outliers
- treated as "true"

Average carbonyl results for 4 exchanges in 2007-08



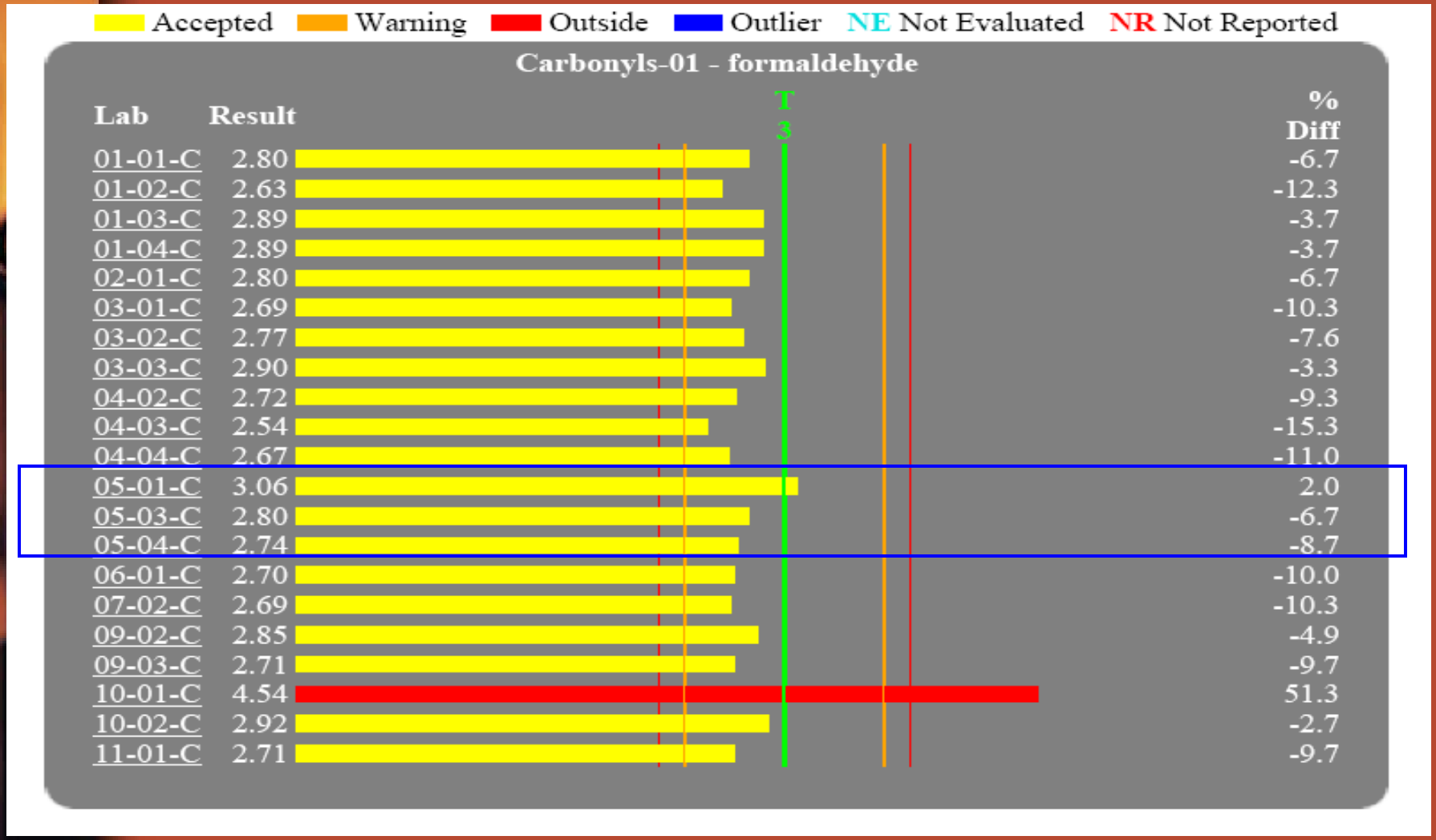
Earlier carbonyl results, 2004-06



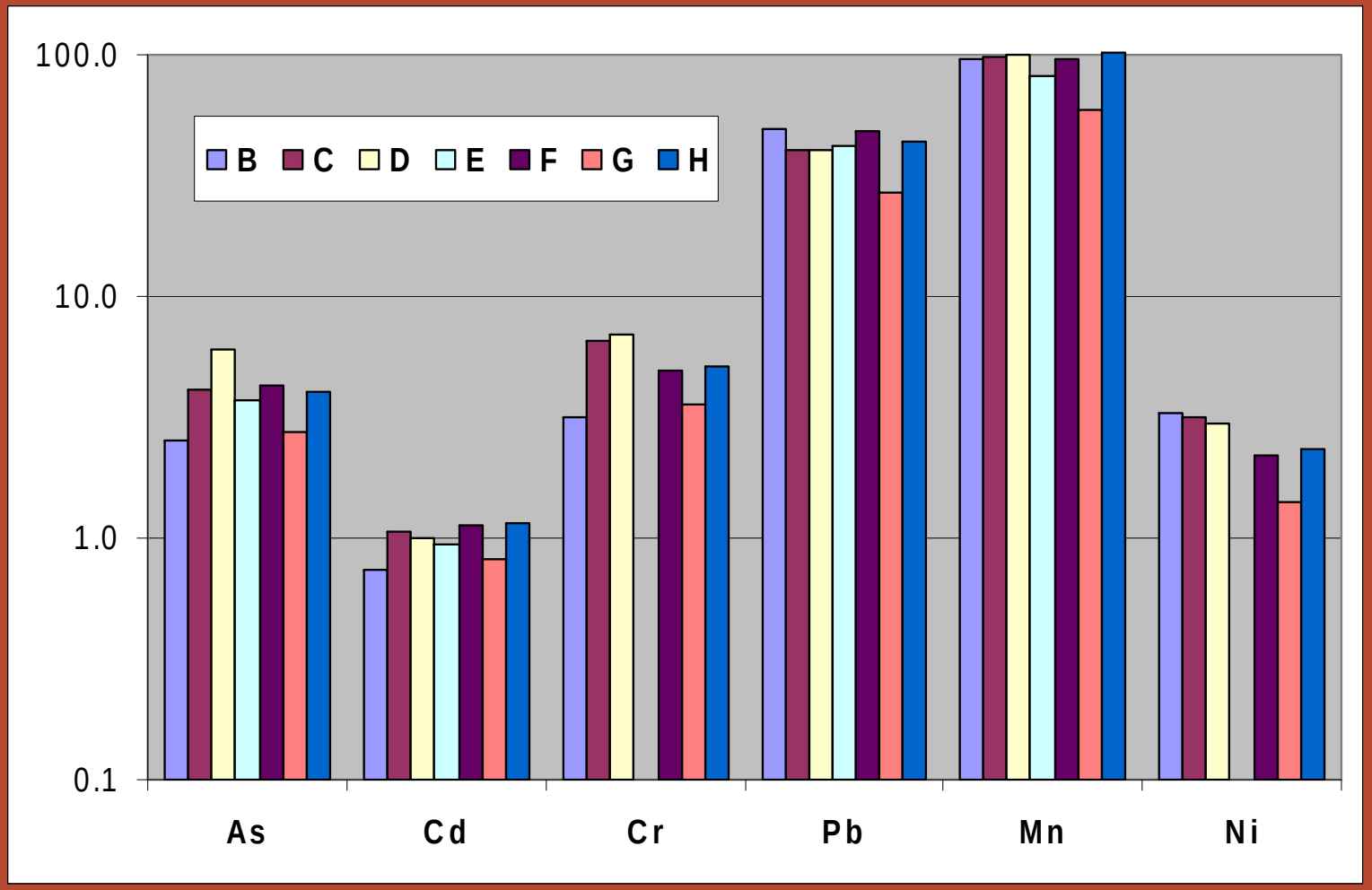
What happened with Lab-D?

- Collocated sampler study confirmed results higher than ERGs
- Found that certified calibration gases from 2 different vendors gave different readings
- Lab-D purchased new gas from the same vendor as ERG

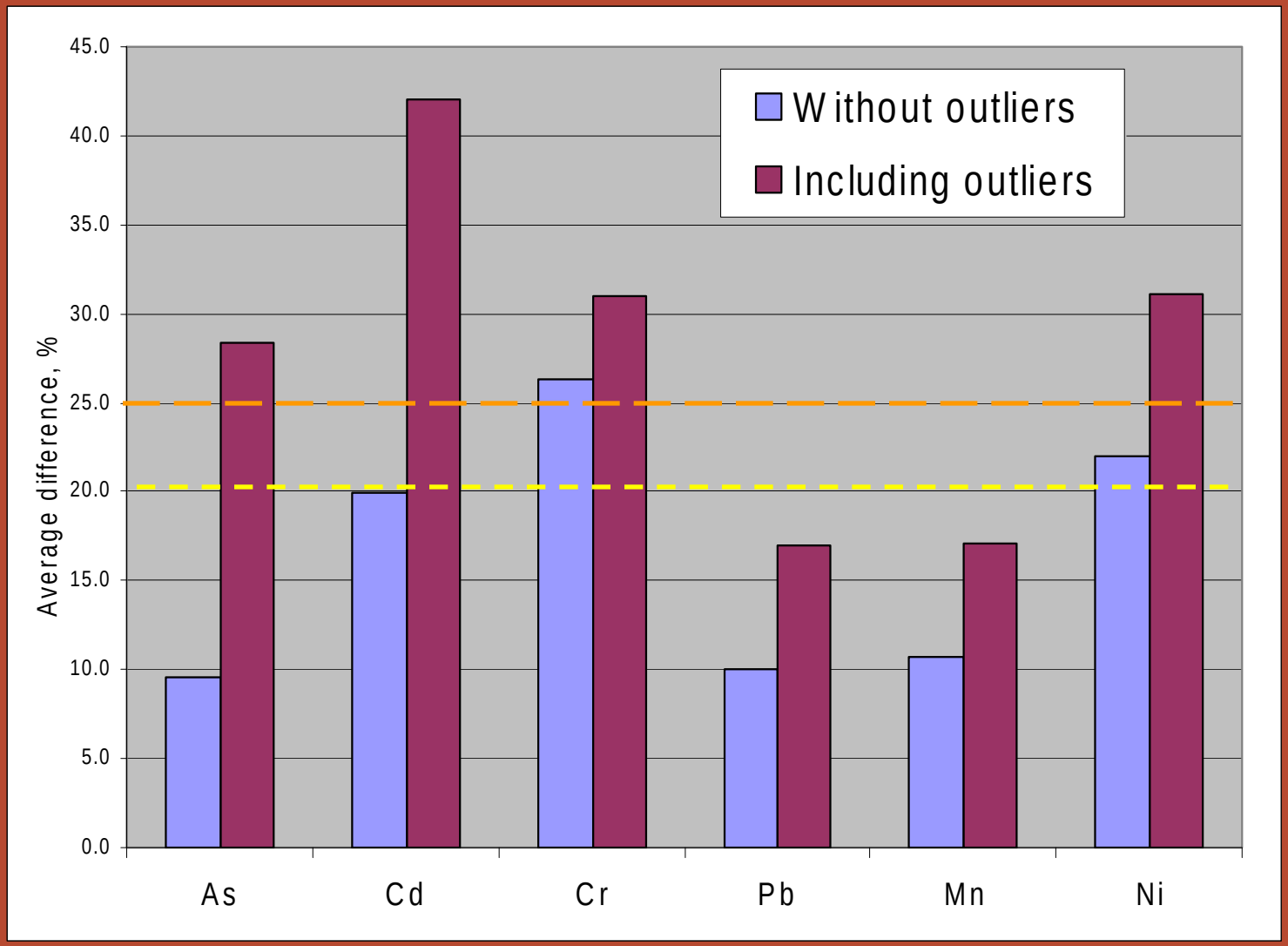
Lab-D is now in line as shown in NATTS PT results



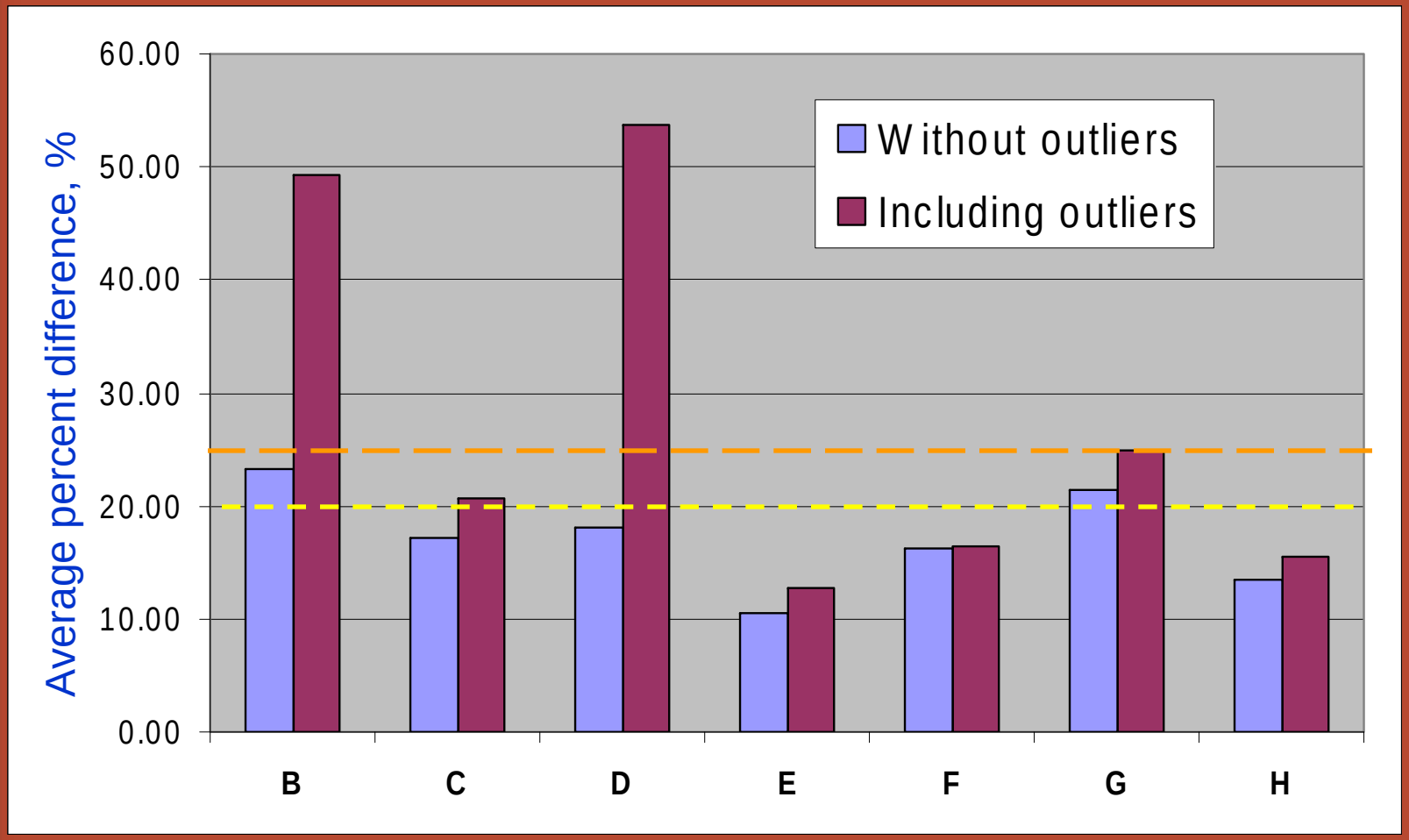
Recent metals result, 2007a



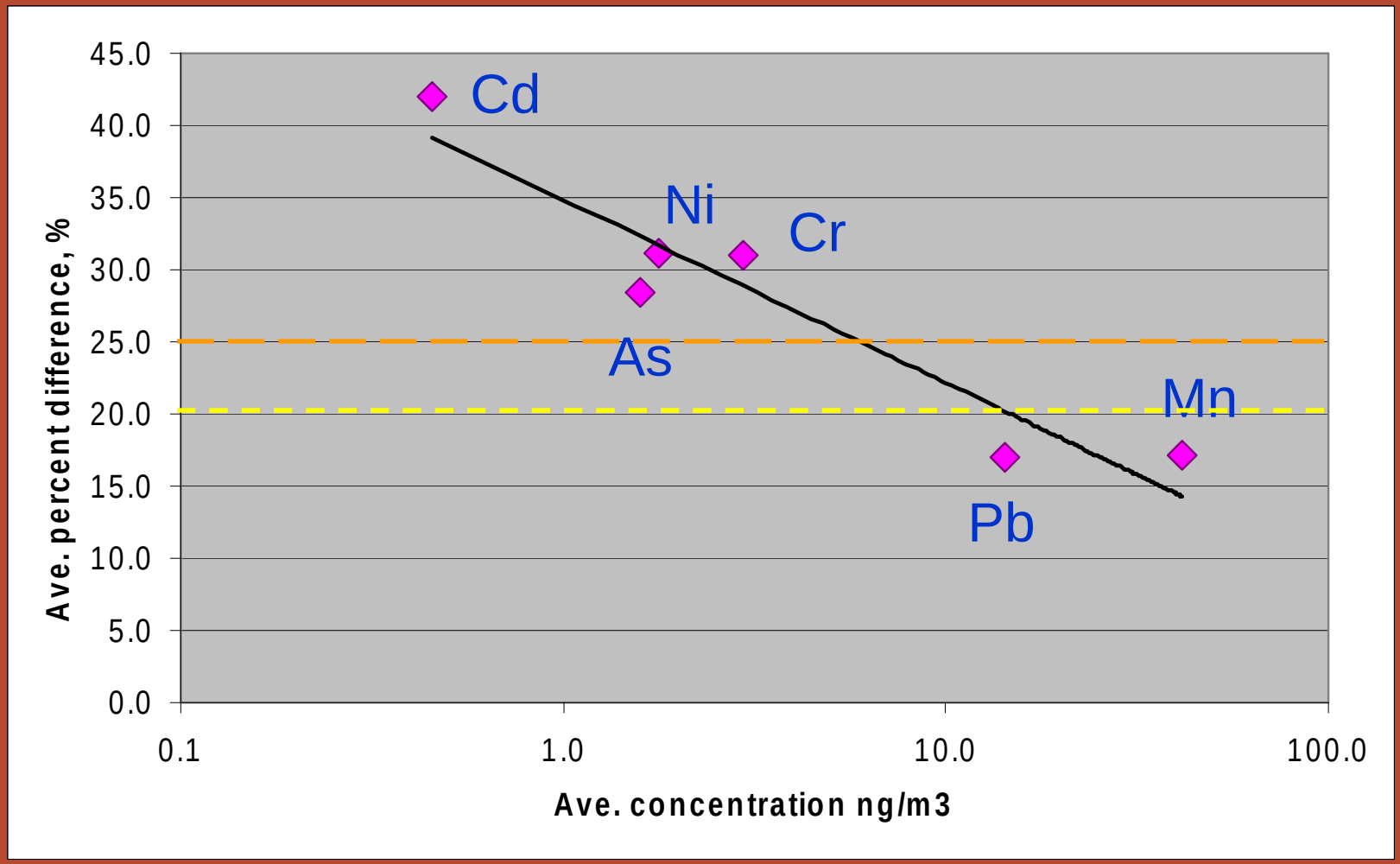
Combined metals results, 4 exchanges 2007-08



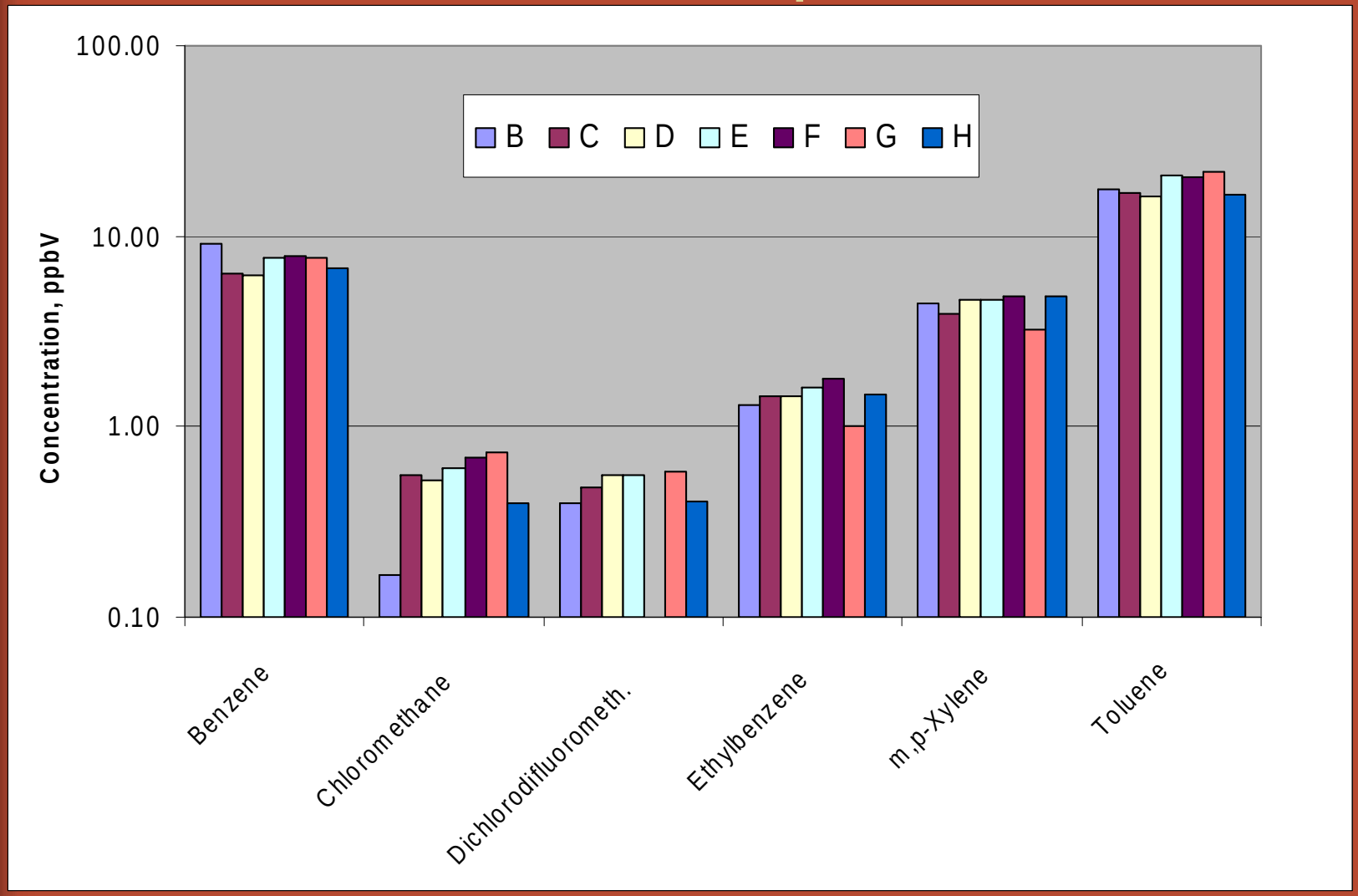
Combined metals results summarized by laboratory



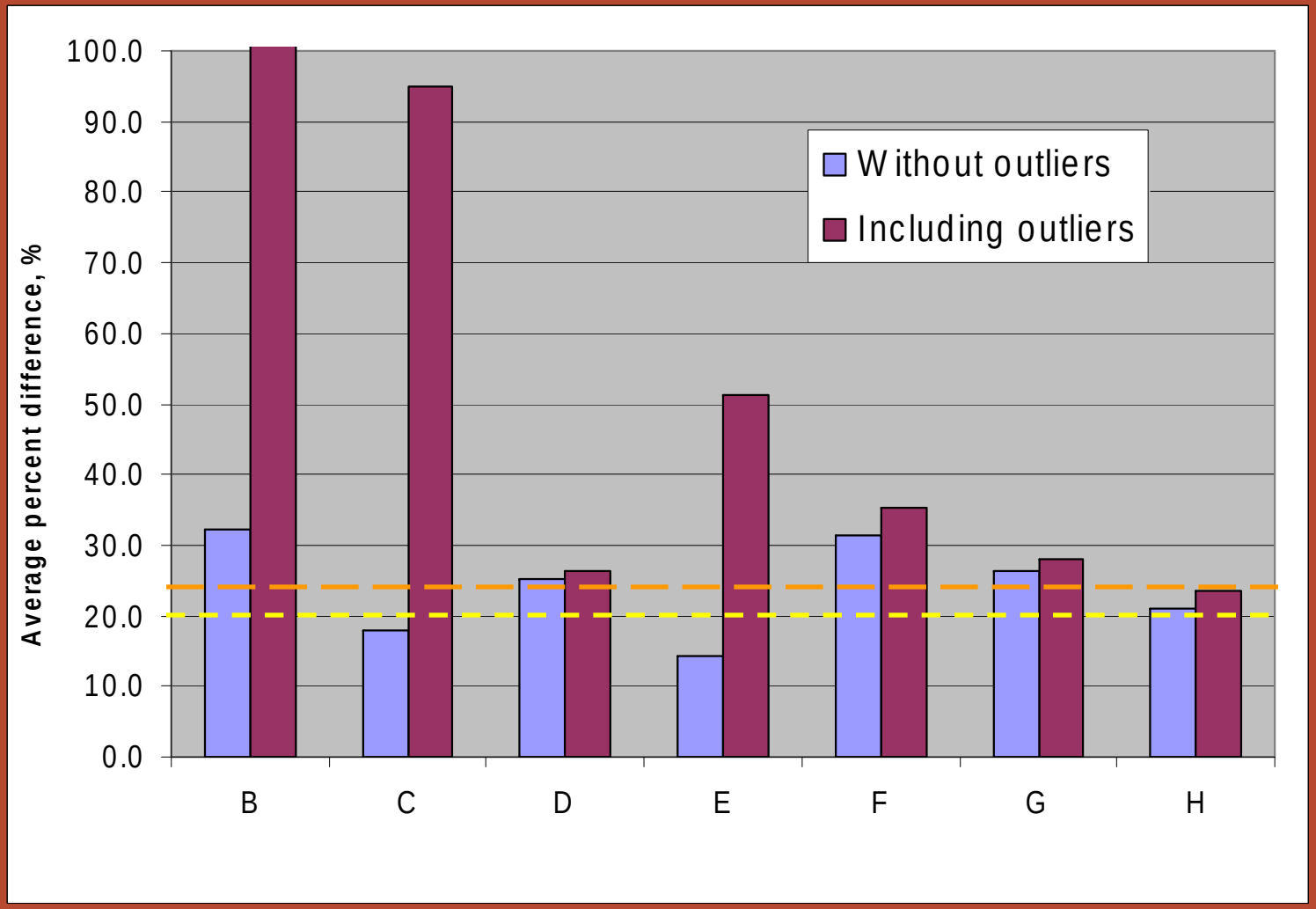
Precision vs. concentration



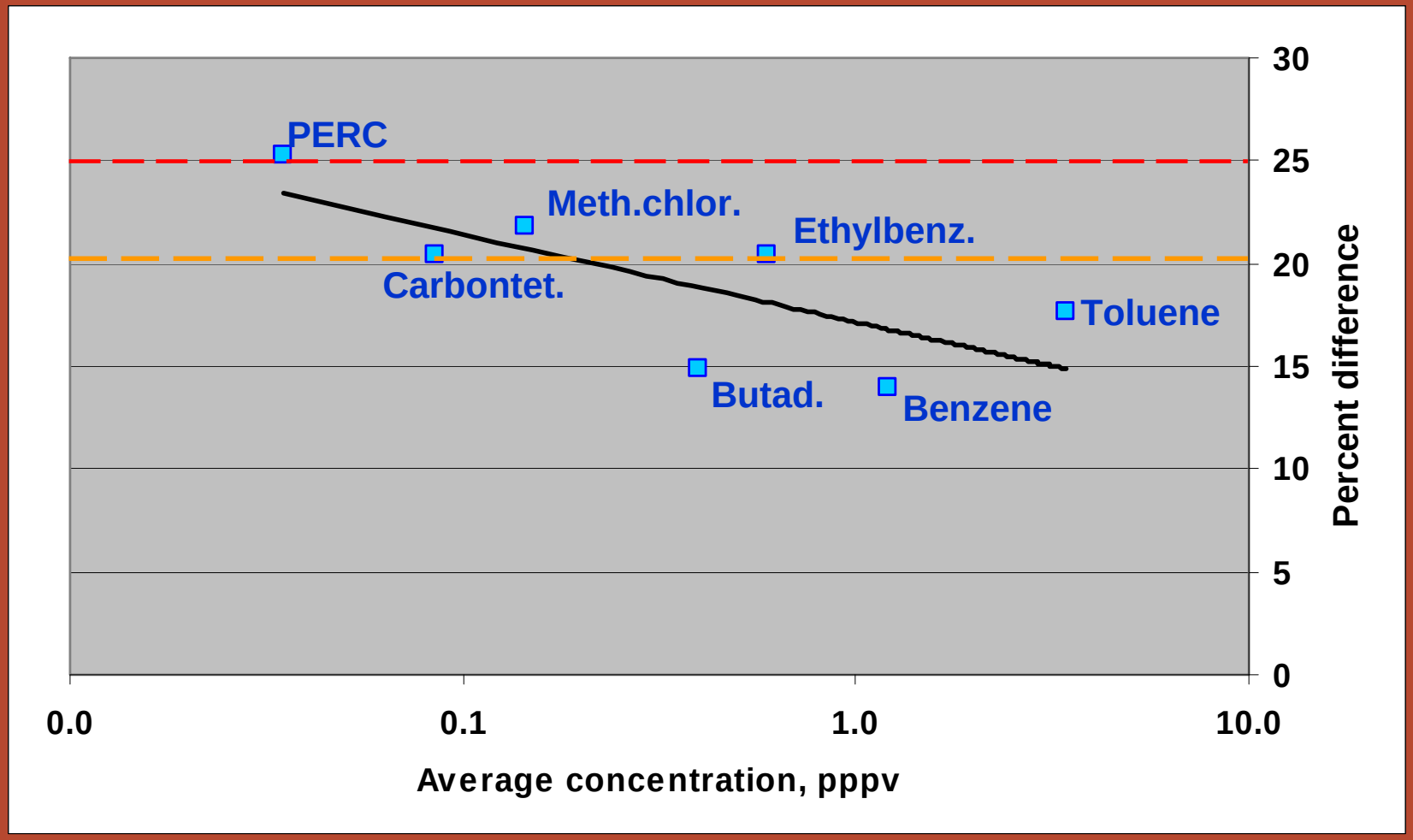
Recent result (2009) for select VOC compounds



Combined results by laboratory for ~18 VOCs



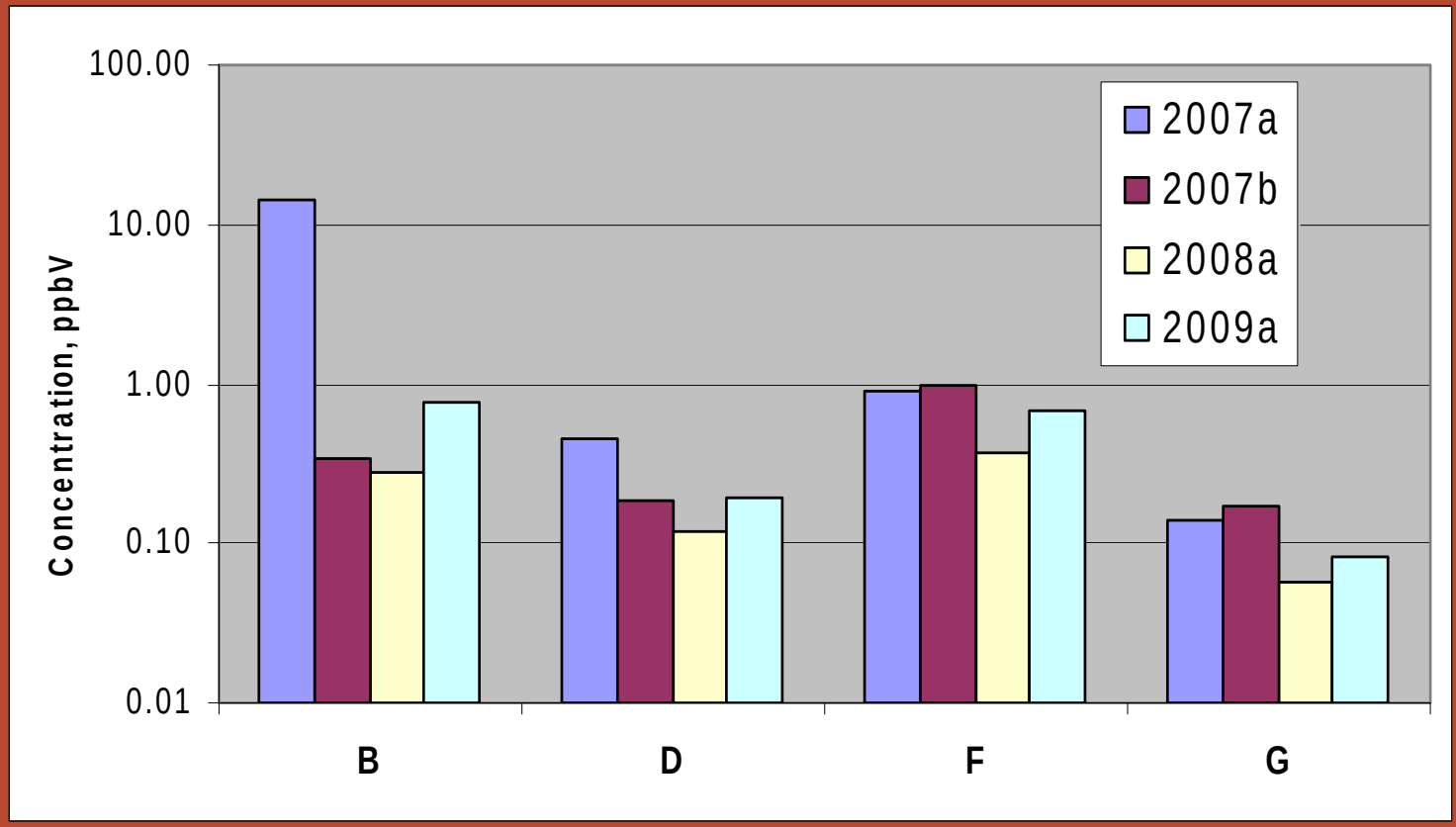
Precision vs. conc. (2004-06)



What about acrolein?

- Not all participants report it
- Those who report acrolein, may or may not follow EPA method
- Those following EPA method need some time to work out the kinks
- The best we've seen is ~ 56% average difference from the adjusted group average

Acrolein measurements in 4 recent VOC exchanges



Guess who had a faulty gas standard?

Conclusions

- Results are best for..
  - Most experienced laboratories, i.e. years of practice with a particular method. Don’t assume EPA contract lab is the only reliable option.
  - Compounds well above detection limits
- Need for better source of certified VOC and carbonyl calibration gases