

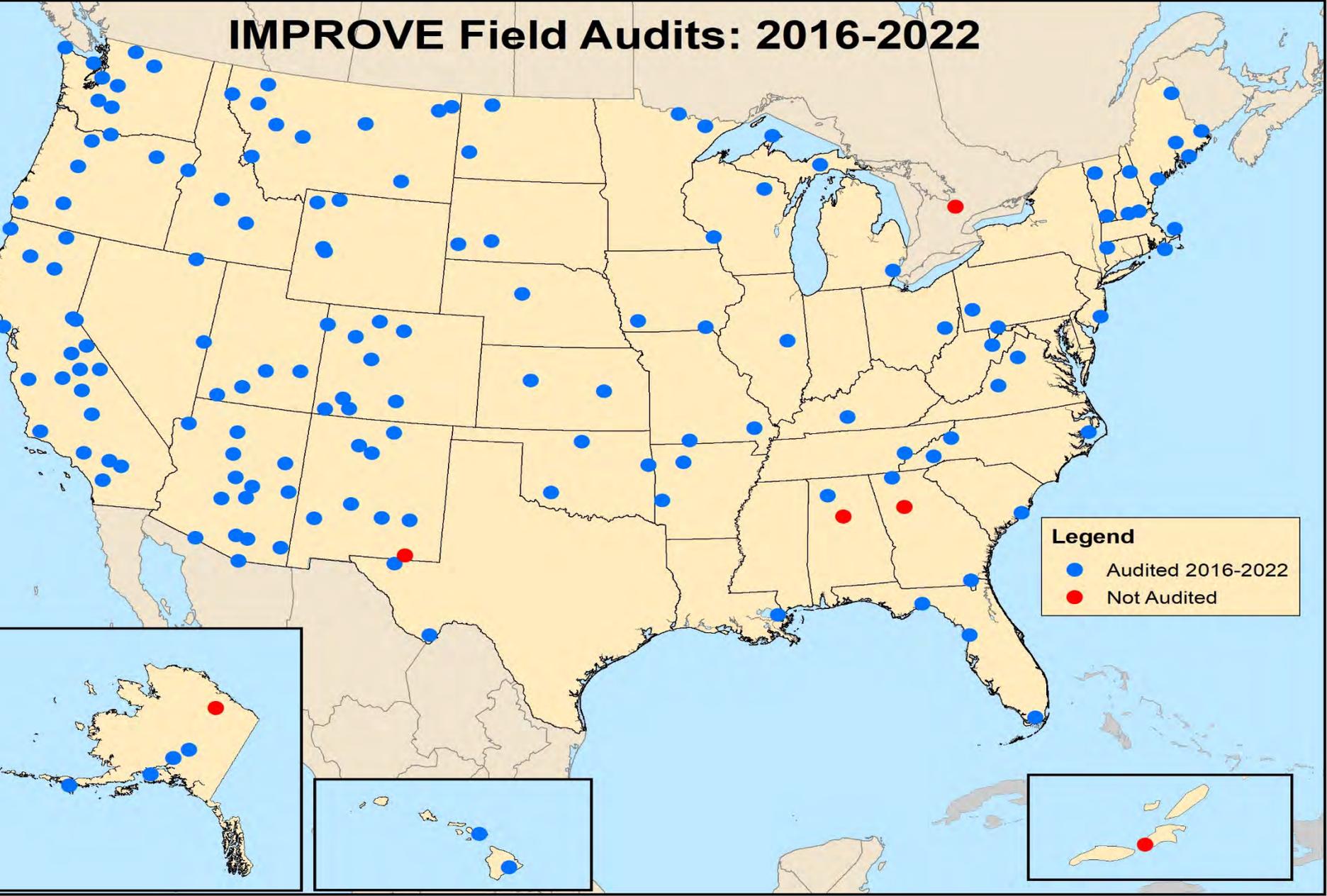
Results of Field Audits from IMPROVE Network Samplers 2016-2022

Presented at Annual IMPROVE Steering Committee
Meeting 11/2-3/2022

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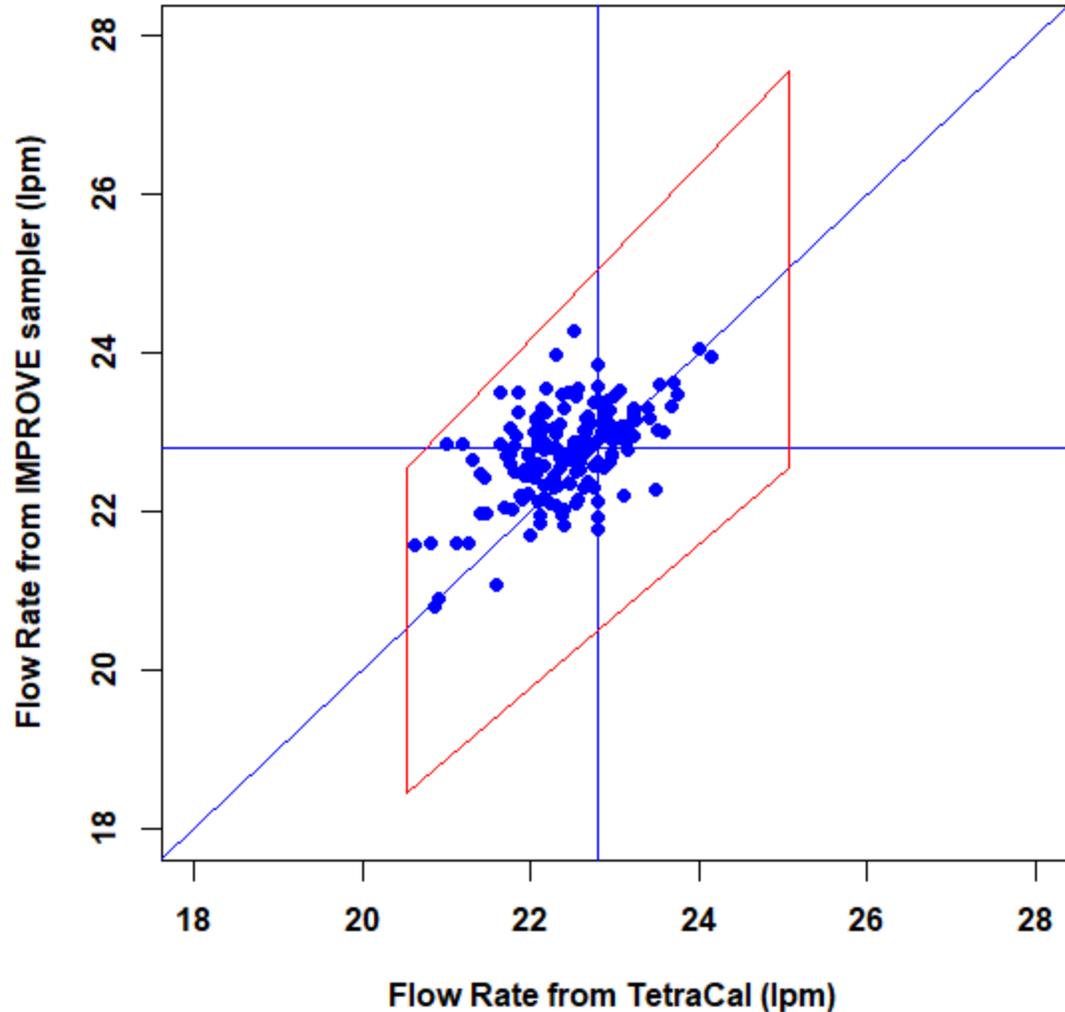
IMPROVE Field Audits: 2016-2022



All US IMPROVE sites have been audited except the five sites marked by red points.

Module A: Comparison Between Audit device and Sampler flow rates

Module A (PM2.5 & XRF)

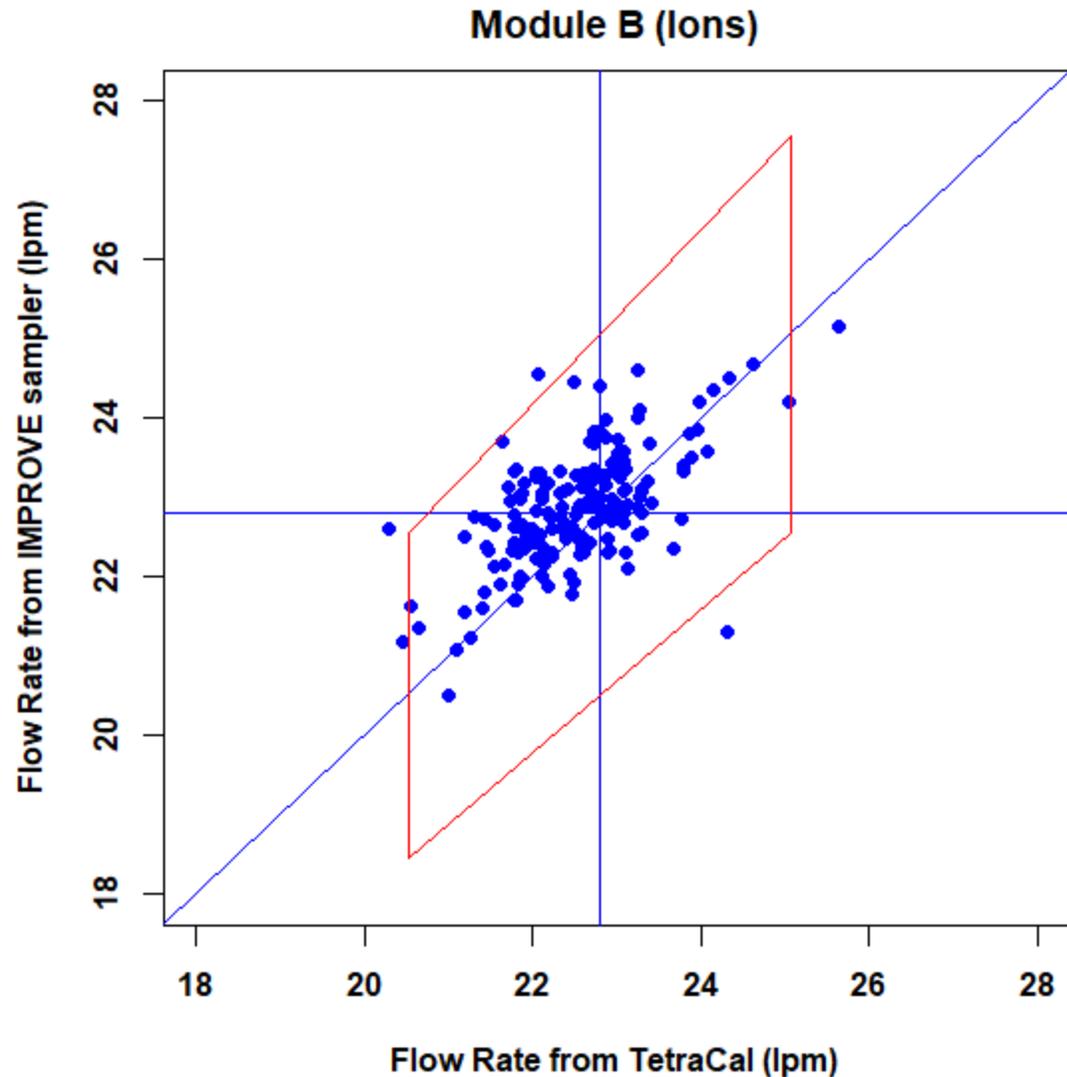


Summary statistics

Audit	IMP	%diff
Min. :20.61	Min. :20.81	Min. :0.02345
1st Qu.:22.07	1st Qu.:22.45	1st Qu.:0.84327
Median :22.45	Median :22.83	Median :1.71958
Mean :22.42	Mean :22.76	Mean:3.41628
Max. :24.16	Max. :24.29	Max. :8.91033
NA's :1	NA's :1	NA's :1

Results: All module A flow rate measurements passed audit check (ie > 10% difference between measured flow rate and reported sampler flow rate; also > 10% difference between audit flow rate and nominal flow rate (22.8 lpm)).

Module B: Comparison Between Audit device and Sampler flow rates

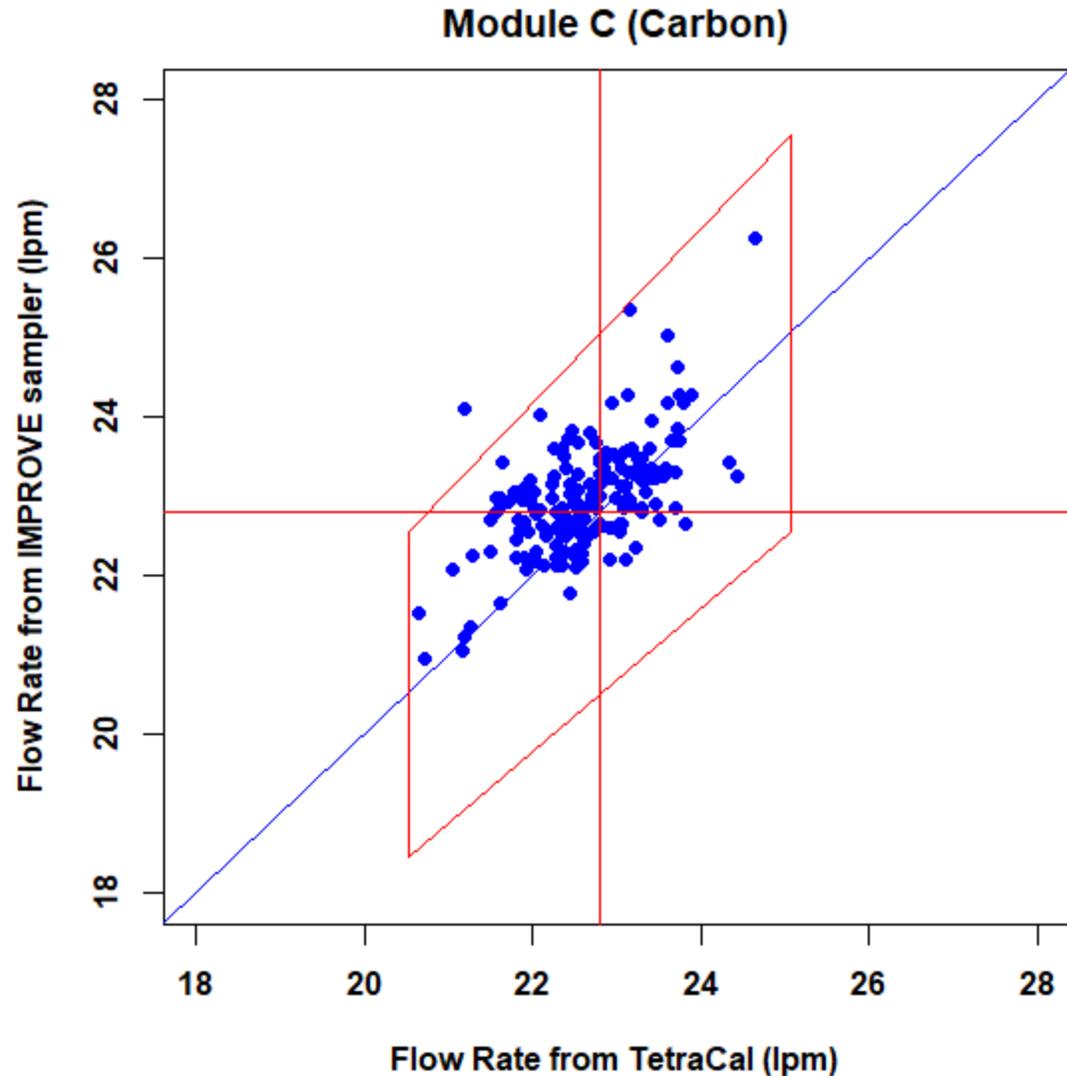


Summary statistics

Audit	IMP	%diff
Min. :20.30	Min. :20.52	Min. : 0.0000
1st Qu.:21.95	1st Qu.:22.44	1st Qu.: 0.9756
Median :22.52	Median :22.82	Median : 2.0342
Mean :22.51	Mean :22.85	Mean : 2.6098
3rd Qu.:22.96	3rd Qu.:23.26	3rd Qu.: 3.5652
Max. :25.64	Max. :25.17	Max. :12.3766
NA's :1	NA's :1	NA's :1

Results: Five module B flow rate measurements failed audit check (ie > 10% difference between measured flow rate and reported sampler flow rate; also > 10% difference between audit flow rate and nominal flow rate (22.8 lpm)).

Module C: Comparison Between Audit device and Sampler flow rates

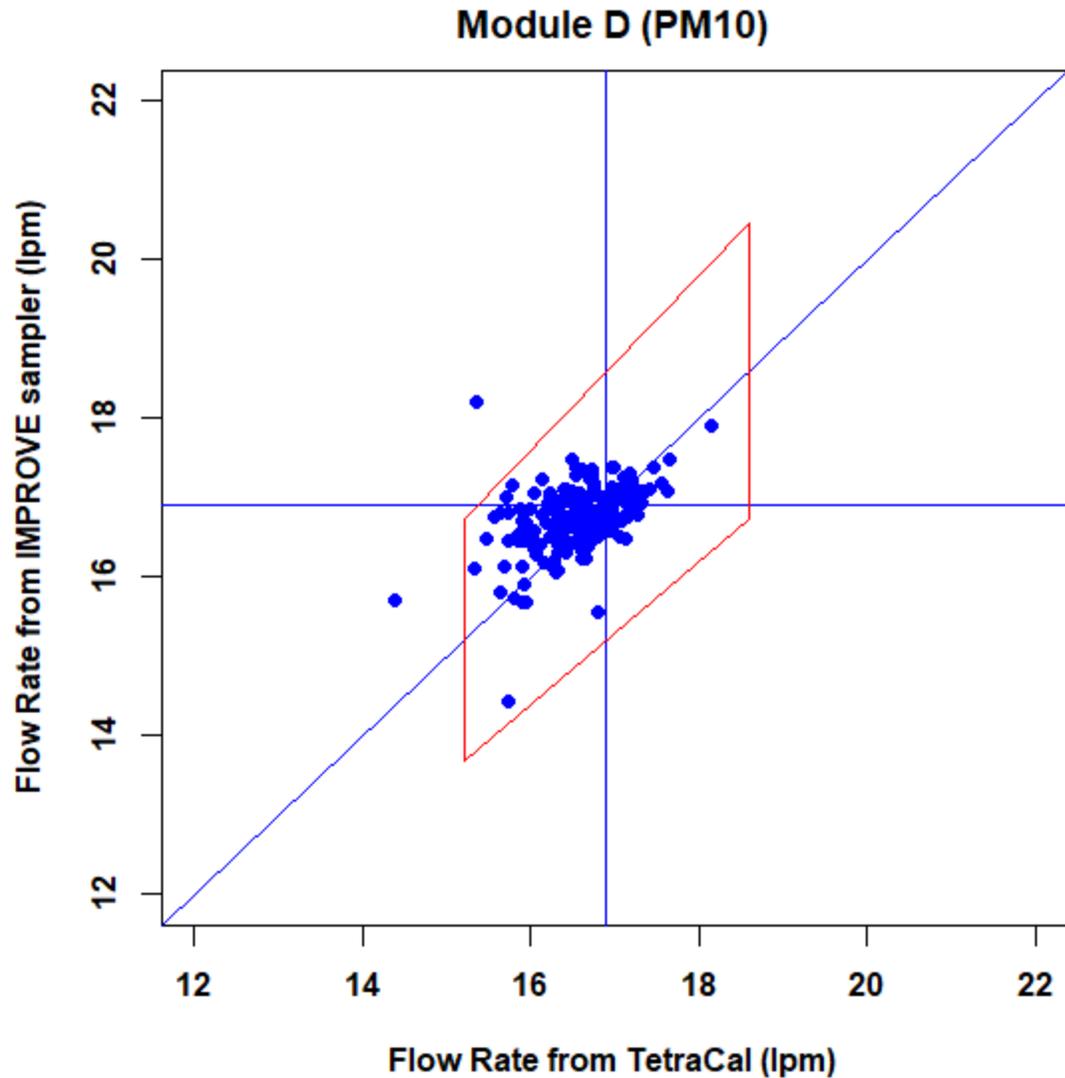


Summary statistics

Audit	IMP	%diff
Min. :20.65	Min. :20.97	Min. : 0.0000
1st Qu.:22.24	1st Qu.:22.60	1st Qu.: 0.7835
Median :22.61	Median :22.93	Median : 1.7768
Mean :22.64	Mean :22.99	Mean : 2.4288
3rd Qu.:23.12	3rd Qu.:23.35	3rd Qu.: 3.6300
Max. :24.64	Max. :26.25	Max. :13.7264

Results: One module C flow rate measurement failed audit check (ie > 10% difference between measured flow rate and reported sampler flow rate; also > 10% difference between audit flow rate and nominal flow rate (22.8 lpm)).

Module D: Comparison Between Audit device and Sampler flow rates



Summary statistics

Audit	IMP	%diff
Min. :14.39	Min. :14.45	Min. : 0.02402
1st Qu.:16.22	1st Qu.:16.52	1st Qu.: 1.00592
Median :16.54	Median :16.77	Median : 1.83432
Mean :16.52	Mean :16.74	Mean : 2.51531
3rd Qu.:16.89	3rd Qu.:17.00	3rd Qu.: 3.43965
Max. :18.16	Max. :18.20	Max. :18.56677
NA's :6	NA's :6	NA's :6

Results: Two module D flow rate measurements failed audit check (ie > 10% difference between measured flow rate and reported sampler flow rate; also > 10% difference between audit flow rate and nominal flow rate (16.9 lpm)). Five module D samplers did not get audited because inlet stacks could not be removed (access to roof, bees, inclement weather made it too dangerous).

Conclusion:

To date all but 5 US IMPROVE sites have been audited. Several sites have been audited more than once. State auditors from Colorado and Missouri are continuing to perform audits regularly. During the 180 audits performed, 8 modules failed audit flow checks, a few stacks were found to be not seated properly, some sampler stands were unsafe or inadequate, some vegetation was found to be too close to the inlets. A complete listing of issues and resolutions will be included in the year end report.