Improve Quality Assurance for IMPROVE

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Ways to Improve QA for IMPROVE

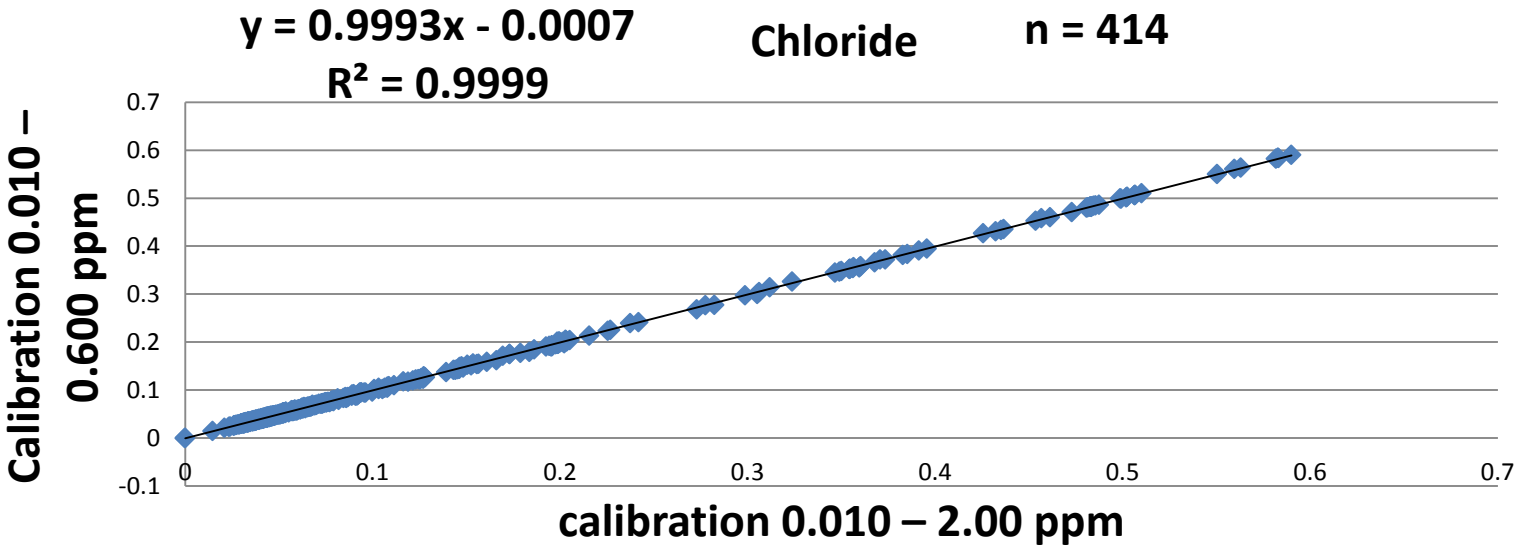
- Introduction of round robin or interlaboratory comparison samples.
- USGS evaluates laboratories with a precipitation chemistry quality assurance project.
- Use composite precipitation samples, blank samples and external QA samples shipped monthly to participating laboratories to analyze and publish results showing how laboratories compare, gives laboratories tools to identify potential bias and is ongoing.

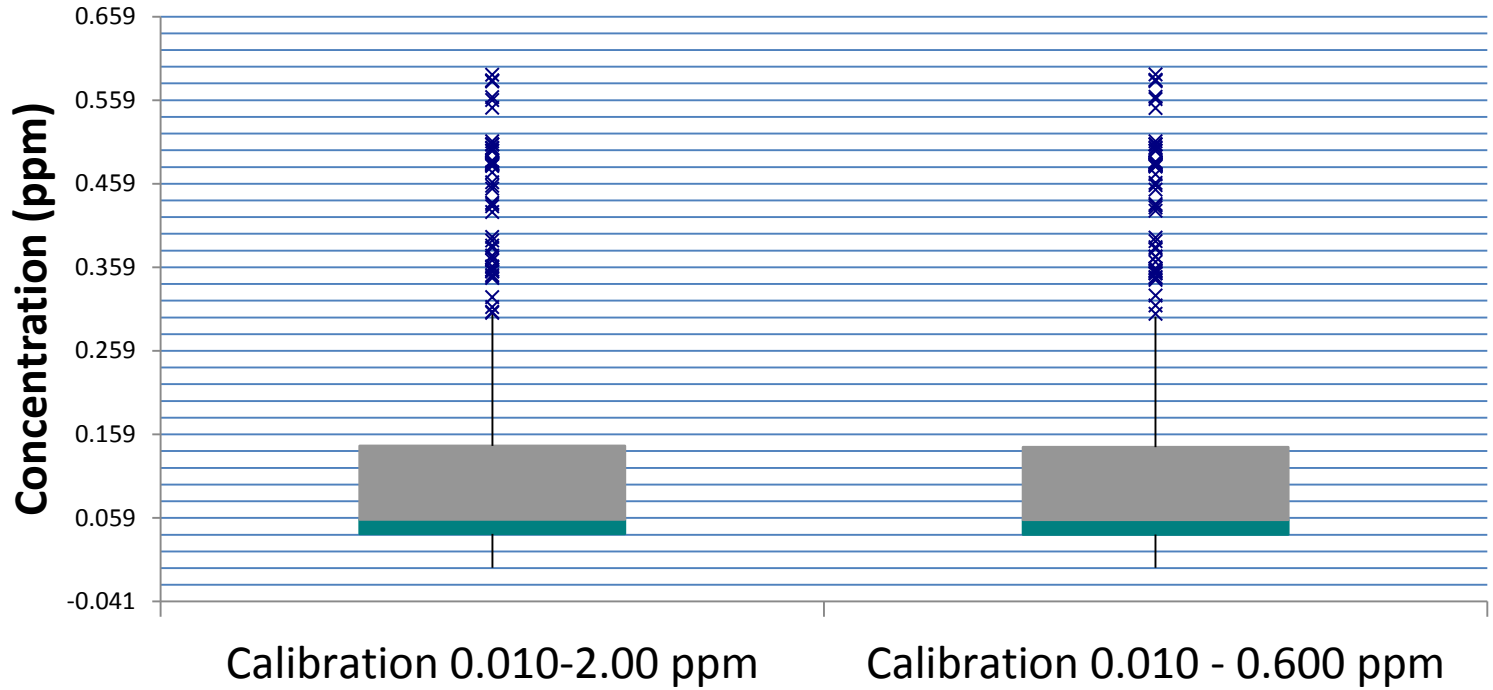
Use of Trends and historic values at laboratory levels for QA

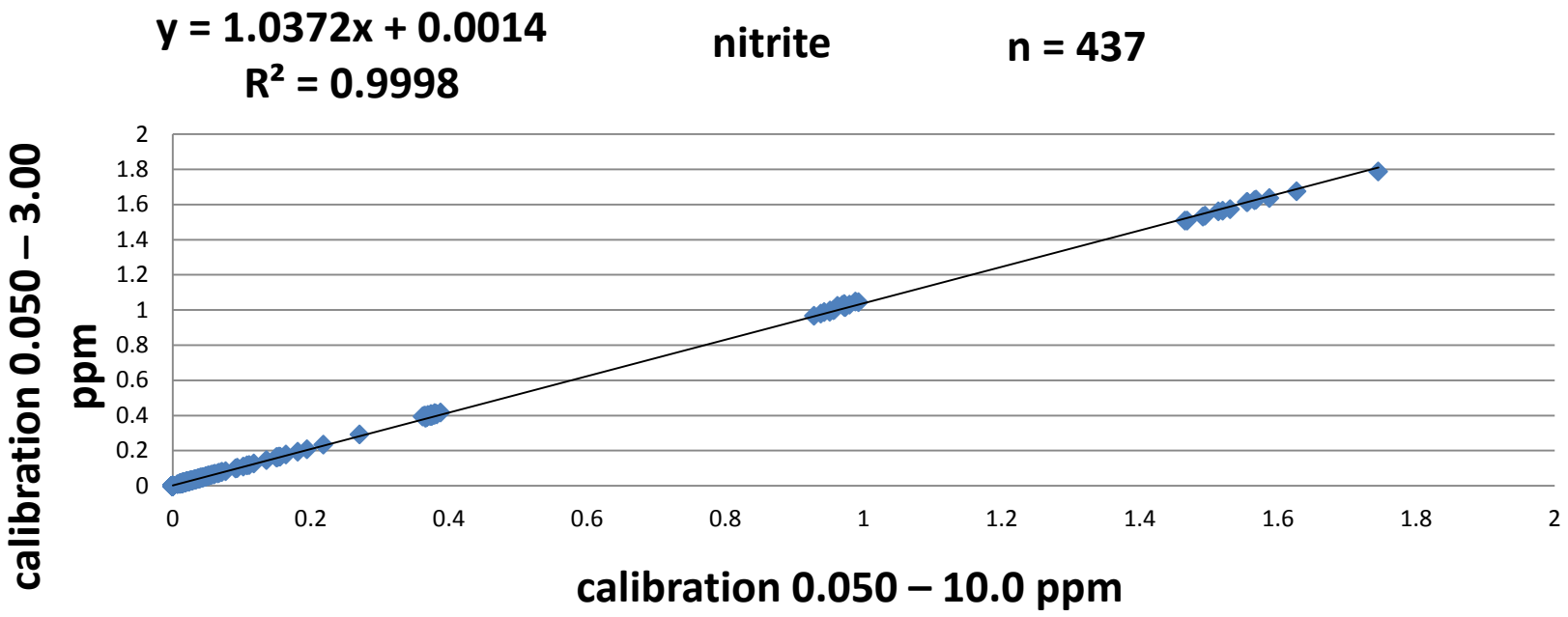
Chloride percentile concentrations	2011	2012	2013	2014
10TH	0.021	0.019	0.018	0.023
25TH	0.030	0.025	0.024	0.032
50TH	0.056	0.040	0.039	0.047
75TH	0.197	0.085	0.087	0.093
90TH	0.331	0.261	0.267	0.257
95TH	0.615	0.539	0.569	0.547
99TH	1.978	1.940	1.934	1.009
max	9.641	12.327	12.600	8.513

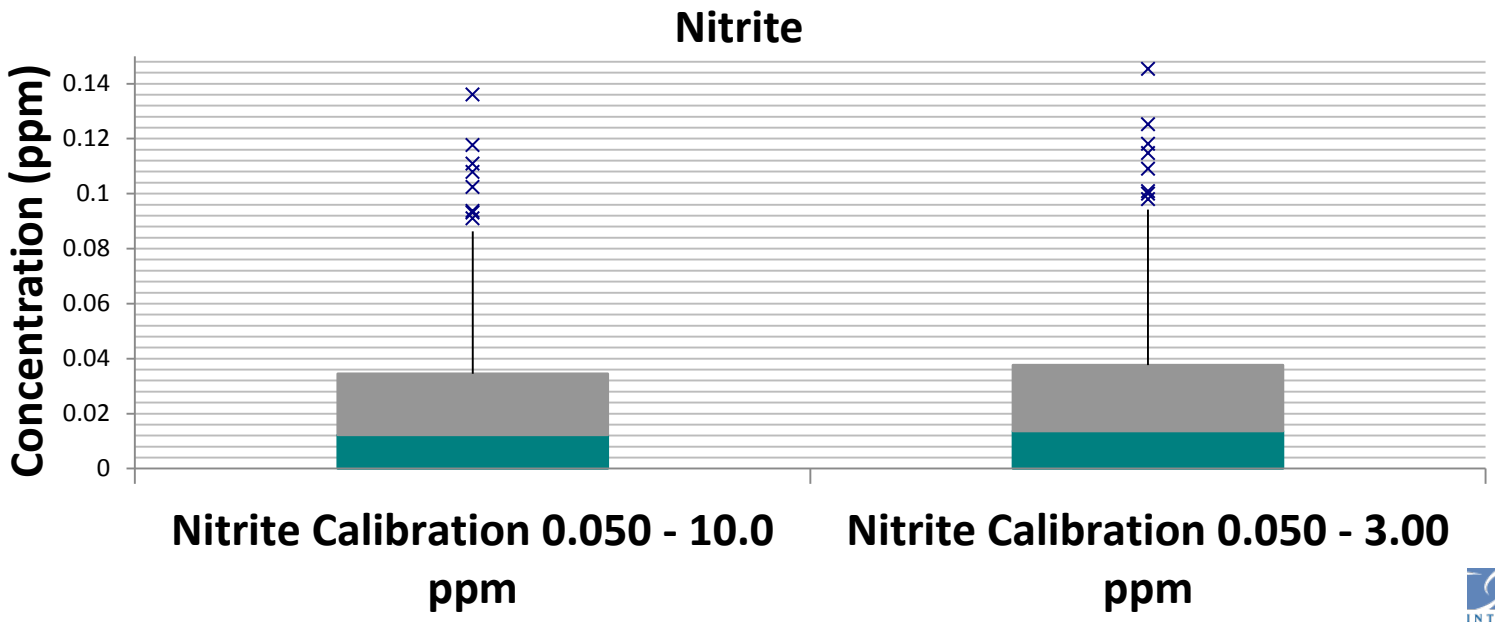
Nitrate percentile concentrations	2011	2012	2013	2014
10TH	0.080	0.076	0.066	0.062
25TH	0.129	0.135	0.122	0.117
50TH	0.262	0.279	0.272	0.26
75TH	0.571	0.528	0.614	0.611
90TH	1.321	1.210	1.484	1.522
95TH	2.403	2.090	2.65	2.728
99TH	7.223	5.840	7.297	7.461
max	51.769	46.18	84.829	72.2667

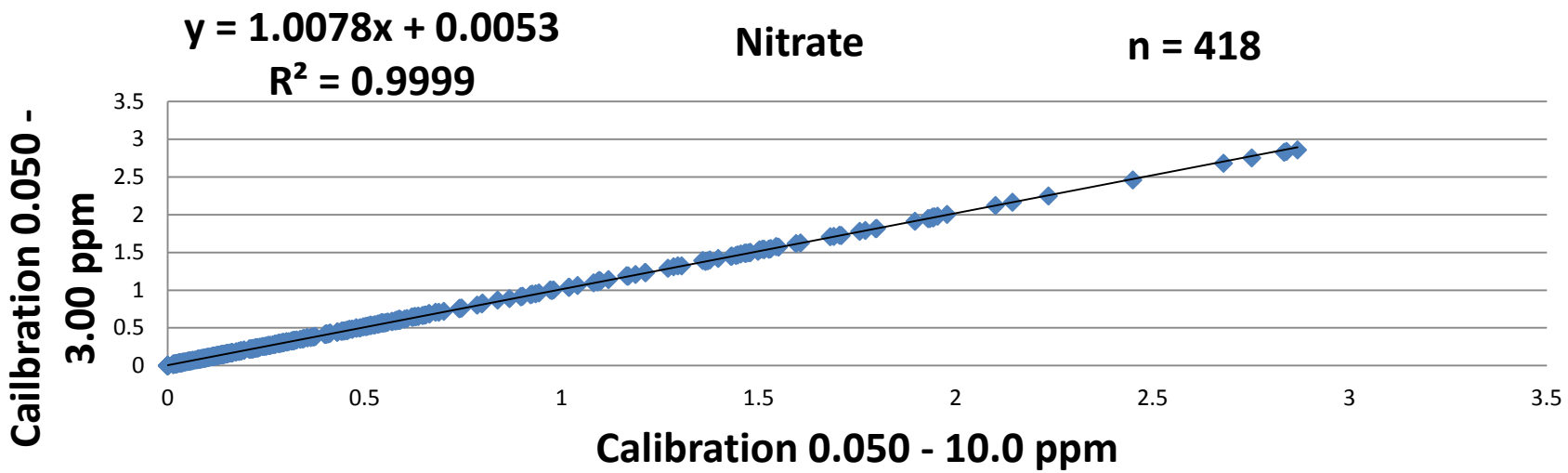
Sulfate percentile concentrations	2011	2012	2013	2014
10TH	0.274	0.260	0.264	0.234
25TH	0.536	0.513	0.518	0.461
50TH	1.035	1.003	0.996	0.926
75TH	2.094	1.904	1.881	1.768
90TH	3.864	3.187	3.272	3.091
95TH	5.306	4.255	4.304	4.142
99TH	8.705	6.683	7.012	7.031
max	31.752	22.925	53.751	52.726

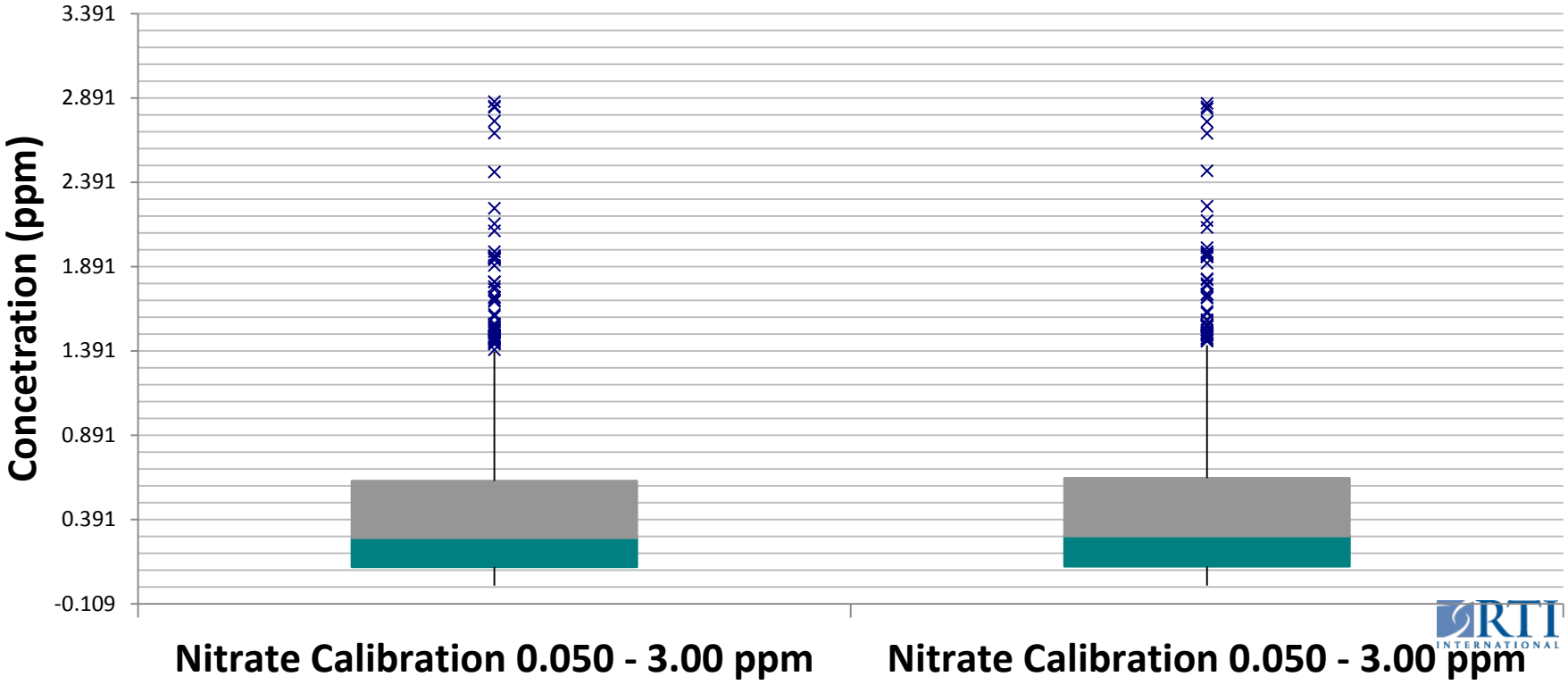

y = 0.9993x - 0.0007
R² = 0.9999
Chloride
n = 414
Calibration 0.010 – 0.600 ppm
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
calibration 0.010 – 2.00 ppm

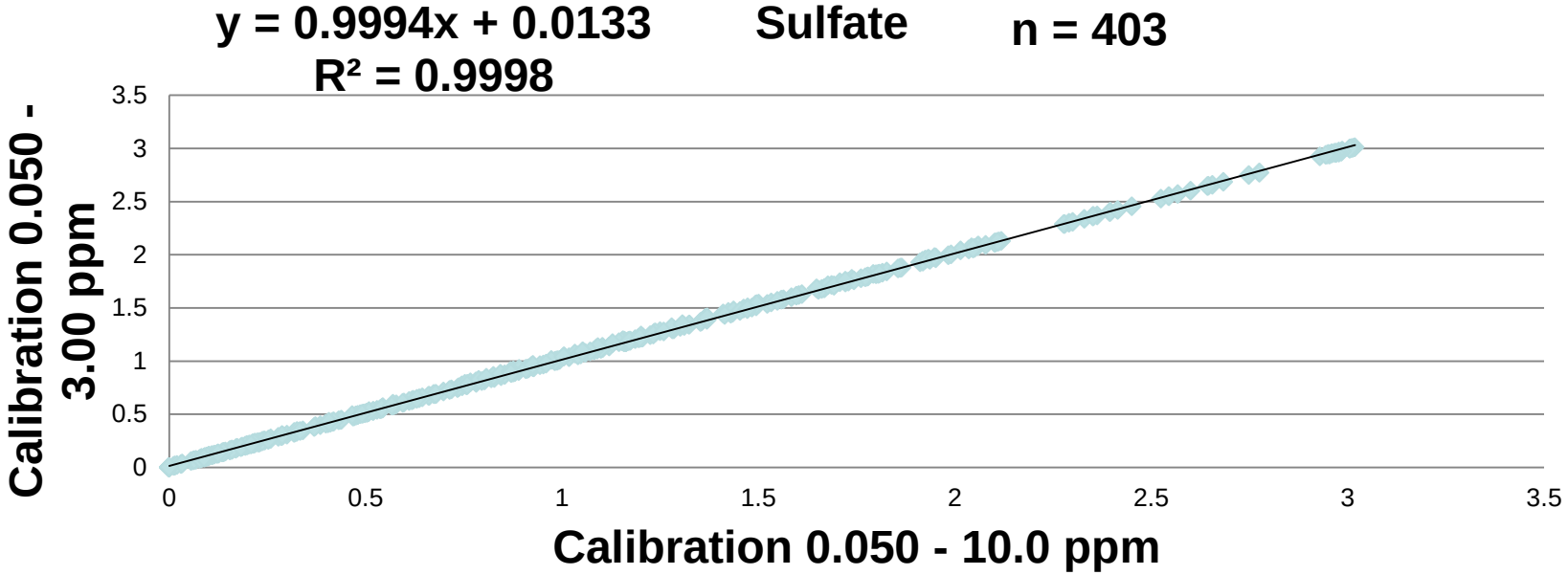

Concentration (ppm)
0.659
0.559
0.459
0.359
0.259
0.159
0.059
-0.041
Calibration 0.010-2.00 ppm
Calibration 0.010 - 0.600 ppm

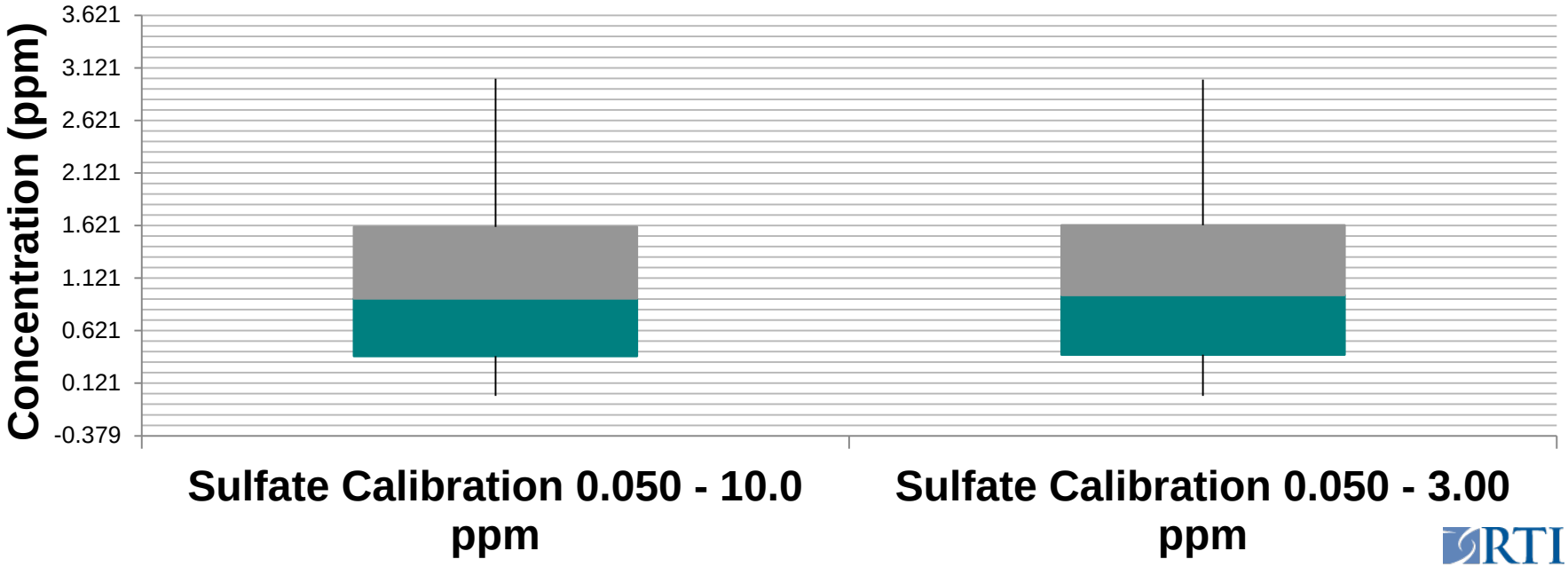

y = 1.0372x + 0.0014
R² = 0.9998
nitrite
n = 437
calibration 0.050 – 3.00 ppm
calibration 0.050 – 10.0 ppm
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2


Nitrite
Concentration (ppm)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
Nitrite Calibration 0.050 - 10.0 ppm
Nitrite Calibration 0.050 - 3.00 ppm


y = 1.0078x + 0.0053
R² = 0.9999
Nitrate
n = 418
Cailbration 0.050 - 3.00 ppm
3.5
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
3.5
Calibration 0.050 - 10.0 ppm


Concetration (ppm)
3.391
2.891
2.391
1.891
1.391
0.891
0.391
-0.109
Nitrate Calibration 0.050 - 3.00 ppm
Nitrate Calibration 0.050 - 3.00 ppm


y = 0.9994x + 0.0133
R² = 0.9998
Sulfate
n = 403
Calibration 0.050 - 3.00 ppm
3.5
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
3.5
Calibration 0.050 - 10.0 ppm


Concentration (ppm)
3.621
3.121
2.621
2.121
1.621
1.121
0.621
0.121
-0.379
Sulfate Calibration 0.050 - 10.0 ppm
Sulfate Calibration 0.050 - 3.00 ppm

What do we do with this info?

- Align our calibration ranges and QC standards for a better data representation.

- Use historic values at sites to flag potential outlier data.

Questions?