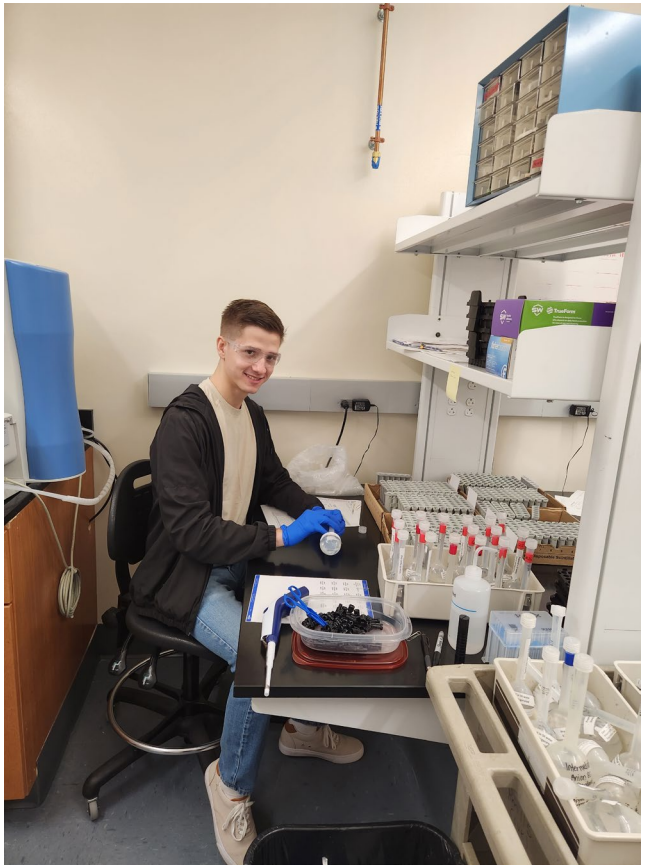
IMPROVE Steering Committee Meeting

Kalispell Montana, October 2023

Tracy Dombek, Ions Report

RTI International Staff changes

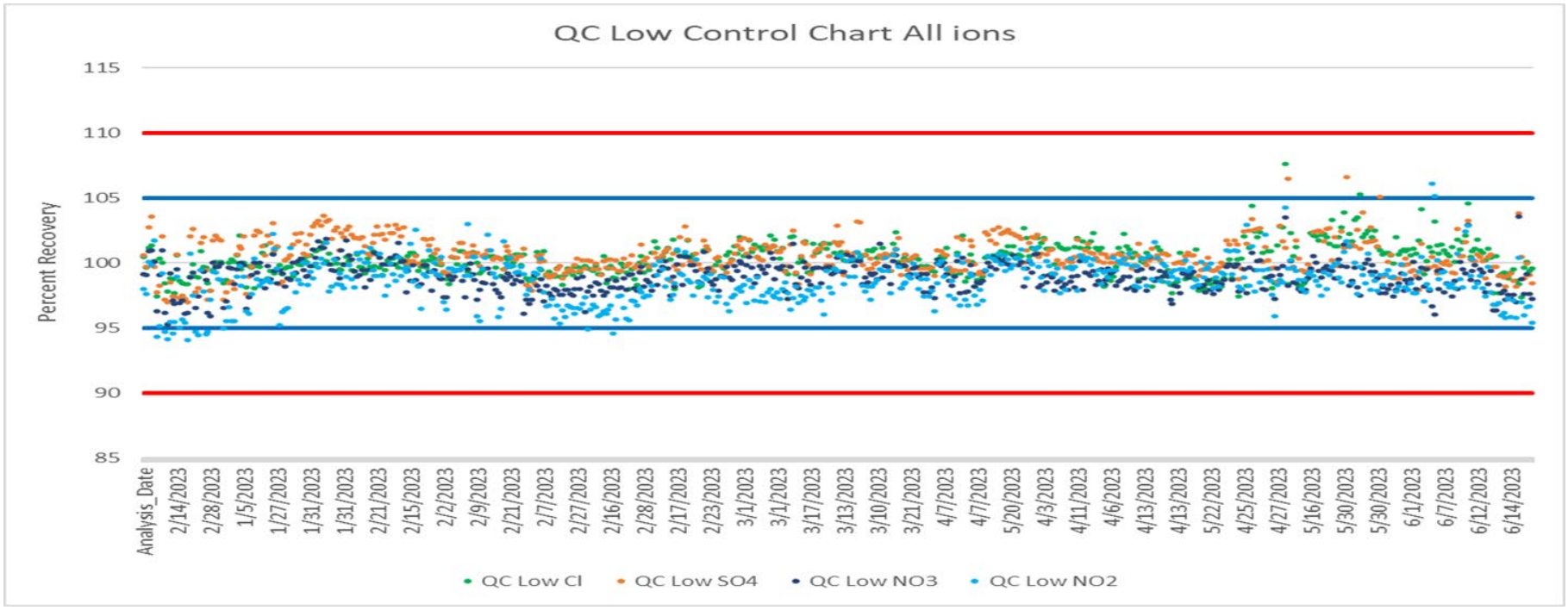


Minimum Detection Limits & Process

- Extract nylon filters in 20 mL of DI water.
- Calibrate systems daily using primary stock standards.
- Quality Controls using secondary source standards before and after every ten samples analyzed.
- Duplicates at a rate of 3 per batch of 50 samples.
- Perform matrix spikes at a rate of 2 per batch of 50 samples.
- Random reanalysis of 5% of the sample total.
- Re-extraction of filters to evaluate extraction efficiencies.

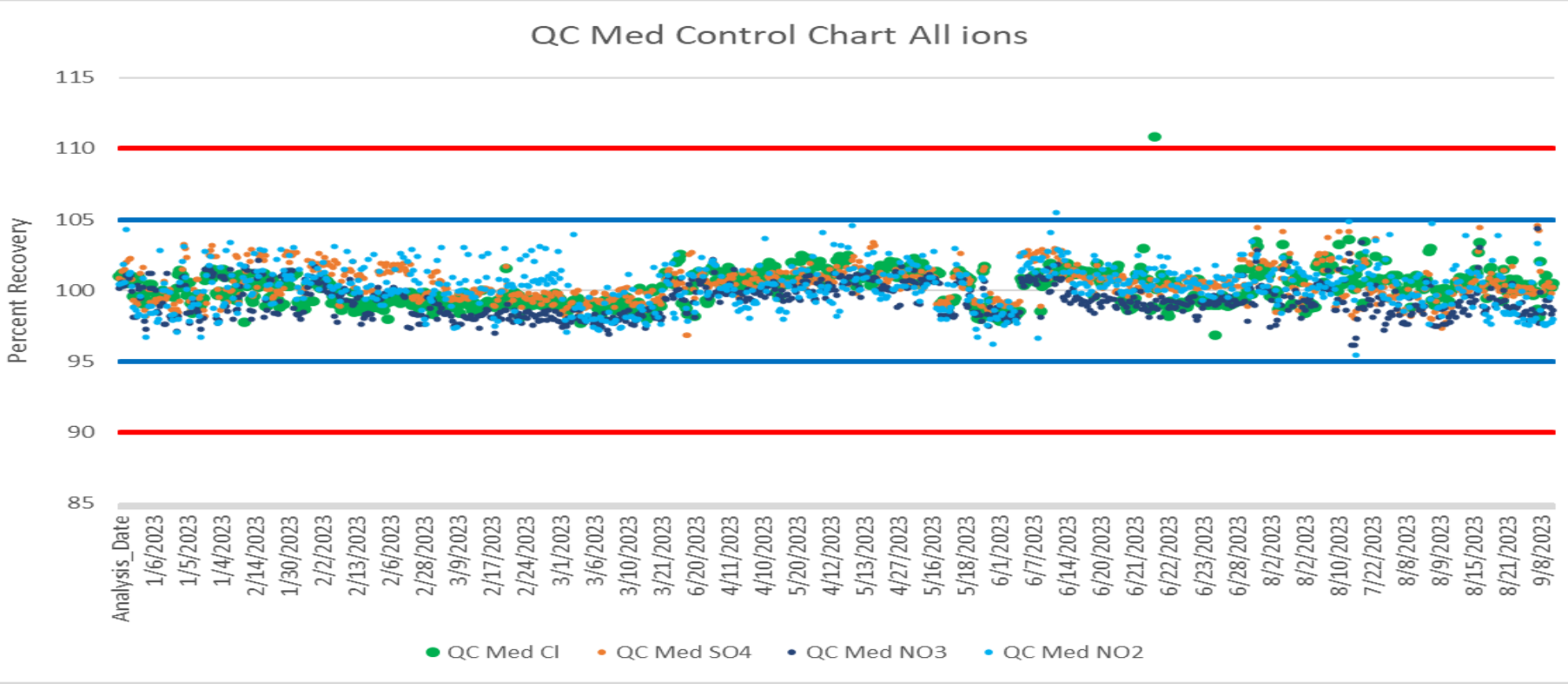
	Chloride	Nitrite	Nitrate	Sulfate
2023	0.006 ppm	0.010 ppm	0.008 ppm	0.011 ppm

Control Charts



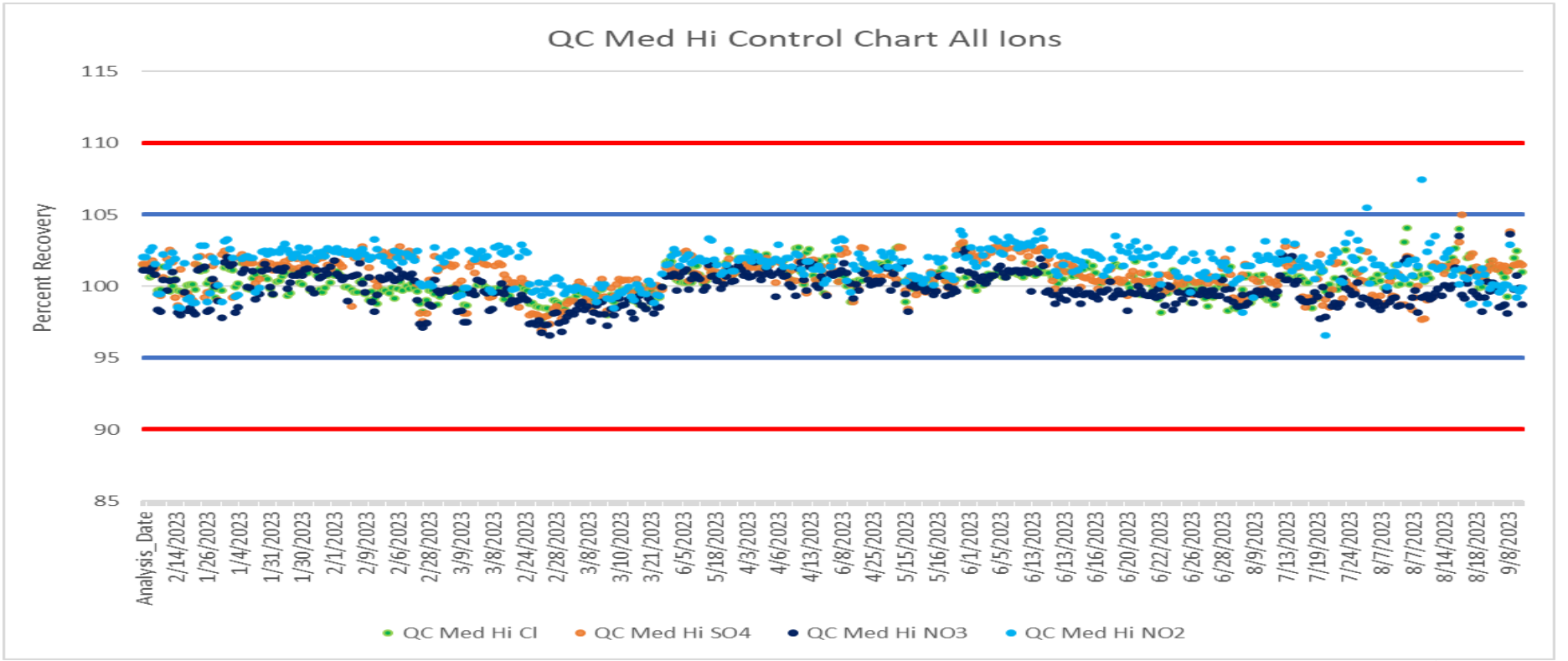
Ion	Median Percent Recovery	Average Percent Recovery	Count
Chloride	100%	100%	542
Sulfate	100%	101%	542
Nitrate	99.0%	98.9%	542
Nitrite	98.7%	98.6%	542

Control Charts



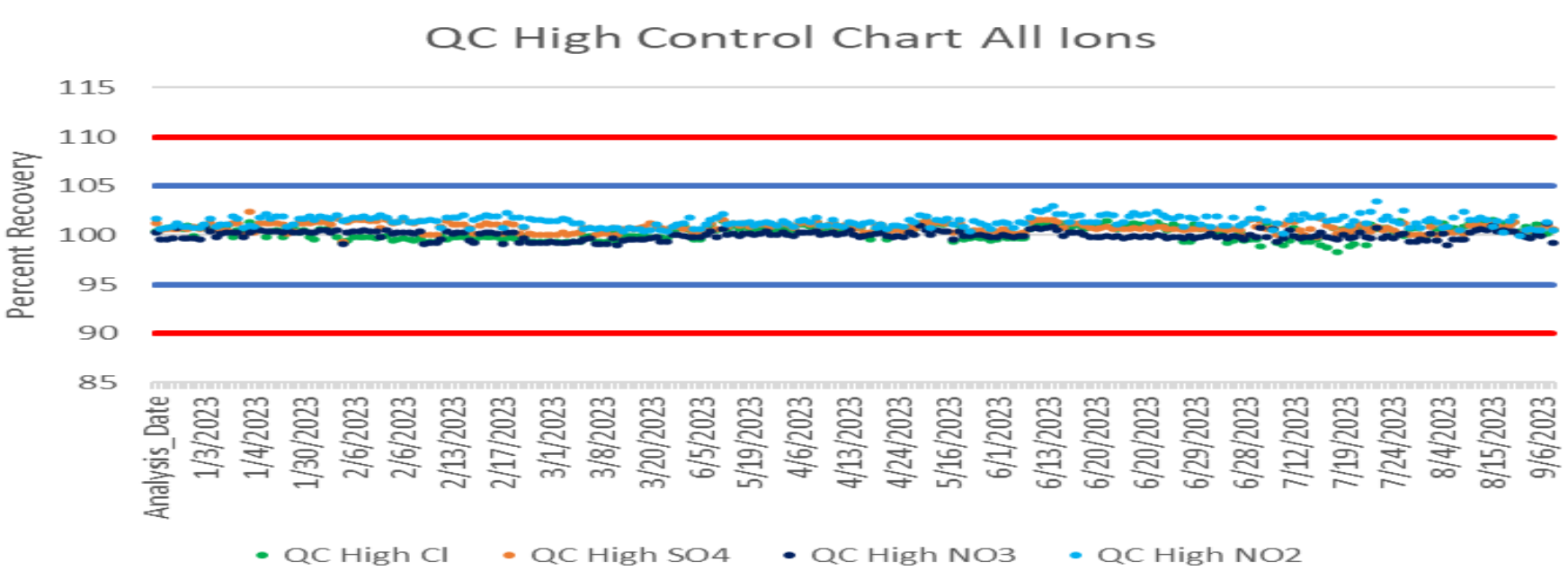
Ion	Median Percent Recovery	Average Percent Recovery	Count
Chloride	100%	100%	806
Sulfate	100%	100%	806
Nitrate	99.2%	99.3%	806
Nitrite	97.7%	100%	806

Control Charts



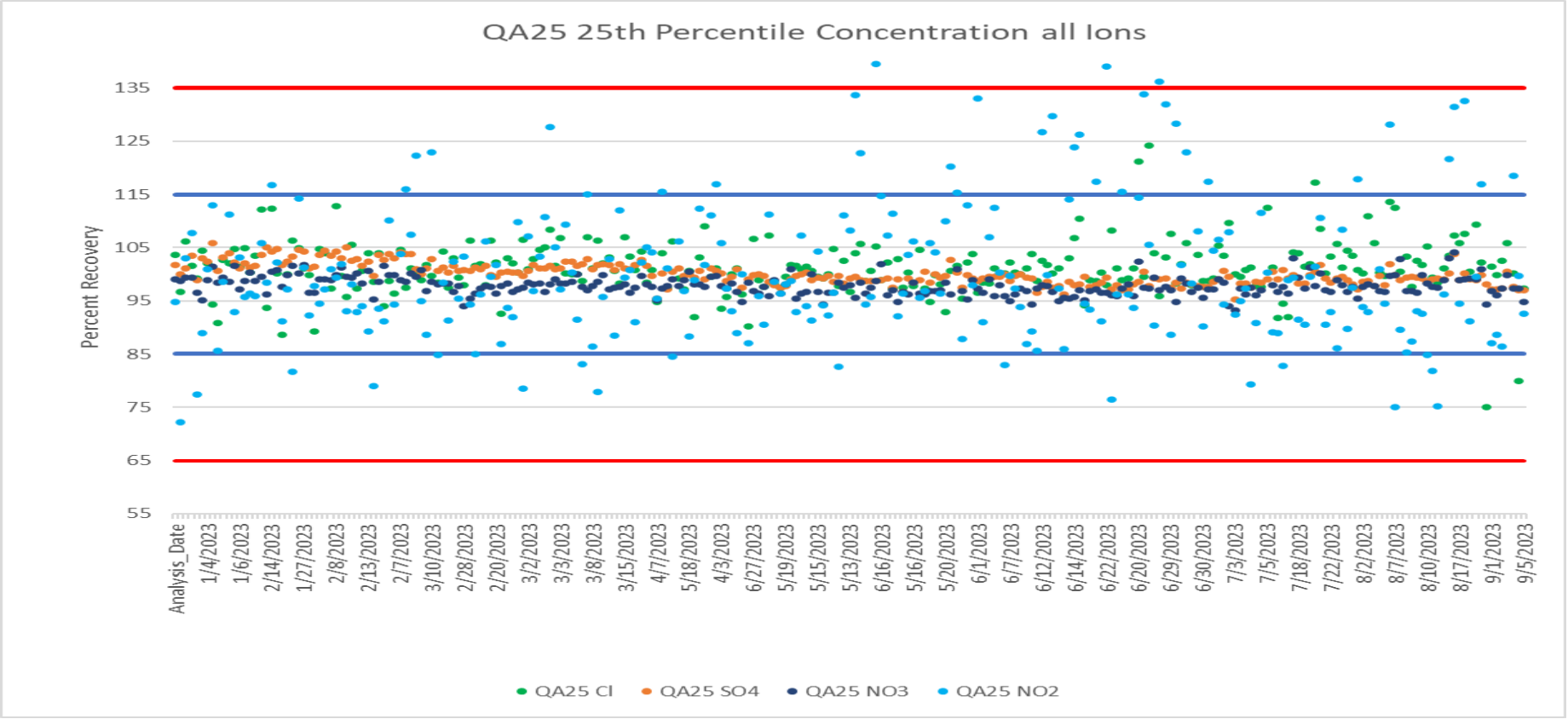
Ion	Median Percent Recovery	Average Percent Recovery	Count
Chloride	100%	100%	479
Sulfate	101%	101%	479
Nitrate	99.7%	99.8%	479
Nitrite	102%	102%	479

Control Charts



Ion	Median Percent Recovery	Average Percent Recovery	Count
Chloride	101%	100%	255
Sulfate	101%	101%	255
Nitrate	99.9%	100%	255
Nitrite	101%	101%	255

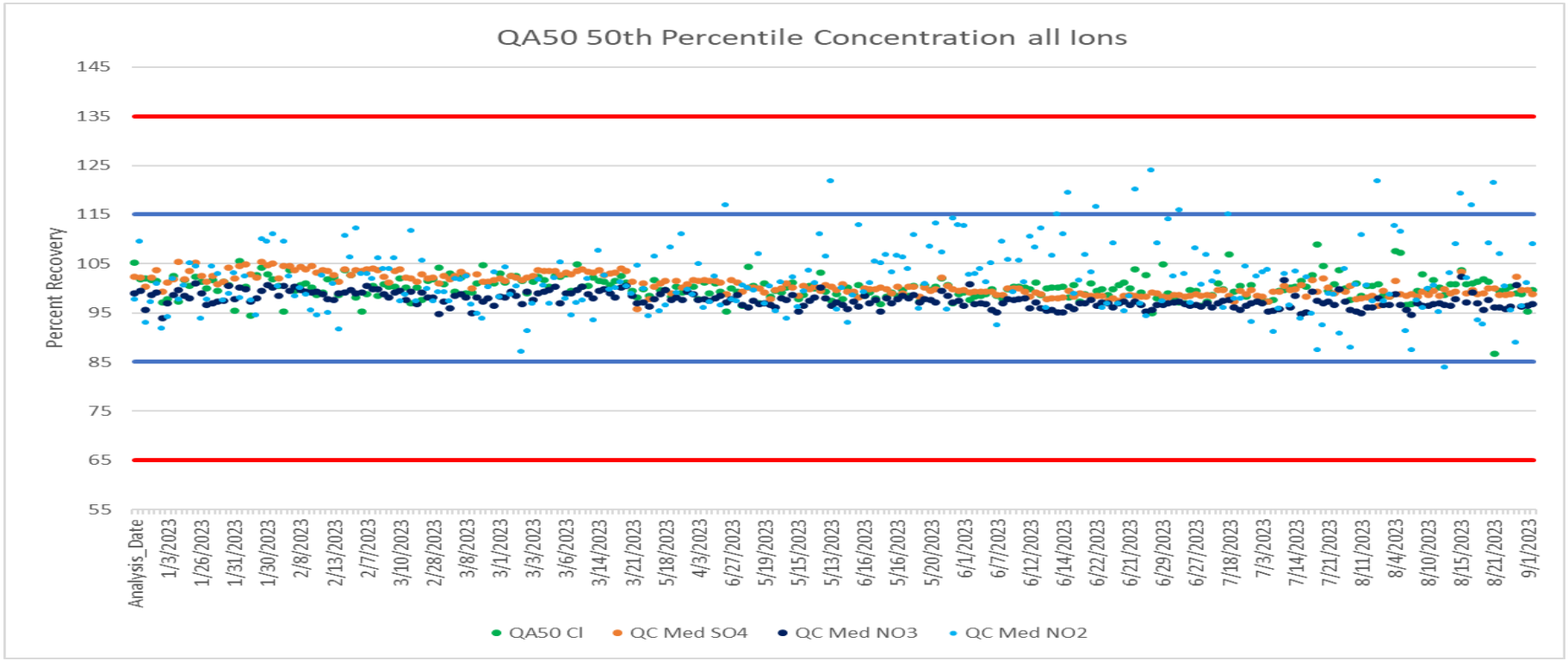
Control Charts



Approximate Air Concentration

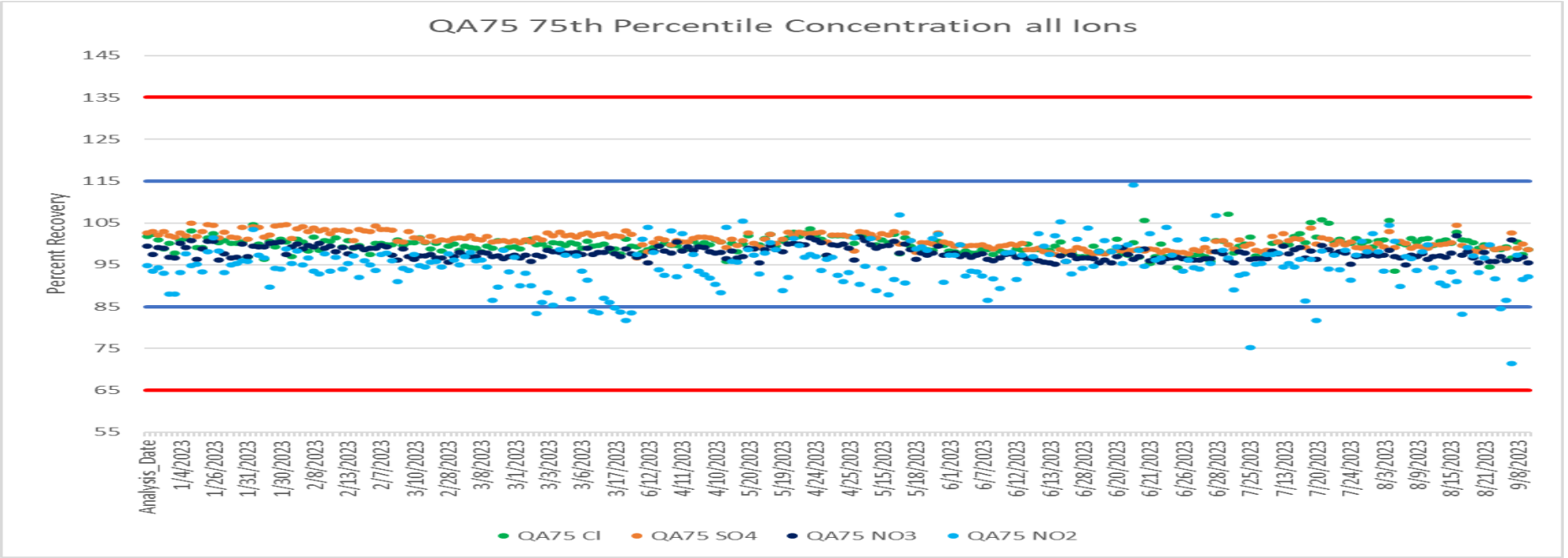
Chloride - 0.016 µg/m^3
Sulfate - 0.300 µg/m^3
Nitrate - 0.092 µg/m^3
Nitrite - 0.007 µg/m^3

Control Charts



Approximate Air Concentration

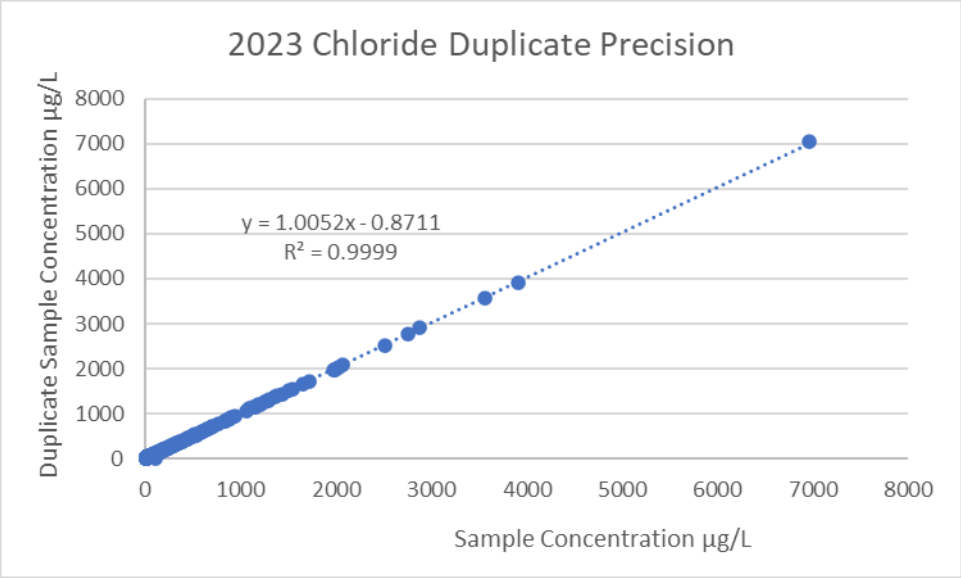
Chloride - 0.031 µg/m^3
Sulfate - 0.60 µg/m^3
Nitrate - 0.180 µg/m^3
Nitrite - 0.013 µg/m^3



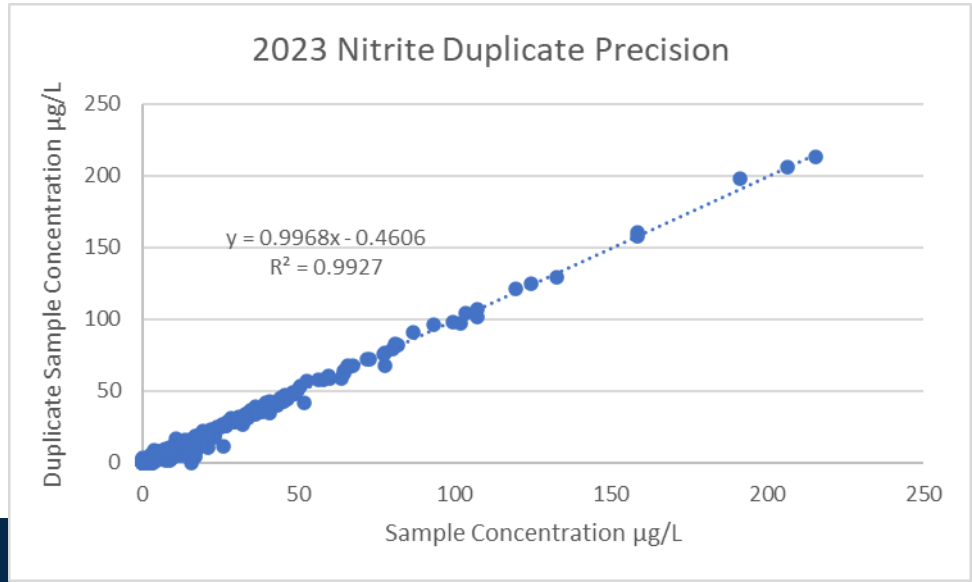
Approximate Air Concentration

Chloride - 0.061 µg/m^3
Sulfate - 1.2 µg/m^3
Nitrate - 0.36 µg/m^3
Nitrite - 0.026 µg/m^3

Duplicate Precision

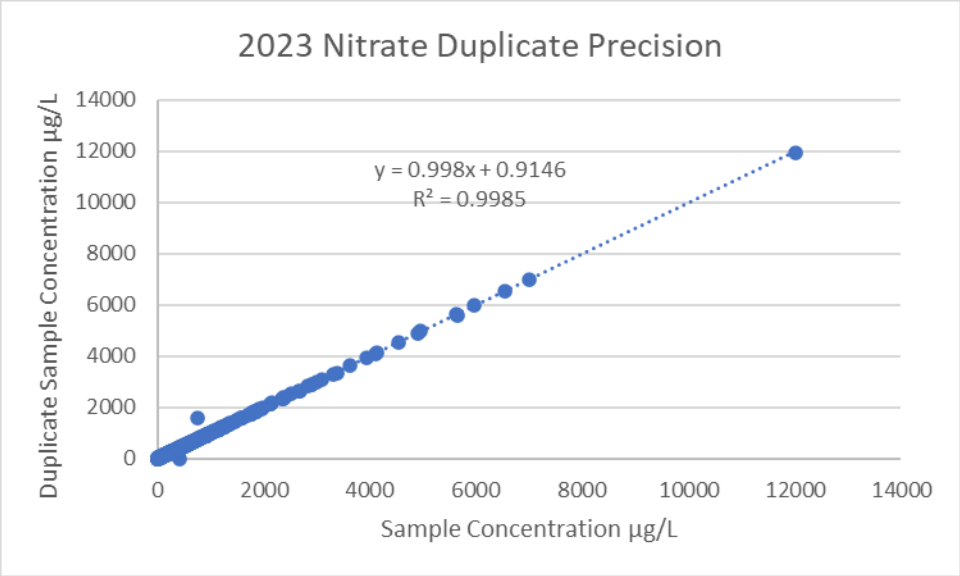


Chloride Percent Differences
Average = 0.56%
Median = 0.17%
Maximum = 200%
Minimum = -29.7%
Count = 661
Failures 0%

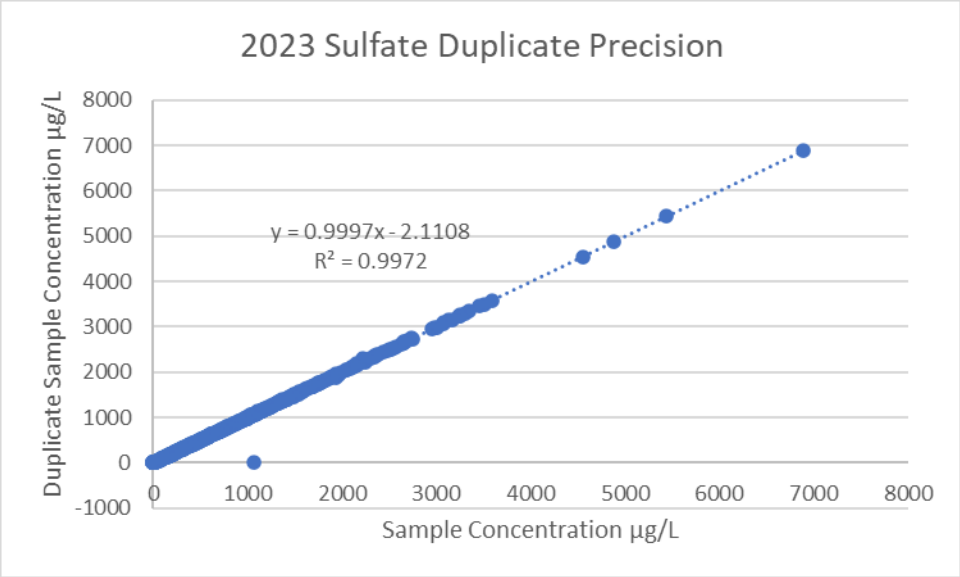


Nitrite Percent Differences
Average = 6.40%
Median = 0.1.32%
Maximum = 200%
Minimum = -87.3 %
Count = 661
Failures 0%

Duplicate Precision



Nitrate Percent Differences
Average = 1.0%
Median = 0.17%
Maximum = 200%
Minimum = -69.8 %
Count = 661
Failures 0.30%



Sulfate Percent Differences
Average = 2.14%
Median = 0.18%
Maximum = 200%
Minimum = -200%
Count = 661
Failures 0.15%

Reanalysis

	Chloride	Nitrite	Nitrate	Sulfate
2023 median RPD	0.92%	1.28%	-0.67%	3.50%
2023 average RPD	0.54%	13.7%	-0.12%	-1.97%

- Roughly 5% of each batch of 400 NPS samples are reanalyzed after the original analysis.
- The Relative Percent Differences are calculated and verified against the DQO requirements.
- Any samples failing to meet DQO's are reanalyzed a third time to check.

Routine Filter Re-Extraction

- Extraction efficiencies were evaluated on nearly 349 samples.
- Efficiency is determined by dividing the result measured on the re-extracted filter by the sum of the original and re-extracted results.

Chloride	Nitrite	Nitrate	Sulfate
99.0%	99.7%	98.4%	100%

Improvements to Quality System

Participation in PE evaluation conducted by Environment Canada.

Analyzed 10 samples and received a perfect score on results.

Obtained a laboratory accreditation through Industrial Hygiene for analysis of ions from $PM_{2.5}$ filters in samples.

RTI International

delivering **the promise of science**
for global good

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