# Clean Air Status and Trends Network

## First Quarter 2024 Quality Assurance Report

### Summary of Quarterly Operations (January through March)
### EPA Contract No. 68HERH21D0006
### EPA Project No. 68HERH23F0263

**Introduction**

This quarterly report summarizes results from the Clean Air Status and Trends Network (CASTNET) quality assurance/quality control (QA/QC) program for data collected during first quarter 2024. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan [QAPP; WSP USA Environment & Infastructure Inc. (WSP), 2024]. The QAPP is comprehensive and includes standards and policies for all components of project operation, from site selection through final data reporting. It is reviewed annually and updated as warranted.

**Quarterly Summary**

On January 24, 2024, WSP submitted results of analyses for proficiency test (PT) 123 for Rain and Soft Waters from the Water Science and Technology Directorate (WS&TD), a branch of Environmental Science and Technology Laboratories with Environment and Climate Change Canada. On March 25, 2024, WSP received final results and a laboratory performance assessment score for PT 123 from the WS&TD. WSP's final results were assessed as "Very Good." WSP was the only laboratory that participated in PT 123 to receive this rating. WSP's five-year historical performance is rated as "Good."

The site operator for the MKG113, PA site suffered a broken foot in December 2023 and was unable to perform his site operator duties through first quarter 2024. As a result of the data loss at the MKG113 site due to the site operator's injury, corrective action 0126 (CA_0126) was initiated. Tickets have customarily been opened in the field problem ticketing system by field or data personnel pursuant to problems with equipment or continuous data collection. Under this corrective action, a problem ticket will be opened for any issue adversely affecting the collection of data, including issues that interrupt or compromise filter pack sampling (e.g., if a site operator is unable to service their site). Filter pack sampling resumed March 24, 2024, and the regular site operator returned to duty on April 23. Ozone measurements continued without interruption throughout the quarter.

Documentation was requested by the American Association for Laboratory Accreditation (A2LA) in support of continuation of International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2017 accreditation of WSP's analytical and field laboratories. The CASTNET QA Manager worked with the CASTNET Laboratory Operations Manager and CASTNET Field Operations Manager to compile the necessary annual review documentation. The annual review documentation provided by WSP was accepted by the A2LA, and the A2LA reaffirmed WSP's ISO/IEC 17025:2017 accreditation until May 31, 2025.

The QA Manager received comments and recommendations for changes to the draft CASTNET QAPP Revision 10.1 from EPA's Office of Atmospheric Protection. The QA Manager began incorporating the recommendations and changes to the QAPP Revision 10.1. The updated, final version of the QAPP will be resubmitted to EPA in early second quarter 2024.

WSP attended EPA's Office of Air Quality Planning and Standards National Performance Audit Program training during the week of March 4, 2024. The training included a review of regulation changes and the new addition of Nafion dryers. Greg Noah (EPA) credited the work done by the WSP field technicians and CASTNET for the acceptance of Nafion in a regulatory ozone system.

The QA Manager continued working with the EPA Region 3 QA Coordinator regarding the mini technical systems audit (TSA) of the PAR107, VA ozone system on August 21, 2023. During March 2024, the Region 3 QA Coordinator requested additional information for the TSA report. In particular, he asked for the residence time, how often residence time is tested, and the schedule of maintenance procedures such as tubing exchanges.

Table 1 lists the quarters of data that were validated to Level 3 during first quarter 2024 by the site calibration group. Table 2 lists the sites in each calibration group along with the calibration schedule. Table 3 presents the measurement criteria for laboratory filter pack measurements. These criteria apply to the QC samples listed in the following section of this report. Table 4 presents the critical criteria for ozone monitoring. Table 5 presents the critical criteria for trace-level gas monitoring.

**Quality Control Analysis Count**

The QC sample statistics presented in this report are for reference standards (RF) and continuing calibration verification spikes (CCV) used to assess accuracy and for replicate sample analyses (RP) used to assess "in-run" precision. In addition, laboratory method blanks (MB) containing reagents without a filter; laboratory blanks (LB) containing reagents and a new, unexposed filter; and field blanks (FB) containing reagents and an unexposed filter that was loaded into a filter pack assembly and shipped to and from the monitoring site while remaining in sealed packaging, are also included. Table 6 presents the number of analyses in each category that were performed during first quarter 2024.

**Sample Receipt Statistics**

Ninety-five percent of field samples from EPA-sponsored sites must be received by the CASTNET laboratory in Gainesville, FL no later than 14 days after removal from the sampling tower. Table 7 presents the relevant sample receipt statistics for first quarter 2024.

**Data Quality indicator (DQI) Results**

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for first quarter 2024. All results were within the criteria listed in Table 3.

Table 8 presents summary statistics of critical criteria measurements at ozone sites collected during first quarter 2024. The statistics presented contain data validated at Level 2 and Level 3. All data associated with QC checks that fail to meet the criteria listed in Table 4 were or will be invalidated unless the cause of failure has no effect on ambient data collection, and passing results still meet frequency criteria. If a cell is shaded, the result either exceeds documented criteria or is otherwise notable. Table 9 presents observations associated with the shaded cell results in Table 8.

Table 10 presents summary statistics of critical criteria measurements at trace-level gas monitoring sites collected during first quarter 2024. The statistics presented contain data validated at Level 2 and Level 3. All data associated with QC checks that fail to meet the criteria listed in Table 5 were or will be invalidated unless the cause of failure has no effect on ambient data collection, and passing results still meet frequency criteria. If a cell is shaded, the result either exceeds documented criteria or is otherwise notable. During first quarter, no values exceeded documented criteria or were otherwise notable.

**Laboratory Control Sample Analysis**

The laboratory control sample (LCS) is a reagent blank spiked with the target analytes from the established analytical methods and carried through the same extraction process that field samples must undergo. LCS analyses are performed by the laboratory to monitor for potential sample handling artifacts and provide a means to identify possible analyte loss from extraction to extraction. Figure 4 presents LCS analysis results for first quarter 2024. All recovery values were between 91 percent and 103 percent.

**Blank Results**

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for first quarter 2024. All first quarter results were within criteria (two times the reporting limit) listed in Table 3 (with the exception of one cellulose $SO_2$ FB result reported at 4.2 parts per billion).

**Suspect/Invalid Filter Pack Samples**

Filter pack samples that were flagged as suspect or invalid during first quarter 2024 are listed in Table 11. This table also includes associated site identification and a brief description of the reason the sample was flagged. During first quarter, 5 filter pack samples were invalidated.

**Field Problem Count**

Table 12 presents counts of field problems affecting continuous data collection for more than one day for first quarter 2024. The problem counts are sorted by a 30-, 60-, or 90-day time period to resolution. A category for unresolved problems is also included.

## References

American Society for Testing and Materials (ASTM). 2022. ASTM E29-22, “Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.” ASTM International, West Conshohocken, PA, DOI:10.1520/E0029-22. www.astm.org.

International Organization for Standardization (ISO). 2015. Statistical Methods for the Use in Proficiency Testing by Interlaboratory Comparisons, Annex C, Robust Analysis, Section C.1: Algorithm A. Standard 13528. ISO 13528:2015(E).

WSP USA Environment & Infrastructure Inc. (WSP) formerly known as Wood USA Environment & Infrastructure Inc. 2022. Clean Air Status and Trends Network (CASTNET) Quality Assurance Project Plan (QAPP) Revision 9.5. Prepared for U.S. Environmental Protection Agency (EPA), Office of Air and Radiation, Clean Air Markets Division, Washington, DC. Contract No. 68HERH21D0006. Gainesville, FL. https://www3.epa.gov/castnet/docs/QAPP_v9-5_Main_Body.pdf.

**Table 1** Data Validated to Level 3 through First Quarter 2024

| Calibration Group* | Months Available | Number of Months | Complete Quarters | Number of Quarters |
|---|---|---|---|---|
| E-3/W-10† | May 2023–October 2023 | 6 | Quarter 3 2023 | 1 |
| SE-4/MW-6‡ | July 2023–December 2023 | 6 | Quarter 3 2023–Quarter 4 2023 | 2 |

**Notes:** * The sites contained in each calibration group are listed in Table 2.
† Contains ROM206 of the ROM406/ROM206 co-located pair
‡ Contains MCK131/231 co-located pair

**Table 2** Field Calibration Schedule for 2024

| Calibration Group | Months Calibrated | Sites Calibrated | | | |
|---|---|---|---|---|---|
| Eastern Sites (22 Total) | | | | | |
| E-1 (8 Sites) | February/August | BEL116, MD<br>BWR139, MD | WSP144, NJ<br>CTH110, NY | ARE128, PA<br>PSU106, PA | PED108, VA<br>VPI120, VA |
| E-2 (9 Sites) | April/October | ABT147, CT<br>ASH135, ME<br>WST109, NH | CAT175, NY<br>HWF187, NY[1]<br>WFM105, NY | NIC001, NY<br>EGB181, ON<br>UND002, VT | |
| E-3 (5 Sites) | May/November | KEF112, PA<br>MKG113, PA | LRL117, PA<br>PAR107, WV | CDR119, WV | |
| Southeastern Sites (11 Total) | | | | | |
| SE-4 (7 Sites) | January/July | SND152, AL<br>GAS153, GA | BFT142, NC<br>CND125, NC | COW137, NC<br>DUK008, NC[1] | SPD111, TN |
| SE-5 (4 Sites) | February/August | CAD150, AR<br>IRL141, FL | SUM156, FL<br>CVL151, MS | | |
| Midwestern Sites (18 Total) | | | | | |
| MW-6 (6 Sites) | January/July | CDZ171, KY<br>CKT136, KY | MCK131, KY<br>MCK231, KY | PNF126, NC[1]<br>ESP127, TN | |
| MW-7 (8 Sites) | March/September | BVL130, IL[2]<br>STK138, IL | VIN140, IN<br>RED004, MN | DCP114, OH<br>OXF122, OH | QAK172, OH<br>PRK134, WI |
| MW-8 (4 Sites) | April/October | SAL133, IN<br>HOX148, MI | ANA115, MI<br>UVL124, MI | | |
| Western Sites (13 Total) | | | | | |
| W-9 (5 Sites) | March/September | KNZ184, KS<br>KIC003, KS | CHE185, OK<br>SAN189, NE | ALC188, TX | |
| W-10 (8 Sites) | May/November | LPO010, CA<br>GTH161, CO | ROM206, CO[3]<br>NPT006, ID | PAL190, TX<br>UMA009, WA | CNT169, WY<br>PND165, WY[3] |

**Notes**: [1] Trace-level gas calibrations are performed quarterly in January, April, July, and October.
[2] Trace-level gas calibrations are performed quarterly in March, June, September, and December.
[3] Trace-level gas calibrations are performed quarterly in February, May, August, and November.

**Table 3** Data Quality Indicators for CASTNET Laboratory Measurements

| Analyte | Method | Precision[1] (MARPD) | Accuracy[2] (%) | Nominal Reporting Limits[3] | |
|---|---|---|---|---|---|
| | | | | mg/L | µg/Filter |
| Ammonium ($NH_4^+$) | AC | 20 | 90-110 | 0.020* | 0.5 |
| Sodium ($Na^+$) | ICP-OES | 20 | 95-105 | 0.005 | 0.125 |
| Potassium ($K^+$) | ICP-OES | 20 | 95-105 | 0.006 | 0.15 |
| Magnesium ($Mg^{2+}$) | ICP-OES | 20 | 95-105 | 0.003 | 0.075 |
| Calcium ($Ca^{2+}$) | ICP-OES | 20 | 95-105 | 0.006 | 0.15 |
| Chloride ($Cl^-$) | IC | 20 | 95-105 | 0.020 | 0.5 |
| Nitrate ($NO_3^-$) | IC | 20 | 95-105 | 0.008* | 0.2 |
| Sulfate ($SO_4^{2-}$) | IC | 20 | 95-105 | 0.040 | 1.0 |

**Notes**: [1] This column lists precision goals for both network precision calculated from co-located filter samples and laboratory precision based on replicate samples for samples > five times the reporting limit. The criterion is ± the reporting limit if the sample is ≤ five times the reporting limit.
[2] This column lists laboratory accuracy goals based on reference standards and continuing calibration verification spikes. The criterion is 90–110 percent for ICP-OES reference standards.
[3] The reporting limit for sulfate on cellulose filters is 0.080 mg/L (2.0 µg/filter).

| | | |
|---|---|---|
| AC | = | automated colorimetry |
| IC | = | ion chromatography |
| ICP-OES | = | inductively coupled plasma-optical emission spectrometry |
| MARPD | = | mean absolute relative percent difference |
| mg/L | = | milligrams per liter |
| µg/Filter | = | micrograms per filter |
| * | = | as nitrogen |

Values are rounded according to American Society for Testing and Materials (ASTM) E29-22, “Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications” (ASTM, 2022).

For more information on analytical methods and associated precision and accuracy criteria, see the CASTNET QAPP, (WSP, 2022).

**Table 4** Ozone Critical Criteria*

| Type Check | Analyzer Response |
|---|---|
| Zero | Less than ± 3.1 parts per billion (ppb) |
| Span | Less than ± 7.1 percent between supplied and observed concentrations |
| Single Point QC | Less than ± 7.1 percent between supplied and observed conentrations |

**Notes:** * Applies to CASTNET sites that are configured and operated in accordance with Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2022). The minimum frequency for these checks is once every two weeks.

Values are rounded according to ASTM E29-22, “Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications” (ASTM, 2022).

**Table 5** Trace-level Gas Monitoring Critical Criteria*

| Parameter | Analyzer Response | |
|---|---|---|
| | Zero Check | Span Check / Single Point QC Check |
| $SO_2$ | Less than ± 1.51 ppb | Less than ± 10.1 percent between supplied and observed concentrations |
| $NO_y$ | Less than ± 1.51 ppb | |
| CO | Less than ± 50 ppb | |

**Notes**: *Applies to CASTNET sites that are configured and operated in accordance with Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2022). The minimum frequency for these checks is once every two weeks.

Values are rounded according to ASTM E29-22, "Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications" (ASTM, 2022).

$SO_2$ = sulfur dioxide
$NO_y$ = total reactive oxides of nitrogen
CO = carbon monoxide
ppb = parts per billion

**Table 6** QC Analysis Count for First Quarter 2024

| Filter Type | Parameter | RF Sample Count | CCV Sample Count | RP Sample Count | MB Sample Count | LB Sample Count | FB Sample Count |
|---|---|---|---|---|---|---|---|
| Teflon | $SO_4^{2-}$ | 52 | 147 | 62 | 13 | 20 | 57 |
| | $NO_3^-$ | 52 | 147 | 62 | 13 | 20 | 57 |
| | $NH_4^+$ | 26 | 131 | 58 | 13 | 20 | 57 |
| | $Cl^-$ | 52 | 147 | 62 | 13 | 20 | 57 |
| | $Ca^{2+}$ | 26 | 133 | 61 | 13 | 20 | 57 |
| | $Mg^{2+}$ | 26 | 133 | 61 | 13 | 20 | 57 |
| | $Na^+$ | 26 | 133 | 61 | 13 | 20 | 57 |
| | $K^+$ | 26 | 133 | 61 | 13 | 20 | 57 |
| Nylon | $SO_4^{2-}$ | 27 | 125 | 61 | 9 | 22 | 57 |
| | $NO_3^-$ | 27 | 125 | 61 | 9 | 22 | 57 |
| Cellulose | $SO_4^{2-}$ | 35 | 111 | 50 | 11 | 26 | 60 |

**Table 7** Filter Pack Receipt Summary for First Quarter 2024

| | |
|---|---|
| Count of samples received more than 14 days after removal from tower: | 14 |
| Count of all samples received | 692 |
| Fraction of samples received within 14 days: | 0.980 |
| Average interval in days: | 5.390 |
| First receipt date: | 1/2/2024 |
| Last receipt date: | 3/30/2024 |

**Note**: Sample shipments for the Egbert, Ontario site (EGB181) are in groups of four. Samples associated with EGB181 are excluded from this statistic.

**Table 8** Ozone QC Summary for First Quarter 2024 (1 of 2)

| Site ID | % Span Pass[1] | Span [%D][2] | % Single Point QC Pass[1] | Single Point QC [%D][2] | % Zero Pass[1] | Zero Average (ppb)[2] |
|---|---|---|---|---|---|---|
| ABT147, CT | 100.00 | 1.43 | 100.00 | 1.14 | 100.00 | 0.16 |
| ALC188, TX | 100.00 | 1.32 | 100.00 | 1.21 | 100.00 | 0.40 |
| ANA115, MI | 100.00 | 1.26 | 100.00 | 1.50 | 100.00 | 0.20 |
| ARE128, PA | 100.00 | 1.32 | 100.00 | 1.21 | 100.00 | 0.57 |
| ASH135, ME | N/A | N/A | N/A | N/A | N/A | N/A |
| BEL116, MD | 100.00 | 0.57 | 100.00 | 0.73 | 100.00 | 0.60 |
| BFT142, NC | 100.00 | 1.11 | 100.00 | 0.97 | 100.00 | 0.26 |
| BVL130, IL | 85.87 | 15.60 | 85.87 | 15.36 | 100.00 | 0.12 |
| BWR139, MD | 100.00 | 0.99 | 100.00 | 1.13 | 100.00 | 0.43 |
| CAD150, AR | 100.00 | 1.71 | 100.00 | 1.79 | 100.00 | 0.24 |
| CDR119, WV | N/A | N/A | N/A | N/A | N/A | N/A |
| CDZ171, KY | N/A | N/A | N/A | N/A | N/A | N/A |
| CKT136, KY | 100.00 | 0.54 | 100.00 | 0.59 | 100.00 | 0.09 |
| CND125, NC | 100.00 | 1.07 | 100.00 | 1.33 | 100.00 | 0.33 |
| CNT169, WY | 100.00 | 0.69 | 100.00 | 0.99 | 100.00 | 0.39 |
| COW137, NC | 100.00 | 0.88 | 100.00 | 1.39 | 100.00 | 0.33 |
| CTH110, NY | 100.00 | 0.50 | 100.00 | 0.93 | 100.00 | 0.16 |
| CVL151, MS | 95.74 | 2.87 | 93.62 | 3.01 | 100.00 | 0.21 |
| DCP114, OH | N/A | N/A | N/A | N/A | N/A | N/A |
| DUK008, NC | 100.00 | 2.35 | 100.00 | 2.54 | 100.00 | 0.50 |
| ESP127, TN | 100.00 | 1.26 | 100.00 | 1.49 | 100.00 | 0.65 |
| GAS153, GA | 100.00 | 1.23 | 97.83 | 2.22 | 97.83 | 0.94 |
| GTH161, CO | 100.00 | 2.17 | 98.91 | 2.24 | 93.48 | 0.88 |
| HOX148, MI | 100.00 | 0.88 | 100.00 | 0.88 | 100.00 | 0.22 |
| HWF187, NY | N/A | N/A | N/A | N/A | N/A | N/A |
| IRL141, FL | 98.92 | 2.13 | 100.00 | 1.55 | 100.00 | 0.38 |
| KEF112, PA | 100.00 | 3.09 | 100.00 | 1.59 | 100.00 | 0.71 |
| LPO010, CA | 98.96 | 0.68 | 100.00 | 0.62 | 100.00 | 0.16 |
| LRL117, PA | 100.00 | 1.39 | 100.00 | 1.18 | 100.00 | 0.19 |
| MCK131, KY | 100.00 | 1.72 | 100.00 | 1.64 | 100.00 | 0.25 |
| MCK231, KY | 100.00 | 0.89 | 98.91 | 1.64 | 100.00 | 0.28 |
| MKG113, PA | 100.00 | 1.46 | 100.00 | 1.14 | 100.00 | 0.26 |
| NPT006, ID | 100.00 | 1.47 | 100.00 | 1.60 | 100.00 | 0.12 |
| OXF122, OH | 100.00 | 2.40 | 100.00 | 2.68 | 100.00 | 0.27 |
| PAL190, TX | 97.89 | 0.85 | 100.00 | 0.60 | 100.00 | 0.28 |
| PAR107, WV | 100.00 | 0.65 | 100.00 | 0.62 | 100.00 | 0.26 |
| PED108, VA | 100.00 | 1.26 | 100.00 | 1.17 | 100.00 | 0.23 |
| PND165, WY | 100.00 | 1.14 | 100.00 | 0.87 | 100.00 | 0.32 |
| PNF126, NC | N/A | N/A | N/A | N/A | N/A | N/A |
| PRK134, WI | 97.85 | 3.87 | 97.85 | 4.27 | 100.00 | 0.30 |
| PSU106, PA | 100.00 | 0.54 | 100.00 | 0.85 | 100.00 | 0.79 |
| QAK172, OH | 100.00 | 2.14 | 100.00 | 2.25 | 100.00 | 0.29 |

**Table 8** Ozone QC Summary for First Quarter 2024 (2 of 2)

| Site ID | % Span Pass[1] | Span [%D][2] | % Single Point QC Pass[1] | Single Point QC [%D][2] | % Zero Pass[1] | Zero Average (ppb)[2] |
|---|---|---|---|---|---|---|
| ROM206, CO | 96.67 | 4.66 | 97.78 | 2.45 | 97.78 | 1.40 |
| SAL133, IN | 100.00 | 0.90 | 100.00 | 0.70 | 100.00 | 0.18 |
| SAN189, NE | 100.00 | 1.99 | 100.00 | 2.56 | 100.00 | 0.45 |
| SND152, AL | 100.00 | 1.32 | 100.00 | 1.15 | 100.00 | 0.30 |
| SPD111, TN | 100.00 | 2.13 | 100.00 | 1.43 | 100.00 | 0.57 |
| STK138, IL | 100.00 | 1.15 | 100.00 | 1.30 | 100.00 | 0.21 |
| SUM156, FL | 92.31 | 3.48 | 95.51 | 2.57 | 100.00 | 0.20 |
| UMA009, WA | 100.00 | 0.75 | 100.00 | 1.03 | 97.87 | 0.53 |
| UVL124, MI | 100.00 | 1.81 | 100.00 | 1.87 | 100.00 | 0.21 |
| VIN140, IN | 100.00 | 0.92 | 100.00 | 1.06 | 100.00 | 0.14 |
| VPI120, VA | 100.00 | 1.74 | 100.00 | 2.24 | 98.96 | 0.38 |
| WSP144, NJ | 100.00 | 0.64 | 100.00 | 0.76 | 100.00 | 0.23 |
| WST109, NH | 98.95 | 1.74 | 95.79 | 2.42 | 95.79 | 0.92 |

**Notes**: [1] Percentage of comparisons that pass the criteria listed in Table 4. Values falling below 90 percent are addressed in Table 9.
[2] Absolute value of the average percent differences between the on-site transfer standard and the site monitor. Values exceeding the criteria listed in Table 4 are addressed in Table 9.
%D = percent difference
ppb = parts per billion

**Table 9** Ozone QC Observations for First Quarter 2024

| Site ID | QC Criterion | Comments |
|---|---|---|
| BVL130 | % Span Pass<br>Span \|%D\|<br>% Single Point QC Pass<br>Single Point QC \|%D\| | Site analyzer pump failed 1/26/2024 and was replaced 2/1/2024. |

**Note:** %D = percent difference

**Table 10** Trace-level Gas QC Summary for First Quarter 2024

| Parameter | % Span Pass[1] | Span [%D][2] | % Single Point QC Pass[1] | Single Point QC [%D][2] | % Zero Pass[1] | Zero Average (ppb)[2] |
|---|---|---|---|---|---|---|
| BVL130, IL | | | | | | |
| $SO_2$ | 100.00 | 0.97 | 100.00 | 1.55 | 100.00 | 0.36 |
| $NO_y$ | 100.00 | 2.42 | 100.00 | 2.17 | 95.56 | 0.24 |
| CO | 100.00 | 1.41 | 90.00 | 5.15 | 94.00 | 21.16 |
| DUK008, NC | | | | | | |
| $NO_y$ | 100.00 | 1.20 | 100.00 | 1.80 | 91.89 | 0.77 |
| HWF187, NY | | | | | | |
| $NO_y$ | N/A | N/A | N/A | N/A | N/A | N/A |
| PND165, WY | | | | | | |
| $NO_y$ | 100.00 | 0.93 | 100.00 | 1.43 | 100.00 | 0.50 |
| PNF126, NC | | | | | | |
| $NO_y$ | N/A | N/A | N/A | N/A | N/A | N/A |
| ROM206, CO | | | | | | |
| $NO_y$ | 97.83 | 0.96 | 97.83 | 1.62 | 100.00 | 0.12 |

**Notes**: %D = percent difference
ppb = parts per billion

**Table 11** Filter Packs Flagged as Suspect or Invalid During First Quarter 2024

| Site ID | Sample No. | Reason |
|---|---|---|
| CAT175 | 2403001-10 | Power failure. |
| CVL151 | 2402001-18 | Flow rate was unknown during this sampling week. |
| KEF112 | 2402001-28 | Filter pack failed leak check. |
| SHE604 | 2402005-05 | Flow rate was invalidated as suspect. |
| SHE604 | 2404005-05 | Invalidated for suspect data. |

**Table 12** Field Problems Affecting Data Collection

| Days to Resolution | Problem Count |
|---|---|
| 30 | 151 |
| 60 | 5 |
| 90 | 0 |
| Unresolved by end of quarter | 9 |

**Figure 1** Reference Standard Results for First Quarter 2024 (percent recovery)

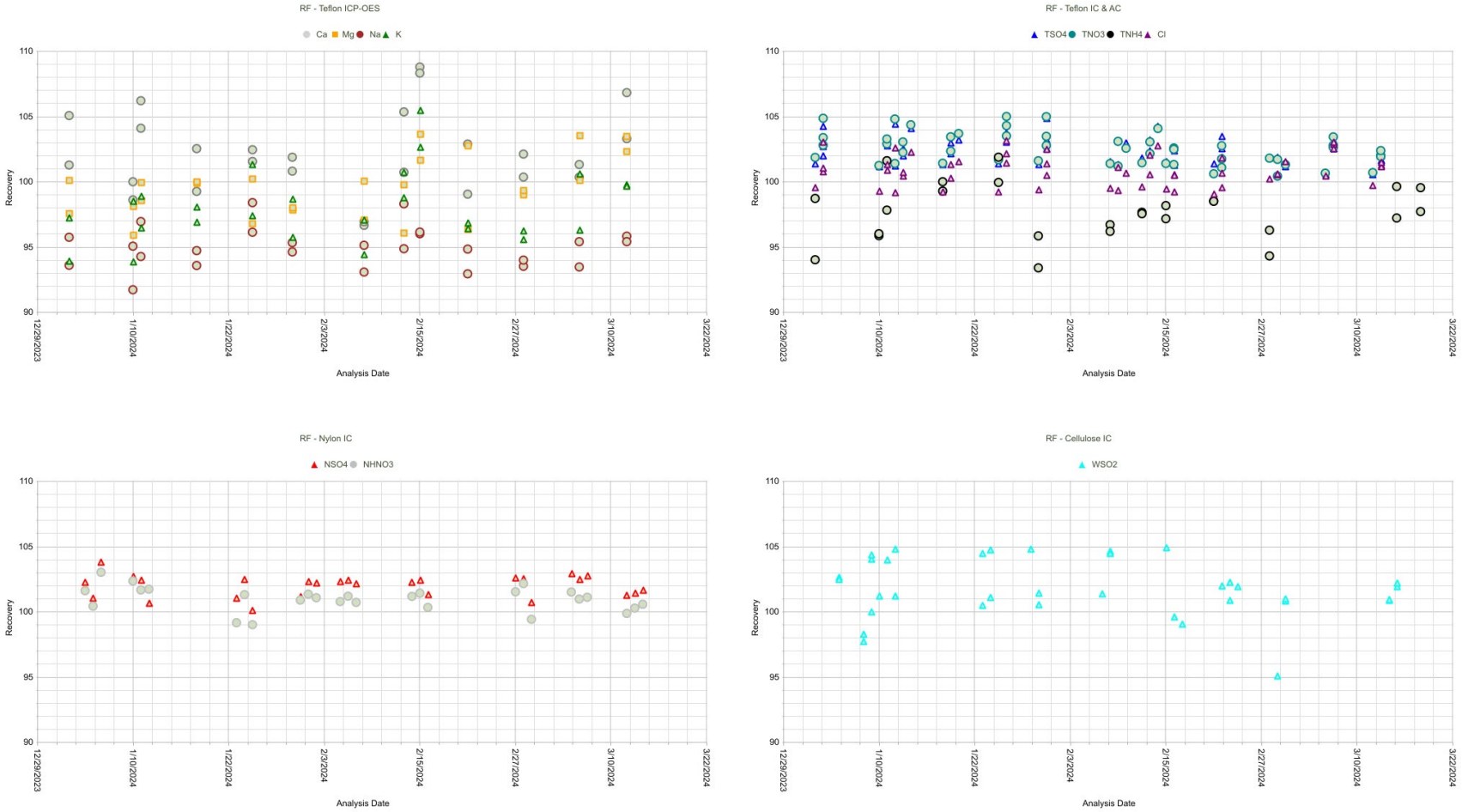

**Figure 2** Continuing Calibration Spike Results for First Quarter 2024 (percent recovery)

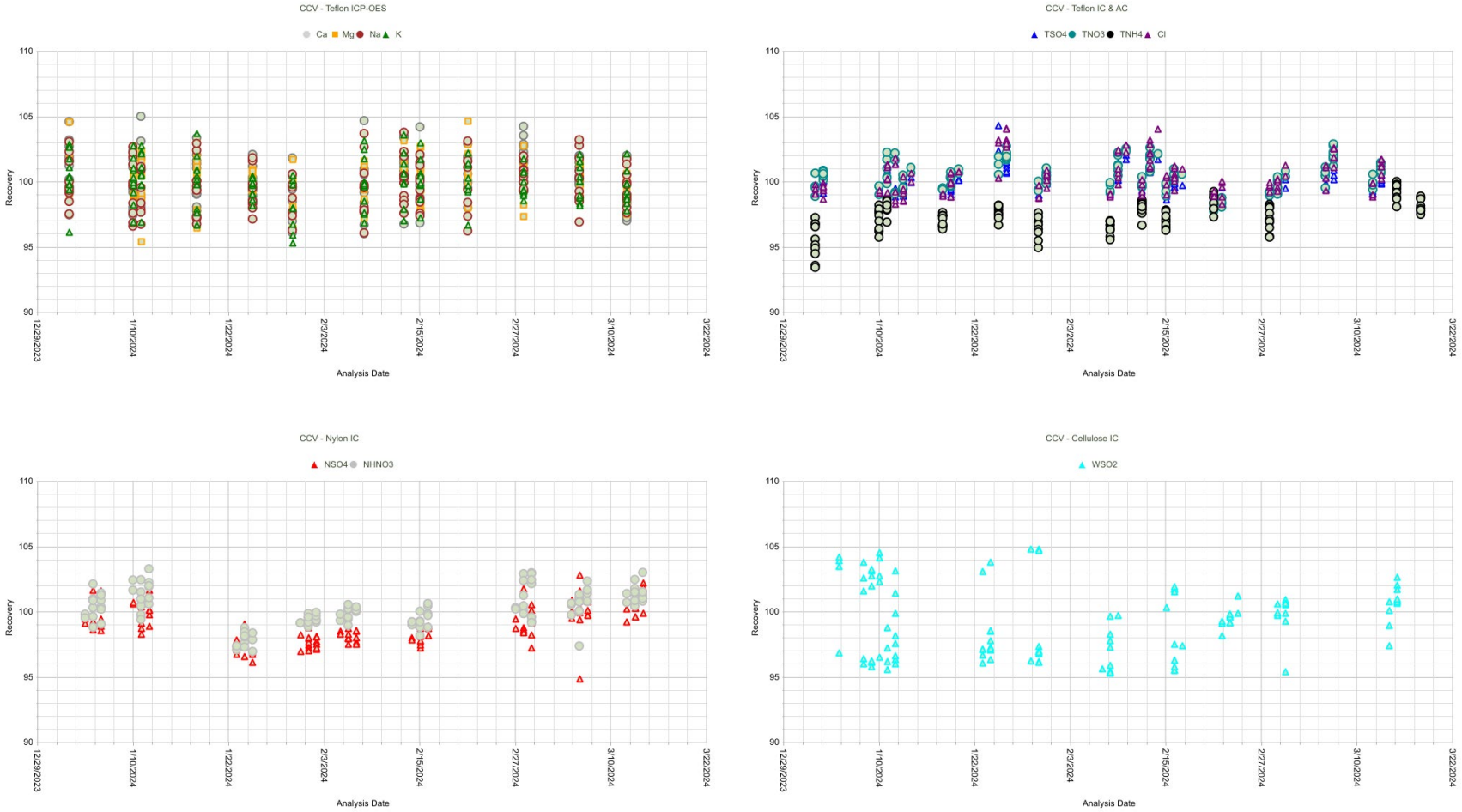

**Figure 3** Replicate Sample Analysis Results for First Quarter 2024 (percent difference)

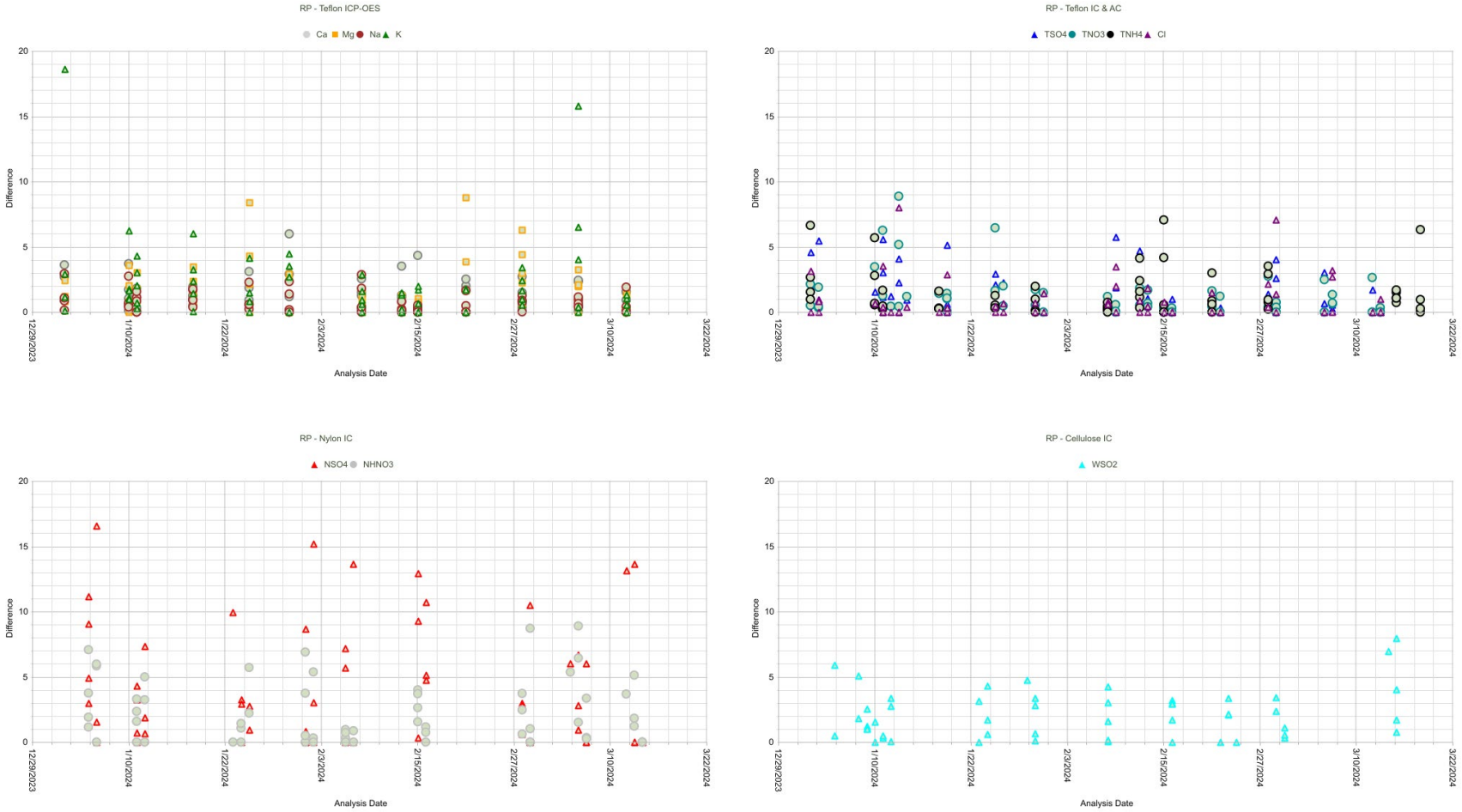

**Figure 4** Laboratory Control Sample Results for First Quarter 2024 (percent recovery)

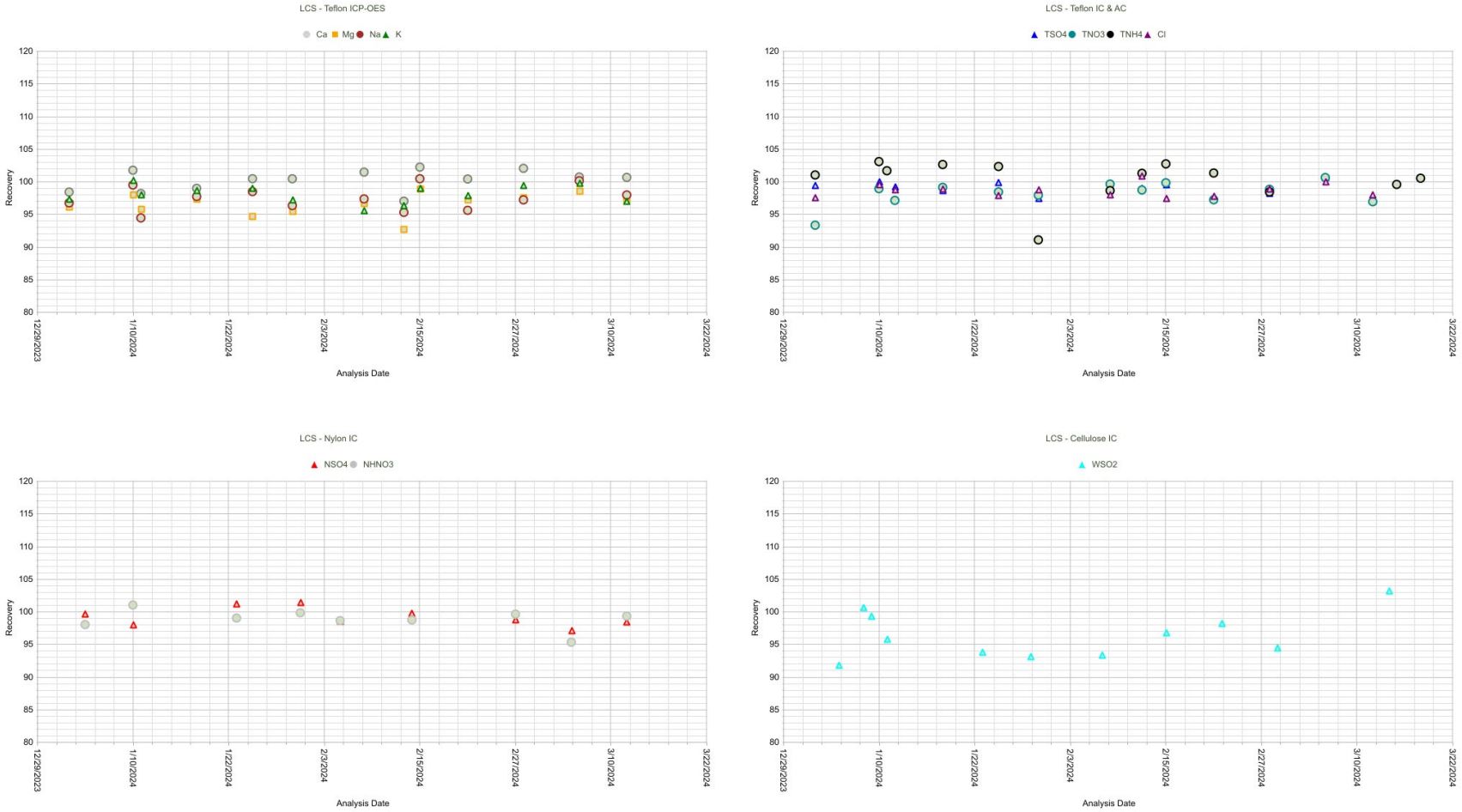

**Figure 5** Method Blank Analysis Results for First Quarter 2024 (total micrograms)

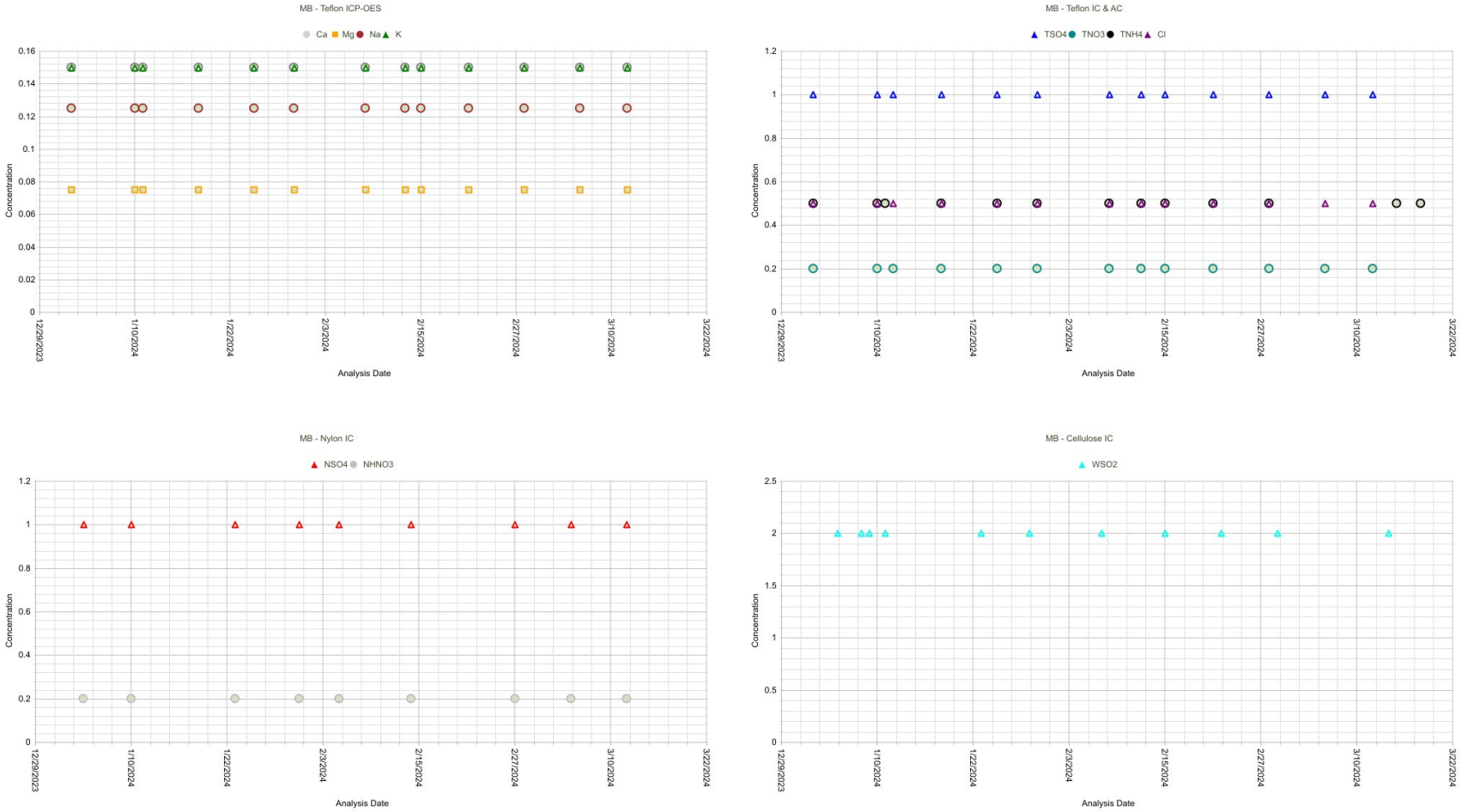

**Figure 6** Laboratory Blank Analysis Results for First Quarter 2024 (total micrograms)

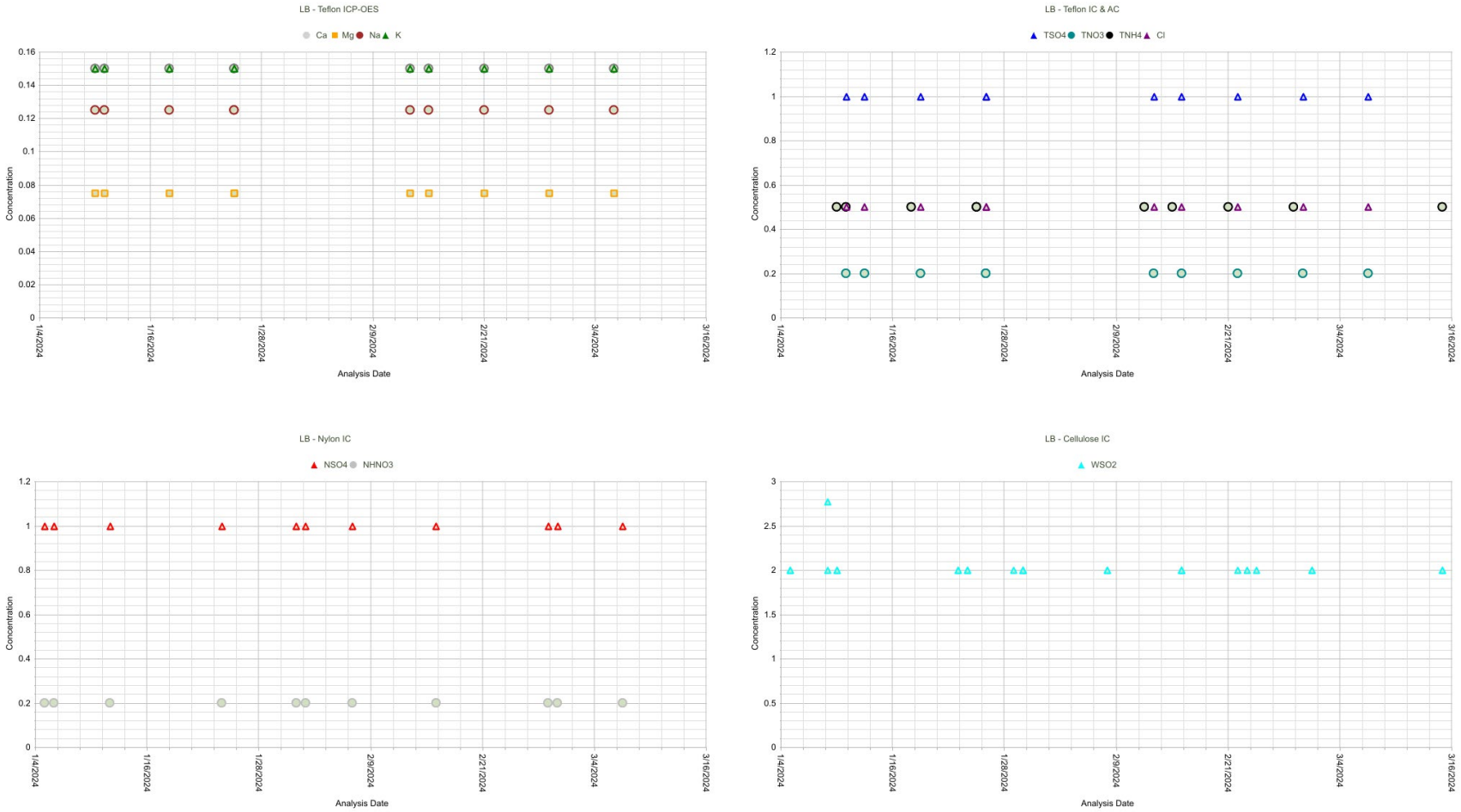

**Figure 7** Field Blank Analysis Results for First Quarter 2024 (total micrograms)