



Summary of Quarterly Operations (April through June)

EPA Contract No. EP-W-15-003

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 second quarter 2015. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP; AMEC, 2014). 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

AMEC corporate continued to support the analytical laboratory's activities with regard to maintaining 17025:2005 accreditation under the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC). An assessment of the laboratory was performed by an assigned assessor from the American Association for Laboratory Accreditation (A2LA) in early April 2015. There was a single deficiency related to the existing scope of accreditation requiring an explicit definition of the authority of the Quality Assurance Manager to ensure the management system is implemented and followed. This deficiency was addressed by revising the laboratory quality manual. Objective evidence of the corrective action was provided to A2LA in early May 2015. AMEC's accreditation was renewed and is good for two years until May 31, 2017.

AMEC is extending ISO/IEC 17025:2005 accreditation to select field-based activities. ISO/IEC 17025:2005 management system training and documentation of training is required for accreditation of those activities. AMEC is working with site operators and field subcontractors to complete requirements. AMEC received an extension for the ISO/IEC response for field-based activities. AMEC's ISO/IEC response date is July 31, 2015. [Update: prior to publication of this report, on July 1, 2015, AMEC received ISO/IEC 17025:2005 accreditation from A2LA for select field-based activities. This accreditation is good until May 31, 2017.]

During second quarter, AMEC determined that ozone concentration data from the ROM206, CO site showed concentrations have been 2 to 3 parts per billion higher than those measured by the collocated ROM406 site since installation of the NO_y analyzer at ROM206. AMEC took steps to eliminate the bias by placing the ozone analyzer on the standard zero air generation system used at CASTNET sites that do not measure trace-level gases. AMEC is currently investigating whether the Teledyne Advanced Pollution Instrumentation (TAPI) zero air system introduced a bias relative to the standard system.

EPA's Office of Air Quality Planning and Standards (OAQPS) requested that only ozone 1-point QC checks that are associated with valid data be submitted to EPA's Air Quality System (AQS). AMEC will begin the process of excluding those 1-point QC checks that are associated with data that have been invalidated starting with the January 2015 ozone data. AMEC will work with EPA to determine if historically submitted 1-point QC checks from 2011 through 2014 need to be updated and if so, on what schedule.

Table 1 lists the quarters of data that were validated to Level 3 during second quarter 2015 by 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 second quarter 2015.

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 second quarter 2015.

Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for second quarter 2015. All results were within the criteria listed in Table 3.

Table 8 presents summary statistics of critical criteria measurements at ozone sites collected during second quarter 2015. 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 affect on ambient data collection, and passing results still meet frequency criteria. Results in shaded cells either exceed documented criteria or are 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 second quarter 2015. 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 affect on ambient data collection, and passing results still meet frequency criteria. During second quarter 2015, no results 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. The LCS is not required by the CASTNET QA/QC program. 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 second quarter 2015. All recovery values were between 90 percent and 110 percent.

Blank Results

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for second quarter 2015. All second quarter results were within criteria (two times the reporting limit) listed in Table 3.

Suspect/Invalid Filter Pack Samples

Filter pack samples that were flagged as suspect or invalid during second quarter 2015 are listed in Table 11. This table also includes associated site identification and a brief description of the reason the sample was flagged. During second quarter, 11 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 second quarter 2015. The problem counts are sorted by a 30-, 60-, or 90-day time period to resolution. A category for unresolved problems is also included. Time to resolution indicates the period taken to implement corrective action.

References

- AMEC Environment & Infrastructure, Inc. (AMEC). 2014. *Clean Air Status and Trends Network (CASTNET) Quality Assurance Project Plan (QAPP) Revision 8.2*. Prepared for U.S. Environmental Protection Agency (EPA), Office of Air and Radiation, Clean Air Markets Division, Washington, DC. Contract No. EP-W-09-028. Gainesville, FL. <http://java.epa.gov/castnet/documents.do>.
- American Society for Testing and Materials (ASTM). 2008. *ASTM E29-08, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*. ASTM International, West Conshohocken, PA, DOI:10.1520/E0029-08. www.astm.org.
- U.S. Environmental Protection Agency (EPA). 2014. Appendix A to Part 58 – Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS), Special Purpose Monitors (SPMs), and Prevention of Significant Deterioration (PSD) Air Monitoring. 40 *CFR* Part 58.

Table 1 Data Validated to Level 3 during Second Quarter 2015

| Calibration Group* | Months Available | Number of Months | Complete Quarters | Number of Quarters |
|--------------------|--------------------------------|------------------|---------------------------------|--------------------|
| E-1/SE-5 | August 2014 – January 2015 | 6 | Quarter 4 2014 | 1 |
| MW-7/W-9 | September 2014 – February 2015 | 6 | Quarter 4 2014 | 1 |
| E-2/MW-8 | October 2014 – March 2015 | 6 | Quarter 4 2014 – Quarter 1 2015 | 2 |

Note: * The sites contained in each calibration group are listed in Table 2.

Table 2 Field Calibration Schedule for 2015

| Calibration Group | Months Calibrated | Sites Calibrated | | | |
|--------------------------------------|-------------------|--|--|--|--------------------------|
| Eastern Sites (24 Total) | | | | | |
| E-1 (8 Sites) | February/August | BEL116, MD BWR139, MD | WSP144, NJ CTH110, NY | ARE 128, PA PSU106, PA | PED108, VA VPI120, VA |
| E-2 (11 Sites) | April/October | ABT147, CT ASH135, ME HOW191, ME | WST109, NH CAT175, NY HWF187, NY | WFM007, NY WFM105, NY NIC001, NY | EGB181, ON UND002, VT |
| E-3 (5 Sites) | May/November | KEF112, PA MKG113, PA | LRL117, PA PAR107, WV | CDR119, WV | |
| Southeastern Sites (11 Total) | | | | | |
| SE-4 (7 Sites) | January/July | SND152, AL GAS153, GA | BFT142, NC CND125, NC | COW005, NC COW137, NC | SPD111, TN |
| SE-5 (4 Sites) | February/August | CAD150, AR CVL151, MS | IRL141, FL SUM156, FL | | |
| Midwestern Sites (19 Total) | | | | | |
| MW-6 (6 Sites) | January/July | CDZ171, KY CKT136, KY | MCK131, KY MCK231, KY | PNF126, NC ESP127, TN | |
| MW-7 (9 Sites) | March/September | ALH157, IL BVL130, IL STK138, IL | VIN140, IN RED004, MN DCP114, OH | OXF122, OH QAK172, OH PRK134, WI | |
| MW-8 (4 Sites) | April/October | SAL133, IN HOX148, MI | ANA115, MI UVL124, MI | | |
| Western Sites (10 Total) | | | | | |
| W-9 (5 Sites) | March/September | KNZ184, KS KIC003, KS | CHE185, OK SAN189, NE | ALC188, TX | |
| W-10 (5 Sites) | May/November | GTH161, CO ROM206, CO | CNT169, WY PND165, WY | PAL190, TX | |

Table 3 Data Quality Indicators for CASTNET Laboratory Measurements

| Analyte | Method | Precision ¹ (MARPD) | Accuracy ² (%) | Nominal Reporting Limits | |
|--|---------|-----------------------------------|------------------------------|--------------------------|-----------|
| | | | | 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 collocated filter samples and laboratory precision based on replicate samples.

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.

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) E29-08, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications (ASTM, 2008).

For more information on analytical methods and associated precision and accuracy criteria, see the CASTNET QAPP, (AMEC, 2014).

Table 4 Ozone Critical Criteria*

| Type of Check | Analyzer Response |
|-----------------|--|
| Zero | Less than ± 3 parts per billion (ppb) |
| Span | Less than or equal to ± 7 percent between supplied and observed concentrations |
| Single Point QC | Less than or equal to ± 7 percent between supplied and observed concentrations |

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, 2014). The minimum frequency for these checks is once every two weeks.

Values are rounded according to ASTM E29-08, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications (ASTM, 2008).

Table 5 Trace-level Gas Monitoring Critical Criteria *

| Parameter | Analyzer Response | |
|-----------------|--------------------|---|
| | Zero Check | Span Check / Single Point QC Check |
| SO ₂ | Less than ± 3 ppb | Less than or equal to ± 10 percent between supplied and observed concentrations |
| NO _y | Less than ± 3 ppb | |
| CO | Less than ± 40 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, 2014). The minimum frequency for these checks is once every two weeks.

Values are rounded according to ASTM E29-08, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications E29 (ASTM, 2008).

SO₂ = sulfur dioxide

NO_y = total reactive oxides of nitrogen

CO = carbon monoxide

ppb = parts per billion

Table 6 QC Analysis Count for Second Quarter 2015

| 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⁻ | 51 | 193 | 82 | 18 | 26 | 96 |
| | NO ₃ ⁻ | 51 | 193 | 82 | 18 | 26 | 96 |
| | NH ₄ ⁺ | 36 | 175 | 81 | 18 | 26 | 96 |
| | Cl ⁻ | 51 | 193 | 82 | 18 | 26 | 96 |
| | Ca ²⁺ | 38 | 181 | 83 | 19 | 26 | 96 |
| | Mg ²⁺ | 38 | 181 | 83 | 19 | 26 | 96 |
| | Na ⁺ | 38 | 181 | 83 | 19 | 26 | 96 |
| | K ⁺ | 38 | 181 | 83 | 19 | 26 | 96 |
| Nylon | SO ₄ ²⁻ | 37 | 181 | 79 | 18 | 26 | 96 |
| | NO ₃ ⁻ | 51 | 195 | 86 | 25 | 26 | 103 |
| Cellulose | SO ₄ ²⁻ | 35 | 177 | 80 | 17 | 26 | 96 |

Table 7 Filter Pack Receipt Summary for Second Quarter 2015

| | |
|---|-----------|
| Count of samples received more than 14 days after removal from tower: | 9 |
| Count of all samples received: | 751 |
| Fraction of samples received within 14 days: | 0.988 |
| Average interval in days: | 4.762 |
| First receipt date: | 4/02/2015 |
| Last receipt date: | 6/25/2015 |

Table 8 Ozone QC Summary for Second Quarter 2015 (1 of 2)

| Site ID | % Span Pass ¹ | Span %D ² | % Single Point QC Pass ¹ | Single Point QC %D ² | Single Point QC CL ³ | % Zero Pass ¹ | Zero Average (ppb) ² |
|------------|--------------------------|------------------------|-------------------------------------|-----------------------------------|---------------------------------|--------------------------|---------------------------------|
| ABT147, CT | 100.00 | 1.27 | 98.92 | 1.32 | 0.21 | 100.00 | 0.21 |
| ALC188, TX | 91.43 | 3.04 | 90.38 | 3.90 | 1.83 | 98.08 | 1.12 |
| ALH157, IL | 100.00 | 1.63 | 100.00 | 0.94 | 0.15 | 100.00 | 0.19 |
| ANA115, MI | 98.94 | 0.96 | 100.00 | 0.78 | 0.10 | 100.00 | 0.16 |
| ARE128, PA | 97.87 | 3.35 | 97.87 | 1.95 | 1.07 | 97.87 | 0.86 |
| ASH135, ME | 100.00 | 1.51 | 100.00 | 1.44 | 0.08 | 100.00 | 0.17 |
| BEL116, MD | 100.00 | 2.64 | 92.31 | 5.37 | 0.22 | 100.00 | 1.66 |
| BFT142, NC | 97.89 | 1.69 | 92.63 | 2.59 | 0.63 | 98.95 | 0.82 |
| BVL130, IL | 100.00 | 1.41 | 100.00 | 2.79 | 0.18 | 100.00 | 1.47 |
| BWR139, MD | 100.00 | 2.53 | 100.00 | 3.27 | 0.19 | 100.00 | 0.18 |
| CAD150, AR | 98.86 | 2.34 | 98.86 | 1.09 | 0.25 | 98.86 | 0.39 |
| CDR119, WV | 98.94 | 2.18 | 98.94 | 2.27 | 0.23 | 100.00 | 0.37 |
| CDZ171, KY | 95.88 | 1.90 | 92.78 | 2.13 | 0.80 | 94.85 | 0.94 |
| CKT136, KY | 100.00 | 0.92 | 100.00 | 1.77 | 0.12 | 100.00 | 0.15 |
| CND125, NC | 97.87 | 1.53 | 97.87 | 1.43 | 0.93 | 97.87 | 0.74 |
| CNT169, WY | 100.00 | 2.47 | 100.00 | 3.37 | 0.17 | 100.00 | 0.64 |
| COW137, NC | 100.00 | 1.47 | 100.00 | 2.30 | 0.14 | 100.00 | 0.32 |
| CTH110, NY | 91.92 | 3.82 | 93.94 | 2.33 | 0.45 | 97.98 | 1.43 |
| CVL151, MS | 88.00 | 3.09 | 92.00 | 1.93 | 0.52 | 99.00 | 0.55 |
| DCP114, OH | 100.00 | 1.49 | 97.75 | 1.64 | 0.34 | 100.00 | 0.20 |
| ESP127, TN | 97.92 | 2.50 | 96.88 | 1.82 | 0.31 | 100.00 | 0.19 |
| GAS153, GA | 100.00 | 0.24 | 100.00 | 0.48 | 0.10 | 100.00 | 0.34 |
| GTH161, CO | 100.00 | 0.50 | 100.00 | 0.74 | 0.09 | 100.00 | 0.20 |

Table 8 Ozone QC Summary for Second Quarter 2015 (2 of 2)

| Site ID | % Span Pass ¹ | Span %D ² | % Single Point QC Pass ¹ | Single Point QC %D ² | Single Point QC CL ³ | % Zero Pass ¹ | Zero Average (ppb) ² |
|------------|--------------------------|------------------------|-------------------------------------|-----------------------------------|---------------------------------|--------------------------|---------------------------------|
| HOX148, MI | 100.00 | 0.44 | 100.00 | 0.87 | 0.10 | 100.00 | 0.64 |
| HWF187, NY | 100.00 | 0.90 | 95.51 | 2.39 | 1.14 | 98.86 | 0.93 |
| IRL141, FL | 98.02 | 3.24 | 97.85 | 2.48 | 1.53 | 97.85 | 1.35 |
| KEF112, PA | 100.00 | 0.59 | 97.87 | 1.15 | 0.31 | 100.00 | 0.27 |
| LRL117, PA | 100.00 | 0.68 | 100.00 | 0.39 | 0.07 | 100.00 | 0.21 |
| MCK131, KY | 98.94 | 1.72 | 98.94 | 1.99 | 0.31 | 100.00 | 0.53 |
| MCK231, KY | 98.95 | 1.75 | 96.84 | 2.80 | 0.35 | 100.00 | 0.66 |
| MKG113, PA | 100.00 | 0.53 | 100.00 | 0.64 | 0.18 | 100.00 | 0.40 |
| OXF122, OH | 97.92 | 2.36 | 86.46 | 3.72 | 0.75 | 97.92 | 1.39 |
| PAL190, TX | 100.00 | 1.35 | 100.00 | 1.60 | 0.16 | 100.00 | 0.25 |
| PAR107, WV | 97.89 | 1.24 | 97.89 | 1.34 | 0.34 | 100.00 | 0.65 |
| PED108, VA | 89.90 | 5.62 | 92.93 | 4.68 | 1.13 | 100.00 | 0.55 |
| PND165, WY | 79.59 | 20.15 | 79.59 | 20.92 | 6.20 | 100.00 | 1.04 |
| PNF126, NC | 100.00 | 0.87 | 95.51 | 3.62 | 0.36 | 100.00 | 2.42 |
| PRK134, WI | 100.00 | 1.70 | 98.91 | 1.44 | 0.30 | 100.00 | 0.35 |
| PSU106, PA | 100.00 | 2.17 | 100.00 | 2.09 | 0.39 | 100.00 | 0.17 |
| QAK172, OH | 100.00 | 1.77 | 98.92 | 1.55 | 0.77 | 100.00 | 0.33 |
| ROM206, CO | 84.54 | 16.24 | 83.51 | 16.98 | 5.97 | 100.00 | 0.52 |
| SAL133, IN | 100.00 | 1.08 | 96.88 | 1.58 | 0.36 | 100.00 | 0.42 |
| SAN189, NE | 100.00 | 0.49 | 100.00 | 0.43 | 0.06 | 100.00 | 0.16 |
| SND152, AL | 100.00 | 1.61 | 100.00 | 1.87 | 0.12 | 100.00 | 0.31 |
| SPD111, TN | 100.00 | 1.62 | 98.91 | 1.79 | 0.17 | 100.00 | 0.23 |
| STK138, IL | 100.00 | 0.88 | 98.81 | 0.47 | 0.16 | 100.00 | 0.57 |
| SUM156, FL | 94.57 | 3.06 | 100.00 | 1.28 | 0.15 | 100.00 | 0.35 |
| UVL124, MI | 96.74 | 3.86 | 96.74 | 3.90 | 3.04 | 100.00 | 0.14 |
| VIN140, IN | 100.00 | 0.78 | 100.00 | 0.73 | 0.12 | 100.00 | 0.24 |
| VPI120, VA | 100.00 | 0.68 | 100.00 | 0.97 | 0.09 | 100.00 | 0.34 |
| WSP144, NJ | 98.90 | 1.19 | 98.90 | 1.12 | 0.20 | 100.00 | 0.56 |
| WST109, NH | 100.00 | 0.59 | 100.00 | 0.50 | 0.07 | 100.00 | 0.11 |

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.

³ 90 percent confidence limit of the coefficient of variation. This should be less than or equal to the 7 percent single point QC check critical criterion. Values exceeding this criterion are addressed in Table 9.

%D = percent difference

CL = confidence limit

ppb = parts per billion

Table 9 Ozone QC Observations for Second Quarter 2015

| Site ID | QC Criterion | Comments |
|------------|--|--|
| CVL151, MS | % Span Pass | System moisture problems caused occasional erratic readings during June. Associated data will be invalidated. |
| OXF122, OH | % Single Point QC Pass | System moisture problems were suspected during June. Telemetry issues prevented collection of 1-minute and other confirmation data. Associated data will be invalidated. |
| PND165, WY | % Span Pass Span %D % Single Point QC Pass Single Point QC %D | The sample pump failed in June. Associated data will be invalidated. |
| ROM206, CO | % Span Pass Span %D % Single Point QC Pass Single Point QC %D | The sample pump failed in June. Associated data will be invalidated. |

Notes: %D = percent difference

Table 10 Trace-level Gas QC Summary for Second Quarter 2015

| Parameter | % Span Pass ¹ | Span %D ² | % Single Point QC Pass ¹ | Single Point QC %D ² | Single Point QC CL ³ | % Zero Pass ¹ | Zero Average (ppb) ² |
|-------------------|--------------------------|------------------------|-------------------------------------|-----------------------------------|---------------------------------|--------------------------|---------------------------------|
| BEL116, MD | | | | | | | |
| SO ₂ | 95.24 | 7.01 | 97.62 | 3.56 | 3.83 | 100.00 | 1.12 |
| NO _y | 97.06 | 4.52 | 97.06 | 4.88 | 3.79 | 100.00 | 1.90 |
| BVL130, IL | | | | | | | |
| SO ₂ | 100.00 | 1.18 | 100.00 | 2.90 | 0.38 | 100.00 | 0.57 |
| NO _y | 100.00 | 3.69 | 100.00 | 5.89 | 0.56 | 100.00 | 0.80 |
| CO | 100.00 | 0.89 | 100.00 | 2.02 | 0.43 | 100.00 | 8.09 |
| HWF187, NY | | | | | | | |
| NO _y | 100.00 | 1.25 | 100.00 | 1.53 | 0.33 | 100.00 | 1.07 |
| PND165, WY | | | | | | | |
| NO _y | 100.00 | 2.42 | 100.00 | 3.37 | 0.36 | 100.00 | 0.53 |
| PNF126, NC | | | | | | | |
| NO _y | 100.00 | 3.73 | 100.00 | 3.52 | 0.62 | 100.00 | 0.91 |
| ROM206, CO | | | | | | | |
| NO _y | 100.00 | 0.63 | 100.00 | 1.40 | 0.29 | 100.00 | 1.26 |

Notes: ¹ Percentage of comparisons that pass the criteria listed in Table 5.

² Absolute value of the average percent differences between the supplied and observed concentrations. Criteria are listed in Table 5.

³ 90 percent confidence limit of the coefficient of variation. This should be less than or equal to the 10 percent single point QC check critical criterion.

%D = percent difference

CL = confidence limit

ppb = parts per billion

Table 11 Filter Packs Flagged as Suspect or Invalid during Second Quarter 2015

| Site ID | Sample No. | Reason |
|------------|------------|----------------------------|
| BUF603, WY | 1517003-02 | Insufficient flow volume |
| FOR605, WY | 1518003-03 | Insufficient flow volume |
| GLR468, MT | 1518001-33 | Insufficient flow volume |
| HWF187, NY | 1517001-40 | Insufficient flow volume |
| IRL141, FL | 1516001-41 | Insufficient flow volume |
| JOT403, CA | 1518001-42 | Insufficient flow volume |
| KIC003, KS | 1519001-44 | Insufficient flow volume |
| MCK231, KY | 1515001-50 | Potassium data invalidated |
| PND165, WY | 1520001-60 | Insufficient flow volume |
| ROM206, CO | 1520001-66 | Insufficient flow volume |
| STK138, IL | 1520001-74 | Insufficient flow volume |

Table 12 Field Problems Affecting Data Collection

| Days to Resolution | Problem Count |
|------------------------------|---------------|
| 30 | 230 |
| 60 | 5 |
| 90 | 1 |
| Unresolved by End of Quarter | 33 |

Figure 1 Reference Standard Results for Second Quarter 2015 (percent recovery)

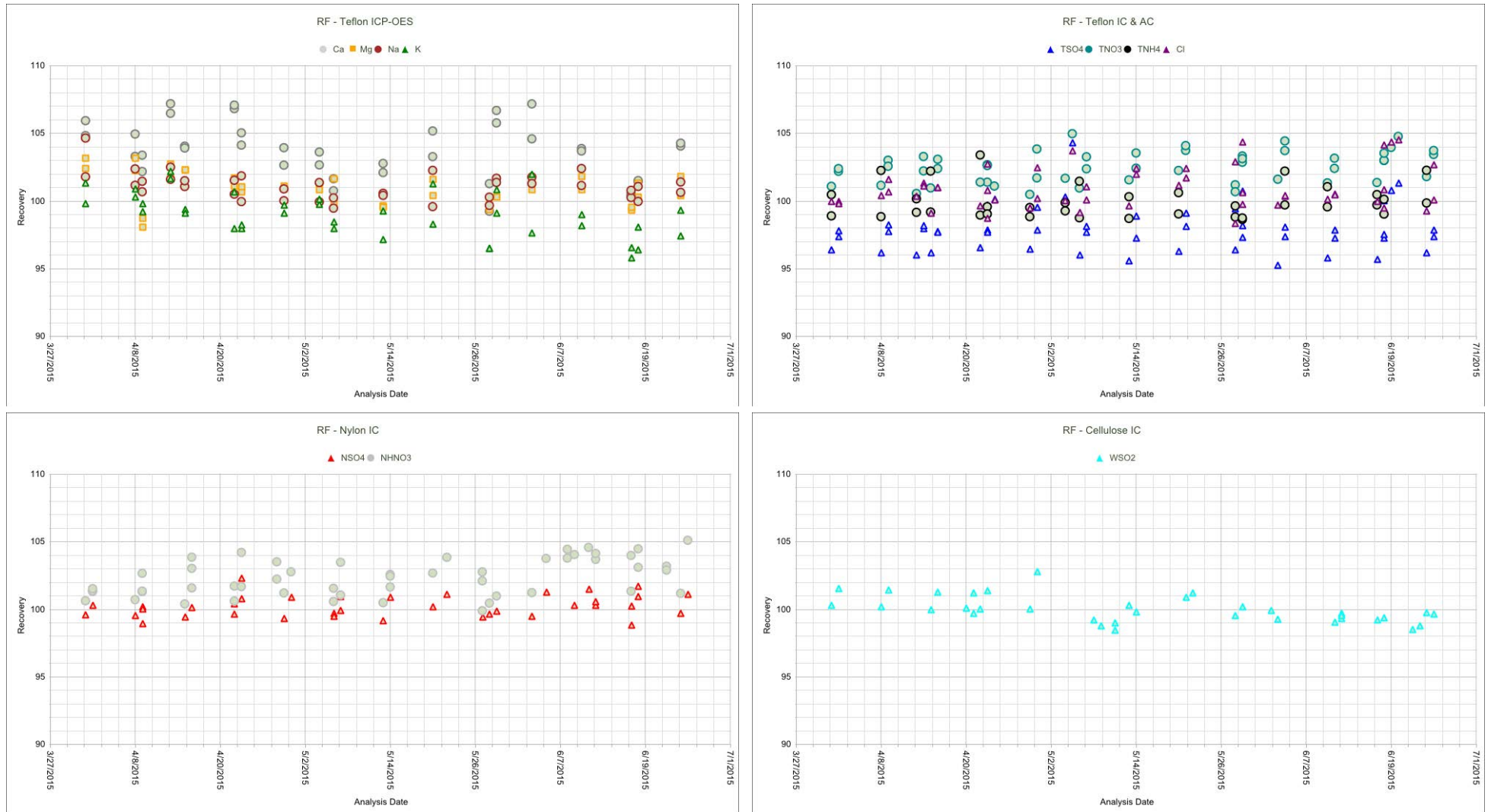


Figure 2 Continuing Calibration Spike Results for Second Quarter 2015 (percent recovery)

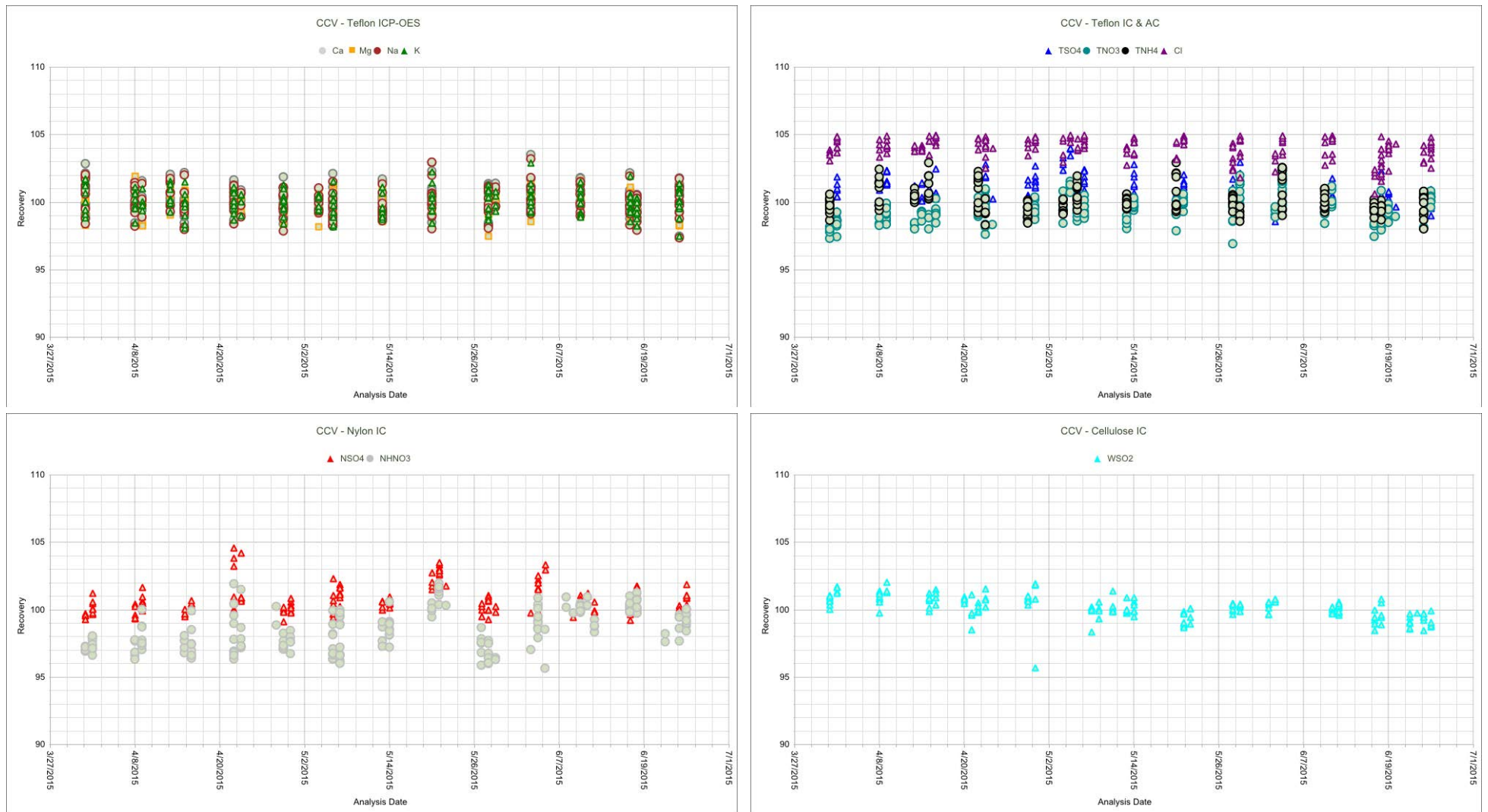


Figure 3 Replicate Sample Analysis Results for Second Quarter 2015 (percent difference)

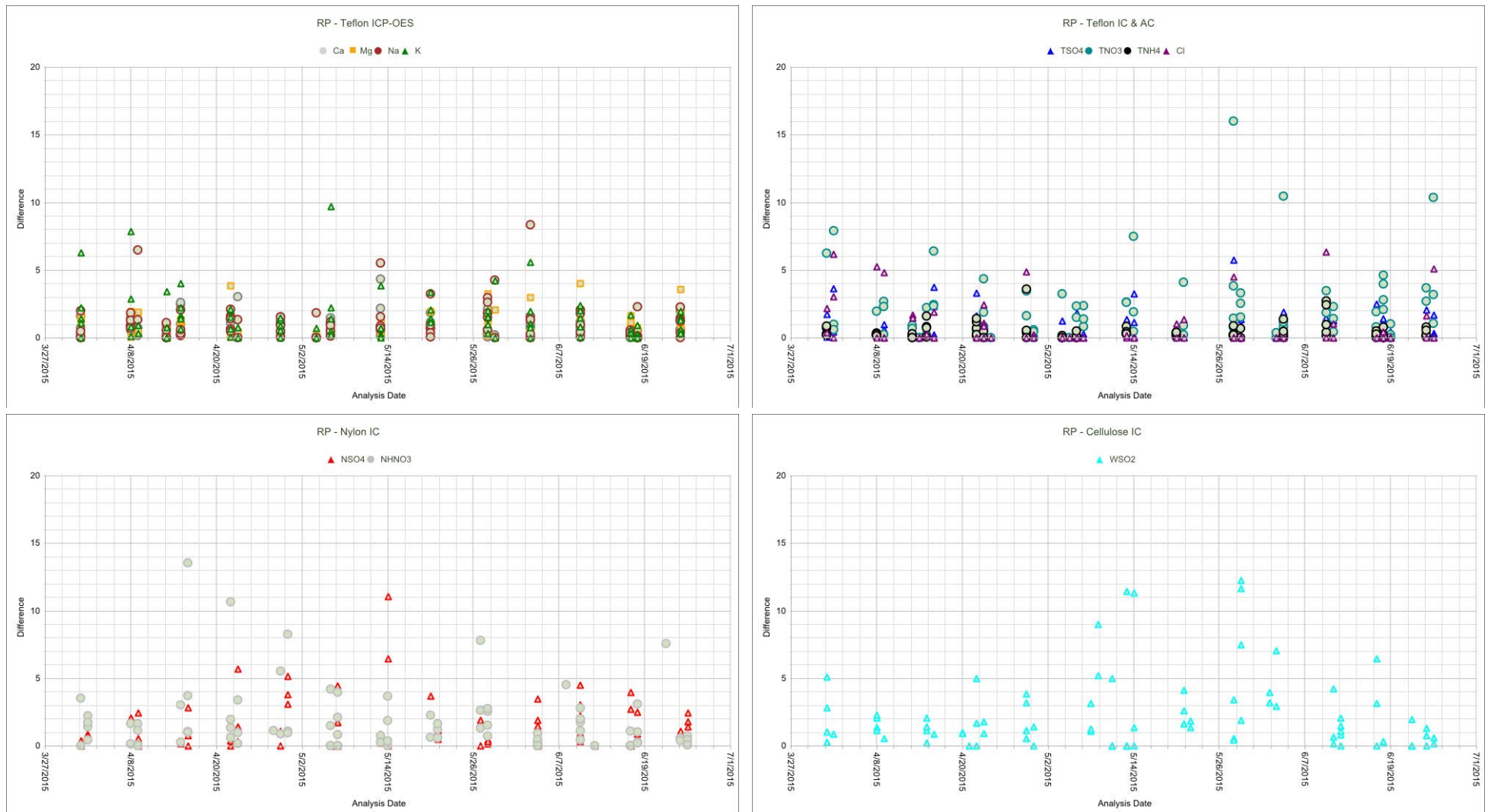


Figure 4 Laboratory Control Sample Results for Second Quarter 2015 (percent recovery)

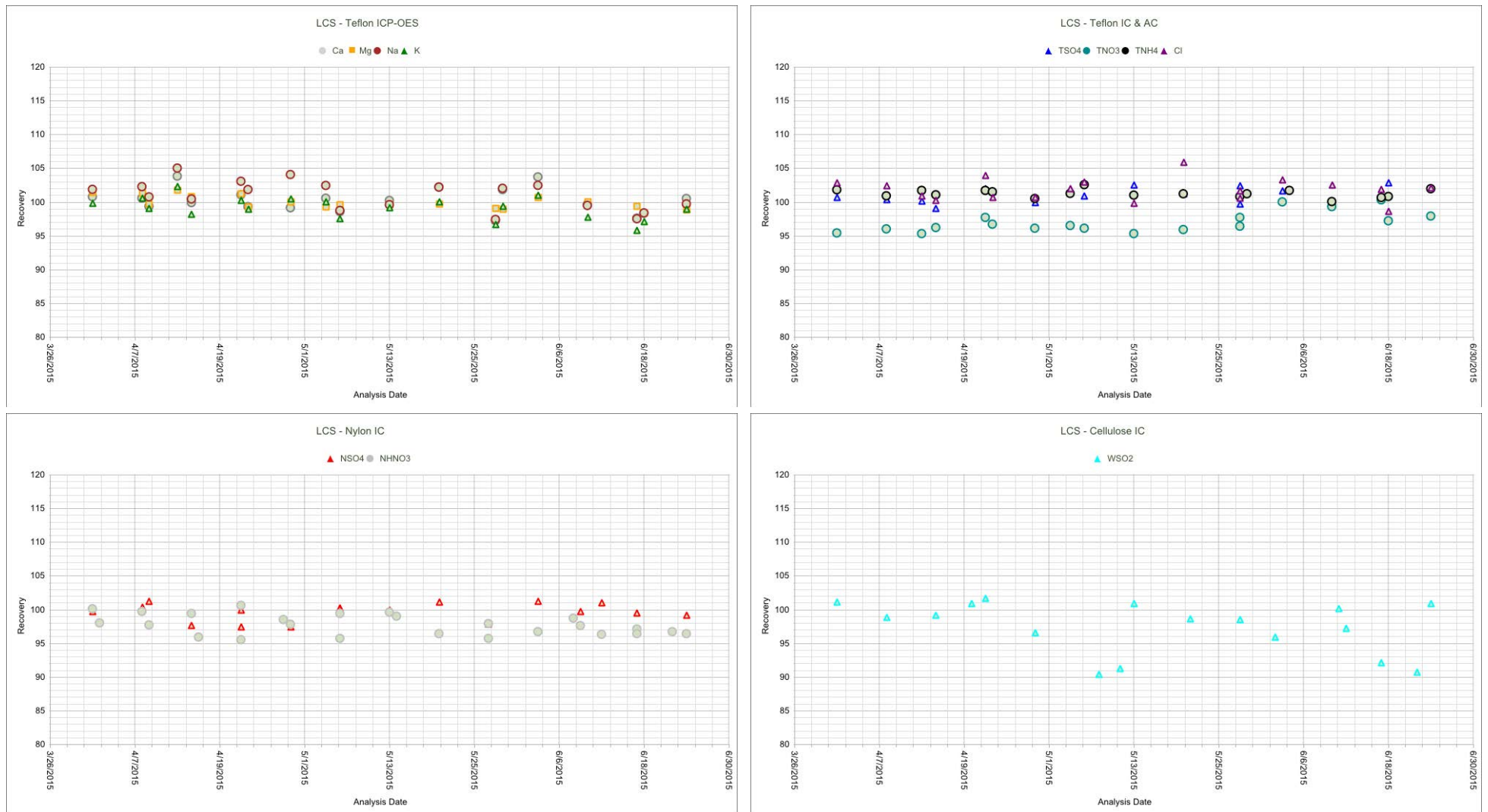


Figure 5 Method Blank Analysis Results for Second Quarter 2015 (total micrograms)



Figure 6 Laboratory Blank Analysis Results for Second Quarter 2015 (total micrograms)

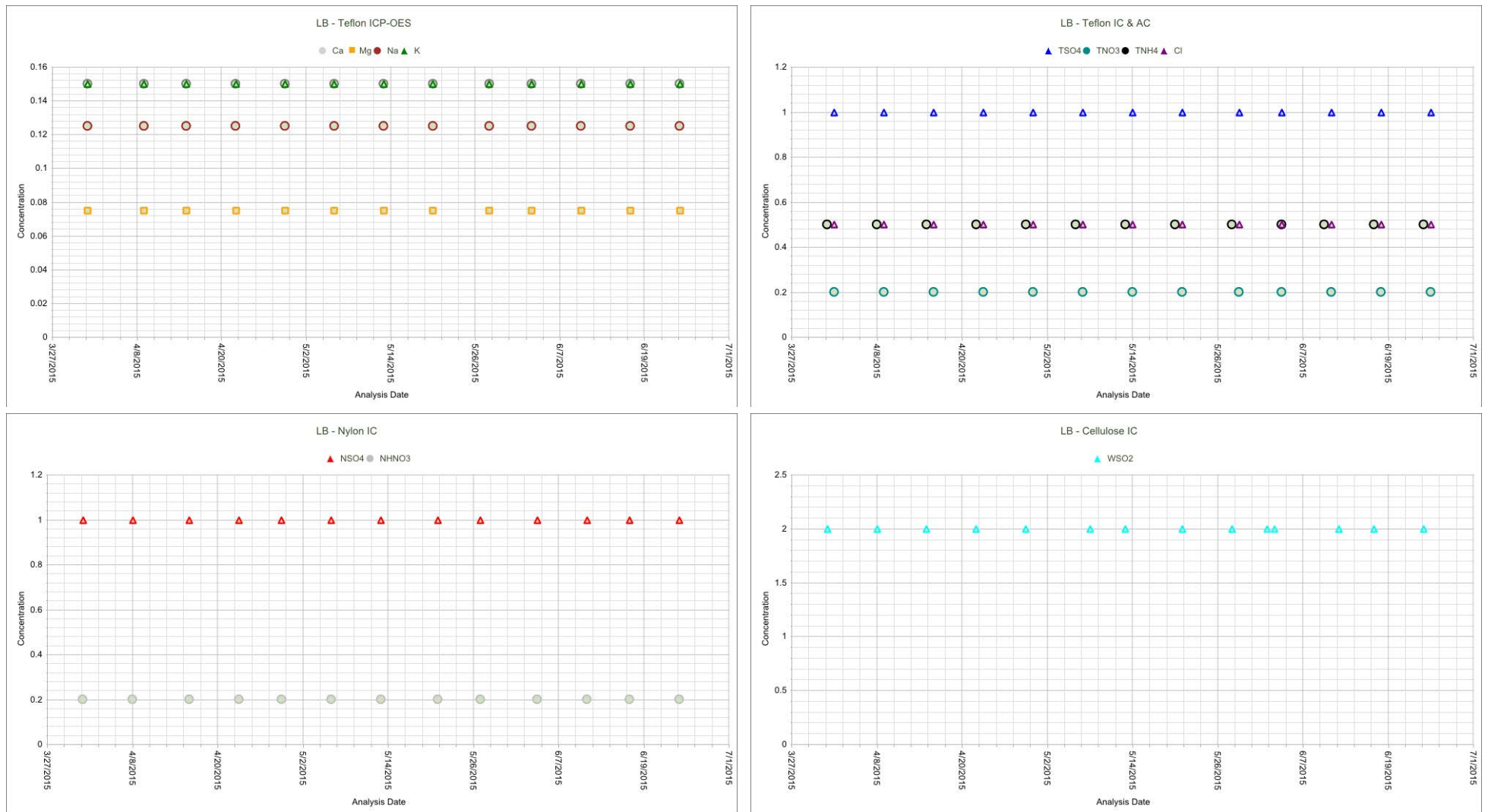


Figure 7 Field Blank Analysis Results for Second Quarter 2015 (total micrograms)

