



Clean Air Status and Trends Network

Third Quarter 2022 Quality Assurance Report

Summary of Quarterly Operations (July through September)

EPA Contract No. 68HERH21D0006

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 third quarter 2022. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP; Wood, 2021; 2022). 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

The acquisition of Wood Environment & Infrastructure Solutions, Inc. (Wood) by WSP was completed on September 21, 2022. The new company name is WSP USA Environment and Infrastructure Solutions Inc. However, we will continue using Wood until November 1 or later, depending on finalization of the name change across all licensing and state regulatory entities.

Preparation of the annual management review report and presentation in support of International Organization for Standardization/International Electrotechnical Commission 17025:2017 accreditation continued during third quarter 2022. This year's report includes details of the move to the new location and procedures to verify operation of the analytical and equipment laboratories. The report was distributed to reviewers, and the presentation took place on July 29, 2022. The presentation was well received by the CASTNET management team, CASTNET QA Supervisor, and Wood's regional corporate management and QA representatives.

The CASTNET QAPP Revision 9.5 was submitted to EPA for final approval on July 29, 2022. The QAPP was signed and became effective on September 6, 2022.

Under the corrective action (CA_115) for the Level 2 transfer failure during some of the March 2022 calibration site visits, Wood scheduled visits to the March sites to verify that the ozone analyzer and transfer were within criteria if one of the affected sites was near another site scheduled for a routine calibration trip. Wood completed these site visits in second quarter 2022 for QAK172, OH; ALH157, IL; and VIN140, IN. For other March sites that are not near another site, Wood sent a verified transfer standard to be installed by the site operator as a replacement for the transfer audited in March. Verified replacement transfer standards were sent to the STK138, IL; OXF122, OH; and PRK134, WI sites. The DCP114, PA site was also audited in March with the Level 2 transfer that failed. Since DCP114 is currently "mothballed," no actions were taken to verify or replace the transfer. When the site resumes operation, Wood will either make a site visit to verify the site ozone transfer or send a verified replacement transfer to be installed by the site operator to address the problem.

Wood continued to evaluate the cause of the positively biased converter efficiency results for NO_y found by EEMS during the performance evaluation audit of the PND165, WY site in May 2022. During the routine calibration visit to the PND165, WY site on August 22–25, 2022, Wood's field technician performed troubleshooting for the high conversion efficiency (found to be ~113 percent on average). The ozone generator inside the NO/NO_y analyzer was replaced. After replacement, the ozone generator flow was verified, and converter efficiency was found to be reasonable at 98 percent. Wood is investigating the effect on reported NO_y data. Data for NO are not affected.

Wood's CASTNET QA Manager completed a method audit of one of the laboratory analysts. It was the first method audit to take place in Wood's new location. The analyst demonstrated thorough knowledge of the method and instrument operation. Method audits are performed to assess analysts' proficiency and compliance with written procedures.

EPA noted an error in one of the data tables. The `das_flow_dateoff` field in the `filter_pack` table is manually entered from the Site Status Report Form and is no longer verified by double entry since it is not used to generate reported sample data. During third quarter, Wood incorporated screening of manually entered fields to flag out-of-range values.

During September 2022, Wood received final results from analyses of samples for proficiency test (PT) study 120 for Rain and Soft Waters. The results showed no indication of systemic bias and no warnings or flags. The laboratory's performance was rated as "Good." PT study 120 is overseen by the Water Science and Technology (WS&T) Directorate, a branch of Environmental Science and Technology Laboratories with ECCC. The WS&T Directorate provides quality assurance and proficiency testing services. Wood generally participates in two ECCC PT studies each year. However, because of difficulties and delays caused by ongoing COVID 19 restrictions, the previous PT study (number 118) was delayed, and ECCC canceled PT study 119. The study number 119 was retired by ECCC in order to preserve the naming convention.

Wood proposed a change in key personnel from Anne Glubis to Kimberly Holland-Chominsky as the CASTNET Quality Assurance Supervisor. EPA approved the change on September 23, 2022.

EPA requested Wood's CASTNET QA Manager provide additional audits of polyfluorinated alkyl substances (PFAS) data quality for archived cloud water samples collected as part of the National Atmospheric Deposition Program (NADP) PFAS Wet Deposition Pilot Study and for precipitation sample PFAS data from September 2021 through January 2022. The QA Manager requested the data from NADP, and he will perform the data audits during fourth quarter 2022. He will use the EPA Office of Research and Development PFAS QAPP and NADP Central Analytical Laboratory standard operating procedures in addition to PFAS laboratory data reports, chains-of-custody, etc. during the audit.

Table 1 lists the quarters of data that were validated to Level 3 during third quarter 2022 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 third quarter 2022.

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 third quarter 2022. For multiple weeks during third quarter, all filter packs expected to be received were received on time. The upgrade to priority shipping and the move to the new office, which is in an area served by the larger Gainesville postal service, has greatly reduced the number of late filter packs.

Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for third quarter 2022. All results were within the criteria listed in Table 3. The nylon sulfate RP value at 20.48 percent is within the reporting limit criterion for sample values less than 5 times the reporting limit.

Table 8 presents summary statistics of critical criteria measurements at ozone sites collected during third quarter 2022. 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. 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 third quarter 2022. 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. Results in shaded cells either exceed documented criteria or are otherwise notable. Table 11 presents observations associated with the shaded cell results in Table 10.

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 third quarter 2022. All recovery values were between 87.8 percent and 105.4 percent. The lower values for Teflon ammonium are from a new LCS lot and still within the established criterion.

Blank Results

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for third quarter 2022. All third quarter results were within criteria (two times the reporting limit) listed in Table 3 with the exception of one HNO₃ LB at 2.4 times the reporting limit. The other LB in the batch as well as all other QC samples were within criteria. In addition, the associated field samples were reasonable compared with the sites' historical data.

Suspect/Invalid Filter Pack Samples

Filter pack samples that were flagged as suspect or invalid during third quarter 2022 are listed in Table 12. This table also includes associated site identification and a brief description of the reason the sample was flagged. During third quarter, five filter pack samples were invalidated.

Field Problem Count

Table 13 presents counts of field problems affecting continuous data collection for more than one day for third quarter 2022. 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

- 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). 2020. Title 40 *Code of Federal Regulations* Part 58, "Appendix A to Part 58 – Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards."
- Wood Environment & Infrastructure Solutions, Inc. (Wood) 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://java.epa.gov/castnet/documents.do>.
- Wood Environment & Infrastructure Solutions, Inc. (Wood) 2021. *Clean Air Status and Trends Network (CASTNET) Quality Assurance Project Plan (QAPP) Revision 9.4*. Prepared for U.S. Environmental Protection Agency (EPA), Office of Air and Radiation, Clean Air Markets Division, Washington, DC. Contract No. EP-W-16-015. Gainesville, FL. <https://java.epa.gov/castnet/documents.do>.

Table 1 Data Validated to Level 3 during Third Quarter 2022

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
E-3/W-10 [†]	November 2021 – April 2022	6	Quarter 1 2022	1
SE-4/MW-6 [‡]	January 2022 – June 2022	6	Quarter 1 2022 – Quarter 2 2022	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 2022

Calibration Group	Months Calibrated	Sites Calibrated			
Eastern Sites (22 Total)					
E-1 (8 Sites)	February/August	BEL116, MD BWR139, MD	WSP144, NJ CTH110, NY	ARE128, PA PSU106, PA	PED108, VA VPI120, VA
E-2 (9 Sites)	April/October	ABT147, CT ASH135, ME	WST109, NH CAT175, NY	HWF187, NY ¹ NIC001, NY	WFM105, NY UND002, VT EGB181, ON
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	COW137, NC DUK008, NC ¹	SPD111, TN
SE-5 (4 Sites)	February/August	CAD150, AR IRL141, FL	SUM156, FL CVL151, MS		
Midwestern Sites (19 Total)					
MW-6 (6 Sites)	January/July	CDZ171, KY CKT136, KY	MCK131, KY MCK231, KY	PNF126, NC ¹ ESP127, TN	
MW-7 (9 Sites)	March/September	ALH157, IL BVL130, IL ²	STK138, IL VIN140, IN	RED004, MN DCP114, OH	OXF122, OH PRK134, WI QAK172, OH
MW-8 (4 Sites)	April/October	SAL133, IN HOX148, MI	ANA115, MI UVL124, MI		
Western Sites (12 Total)					
W-9 (5 Sites)	March/September	KNZ184, KS KIC003, KS	CHE185, OK SAN189, NE	ALC188, TX	
W-10 (7 Sites)	May/November	GTH161, CO ROM206, CO ³	NPT006, ID PAL190, TX	UMA009, WA CNT169, WY	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	
				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) E29-08, “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, (Wood, 2021; 2022).

Table 4 Ozone Critical Criteria*

Type of 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 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, 2020). 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 ± 1.51 ppb	Less than ± 10.1 percent between supplied and observed concentrations
NO _y	Less than ± 1.51 ppb	
CO	Less than ± 30.1 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, 2020). 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).

SO₂ = sulfur dioxide

NO_y = total reactive oxides of nitrogen

CO = carbon monoxide

ppb = parts per billion

Table 6 QC Analysis Count for Third Quarter 2022

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⁻	64	177	77	16	22	71
	NO ₃ ⁻	64	177	77	16	22	71
	NH ₄ ⁺	32	161	77	16	22	71
	Cl ⁻	64	177	77	16	22	71
	Ca ²⁺	38	171	83	18	24	78
	Mg ²⁺	38	171	83	18	24	78
	Na ⁺	38	171	83	18	24	78
	K ⁺	38	171	83	18	24	78
Nylon	SO ₄ ²⁻	29	140	68	10	22	39
	NO ₃ ⁻	29	140	68	10	22	39
Cellulose	SO ₄ ²⁻	46	159	69	14	22	77

Table 7 Filter Pack Receipt Summary for Third Quarter 2022

Count of samples received more than 14 days after removal from tower:	14
Count of all samples received:	555
Fraction of samples received within 14 days:	0.975
Average interval in days:	4.407
First receipt date:	07/01/2022
Last receipt date:	09/15/2022

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 Third Quarter 2022 (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	1.17	100.00	1.08	100.00	0.35
ALC188, TX	87.76	4.28	95.88	2.97	100.00	0.42
ALH157, IL	100.00	1.89	100.00	2.24	100.00	0.21
ANA115, MI	93.41	8.38	93.41	9.98	100.00	0.47
ARE128, PA	100.00	0.83	100.00	1.29	100.00	0.29
ASH135, ME ³	N/A	N/A	N/A	N/A	N/A	N/A
BEL116, MD	100.00	1.77	100.00	1.42	100.00	0.60
BFT142, NC	100.00	1.89	100.00	2.03	100.00	0.29
BVL130, IL	100.00	2.22	93.88	2.94	92.86	1.82
BWR139, MD	100.00	0.92	96.70	1.85	97.80	0.60
CAD150, AR	100.00	2.01	100.00	2.76	100.00	0.28
CDR119, WV ³	N/A	N/A	N/A	N/A	N/A	N/A
CDZ171, KY ³	N/A	N/A	N/A	N/A	N/A	N/A
CKT136, KY	100.00	0.89	100.00	1.00	100.00	0.13
CND125, NC	98.92	2.74	100.00	2.90	100.00	0.97
CNT169, WY	100.00	1.23	100.00	1.67	100.00	0.45
COW137, NC	100.00	0.53	100.00	0.85	100.00	0.40
CTH110, NY	100.00	0.68	100.00	0.89	100.00	0.17
CVL151, MS	100.00	2.21	100.00	2.53	100.00	0.21
DCP114, OH ³	N/A	N/A	N/A	N/A	N/A	N/A
DUK008, NC	100.00	1.52	100.00	1.17	100.00	0.53
ESP127, TN	100.00	2.35	98.94	1.87	100.00	0.46
GAS153, GA	87.00	6.69	86.00	25.11	92.00	12.52
GTH161, CO	100.00	2.89	100.00	2.89	100.00	0.23

Table 8 Ozone QC Summary for Third Quarter 2022 (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
HOX148, MI	100.00	1.63	100.00	2.96	100.00	0.75
HWF187, NY ³	N/A	N/A	N/A	N/A	N/A	N/A
IRL141, FL	97.85	2.13	100.00	1.79	100.00	0.95
KEF112, PA	100.00	1.65	100.00	0.98	100.00	0.43
LRL117, PA	100.00	2.61	100.00	2.30	100.00	0.22
MCK131, KY	98.97	1.67	97.94	1.99	98.97	0.24
MCK231, KY	98.95	0.87	100.00	0.79	98.95	0.20
MKG113, PA	100.00	1.01	98.86	1.05	98.86	0.40
NPT006, ID	91.75	8.93	91.75	8.50	97.94	0.58
OXF122, OH	100.00	2.52	100.00	2.85	100.00	0.67
PAL190, TX	100.00	1.70	100.00	1.91	100.00	0.46
PAR107, WV	100.00	1.63	100.00	1.75	100.00	0.16
PED108, VA	100.00	1.00	100.00	1.03	100.00	0.26
PND165, WY	100.00	1.66	100.00	1.26	100.00	0.29
PNF126, NC ³	N/A	N/A	N/A	N/A	N/A	N/A
PRK134, WI	100.00	2.84	97.89	3.06	100.00	0.51
PSU106, PA	100.00	1.45	98.94	2.08	100.00	0.26
QAK172, OH	100.00	0.99	100.00	1.44	100.00	0.31
ROM206, CO	100.00	1.05	100.00	0.76	100.00	0.44
SAL133, IN	100.00	0.85	100.00	0.80	100.00	0.27
SAN189, NE	98.89	3.85	100.00	3.53	100.00	0.38
SND152, AL	100.00	2.49	100.00	2.74	100.00	0.45
SPD111, TN	100.00	2.16	97.00	2.62	93.00	0.85
STK138, IL	100.00	2.57	100.00	2.60	100.00	0.64
SUM156, FL	100.00	0.74	100.00	0.75	100.00	0.15
UMA009, WA	100.00	1.43	100.00	1.13	100.00	0.42
UVL124, MI	97.92	2.38	97.92	2.66	97.92	0.98
VIN140, IN	97.75	3.22	97.75	3.49	97.75	0.26
VPI120, VA	100.00	1.06	94.57	1.87	96.74	0.35
WSP144, NJ	93.75	2.33	95.83	2.46	97.92	0.38
WST109, NH ³	N/A	N/A	N/A	N/A	N/A	N/A

Notes: ¹Percentage of comparisons that pass the criteria listed in Table 4. Values falling below 90 percent are addressed in Table 9.

²Absolute 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.

³Site ceased sampling activities beginning May 10, 2022, due to fiscal year 2022 budget constraints.

%D = percent difference

ppb = parts per billion

Table 9 Ozone QC Observations for Third Quarter 2022

Site ID	QC Criterion	Comments
ALC188, TX	% Span Pass	The analyzer required calibration. Calibration was completed 9/29/2022.
ANA115, MI	Span %D Single Point QC %D	The analyzer sample pump failed and was replaced 7/21/2022.
GAS153, GA	% Span Pass % Single Point QC Pass Single Point QC %D Zero Average	The analyzer malfunctioned and was replaced 7/13/2022.
NPT006, ID	Span %D Single Point QC %D	The analyzer malfunctioned intermittently.

Note: %D = percent difference

Table 10 Trace-level Gas QC Summary for Third Quarter 2022

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	0.69	100.00	3.64	100.00	0.69
NO _y	100.00	1.49	100.00	0.73	100.00	0.18
CO	100.00	1.55	77.27	9.46	72.09	31.10
DUK008, NC						
NO _y	100.00	1.73	100.00	2.04	100.00	0.26
HWF187, NY ³						
NO _y	N/A	N/A	N/A	N/A	N/A	N/A
PND165, WY						
NO _y	100.00	1.99	100.00	2.89	100.00	0.35
PNF126, NC ³						
NO _y	N/A	N/A	N/A	N/A	N/A	N/A
ROM206, CO						
NO _y	100.00	2.26	100.00	2.75	98.00	0.67

Notes: ¹Percentage of comparisons that pass the criteria listed in Table 5. Values falling below 90 percent are addressed in Table 11.

²Absolute value of the average percent differences between the supplied and observed concentrations. Values exceeding the criteria listed in Table 5 are addressed in Table 11.

³HWF187 and PNF126 ceased sampling activities beginning May 10, 2022, due to fiscal year 2022 budget constraints.

%D = percent difference

ppb = parts per billion

Table 11 Trace-level Gas QC Observations for Third Quarter 2022

Site ID	Parameter	QC Criterion	Comments
BVL130, IL	CO	% Single Point QC Pass % Zero Pass	QC check failures in July were caused by a loose Ethernet cable.

Table 12 Filter Packs Flagged as Suspect or Invalid during Third Quarter 2022

Site ID	Sample No.	Reason
BEL116, MD	2228001-06	Power failure
LAV410, CA	2228003-13	Power failure
PED108, VA	2229001-39	Power failure followed by a mass flow controller malfunction
QAK172, OH	2229001-44	Valid hourly flow < 75%
STK138, IL	2227001-49	Valid hourly flow < 75%

Table 13 Field Problems Affecting Data Collection

Days to Resolution	Problem Count
30	314
60	9
90	1
Unresolved by End of Quarter	10

Figure 1 Reference Standard Results for Third Quarter 2022 (percent recovery)

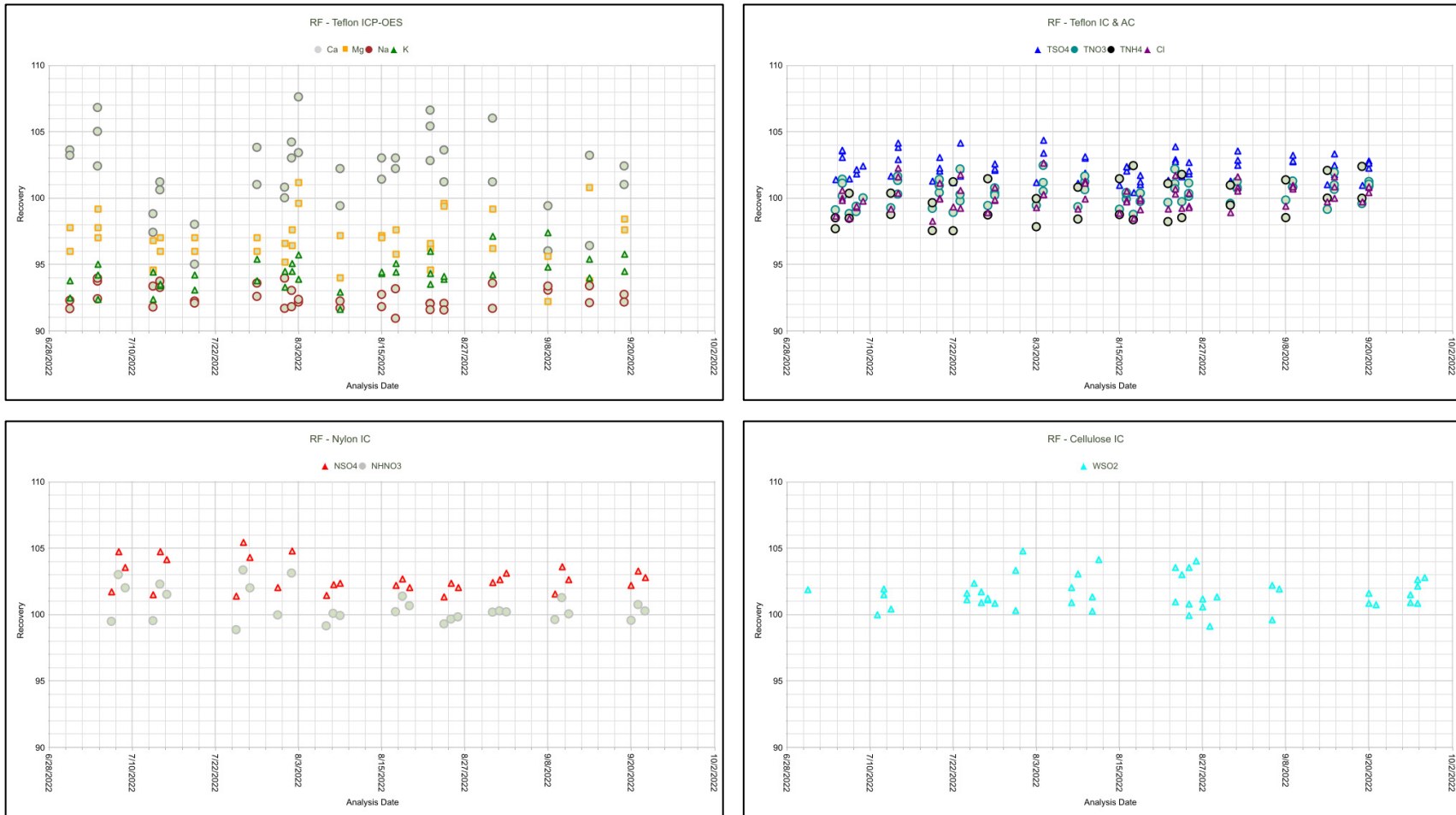


Figure 2 Continuing Calibration Spike Results for Third Quarter 2022 (percent recovery)

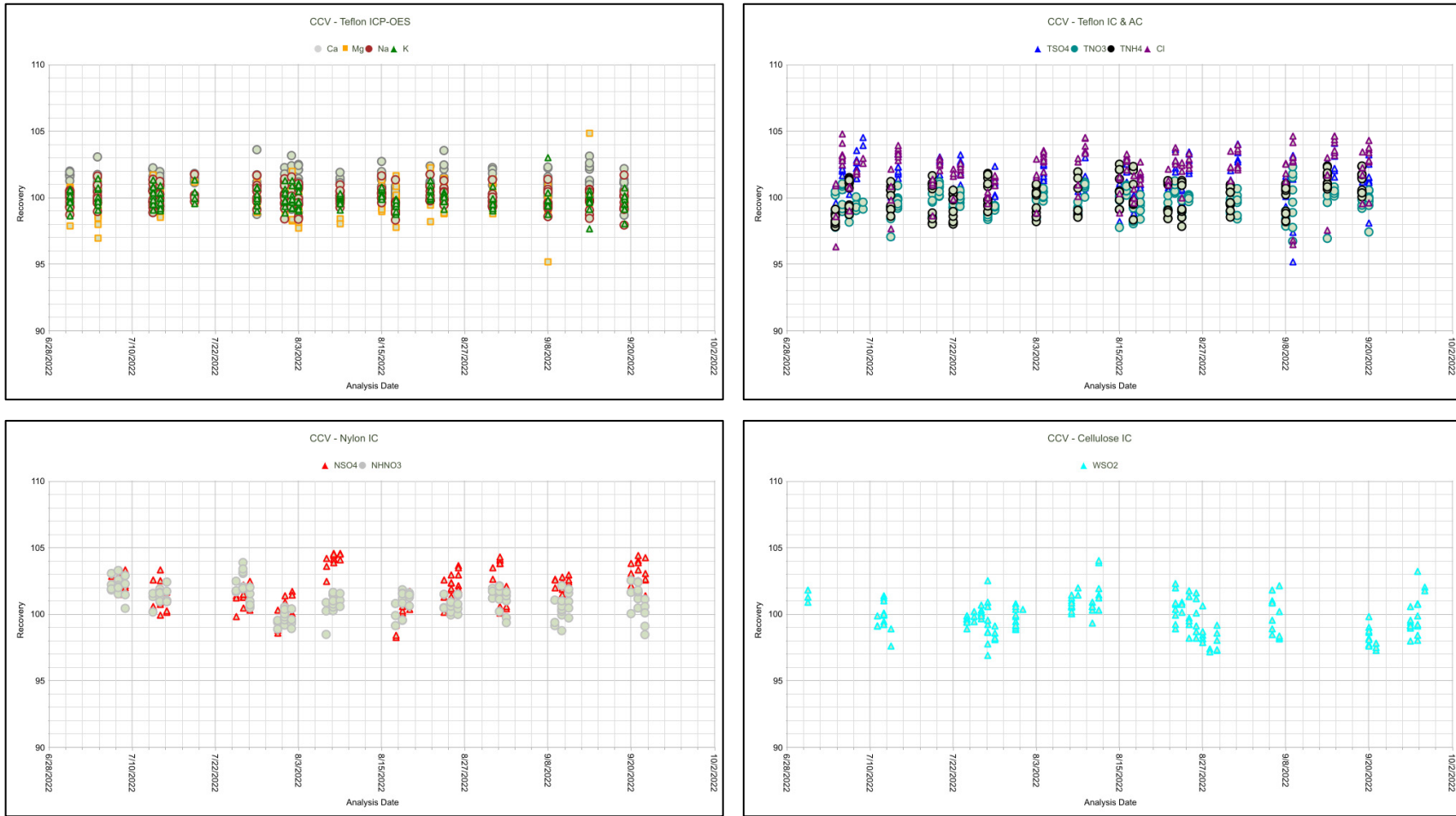


Figure 3 Replicate Sample Analysis Results for Third Quarter 2022 (percent difference)

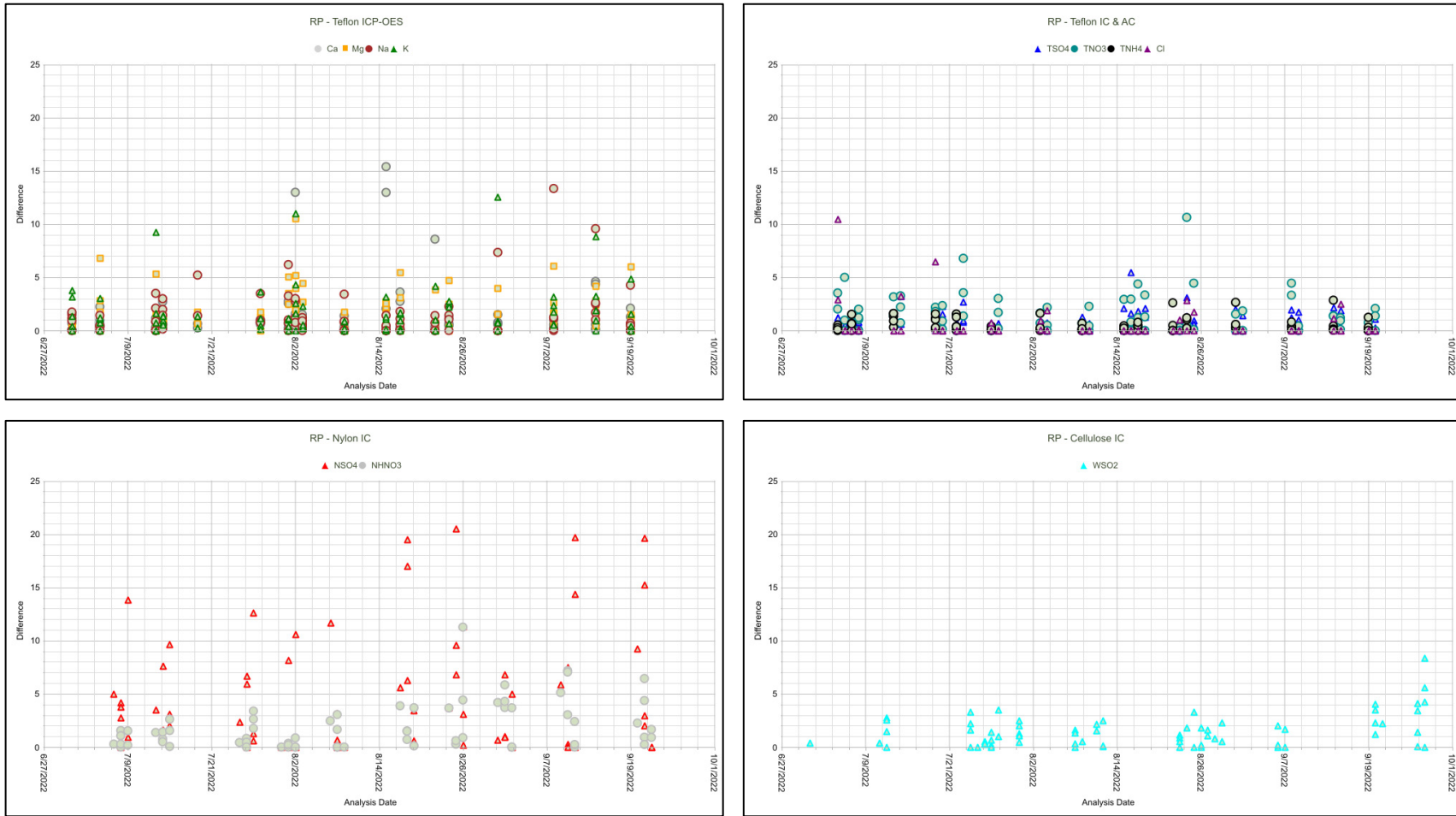


Figure 4 Laboratory Control Sample Results for Third Quarter 2022 (percent recovery)

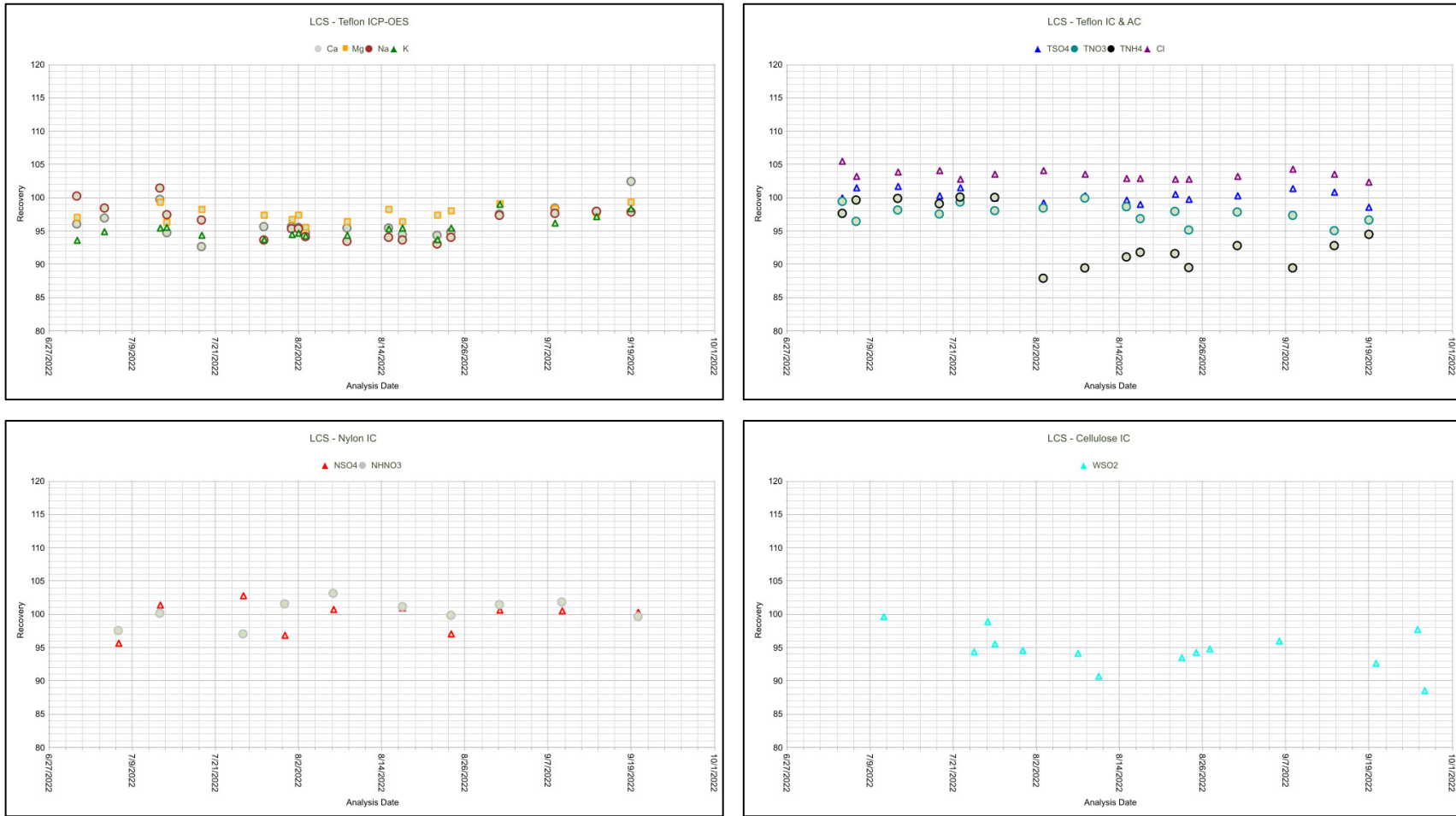


Figure 5 Method Blank Analysis Results for Third Quarter 2022 (total micrograms)

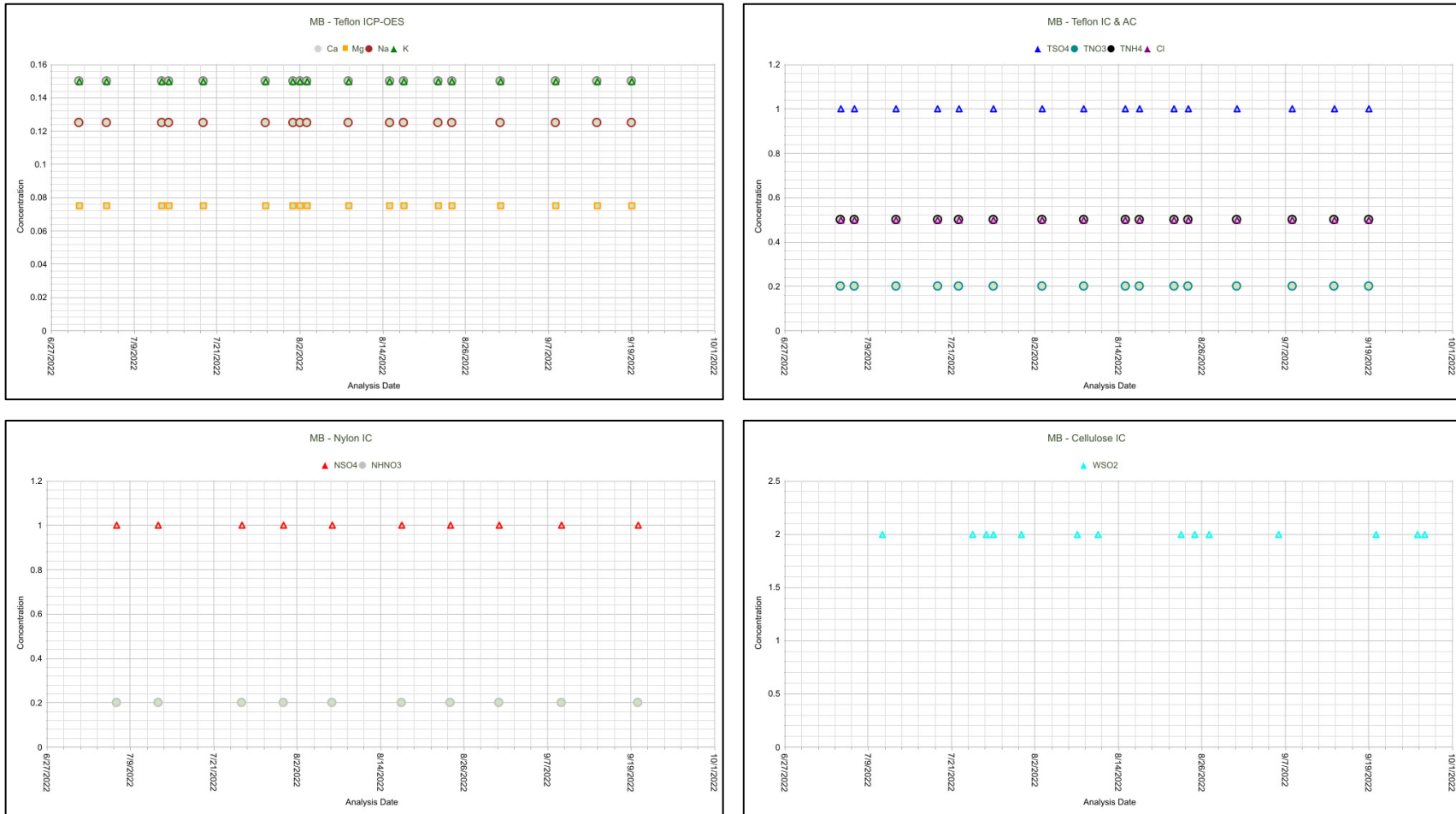


Figure 6 Laboratory Blank Analysis Results for Third Quarter 2022 (total micrograms)

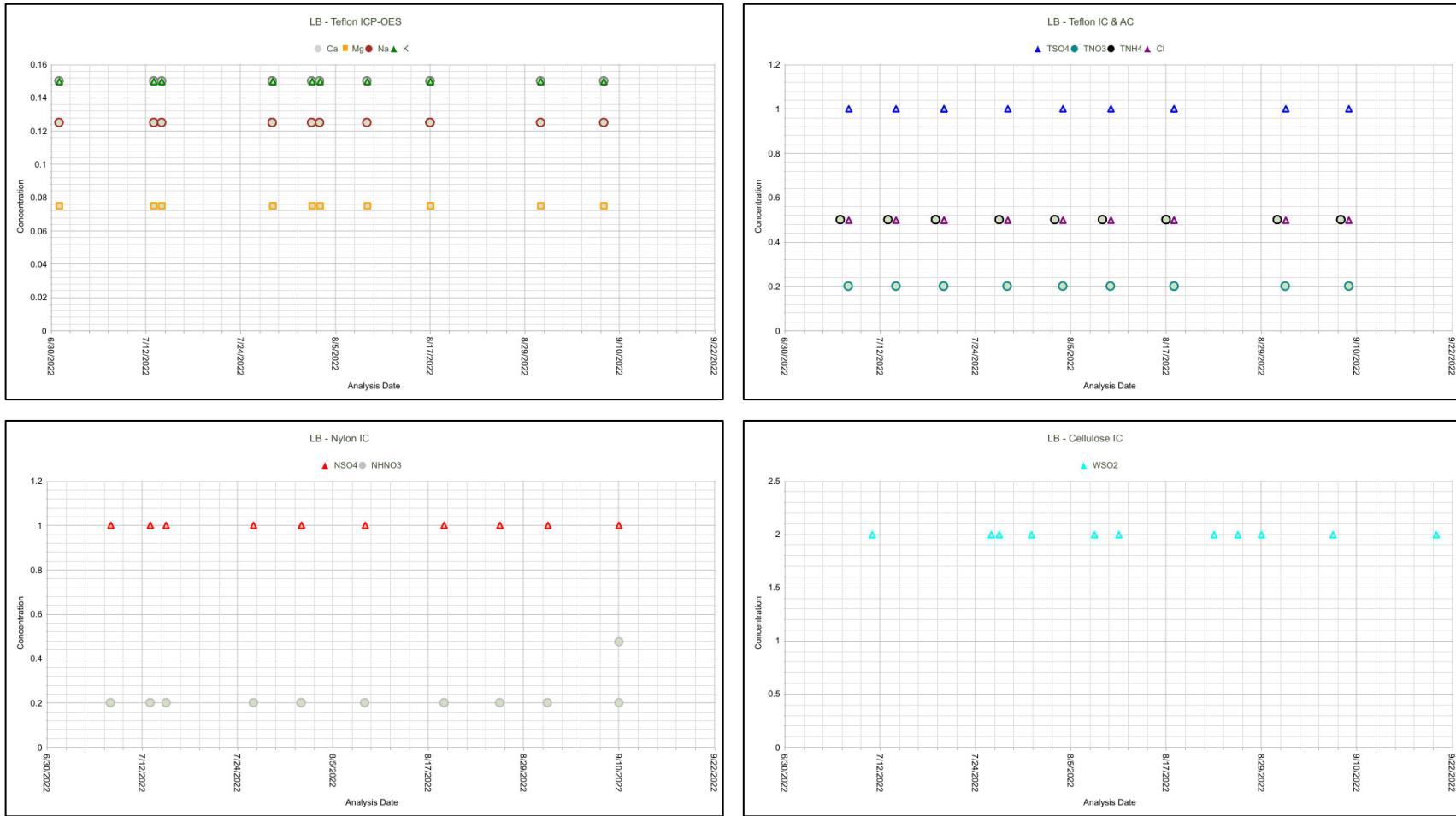


Figure 7 Field Blank Analysis Results for Third Quarter 2022 (total micrograms)

