



Clean Air Status and Trends Network

Third Quarter 2023 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 2023. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP; WSP, 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

During July 2023, WSP's CASTNET QA Manager was notified via EPA Chief Information Officer directives that EPA's QA/R-5, "EPA Requirements for QA Project Plans" had been superseded by "Quality Assurance Project Plan Standard" (CIO 2105-S-02.0). The QA Manager evaluated the changes and verified the effects of the updates on the CASTNET QAPP Revision 10.1. The only update required by the new standard was to identify the providers of the subcontracted field technicians: Inquest Environmental, Inc.; Trinity Consultants, Inc.; and S&P AQS. The QAPP Revision 10.1 includes rebranding from Wood Environment & Infrastructure Solutions, Inc. to WSP Environment & Infrastructure Inc. (WSP) and updates to identify field subcontractors to align with the new directive. WSP will submit Revision 10.1 to EPA for review and comment during fourth quarter 2023.

The WSP Quality Management Plan (QMP) is under the purview of the WSP Regional Quality Manager who is also the CASTNET Project QA Supervisor. The QA Manager notified the Project QA Supervisor that EPA's QA/R-2, "EPA Requirements for Quality Management Plans" had been superseded by "Quality Management Plan Standard" (CIO 2105-S-01.1).

WSP submitted results of analyses for proficiency test (PT) study 122 for Rain and Soft Waters to 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. Total nitrogen was one of the parameters offered under PT study 122, and WSP submitted results of analyses of total nitrogen along with the standard CASTNET parameters analyzed for PT studies. Final results were rated, "Good." However, two calcium values and three sodium values were flagged indicating potential low bias. WSP is currently troubleshooting the cause of the low values and has contacted PerkinElmer, the manufacturer of the inductively coupled plasma-optical emission spectrometry (ICP-OES) instrument used to analyze the PT samples. There has been no indication of recent bias in CASTNET samples or standards. A corrective action has been initiated.

Preparation of the presentation for the annual management review and report in support of International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2017 accreditation was completed, and the CASTNET QA Manager scheduled the

presentation for July 26, 2023. Attendees included the CASTNET Project QA Supervisor, CASTNET management team, WSP regional management, and WSP QA management.

EEMS performed annual performance evaluation (PE) audits of the ROM406/206 co-located ozone systems on August 17, 2023. The ozone system used for regulatory purposes is the ROM406 system. EEMS notified WSP that the ROM206 site failed the audit. A WSP field technician tested the analyzer and solenoids and found no problems. The zsp QC checks of the ROM206 site analyzer were within criteria. However, the ROM206 analyzer was slower to respond than the ROM406 analyzer during the audit. Co-located responses compared well during routine ambient monitoring both before and after the audit. WSP replaced the ozone analyzer. Once the ozone analyzer that was in operation during the August PE audit is returned to WSP's Gainesville office, it will be evaluated to try to determine the cause of the problem.

Additionally, during the ROM206 PE audit, EEMS noted the temperature probe shield at the site as not being located properly in accordance with the CASTNET QAPP. WSP reviewed the QAPP temperature probe placement requirement. It states that probe inlets be “pointed north or otherwise positioned to avoid radiated heat sources such as buildings, walls, etc.”

During a PE audit by EEMS at the MCK131/231, KY site, the Nafion dryer at the MCK231 site was broken. As a result, WSP believes the MCK131/231 audit results were suspect. The MCK231 Nafion dryer stopped working as of September 22, 2023. The ozone analyzer at MCK231 is currently operating without the Nafion dryer.

A temperature sensor at the PAR107, WV site failed a PE audit at the highest level (49C) on August 8, 2023. A corrective action has been opened as required under accreditation requirements for ISO/IEC 17025:2017 accreditation by the A2LA.

EPA Region 3 contacted EPA CAMD to offer a “mini” technical systems audit (TSA) of the ozone system at the PAR107 site consisting of a field site visit but no laboratory facility audit. WSP coordinated the field site TSA on August 21, 2023, with the site operator and EPA Region 3. The Region 3 auditor was very thorough with her assessment of the site operator's abilities and the CASTNET ozone system. The site audit went well. The auditor contacted the QA Manager and expressed satisfaction with the site operator's level of knowledge and cooperation.

The CASTNET Project Manager found a problem with the hourly flow data that was related to an issue with the NPS/BLM continuous data exports received by WSP. Some flow data were flagged incorrectly. Concentration data for 2000 through 2023 were rerun to correct the flagging errors and recalculate weekly values.

Table 1 lists the quarters of data that were validated to Level 3 during third quarter 2023 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 2023.

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 2023.

Data Quality indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for third quarter 2023. All results were within the criteria listed in Table 3.

Table 8 presents summary statistics of critical criteria measurements at ozone sites collected during third quarter 2023. 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 2023. 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 2023. All recovery values were between 85.9 percent and 109.6 percent.

Blank Results

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for third quarter 2023. All third 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 third quarter 2023 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, nine 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 2023. 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.

U.S. Environmental Protection Agency (EPA). 2022. 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.”

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 the U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Atmospheric Protection, Clean Air Markets Division, Washington, DC. Contract No. 68HERH21D0006. Gainesville, FL. <https://java.epa.gov/castnet/documents.do>.

Table 1 Data Validated to Level 3 through Third Quarter 2023

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
E-3/W-10 [†]	November 2022– April 2023	6	Quarter 1 2023	1
SE-4/MW-6 [‡]	January 2023– June 2023	6	Quarter 1 2023– Quarter 2 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 2023

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 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	COW137, NC DUK008, NC ¹	SPD111, TN
SE-5 (4 Sites)	February/August	CAD150, AR IRL141, FL	SUM156, FL CVL151, MS		
Midwestern Sites (18 Total)					
MW-6 (6 Sites)	January/July	CDZ171, KY CKT136, KY	MCK131, KY MCK231, KY	PNF126, NC ¹ ESP127, TN	
MW-7 (8 Sites)	March/September	BVL130, IL ² 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 (13 Total)					
W-9 (5 Sites)	March/September	KNZ184, KS KIC003, KS	CHE185, OK SAN189, NE	ALC188, TX	
W-10 (8 Sites)	May/November	LPO010, CA GTH161, CO	ROM206, CO ³ NPT006, ID	PAL190, TX UMA009, WA	CNT169, WY PND165, WY ³

Notes: ¹Trace-level gas calibrations are performed quarterly in January, April, July, and October.

²Trace-level gas calibrations are performed quarterly in March, June, September, and December.

³Trace-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: ¹This 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.

²This 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.

³The 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 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, 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).

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 2023

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⁻	54	150	63	13	22	43
	NO ₃ ⁻	54	150	63	13	22	43
	NH ₄ ⁺	26	135	62	13	22	43
	Cl ⁻	54	150	63	13	22	43
	Ca ²⁺	26	135	62	13	22	43
	Mg ²⁺	26	135	62	13	22	43
	Na ⁺	26	135	62	13	22	43
	K ⁺	26	135	62	13	22	43
Nylon	SO ₄ ²⁻	27	125	56	8	22	43
	NO ₃ ⁻	27	125	56	8	22	43
Cellulose	SO ₄ ²⁻	38	133	60	12	24	85

Table 7 Filter Pack Receipt Summary for Third Quarter 2023

Count of samples received more than 14 days after removal from tower:	15
Count of all samples received	652
Fraction of samples received within 14 days:	0.977
Average interval in days:	5.299
First receipt date:	7/1/2023
Last receipt date:	9/27/2023

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 2023 (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	2.79	100.00	2.62	100.00	0.41
ALC188, TX	100.00	0.53	100.00	0.78	100.00	0.34
ANA115, MI	100.00	1.84	100.00	2.53	100.00	0.40
ARE128, PA	100.00	1.99	100.00	2.44	100.00	0.84
ASH135, ME	N/A	N/A	N/A	N/A	N/A	N/A
BEL116, MD	100.00	1.45	100.00	0.60	100.00	0.32
BFT142, NC	100.00	2.89	100.00	2.94	100.00	0.37
BVL130, IL	100.00	2.24	100.00	3.43	98.88	1.31
BWR139, MD	100.00	1.60	100.00	1.11	98.94	0.43
CAD150, AR	100.00	3.69	100.00	3.74	100.00	0.30
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	1.24	100.00	1.41	100.00	0.15
CND125, NC	100.00	1.38	100.00	1.48	100.00	0.25
CNT169, WY	100.00	2.12	100.00	2.46	100.00	0.65
COW137, NC	100.00	0.60	100.00	1.11	100.00	0.28
CTH110, NY	100.00	1.77	100.00	1.52	100.00	0.18
CVL151, MS	100.00	1.98	100.00	2.12	100.00	0.27
DCP114, OH	N/A	N/A	N/A	N/A	N/A	N/A
DUK008, NC	100.00	2.92	100.00	2.73	100.00	0.99
ESP127, TN	100.00	1.34	100.00	1.55	100.00	0.37
GAS153, GA	100.00	1.04	100.00	1.92	100.00	0.66
GTH161, CO	100.00	2.36	100.00	2.13	100.00	0.26
HOX148, MI	94.79	10.02	95.79	9.29	100.00	0.28
HWF187, NY	N/A	N/A	N/A	N/A	N/A	N/A
IRL141, FL	98.88	2.14	100.00	1.79	100.00	0.43
KEF112, PA	100.00	3.35	100.00	1.75	100.00	0.55
LPO010, CA	98.95	1.89	100.00	1.43	100.00	0.46
LRL117, PA	100.00	1.88	100.00	1.53	100.00	0.35
MCK131, KY	100.00	0.67	100.00	0.83	100.00	0.19
MCK231, KY	88.12	2.75	94.06	2.41	95.00	0.67
MKG113, PA	97.89	4.56	95.79	4.86	96.84	0.80
NPT006, ID	100.00	1.73	100.00	1.86	100.00	0.12
OXF122, OH	100.00	1.62	100.00	1.49	100.00	0.27
PAL190, TX	100.00	1.92	100.00	2.24	100.00	0.45
PAR107, WV	100.00	1.50	100.00	1.23	100.00	0.15
PED108, VA	100.00	1.84	100.00	2.21	100.00	0.28
PND165, WY	100.00	3.49	100.00	2.75	100.00	0.73
PNF126, NC	N/A	N/A	N/A	N/A	N/A	N/A
PRK134, WI	100.00	2.18	97.98	2.32	97.98	0.43
PSU106, PA	96.00	2.64	95.00	5.15	97.00	0.72
QAK172, OH	100.00	1.63	100.00	3.37	100.00	0.65

Table 8 Ozone QC Summary for Third Quarter 2023 (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	98.77	1.81	100.00	1.50	100.00	0.21
SAL133, IN	100.00	1.06	100.00	0.99	100.00	0.34
SAN189, NE	100.00	1.34	100.00	1.61	100.00	0.27
SND152, AL	100.00	1.28	100.00	1.66	97.89	0.43
SPD111, TN	99.07	1.71	100.00	2.07	100.00	0.56
STK138, IL	100.00	3.50	100.00	3.37	100.00	0.86
SUM156, FL	100.00	2.58	100.00	2.91	100.00	0.15
UMA009, WA	100.00	0.50	100.00	0.69	100.00	0.30
UVL124, MI	100.00	1.65	98.96	1.17	100.00	0.52
VIN140, IN	100.00	1.44	100.00	1.42	100.00	0.17
VPI120, VA	96.36	1.90	93.33	3.04	96.19	0.60
WSP144, NJ	100.00	1.28	98.84	1.54	96.51	0.48
WST109, NH	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.

%D = percent difference
ppb = parts per billion

Table 9 Ozone QC Observations for Third Quarter 2023

Site ID	QC Criterion	Comments
HOX148, MI	Span [%D] Single Point QC [%D]	Site analyzer pump failed on 8/14/2023 and was replaced on 8/16/2023. Associated data will be invalidated.
MCK231, KY	% Span Pass	The ozone dryer was broken on 9/22/2023, and the Nafion dryer was bypassed on 9/29/2023.

Note: %D = percent difference

Table 10 Trace-level Gas QC Summary for Third Quarter 2023

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	2.48	90.48	5.28	100.00	0.57
NO _y	95.65	5.40	95.56	18.99	95.56	2.96
CO	100.00	1.21	100.00	3.76	100.00	24.91
DUK008, NC						
NO _y	100.00	3.44	100.00	1.73	97.83	2.21
HWF187, NY						
NO _y	N/A	N/A	N/A	N/A	N/A	N/A
PND126, NC						
NO _y	100.00	1.78	100.00	2.63	100.00	0.26
PNF126, NC						
NO _y	N/A	N/A	N/A	N/A	N/A	N/A
ROM206, CO						
NO _y	97.92	1.77	97.92	2.76	100.00	0.38

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.

%D = percent difference
ppb = parts per billion

Table 11 Trace-level Gas QC Observations for Third Quarter 2023

Site ID	Parameter	QC Criterion	Comments
BVL130, IL	NO _y	Single Point QC [%D]	An extra filter was erroneously installed resulting in a flow restriction. Associated data will be invalidated.

Note: %D = percent difference

Table 12 Filter Packs Flagged as Suspect or Invalid During Third Quarter 2023

Site ID	Sample No.	Reason
CND125, NC	2330001-14 2331001-14	The site had data logger issues due to low voltage from the battery pack.
CVL151, MS	2331001-18	Data logger issues
KNZ184, KS	2329001-29	Flow pump was left off until the broken knockout bottle was replaced.
SHE604, WY	2327005-05 2328005-05 2329005-05 2330005-05 2331005-05	The flow pump and the mass flow controller failed. Both were replaced.

Table 13 Field Problems Affecting Data Collection

Days to Resolution	Problem Count
30	324
60	7
90	0
Unresolved by end of quarter	0

Figure 1 Reference Standard Results for Third Quarter 2023 (percent recovery)

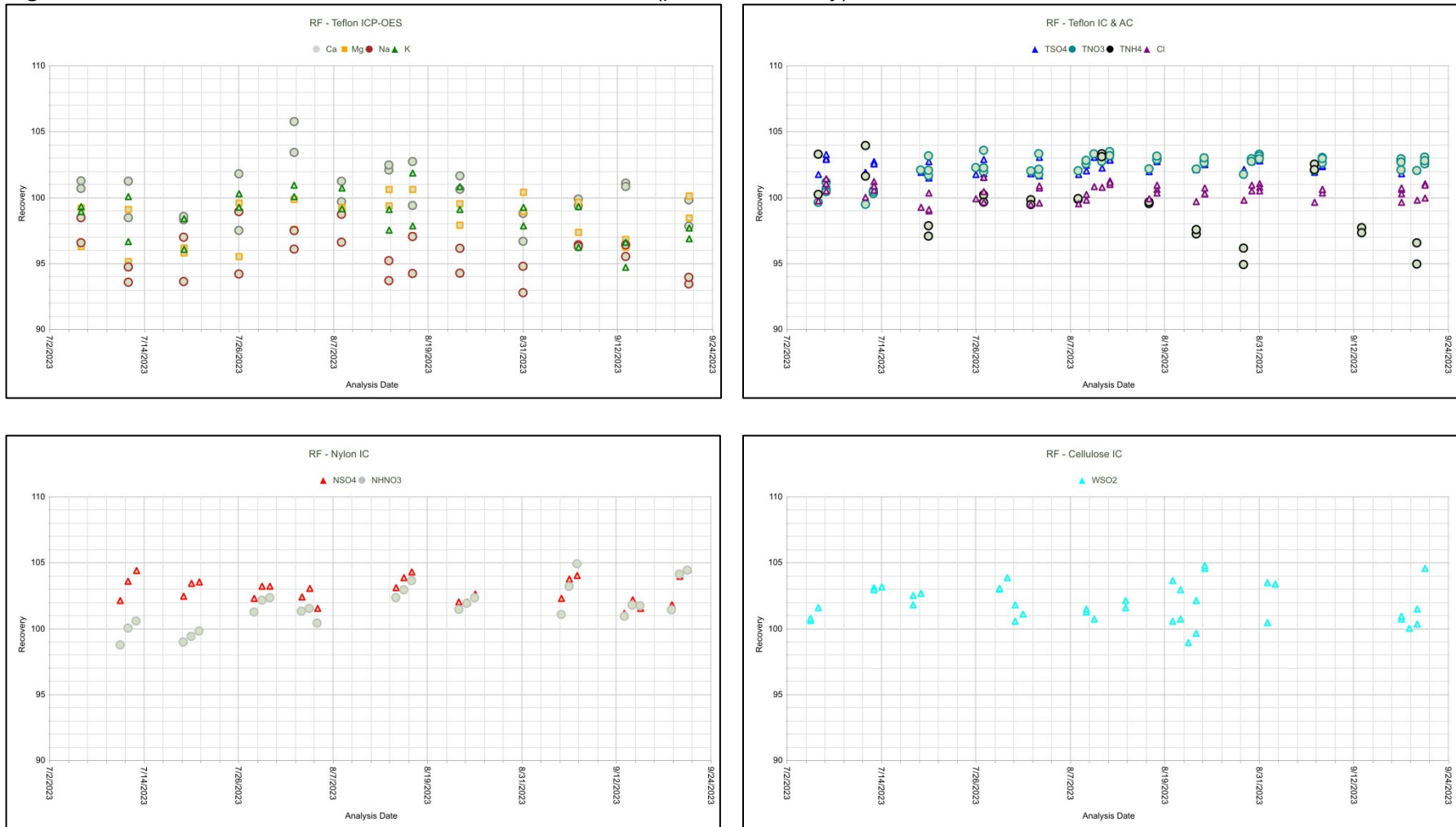


Figure 2 Continuing Calibration Spike Results for Third Quarter 2023 (percent recovery)

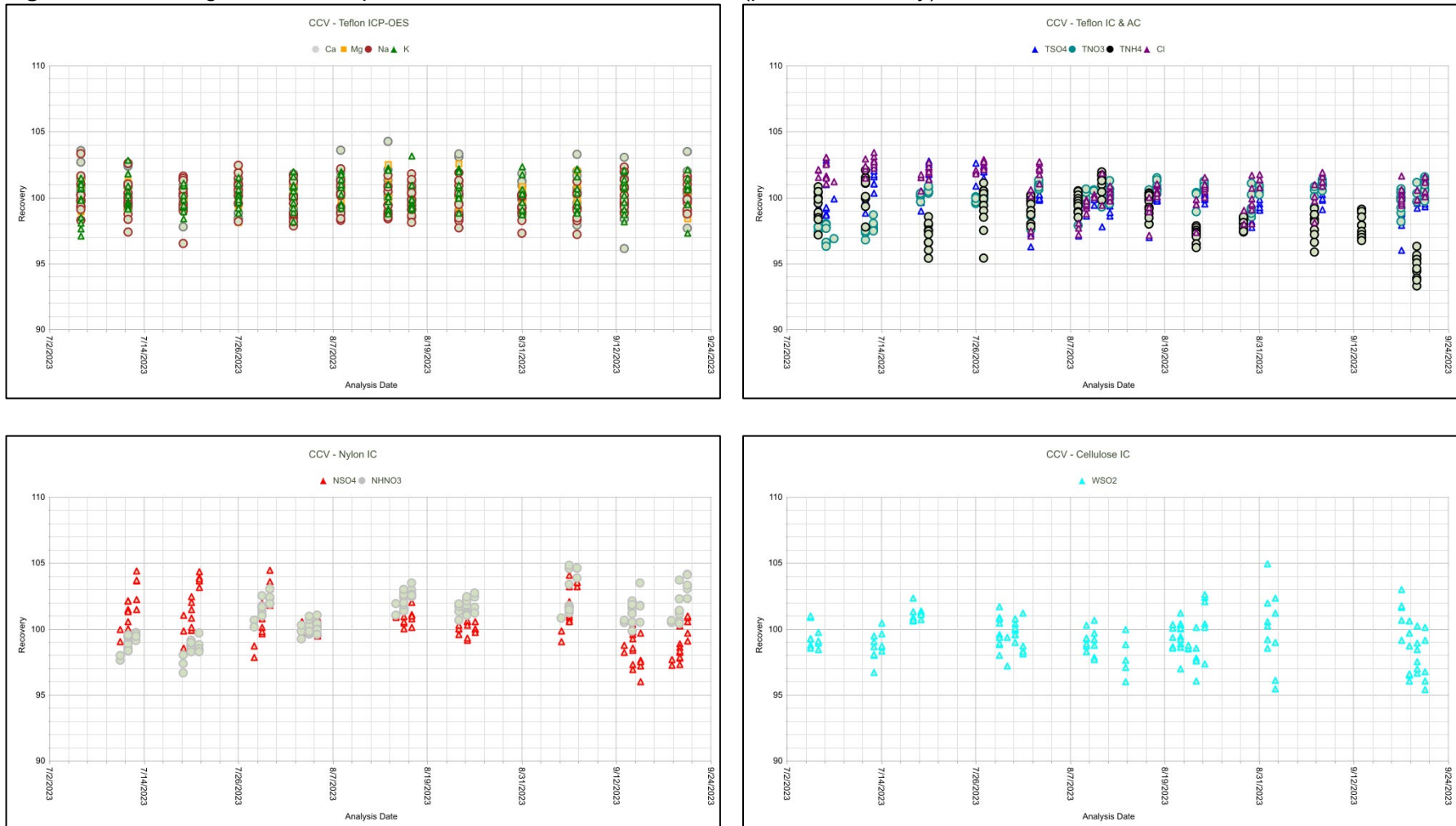


Figure 3 Replicate Sample Analysis Results for Third Quarter 2023 (percent difference)

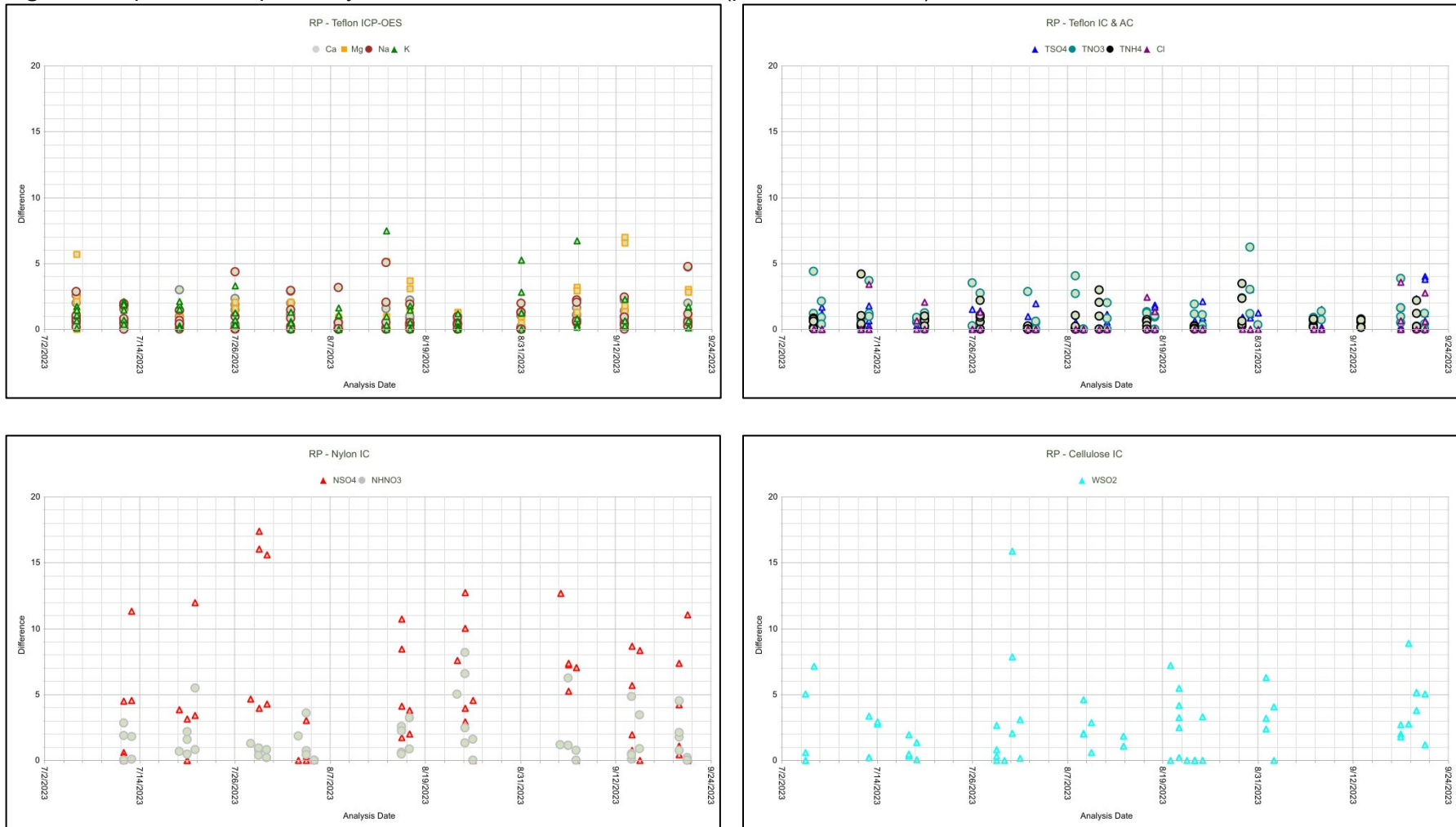


Figure 4 Laboratory Control Sample Results for Third Quarter 2023 (percent recovery)

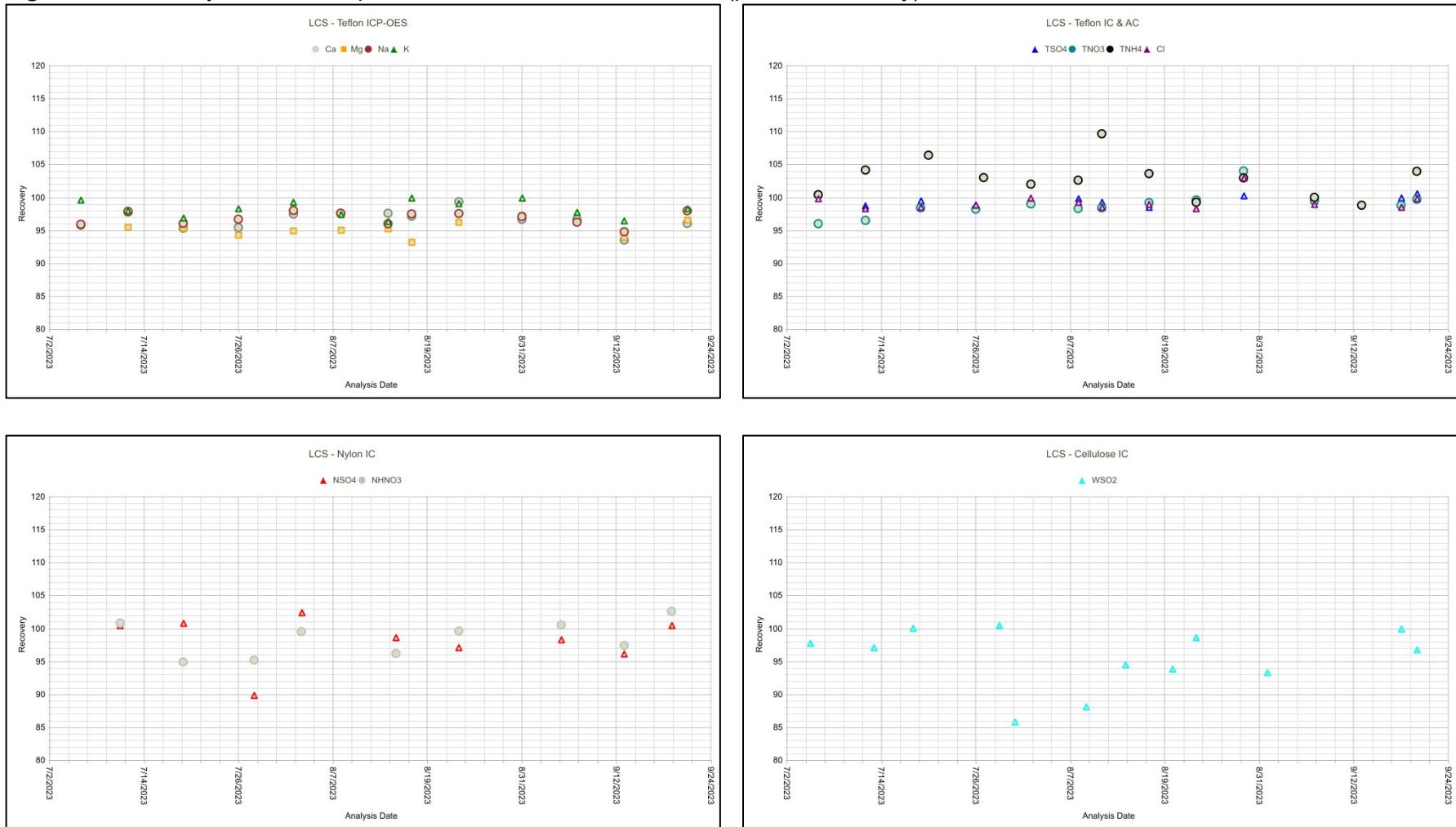


Figure 5 Method Blank Analysis Results for Third Quarter 2023 (total micrograms)

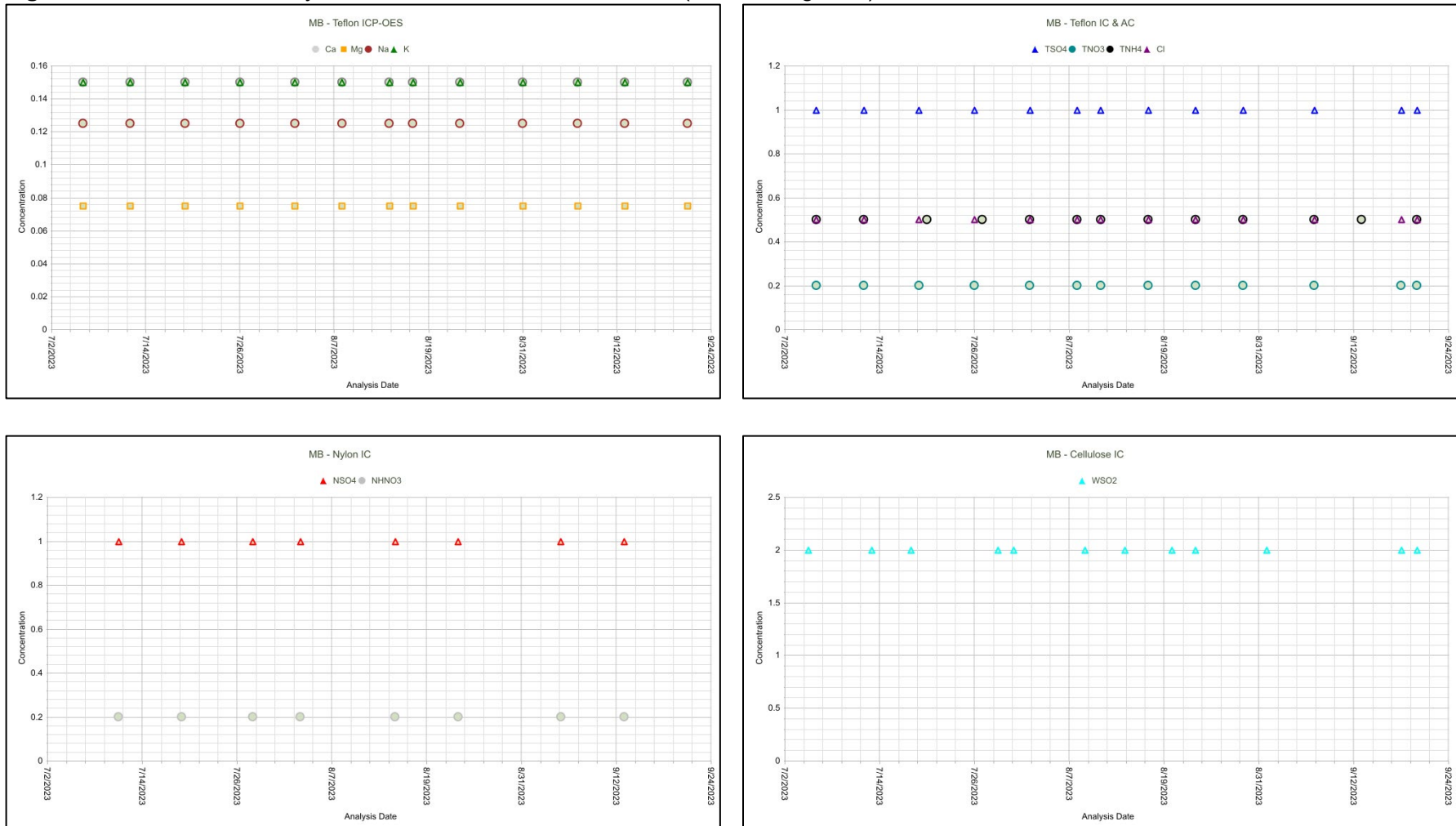


Figure 6 Laboratory Blank Analysis Results for Third Quarter 2023 (total micrograms)

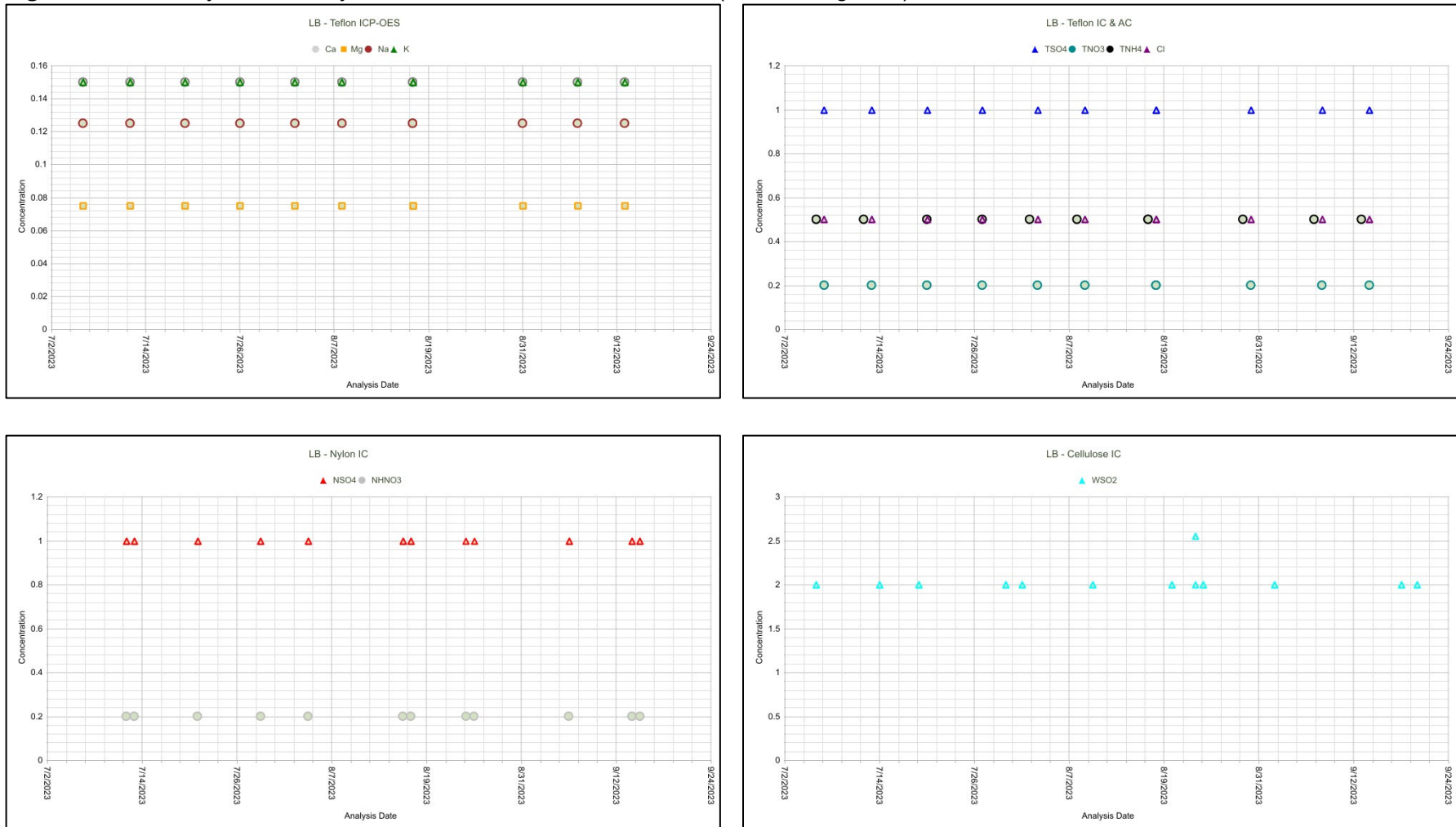


Figure 7 Field Blank Analysis Results for Third Quarter 2023 (total micrograms)

