



Clean Air Status and Trends Network

Fourth Quarter 2025 Quality Assurance Report

Summary of Quarterly Operations (October through December) with 2025 Annual Summary

Submitted to U.S. Environmental Protection Agency (EPA)
Air Quality Assessment Division

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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 fourth quarter 2025. It also provides an annual summary that includes data from the three previous quarters. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP) WSP USA Environment & Infrastructure Inc. (WSP, 2024; 2025). 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.

Significant Events for 2025

WSP's corporate laboratory safety auditor performed a safety inspection of the CASTNET laboratories on January 23, 2025. The laboratories passed the audit. There were no findings.

WSP's corporate office agreed to sponsor a new, upgraded ion chromatograph (IC) for the analytical laboratory. Installation of the new Thermo Dionex Inuvion IC instrument was completed on January 24, 2025. Thermo provided training for WSP laboratory analysts on January 29–30, 2025. The new IC was tested and evaluated for precision and accuracy by running a method detection limit study as well as select reference samples. Additionally, previously analyzed CASTNET filter pack samples were run on the Thermo Dionex Inuvion IC and compared with the original results. The new IC began being used for routine CASTNET sample analyses on February 12, 2025. The QA Manager performed a method audit of the CASTNET standard operation procedure GLM-3180-001 with the laboratory analyst performing sample analyses using the new IC instrument to verify that the documented method captured new details associated with the Inuvion instrument. There were new details (e.g., different software version) observed during the audit that were documented in the CASTNET QAPP Revision 10.2 (WSP, 2025).

The CASTNET QAPP Revision 10.2 (WSP, 2025) was submitted to EPA on March 6, 2025, and EPA approved it. After other CASTNET stakeholders completed the approval and signature process, the QAPP Revision 10.2 was uploaded to EPA's CASTNET web page (<https://www.epa.gov/castnet/documents-reports#QualityAssuranceProjectPlan>).

During first and second quarters of 2025, WSP completed preparation and organization of the documentation for renewal of International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2017 accreditation by the American Association for Laboratory Accreditation (A2LA). The assessor performed an onsite assessment of the WSP analytical and field laboratories on April 14–16, 2025. The CASTNET Project Manager, Laboratory Operations Manager (LOM), QA Manager, and Field Operations Manager (FOM) met with the

assessor to answer questions and provide access to the areas to be assessed. Other CASTNET personnel met with the assessor, as requested.

Overall, the A2LA assessment went smoothly. The assessor found 10 deficiencies in documentation. There were no technical performance deficiencies, and the assessor highly praised the technical staff for their competence. The LOM, QA Manager, and FOM began working on developing corrective actions to address the deficiencies and provide plans for resolution. Corrective action plans for all the noted deficiencies were submitted to A2LA on May 15, 2025. Four of the corrective action plans were finalized and closed by that date. The remaining corrective action plans were completed, closed, and submitted to A2LA on June 30, 2025. WSP's current ISO/IEC 17025:2017 accreditation was extended through August 31, 2025, to ensure the accreditation remained active until all corrective action plans were resolved, closed, and reviewed by A2LA. On July 22, 2025, WSP was notified by the A2LA that WSP's field and analytical laboratories were approved for renewal of ISO/IEC 17025:2017 accreditation for two years, through May 31, 2027.

During 2025, the QA Manager performed the annual supplier evaluation for 2024 activities. As per A2LA requirements, suppliers are audited for both the quality of the products provided and their adherence to scheduling. All suppliers met performance requirements during 2024.

A managerial review is performed annually in support of ISO/IEC 17025:2017 accreditation by the A2LA. The QA Manager organized documentation and completed preparation of the report on his findings from the managerial review for activities during 2024 during third quarter 2025. He provided the report to the CASTNET management team for review prior to developing a presentation of the report's findings. The CASTNET management team and WSP corporate QA and management personnel attended the presentation on October 27, 2025. The presentation was well received.

During 2025, WSP completed the process of updating CASTNET Level 2 ozone (O_3) transfers to the new cross-section. As of the end of fourth quarter 2025, all CASTNET Level 2 transfers, which included two Thermo 49i-PS bench standards and five Thermo 49i Level 2 traveling transfers, had been sent to an EPA regional standard reference photometer for updating with the new cross-section and verification following the guidelines in EPA's 2023 Transfer Standards for Calibration of Air Monitoring Analyzers for Ozone Technical Assistance Document (TAD; EPA, 2023).

Additionally, WSP completed updating all onsite Level 3 O_3 transfer standards to the new cross-section following EPA's updated 2023 O_3 TAD guidelines (EPA, 2023) by the end of fourth quarter 2025. The new process included updating each site's data logger program and completing updated documentation during the reverification of the site transfer standard. Beginning January 1, 2025, data from O_3 systems not using the new cross-section were required to be flagged "XS" in EPA's Air Quality System (AQS). WSP appended the "XS" qualifier flags to the 2025 O_3 data collected by EPA-sponsored CASTNET sites until the date and time the onsite transfer was updated to the new cross-section. All EPA-sponsored CASTNET sites listed in Table 1 were updated to the new O_3 cross-section as of the date and time listed for each site.

The QA Manager completed review of the results of the Level 4 O₃ validation by Air Resource Specialists, Inc. (ARS). ARS reviewed the O₃ data set for data collected from 2021 through 2023. WSP made the recommended changes and will resubmit the updated data to EPA's Air Quality Assessment Division (AQAD) and EPA's AQS during first quarter 2026.

EPA's Office of State Air Partnerships (OSAP) is encouraging O₃ monitoring organizations to transition to scrubber-free O₃ transfer standards. WSP believes the best option for transitioning to scrubber-free transfer standards is through equipment changes over several years. WSP evaluated potential O₃ replacement systems under Task Order 68HERH24F0336, Non-routine Maintenance and Repairs (3006), and, with approval from EPA's AQAD, purchased new Teledyne API (TAPI) O₃ systems (models N400 and N703U) to replace the aging Thermo 49i O₃ systems currently in use at CASTNET sites. The TAPI model N703U, a trace-level, photometric O₃ calibrator, is a microprocessor-controlled O₃ transfer that does not have a scrubber. During fourth quarter 2025, WSP began receiving shipments of model N400, the replacement for the site O₃ analyzers. WSP anticipates receiving the N703U transfers beginning in June 2026.

During August 2025, WSP used satellite imaging to update the accuracy of latitude and longitude of EPA-sponsored CASTNET sites. The towers were located on satellite maps, and the satellite coordinates for the towers were obtained and compared to the coordinates currently listed for the sites. During September, WSP updated the site data in the CASTNET database with the corrected latitude and longitude of EPA-sponsored CASTNET sites and submitted them to EPA. During November, WSP updated the latitude and longitude of the QuantAQ MODULAIR multi-gas/particulate matter (PM) and PM-only sensors at CASTNET sites as needed. During December, WSP updated the latitude and longitude of the PurpleAir PM sensors, as needed. The locations of all PM sensors at CASTNET sites are now accurately depicted on the corresponding public maps.

EPA's OSAP finalized the parameters for submission of CASTNET filter pack data to EPA's AQS. During third and fourth quarters 2025, WSP completed uploading validated filter pack data to AQS. Validated filter pack data from EPA-sponsored CASTNET sites from 1990 through December 31, 2024 were uploaded. Validated filter pack data from National Park Service (NPS)-sponsored CASTNET sites were uploaded for sites active in AQS through 2024. Filter pack data for Bureau of Land Management-sponsored sites active in AQS were uploaded through March 22, 2025. Going forward, validated filter pack data will be updated annually in AQS.

During fourth quarter, WSP began preparing 9-meter temperature data for upload to AQS. The temperature data will be uploaded for the same time period of record for each site as the filter pack concentration data discussed above.

The CASTNET QAPP is reviewed annually and updated if warranted. The draft of the CASTNET QAPP Revision 11.0 was submitted to EPA for review and comments on November 3, 2025.

The QA Manager began reviewing the WSP corporate Quality Management Plan (QMP) during fourth quarter to assess if it addresses updated EPA guidelines. After completion of his review, he forwarded the proposed changes to WSP's corporate QA personnel for incorporation into the WSP QMP.

After an auditor with Environmental Engineering & Measurement Services, Inc. noted that the latest calibration documentation for a site being audited was not available to the auditor, the CASTNET QA Manager initiated corrective actions (CA_141 and CA_142) to ensure CASTNET field calibrators return calibration files promptly after completion of the calibration and the field team complies with the policy that requires regular verification that the most recent calibration documentation has been uploaded to each site's computer and is available to auditors. Actions described in CA_141 include designating a specific person and developing a schedule to check sites for current documentation. Actions described in CA_142 include prompt return of field calibration files from calibrated sites with their calibration group.

The QA Manager performed an audit of data quality for per- and polyfluoroalkyl substances (PFAS) data collected from January 2023 to December 2024. The QA Manager received data from Martin Shafer with the National Atmospheric Deposition Program analytical laboratory. The results of the audit will be submitted to EPA in early first quarter 2026.

During 2025, 20 external audits of CASTNET O₃ systems at EPA-sponsored sites were performed by state agencies and NADP auditors. Table 2 lists the sites audited by quarter during 2025.

Table 3 lists the quarters of data that were validated to Level 3 during 2025 by site calibration group. Table 4 lists the sites in each calibration group along with the calibration schedule. Table 5 presents the measurement criteria for continuous field measurements. These criteria apply to the instrument challenges performed during site calibrations. Table 6 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 7 presents the critical criteria for ozone monitoring. Table 8 presents the critical criteria for trace-level gas monitoring.

Laboratory Intercomparison Results Summary

WSP's CASTNET laboratory regularly participates in the Environment and Climate Change Canada (ECCC) Proficiency Testing (PT) Program for Inorganic Environmental Substances. The results reported by the participating laboratories are evaluated for systematic bias and precision. Based on the final report for each PT study, the CASTNET laboratory's proficiency testing plan requires action for 1) individual test results with an "action" flag, 2) three or more parameters with a "warning" flag, or 3) consecutive PT study results with a warning flag for the same parameter.

During April 2025, WSP received results for sample analyses for PT study 125 for Rain and Soft Waters submitted to the Water Science and Technology Directorate (WS&TD), a branch of Environmental Science and Technology Laboratories with ECCC that provides QA services. WSP's results had no flags and received a rating of "Good" for PT 125 (ECCC, 2025a).

During September 2025, WSP received results for sample analyses submitted for PT study 126 for Rain and Soft Waters from WS&TD. There were two warning flags: one for an ammonia sample and one for a pH sample. Overall, WSP's results for PT 126 received a rating of "Good" (ECCC, 2025b). WSP's 5-year average was also rated as "Good" (ECCC, 2025b).

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 had been loaded into a filter pack assembly and shipped to and from the monitoring site while remaining in sealed packaging are also included. Tables 9 through 12 present the number of analyses in each category that were performed during each quarter of 2025.

Sample Receipt Statistics

Ninety-five percent of field samples from EPA-sponsored sites should be received by the CASTNET laboratory in Gainesville, FL no later than 14 days after removal from the sampling tower. Table 13 presents the relevant sample receipt statistics for each of the four quarters of 2025 together with an annual summary for each category.

Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for fourth quarter 2025. All results were within the criteria listed in Table 6. The magnesium RP value at 24 percent in Figure 3 was a comparison between a sample analysis at 0.35 µg and its replicate analysis at 0.28 µg. This meets the criterion for samples within 5 times the reporting limit. Table 14 presents the percent recoveries and standard deviations for RF, CCV, and RP QC sample analyses for 2025. Quarterly averages are all within criteria.

Table 15 presents quarterly co-located filter pack precision results for data validated to Level 3 during the year. Results for MCK131/231, KY and ROM406/206, CO were within the criterion for all of the 11 parameters reported.

Figure 4 presents completeness statistics for continuous measurements validated to Level 3 during the year. All parameters met the 90 percent criterion with the exception of delta temperature, now measured at only 4 sites. A 58.5 percent completeness for this parameter at IRL141, FL lowered the average under 90 percent.

Table 16 presents summary statistics of critical criteria measurements at ozone sites collected during fourth quarter 2025. 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 7 were or will be invalidated unless the cause of failure has no effect on ambient data collection. Results in shaded cells either exceed documented criteria or are otherwise notable. Table 17 presents observations associated with the shaded cell results in Table 16.

Table 18 presents summary statistics of critical criteria measurements at trace-level gas monitoring sites collected during fourth quarter 2025. 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 8 were or

will be invalidated unless the cause of failure has no effect on ambient data collection. Results in shaded cells either exceed documented criteria or are otherwise notable. Table 19 presents observations associated with the shaded cell results in Table 18.

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 the extraction process. Figure 5 presents LCS analysis results for fourth quarter 2025. All recovery values were between 90 percent and 105 percent.

Blank Results

Figures 6 through 8 present the results of MB, LB, and FB QC sample analyses for fourth quarter 2025. All fourth quarter results were within criteria (two times the reporting limit) listed in Table 6. Table 20 summarizes the record of filter blanks for 2025. All 2025 results were within criteria listed in Table 6 with the exception of one cellulose filter FB for sulfur dioxide that occurred during second quarter and one Teflon filter FB for calcium that occurred during third quarter. The sample concentration data associated with the sites and sampling weeks were reasonable. All other blank QC checks in their respective batches were within criteria.

Suspect/Invalid Filter Pack Samples

Filter pack samples that were flagged as suspect or invalid during each of the four quarters of 2025 are listed in Table 21. This table also includes associated site identification and a brief description of the reason the sample was flagged. During fourth quarter, six filter pack samples were invalidated.

Field Problem Count

Table 22 presents counts of field problems affecting continuous data collection for more than one day for each quarter during 2025. 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.

Field Calibration Results

A summary of field calibration failures by parameter for each quarter of 2025 is listed in Table 23. Calibrations were performed at 21 sites during fourth quarter 2025. During 2025, all sites and parameters were within the criteria listed in Table 5 with the exception of the parameters at the seven sites that are listed in Table 23.

Table 24 presents field accuracy results for 2025 based on instrument challenges performed using independent reference standards during site calibration visits. Each parameter was within its criterion with at least 90 percent frequency except delta temperature ambient at 70.0 percent. Per CASTNET project protocols, data are flagged but still considered valid if the calibration criterion is not exceeded by more than its magnitude (i.e., if within two times the criterion). All calibration failures reported in 2025 for the indicated parameters were within two times the criterion with the exception of

temperature at IRL141, FL, and WST109, NH; flow rate at NIC001, NY; flow rate and temperature at UMA009, WA; and relative humidity at CNS011, FL. Data associated with the failures at the listed sites were invalidated.

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.

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Table 1 Date and Time CASTNET Sites were Updated to the New Ozone Cross-Section During 2025

Site ID	Date	Time
ABT147, CT	05/09/2025	04:10 EST
ALC188, TX	09/24/2025	14:01 CST
ANA115, MI	10/21/2025	21:31 EST
ARE128, PA	08/25/2025	15:55 EST
BEL116, MD	08/21/2025	20:34 EST
BFT142, NC	10/27/2025	14:40 EST
BVL130, IL	09/26/2025	14:38 CST
BWR139, MD	08/22/2025	15:50 EST
CAD150, AR	08/18/2025	20:37 CST
CKT136, KY	07/24/2025	13:15 EST
CND125, NC	08/11/2025	14:37 EST
CNT169, WY	11/14/2025	18:09 MST
COW137, NC	08/12/2025	19:30 EST
CTH110, NY	08/24/2025	05:43 EST
CVL151, MS	08/17/2025	20:45 CST
DUK008, NC	09/01/2025	21:17 EST
ESP127, TN	07/21/2025	21:51 CST
GAS153, GA	08/15/2025	14:41 EST
GTH161, CO	11/10/2025	19:37 MST
HAS012, KS	09/11/2025	12:35 CST
HOX148, MI	10/23/2025	23:02 EST
IRL141, FL	08/25/2025	21:43 EST
KEF112, PA	11/19/2025	12:51 EST
LPO010, CA	06/26/2025	19:10 PST
LRL117, PA	11/04/2025	13:48 EST

Site ID	Date	Time
MCK131, KY	07/23/2025	12:56 CST
MCK231, KY	07/22/2025	21:36 CST
MKG113, PA	11/18/2025	12:35 EST
NPT006, ID	11/18/2025	14:36 PST
OXF122, OH	09/23/2025	20:38 EST
PAL190, TX	11/12/2025	16:00 CST
PAR107, WV	11/05/2025	13:25 EST
PED108, VA	08/27/2025	15:15 EST
PND165, WY	11/15/2025	19:22 MST
PRK134, WI	09/28/2025	20:21 CST
PSU106, PA	08/24/2025	19:15 EST
QAK172, OH	09/22/2025	19:51 EST
ROM206, CO	11/13/2025	21:53 MST
SAL133, IN	10/21/2025	03:31 EST
SAN192, NE	09/09/2025	14:45 CST
SND152, AL	08/16/2025	22:35 CST
SPD111, TN	08/13/2025	22:09 EST
STK138, IL	10/03/2025	04:32 CST
SUM156, FL	08/21/2025	06:54 EST
UMA009, WA	11/17/2025	15:34 PST
UVL124, MI	10/25/2025	10:53 EST
VIN140, IN	09/25/2025	07:56 CST
VPI120, VA	08/26/2025	17:05 EST
WSP144, NJ	08/23/2025	11:29 EST
WST109, NH	05/10/2025	11:16 EST

Table 2 NPAP and State Agency Audits of CASTNET Ozone Systems

Site ID	Auditing Agency
First Quarter	
LPO010, CA	NPAP (EPA Region 9)
Second Quarter	
SND152, AL	NPAP (EPA Region 4)
VIN140, IN	NPAP (EPA Region 5)
VPI120, VA	NPAP (EPA Region 3)
Third Quarter	
ESP127, TN	NPAP (EPA Region 4)
HOX148, MI	NPAP (EPA Region 5)
KEF112, PA	State of Pennsylvania Department of Environmental Protection
LPO010, CA	California Air Resources Board
LRL117, PA	State of Pennsylvania Department of Environmental Protection
MKG113, PA	State of Pennsylvania Department of Environmental Protection
PAL190, TX	NPAP (EPA Region 6)
QAK172, OH	NPAP (EPA Region 5)
SAL133, IN	Indiana Department of Environmental Management
STK138, IL	NPAP (EPA Region 5)
VIN140, IN	Indiana Department of Environmental Management
VIN140, IN	NPAP (EPA Region 5)
UVL124, MI	NPAP (EPA Region 5)
Fourth Quarter	
MCK131, KY	NPAP (EPA Region 4)
MCK231, KY	NPAP (EPA Region 4)
CAD150, AR	NPAP (EPA Region 6)

Notes: The EPA Air Quality System AMP600 report "Data Evaluation and Concurrence Report for Gaseous Pollutants" for 2025 lists passing results for all site audits listed in the report. MCK231, KY is not listed in this report because it is a quality assurance monitor.

Table 3 Data Validated to Level 3 through Fourth Quarter 2025

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
SE-4/MW-6†	July 2024–June 2025	12	Quarter 3 2024–Quarter 2 2025	4
E-1/SE-5	August 2024–July 2025	12	Quarter 4 2024–Quarter 2 2025	3
MW-7/W-9	September 2024–August 2025	12	Quarter 4 2024–Quarter 2 2025	3
E-2/MW-8	October 2024–September 2025	12	Quarter 4 2024–Quarter 3 2025	4
E-3/W-10‡	May 2024–April 2025	12	Quarter 3 2024–Quarter 1 2025	3

Notes: * The sites contained in each calibration group are listed in Table 4.

† Contains MCK131/231 co-located pair

‡ Contains ROM206 of the ROM406/ROM206 co-located pair

Table 4 Field Calibration Schedule for 2025

Calibration Group	Months Calibrated	Sites Calibrated			
Eastern Sites (16 Total)					
E-1 (7 Sites)	February/August	ARE128, PA PED108, VA	BEL116, MD VPI120, VA	BWR139, MD WSP144, NJ	CTH110, NY
E-2 (5 Sites)	April/October	ABT147, CT WST109, NH	EGB181, ON	NIC001, NY	WFM105, NY
E-3 (4 Sites)	May/November	KEF112, PA	LRL117, PA	MKG113, PA	PAR107, WV
Southeastern Sites (12 Total)					
SE-4 (7 Sites)	January/July	BFT142, NC GAS153, GA	CND125, NC SND152, AL	COW137, NC SPD111, TN	DUK008, NC ¹
SE-5 (5 Sites)	February/August	CAD150, AR SUM156, FL	CNS011, FL	CVL151, MS	IRL141, FL
Midwestern Sites (15 Total)					
MW-6 (4 Sites)	January/July	CKT136, KY	ESP127, TN	MCK131, KY	MCK231, KY
MW-7 (7 Sites)	March/September	BVL130, IL ² RED004, MN	OXF122, OH STK138, IL ²	PRK134, WI VIN140, IN	QAK172, OH
MW-8 (4 Sites)	April/October	ANA115, MI	HOX148, MI	SAL133, IN	UVL124, MI
Western Sites (13 Total)					
W-9 (5 Sites)	March/September	ALC188, TX SAN192, NE ²	CHE185, OK	HAS012, KS	KNZ184, KS
W-10 (8 Sites)	May/November	CNT169, WY PAL190, TX	GTH161, CO PND165, WY	LPO010, CA ROM206, CO	NPT006, ID UMA009, WA

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.

Table 5 Data Quality Indicators for CASTNET Continuous Measurements

Measurements		Criteria ¹	
Parameter ²	Method	Precision	Accuracy
Filter pack flow	Mass flow controller	± 10%	± 5%
Ozone ³	UV absorbance	All points within ± 2% of full scale of best fit straight line Linearity error < 5%	
Wind speed	Anemometer	± 0.5 m/s	The greater of ± 0.5 m/s for winds < 5 m/s or ± 5% winds ≥ 5 m/s
Wind direction	Wind vane	± 5°	± 5°
Sigma theta	Wind vane	Undefined	Undefined
Ambient temperature	Platinum RTD	± 1.0°C (of full scale)	± 0.5°C
Delta temperature	Platinum RTD	± 0.5°C	± 0.5 °C
Relative humidity	Thin film capacitor	± 10% (of full scale)	± 10%
Precipitation	Tipping bucket rain gauge	± 10% (of reading)	± 0.05 inch ⁴
Solar radiation	Pyranometer	± 10% (of reading taken at local noon)	± 10%
Surface wetness	Conductivity bridge	Undefined	Undefined

Notes: °C = degrees Celsius
 m/s = meters per second
 RTD = resistance-temperature device
 UV = ultraviolet

¹ Precision criteria apply to co-located instruments, and accuracy criteria apply to calibration of instruments. Co-located precision criteria do not apply to CASTNET sites that are configured and operated in accordance with Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2022)

² Meteorological parameters are only measured at five of the EPA-sponsored CASTNET sites: CNS011, FL; IRL141, FL; BVL130, IL; BEL116, MD; CHE185, OK; and PND165, WY. Meteorological measurements ended at PND165 as of 03/31/2025.

³ Ozone is not measured at eight EPA-sponsored CASTNET sites: KIC003, KS; KNZ184, KS; RED004, MN; EGB181, ON; CAT175, NY; NIC001, NY; WFM105, NY; and UND002, VT.

⁴ For target value of 0.50 inch

Table 6 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 \pm the reporting limit if the sample is \leq 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 (reported as SO₄²⁻ with correction factor applied) 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, 2025).

Table 7 Ozone Critical Criteria*

Type Check	Analyzer Response
Zero	Less than \pm 3.1 parts per billion (ppb)
Span	Less than \pm 7.1 percent between supplied and observed concentrations
Single Point QC	Less than \pm 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, 2023). 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 8 Trace-level Gas Monitoring Critical Criteria^{*}

Parameter	Analyzer Response	
	Zero Check	Span Check / Single Point QC Check
SO ₂	Less than \pm 1.51 ppb	Less than \pm 10.1 percent between supplied and observed concentrations
NO _y	Less than \pm 1.51 ppb	
CO	Less than \pm 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, 2023). 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 9 QC Analysis Count for First Quarter 2025

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⁻	67	193	81	16	24	90
	NO ₃ ⁻	67	193	81	16	24	90
	NH ₄ ⁺	32	167	75	16	24	90
	Cl ⁻	67	193	81	16	24	90
	Ca ²⁺	33	169	77	16	24	90
	Mg ²⁺	33	169	77	16	24	90
	Na ⁺	33	169	77	16	24	90
	K ⁺	33	169	77	16	24	90
Nylon	SO ₄ ²⁻	36	155	67	12	24	90
	HNO ₃	36	155	67	12	24	90
Cellulose	SO ₂	23	51	20	8	24	26

Table 10 QC Analysis Count for Second Quarter 2025

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⁻	63	186	76	15	22	41
	NO ₃ ⁻	63	186	76	15	22	41
	NH ₄ ⁺	31	158	72	15	20	41
	Cl ⁻	63	186	76	15	22	41
	Ca ²⁺	30	160	72	15	20	41
	Mg ²⁺	30	160	72	15	20	41
	Na ⁺	30	160	72	15	20	41
	K ⁺	30	160	72	15	20	41
Nylon	SO ₄ ²⁻	41	159	69	13	22	41
	HNO ₃	41	159	69	13	22	41
Cellulose	SO ₂	24	50	16	9	20	8

Table 11 QC Analysis Count for Third Quarter 2025

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⁻	56	167	70	14	22	41
	NO ₃ ⁻	56	167	70	14	22	41
	NH ₄ ⁺	28	154	70	14	22	41
	Cl ⁻	56	167	70	14	22	41
	Ca ²⁺	28	152	69	14	22	41
	Mg ²⁺	28	152	69	14	22	41
	Na ⁺	28	152	69	14	22	41
	K ⁺	28	152	69	14	22	41
Nylon	SO ₄ ²⁻	42	165	70	14	22	41
	HNO ₃	42	165	70	14	22	41
Cellulose	SO ₂	24	49	14	9	22	8

Table 12 QC Analysis Count for Fourth Quarter 2025

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	154	65	14	22	43
	NO ₃ ⁻	54	154	65	14	22	43
	NH ₄ ⁺	26	138	64	13	22	43
	Cl ⁻	54	154	65	14	22	43
	Ca ²⁺	26	137	62	13	22	43
	Mg ²⁺	26	137	62	13	22	43
	Na ⁺	26	137	62	13	22	43
	K ⁺	26	137	62	13	22	43
Nylon	SO ₄ ²⁻	46	159	66	13	22	43
	HNO ₃	46	159	66	13	22	43
Cellulose	SO ₂	20	39	15	8	20	9

Table 13 Filter Pack Receipt Summary for 2025

Description	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Summary
Count of samples received more than 14 days after removal from tower:	24	25	19	27	95
Count of all samples received:	694	727	682	720	2823
Fraction of samples received within 14 days:	0.965	0.966	0.972	0.963	0.966*
Average interval in days:	5.667	4.933	6.085	5.755	5.610
First receipt date:	01/02/2025	04/01/2025	7/01/2025	10/1/2025	01/02/2025
Last receipt date:	03/27/2025	06/30/2025	9/30/2025	12/30/2025	12/30/2025

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

*annual average

Table 14 Filter Pack QC Summary for 2025

Filter Type	Parameter	Reference Sample ¹ Recovery (%R)			Continuing Calibration Verification Samples (%R)			In-Run Replicate ² (RPD)		
		Mean	Std. Dev.	Count ³	Mean	Std. Dev.	Count ³	Mean	Std. Dev.	Count ³
Teflon	SO ₄ ²⁻	100.76	0.99	244	100.40	1.01	713	1.11	1.31	298
	NO ₃ ⁻	100.98	0.98	244	100.43	1.16	713	1.59	1.96	298
	NH ₄ ⁺	95.10	2.76	121	98.57	1.97	639	1.25	2.31	291
	Ca ²⁺	102.05	2.57	123	100.99	1.64	643	2.57	2.78	291
	Mg ²⁺	101.84	2.32	123	100.11	1.18	643	3.03	3.33	291
	Na ⁺	95.86	1.63	123	99.87	1.53	643	1.28	1.05	291
	K ⁺	98.65	1.81	123	100.00	1.38	643	1.83	2.25	291
	Cl ⁻	101.43	1.00	244	100.49	1.52	713	1.48	1.96	297
Nylon	SO ₄ ²⁻	102.43	0.99	169	98.82	1.37	651	5.83	4.65	277
	NO ₃ ⁻	100.68	0.98	169	99.09	1.09	651	2.25	2.83	277
Cellulose	SO ₄ ²⁻	100.93	1.50	99	101.52	1.68	203	2.65	3.06	68

Notes: % R = percent recovery
RPD = relative percent difference

¹Results of reference sample analyses provide accuracy estimates

²Results of replicate analyses provide precision estimates

³Number of QC Samples

Table 15 Precision Results for Third Quarter 2024 through Second Quarter 2025

Quarter	SO ₄ ²⁻	NO ₃ ⁻	NH ₄ ⁺	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	Cl ⁻	HNO ₃	Total NO ₃ ⁻
MCK131/231, KY										
2024 Q3	1.63	5.06	3.13	7.45	7.76	4.17	6.02	1.11	4.08	3.83
2024 Q4	1.65	4.32	8.12	6.61	5.84	6.77	3.3	3.67	7.06	5.44
2025 Q1	1.15	3.16	2.25	7.06	5.61	4.49	3.90	6.37	8.03	3.03
2025 Q2	2.63	6.63	2.63	9.00	5.64	3.68	4.95	3.85	3.95	3.89
Average	1.77	4.79	4.03	7.53	6.21	4.78	4.54	3.75	5.78	4.05
ROM406/206, CO										
2024 Q3	10.34	13.41	7.23	12.94	11.78	15.33	13.21	10.53	12.47	11.39
2024 Q4	3.83	12.09	6.86	11.08	11.49	6.86	10.13	6.44	4.22	3.51
2025 Q1	3.59	11.85	7.65	7.06	11.47	11.02	15.92	16.60	6.72	7.18
2025 Q2	4.12	12.29	14.35	6.62	9.05	8.41	11.97	10.90	8.76	3.93
Average	5.47	12.41	9.02	9.43	10.95	10.41	12.81	11.12	8.04	6.50

Notes: 0 of 88 site-quarter-parameters were outside criterion

Table 16 Ozone QC Summary for Fourth Quarter 2025 (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	1.18	100.00	1.90	100.00	0.17
ALC188, TX	100.00	0.58	100.00	0.94	100.00	0.48
ANA115, MI	100.00	1.60	100.00	1.37	100.00	0.21
ARE128, PA	100.00	2.84	100.00	3.90	100.00	0.87
BEL116, MD	100.00	0.63	100.00	0.60	100.00	0.38
BFT142, NC	100.00	2.46	100.00	2.47	100.00	0.25
BVL130, IL	100.00	1.43	100.00	1.44	100.00	0.14
BWR139, MD	100.00	2.60	100.00	3.09	100.00	0.32
CAD150, AR	100.00	0.88	100.00	0.93	100.00	0.67
CKT136, KY	100.00	0.83	100.00	0.56	100.00	0.16
CND125, NC	100.00	0.69	100.00	1.24	100.00	0.37
CNT169, WY	100.00	0.42	100.00	0.75	100.00	0.20
COW137, NC	100.00	2.62	100.00	2.51	96.84	0.74
CTH110, NY	100.00	0.59	100.00	0.74	100.00	0.17
CVL151, MS	100.00	0.98	100.00	0.76	100.00	0.42
DUK008, NC	100.00	2.34	100.00	3.63	98.88	1.15
ESP127, TN	100.00	0.74	100.00	0.82	100.00	0.29
GAS153, GA	100.00	0.59	100.00	1.62	100.00	0.71
GTH161, CO	100.00	1.59	100.00	1.77	100.00	0.24
HAS012, KS	100.00	0.87	100.00	0.91	100.00	0.34
HOX148, MI	100.00	0.54	100.00	0.65	100.00	0.15
IRL141, FL	100.00	0.74	100.00	0.62	100.00	0.34
KEF112, PA	95.96	5.34	95.96	5.10	100.00	0.24
LPO010, CA	100.00	2.29	100.00	2.40	100.00	0.15
LRL117, PA	100.00	1.18	100.00	1.14	100.00	0.34
MCK131, KY	100.00	0.47	100.00	0.57	100.00	0.59
MCK231, KY	100.00	0.53	100.00	1.09	100.00	0.74
MKG113, PA	100.00	0.85	100.00	0.94	100.00	0.27
NPT006, ID	100.00	0.89	100.00	1.52	100.00	0.25
OXF122, OH	78.64	23.01	78.64	21.59	96.12	1.28
PAL190, TX	100.00	0.97	100.00	0.76	100.00	0.20
PAR107, WV	100.00	0.96	100.00	1.18	100.00	0.24
PED108, VA	88.89	3.30	90.00	3.45	100.00	0.48
PND165, WY	100.00	1.90	100.00	1.83	100.00	0.36
PRK134, WI	100.00	0.87	100.00	0.83	100.00	0.23
PSU106, PA	100.00	1.98	100.00	1.54	100.00	0.27
QAK172, OH	100.00	1.01	100.00	1.11	100.00	0.20
ROM206, CO	98.91	2.98	100.00	2.31	100.00	0.33
SAL133, IN	100.00	0.85	100.00	1.10	100.00	0.25
SAN192, NE	100.00	2.58	100.00	3.03	100.00	0.71
SND152, AL	100.00	0.85	100.00	1.34	100.00	0.19
SPD111, TN	100.00	0.65	100.00	0.76	100.00	0.24
STK138, IL	100.00	1.53	100.00	1.14	100.00	0.24
SUM156, FL	100.00	0.67	100.00	1.41	100.00	0.26

Table 16 Ozone QC Summary for Fourth Quarter 2025 (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
UMA009, WA	100.00	1.01	100.00	1.30	100.00	0.72
UVL124, MI	100.00	1.06	100.00	1.56	95.95	0.74
VIN140, IN	100.00	0.74	100.00	0.74	100.00	0.23
VPI120, VA	100.00	0.62	100.00	0.97	100.00	0.21
WSP144, NJ	100.00	0.68	100.00	1.08	100.00	0.46
WST109, NH	100.00	0.52	100.00	1.16	100.00	0.52

Notes: ¹Percentage of comparisons that pass the criteria listed in Table 7. Values falling below 90 percent are addressed in Table 17.

²Absolute value of the average percent differences between the on-site transfer standard and the site monitor. Values exceeding the criteria listed in Table 7 are addressed in Table 17.

%D = percent difference

ppb = parts per billion

Table 17 Ozone QC Observations for Fourth Quarter 2025

Site ID	QC Criterion	Comments
OXF122, OH	% Span Pass Span [%D] % Single Point QC Pass Single Point QC [%D]	Due to a failed sample pump in December.
PED108, VA	% Span Pass	Investigation found no reason for failures in late December. Data associated with failures will be invalidated.

Note: %D = percent difference

Table 18 Trace-level Gas QC Summary for Fourth Quarter 2025

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	81.40	19.23	81.40	25.54	100.00	0.17
NO _y	97.87	7.59	97.87	5.27	97.87	0.52
CO	97.87	3.10	95.74	4.28	97.87	17.74
DUK008, NC						
NO _y	97.67	7.69	97.67	7.94	100.00	0.57
SAN192, NE						
NO _y	97.62	3.68	97.62	4.69	92.86	0.67
STK138, IL						
NO _y	100.00	3.70	73.47	6.88	97.96	0.43

Notes: ¹Percentage of comparisons that pass the criteria listed in Table 8. Values falling below 90 percent are addressed in Table 19.

²Absolute value of the average percent differences between the supplied and observed concentrations. Values exceeding the criteria listed in Table 8 are addressed in Table 19.

%D = percent difference

ppb = parts per billion

Table 19 Trace-level Gas QC Observations for Fourth Quarter 2025

Site ID	Parameter	QC Criterion	Comments
BVL130, IL	SO ₂	% Span Pass Span %D % Single Point QC Pass Single Point QC %D	Sample pump failed 12/13/2025 and was replaced 01/14/2026.
STK138, IL	NO _y	Single Point QC %D	Due to calibration drift. Analyzer recalibrated 10/15/2025.

Note: %D = percent difference

Table 20 Summary of Filter Blanks for 2025 (1 of 2)

Parameter Name	Detection Limit Total µg	Total Number	Number > Detection Limit	Average Total µg*	Average Absolute Deviation	Maximum Total µg
FIELD BLANKS						
Teflon - NH ₄ ⁺ -N	0.500	291	0	0.500	0.000	0.500
Teflon - NO ₃ ⁻ -N	0.200	291	0	0.200	0.000	0.200
Teflon - SO ₄ ²⁻	1.000	291	0	1.000	0.000	1.000
Cl ⁻	0.500	291	0	0.500	0.000	0.500
Ca ²⁺	0.150	291	4	0.161	0.022	3.363
Mg ²⁺	0.075	291	0	0.075	0.000	0.075
Na ⁺	0.125	291	0	0.125	0.000	0.125
K ⁺	0.150	291	0	0.150	0.000	0.150
Nylon - NO ₃ ⁻ -N	0.200	291	1	0.200	0.000	0.243
Nylon - SO ₄ ²⁻	1.000	291	1	1.000	0.000	1.028
Cellulose - SO ₄ ²⁻	2.000	63	11	2.175	0.289	8.210
LABORATORY BLANKS						
Teflon - NH ₄ ⁺ -N	0.500	102	0	0.500	0.000	0.500
Teflon - NO ₃ ⁻ -N	0.200	102	0	0.200	0.000	0.200
Teflon - SO ₄ ²⁻	1.000	102	0	1.000	0.000	1.000
Cl ⁻	0.500	102	0	0.500	0.000	0.150
Ca ²⁺	0.150	102	0	0.150	0.000	0.150
Mg ²⁺	0.075	102	0	0.075	0.000	0.075
Na ⁺	0.125	102	0	0.125	0.000	0.125
K ⁺	0.150	102	0	0.150	0.000	0.150
Nylon - NO ₃ ⁻ -N	0.200	102	0	0.200	0.000	0.200
Nylon - SO ₄ ²⁻	1.000	102	0	1.000	0.000	1.000
Cellulose - SO ₄ ²⁻	2.000	102	10	2.024	0.043	2.435

Table 20 Summary of Filter Blanks for 2025 (2 of 2)

Parameter Name	Detection Limit Total µg	Total Number	Number > Detection Limit	Average Total µg*	Average Absolute Deviation	Maximum Total µg
METHOD BLANKS						
Teflon - NH ₄ ⁺ -N	0.500	60	0	0.500	0.000	0.500
Teflon - NO ₃ ⁻ -N	0.200	61	0	0.200	0.000	0.200
Teflon - SO ₄ ²⁻	1.000	61	0	1.000	0.000	1.000
Cl ⁻	0.500	61	0	0.500	0.000	0.500
Ca ²⁺	0.150	61	0	0.150	0.000	0.150
Mg ²⁺	0.075	61	0	0.075	0.000	0.075
Na ⁺	0.125	61	0	0.125	0.000	0.125
K ⁺	0.150	61	0	0.150	0.000	0.150
Nylon - NO ₃ ⁻ -N	0.200	54	0	0.200	0.000	0.200
Nylon - SO ₄ ²⁻	1.000	54	0	1.000	0.000	1.000
Cellulose - SO ₄ ²⁻	2.000	36	0	2.000	0.000	2.000
ACCEPTANCE TEST VALUES ¹						
Teflon - NH ₄ ⁺ -N	0.500	188	0	0.500	0.000	0.500
Teflon - NO ₃ ⁻ -N	0.200	188	0	0.200	0.000	0.200
Teflon - SO ₄ ²⁻	1.000	188	0	1.000	0.000	1.000
Cl ⁻	0.500	188	0	0.500	0.000	0.500
Ca ²⁺	0.150	188	0	0.150	0.000	0.150
Mg ²⁺	0.075	188	0	0.075	0.000	0.075
Na ⁺	0.125	188	0	0.125	0.000	0.125
K ⁺	0.150	188	0	0.150	0.000	0.150
Nylon - NO ₃ ⁻ -N	0.200	96	0	0.200	0.000	0.200
Nylon - SO ₄ ²⁻	1.000	96	0	1.000	0.000	1.000
Cellulose - SO ₄ ²⁻	2.000	54	0	2.000	0.000	2.000

Note: ¹Only filter batches passing QC requirements are used for sampling and analysis.

*Reporting limit values are used for this calculation when values are at or below reporting limit.

Table 21 Filter Packs Flagged as Suspect or Invalid

Site ID	Sample No.	Reason
First Quarter 2025		
ALB801, AB	2505007-01	Flow data from 02/01/2025 forward are not currently in the Level 2 data table.
BEL116, MD	2505001-03	Power failure
BUF603, WY	2505005-02	Flow data from 02/01/2025 forward are not currently in the Level 2 data table.
CAT175, NY	2502001-08	Communication issue required replacement of the modem and site batteries.
	2503001-08	
	2504001-08	
FOR605, WY	2505005-03	Flow data from 02/01/2025 forward are not currently in the Level 2 data table.
NEC602, WY	2505005-04	Flow data from 02/01/2025 forward are not currently in the Level 2 data table.
WST109, NH	2505001-49	Flow channel left down during filter change. Five-minute averaged data are available. This sample should be recovered during Level 3 data validation.
Second Quarter 2025		
ALB801, AB	2518007-01	Flow volume was insufficient. Data may be recovered with next flow data upload.
CHE185, OK	2520004-02	Site was affected by a power failure.
MCK231, KY	2522001-28	The data logger malfunctioned 05/30/2025 and was replaced 06/07/2025.
VOY413, CA	2520003-21	Site was affected by a power failure.
Third Quarter 2025		
ALB801, AB	2531007-01	Flow data are missing after 07/31/2025. Data may be recovered.
ARE128, PA	2527001-02	Power failure affecting three samples
	2528001-02	
	2529001-02	
CHA467, AZ	2532003-04	Flow data are missing after 07/31/2025. Data may be recovered.
NIC001, NY	2529001-30	Power failure
SAL133, IN	2530001-39	The flow pump was left off after the filter pack exchange.
SND152, AL	2533001-40	The field calibration technician left flow offline after their site visit during the sampling period.
VOY413, MN	2533003-21	Flow data are missing after 08/12/2025. Data may be recovered.
Fourth Quarter 2025		
ALB801, AB	2541007-01	Flow data flagged "C" and not treated as valid. Laboratory data appear reasonable.
ALB801, AB	2544007-01	November flow data not in data table.
BEL116, MD	2544001-03	Due to power failure.
KNZ184, KS	2543001-25	Invalidated due to suspect data.
MAR013, FL	2542006-03	Due to power failure.
UVL124, MI	2543001-44	Flow data flagged "C" for 2 days of this week and not treated as valid.

Table 22 Field Problems Affecting Data Collection

Days to Resolution	Problem Count
First Quarter 2025	
30	223
60	8
90	2
Unresolved by End of Quarter	10
Second Quarter 2025	
30	217
60	6
90	0
Unresolved by End of Quarter	3
Third Quarter 2025	
30	309
60	8
90	1
Unresolved by End of Quarter	5
Fourth Quarter 2025	
30	275
60	10
90	1
Unresolved by Date of Publication	14

Table 23 Field Calibration Failures by Parameter for 2025

Site ID	Reason
First Quarter 2025	
CNS011, FL	Humidity
IRL141, FL	Temperature, Ambient; Delta Temperature, Ambient
Second Quarter 2025	
HOX148, MI	Temperature, Ambient
UMA009, WA	Temperature, Zero; Temperature, Ambient
Third Quarter 2025	
IRL141, FL	Temperature, Ambient; Delta Temperature, Ambient
BVL130, IL	Delta Temperature, Ambient
Fourth Quarter 2025	
HOX148, MI	Flow
NIC001, NY	Flow
UMA009, WA	Flow
WST109, NH	Temperature, Zero; Temperature, Ambient

Note: Per CASTNET project protocols, data for all parameters except flow are flagged as "suspect" (S) but still considered valid if the calibration criterion is not exceeded by more than its magnitude (i.e., if within two times the criterion). If flow calibrations fall within two times the criterion, these data are adjusted per approved protocol described in the CASTNET QAPP, (WSP, 2025). Please refer to Table 17 for documentation of the QC failures affecting the validity of ozone data.

Table 24 Accuracy results for 2025 Field Measurements

Parameter	Percent Within Criterion*
Flow rate	97.2
Wind speed < 5 m/s	100.0
Wind speed ≥ 5 m/s	100.0
Wind direction north	100.0
Wind direction south	100.0
Temperature (0°C)	98.2
Temperature (ambient)	94.5
Delta temperature (0°C)	100.0
Delta temperature (ambient)	70.0
Relative humidity	90.0
Precipitation	100.0
Solar radiation	100.0
Wetness (w/in 0.5 volts)	100.0

Notes: °C = degrees Celsius

m/s = meters per second

* = Per CASTNET project protocols, data are flagged as "suspect" (S) but still considered valid if the calibration criterion is not exceeded by more than its magnitude (i.e., if within two times the criterion). All calibration failures reported in 2025 for the indicated parameters were within two times the criterion with the exception of temperature at IRL141, FL, and WST109, NH; flow rate at NIC001, NY; flow rate and temperature at UMA009, WA; and relative humidity at CNS011, FL. Associated data were invalidated.

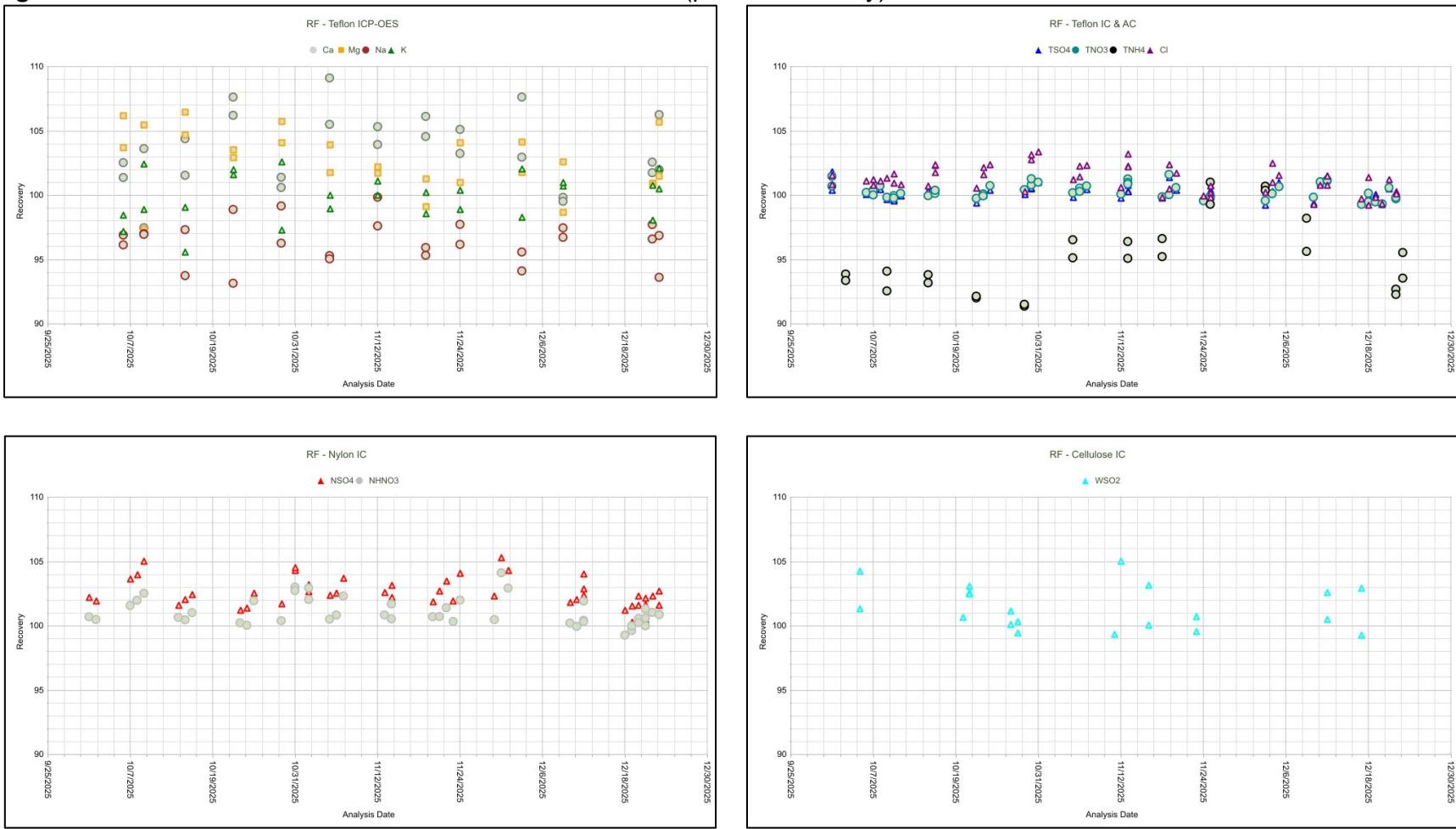
Figure 1 Reference Standard Results for Fourth Quarter 2025 (percent recovery)

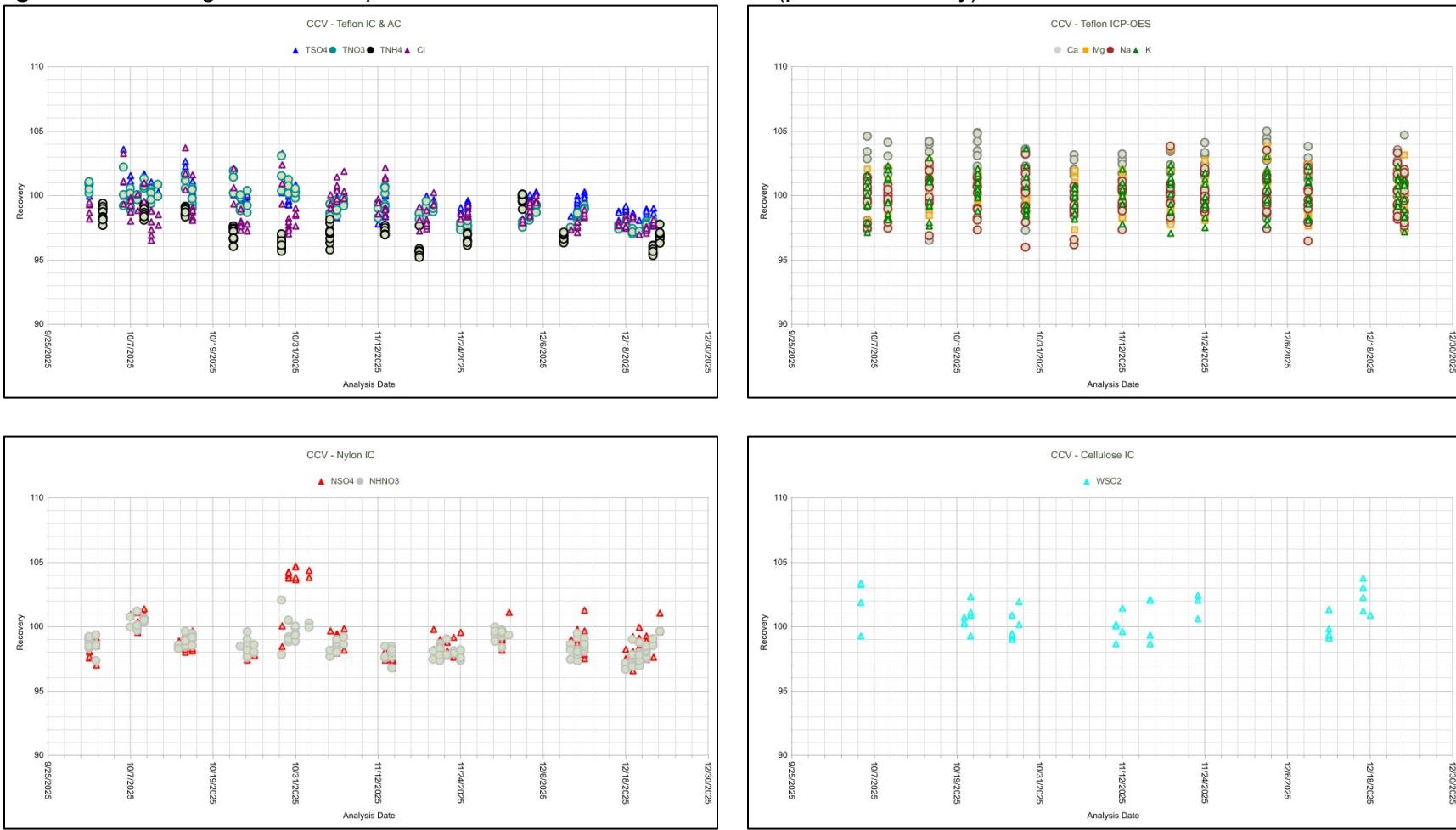
Figure 2 Continuing Calibration Spike Results for Fourth Quarter 2025 (percent recovery)

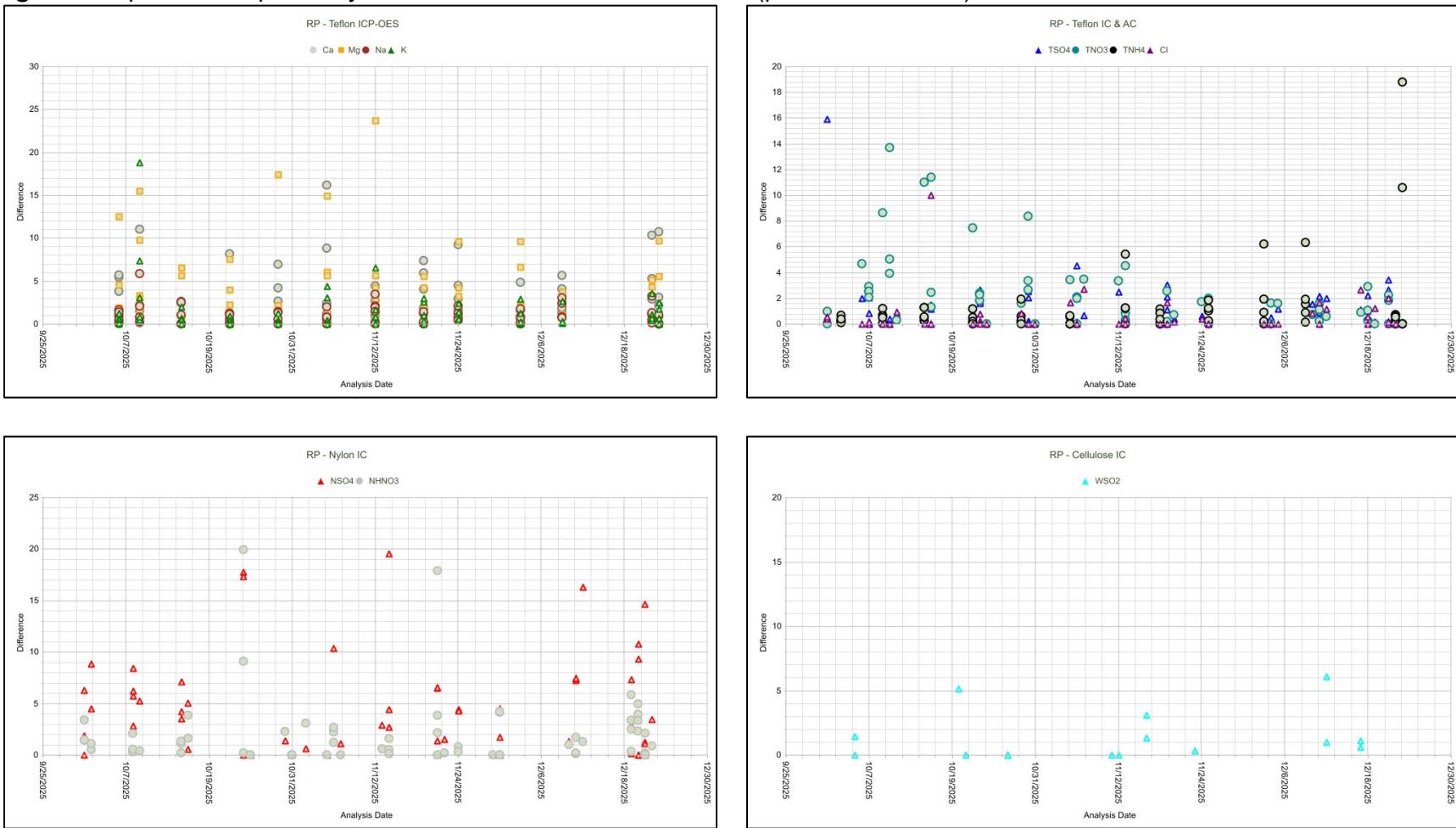
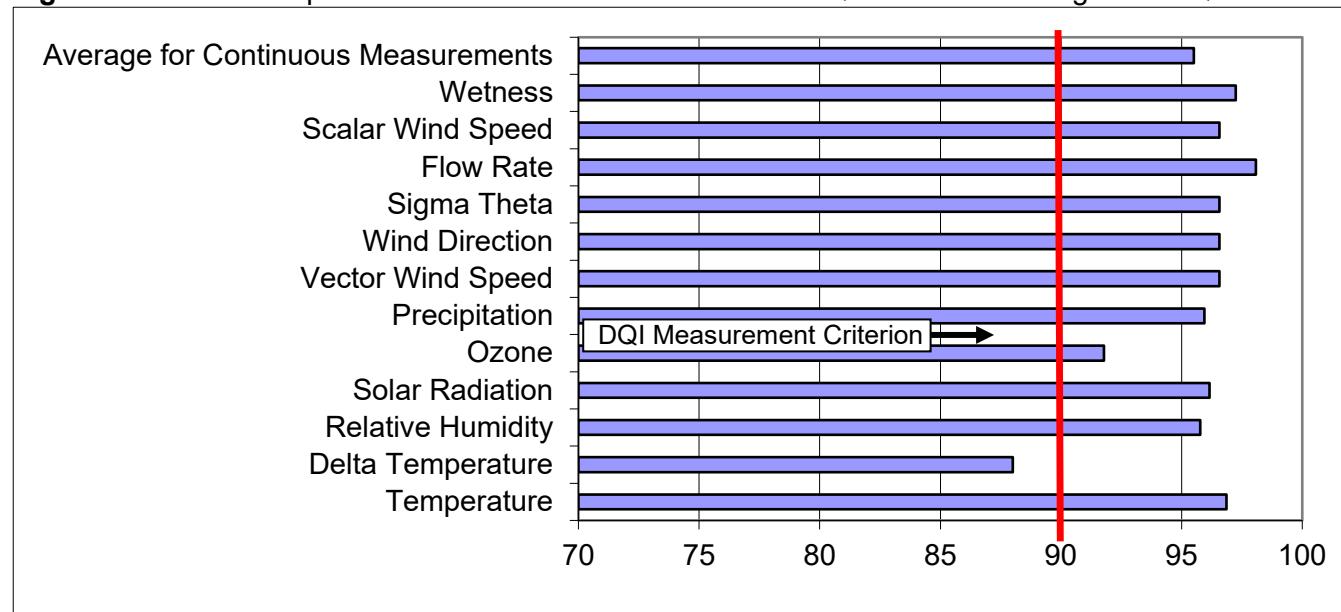
Figure 3 Replicate Sample Analysis Results for Fourth Quarter 2025 (percent difference)

Figure 4 Percent Completeness of Measurements for Second Quarter 2024 through Third Quarter 2025

Note: Presents Level 3 data available during the fourth quarter of 2025

Delta temperature percent completeness due to 58.5% comp at IRL141 and only 3 other sites reporting delta temperature.

IRL141, FL delta temperature affected by a loose wire August - October 2025 and a calibration failure in August 2025.

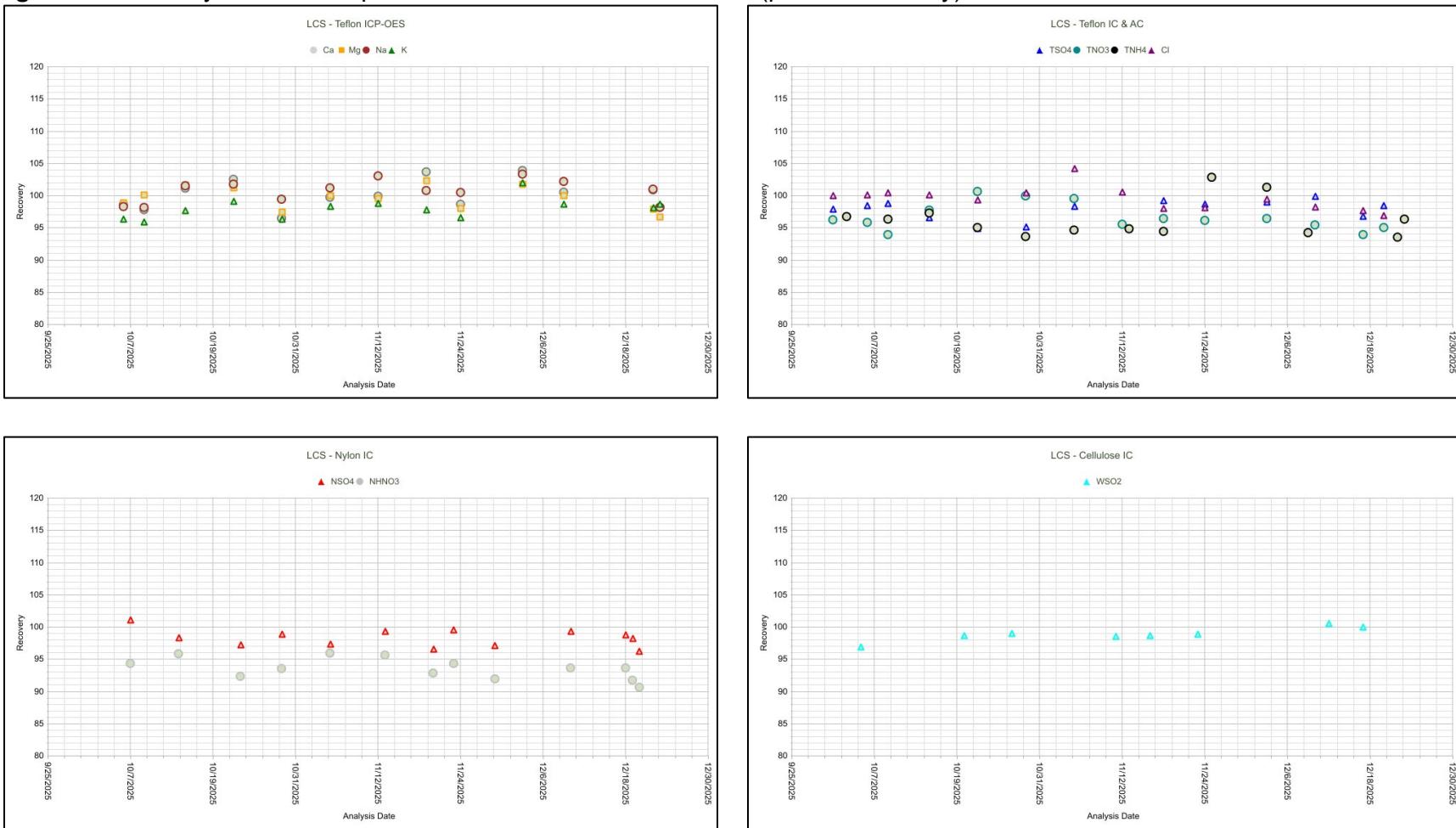
Figure 5 Laboratory Control Sample Results for Fourth Quarter 2025 (percent recovery)

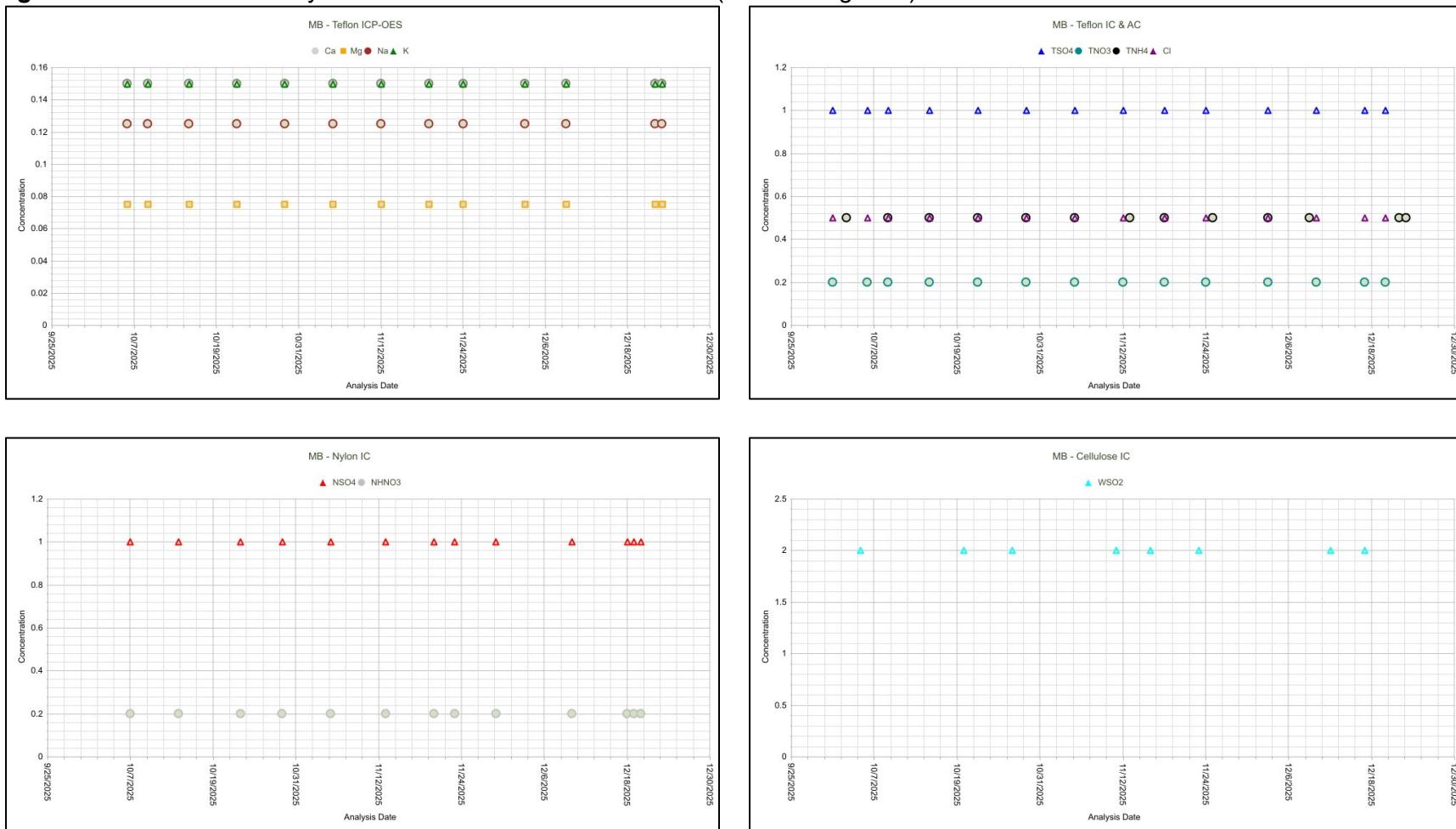
Figure 6 Method Blank Analysis Results for Fourth Quarter 2025 (total micrograms)

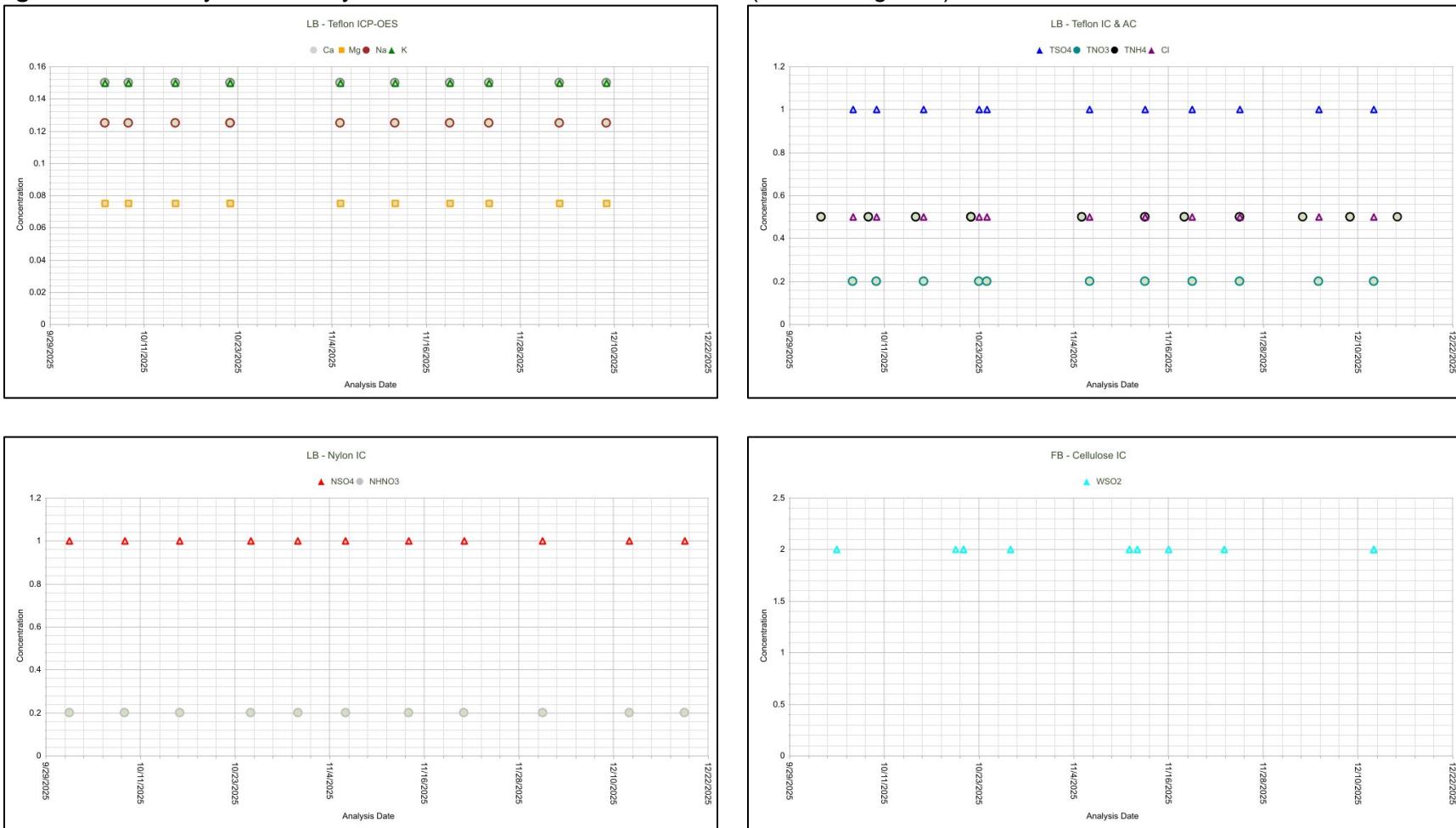
Figure 7 Laboratory Blank Analysis Results for Fourth Quarter 2025 (total micrograms)

Figure 8 Field Blank Analysis Results for Fourth Quarter 2025 (total micrograms)