

Clean Air Status and Trends Network

Quarterly Data Summary for First Quarter 2026 (January through March)

Prepared for: U.S. Environmental Protection Agency (EPA), Air Quality Assessment Division
EPA Contract No.: 68HERH21D0006
EPA Task Order No.: 68HERH25F0243, CASTNET Base Program (4003)
Prepared by: WSP Environment and Infrastructure Inc., Gainesville, Florida
WSP Project No.: US0045752.0110
Submitted: June 30, 2026

Introduction

This quarterly report summarizes the Clean Air Status and Trends Network (CASTNET) data collected during first quarter 2026. Trends in pollutants measured at eastern and western reference sites are shown. Results from the quality assurance/quality control (QA/QC) program are presented for first quarter data and include completeness and precision of filter concentrations and hourly ozone (O_3) concentrations. This report also analyzes data for continuous, trace-level total reactive oxides of nitrogen (NO_y) from the five sites that were operational during first quarter. Other QC statistics are given in the CASTNET First Quarter 2026 Quality Assurance Report (WSP, 2026).

Figure 1. Fourth Highest Maximum Daily Average 8-hour O_3 Concentrations (ppb) for 2026 through March 31, 2026

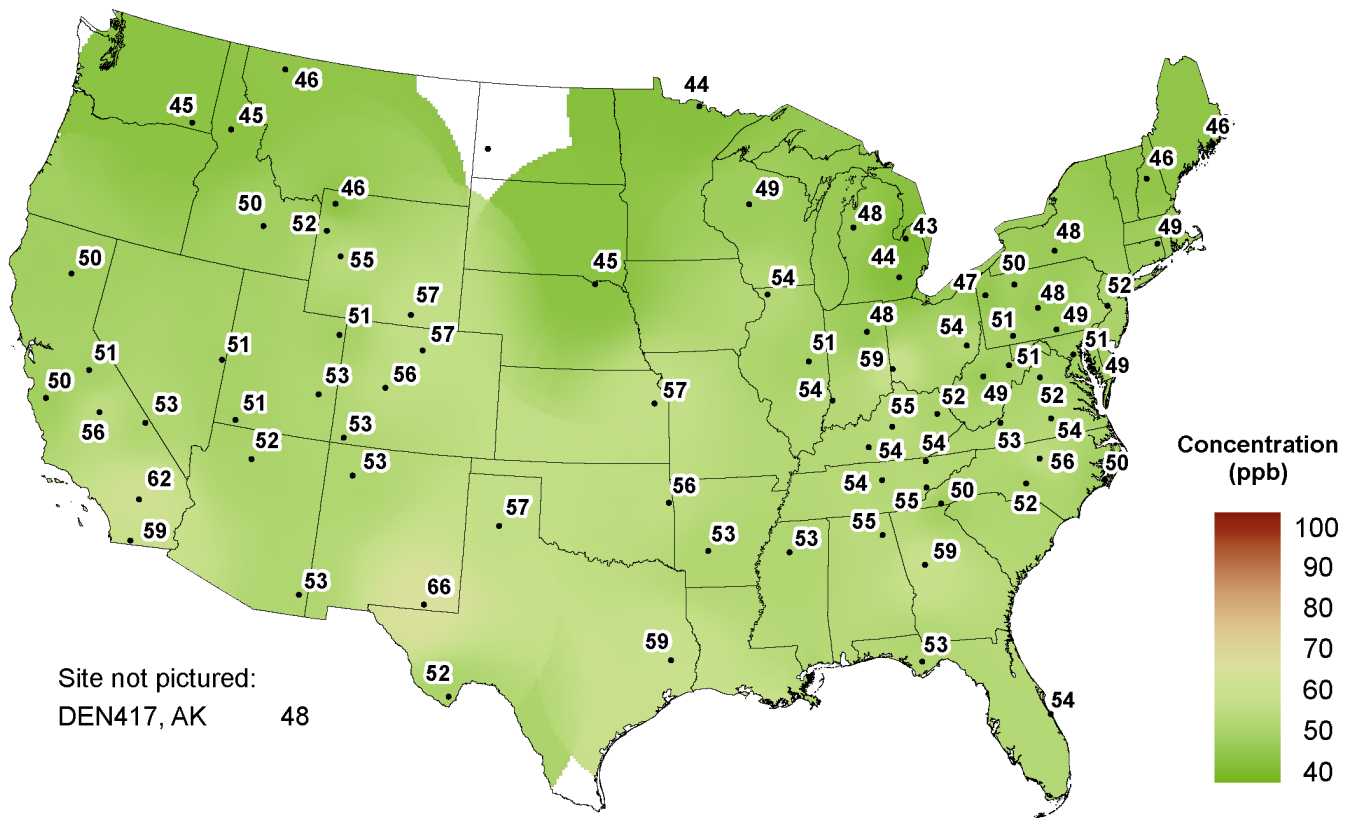


Figure 1 shows the fourth highest maximum daily average eight-hour (MDA8) O₃ concentrations in parts per billion (ppb) measured through first quarter 2026. No sites exceeded the 0.070 parts per million (70 ppb in practice) National Ambient Air Quality Standards for O₃.

Trends

First Quarter Concentrations

Trend analyses were performed based on filter pack pollutant concentrations measured in micrograms per cubic meter (µg/m³) of air at the 27 eastern and 16 western reference sites during first quarter. Quarterly concentrations of nitric acid (HNO₃), nitrate (NO₃⁻), ammonium (NH₄⁺), total NO₃⁻, sulfate (SO₄²⁻), chloride (Cl⁻), calcium (Ca²⁺), potassium (K⁺), magnesium (Mg²⁺), sodium (Na⁺), and O₃ concentrations were analyzed using box plots. Plots were constructed by averaging all valid concentrations for all eastern and western reference sites. The percent change in first quarter mean filter pack concentrations and O₃ concentrations at eastern and western reference sites from 2025 to 2026 are shown in Table 1. Trends in quarterly mean filter pack and O₃ concentrations are shown using box plots in Figures 2 through 12.

Table 1. Percent Change in Concentrations from First Quarter 2025 to First Quarter 2026

	O ₃	Total NO ₃ ⁻	NH ₄ ⁺	SO ₄ ²⁻	Ca ²⁺	K ⁺	Mg ²⁺	Na ⁺	Cl ⁻
Eastern	-2	11	11	6	-15	8	-5	14	13
Western	-5	-15	15	19	-19	-24	-27	-28	-42

Figure 2. Trends in First Quarter Mean HNO₃ Concentrations

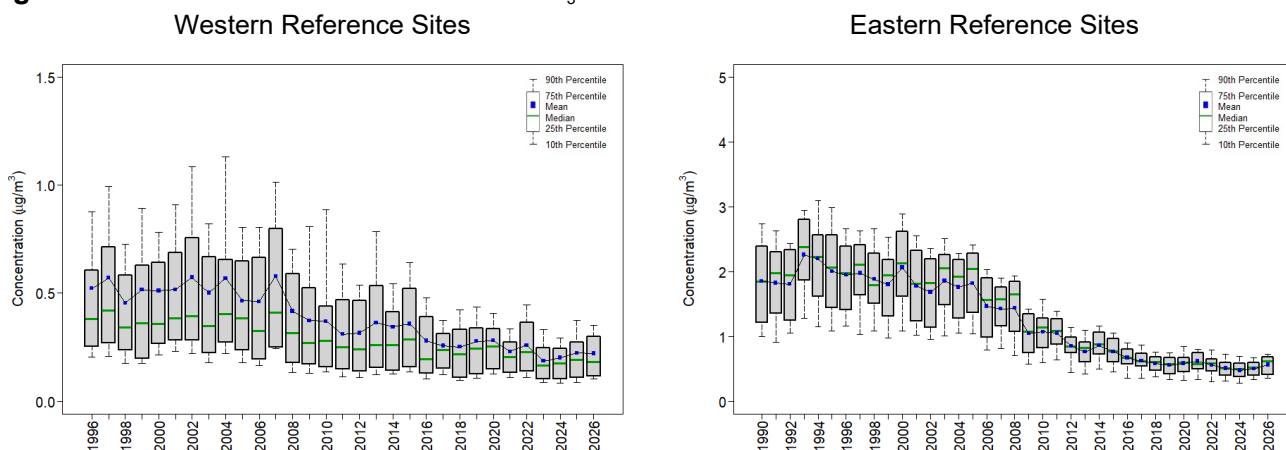
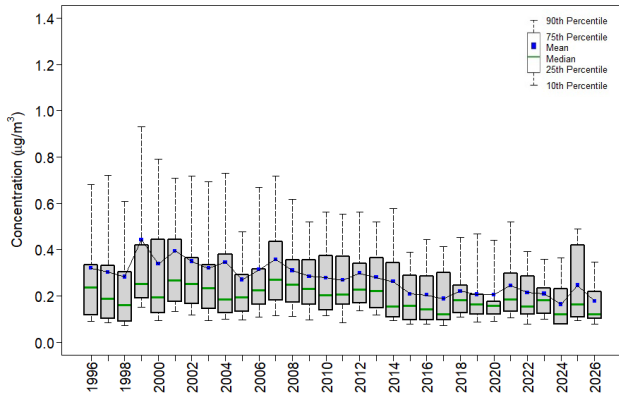


Figure 3. Trends in First Quarter Mean NO₃ Concentrations
Western Reference Sites



Eastern Reference Sites

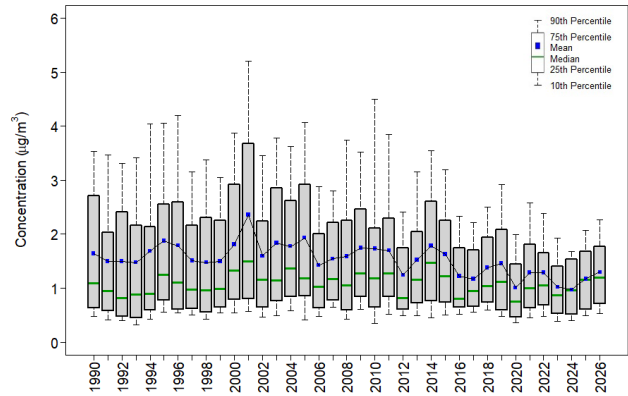
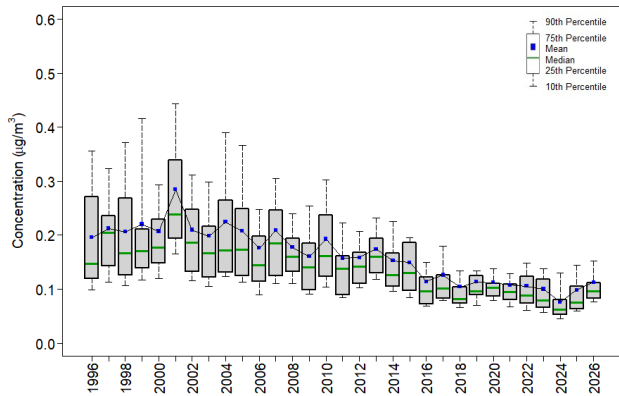


Figure 4. Trends in First Quarter Mean NH₄⁺ Concentrations
Western Reference Sites



Eastern Reference Sites

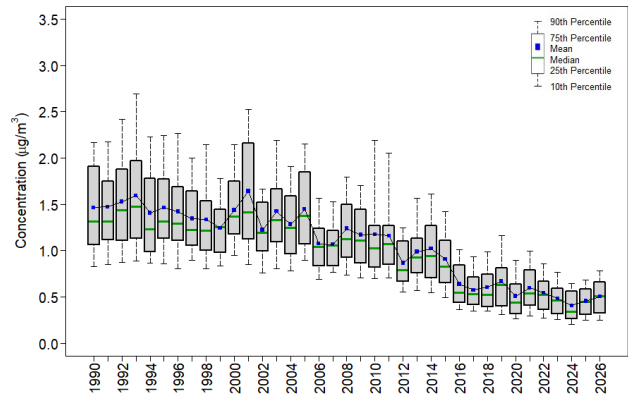
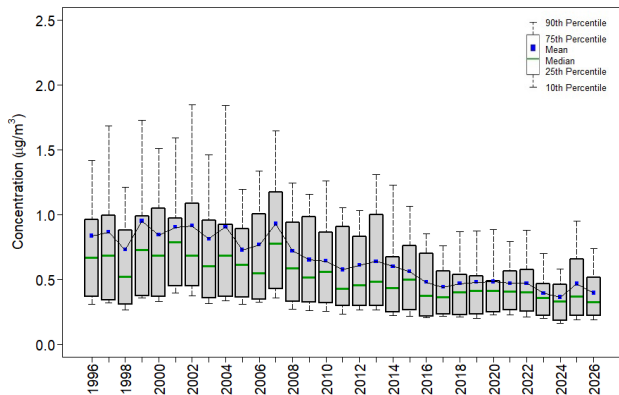


Figure 5. Trends in First Quarter Mean Total NO₃ Concentrations
Western Reference Sites



Eastern Reference Sites

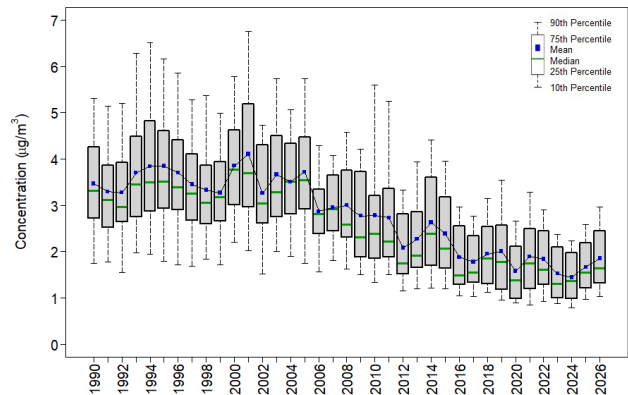
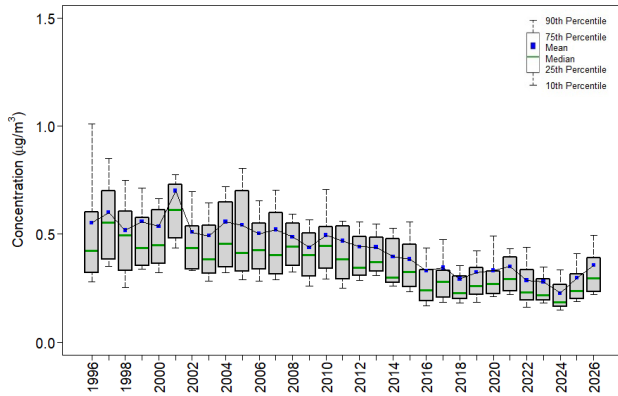


Figure 6. Trends in First Quarter Mean SO₄²⁻ Concentrations
Western Reference Sites



Eastern Reference Sites

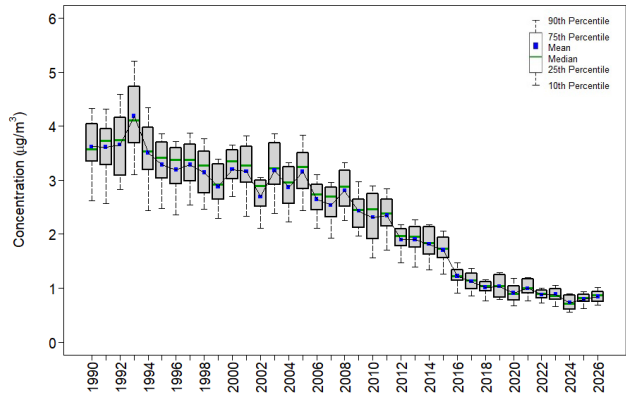
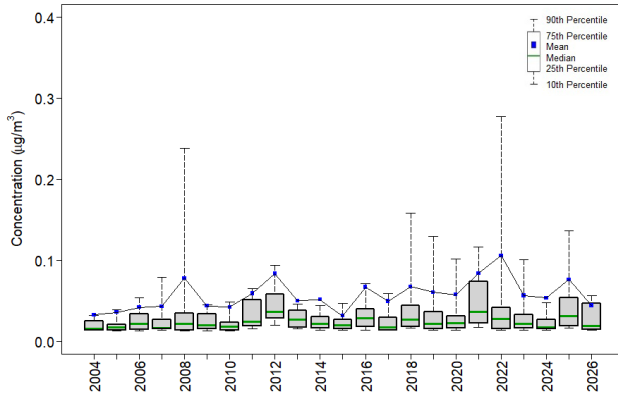


Figure 7. Trends in First Quarter Mean Cl⁻ Concentrations
Western Reference Sites



Eastern Reference Sites

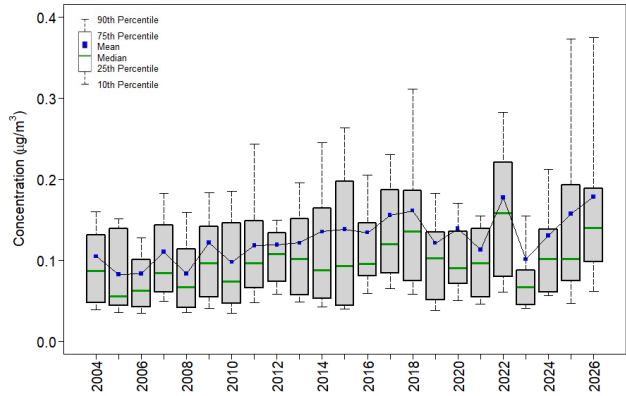
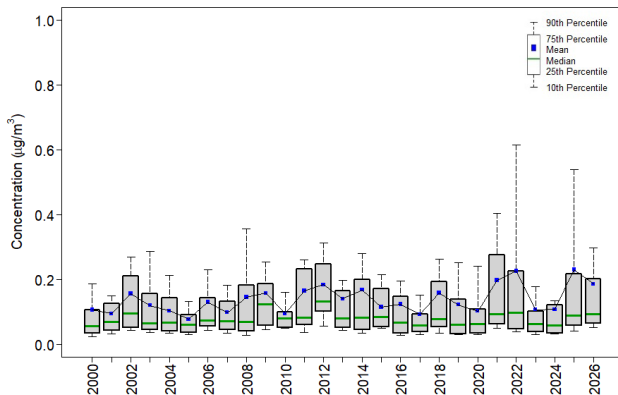


Figure 8. Trends in First Quarter Mean Ca²⁺ Concentrations
Western Reference Sites



Eastern Reference Sites

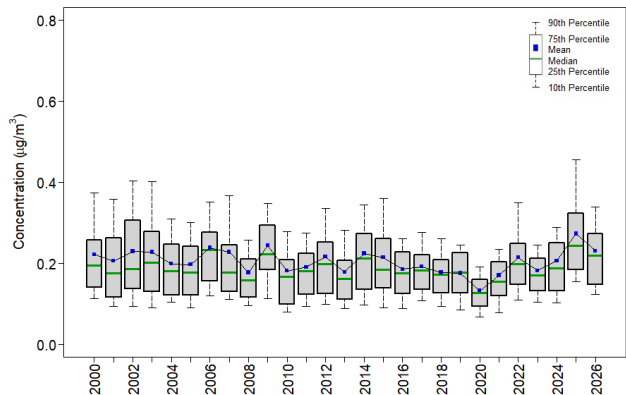
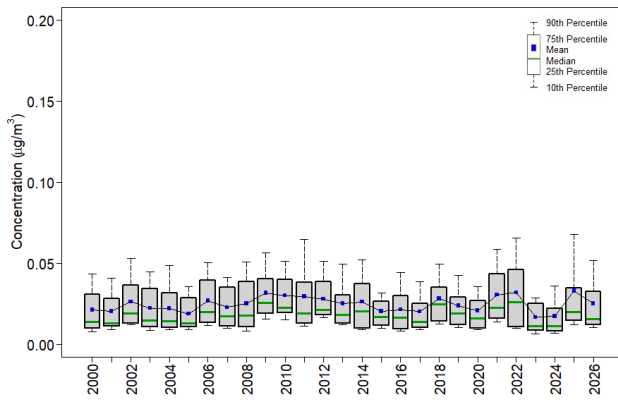


Figure 9. Trends in First Quarter Mean K^+ Concentrations
Western Reference Sites



Eastern Reference Sites

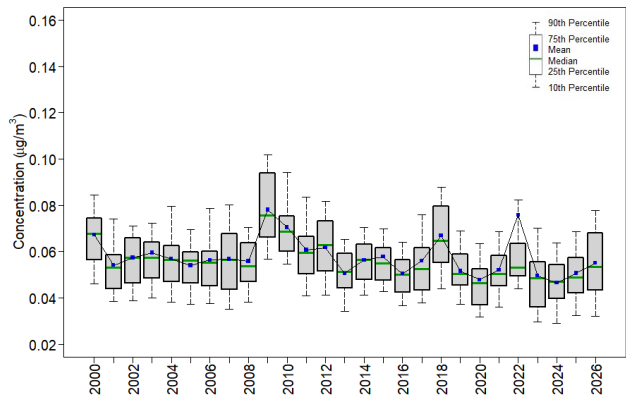
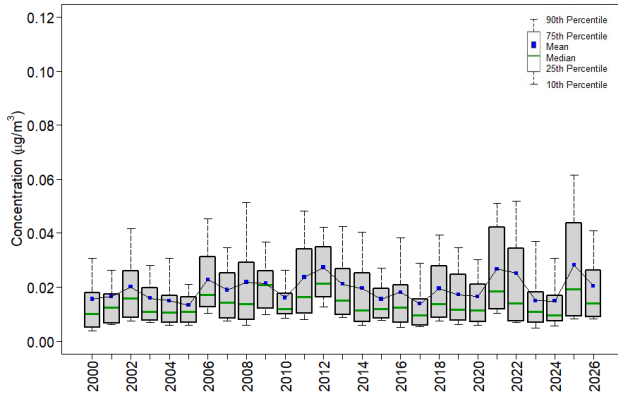


Figure 10. Trends in First Quarter Mean Mg^{2+} Concentrations
Western Reference Sites



Eastern Reference Sites

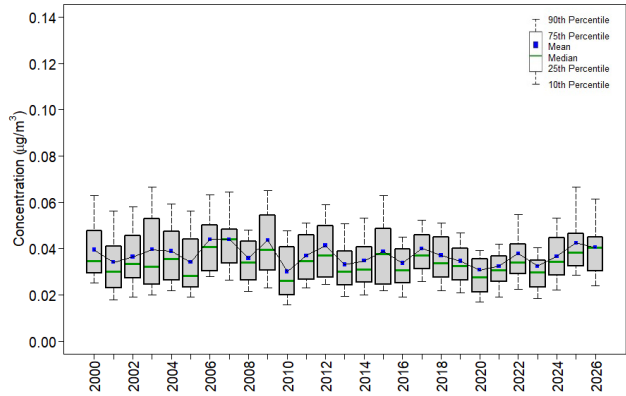
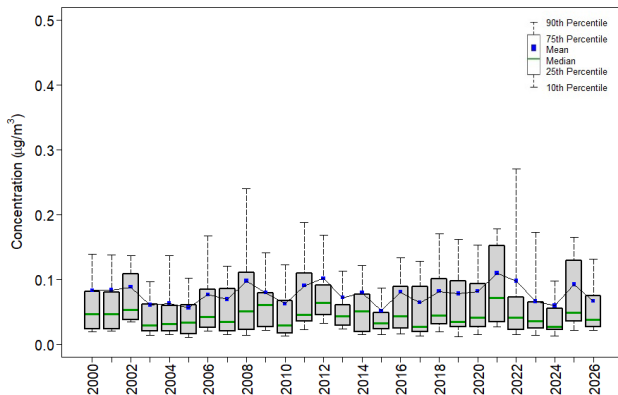


Figure 11. Trends in First Quarter Mean Na^+ Concentrations
Western Reference Sites



Eastern Reference Sites

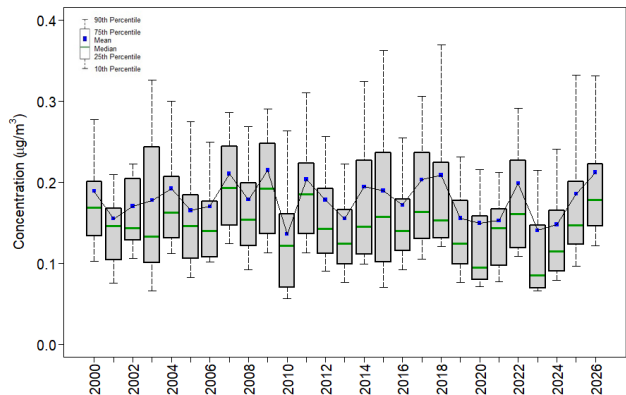
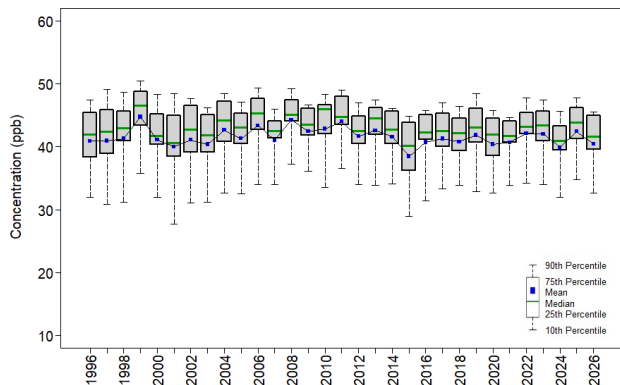
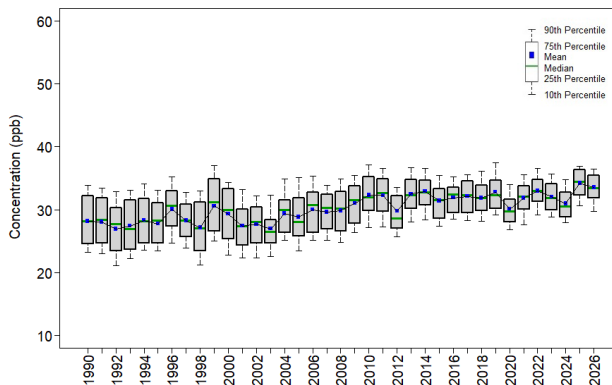


Figure 12. Trends in First Quarter Mean O₃ Concentrations
Western Reference Sites



Eastern Reference Sites



Changes in Three-Year Average First Quarter Concentrations

Tables 2 and 3 summarize changes in three-year averages of quarterly mean concentrations of O₃, total NO₃⁻, NH₄⁺, and SO₄²⁻ over the period 1990–1992 and 2024–2026 for the eastern reference sites and 1996–1998 and 2024–2026 for the western reference sites. Changes in Ca²⁺, K⁺, Mg²⁺, Na⁺, and Cl⁻ concentrations are shown from 2004–2006 and 2024–2026.

Table 2. Eastern Reference Sites: Three-Year Mean Values (ppb or µg/m³)

	O ₃ (ppb)	Total NO ₃ ⁻	NH ₄ ⁺	SO ₄ ²⁻	Ca ²⁺	K ⁺	Mg ²⁺	Na ⁺	Cl ⁻
1990–1992	28	3.3	1.5	3.6					
2004–2006					0.21	0.06	0.04	0.18	0.09
2024–2026	33	1.7	0.5	0.8	0.24	0.05	0.04	0.18	0.15
Percent Change	19	-51	-70	-78	12	-9	2	3	72

Note: Ozone concentrations are given as ppb. Concentrations for all other parameters are in µg/m³.

Table 3. Western Reference Sites: Three-Year Mean Values (ppb or µg/m³)

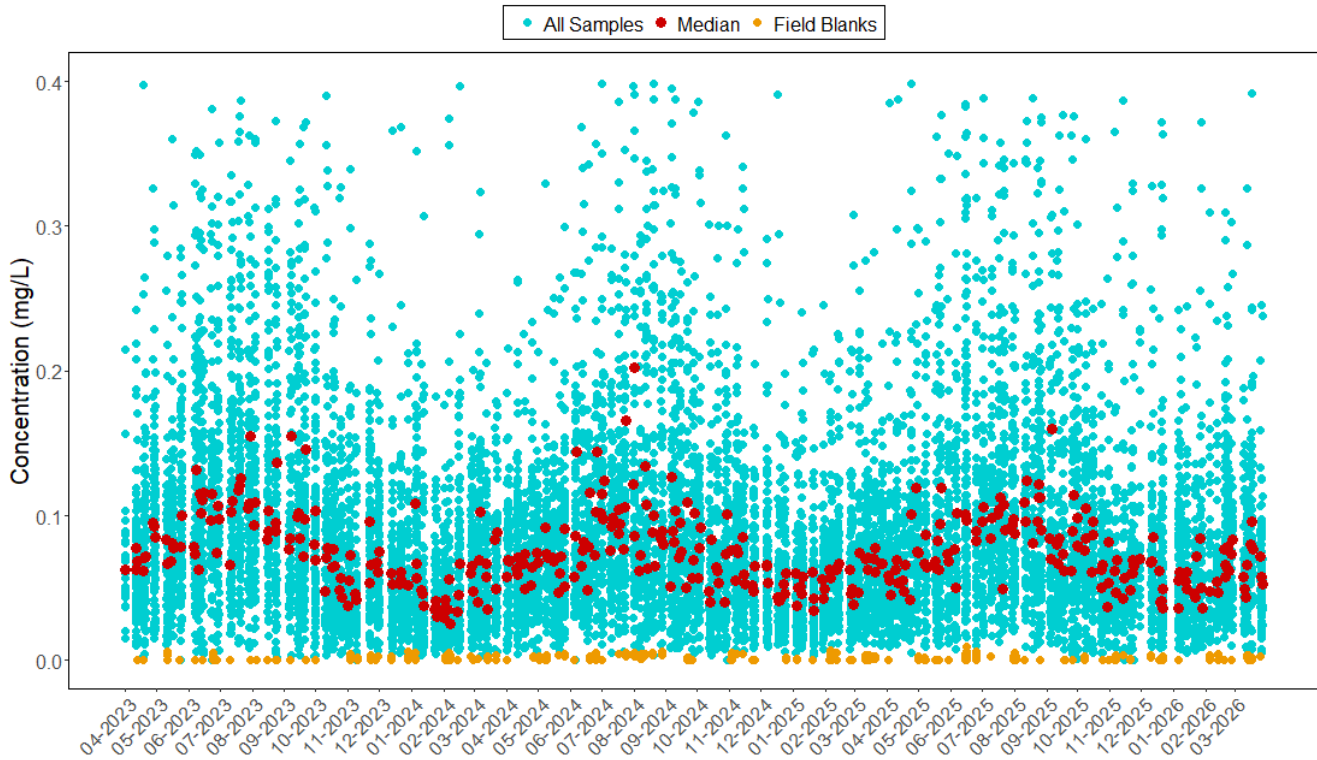
	O ₃ (ppb)	Total NO ₃ ⁻	NH ₄ ⁺	SO ₄ ²⁻	Ca ²⁺	K ⁺	Mg ²⁺	Na ⁺	Cl ⁻
1996–1998	41	0.8	0.2	0.6					
2004–2006					0.10	0.02	0.02	0.07	0.04
2024–2026	41	0.4	0.1	0.3	0.17	0.03	0.02	0.07	0.06
Percent Change	0	-50	-53	-47	68	11	25	11	58

Note: Ozone concentrations are given as ppb. Concentrations for all other parameters are in µg/m³.

Time Series of Laboratory Analysis Parameters for All Sites

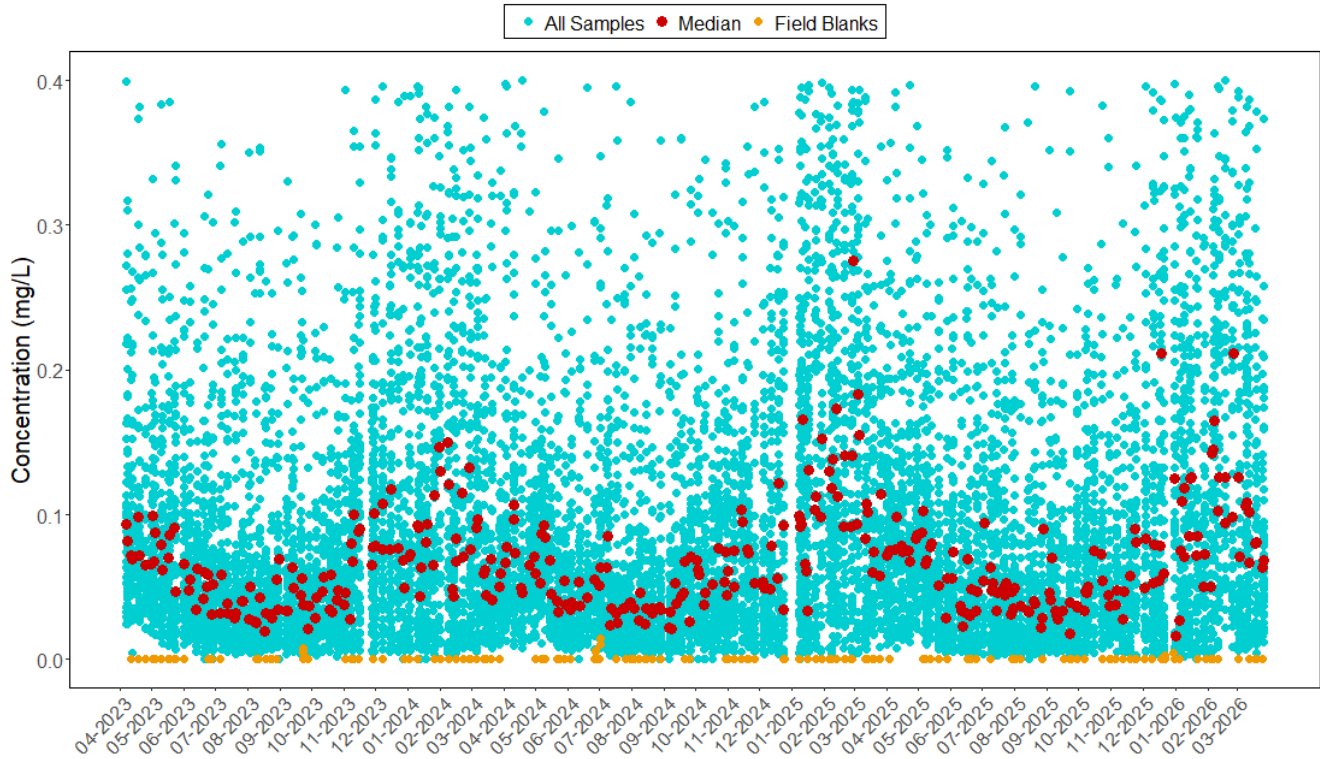
Time series of laboratory-analyzed concentrations of field samples and field blanks of 11 parameters are illustrated in Figures 13 through 23. Data points range from second quarter 2023 through first quarter 2026. Concentrations are measured in milligrams per liter (mg/L) of 11 parameters. These figures provide indications of potential issues with concentration measurements relative to detection and reporting limits.

Figure 13. Concentrations of NO₃⁻ (as N) from Nylon Filters



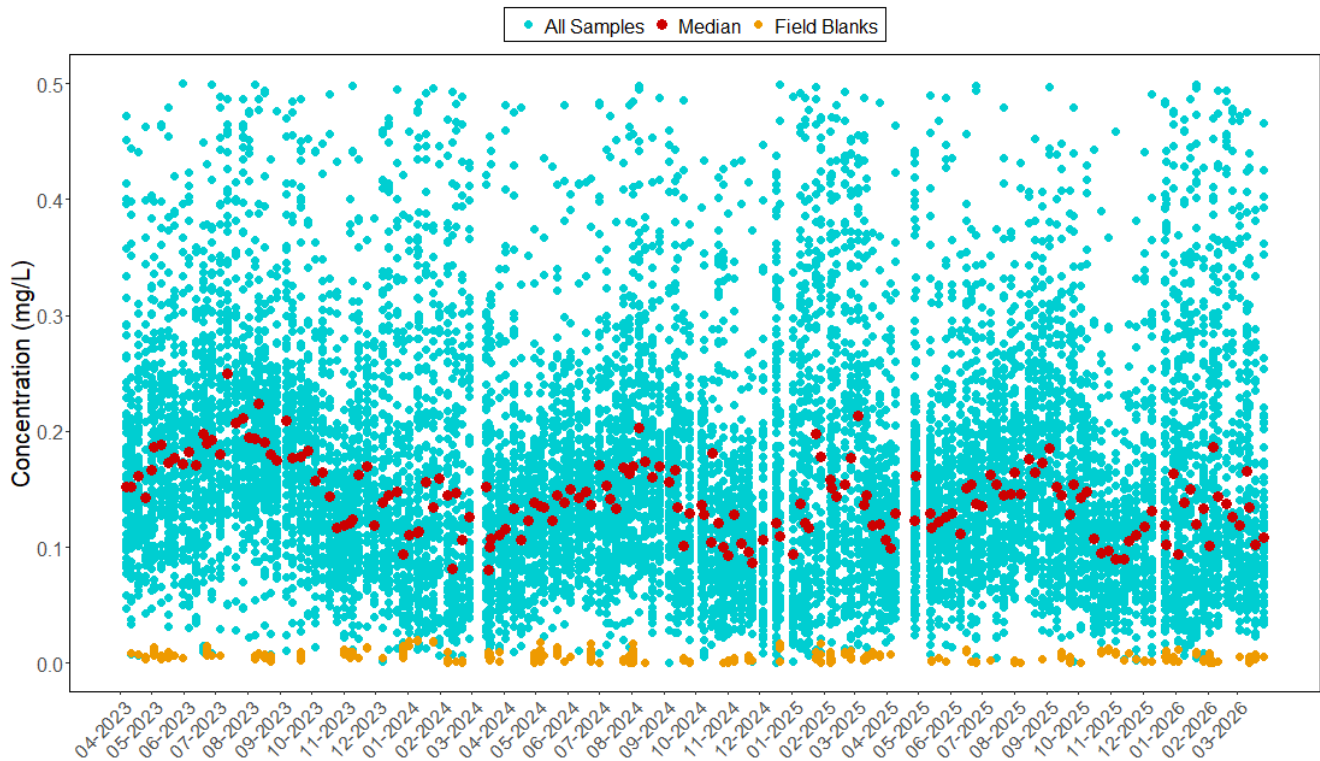
Note: Nominal reporting limit is 0.008 mg/L

Figure 14. Concentrations of NO₃ (as N) from Teflon Filters



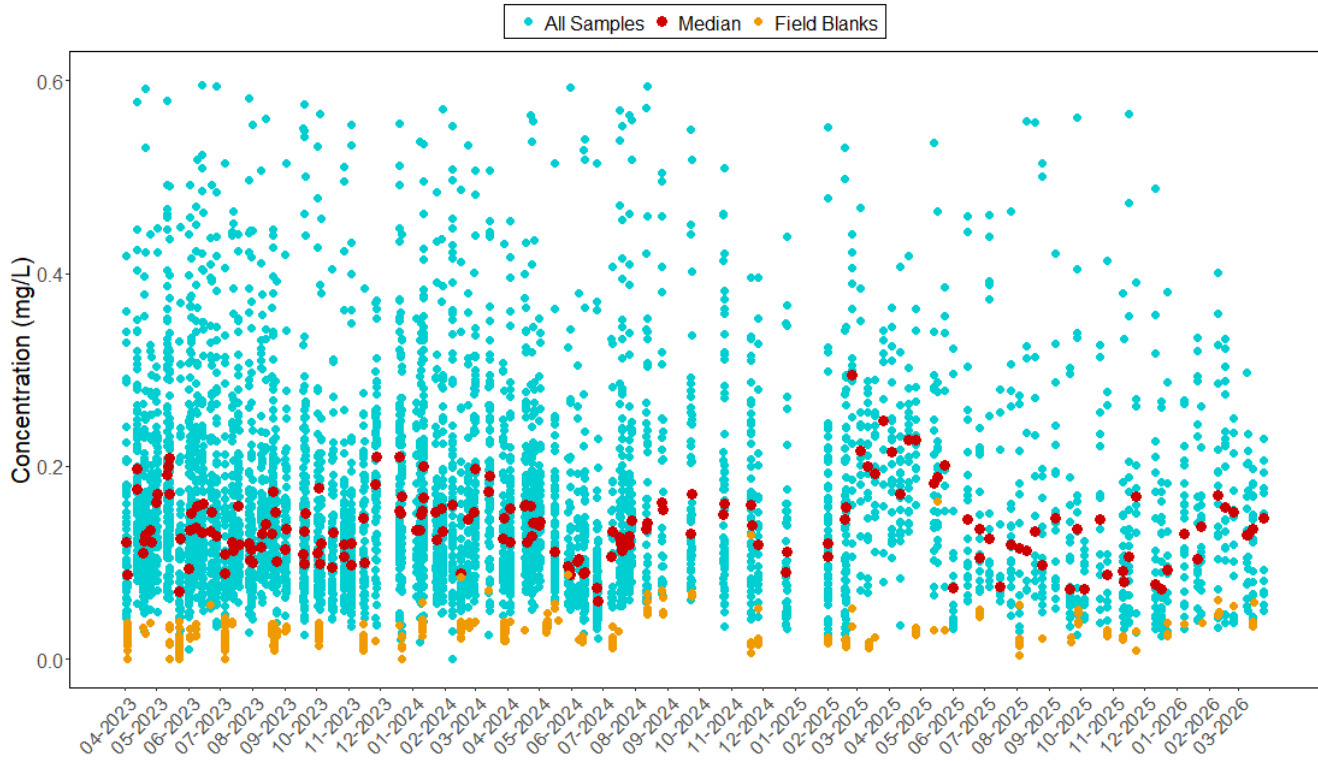
Note: Nominal reporting limit is 0.008 mg/L

Figure 15. Concentrations of NH₄⁺ (as N) from Teflon Filters



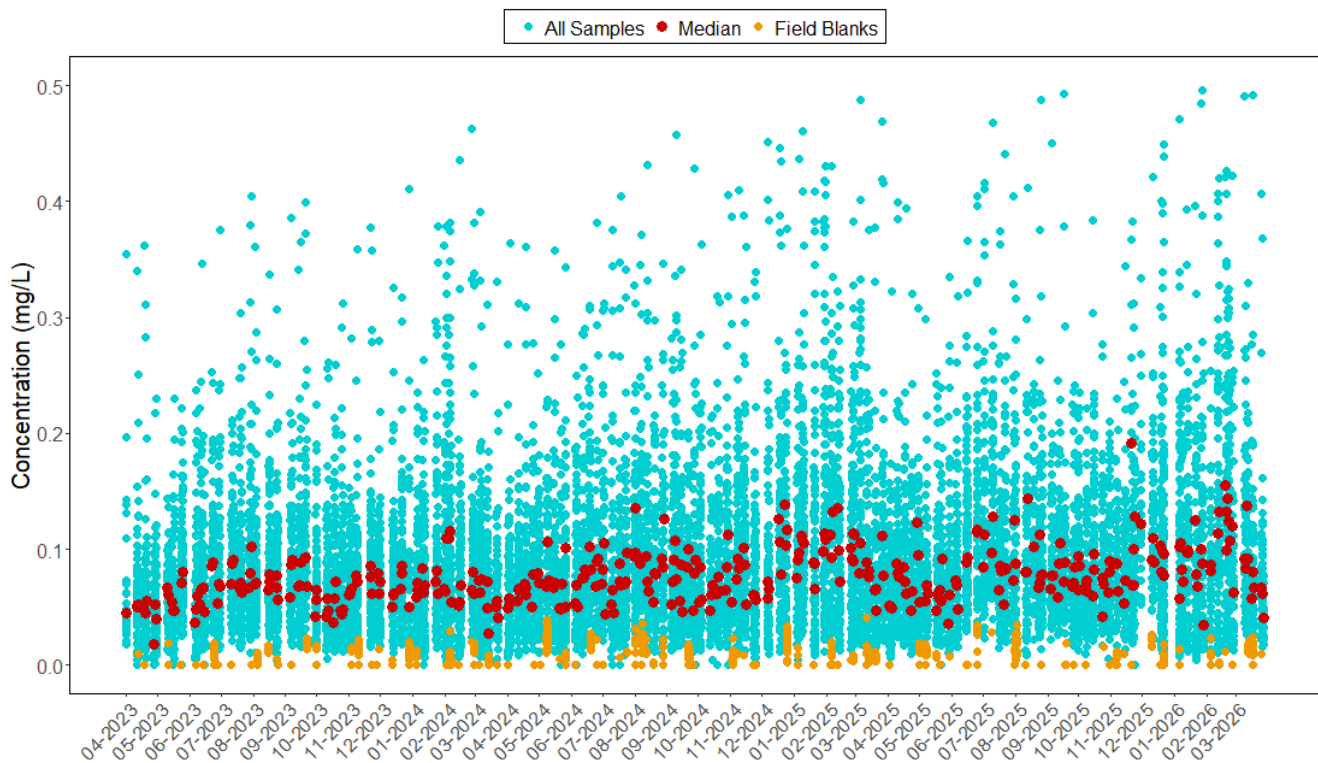
Note: Nominal reporting limit is 0.020 mg/L

Figure 16. Concentrations of SO₂ from Potassium Carbonate-impregnated Cellulose Filters



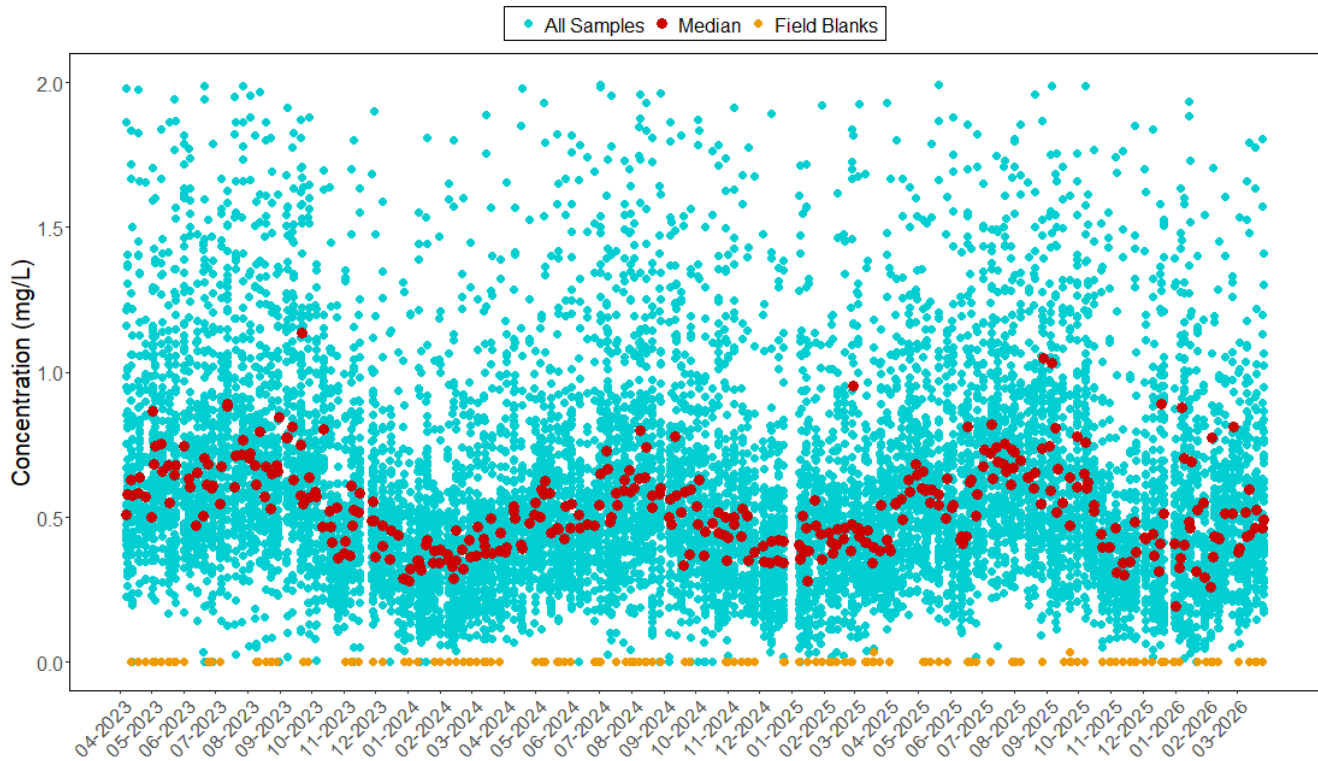
Note: Nominal reporting limit is 0.040 mg/L

Figure 17. Concentrations of SO₄²⁻ from Nylon Filters



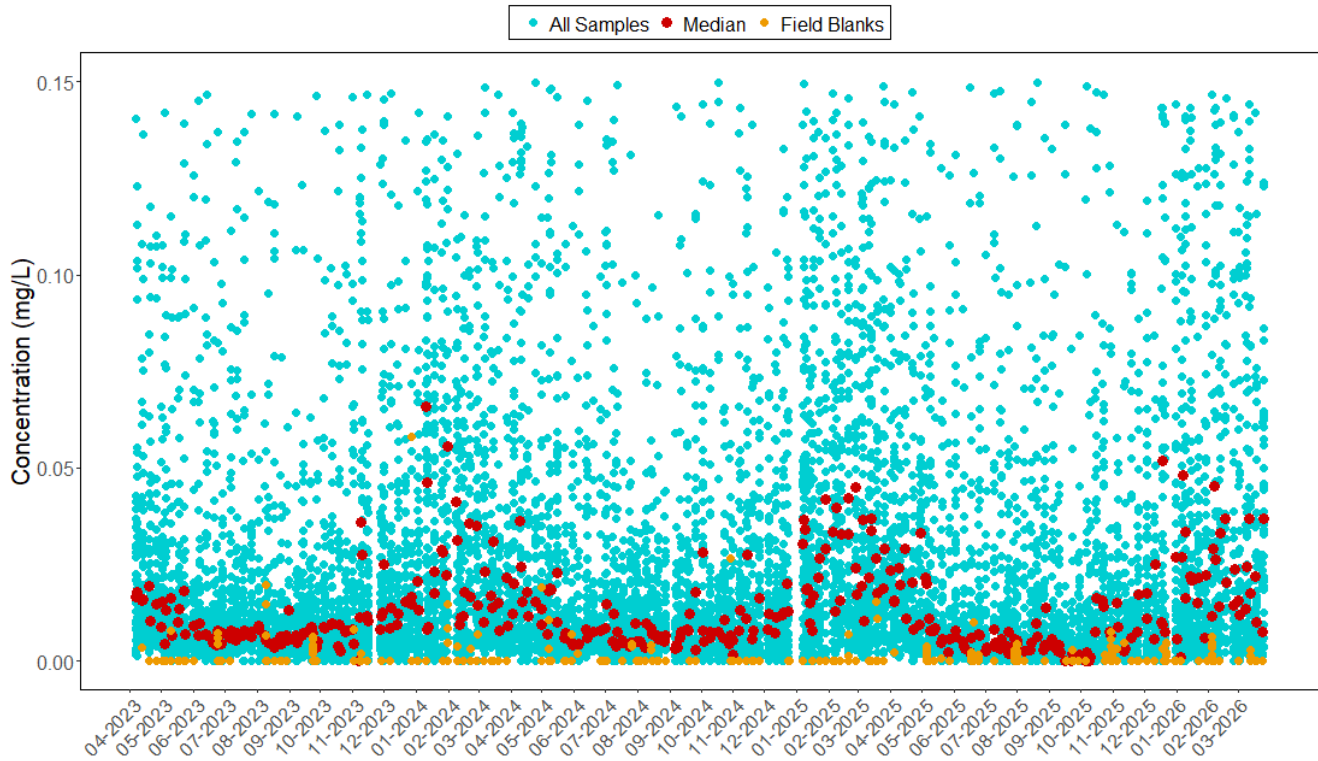
Note: Nominal reporting limit is 0.040 mg/L

Figure 18. Concentrations of SO₄²⁻ from Teflon Filters



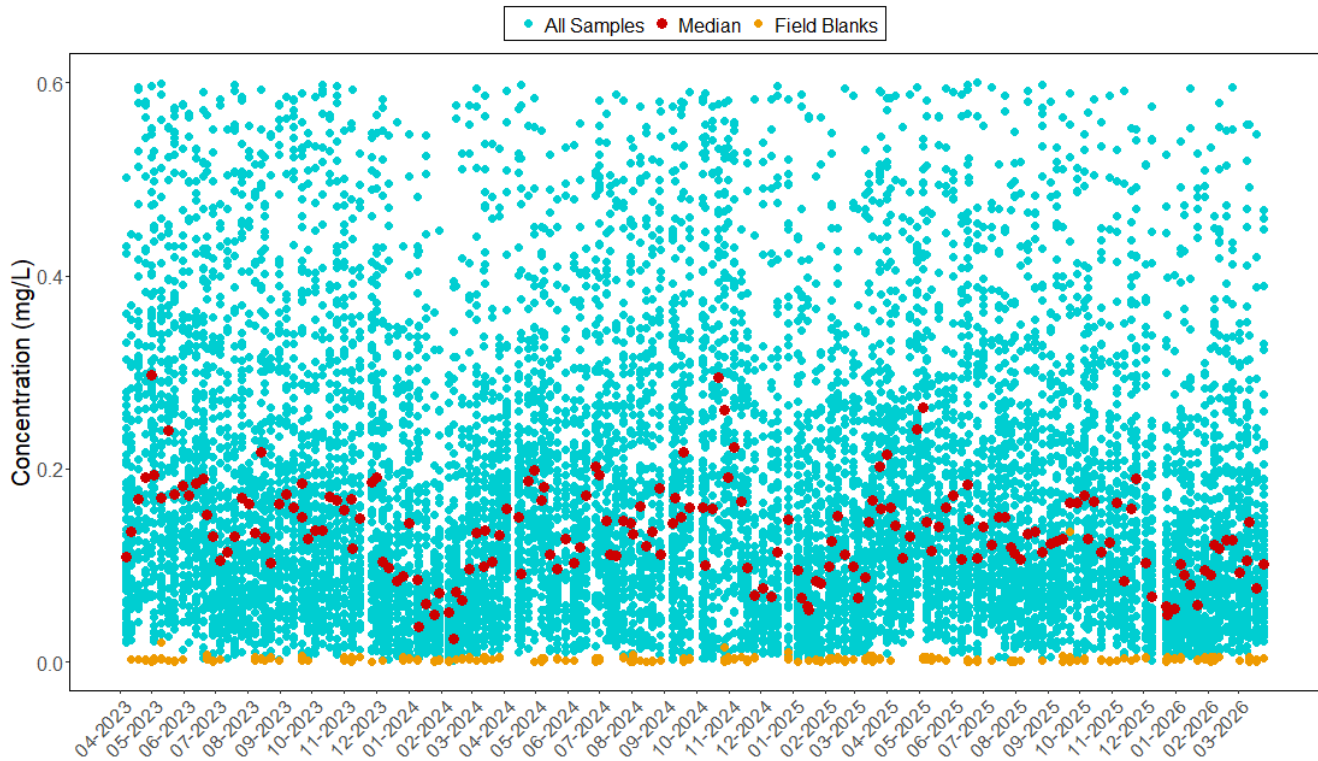
Note: Nominal reporting limit is 0.040 mg/L

Figure 19. Concentrations of Cl⁻ from Teflon Filters



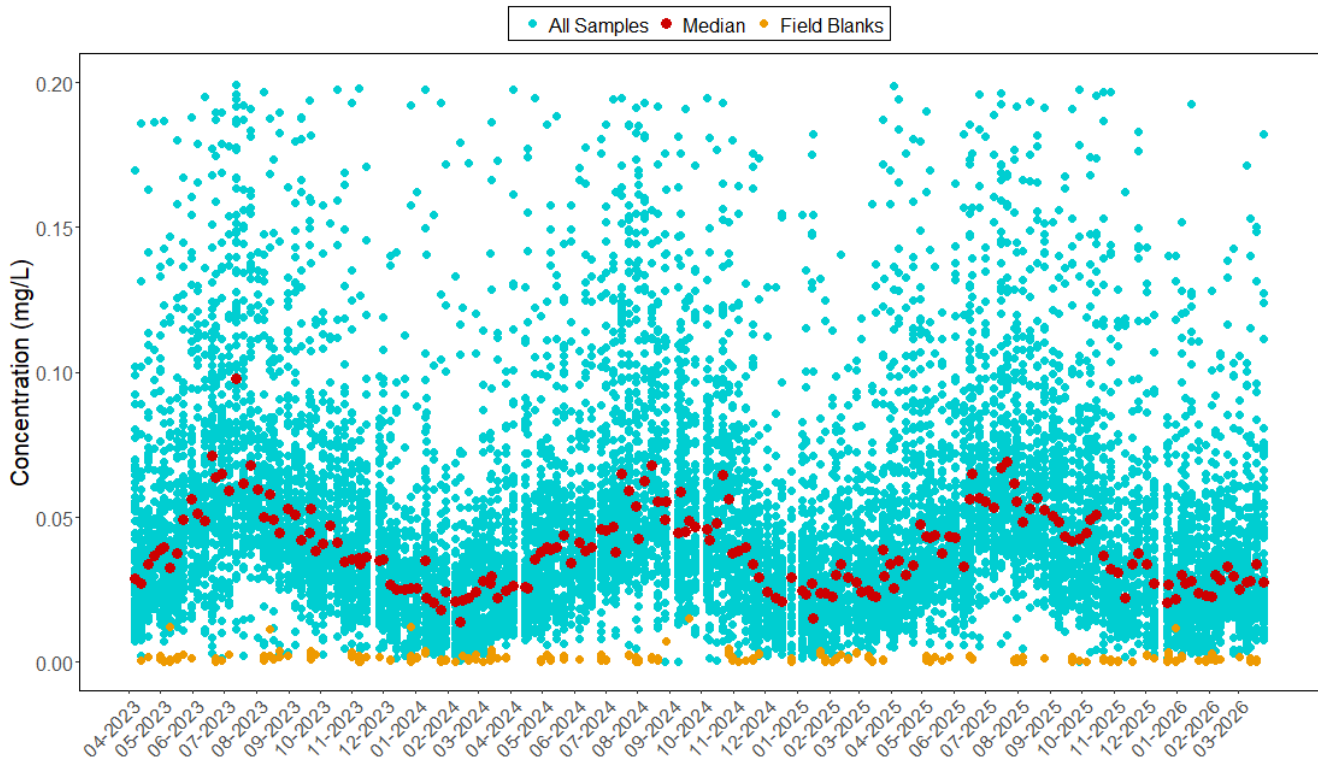
Note: Nominal reporting limit is 0.020 mg/L

Figure 20. Concentrations of Ca^{2+} from Teflon Filters



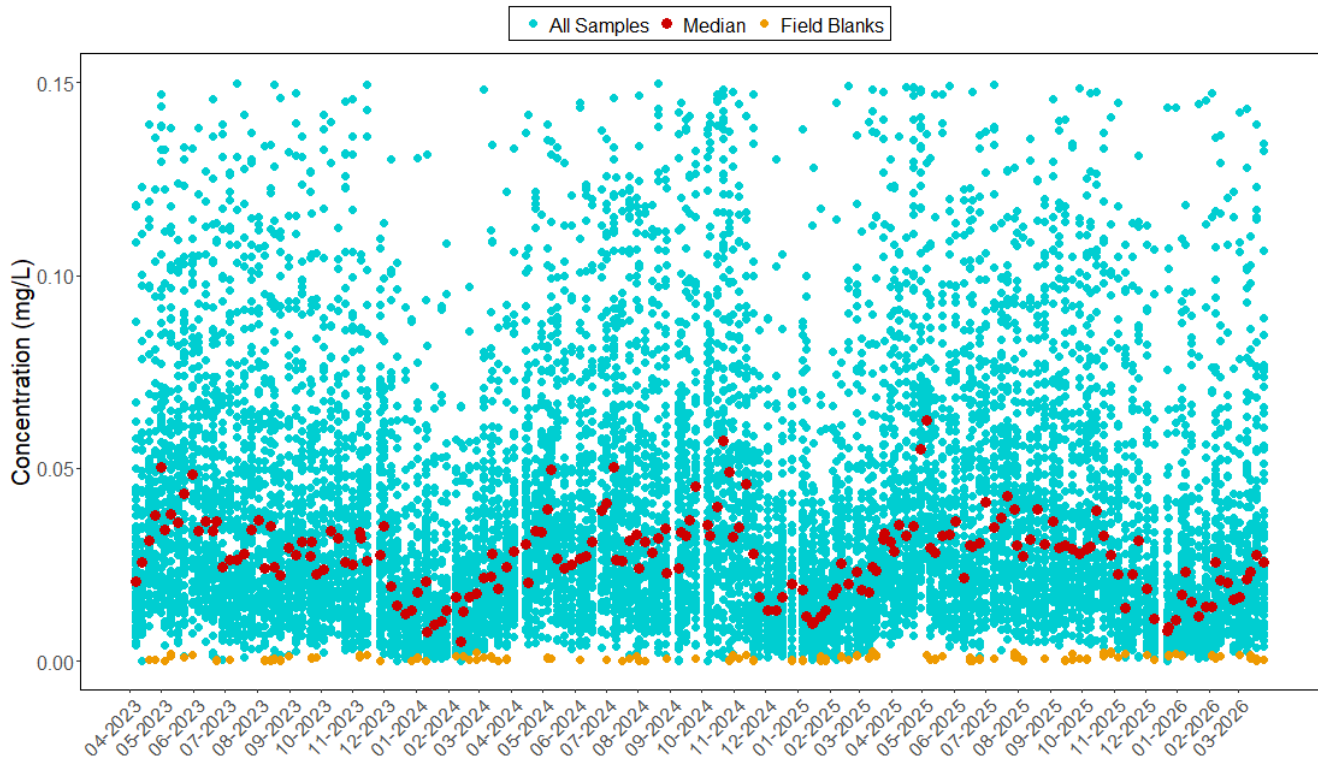
Note: Nominal reporting limit is 0.006 mg/L

Figure 21. Concentrations of K^+ from Teflon Filters



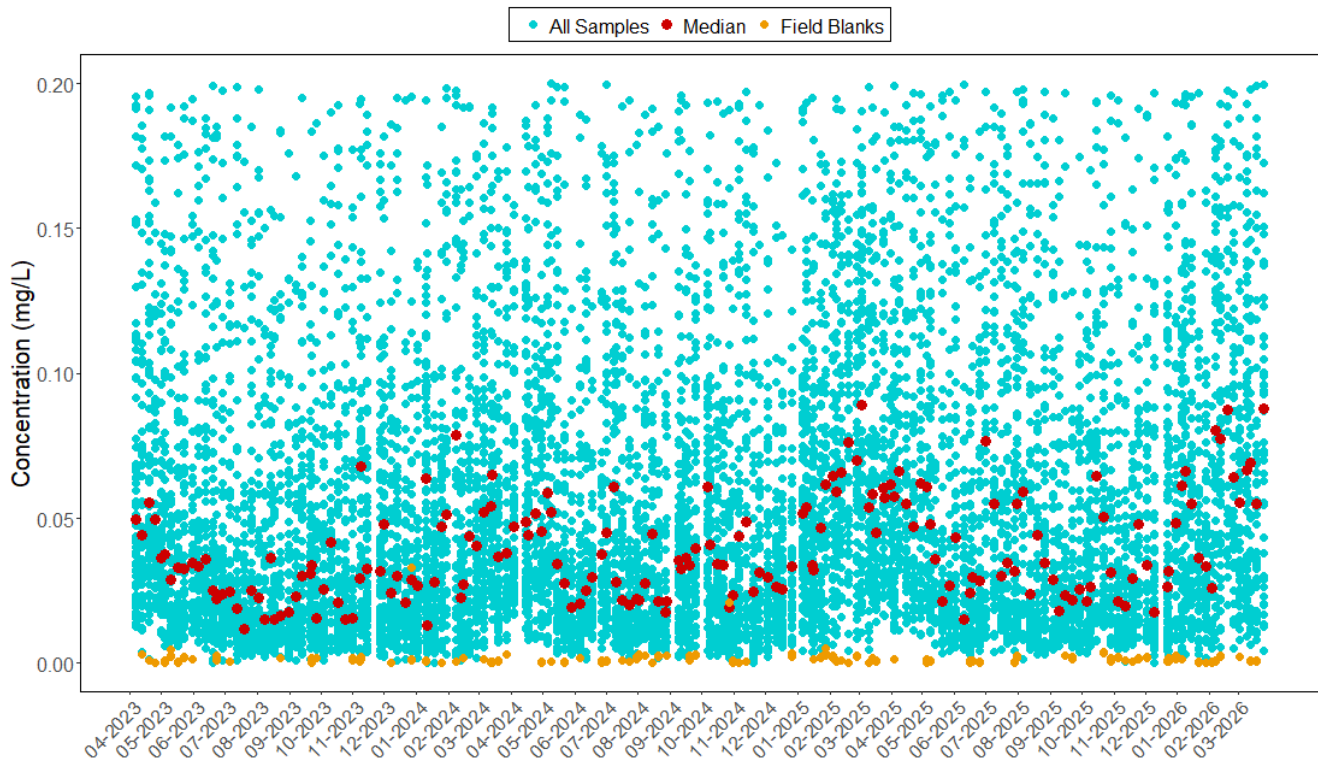
Note: Nominal reporting limit is 0.006 mg/L

Figure 22. Concentrations of Mg²⁺ from Teflon Filters



Note: Nominal reporting limit is 0.003 mg/L

Figure 23. Concentrations of Na⁺ from Teflon Filters



Note: Nominal reporting limit is 0.005 mg/L

Time Series of Concentration Differences from Co-located Sites

Figures 24 and 25 show time series of filter concentration differences between the two sets of co-located sites.

Figure 24. Filter Concentration Differences between MCK131 and MCK231, KY

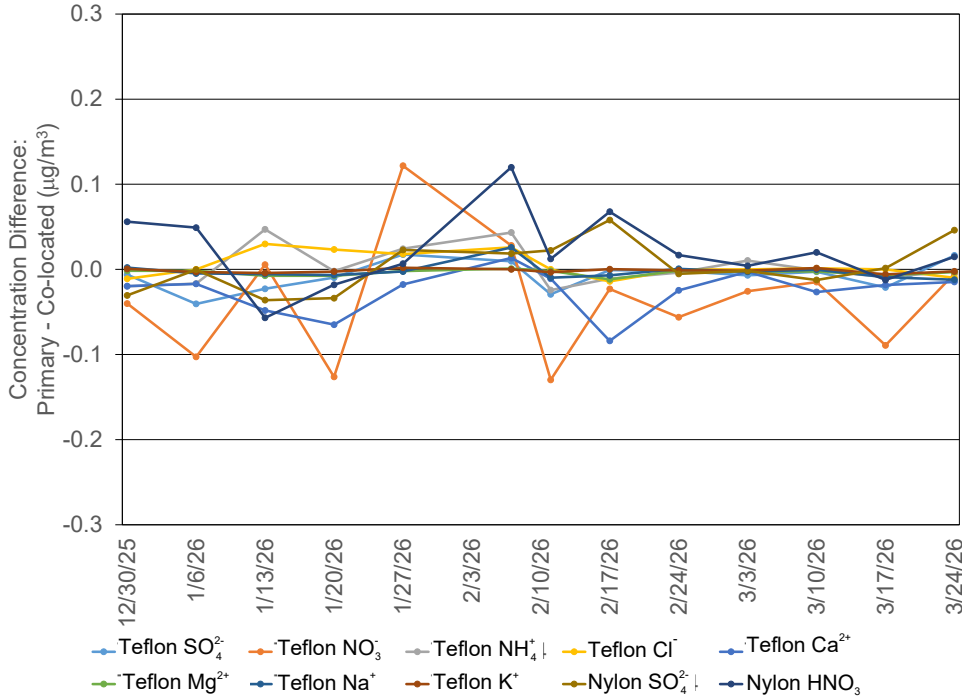
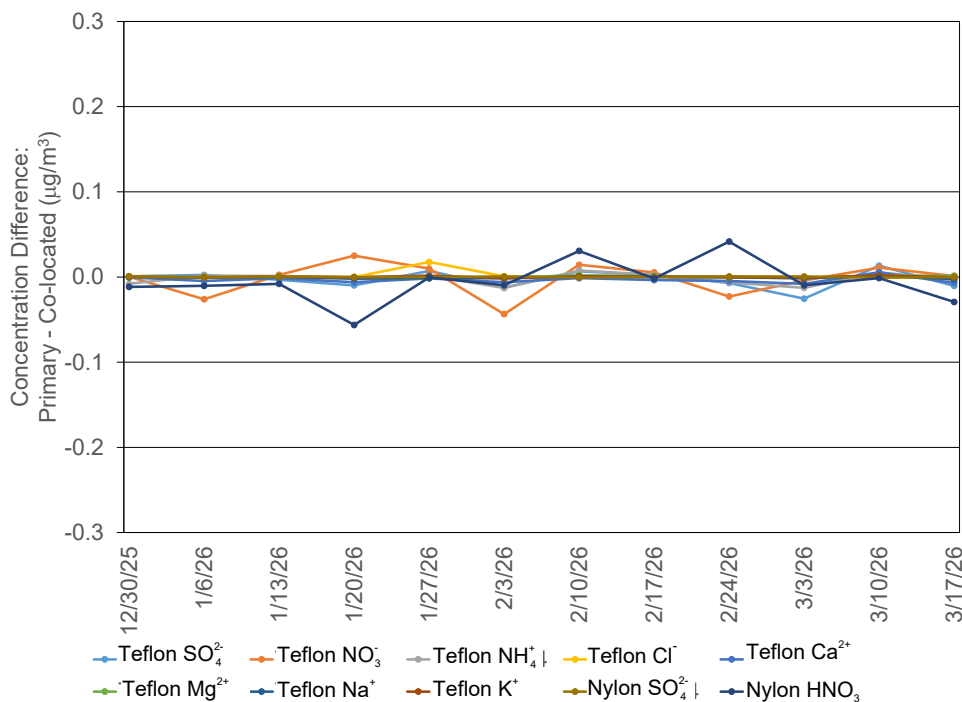


Figure 25. Filter Concentration Differences between ROM406 and ROM206, CO



Precision of Filter Pack Concentrations

Table 4 shows mean absolute relative percent differences (MARPD) for concentrations measured at MCK131/231, KY and ROM406/206, CO during first quarter 2026. The MARPD values met the 20 percent criterion.

Table 4. Precision (MARPD) for Co-located Filter Pack Data during First Quarter 2026

	Total NO ₃ ⁻	HNO ₃	NO ₃ ⁻	NH ₄ ⁺	SO ₄ ²⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	Cl ⁻
MCK131/231, KY										
\bar{X} (μg/m ³)	1.70	0.60	1.11	0.54	1.03	0.30	0.04	0.08	0.06	0.04
\bar{Y} (μg/m ³)	1.73	0.61	1.13	0.55	1.05	0.31	0.04	0.08	0.06	0.04
MAD	0.06	0.04	0.05	0.02	0.03	0.03	0.00	0.00	0.00	0.00
MARPD	5.57	6.47	8.13	5.02	4.18	10.95	8.54	8.17	5.17	1.58
ROM406/206, CO										
\bar{X} (μg/m ³)	0.38	0.27	0.11	0.10	0.26	0.07	0.01	0.02	0.01	0.02
\bar{Y} (μg/m ³)	0.39	0.29	0.11	0.10	0.26	0.08	0.01	0.02	0.01	0.02
MAD	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
MARPD	6.89	8.54	5.91	5.82	5.13	15.45	14.03	14.16	7.27	4.47

Completeness for Filter Pack Concentrations

Table 5 shows CASTNET sites with less than 90 percent completeness for weekly filter pack concentrations. Comments are included to provide information on why these sites experienced low data completeness.

Table 5. Sites with Less than 90 Percent Success in Filter Pack Deployment during First Quarter 2026

Site ID	Teflon SO ₄ ²⁻	Teflon NO ₃ ⁻	Teflon NH ₄ ⁺	Teflon Minor Cations	Teflon Cl ⁻	Nylon HNO ₃	Nylon SO ₄ ²⁻	Cellulose SO ₂	Comments
CHA467, AZ	85	85	85	85	85	85	85	N/A	There was insufficient valid flow volume for one sample. In addition, the next to last filter pack for the quarter was exchanged one day after quarter's end, removing it from the completion statistic for the quarter.
CVL151, MS	69	69	69	69	69	69	69	N/A	A power failure affected 4 sampling weeks.
EVE419, FL	85	85	85	85	85	85	85	N/A	The week 3 filter pack was improperly installed. The week 9 filter pack flow was invalidated due to a data logger cable issue.
HAS012, KS	77	77	77	77	77	77	77	77	There were three 2-week samples during the quarter.
LPO010, CA	62	62	62	62	62	62	62	62	A 5-week sample installed in mid-December ran through week 3 of 2026 sampling. In addition, there was a 3-week sample and two 2-week samples during the quarter.
PED108, VA	77	77	77	77	77	77	77	N/A	There was one 2-week sample during the quarter. Another two samples were invalidated for having suspect flow data.
SHN418, VA	85	85	85	85	85	85	85	N/A	There was one 2-week sample during the quarter, and another sample was invalidated because of intermittent power failures.
THR422, ND	85	85	85	85	85	85	85	N/A	One sample was invalidated for insufficient flow volume, and flow data were invalidated for a second sample.
WSP144, NJ	46	46	46	46	46	46	46	N/A	A sample installed for 3 weeks with only 105 hours of valid flow was invalidated. In addition, the quarter also included a 5-week sample due to a power issue.

Note: N/A = Filter pack SO₂ concentrations were not measured.

Precision of Ozone Concentrations

Time series of hourly O₃ concentration differences for first quarter 2026 are provided in Figures 26 and 27 for co-located sites MCK131/231 and ROM406/206, respectively. Figure 26 indicates no consistent bias between the co-located analyzers on site. Figure 27 indicates a -2 ppb bias toward the ROM206 analyzer. This bias is approximately one percent of full scale for the instruments on site.

Figure 26. O₃ Concentrations Differences between MCK131 and MCK231, KY

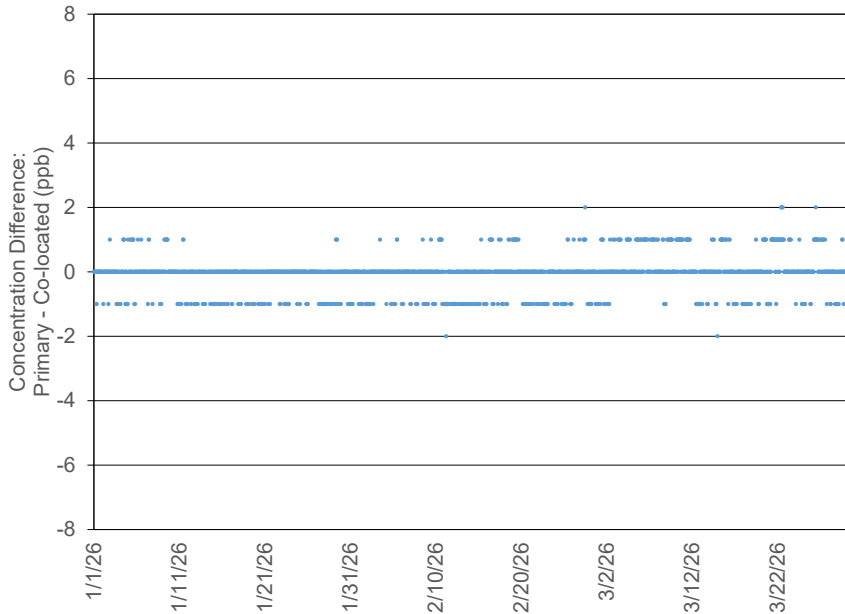


Figure 27. O₃ Concentrations Differences between ROM406 and ROM206, CO

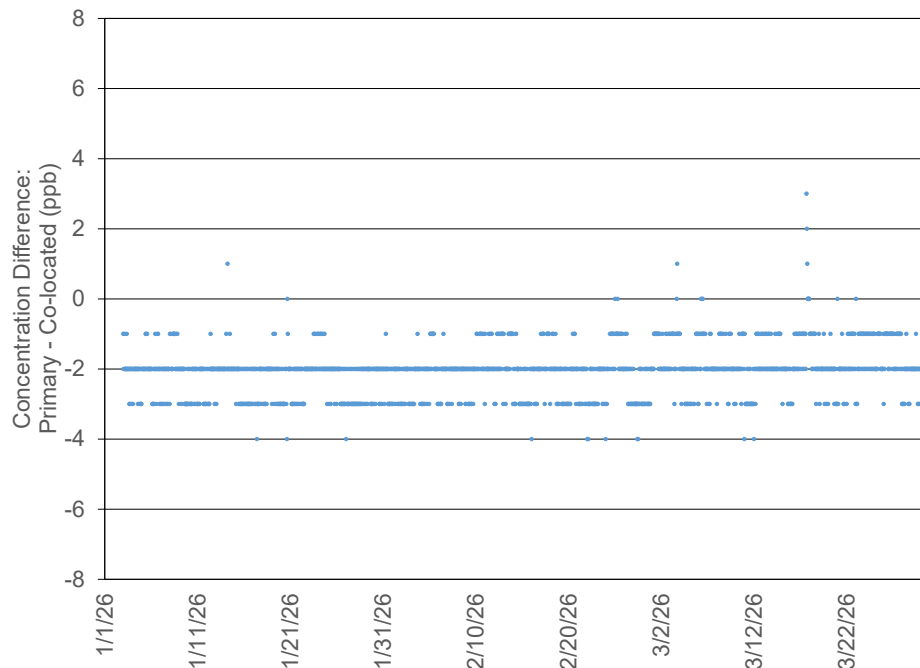


Table 6 gives MARPD data for O₃ data measured at the two co-located sites.

Table 6. Quarterly Precision (MARPD) for Co-located O₃ Concentrations

Site Pair	Quarter	Start Date	MARPD	Records
MCK131/231, KY				
	2	04/01/2025	7.3	1885
	3	07/01/2025	2.1	2022
	4	10/01/2025	0.9	2065
	1	01/01/2026	0.8	2040
ROM406/206, CO				
	2	04/01/2025	1.3	2057
	3	07/01/2025	4.1	2039
	4	10/01/2025	3.7	1951
	1	01/01/2026	4.4	2051

Completeness for Ozone Concentrations

Calculation of an annual O₃ value requires 75 percent completeness. However, calculation of the three-year design value used for regulatory purposes requires 90 percent completeness. Table 7 shows CASTNET sites with less than 90 percent completeness for MDA8 O₃ concentrations. Comments are provided for these sites.

Table 7. Sites with less than 90 Percent Data Completeness for MDA8 Concentrations during First Quarter 2026

Site ID	Percent Completeness	Comments
ALC188, TX	84	The line dryer malfunctioned and had to be bypassed. Associated data mid to late January were invalidated
CHE185, OK	82	The site analyzer was removed for annual maintenance from 02/17/2026 to 02/24/2026.
CVL151, MS	73	Site power was out from late January through mid-February.
GTR434, WY	83	Data were invalidated from 01/06/2026 to 01/20/2026. A leak was found in the sample filter housing and calibration checks were outside of acceptance criteria.
IRL141, FL	84	The site analyzer pump failed 03/17/2026 and was replaced 03/24/2026.
SHN418, VA	88	Intermittent power failures throughout the quarter.
UMA009, WZ	67	The zero-air solenoid leaked intermittently and affected ambient data collection from early January to late February. Associated data were invalidated.
WSP144, NJ	81	The data logger was unplugged from late February through mid-March. Weather conditions and associated site access issues contributed to the delay in restarting data collection.
YEL408, WY	64	Data were invalidated from 03/01/2026 to 03/31/2026. Air Resource Specialists noted that these data were recently restored as valid.

Table 8 shows CASTNET sites with less than 90 percent completeness for hourly O₃ concentrations during first quarter 2026. Comments are provided for these sites. The average-annual percent completeness for each of these sites is included for reference.

Table 8. Sites with less than 90 Percent Data Completeness for O₃ Concentrations

Site ID	Q1 2026	Q2 2025 – Q1 2026	Comments
ALC188, TX	85	91	The line dryer malfunctioned and had to be bypassed. Associated data from mid to late January were invalidated
CVL151, MS	77	92	Site power was out from late January through mid-February.
GRT434, WY	84	96	A leak was found in the sample filter housing and calibration checks were outside of acceptance criteria. Data were invalidated from 01/06/2026 to 01/20/2026.
UMA009, WA	75	93	The zero-air solenoid leaked intermittently and affected ambient data collection from early January to late February. Associated data were invalidated.
WSP144, NJ	81	93	The data logger was unplugged from late February through mid-March.
YEL408, WY	65	81	Data were invalidated from 03/01/2026 to 03/31/2026. Air Resource Specialists noted that these data were recently restored as valid.

Filter Pack Total Nitrate and Continuous Trace-level NO_y Concentrations at CASTNET Sites

Figures 28 through 32 show a comparison of weekly average continuous NO_y measurements with weekly filter pack total NO₃ concentrations collected at the five sites with NO_y measurements. The NO_y concentrations were consistently higher than the total NO₃ levels at all sites. The average weekly NO_y levels, the weekly total NO₃ concentrations, and their ratios for the five sites with available data are shown in Table 9. Ratios of NO_y to total NO₃ varied from 3.13 at SAN192, NE to 4.73 at DUK008, NC.

Table 9. Summary of Total NO₃/NO_y Measurements for First Quarter 2026

Site ID	Elevation	Total NO ₃ (ppb)	NO _y (ppb)	Ratio
BVL130, IL	213	0.95	3.85	4.21
DUK008, NC	164*	0.66	3.01	4.73
GRS420, TN	793	0.51	1.76	3.52
SAN192, NE	386	0.55	1.36	3.13
STK138, IL	281	0.99	3.20	4.69

Note: * The inlet of the enhanced NO_y monitor is located at the top of the 30-meter tower.

Figure 28. Weekly Mean Continuous NO_y and Total NO₃ Concentrations BVL130, IL

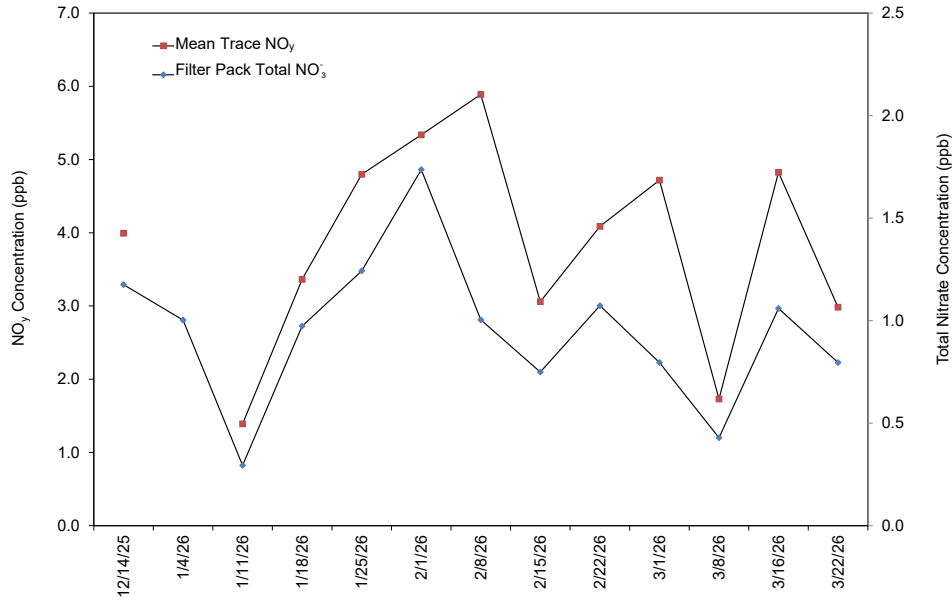


Figure 29. Weekly Mean Continuous NO_y and Total NO₃ Concentrations at DUK008, NC

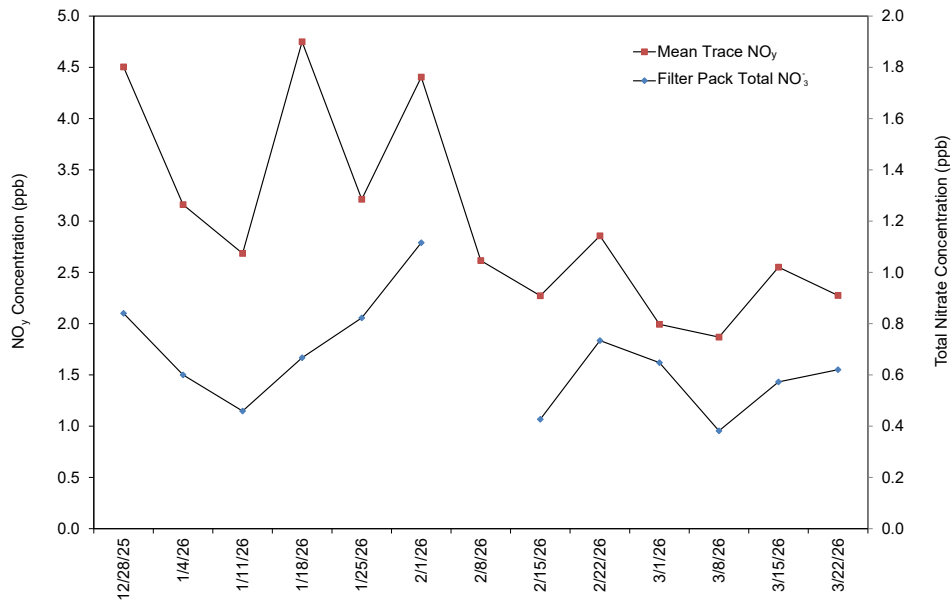


Figure 30. Weekly Mean Continuous NO_y and Total NO₃ Concentrations GRS420, TN

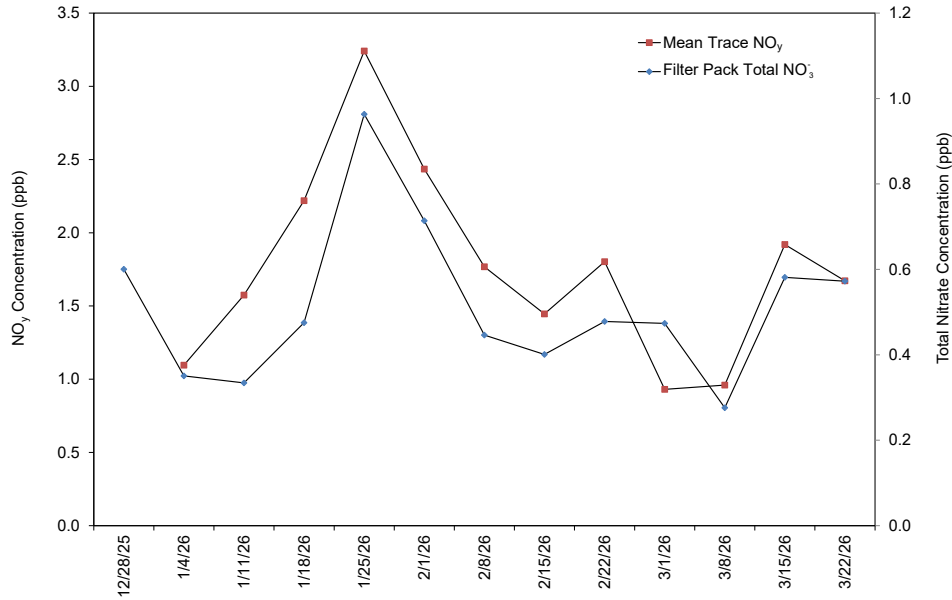


Figure 31. Weekly Mean Continuous NO_y and Total NO₃ Concentrations SAN192, NE

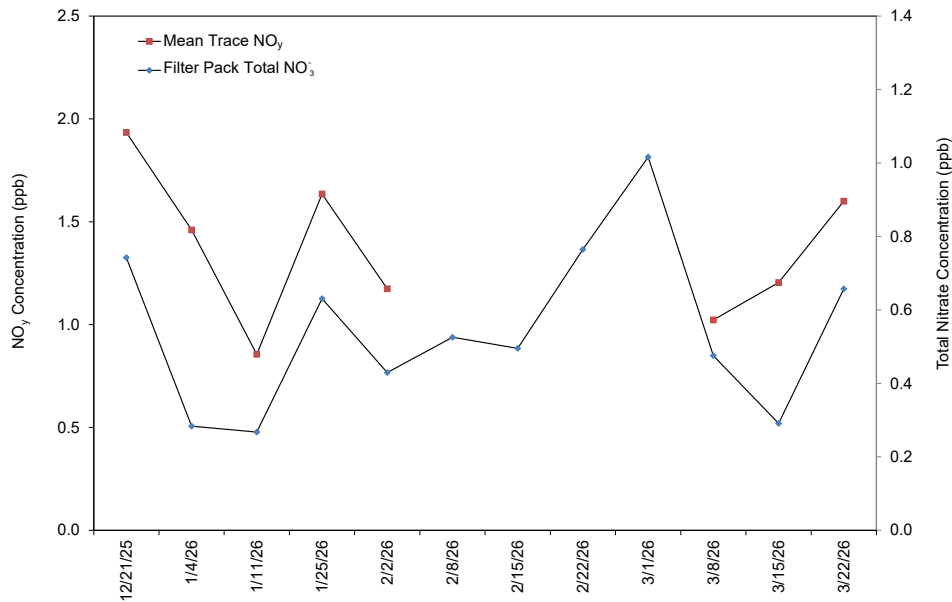
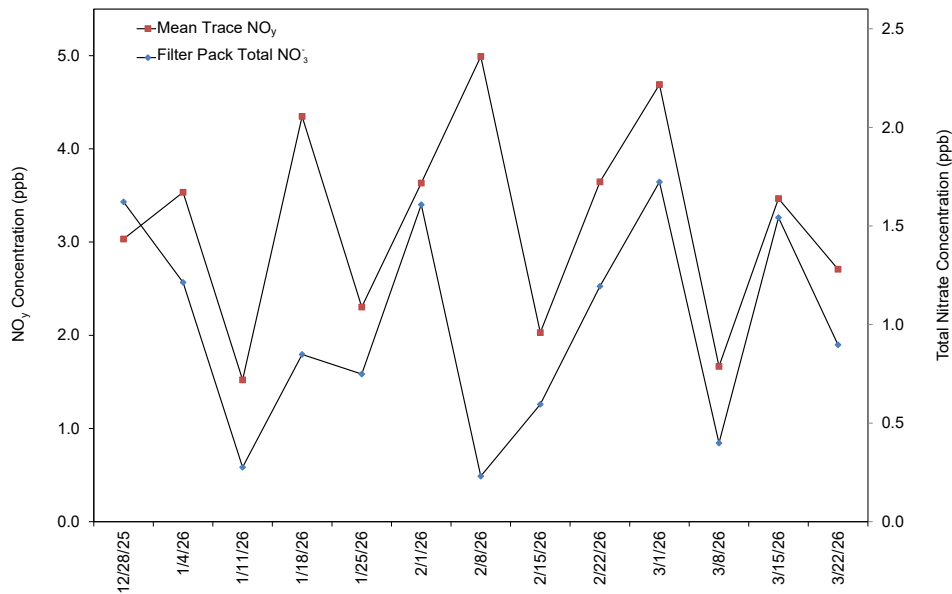


Figure 32. Weekly Mean Continuous NO_y and Total NO₃ Concentrations STK138, IL



Completeness for Continuous Trace-level Gas measurements

Table 10 shows the percent completeness for CASTNET trace-level gas measurements. Comments are provided for sites with less than 90 percent completeness for hourly trace-level gas concentrations during first quarter 2026. The average completeness for second quarter 2025 through first quarter 2026 for each of the sites is included for reference.

Table 10. Percent Data Completeness for Continuous Trace-level Gas Measurements (1 of 2)

Site ID	Parameter*	Q1 2026	Q2 2025– Q1 2026	Comments
BVL130, IL	CO	57	85	The analyzer's power supplies malfunctioned 02/20/2026 and were replaced 03/26/2026. Subsequent data were invalidated until the analyzer stabilized and an auto reference was run on 3/30/2026.
	NO	94	92	
	NOY	82	87	The bypass pump failed 12/30/2025 and was replaced 01/12/2026.
	NOYDIF	82	87	
	SO2_GA	79	86	
CHC432, NM	NO	96	97	
	NOX	96	97	
	NOXDIF	96	97	

Table 10. Percent Data Completeness for Continuous trace-level Gas Measurements (2 of 2)

Site ID	Parameter*	Q1 2026	Q2 2025– Q1 2026	Comments
DUK008, NC	HNO3	76	86	Calibration drift.
	NH3	72	80	
	NO	92	91	
	NO2_TRUE	88	90	Calibration drift.
	NOX_TRUE	88	90	
	NOY	92	91	
	NOY_MINUS	72	85	Calibration drift.
	NOYDIF	92	91	
TNX	76	81	Calibration drift.	
GRS420, TN	CO	0	0	CO analyzer was removed for repair April 2025 at this site. New CO instrument was installed April 2026.
	NO	91	78	
	NOY	91	78	
	NOYDIF	96	91	
	SO2_GA	98	95	
SAN192, NE	NO	61	77	Shelter temperature was intermittently out of range for several periods during the quarter. In addition, QC checks failed intermittently during the quarter.
	NOY	61	71	
	NOYDIF	61	68	QC checks failed intermittently during the quarter.
STK138, IL	HNO3	37	54	QC checks failed intermittently during the quarter.
	NH3	91	67	
	NO	91	65	
	NO2_TRUE	91	65	
	NOX_TRUE	91	65	
	NOY	91	68	
	NOY_MINUS	37	68	QC checks failed intermittently during the quarter.
	NOYDIF	91	50	
TNX	91	81		

Note: * See Table 11

The parameters listed in Table 10 are both calculated and measured. Table 11 provides information on how the parameters listed in Table 10 are obtained.

Table 11. CASTNET Trace-level Gas Measurements

Parameter Name	How Obtained	Description of Process
CO	Measured	Gas filter correlation
HNO3	Calculated	NOY minus NOY-MINUS
NH	Calculated	TNX minus NOY
NO	Measured	Chemiluminescence reaction/no converter used
NO2_True	Calculated	NOX_TRUE minus NO
NOX_True	Measured	Photolytic converter
NOY	Measured	Molybdenum converter at 315° Celsius
NOYDIF	Calculated	NOY minus NO
NOY_MINUS	Measured	Sodium carbonate denuder followed by molybdenum converter at 315° Celsius
NOX	Measured	Molybdenum converter at 325° Celsius
NOXDIF	Calculated	NOX minus NO
SO2_GA	Measured	Ultraviolet fluorescence
TNX	Measured	Platinum/stainless steel converter at 825° Celsius followed by molybdenum converter at 315° Celsius

Reference

WSP USA Environment & Infrastructure Inc. (WSP). 2026. Clean Air Status and Trends Network (CASTNET) First Quarter 2025 Quality Assurance Report.
<https://www.epa.gov/castnet/documents-reports>.