



Summary of Quarterly Operations (January – March)

EPA Contract No. EP-W-09-028

AMEC Project No. 6064130418

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 first quarter 2014. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP; AMEC, 2013). 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 first quarter, AMEC began making adjustments and updates to CASTNET ozone systems in anticipation of proposed changes to Title 40, Part 58 of the Code of Federal Regulations (CFR). Changes include adjustment of the ozone QC check values, installation of sampling line insulation, removal of moisture knockout bottles, replacement of designated site ozone transfer standards, and corresponding changes to the data logger programs. The new QC check targets of 60 parts per billion (ppb) for precision and 225 ppb for span were updated for all sites during first quarter. Other updates and adjustments were made at the sites during first quarter 2014 calibration visits. A spreadsheet with the schedule of changes to the sites is being maintained and is used to update the network change table in the CASTNET database.

During January 2014, AMEC completed the activities necessary to apply for the annual surveillance assessment required to maintain International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2005 accreditation by the American Association for Laboratory Accreditation (A2LA). The surveillance assessment took place on March 18, 2014. AMEC's accredited status was approved through the remainder of its initial certification period, which ends May 2015. The next assessment is scheduled to occur prior to this date. Assessments for renewal of accreditation will then take place every two years.

The CASTNET QA Manager audited the shipping and receiving process for CASTNET during February 2014. The activities and facilities audited were in compliance with project requirements. It was noted that project documents should be updated to include additional procedures (e.g., trace-level gas monitor calibration kits).

Providing a safe working environment is one of AMEC's goals. Sites are routinely checked for safe working conditions at each calibration (i.e., twice per year). Additionally, AMEC performs internal safety audits of selected sites. These safety audits provide a more in-depth review of site safety. A site safety audit was completed at the KIC003, KS site after the site installation was completed in February 2014. The safety audit verified that the site met safety criteria and was ready to begin operation.

During March 2014, AMEC received results from sample analyses for proficiency test (PT) study 103 for Rain and Soft Waters from the National Laboratory of Environmental Testing, a branch of the National Water Research Institute with Environment Canada that provides QA services. Overall, AMEC's laboratory was rated, "very good" for PT 103 analyses. The laboratory's analyses showed no bias. AMEC's 5-year median rating remained "Very Good." Table 1 lists the quarters of data that were validated to Level 3 during first quarter 2014 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 continuous field measurements. These criteria apply to the instrument challenges performed during site calibrations. Table 4 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 5 presents the critical criteria for ozone monitoring at sites that are configured to meet EPA's AQS criteria for QA/QC procedures and are operated in accordance with 40 CFR Part 58 (EPA, 2012). Table 6 presents the critical criteria for AQS-protocol 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 7 presents the number of analyses in each category that were performed during first quarter 2014.

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 8 presents the relevant sample receipt statistics for first quarter 2014.

Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for first quarter 2014. All results were within the criteria listed in Table 4.

Table 9 presents summary statistics of critical criteria measurements at AQS-protocol ozone sites collected during the quarter. 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 was shown to have no affect on ambient data collection, and passing results still meet frequency criteria. Results in shaded cells either exceed documented criteria or are otherwise notable. Table 10 presents observations associated with the shaded cell results in Table 9.

Table 11 presents summary statistics of critical criteria measurements collected during the quarter for the AQS-protocol trace-level gas monitoring sites. All data associated with QC checks that fail to meet the criteria listed in Table 6 were or will be invalidated unless the cause of failure was shown to have no affect on ambient data collection, and passing results still meet frequency criteria. Results in shaded cells either exceed documented criteria or are otherwise notable. Table 12 presents observations associated with the shaded cell results in Table 11.

Laboratory Control Sample Analysis

The laboratory control sample (LCS) is a reagent blank spiked with the target analytes from the established analytical methods and carried through the same extraction process that field samples must undergo. The LCS is not required by the CASTNET QA/QC program. LCS analyses are performed by the laboratory to monitor for potential sample handling artifacts and provide a means to identify possible analyte loss from extraction to extraction. The current action limits for LCS recovery are 80 percent and 120 percent. Figure 4 presents LCS analysis results for first quarter 2014. All recovery values were between 90 percent and 105 percent.

Blank Results

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for first quarter 2014. All results were within criteria (two times the reporting limit) listed in Table 4.

Suspect/Invalid Filter Pack Samples

Filter pack samples that were flagged as suspect or invalid during first quarter 2014 are listed in Table 13. This table includes associated site identification and a brief description of the reason the sample was flagged. During first quarter, eight filter pack samples were invalidated.

Field Problem Count

Table 14 presents counts of field problems affecting continuous data collection for more than one day during first quarter 2014. 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

- AMEC Environment & Infrastructure, Inc. (AMEC). 2013. *Clean Air Status and Trends Network (CASTNET) Quality Assurance Project Plan (QAPP) Revision 8.1*. Prepared for U.S. Environmental Protection Agency (EPA), Office of Air and Radiation, Clean Air Markets Division, Washington, DC. Contract No. EP-W-09-028. Gainesville, FL. <http://java.epa.gov/castnet/documents.do>.
- American Society for Testing and Materials (ASTM). 2008. *ASTM E29-08, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*. ASTM International, West Conshohocken, PA, DOI:10.1520/E0029-08. www.astm.org.
- U.S. Environmental Protection Agency (EPA). 2012. Appendix A to Part 58 – Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS), Special Purpose Monitors (SPMs), and Prevention of Significant Deterioration (PSD) Air Monitoring. 40 CFR Part 58.

Table 1 Data Validated to Level 3 during First Quarter 2014

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
E-2/MW-8	April 2013 – September 2013	6	Quarter 2, 2013 – Quarter 3, 2013	2
E-3/W-10 [†]	May 2013 – October 2013	6	Quarter 3 2013	1
SE-4/MW-6 [‡]	July 2013 – December 2013	6	Quarter 3 2013 – Quarter 4 2013	2

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

[†] Contains ROM206 of the ROM406/ROM206 collocated pair

[‡] Contains MCK131/231 collocated pair

Table 2 Field Calibration Schedule

Calibration Group	Months Calibrated	Sites Calibrated			
Eastern Sites (23 Total)					
E-1 (8 Sites)	February/August	BEL116, MD BWR139, MD	WSP144, NJ CTH110, NY	ARE 128, PA PSU106, PA	PED108, VA VPI120, VA
E-2 (10 Sites)	April/October	ABT147, CT ASH135, ME HOW191, ME	WST109, NH CAT175, NY HWF187, NY	WFM105, NY NIC001, NY EGB181 ON	UND002, VT
E-3 (5 Sites)	May/November	KEF112, PA MKG113, PA	LRL117, PA PAR107, WV	CDR119, WV	
Southeastern Sites (10 Total)					
SE-4 (6 Sites)	January/July	SND152, AL GAS153, GA	BFT142, NC CND125, NC	COW137, NC PNF126, NC	
SE-5 (4 Sites)	February/August	CAD150, AR CVL151, MS	IRL141, FL SUM156, FL		
Midwestern Sites (18 Total)					
MW-6 (6 Sites)	January/July	CDZ171, KY CKT136, KY	MCK131, KY MCK231, KY	ESP127, TN SPD111, TN	
MW-7 (8 Sites)	March/September	ALH157, IL BVL130, IL	STK138, IL VIN140, IN	DCP114, OH OXF122, OH	QAK172, OH PRK134, WI
MW-8 (4 Sites)	April/October	SAL133, IN HOX148, MI	ANA115, MI UVL124, MI		
Western Sites (10 Total)					
W-9 (5 Sites)	March/September	KNZ184, KS KIC003, KS	CHE185, OK SAN189, NE	ALC188, TX	
W-10 (5 Sites)	May/November	GTH161, CO ROM206, CO	CNT169, WY PND165, WY	PAL190, TX	

Table 3 Data Quality Indicators for CASTNET Continuous Measurements

Measurement		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% for winds ≥ 5 m/s
Wind direction	Wind vane	± 5°	± 5°
Sigma theta	Wind vane	Undefined	Undefined
Ambient temperature	Platinum RTD	± 1.0°C	± 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 collocated instruments, and accuracy criteria apply to calibration of instruments. Collocated precision criteria do not apply to AQS-protocol ozone measurements.

² Meteorological parameters are only measured at four of the EPA-sponsored CASTNET sites: PAL190, TX; CHE185, OK; BVL130, IL; and BEL116, MD.

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

⁴ For target value of 0.50 inch

Table 4 Data Quality Indicators for CASTNET Laboratory Measurements

Analyte	Method	Precision ¹ (MARPD)	Accuracy ² (%)	Nominal Reporting Limits	
				mg/L	µg/Filter
Ammonium (NH ₄ ⁺)	AC	20	90–110	0.020*	0.5
Sodium (Na ⁺)	ICP-AES	20	95–105	0.005	0.125
Potassium (K ⁺)	ICP-AES	20	95–105	0.006	0.15
Magnesium (Mg ²⁺)	ICP-AES	20	95–105	0.003	0.075
Calcium (Ca ²⁺)	ICP-AES	20	95–105	0.006	0.15
Chloride (Cl ⁻)	IC	20	95–105	0.020	0.5
Nitrate (NO ₃ ⁻)	IC	20	95–105	0.008*	0.2
Sulfate (SO ₄ ²⁻)	IC	20	95–105	0.040	1.0

Notes: ¹ This column lists precision goals for both network precision calculated from collocated filter samples and laboratory precision based on replicate samples.

² This column lists laboratory accuracy goals based on reference standards and continuing calibration verification spikes. The criterion is 90–110 percent for ICP-AES reference standards.

AC = automated colorimetry
 IC = ion chromatography
 ICP-AES = inductively coupled plasma-atomic emission spectrometry
 MARPD = mean absolute relative percent difference
 mg/L = milligrams per liter
 µg/Filter = micrograms per filter
 * = as nitrogen

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

For more information on analytical methods and associated precision and accuracy criteria, see the CASTNET QAPP, (AMEC, 2013)

Table 5 AQS-Protocol Ozone Critical Criteria*

Type of Check	Analyzer Response
Zero	Less than ± 10 ppb
Span	Less than or equal to ± 7 percent between supplied and observed concentrations
Single Point QC	Less than or equal to ± 7 percent between supplied and observed concentrations

Note: * Applies to CASTNET sites that are configured and operated in accordance with Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2012). The minimum frequency for these checks is once every two weeks.

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

Table 6 AQS-Protocol Trace-level Gas Monitoring Critical Criteria *

Parameter	Analyzer Response		
	Zero Check	Span Check	Single Point QC Check
SO ₂	Less than ± 3 ppb	Less than or equal to ± 10 percent between supplied and observed concentrations	Less than or equal to ± 10 percent between supplied and observed concentrations
NO _y	Less than ± 3 ppb	Less than or equal to ± 10 percent between supplied and observed concentrations	Less than or equal to ± 10 percent between supplied and observed concentrations
CO	Less than ± 40 ppb	Less than or equal to ± 10 percent between supplied and observed concentrations	Less than or equal to ± 10 percent between supplied and observed concentrations

Note: *Applies to CASTNET sites that are configured and operated in accordance with Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2012). The minimum frequency for these checks is once every two weeks.

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

SO₂ = sulfur dioxide

NO_y = total reactive oxides of nitrogen

CO = carbon monoxide

Table 7 QC Analysis Count for First Quarter 2014

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⁻	46	173	77	16	26	44
	NO ₃ ⁻	46	173	77	16	26	44
	NH ₄ ⁺	32	158	75	16	26	44
	Cl ⁻	46	173	77	16	26	44
	Ca ²⁺	32	159	75	16	26	44
	Mg ²⁺	32	159	75	16	26	44
	Na ⁺	32	159	75	16	26	44
	K ⁺	32	159	75	16	26	44
Nylon	SO ₄ ²⁻	32	167	76	16	28	44
	NO ₃ ⁻	32	167	76	16	28	44
Cellulose	SO ₄ ²⁻	36	174	83	18	28	44

Table 8 Filter Pack Receipt Summary for First Quarter 2014

Count of samples received more than 14 days after removal from tower:	14
Count of all samples received:	1142
Fraction of samples received within 14 days:	0.988
Average interval in days:	4.09
First receipt date:	01/02/2014
Last receipt date:	03/31/2014

Table 9 AQS-Protocol Ozone QC Summary (1 of 2)

Site ID	% Span Pass ¹	Span %D ²	% Single Point QC Pass ¹	Single Point QC %D ²	Single Point QC CL ³	% Zero Pass ¹	Zero Average (ppb) ²
ABT147, CT	100.0	0.6	100.0	0.9	0.1	100.0	1.4
ALC188, TX	100.0	0.8	97.8	1.7	0.6	100.0	0.3
ALH157, IL	97.8	6.4	97.8	9.7	10.0	100.0	1.0
ANA115, MI	100.0	0.3	100.0	0.5	0.1	100.0	0.7
ARE128, PA	100.0	1.4	98.9	1.4	0.3	100.0	3.0
ASH135, ME	100.0	0.6	100.0	0.5	0.1	100.0	0.2
BEL116, MD	100.0	0.4	100.0	1.4	0.2	100.0	1.0
BFT142, NC	100.0	1.6	100.0	1.4	0.1	100.0	0.7
BVL130, IL	91.7	1.7	90.5	3.1	0.7	90.5	3.1
BWR139, MD	100.0	1.8	100.0	2.1	0.1	100.0	0.3
CAD150, AR	100.0	2.8	100.0	2.7	0.5	100.0	0.2
CDR119, WV	100.0	0.3	100.0	0.4	0.1	100.0	1.5
CDZ171, KY	100.0	0.4	100.0	0.6	0.1	100.0	0.1
CKT136, KY	100.0	0.9	100.0	1.1	0.1	100.0	0.2
CND125, NC	98.7	32.8	98.7	36.9	56.7	100.0	0.4
CNT169, WY	98.5	2.1	98.5	1.3	0.6	98.5	0.9
COW137, NC	100.0	1.3	100.0	1.8	0.1	100.0	0.4
CTH110, NY	100.0	2.2	100.0	1.6	0.2	100.0	0.7
CVL151, MS	97.5	1713.7	97.5	1901.1	2217.2	100.0	0.3
DCP114, OH	100.0	0.4	100.0	0.5	0.1	100.0	1.5
ESP127, TN	100.0	0.6	98.8	1.0	0.2	100.0	0.2
GAS153, GA	100.0	2.1	96.3	2.2	0.4	100.0	1.6
GTH161, CO	100.0	2.0	100.0	2.0	0.1	100.0	0.2
HOX148, MI	97.5	3.3	97.5	3.9	2.9	100.0	0.5

Table 9 AQS-Protocol Ozone QC Summary (2 of 2)

Site ID	% Span Pass ¹	Span %D ²	% Single Point QC Pass ¹	Single Point QC %D ²	Single Point QC CL ³	% Zero Pass ¹	Zero Average (ppb) ²
HWF187, NY	100.0	2.0	63.6	5.1	0.6	100.0	2.6
IRL141, FL	100.0	1.2	100.0	1.9	0.2	95.1	1.7
KEF112, PA	100.0	1.8	100.0	1.7	0.1	100.0	0.3
LRL117, PA	100.0	1.2	100.0	0.8	0.1	100.0	0.3
MCK131, KY	100.0	2.0	100.0	1.7	0.1	100.0	0.5
MCK231, KY	100.0	2.4	100.0	2.2	0.2	100.0	0.8
MKG113, PA	100.0	1.3	100.0	1.6	0.2	100.0	0.4
OXF122, OH	96.7	586.0	96.7	517.6	848.6	97.8	0.9
PAL190, TX	100.0	0.5	100.0	0.6	0.1	100.0	0.5
PAR107, WV	96.8	3.5	96.8	4.5	3.1	100.0	1.8
PED108, VA	86.5	12.2	86.5	10.8	4.5	85.6	4.9
PND165, WY	100.0	0.5	100.0	1.4	0.2	100.0	0.9
PNF126, NC	100.0	1.6	100.0	2.3	0.1	100.0	0.7
PRK134, WI	100.0	0.8	100.0	1.2	0.1	100.0	0.4
PSU106, PA	92.0	7.5	89.8	5.5	2.3	93.2	2.4
QAK172, OH	100.0	0.5	100.0	0.5	0.1	100.0	1.1
ROM206, CO	100.0	1.0	100.0	3.4	0.2	100.0	2.0
SAL133, IN	100.0	0.5	100.0	0.6	0.1	100.0	0.4
SAN189, NE	87.5	11.6	87.5	9.1	3.8	86.4	5.0
SND152, AL	100.0	0.8	100.0	1.2	0.1	100.0	0.5
SPD111, TN	100.0	2.0	100.0	2.0	0.1	100.0	0.2
STK138, IL	100.0	1.2	100.0	1.4	0.2	100.0	0.5
SUM156, FL	100.0	1.6	96.5	2.5	0.2	98.8	1.4
UVL124, MI	100.0	0.8	100.0	0.8	0.1	100.0	0.2
VIN140, IN	100.0	4.6	100.0	4.2	0.1	100.0	0.4
VPI120, VA	100.0	1.9	100.0	1.4	0.1	100.0	0.4
WSP144, NJ	88.8	9.7	90.9	7.5	4.0	90.1	3.8
WST109, NH	100.0	0.7	100.0	0.8	0.1	100.0	1.1

Notes: ¹ Percentage of comparisons that pass the criteria listed in Table 5. Values falling below 90 percent are addressed in Table 10.

² Absolute value of the average percent differences between the on-site transfer standard and the site monitor. Values exceeding the criteria listed in Table 5 are addressed in Table 10.

³ 90% confidence limit of the coefficient of variation. This should be less than or equal to the 7% one point QC check critical criterion. Values exceeding this criterion are addressed in Table 10.

%D = percent difference

CL = confidence limit

ppb = parts per billion

Table 10 AQS-Protocol Ozone QC Observations

Site ID	QC Criterion	Comments
CND125, NC	Span %D Single Point QC %D Single Point QC CL	Ice clogged the calibration gas supply line for a single automated QC check. Ambient data were not affected.
CVL151, MS	Span %D Single Point QC %D Single Point QC CL	Ice clogged the calibration gas supply line for two automated QC checks. Ambient data were not affected.
HWF187, NY	% Single Point QC Pass	The cause of the failures was not determined. Data associated with the failures were invalidated through February. Associated March data will be invalidated during routine validation procedures. All data reported to AQS at the time of this report were invalidated prior to submission.
OXF122, OH	Span %D Single Point QC %D Single Point QC CL	QC failures were associated with a combination of a malfunctioning transfer standard and a period when the zero air system was not connected. Ambient data were not affected.
PED108, VA	% Span Pass Span %D % Single Point QC Pass Single Point QC %D % Zero Pass	QC failures were associated with a period when the zero air system was not connected. Ambient data were not affected.
PSU106, PA	Span %D	The calibration gas supply line was restricted for five days. Ambient data were not affected.
SAN189, NE	% Span Pass Span %D % Single Point QC Pass Single Point QC %D % Zero Pass	QC failures were associated with a period when the zero air system was not connected. Ambient data were not affected.
WSP144, NJ	% Span Pass Span %D Single Point QC %D	QC failures were associated with one period when the calibration gas supply line was clogged with ice and another when the zero air system was not connected. Ambient data were not affected.

Notes: %D = percent difference
CL = confidence limit

Table 11 AQS-Protocol Trace-level Gas QC Summary

Parameter	% Span Pass ¹	Span %D ²	% Single Point QC Pass ¹	Single Point QC %D ²	Single Point QC CL ³	% Zero Pass ¹	Zero Average (ppb) ²
BEL116, MD							
SO ₂	100.0	2.2	100.0	2.7	0.5	100.0	0.8
NO _y	100.0	3.6	100.0	4.1	0.4	97.1	0.5
BVL130, IL							
SO ₂	100.0	2.6	100.0	1.3	0.3	100.0	0.5
NO _y	100.0	3.7	100.0	4.4	0.4	97.7	0.9
CO	97.9	3.1	87.2	7.1	3.8	93.6	10.8
HWF187, NY							
NO _y	100.0	1.7	100.0	3.4	0.3	100.0	0.4
PND165, WY							
NO _y	100.0	1.7	100.0	3.2	0.5	100.0	0.1
PNF126, NC							
NO _y	100.0	2.0	100.0	2.4	0.5	100.0	0.3
ROM206, CO							
NO _y	100.0	0.5	100.0	1.6	0.2	100.0	0.1

Notes: ¹ Percentage of comparisons that pass the criteria listed in Table 6. Values falling below 90 percent are addressed in Table 12.

² Absolute value of the average percent differences between the supplied and observed concentrations. Values exceeding the criteria listed in Table 6 are addressed in Table 12.

³ 90 percent confidence limit of the coefficient of variation. This should be less than or equal to the 10 percent single point QC check critical criterion. Values exceeding this criterion are addressed in Table 12.

%D = percent difference

CL = confidence limit

ppb = parts per billion

Table 12 AQS-Protocol Trace-level Gas QC Observations

Site ID	Parameter	QC Criterion	Comments
BVL130, IL	CO	% Single Point QC Pass	The baseline was elevated after a power failure. Associated data were invalidated.

Notes: %D = percent difference

CL = confidence limit

Table 13 Filter Packs Flagged as Suspect or Invalid

Site ID	Sample No.	Reason
BWR139, MD	1402001-13	Insufficient flow volume
FOR605, WY	1405003-02	Insufficient flow volume
GAS153, GA	1405001-32	Insufficient flow volume
JOT403, CA	1405001-42	Insufficient flow volume
PNF126, NC	1404001-63	Insufficient flow volume
SHE604, WY	1402003-03	Insufficient flow volume
	1407003-03	
SND152, AL	1405001-74	Insufficient flow volume

Table 14 Field Problems Affecting Data Collection

Days to Resolution	Problem Count
30	226
60	10
90	3
Unresolved by End of Quarter	4

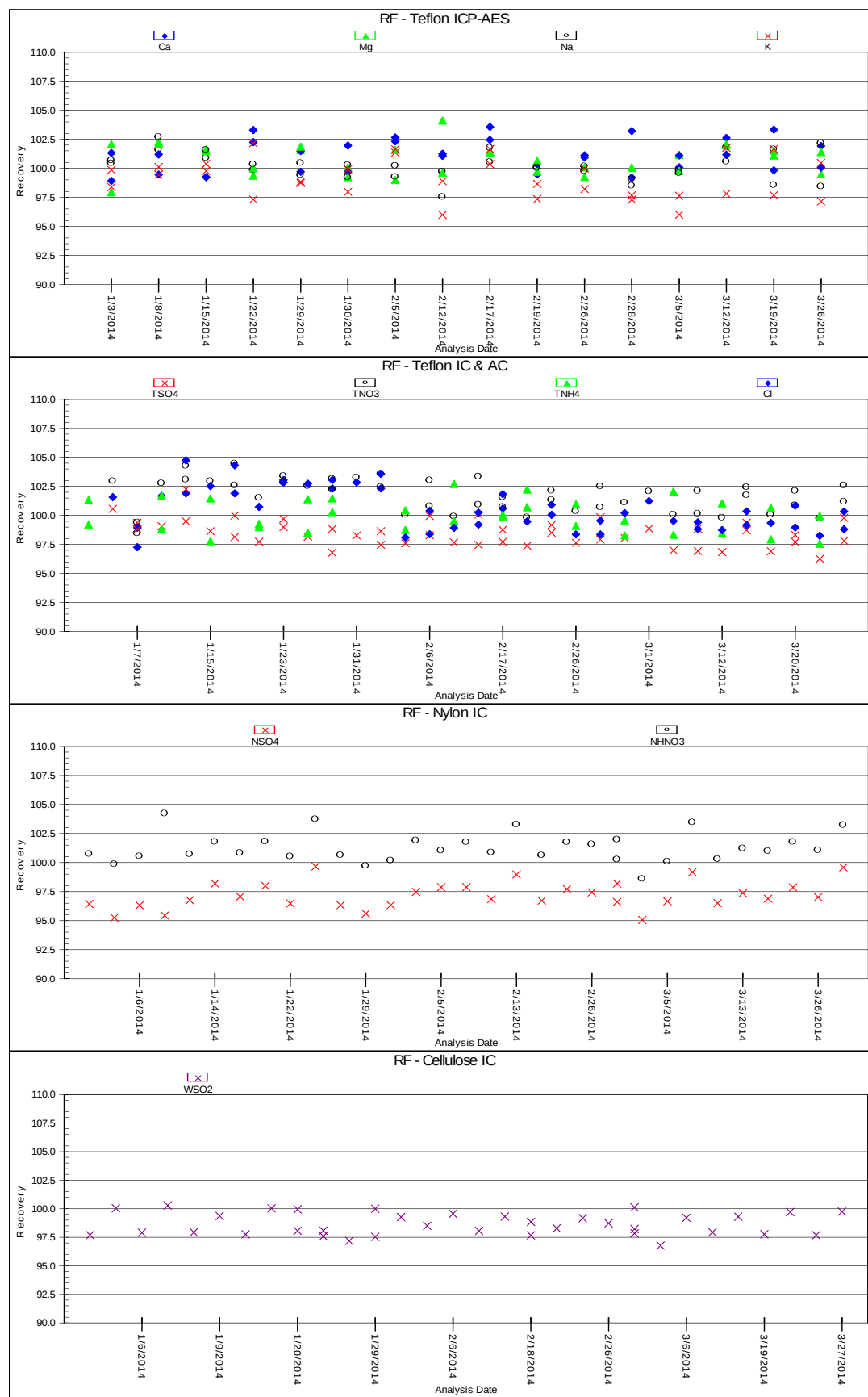
Figure 1 Reference Standard Results for First Quarter 2014 (percent recovery)

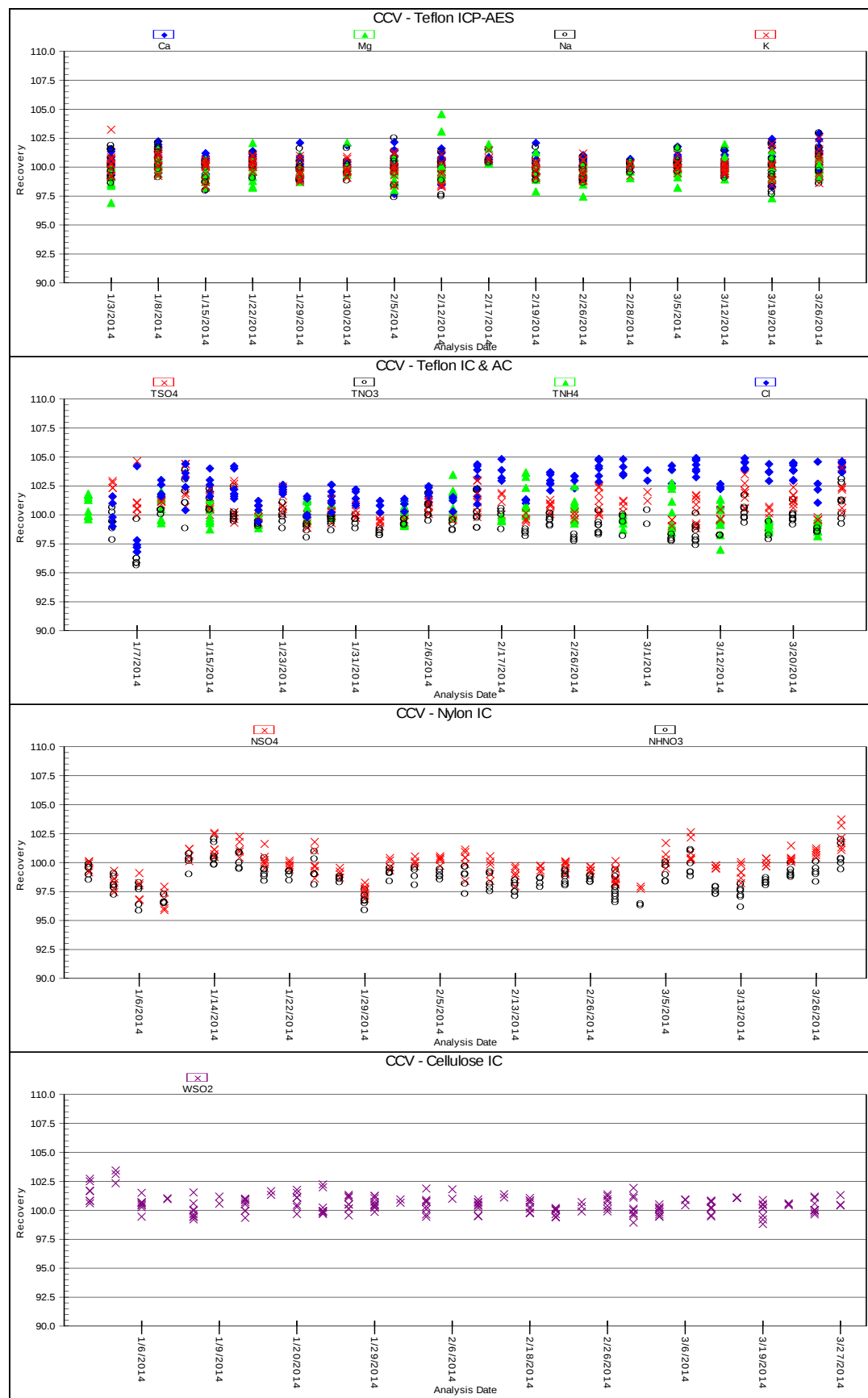
Figure 2 Continuing Calibration Spike Results for First Quarter 2014 (percent recovery)

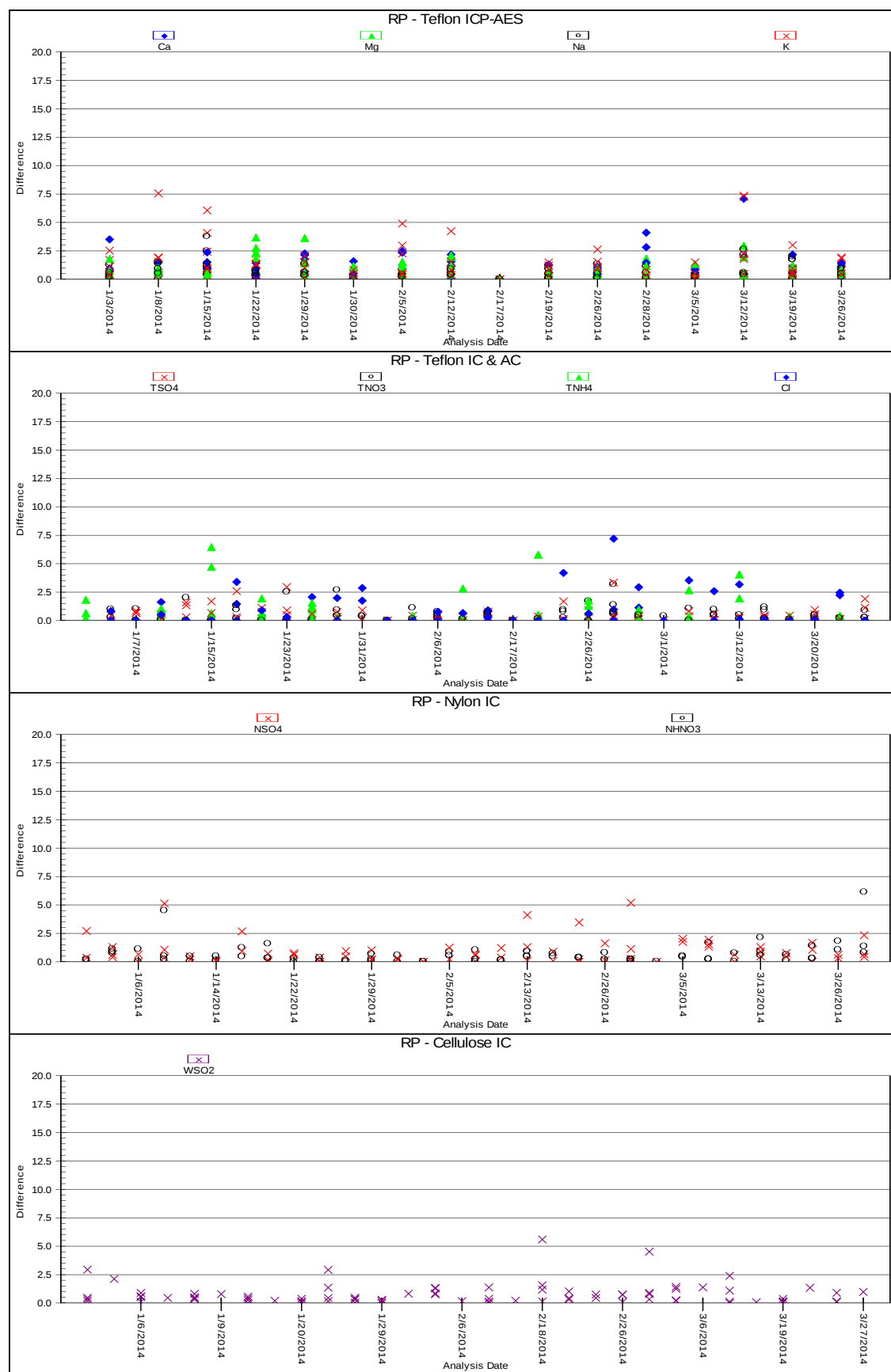
Figure 3 Replicate Sample Analysis Results for First Quarter 2014 (percent difference)

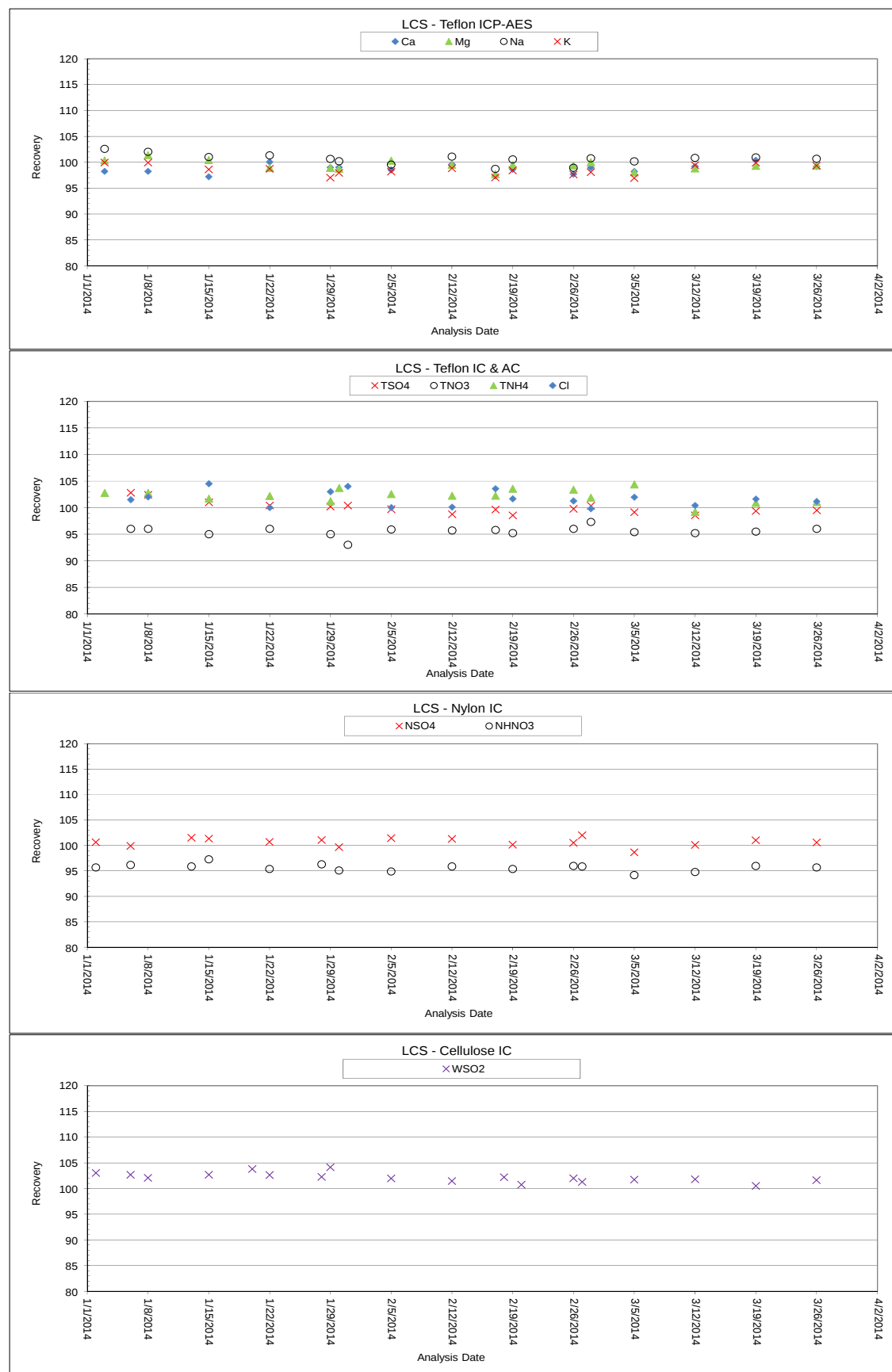
Figure 4 Laboratory Control Sample Results for First Quarter 2014 (percent recovery)

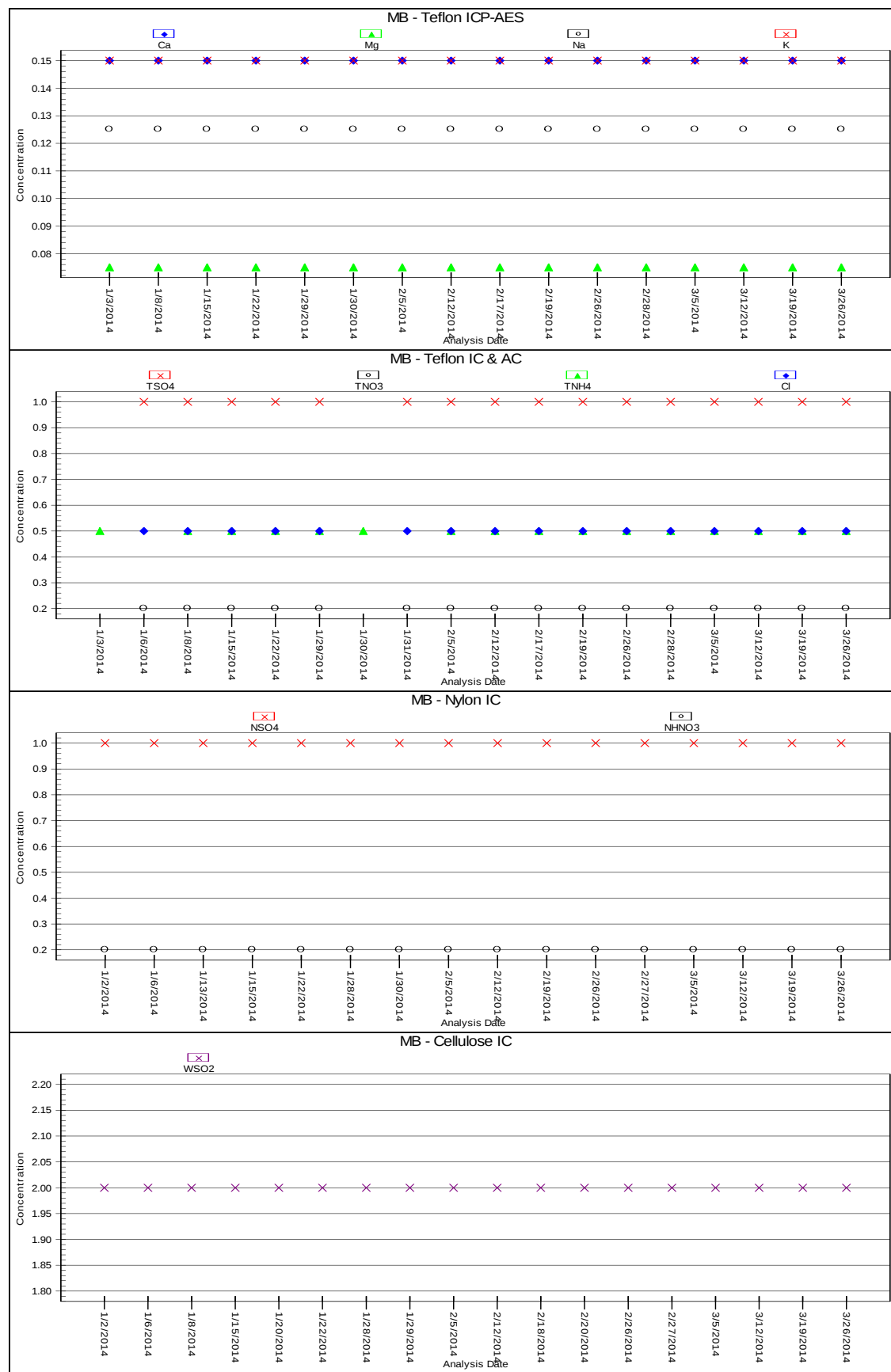
Figure 5 Method Blank Analysis Results for First Quarter 2014 (total micrograms)

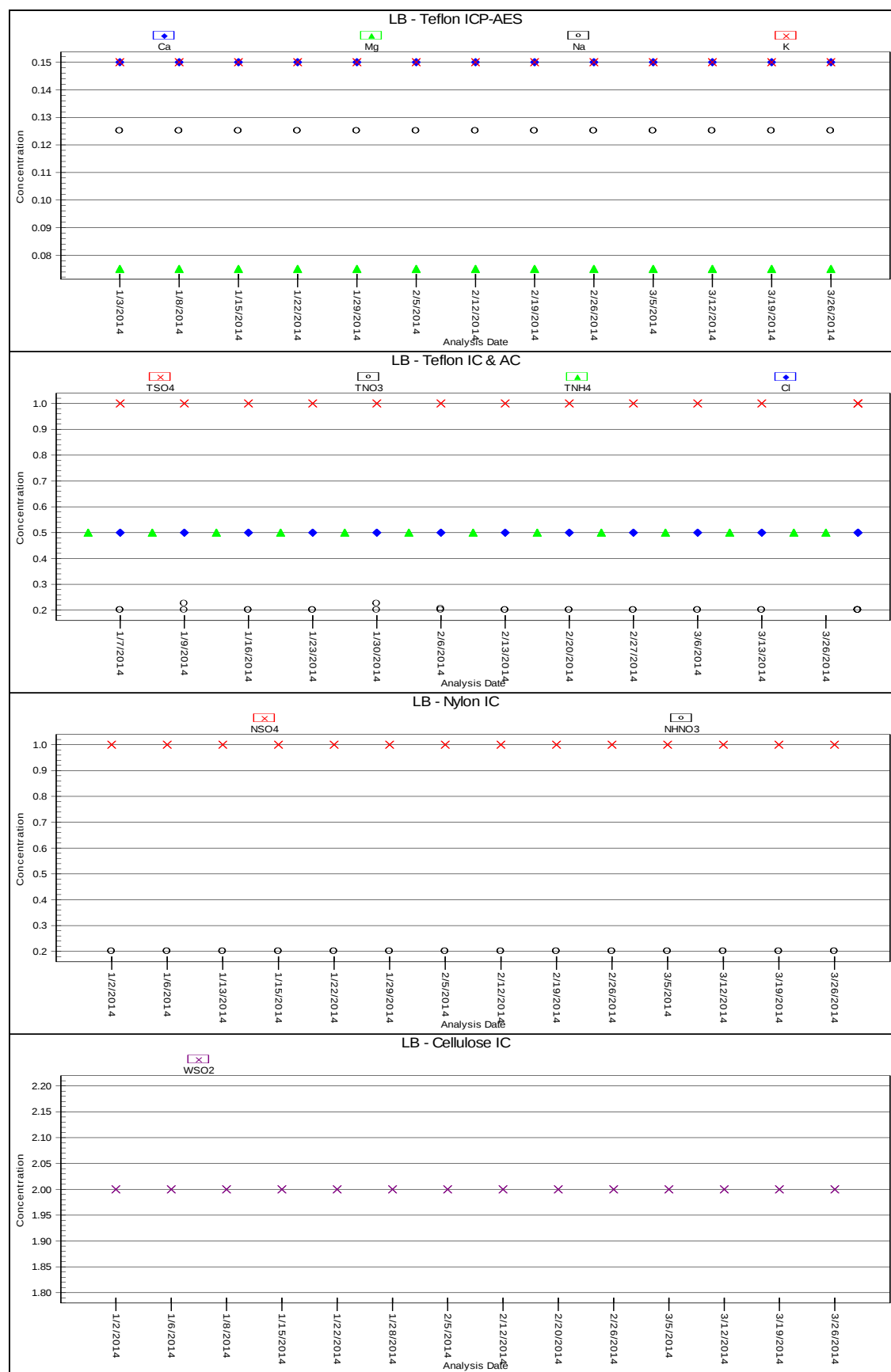
Figure 6 Laboratory Blank Analysis Results for First Quarter 2014 (total micrograms)

Figure 7 Field Blank Analysis Results for First Quarter 2014 (total micrograms)