



## Summary of Quarterly Operations (January – March)

EPA Contract No. EP-W-09-028

AMEC Project No.: 6064120318

### 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 2013. The various QA/QC criteria and policies are documented in the CASTNET Quality Assurance Project Plan (QAPP; AMEC, 2012). 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

AMEC's analytical laboratory continued to pursue International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025 accreditation by the American Association for Laboratory Accreditation (A2LA). On January 21–22, 2013, a certified assessor audited AMEC's Gainesville, FL analytical laboratory. Overall, the laboratory did well. The assessor was pleased with laboratory personnel, instruments and equipment, and the quality of the data produced. Findings were minor and related to documentation of procedures. The laboratory's response to the A2LA assessment findings was submitted to A2LA on February 22, 2013. AMEC's response included corrective actions and evidence of completion of the corrective actions. All findings were addressed. A2LA staff reviewed the response and requested additional information. As of the end of first quarter 2013, AMEC was working on the follow up response. AMEC's response was submitted to A2LA staff on April 8, 2013. The response was deemed complete and subsequently forwarded to the Accreditation Council for evaluation. AMEC received ISO/IEC 17025:2005 accreditation on April 19, 2013 for its defined chemical testing scope, including, but not limited to, CASTNET laboratory test procedures.

Beginning with the February 2013 data submittal, trace-level gas data from the BVL130, IL site were included in the raw data submittal to EPA's Air Quality System (AQS). Beginning with the

March 2013 data submittal, trace-level gas data from the BEL116, MD and HWF187, NY sites were included with the BVL130 data and submitted to AQS.

During March 2013, AMEC received results from sample analyses for proficiency test (PT) study 101 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 101 analyses. The laboratory's analyses showed no bias. AMEC's 5-year median rating remained "Very Good."

AMEC submitted a Notice of Key Personnel Change to EPA during March 2013, which was approved by EPA. W. Charles Greer will replace William Imbur as the CASTNET QA Supervisor.

Table 1 lists the quarters of data that were validated to Level 3 during first quarter 2013 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 Part 58 of Title 40 of the Code of Federal Regulations (EPA, 2010). 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 2013.

### **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 2013.

## Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for first quarter 2013. 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 will be invalidated. 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 will be invalidated. 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 2013. All recovery values were between 95 percent and 110 percent with the exception of a single Teflon filter nitrate result at 119 percent. Investigation did not reveal the cause of this higher recovery.

## Blank Results

Figures 5 through 7 present the results of MB, LB, and FB QC sample analyses for first quarter 2013. 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 2013 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, 10 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 2013. The problem counts are sorted by a 30-, 60-, or 90- day time period to resolution. A category for unresolved problems is also included. Time to resolution indicates the period taken to implement corrective action.

## References

AMEC Environment & Infrastructure, Inc. (AMEC). 2012. *Clean Air Status and Trends Network (CASTNET) Quality Assurance Project Plan (QAPP) Revision 8.0*. 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](http://www.astm.org).

U.S. Environmental Protection Agency (EPA). 2010. 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 2013

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
E-2/MW-8	April 2012 – September 2012	6	Quarter 2, 2012 – Quarter 3, 2012	2
E-3/W-10 <sup>†</sup>	May 2012 – October 2012	6	Quarter 3 2012	1
SE-4/MW-6 <sup>‡</sup>	July 2012 – December 2012	6	Quarter 3 2012 – Quarter 4 2012	2

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

<sup>†</sup> Contains ROM206 of the ROM406/ROM206 collocated pair

<sup>‡</sup> Contains MCK131/231 collocated pair

**Table 2** Field Calibration Schedule

Calibration Group	Months Calibrated	Sites Calibrated			
<b>Eastern Sites (23 Total)</b>					
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	
<b>Southeastern Sites (10 Total)</b>					
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		
<b>Midwestern Sites (18 Total)</b>					
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		
<b>Western Sites (9 Total)</b>					
W-9 (4 Sites)	March/September	KNZ184, 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 <sup>1</sup>	
Parameter <sup>2</sup>	Method	Precision	Accuracy
Filter pack flow	Mass flow controller	± 10%	± 5%
Ozone <sup>3</sup>	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 <sup>4</sup>
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

<sup>1</sup> 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.

<sup>2</sup> As of January 2013, meteorological parameters were only measured at five of the EPA-sponsored CASTNET sites: PAL190, TX; CHE185, OK; BVL130, IL; BEL116, MD; and BFT142, NC.

<sup>3</sup> Ozone is not measured at two EPA-sponsored CASTNET sites: EGB181, ON and CAT175, NY.

<sup>4</sup> For target value of 0.50 inch

**Table 4** Data Quality Indicators for CASTNET Laboratory Measurements

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

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

<sup>2</sup> 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  
 \* = 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, Revision 8.0 (AMEC, 2012)

**Table 5** AQS-Protocol Ozone Critical Criteria \*

Type of Check	Analyzer Response
Zero	Less than ± 10 parts per billion (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, 2010). 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 <sub>2</sub>	Less than ± 3 parts per billion (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 <sub>y</sub>	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, 2010). 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).

SO<sub>2</sub> = sulfur dioxide  
 NO/NO<sub>y</sub> = total reactive oxides of nitrogen  
 CO = carbon monoxide

**Table 7** QC Analysis Count for First Quarter 2013

Filter Type	Parameter	RF Sample Count	CCV Sample Count	RP Sample Count	MB Sample Count	LB Sample Count	FB Sample Count
Teflon	SO <sub>4</sub> <sup>2-</sup>	34	177	81	17	28	87
	NO <sub>3</sub> <sup>-</sup>	34	177	81	17	28	87
	NH <sub>4</sub> <sup>+</sup>	34	176	84	17	28	87
	Cl <sup>-</sup>	34	177	81	17	28	87
	Ca <sup>2+</sup>	36	179	82	17	28	87
	Mg <sup>2+</sup>	36	179	82	17	28	87
	Na <sup>+</sup>	36	179	82	17	28	87
	K <sup>+</sup>	36	179	82	17	28	87
Nylon	SO <sub>4</sub> <sup>2-</sup>	38	183	85	19	28	88
	NO <sub>3</sub> <sup>-</sup>	38	183	85	19	28	88
Cellulose	SO <sub>4</sub> <sup>2-</sup>	42	192	86	21	28	88



**Table 8** Filter Pack Receipt Summary for First Quarter 2013

Count of samples received more than 14 days after removal from tower:	36
Count of all samples received:	1,185
Fraction of samples received within 14 days:	0.970
Average interval in days:	4.612
First receipt date:	01/02/2013
Last receipt date:	03/29/2013

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

Site ID	% Span Pass <sup>1</sup>	Span  %D  <sup>2</sup>	% Single Point QC Pass	Single Point QC  %D	Single Point QC CL <sup>3</sup>	% Zero Pass	Zero Average (ppb)
ABT147, CT	100	1	100	1	0	100	0
ALC188, TX	98	4	97	3	2	97	2
ALH157, IL	100	2	100	1	0	100	2
ANA115, MI	100	1	100	1	0	100	1
ARE128, PA	100	1	100	1	0	100	0
ASH135, ME	100	1	100	2	0	100	0
BEL116, MD	100	2	100	1	0	100	1
BFT142, NC	99	1	99	1	1	99	1
BVL130, IL	66	94	68	91	105	94	4
BWR139, MD	100	2	100	2	0	100	0
CAD150, AR	100	2	100	3	0	100	0
CDR119, WV	100	1	100	1	0	100	1
CDZ171, KY	100	0	100	0	0	100	0
CKT136, KY	100	1	100	2	0	100	0
CND125, NC	100	1	100	1	0	100	1
CNT169, WY	83	23	75	21	7	94	4
COW137, NC	93	8	93	6	3	93	2
CTH110, NY	100	2	100	1	0	100	0
CVL151, MS	80	3	80	3	1	100	0
DCP114, OH	100	1	100	1	0	100	0
ESP127, TN	100	1	100	1	0	100	1
GAS153, GA	100	1	100	1	0	100	1
GTH161, CO	98	2	98	2	1	98	1
HOX148, MI	100	2	99	2	0	100	1

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

Site ID	% Span Pass <sup>1</sup>	Span  %D  <sup>2</sup>	% Single Point QC Pass <sup>1</sup>	Single Point QC  %D  <sup>2</sup>	Single Point QC CL <sup>3</sup>	% Zero Pass <sup>1</sup>	Zero Average (ppb) <sup>2</sup>
HWF187, NY	100	1	98	3	0	100	6
IRL141, FL	100	0	100	0	0	100	3
KEF112, PA	100	2	100	1	0	100	1
KNZ184, KS	100	0	100	0	0	100	1
LRL117, PA	100	1	100	1	0	100	0
MCK131, KY	100	3	100	3	0	100	0
MCK231, KY	70	4	70	4	1	100	1
MKG113, PA	100	1	100	1	0	100	0
OXF122, OH	100	2	100	2	0	100	1
PAL190, TX	99	1	99	1	1	100	1
PAR107, WV	100	0	100	0	0	100	0
PED108, VA	100	1	100	1	0	100	0
PND165, WY	100	1	100	1	0	100	0
PNF126, NC	100	1	100	0	0	100	0
PRK134, WI	100	0	100	0	0	100	1
PSU106, PA	100	1	100	2	0	100	0
QAK172, OH	100	1	100	2	0	100	0
ROM206, CO	100	2	100	3	0	100	0
SAL133, IN	100	1	100	1	0	100	0
SAN189, NE	100	1	100	1	0	100	0
SND152, AL	99	2	100	1	0	100	0
SPD111, TN	100	2	100	1	0	100	1
STK138, IL	83	11	85	11	5	100	0
SUM156, FL	100	0	100	0	0	100	0
UVL124, MI	100	1	100	1	0	100	0
VIN140, IN	100	1	100	1	0	100	0
VPI120, VA	100	1	100	1	0	100	1
WSP144, NJ	100	1	100	1	0	100	1
WST109, NH	100	2	100	3	0	100	0

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

<sup>2</sup> 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.

<sup>3</sup> 90 percent confidence limit of the coefficient of variation. This should be less than or equal to the 7 percent single 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
BVL130, IL	% Span Pass Span  %D   % Single Point QC Pass Single Point QC  %D  Single Point QC CL	Malfunctions were related to the site transfer standard from early to mid-March. Associated ambient data were invalidated because frequency criteria were not met.
CNT169, WY	% Span Pass Span  %D   % Single Point QC Pass Single Point QC  %D	The sample pump in the site analyzer failed in early March. There were additional QC failures recorded at the end of March. Associated ambient data were invalidated.
COW137, NC	Span  %D	There was a leak in the zero air system for several days in early March. Ambient data were not affected.
CVL151, MS	% Span Pass % Single Point QC Pass	The pressure transducer in the site transfer standard malfunctioned – affecting QC results for more than two weeks in January. Associated ambient data were invalidated because frequency criteria were not met.
MCK231, KY	% Span Pass % Single Point QC Pass	The site analyzer solenoid malfunctioned. Associated ambient data were invalidated.
STK138, IL	% Span Pass Span  %D   % Single Point QC Pass Single Point QC  %D	An instrument malfunction affected data from mid- to late February. Associated ambient data were invalidated.

**Notes:** %D = percent difference  
CL = confidence limit

**Table 11** AQS-Protocol Trace-level Gas QC Summary

Parameter	% Span Pass <sup>1</sup>	Span  %D  <sup>2</sup>	% Single Point QC Pass	Single Point QC  %D	Single Point QC CL <sup>3</sup>	% Zero Pass	Zero Average (ppb)
<b>BEL116, MD</b>							
SO <sub>2</sub>	100	2	97	4	3	100	1
NO <sub>y</sub>	93	10	93	8	5	100	1
<b>BVL130, IL</b>							
SO <sub>2</sub>	90	10	90	9	5	98	0
NO <sub>y</sub>	100	3	96	8	8	100	1
CO	98	2	96	6	1	98	7
<b>HWF187, NY</b>							
NO <sub>y</sub>	100	2	100	4	0	100	1

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

<sup>2</sup> 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.

<sup>3</sup> 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
BEL116, MD	SO <sub>2</sub>		Due to a system leak the calibration gas cylinder ran empty in a single 24-hour period. Frequency requirements for automated calibration checks were not met resulting in invalidation of associated data in March 2013.
	NO <sub>y</sub>		

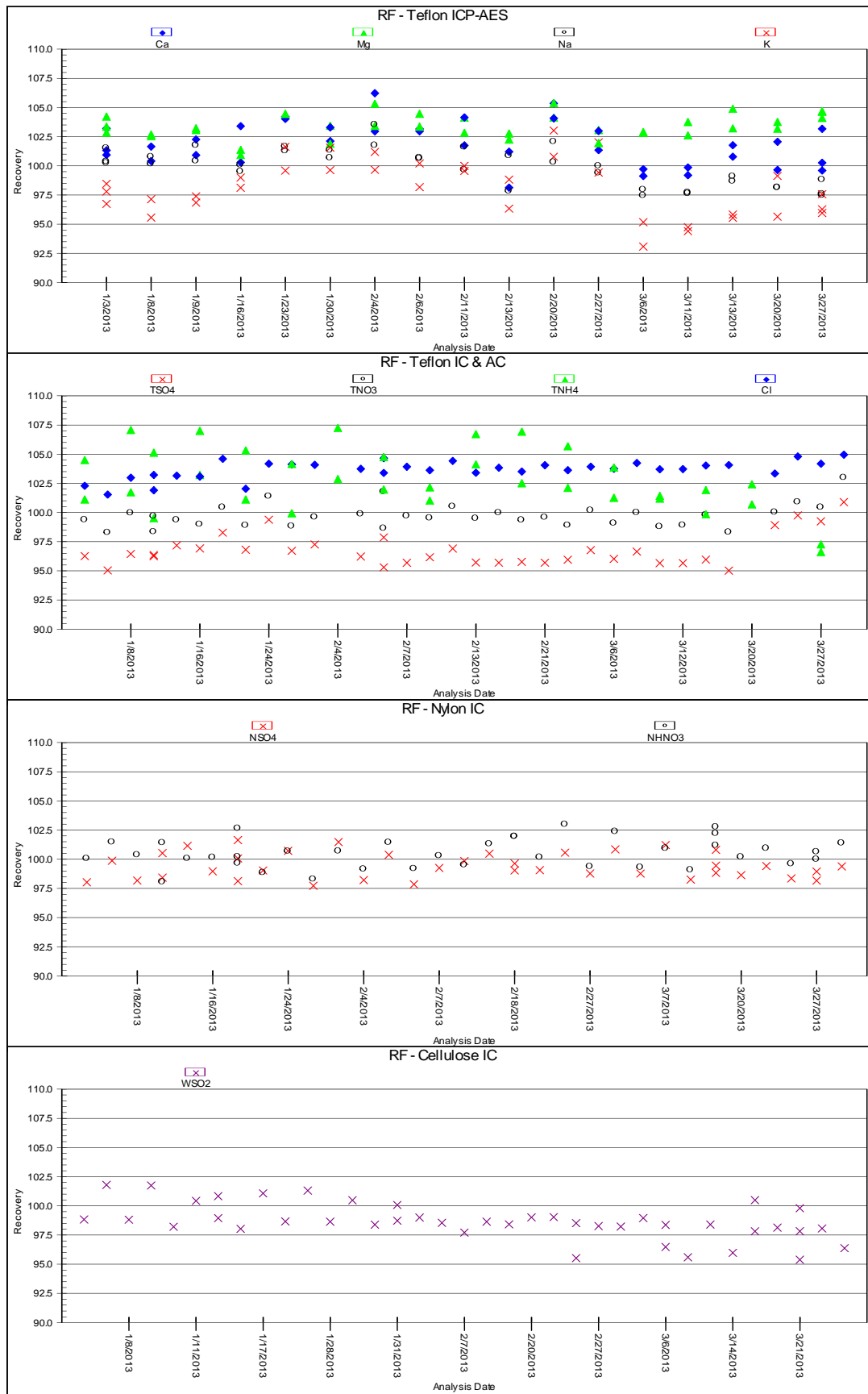
**Table 13** Filter Packs Flagged as Suspect or Invalid

Site ID	Sample No.	Reason
BEL116, MD	1305001-10	Low flow volume due to recurrent power failures
	1306001-10	
	1311001-10	
JOT403, CA	1309001-43	Insufficient flow volume
LRL117, PA	1305001-47	Low flow volume due to telemetry problems
SHE604, WY	1303003-03	Insufficient flow volume
SHN418, VA	1310001-72	Low flow volume due to power failure
UVL124, MI	1303001-79	Low flow volume due to power failure
VPI120, VA	1303001-82	Low flow volume due to power failure
WFM105, NY	1304001-83	The data logger was left in calibration mode after a site visit. Data may be recovered during level 3 validation.

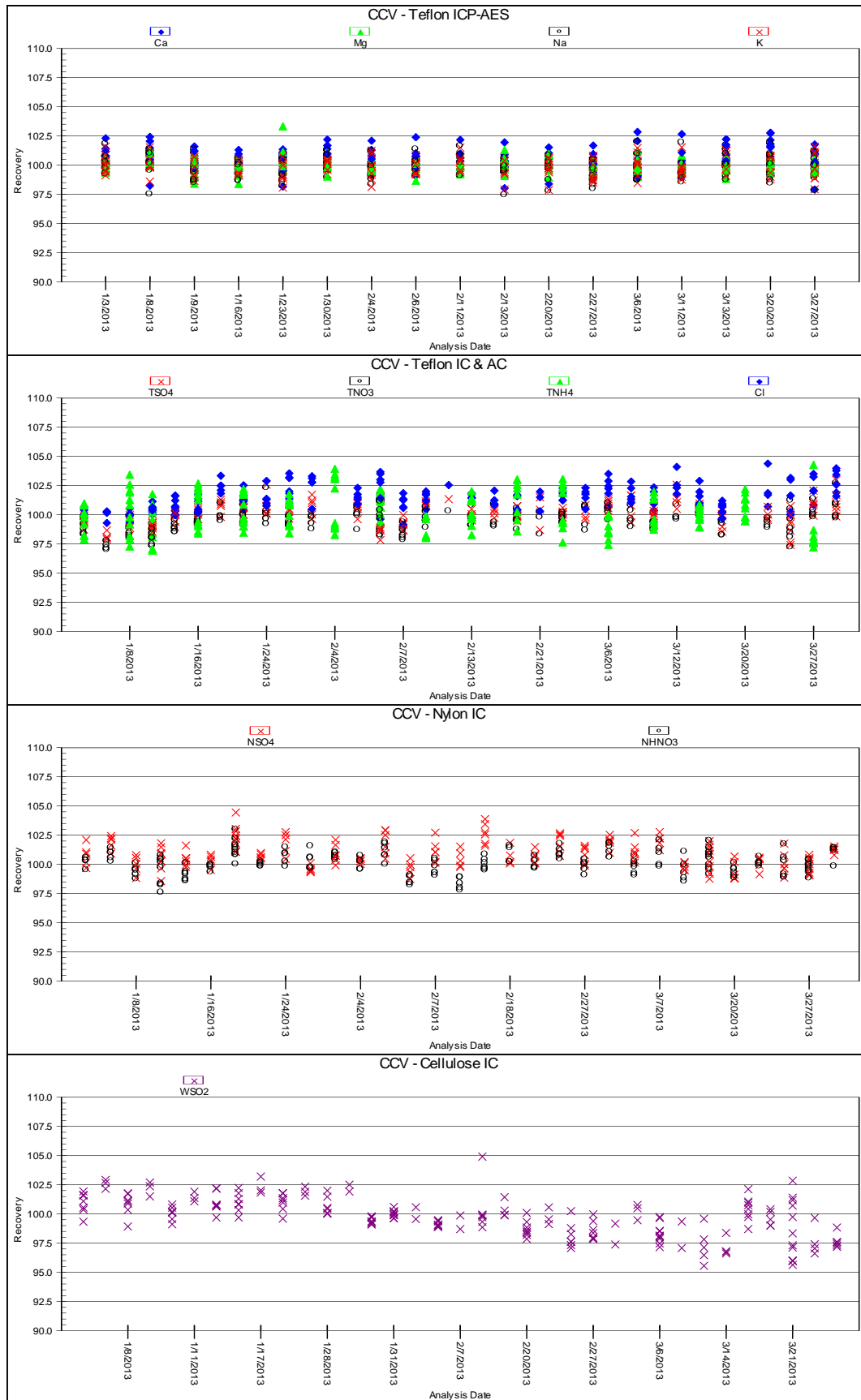
**Table 14** Field Problems Affecting Data Collection

Days to Resolution	Problem Count
30	145
60	9
90	0
Unresolved by End of Quarter	3

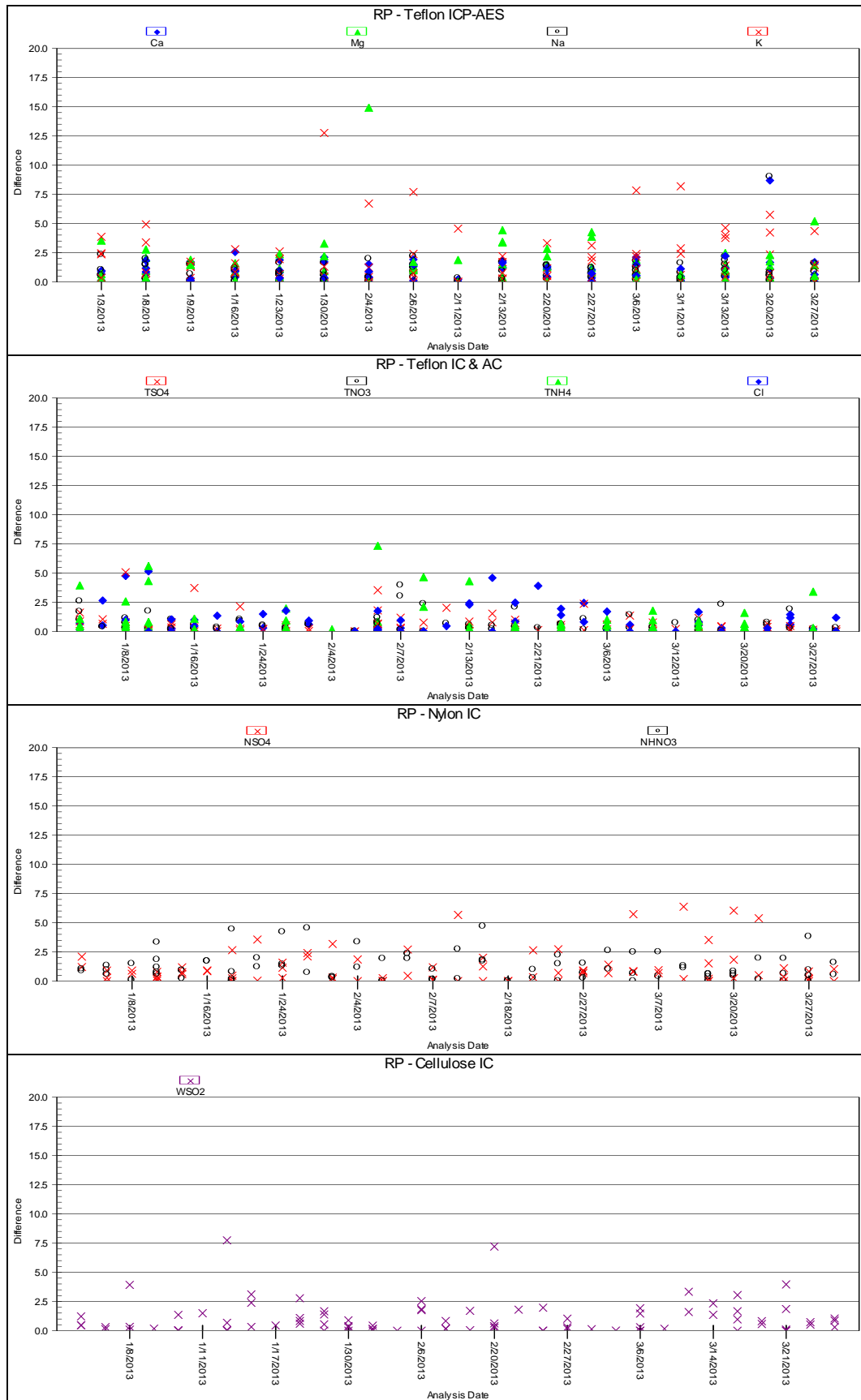
**Figure 1** Reference Standard Results for First Quarter 2013 (percent recovery)



**Figure 2** Continuing Calibration Spike Results for First Quarter 2013 (percent recovery)

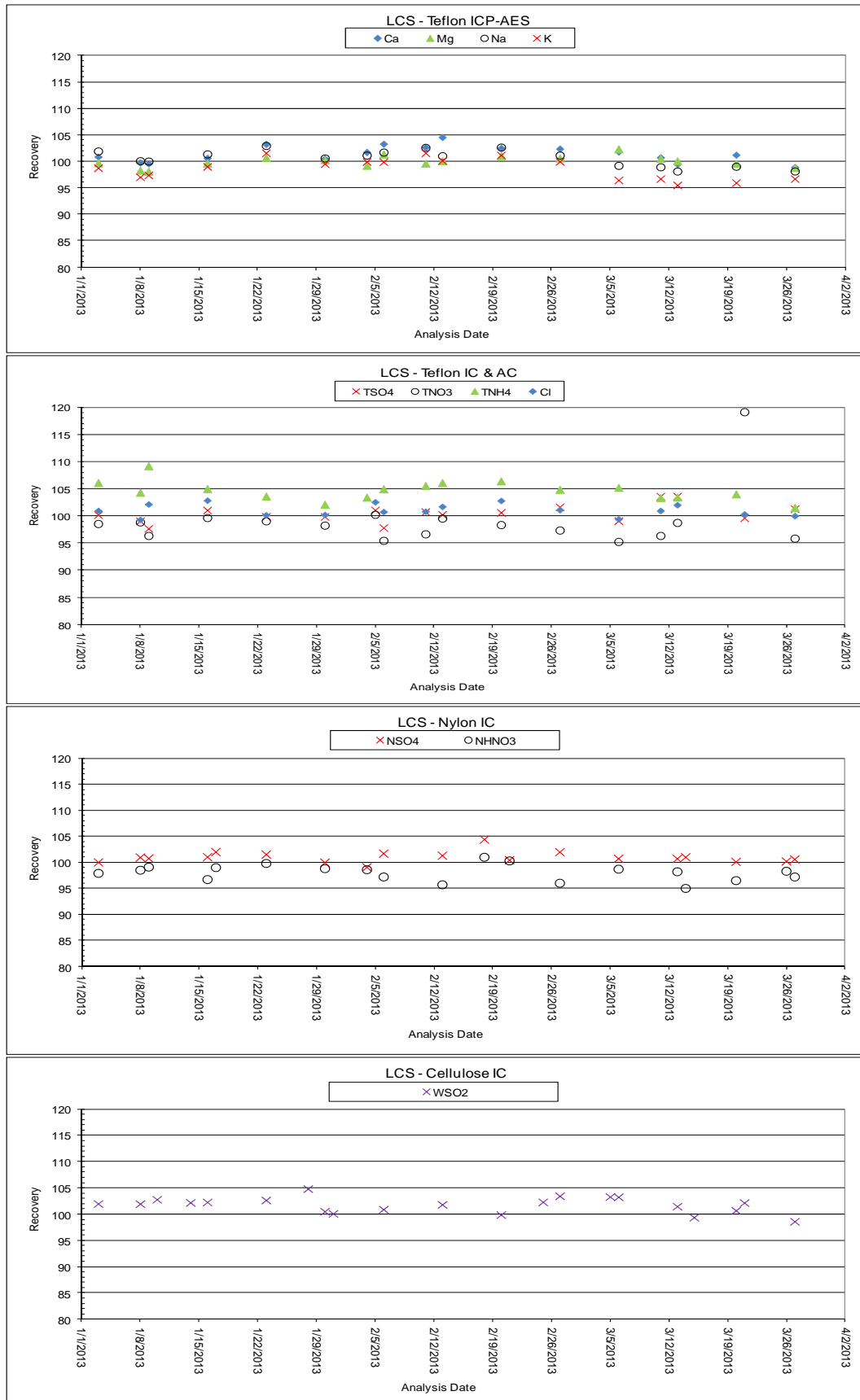


**Figure 3** Replicate Sample Analysis Results for First Quarter 2013 (percent difference)

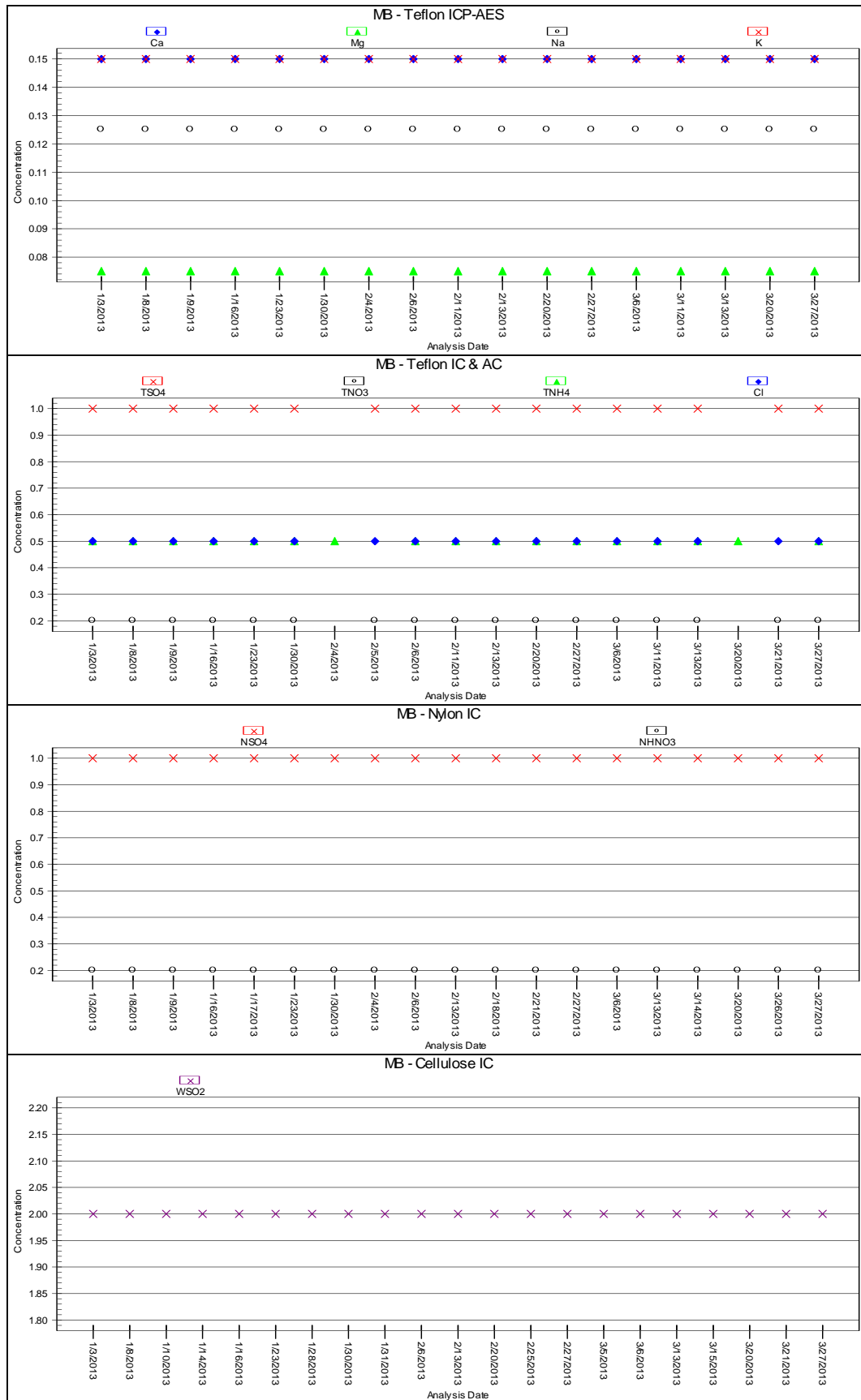




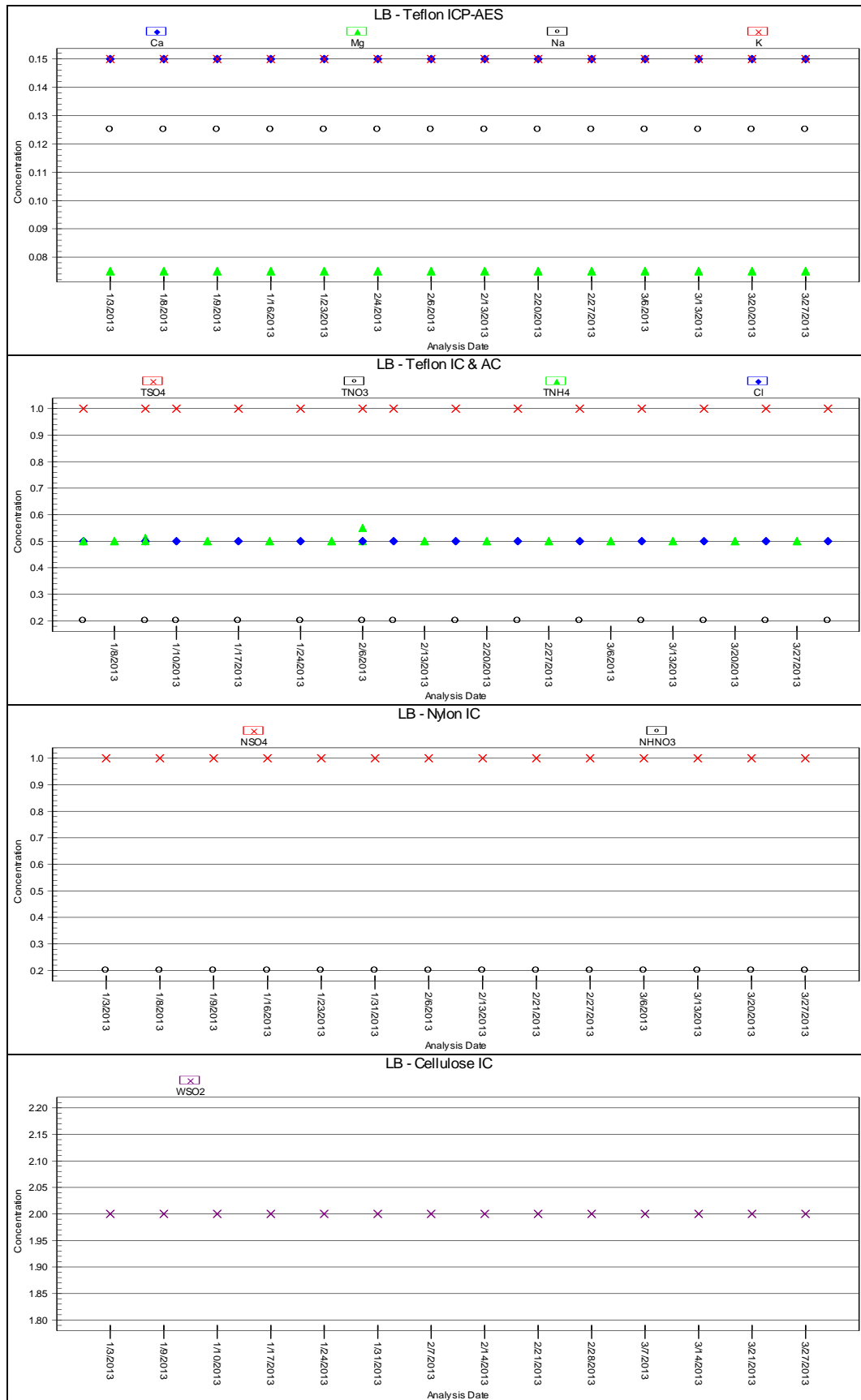
**Figure 4** Laboratory Control Sample Results for First Quarter 2013 (percent recovery)



**Figure 5** Method Blank Analysis Results for First Quarter 2013 (total micrograms)



**Figure 6** Laboratory Blank Analysis Results for First Quarter 2013 (total micrograms)



**Figure 7** Field Blank Analysis Results for First Quarter 2013 (total micrograms)

