



## Summary of Quarterly Operations (April – June)

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 second 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

Comparison of fourth quarter 2012 trace-level gas concentrations and filter pack concentrations at the BEL116, MD and BVL130, IL sites indicated that weekly average trace-level gas sulfur dioxide (SO<sub>2</sub>) concentrations from the Teledyne API (API) analyzer were about 25 percent lower than the corresponding filter pack concentrations. AMEC requested data from EPA for the same period from the Monitors for Aerosols and Gases in Ambient Air (MARGA), located at the BEL116, MD site, for further evaluation of the measured SO<sub>2</sub> concentrations. The filter pack and MARGA concentrations were comparable. AMEC is working with API to determine the cause of the disparity in concentration measurements.

AMEC continued to have problems with the adaptive signal filtering of the API trace-level gas analyzers. A fast response is needed for collecting QC data, but available options are not sufficient to engage this mode under current operational protocols. AMEC contacted API and provided plots of instrument responses and details of the problems encountered. AMEC also provided information about the problem to EPA's Office of Air Quality Planning and Standards.

While the zero/precision/span QC checks have remained within criteria, the API trace-level gas monitoring system at the BEL116, MD site has been only intermittently reporting an expected value. AMEC developed a data logger program to gather operational data to investigate the

problem. With information obtained through the program, a new program to correct the problem was developed. AMEC will test the new program before deploying it during third quarter 2013.

AMEC met with API representatives during June 2013 to discuss the problems encountered during operation of the API trace-level gas instruments. API's product group is reviewing AMEC's questions and comments and will provide feedback on testing and troubleshooting the analyzers during third quarter 2013.

The QA Manager performed two laboratory method audits during June in accordance with AMEC's analytical laboratory's International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025:2005 accreditation.

Table 1 lists the quarters of data that were validated to Level 3 during second 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 Air Quality System (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 second 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 second quarter 2013.

## Data Quality Indicator (DQI) Results

Figures 1 through 3 present the results of RF, CCV, and RP QC sample analyses for second 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 second quarter 2013. 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 second 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 second 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 second quarter, 14 filter pack samples were invalidated for one or more of the measured parameters.

## Field Problem Count

Table 14 presents counts of field problems affecting continuous data collection for more than one day during second 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 Second Quarter 2013

Calibration Group*	Months Available	Number of Months	Complete Quarters	Number of Quarters
E-1/SE-5	August 2012 – January 2013	6	Quarter 4 2012	1
MW-7/W-9	September 2012 – February 2013	6	Quarter 4 2012	1
E-2/MW-8	October 2012 – March 2013	6	Quarter 4 2012 – Quarter 1 2013	2

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

**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 the end of second quarter 2013, meteorological parameters were only measured at four of the EPA-sponsored CASTNET sites: PAL190, TX; CHE185, OK; BVL130, IL; and BEL116, MD

<sup>3</sup> Ozone is not measured at six EPA-sponsored CASTNET sites: EGB181, ON; CAT175, NY; KNZ184, KS; NIC001, NY; WFM105, NY; and UND002, VT.

<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  
 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, 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<sub>y</sub> = total reactive oxides of nitrogen

CO = carbon monoxide

**Table 7** QC Analysis Count for Second 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	161	72	16	24	45
	NO <sub>3</sub> <sup>-</sup>	34	161	72	16	24	45
	NH <sub>4</sub> <sup>+</sup>	32	159	74	16	24	45
	Cl <sup>-</sup>	32	161	72	16	24	45
	Ca <sup>2+</sup>	32	166	72	16	24	45
	Mg <sup>2+</sup>	32	166	72	16	24	45
	Na <sup>+</sup>	32	166	72	16	24	45
	K <sup>+</sup>	32	166	72	16	24	45
Nylon	SO <sub>4</sub> <sup>2-</sup>	31	150	68	15	24	45
	NO <sub>3</sub> <sup>-</sup>	31	150	68	15	24	45
Cellulose	SO <sub>4</sub> <sup>2-</sup>	38	182	82	19	24	45



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

Count of samples received more than 14 days after removal from tower:	12
Count of all samples received:	847
Fraction of samples received within 14 days:	0.986
Average interval in days:	3.965
First receipt date:	04/01/2013
Last receipt date:	06/28/2013

**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 <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>
ABT147, CT	97.8	2.8	97.8	2.9	2.7	100.0	0.4
ALC188, TX	100.0	2.0	96.8	2.8	0.3	91.5	5.2
ALH157, IL	100.0	2.0	100.0	1.6	0.1	100.0	1.3
ANA115, MI	100.0	0.4	100.0	0.5	0.1	100.0	0.5
ARE128, PA	100.0	0.5	100.0	0.6	0.1	100.0	1.9
ASH135, ME	100.0	1.1	100.0	1.3	0.2	98.8	1.0
BEL116, MD	100.0	1.6	100.0	1.3	0.1	97.6	2.2
BFT142, NC	100.0	1.2	100.0	1.4	0.2	98.8	1.2
BVL130, IL	100.0	0.4	100.0	1.0	0.1	97.9	3.8
BWR139, MD	100.0	1.7	100.0	1.6	0.1	100.0	0.8
CAD150, AR	97.9	3.0	96.8	3.5	0.5	96.8	1.8
CDR119, WV	91.6	2.0	89.5	2.2	0.5	100.0	2.8
CDZ171, KY	100.0	0.6	100.0	0.6	0.1	100.0	0.9
CKT136, KY	97.9	1.4	100.0	1.3	0.1	100.0	0.9
CND125, NC	100.0	0.7	100.0	0.6	0.1	100.0	1.4
CNT169, WY	100.0	1.5	100.0	2.7	0.3	100.0	0.2
COW137, NC	95.6	6.6	94.5	8.1	3.8	100.0	1.1
CTH110, NY	100.0	1.8	100.0	1.0	0.1	100.0	0.7
CVL151, MS	100.0	1.0	100.0	1.0	0.1	100.0	0.5
DCP114, OH	100.0	0.7	100.0	1.0	0.1	100.0	0.9
ESP127, TN	100.0	0.5	99.0	1.1	0.7	94.8	4.2
GAS153, GA	100.0	0.7	98.9	1.1	0.2	97.9	4.4
GTH161, CO	100.0	1.9	100.0	1.8	0.1	100.0	0.2
HOX148, MI	92.2	6.8	92.2	5.3	2.8	92.2	3.0

**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	96.0	16.4	86.9	18.7	13.6	80.0	8.9
IRL141, FL	99.0	1.3	99.0	1.7	0.3	93.8	6.2
KEF112, PA	100.0	1.4	100.0	1.3	0.1	100.0	0.8
LRL117, PA	100.0	1.0	100.0	0.7	0.1	100.0	0.4
MCK131, KY	100.0	2.4	100.0	2.7	0.3	100.0	1.2
MCK231, KY	100.0	0.9	100.0	0.6	0.1	98.9	2.7
MKG113, PA	100.0	0.7	100.0	0.9	0.1	100.0	0.6
OXF122, OH	100.0	1.3	98.9	1.4	0.2	100.0	0.7
PAL190, TX	100.0	1.1	100.0	1.4	0.1	100.0	1.6
PAR107, WV	100.0	0.4	100.0	0.3	0.0	100.0	0.5
PED108, VA	100.0	0.6	100.0	0.7	0.1	100.0	0.5
PND165, WY	100.0	0.8	100.0	0.8	0.1	100.0	1.6
PNF126, NC	100.0	0.4	100.0	0.4	0.1	100.0	0.6
PRK134, WI	100.0	0.3	100.0	0.4	0.1	100.0	0.8
PSU106, PA	100.0	1.0	100.0	1.2	0.1	100.0	0.6
QAK172, OH	92.9	1.4	92.9	1.9	0.4	99.0	4.4
ROM206, CO	100.0	1.7	100.0	2.4	0.1	100.0	0.4
SAL133, IN	98.9	0.8	98.9	0.8	0.3	100.0	1.4
SAN189, NE	100.0	0.3	100.0	0.4	0.1	100.0	0.3
SND152, AL	100.0	0.6	100.0	0.9	0.1	100.0	1.3
SPD111, TN	100.0	1.3	100.0	1.2	0.1	97.9	1.8
STK138, IL	100.0	0.9	100.0	1.2	0.1	100.0	0.7
SUM156, FL	100.0	0.6	100.0	0.9	0.1	96.5	1.8
UVL124, MI	100.0	1.1	100.0	1.2	0.1	100.0	0.3
VIN140, IN	100.0	0.9	100.0	0.7	0.1	100.0	0.6
VPI120, VA	100.0	1.4	100.0	1.4	0.2	100.0	0.7
WSP144, NJ	100.0	2.2	100.0	1.6	0.1	100.0	0.5
WST109, NH	100.0	0.8	100.0	1.1	0.1	100.0	0.4

**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
COW137, NC	Single Point QC  %D	The sampling pump in the site analyzer failed. Associated data were invalidated.
HWF187, NY	Span  %D   % Single Point QC Pass Single Point QC  %D  Single Point QC CL % Zero Pass	The site analyzer's pressure transducer malfunctioned. Associated data were invalidated through 5/31/13. June data were not fully validated at the time of publication. The associated data will be invalidated prior to submission to the EPA Air Quality System.

**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 <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>
<b>BEL116, MD</b>							
SO <sub>2</sub>	97.4	2.9	94.9	5.3	3.8	100.0	0.4
NO <sub>y</sub>	93.2	6.1	93.2	10.1	7.4	90.9	2.9
<b>BVL130, IL</b>							
SO <sub>2</sub>	97.9	3.9	100.0	1.8	0.3	100.0	0.6
NO <sub>y</sub>	95.7	3.9	100.0	3.1	0.5	68.1	2.3
CO	100.0	0.6	91.5	5.5	1.3	95.7	10.1
<b>HWF187, NY</b>							
NO <sub>y</sub>	100.0	2.4	100.0	1.3	0.2	100.0	0.7

**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
BVL130, IL	NO <sub>y</sub>	% Zero Pass	Zero failures occurred due to the non-responsive adaptive signal filter discussed in the quarterly summary. Ambient data were not affected.

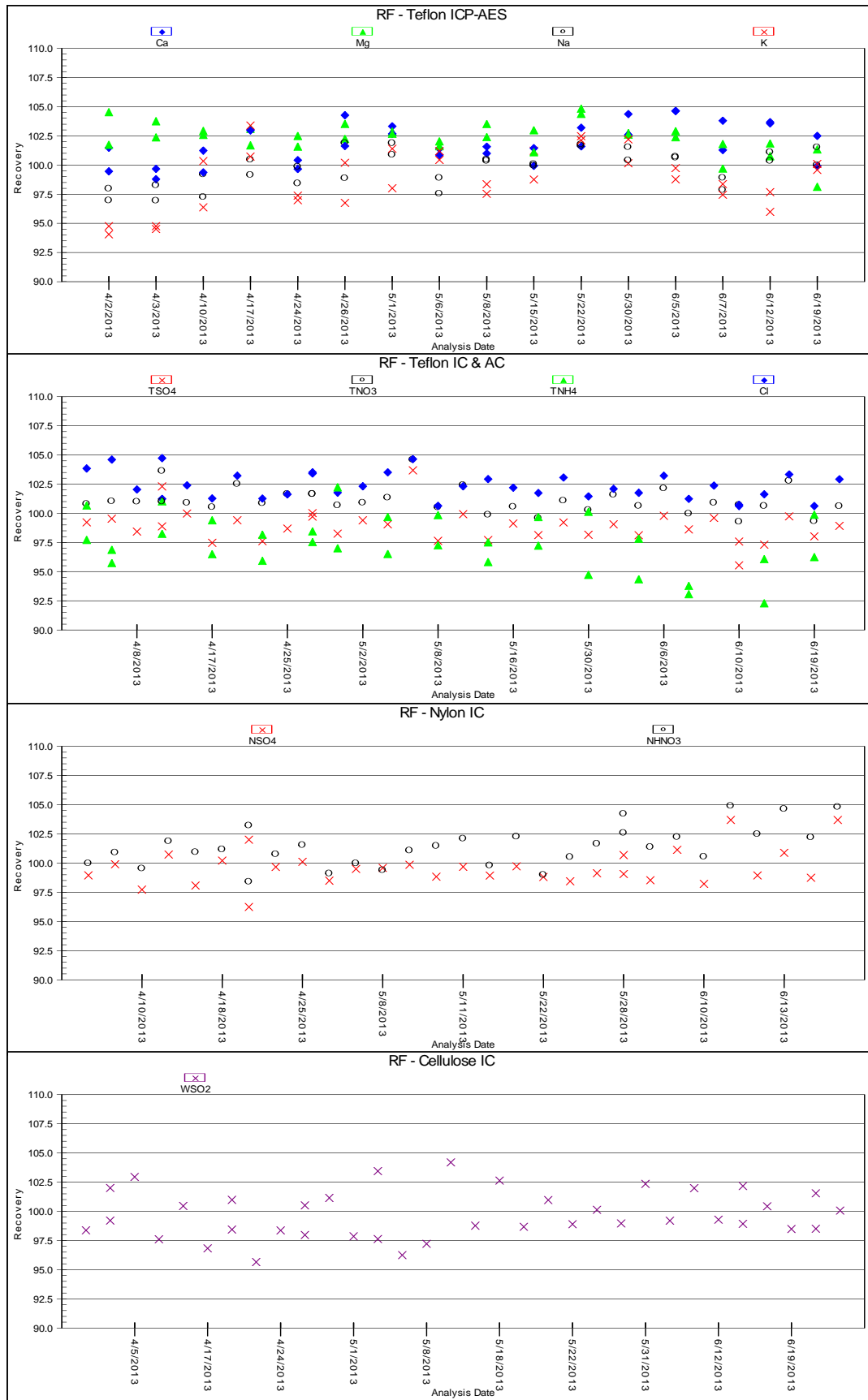
**Table 13** Filter Packs Flagged as Suspect or Invalid

Site ID	Sample No.	Reason
CHA467, AZ	1318001-19	Insufficient flow volume
CHE185, OK	1323001-20	Insufficient flow volume
COW137, NC	1318001-24	Insufficient flow volume
GLR468, MT	1318001-33	Insufficient flow volume
GRC474, AZ	1319001-35	Insufficient flow volume
JOT403, CA	1318001-43	Insufficient flow volume
MAC426, KY	1317001-48	Potassium data invalidated as suspect
NIC001, NY	1316001-55	Insufficient flow volume
	1317001-55	Insufficient flow volume
PIN414, CA	1318001-61	Insufficient flow volume
SUM156, FL	1321001-76	Insufficient flow volume
UND002, VT	1317001-78	Insufficient flow volume
	1321001-78	Insufficient flow volume
VPI120, VA	1317001-82	Insufficient flow volume

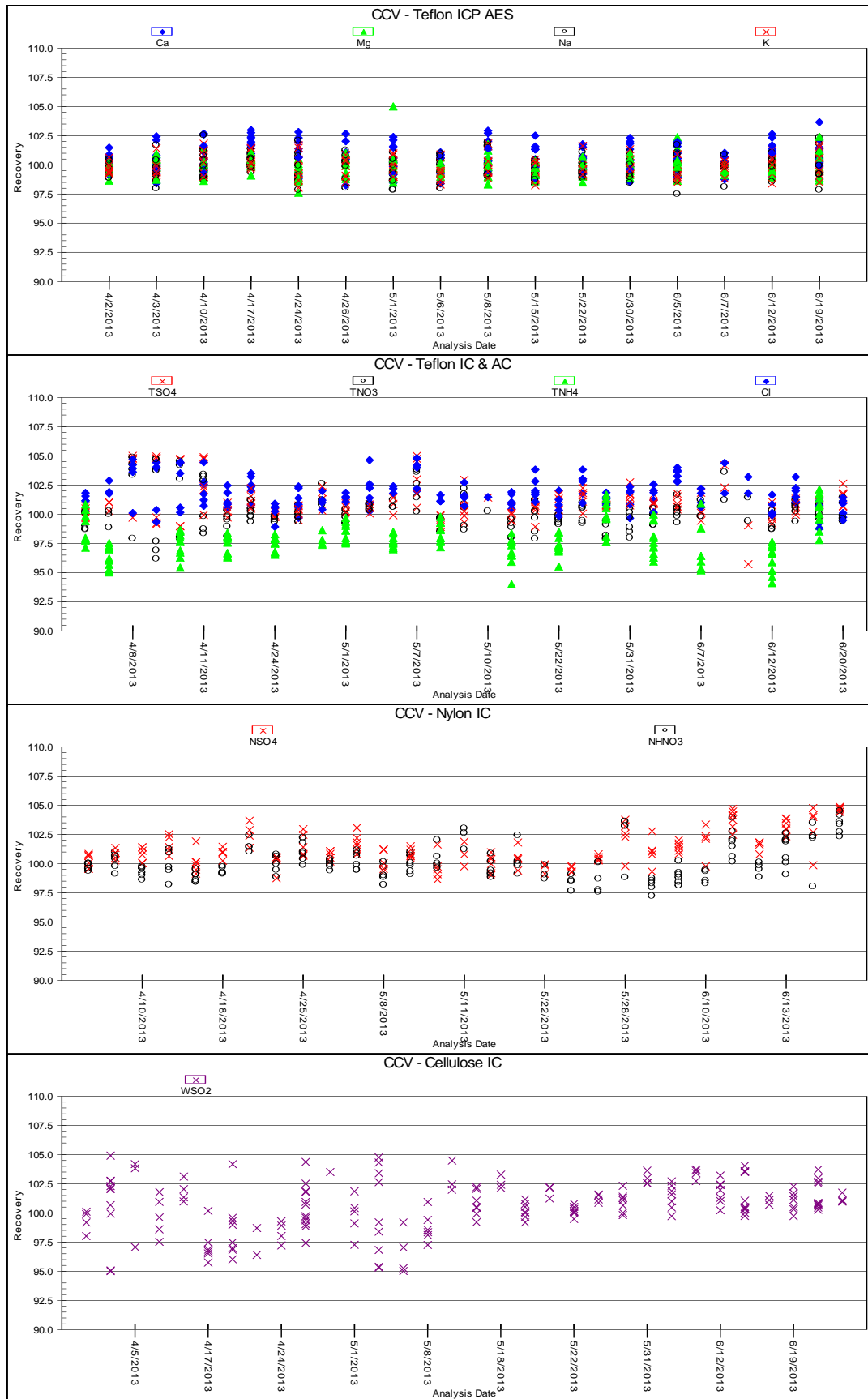
**Table 14** Field Problems Affecting Data Collection

Days to Resolution	Problem Count
30	206
60	9
90	1
Unresolved by End of Quarter	14

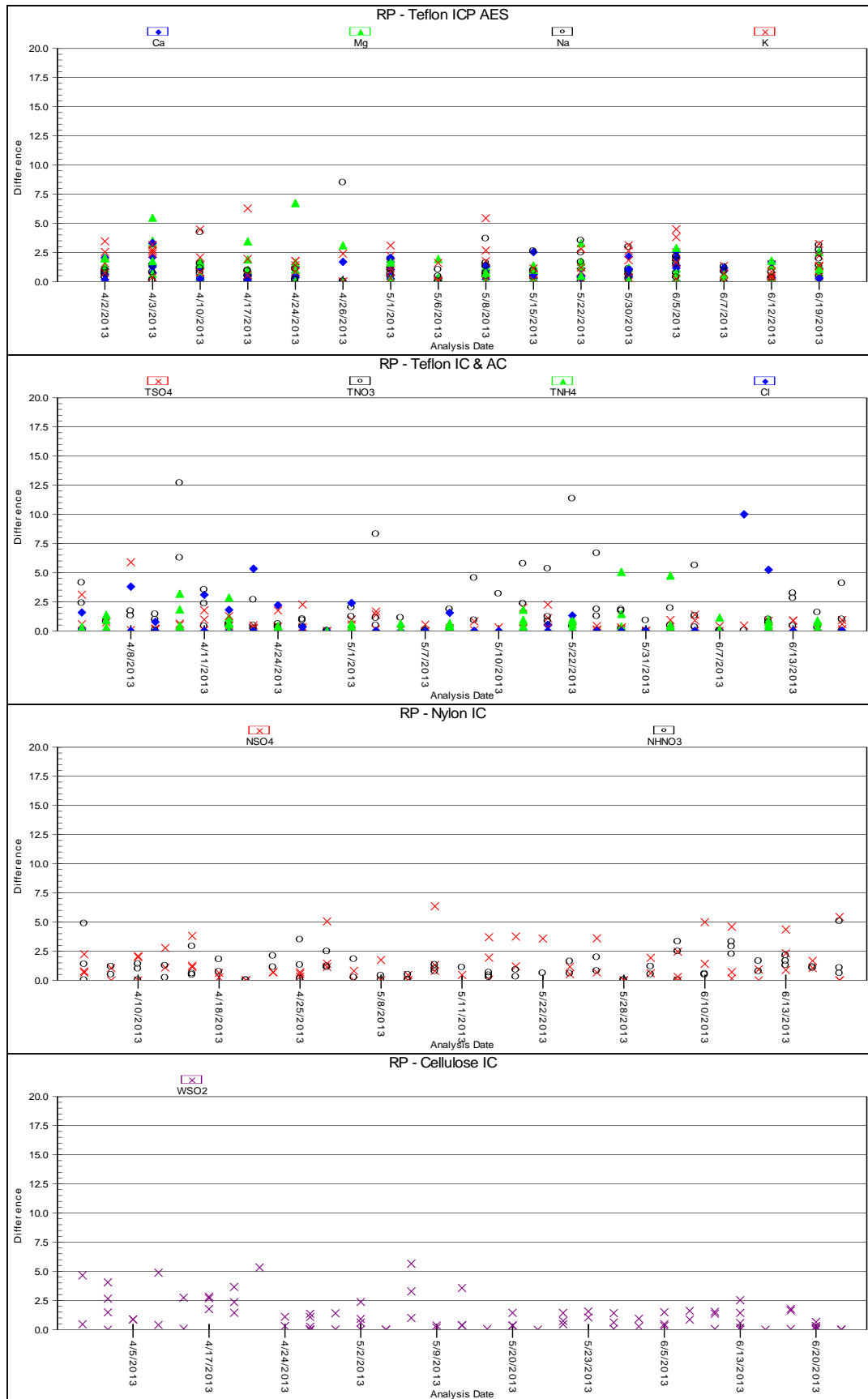
**Figure 1** Reference Standard Results for Second Quarter 2013 (percent recovery)



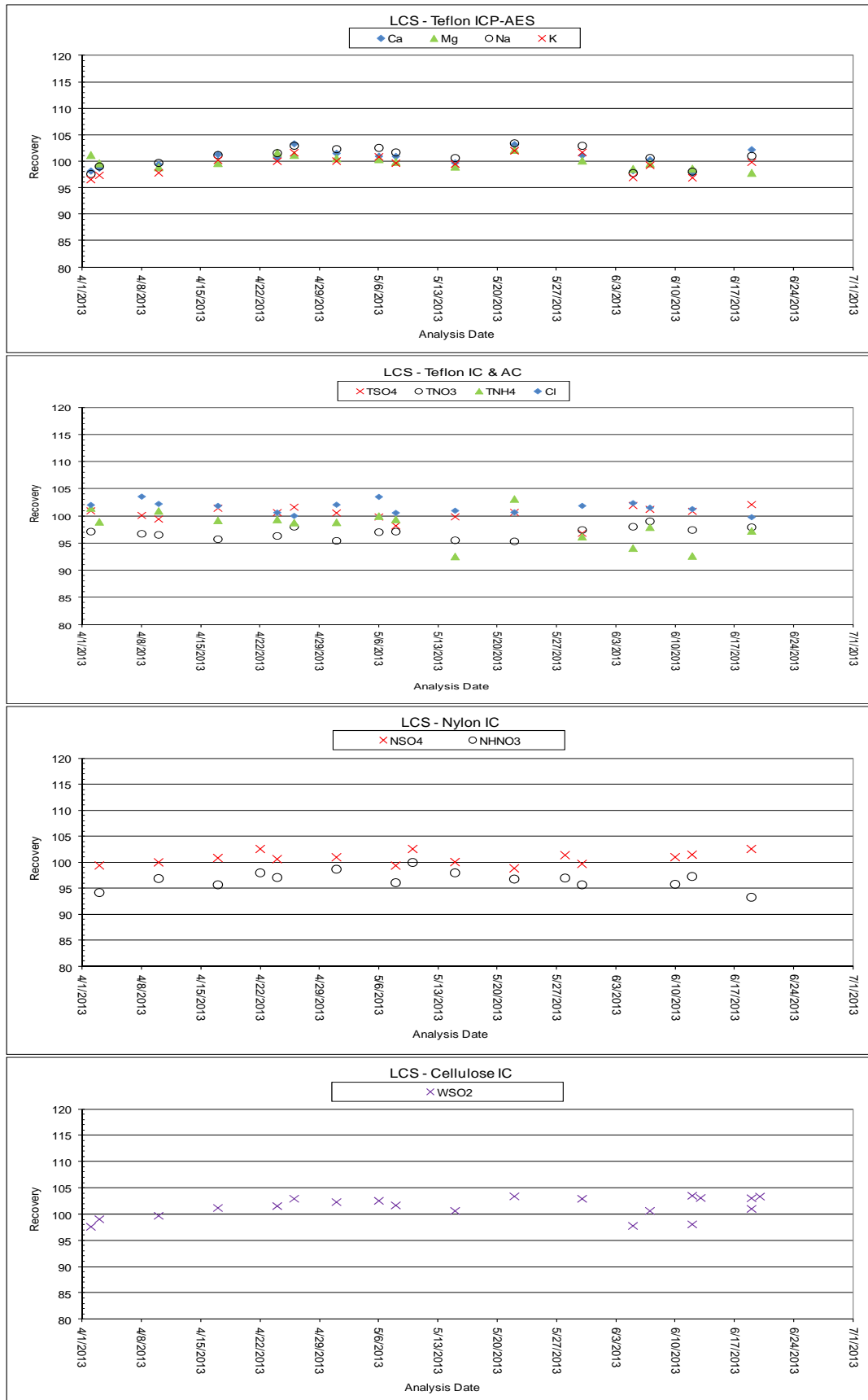
**Figure 2** Continuing Calibration Spike Results for Second Quarter 2013 (percent recovery)



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

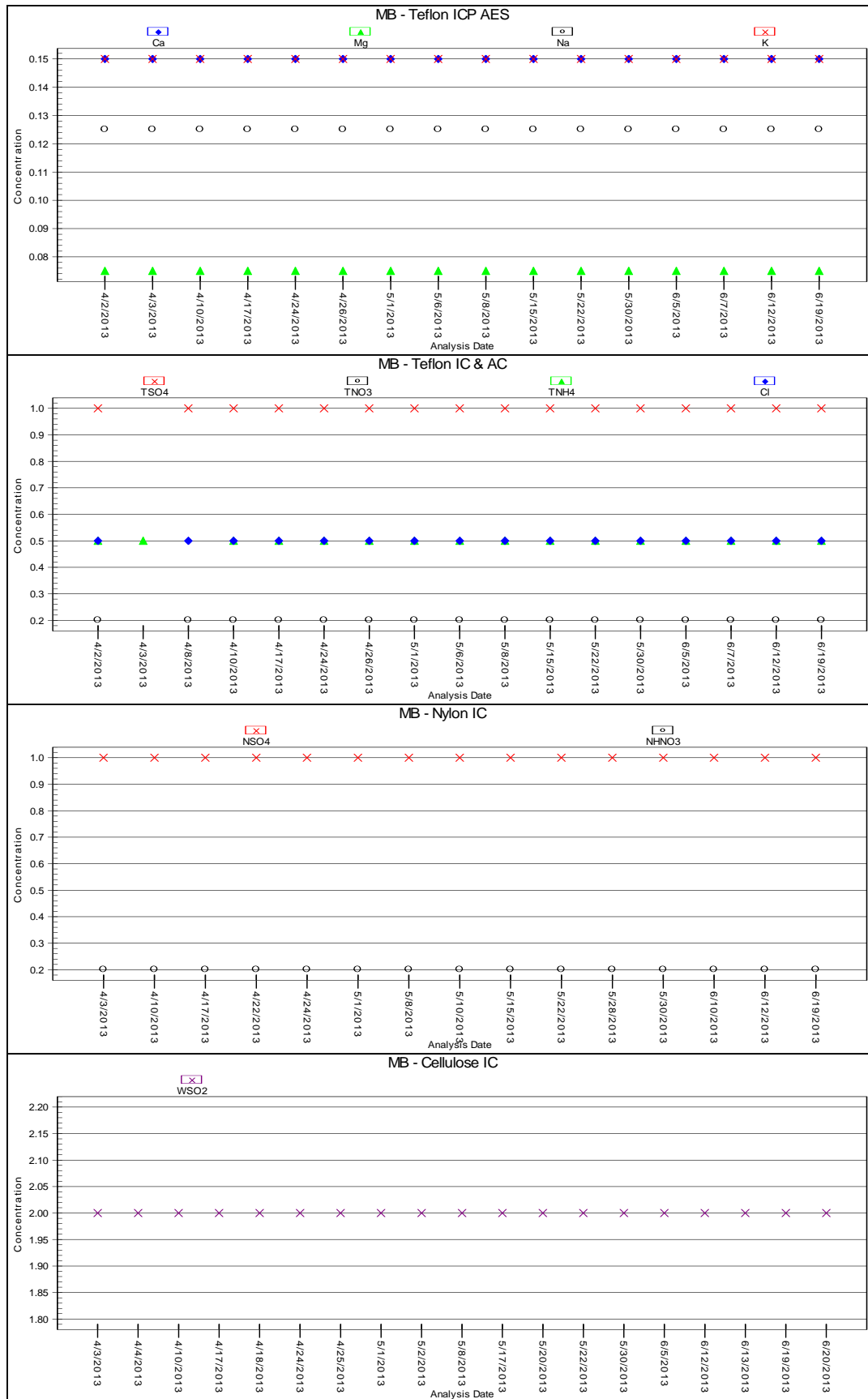


**Figure 4** Laboratory Control Sample Results for Second Quarter 2013 (percent recovery)

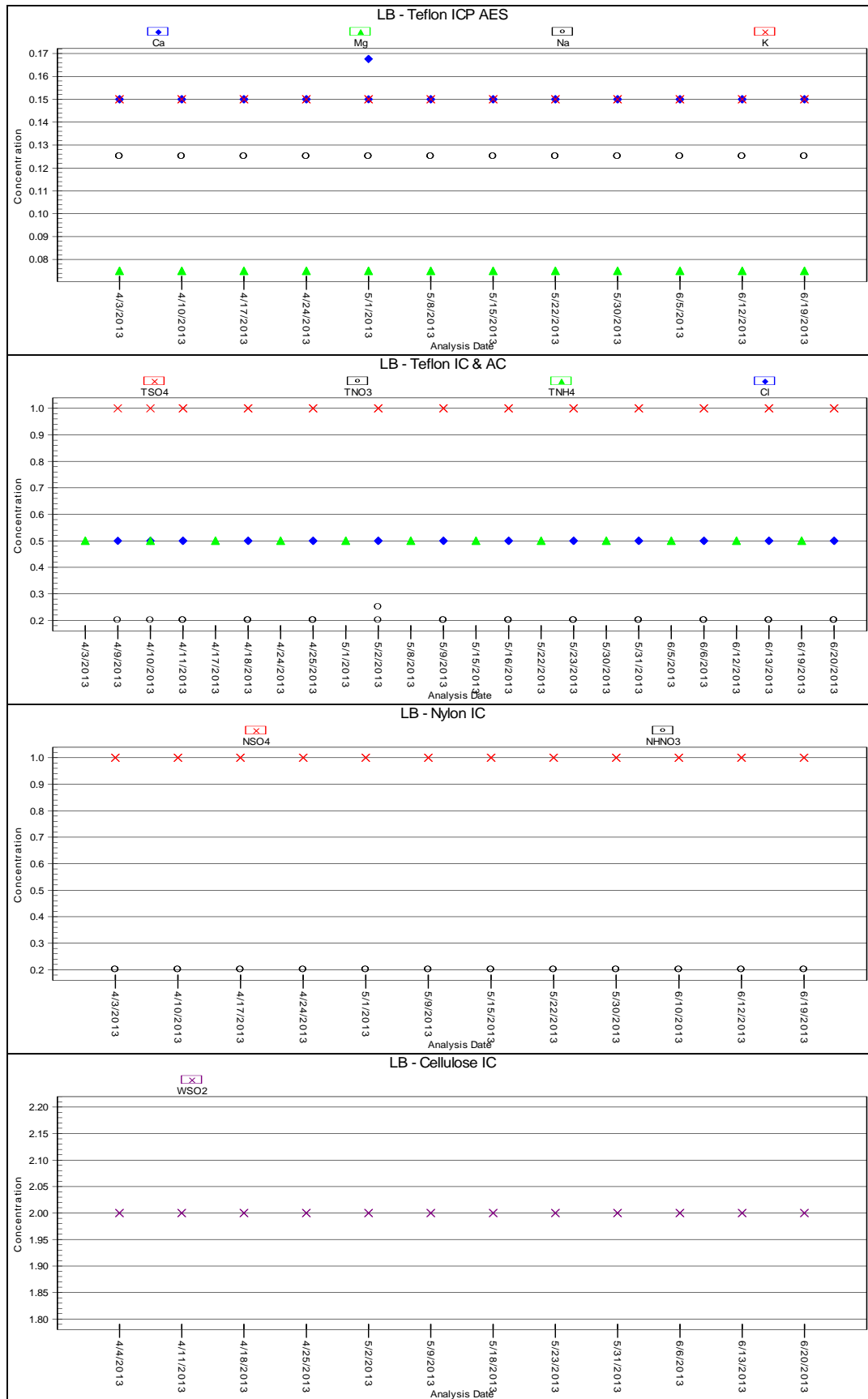




**Figure 5** Method Blank Analysis Results for Second Quarter 2013 (total micrograms)



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



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

